Foundations of Nursing Skills

A Comprehensive Guide for the Australian Context

Leisa Sanderson • Tracey Gooding • Penelope Coogan
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Foundations of Nursing Skills: A Comprehensive Guide for the Australian Context

FOUNDATIONS OF NURSING SKILLS: A COMPREHENSIVE GUIDE FOR THE AUSTRALIAN CONTEXT

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ACKNOWLEDGEMENT OF COUNTRY

At James Cook University we acknowledge with respect the Aboriginal and Torres Strait Islander peoples as the first peoples, educators and innovators of this country. We acknowledge that Country was never ceded, and value the accumulation of knowledge and traditions that reflect the wisdom of ancestral lines going back some 60,000 years, and recognise the significance of this in the ways that Aboriginal and Torres Strait Islander peoples are custodians of Country. As a University, we will continue to learn ways to care for and be responsible for Country, and we will collectively seek to build a future that is based on truth-telling, mutual understanding, hope, empowerment, and self-determination.

Kassandra Savage (JCU Alumni), 'Coming Together and Respecting Difference', acrylic on canvas, 2014, 90cm x 90cm. © Kassandra Savage, reproduced with permission of the artist

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INTRODUCTION

Foundations of Nursing Skills: A Comprehensive Guide for the Australian Context is an essential textbook designed to equip nursing students with the fundamental knowledge and skills required for effective clinical practice in diverse healthcare settings. Tailored specifically for the Australian context, this book integrates culturally sensitive approaches to nursing care, including addressing the unique health needs of Aboriginal and Torres Strait Islander communities.

This comprehensive textbook covers a wide range of foundational nursing skills, including body systems assessment, communication, medication administration, wound care, and infection control. Each chapter provides detailed explanations of key concepts, accompanied by practical guidelines and evidence-based practices.

Moreover, this textbook integrates case studies, reflection questions, and learning activities to facilitate critical thinking and application of knowledge. By engaging with real-world scenarios and culturally diverse contexts, students will develop the skills and confidence needed to deliver holistic and person-centred care to individuals, families, and communities.

Written by a team of experienced nursing educators and practitioners, *Foundations of Nursing Skills: A Comprehensive Guide for the Australian Context* is an invaluable resource for nursing students, educators, and healthcare professionals committed to delivering high-quality, evidence-based, culturally responsive and equitable healthcare services.

INTRODUCTION TO NURSING PRACTICE: PROVIDING SAFE AND EFFECTIVE CARE

Leisa Sanderson and Penelope Coogan

Learning Outcomes

In this chapter, you will learn how to:

- Recognise high prevalence safety concerns in healthcare
- Recognise the purpose of NSQHS standards
- Define the fundamentals of **person-centred care** and application in practice
- Define the fundamentals of cultural safety and application in practice.

Introduction

Providing safe and effective care that delivers the best possible outcomes for all people is a must for all healthcare professionals and is considered a right for all consumers of healthcare. The Australian Charter of Healthcare Rights developed by the Australian Commission on Safety and Quality in Health Care (ACSQHC) provides expectations for consumers engaging with healthcare. Consumers have the right to Access, Safety, Respect, Partnership, Information, Privacy, and the ability to give feedback. To read more about the Australian Charter of Healthcare Rights visit the Australian Commission on Safety and Quality in Health Care website: Australian Charter of Healthcare Rights. The following chapter will provide an overview of the National Safety and Quality Health Service standards developed to provide guidance on highly prevalent safety concerns within healthcare. It will explore the fundamentals of person-centred care and cultural safety, both vital components in ensuring the delivery of safe and effective care.

National Safety and Quality Health Service Standards

Developed by the ACSQHC in collaboration with relevant stakeholders are the National Safety and

Quality Health Service Standards (NSQHS), which provide a consistent statement regarding the level of care consumers should expect from healthcare providers. These standards cover high prevalence safety concerns in healthcare and guide measures that assist in reducing adverse events (ACSQHC, 2021). The overall aim of the eight NSQHS standards is to promote high-quality safe care, effectively protecting the public from harm. The eight standards set by the commission are as follows:

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https://jcu.pressbooks.pub/nursing-skills-foundations/?p=5#h5p-8

Read more about the National Safety and Quality Health service standards on the Australian Commission on Safety and Quality in Health Care website: Safety and Quality.

People come to healthcare facilities expecting to be kept safe while receiving healthcare. According to the Australian Institute of Health and Welfare (AIHW, 2024), as of 2022–23 data showed adverse events treated in hospitals occurred in approximately 5.3% per 100 hospitalisations, this equates to one in 20 persons hospitalised. Data also revealed 82 sentinel events between 2020–2021. **Sentinel events** are events seen as wholly preventable that result in serious harm to or death of a patient (AIHW, 2024). The NSQHS are based around high prevalence safety concerns with the goal of reducing incidents within healthcare. High prevalence includes hospital-acquired infection (HAI), medication errors, communication breakdown, and missed detection of the deteriorating patient. Along with these, the standards also consider the harm that can be caused through pressure injury, falls, nutrition, mental health and cognitive impairment. Nurses must have a deep understanding of these high prevalence areas, why they occur and how they can be active participants in reducing and preventing occurrence. Each of these high prevalence areas will be discussed in their relevant chapters throughout this text.

Person-Centred Care

Person-centred care puts the individual at the heart of the healthcare experience, empowering them to actively participate in their own care and leading to better outcomes, increased satisfaction, and a truly collaborative partnership with their healthcare team.

Picture this: A person walks into a hospital or clinic, feeling vulnerable and uncertain about what lies ahead. Suddenly, they are greeted by a team of healthcare providers who prioritise their unique needs, preferences, and values above all else. They listen attentively to the person's concerns, involve them in decision-making, and tailor their care to align with their individual goals. That is the power of person-

centred care. Person-centred care focuses on treating the whole person, addressing not just physical symptoms but also emotional and social needs.

Figure 1. Healthcare workers at the bedside of a patient

Fundamentals of Person-Centred Care

> *Person-centred care is widely recognised as a foundation to safe, high-quality healthcare. It is care that respects and responds to the preferences, needs and values of patients and consumers.* (ACSQHC, 2011)

Person-centred care recognises the importance of understanding and respecting the unique needs, preferences, values, and beliefs of each individual patient. Person-centred care takes a holistic view of the patient, considering their physical, psychological, emotional, and social well-being. Nurses assess and address not only the patient's medical condition but also their personal and psychosocial needs. This approach recognises that patients are unique individuals with their own life experiences, values, and beliefs that impact their health and healthcare decisions.

The Healthcare Team

Person-centred care involves a collaborative approach in which nurses work together with patients, their families, and other **multidisciplinary** team members. Shared decision-making empowers patients to actively participate in their care by providing information, discussing treatment options, and jointly

deciding on the best course of action as a member of their own healthcare team. Nurses act as advocates, facilitating communication between patients and other healthcare professionals.

Although the patient is a member of their own healthcare team, person-centred care ultimately recognises patient autonomy, or the concept that patients have the right to make decisions about their own healthcare. Each patient is unique, with distinct physical, emotional, and social needs. Nurses should respect patients' choices, values, and preferences and involve them in the decision-making process. This requires effective communication and **active listening** to understand and address the patient's concerns. Nurses should strive to provide personalised care that considers the patient's specific circumstances. This involves tailoring interventions, treatment plans, and education to meet the patient's individual needs, cultural background, and beliefs.

Communication is crucial in person-centred care. Nurses should use clear and concise language, avoiding medical jargon, and ensure that patients understand the information provided. Active listening skills are essential to comprehend patients' concerns, fears, and expectations. Open and honest communication builds trust and fosters a **therapeutic relationship** between the nurse and patient. Respecting privacy and maintaining confidentiality are also integral aspects of person-centred care.

Coordinated Healthcare

Person-centred care extends beyond individual encounters. Nurses should strive to provide continuity of care by promoting coordinated transitions between different healthcare settings and providers to improve patient outcomes. This includes clearly communicating patient information, practising proper handover procedures, and ensuring that patients feel supported throughout their healthcare journey. By promoting coordination and continuity, nurses help prevent fragmented and disjointed care.

Link to Learning

Person-centred care is internationally recognised. Watch the following video from the World Health Organization (WHO) in relation to recommendations and benefits of person-centred care [2:35].

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://jcu.pressbooks.pub/nursing-skills-foundations/?p=5#oembed-1

WHO: What is people-centred care?

In this video WHO suggest that to become person-centred healthcare, providers should move from asking 'What is the matter with you?' to asking 'What matters to you?

Improved Patient Outcomes

When patients are actively involved in their care and their preferences are considered, it can lead to improved health outcomes. Patients who feel empowered and engaged are more likely to adhere to treatment plans, manage chronic conditions effectively, and achieve better overall health. The following image explores how person-centred care leads to improved patient outcomes. Click or tap on the '+' buttons below for more information.

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Improved Population Outcomes

Person-centred care is a healthcare approach that prioritises the individual patient's needs, preferences, and values. While its primary focus is on the individual patient, person-centred care has a broader impact by improving the overall quality of care provided and promoting better health outcomes for the whole community. The following explores some ways in which person-centred care improves population outcomes.

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Benefits of Person-Centred Care

There are multiple benefits of person-centred care, both for the patients and for other involved parties:

- It enhances the overall patient experience, leading to higher levels of satisfaction. Effective communication promotes trust and rapport between patients and healthcare providers. When patients feel respected, heard, and involved in their care, they are more likely to feel satisfied with the healthcare services they receive.
- It contributes to the job satisfaction of healthcare providers, including nurses. When nurses can establish meaningful connections with patients, collaborate in decision-making, and witness positive health outcomes, it can increase their professional fulfilment and motivation.
- It can lead to cost savings in the long run, although person-centred care requires an investment of time and resources. By actively involving patients in their care and tailoring interventions to their needs, unnecessary tests, procedures, and hospital readmissions may be reduced. Additionally, improved adherence to treatment plans can prevent complications and the need for more expensive interventions.

Culturally Safe Care

What is Culture?

Culture is a set of beliefs, attitudes, and practices shared by a group of people or community that is accepted, followed, and passed down to other members of the group. Cultural beliefs and practices bind group or community members together and help form a cohesive identity (Curtis et al, 2019; Young & Gou 2016). Culture has an enduring influence on a person's view of the world, expressed through language and communication patterns, family connections and kinship, religion, cuisine, dress, and other customs and rituals (Campinha-Bacote, 2011). Culture is not static but is dynamic and ever-changing; it changes as members come into contact with beliefs from other cultures. Among cultures, subcultures also exist. A **subculture** is a smaller group of people within a culture, often based on a person's occupation, hobbies, interests, or place of origin. People belonging to a subculture may identify with some, but not all, aspects of their larger "parent" culture. Members of the subculture share beliefs and commonalities that set them apart and do not always conform with those of the larger culture. The word "culture" may at times be

interchanged with terms such as ethnicity, nationality, or race. However, culture is much more than a person's nationality or ethnicity.

Culture can be expressed in a multitude of ways. Click or tap the '+' buttons to explore the different ways in which culture can be expressed.

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People typically belong to more than one culture simultaneously. These cultures overlap, intersect, and are woven together to create a person's cultural identity. In other words, the many ways in which a person expresses their cultural identity are not separated but are closely intertwined, referred to as **intersectionality**.

Cultural Safety

Cultural safety is a framework for ensuring culturally safe care is at the heart of healthcare. Originating from the experiences of the Indigenous people of New Zealand, the concept of cultural safety was developed by nurse leader Irahapeti Ramsden and has fast become a model of care that is adapted for use across Australia, New Zealand, and Canada (Laverty et al., 2017). A commonly accepted definition of cultural safety from the Nursing Council of New Zealand (2005) is, in part, "the effective nursing practice of a person or family from another culture, and is determined by that person or family." The definition further states that "unsafe cultural practice comprises any action which diminishes, demeans or disempowers the cultural identity and well-being of an individual."

Many approaches have been developed and used in various manners in attempts to incorporate culturally safe care into healthcare delivery. These include frameworks such as **cultural awareness**, cultural respect, and cultural competence (Taylor & Guerin, 2018). Culturally safe practices continue to evolve, and along with that, we are seeing the development of other frameworks such as cultural capability and cultural humility (Taylor & Guerin, 2018). These concepts are often incorporated in a hybrid manner across services with terminology used interchangeably between them. Regardless of the model used within a health service, the goal remains the same in that all healthcare services provide care that produces the best possible outcomes using evidence-based, culturally safe person-centred care.

Cultural Safety in Nursing Practice

Australian nurses encounter people from a wide variety of cultural backgrounds. It is essential they can provide culturally safe care recognising the impact history and culture have on one's health and wellbeing. This is mandated in the Nursing and Midwifery Standards of Practice where the board states registered nurses must understand colonisation effects on the cultural, social, and spiritual lives of Aboriginal and Torres Strait Islander peoples which contributes to significant health disparity in Australia (Nursing and Midwifery Board of Australia [NMBA], 2016). While Aboriginal and Torres Strait Islander peoples are a focus within this statement it is important to note that culturally safe care is intended for all cultures and includes differences in gender, religion, age, sexual orientation, ethnicity, disability, and socioeconomic status.

The Australian Institute of Health and Welfare (AIHW, 2023) have developed the *Cultural safety in health care for Indigenous Australians: monitoring framework* that is aimed at measuring progress in achieving cultural safety within the Australian health system. This encourages a health system that respects Indigenous cultural values, strengths and differences and also addresses the issues of racism and inequity.

A healthcare service that delivers culturally safe care means that when planning and providing care, healthcare professionals consider their patients' cultural needs (Moloney et al., 2023). To become a culturally safe practitioner, a nurse needs to become culturally aware and develop cultural sensitivity and cultural respect.

Cultural Awareness

Gaining **cultural awareness** is one of the first steps in becoming a culturally safe practitioner. Put simply it is being aware that everyone is different (Taylor & Guerin, 2018). It is a deliberate, cognitive process in which healthcare providers become aware and appreciative of the values, beliefs, attitudes, practices, and problem-solving strategies of a person's culture. Many cultural awareness programs developed tend to focus on the direct learning of other cultures, it is important to understand that cultural awareness is more than this. Cultural awareness importantly involves the nurse being aware of their own personal cultural values and understanding how these cultural practices may impact others. The nurse needs to be aware of any harmful prejudices, ethnocentric views, and attitudes that can impact the care provided. Cultural awareness goes beyond a simple awareness of the existence of other cultures and involves an interest, curiosity, and appreciation of other cultures. Becoming culturally aware requires the nurse to be critically self-aware, engaging in a lifelong process of self-evaluation and self-reflection.

Cultural Sensitivity

The next step in cultural safety is **cultural sensitivity**. To be culturally sensitive the nurse is sensitive and accepting of cultural practices and beliefs of other people. Cultural sensitivity is demonstrated when the nurse conveys nonjudgmental interest and respect through words and actions and demonstrates an

understanding that some healthcare treatments may conflict with a person's cultural beliefs (Cole, 2018). The nurse acknowledges differences, accepts them, and works towards appropriate alternatives that avoid these conflicts. Cultural sensitivity also acknowledges the damaging effects of stereotyping, prejudice, or biases on a person and their well-being. Nurses who fail to act with cultural sensitivity may be viewed as uncaring or inconsiderate, causing a breakdown in trust for the person and their family members. When a person experiences nursing care that contradicts their cultural beliefs, they may experience moral or ethical conflict, non-adherence, or emotional distress.

Cultural Respect

Cultural respect is defined as: "Recognition, protection and continued advancement of the inherent rights, cultures and traditions of Aboriginal and Torres Strait Islander people" (Australian Health Ministers' Advisory Council, 2021). The importance of cultural safety and cultural respect is outlined in Australian government documents, such as:

- The Cultural Respect Framework 2016–2026 aimed at building a culturally respectful health system, which is achieved when the health system is accessible, responsive and safe for Aboriginal and Torres Strait Islander people, and cultural values, strengths and differences are respected.
- National Aboriginal and Torres Strait Islander Health Plan 2021–2031 seeks to embed the diversity of Aboriginal and Torres Strait Islander communities across Australia, including the diversity of cultures, languages, backgrounds, knowledge systems and beliefs.

Figure 2. Respect for cultural diversity

Cultural Safety Principles

A healthcare service that fosters cultural safety recognises that all people are different, understands decolonisation, considers the impacts of power relationships, promotes reflective practices, and allows the determination of cultural safety to come from persons themselves.

This practice requires practitioners to be aware of their own cultural values, beliefs, attitudes and outlooks that consciously or unconsciously affect their behaviours. Certain behaviours can intentionally or unintentionally cause a person to feel accepted and safe, or rejected and unsafe. Additionally, cultural safety is a systemic outcome that requires organisations to review and reflect on their own policies, procedures, and practices in order to remove barriers to appropriate care (National Collaboration Centre for Indigenous Health in Canada, 2013).

According to Taylor and Guerin (2018), the underlying principles required for cultural safety include:

- Ability to reflect on own practice and develop awareness of own culture, values, and beliefs and how these may impact on care delivered
- Engage with the person, asking and not presuming to gain a full understanding of their beliefs, values, and preferences
- Be aware of and reduce power imbalances between self and person. Consider language, titles, and labels used
- Consider ongoing impacts and be involved in processes of decolonisation
- Ensure actions taken do not diminish, demean, or disempower others.

Culturally safe and respectful practice is not a new concept. Nurses and midwives are expected to engage with all people as individuals in a culturally safe and respectful way, foster open, honest and compassionate professional relationships, and adhere to their obligations about privacy and confidentiality. Nurses and midwives have always had a responsibility to provide care that contributes to the best possible outcome for the person they are caring for. They need to work in partnership with that person to do so (NMBA, 2018).

Key Takeaways

- Ensuring patient safety is a vital component in providing high-quality, person-centred care.
- The National Safety and Quality Health Service standards are developed with the goal of protecting the public from harm and improving the overall quality of healthcare delivery.
- Person-centred care contributes significantly to improving patient outcomes.
- Person-centred care puts the individual at the heart of the healthcare experience, empowering them to actively participate in their own care.
- Culture influences how one views the world producing personal values, beliefs, attitudes and

preferences.

- Culture extends beyond ethnicity to include gender, religion, age, sexual orientation, disability, and socioeconomic status.
- Cultural safety focuses on the nurse's awareness of their own cultural identity, and gaining an understanding of how their own biases, attitudes, beliefs and values can impact the care they deliver.
- Registered nurses must understand colonisation's effects on the cultural, social, and spiritual lives of Aboriginal and Torres Strait Islander peoples and how this has and continues to contribute to significant health disparity in Australia.
- Culturally safe care is determined by the healthcare recipient.

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DEVELOPING PERSON-CENTRED CARE PLANS THROUGH CLINICAL REASONING

Penelope Coogan; Leisa Sanderson; and Tracey Gooding

Learning Outcomes

In this chapter, you will learn how to:

- Define and differentiate the concepts of critical thinking, clinical reasoning and clinical judgement and how they interconnect in nursing practice
- Outline the key steps in clinical decision-making to effectively plan and deliver care
- Analyse patient care needs and prioritise interventions using critical thinking and clinical reasoning skills
- Utilise structured frameworks to develop individualised, comprehensive, and person-centred care plans.

Introduction

In nursing, the ability to think critically, reason effectively, and exercise sound clinical judgement is essential for providing safe, high-quality, and individualised care. This chapter focuses on building these core skills by exploring the concepts of **critical thinking**, **clinical reasoning**, and **clinical judgement**, and their vital role in the clinical decision-making process to plan and deliver care. In this chapter, you will learn to navigate the key steps in clinical decision-making, from assessing patient needs and analysing data, to planning and prioritising care. By utilising structured frameworks such as the Care Planning Process and the Clinical Reasoning Cycle, this chapter will guide you in developing individualised, person-centred care plans that address the unique needs of each patient.

Critical Thinking, Clinical Reasoning and Clinical Judgement

Figure 1. Core thinking skills for nursing

Critical Thinking

To make sound clinical decisions and provide safe, effective and quality patient care, nurses require critical thinking skills (Reji & Sushma, 2022; Willers et al., 2021). Critical thinking is an intellectual process used to analyse and interpret situations, enabling problem-solving and sound decision-making (DeLaune et al., 2020). According to DeLaune et al. (2020), it requires intellectual autonomy, evaluation of evidence, and the ability to see the bigger picture. Nurses use critical thinking to make decisions when providing care to patients. Making decisions as a critical thinker involves recognising the issue, collecting and assessing pertinent information, and developing possible solutions. In order to make a decision, an evaluation of these potential solutions ensues before choosing the most effective solution through clinical reasoning and evidence-based analysis. So, rather than just following orders without question, nurses should critique every situation to ensure the accuracy of all available information. Care plans should be developed around the specific needs of the patient, using the most current clinical practice guidelines and research.

According to the literature, "critical thinkers" possess certain attitudes that cultivate rational thinking and decision-making including, (from Gupta & Upshur, 2012; Papp et al., 2014; Scheffer & Rubenfeld, 2000):

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Clinical Reasoning

Clinical reasoning is a subset of critical thinking that is applied specifically to patient care and forms the basis of clinical decision-making (Tollefson & Hillman, 2022). It can be defined as "a complex cognitive process that uses formal and informal thinking strategies to gather and analyse patient information, evaluate the significance of this information, and weigh alternative actions" (Klenke-Borgmann, 2020). To make sound judgements about patient care, nurses must generate alternatives, weigh them against the evidence, and choose the best course of action (Powers et al., 2020). The ability to clinically reason develops over time and is based on knowledge and experience.

Griffits et al. (2023) describe clinical reasoning as a dynamic and non-linear process that integrates critical thinking, specialised knowledge, and practical experience. This approach helps nurses understand clinical situations, make informed judgements, implement and assess interventions, and manage and reflect on patient care effectively. The process of clinical reasoning involves (Dickison et al., 2019; Tanner, 2006):

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Inductive and **deductive reasoning** are essential critical thinking skills that enable nurses to apply clinical judgement effectively when developing plans of care for patients.

Inductive reasoning is a cognitive process that uses facts or observations to identify patterns and draw conclusions. In nursing, this involves collecting **cues**, making generalisations, and creating **hypotheses** based on specific information or incidents in the environment. Cues, which are pieces of data gathered by the nurse through objective and subjective means, are examined for trends or patterns to hint at possible problems or conditions. By looking for patterns or trends within the cues, generalisations are formed. This thought process, similar to sorting pieces of a jigsaw puzzle into shapes or patterns, helps to make the whole picture clearer. From the generalisations made, the nurse creates a hypothesis regarding a patient problem. The hypothesis is a proposed explanation for a situation, attempting to explain the "why" behind the problem. Once this "why" is identified, a solution can begin to be explored. This type of cognitive process is a key aspect of problem identification and problem-solving.

It is important to note that conclusions drawn from inductive reasoning are not guaranteed but are likely based on the evidence gathered. Errors can occur if not all information is collected. Nurses can improve their inductive reasoning skills by searching for as much evidence as possible and paying close attention to details in their surroundings. This includes paying close attention to the patient and the environment, both physical and social. The nurse should work like a detective, looking for all possible cues to either rule out or support the ideas that are forming. Once all appropriate cues have been gathered, it is easier to determine the cause of a problem and therefore solve it.

Example: A nurse assesses a patient and finds the surgical incision site is red, warm, and tender to the touch. Recognising these cues as a pattern of signs of infection, the nurse hypothesises that the incision has become infected. The medical staff is notified of the patient's change in condition, and a new prescription for an antibiotic is received. This is an example of inductive reasoning in nursing practice.

Deductive reasoning differs from inductive reasoning in that it involves reasoning from a general premise to a specific conclusion, rather than from a set of observations or facts (Berman et al., 2021). Also known as "top-down thinking," deductive reasoning uses a general standard or rule to create a strategy. It relies on a general statement or hypothesis—sometimes called a premise or standard—that is held to be true. This premise is used to reach a specific, logical conclusion. For example, nurses use standards set by the ACSQHC, the Nursing and Midwifery Board of Australia, professional organisations, and their employers to make decisions about patient care and solve problems.

Example: Based on research findings, hospital leaders determine that patients recover more quickly if they receive adequate rest. The hospital creates a policy for quiet zones at night by eliminating overhead paging, promoting low-speaking voices among staff, and reducing hallway lighting. Nurses further implement this policy by organising patient care to promote periods of uninterrupted rest at night. This is an example of deductive reasoning because the intervention is applied to all patients, regardless of whether they have difficulty sleeping or not.

Clinical Judgement

Clinical judgement is the result of critical thinking and clinical reasoning using inductive and deductive reasoning. The concept of clinical judgement can be defined as a reflective and reasoning process through which nurses integrate all available data, drawing upon a comprehensive knowledge base including theoretical understandings and practical experiences (Connor et al., 2023). The process involves critically analysing patient information, recognising patterns, building therapeutic relationships, and applying a clinical reasoning process to reach informed clinical decisions. Effective clinical judgement is essential for ensuring safe and quality patient care in increasingly complex healthcare environments (Connor et al., 2023). After conducting a concept analysis of sound clinical judgement, Manetti (2019) defined it as,

> a cognitive process in which the nurse forms a holistic assessment of a patient situation. Critical thinking, clinical reasoning, practical wisdom, and intuition are used in the decision-making process that ensues. Through careful deliberation, the nurse chooses among alternative actions in light of anticipated outcomes in the best interest of the patient. The nurse reflects on and monitors the patient's responses and modifies actions accordingly. Afterward, further reflection empowers nurse with the improved judgment for future situations. (p. 106)

The following provides examples of clinical judgement in action.

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Common Cognitive Biases that can Influence Decision-making

In nursing practice, several cognitive biases and assumptions can impact decision-making and cause errors in patient care. Nurses play a critical role in identifying and overcoming these biases. Understanding, recognising and addressing these biases can help develop critical thinking skills, improve patient decision-making and ensure quality, safe and effective nursing practice (Jala et al., 2023; Thompson et al., 2023). Click on the tabs below to discover the common cognitive biases and their meaning (Levett-Jones, 2023).

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There are several strategies that can minimise the risk of cognitive bias in clinical decision-making including:

- Systematic approach to assessment and decision making: Using a systematic approach such as the care planning process, can mitigate cognitive biases by standardising assessments and ensuring important factors in the patient's assessment and care are not overlooked.
- Reflection: Routinely reflecting on your decision-making processes can help to identify potential biases that may influence your clinical judgement.
- Collaboration: Collaborating with colleagues and seeking differing opinions can help to reduce the risk of cognitive biases.

The Care Planning Process

The Care Planning Process is a critical thinking model based on a systematic approach to patient-centred care. Nurses use this process to perform clinical reasoning and make clinical judgements when planning and providing patient care. This process has been adapted from the original nursing process based on the American Nursing Association's Standards of Professional Nursing Practice (2021). To better align with the scope of practice for registered nurses in Australia, we have adapted the traditional nursing process by replacing "diagnosis" with "problem identification" to avoid confusion with **medical diagnosis**, which falls outside the RN's role. The Care Planning Process consists of five key components: Assessment, Problem Identification, Developing goals, Implementing interventions, and Evaluating outcomes. Each of these components is further broken down into the key tasks involved in each step of the process.

The Care Planning Process is a continuous, cyclical process that is constantly adapting to the patient's current health status. It requires ongoing assessment, evaluation, and adjustment to ensure care remains aligned with the patient's evolving needs, preferences and goals. See Figure 2 for an illustration of the Care Planning Process.

Figure 2. The Care Planning Process

Now let's take a closer look at each component of the Care Planning Process.

Assessment

Assessment is the first step of the care planning process. The assessment phase of the process aligns with Standard 4 of the Registered Nurse Standards for Practice: Comprehensively conducts assessments (Nursing and Midwifery Board of Australia [NMBA], 2016). This phase involves gathering **objective** and **subjective** data to establish a complete understanding of the patient's health status, needs, and priorities. Information is collected through multiple methods, including patient interviews, physical examinations, observations, and reviewing health records, ensuring a holistic view of the individual. This involves systematically and continuously collecting relevant data related to health and quality of life. This process should be carried out with compassion and respect for each person's wholeness, inherent dignity, worth,

and unique attributes. Accurate and thorough assessments form the foundation for identifying patient problems and planning effective, person-centred care (NMBA, 2016).

Nurses assess patients to gather information to inform the plan of care. Data is considered subjective or objective and can be collected from multiple sources. Click on the tabs below to understand the different data collected in each category.

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Sources of Assessment Data

There are three sources of assessment data: interview, physical examination, and review of laboratory or diagnostic test results. Click through each section of the sources of data for more information.

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Types of Assessments

Several types of nursing assessment are used in clinical practice:

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Problem Identification

Problem identification is the second step of the care planning process and aligns with Standard 1 of the Registered Nurse Standards for Practice: Thinks critically and analyses practice (NMBA, 2016). This standard requires the nurse to use a variety of thinking strategies and the best available evidence to make clinical decisions. The desired **outcome** of this step is the formulation of problem statements, often referred to as a '**nursing problem**'.

Three components that lead to the identification of problems include **analysing the data**, **identifying actual or potential problems**, and **formulating problem statements**. The ability to analyse and compare data effectively to identify accurate problems is a sophisticated skill. It is demonstrated at higher levels as a nurse gains more experience. Experienced nurses often appear to interpret data as second nature; however, it is important to remember that this ability has developed through exposure to a wide range of clinical experiences. While novice nurses tend to focus on more obvious signs or symptoms that are out of range, experienced nurses will pick up on more subtle cues and continue to investigate and analyse the data surrounding these (Levett-Jones, 2023). As a novice nurse, it is recommended to use a structured approach to assessment and problem identification consistently. This reduces the likelihood of missing problems and ensures a thorough identification of issues, systematically addressing all patient needs and leading to a more effective and personalised care plan.

Analysing the Data

During data analysis, nurses compare collected data, such as signs and symptoms, with established norms and standards to identify any deviations from what is considered normal. In this process, they distinguish the relevant data from the irrelevant. Once the relevant data has been identified, the clustering of information occurs. This clustering involves matching patterns and identifying relationships to generate tentative hypotheses about the patient's condition. Additionally, the nurse will look for gaps and inconsistencies in the data collected to ensure a comprehensive understanding of the patient's health status is achieved. Discovering the gaps and inconsistencies may instigate the collection of further data to either support or negate the hypothesis (validation).

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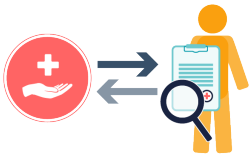
Identifying Problems

A nursing problem is a clinical judgement that is made following analysis of all available data on the

patient's presenting issues. Nursing problems focus on a human response to actual or potential health conditions or life processes. The problem should, where possible, identify a causative factor to allow the development of targeted intervention/care. There are two types of problems that should be identified at this stage: Actual and potential problems.

Accuracy in problem identification is vital for care planning. Nurses can verify accuracy by clearly establishing connections between the defining characteristics, related factors, and/or risk factors identified during the patient's assessment. It is important that nursing problems focus on the human response to the health condition and not the medical diagnosis. Key differences between medical diagnosis and nursing problems exist.

Medical diagnoses target a specific illness, injury, or disease process, remain constant until a cure or resolution is achieved, and are diagnosed by a medical practitioner (Delaune, 2023). For example, a medical diagnosis of "pneumonia" is a condition caused by an infection in the lungs. Medical treatment will be to treat the infection (e.g., antibiotics).



Nursing problems are a response to a condition that causes an impact on the patient (a human response). The impacts can change as the patient's health or situation changes and interventions to assist will fall into the scope of practice of the nurse (Delaune, 2023). For example, the patient who was medically diagnosed with Pneumonia experiences inflammation and fluid accumulation in the lungs as part of this condition. This impacts the patient as respiratory effort increases to improve gas exchange in the lungs. This causes undesirable effects such as fatigue. Through the analysis of the data, the nurse will conclude the patient is experiencing fatigue related to impaired gas exchange evidenced by increased work of breathing, cyanosis and low oxygen saturation. The nurse can now plan treatment toward the cause (impaired gas exchange) to relieve the patient's responses, for example, deep breathing and coughing exercises to expel fluid from the lungs, sitting the patient upright to improve gas exchange.

When planning care for a patient the nurse will consider events that are happening at that point in time for the patient and those that could possibly develop in the future if interventions are not implemented. Problems are therefore classified as either an actual problem or a potential problem.

Formulating Problem Statements

To ensure accurate care planning nursing problem statements need to remain focused towards the human response, and causative factors need to be clear. It is therefore important problem statements are written in a manner that reflects this.

A problem statement should contain the problem, related factors, and defining characteristics and be written as either a two or three part statement using the **PAS format**.

Problem (P): The **p**roblem (actual or potential); phrased with 'is experiencing' or 'is at risk of'.

Aetiology (A): The related factors (i.e., the aetiology/cause) of the problem; phrased as "related to".

Signs and Symptoms (S): The defining characteristics observed during the patient assessment. This will include the **s**igns and **s**ymptoms/subjective and objective data/clinical cues that led to the identification of the problem for the patient; phrased with "as evidenced by".

Two common errors are seen when formulating problem statements and are explored below:

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1. The nurse focuses on individual signs and symptoms (cues) rather than completing a full analysis.

Incorrect problem statement:

(Patient name) is experiencing tachycardia related to pain evidenced by heart rate of 110bpm.

In the example, the nurse has focused on one particular sign and not the causative factor that is producing this sign. Further analysis of the patient's situation is required to allow interventions to be targeted towards the causative factor of tachycardia. In this case, the human response that is observable is pain, to treat the pain we need to know the causative factor, therefore adding a focused pain assessment can assist in understanding this.

Correct problem statement:

(Patient Name) is experiencing acute pain in ankle related to tissue swelling as evidenced by recent surgery, patient statement of 6/10 on VAS, facial grimacing on movement, and tachycardia.

2. The nurse uses medical terminology rather than nursing terminology.

Incorrect problem statement:

(Patient name) is experiencing inflammation and fluid accumulation in the lungs related to pneumonia evidenced by low oxygen saturation and shortness of breath.

In the example, the focus has become the medical diagnosis rather than that of the human response displayed with the causative factor. Further analysis of the situation can establish what issues the accumulation of fluid is causing for the patient.

Correct problem statement:

(Patient name) is experiencing fatigue related to impaired gas exchange evidenced by increased work of breathing, cyanosis and low oxygen saturation.

After formulating problem statements tailored to your patient's specific assessment findings, it is essential to evaluate whether the identified problem statement addresses the root cause of the issue. Refer to Figure 3 for a cognitive aid designed to support the evaluation of your problem statements.

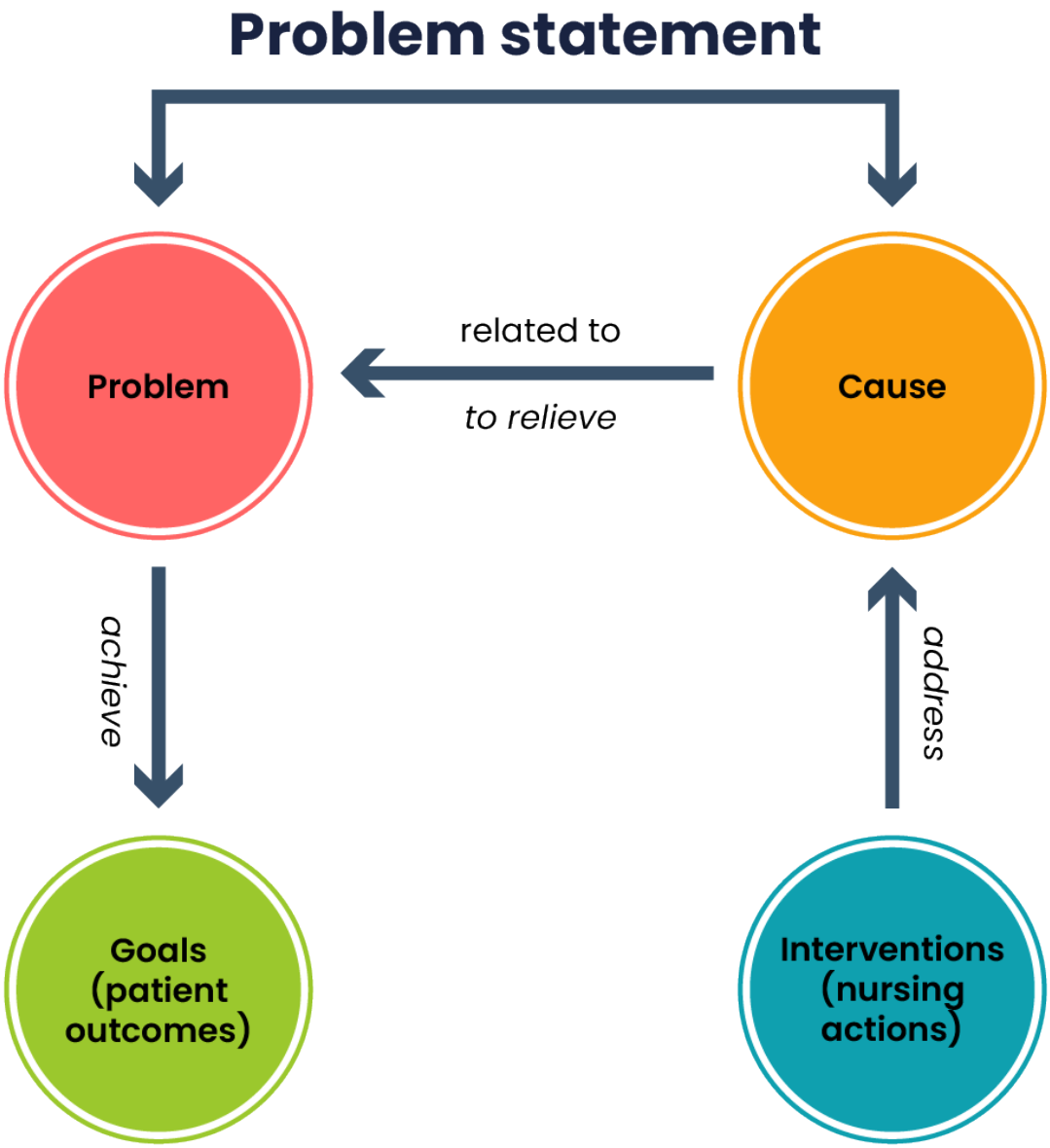

Figure 3. Formulating the problem statement

Developing Goals

Once problems have been identified, the nurse collaborates with the patient to determine desired outcomes and set goals to achieve them. This third stage of the care planning process involves the development of comprehensive care plans that address the patient's specific health concerns.

Care planning aligns with Standard 5 of the NMBA Registered Nurse Standards for Practice: Develops a plan for nursing practice. In accordance with this standard, nurses are accountable for developing and communicating nursing care plans based on comprehensive assessments, evidence, and agreed priorities. They must collaboratively establish goals, actions, outcomes, and timeframes, ensuring these are clearly

documented and effectively communicated. Plans must be regularly evaluated and adjusted to support the achievement of outcomes, with resources coordinated appropriately (NMBA, 2016).

During the goal development phase, the nurse focuses on three key areas:

1. Prioritising identified problems
2. Identifying outcomes
3. Developing patient-centred short- and long-term goals

Prioritising Identified Problems

Priority setting is a crucial skill for nurses, involving the determination of which actions must come first to ensure patient safety and optimal outcomes. Nurses frequently prioritise their actions throughout their shifts, with the highest priority given to patient problems that could result in harm if left untreated, especially life-threatening issues. Each patient situation is unique, necessitating different priorities. Involving patients in the planning process ensures their needs are met.

Several concepts guide the **prioritisation** of care, including the "Safety First" principle and the ABCDE health assessment framework. Considerations are also made in regard to actual and potential problems, acute vs chronic conditions and any uncompensated condition. When considering the intervention or care to be provided the least invasive option is the preferred choice.

Safety first

Safety always comes first, addressing any immediate dangers to both the healthcare provider and the patient before moving on to other priorities. For example, a patient in immediate danger from a fire must be moved before any life-saving measure can begin.

ABCDE approach to health assessment framework

The ABCDE approach (Airway, Breathing, Circulation, Disability, and Exposure) is used during patient assessment and can also help prioritise care. Problems are addressed in this order, with life-threatening issues attended to first, interventions should start immediately and be resolved before moving to the next step. For instance, if you are about to clean a tracheostomy (exposure) and notice sputum collecting in the airway (airway), suctioning the airway becomes the priority before proceeding with the cleaning (A before E).

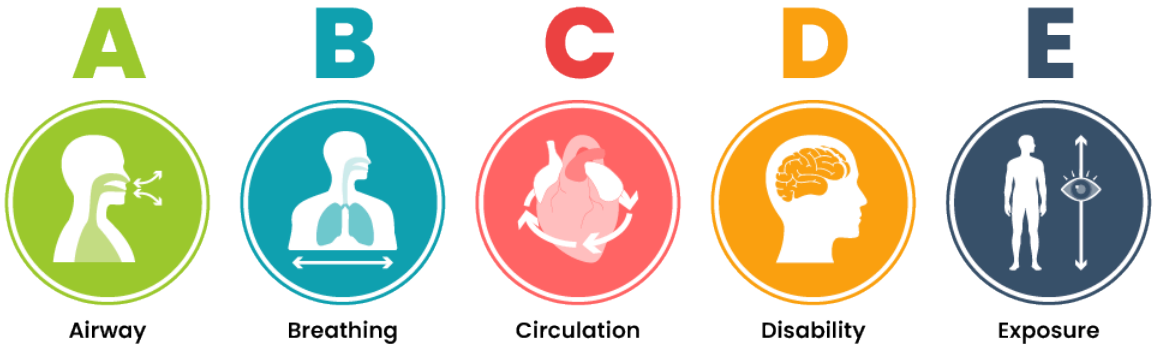

Figure 4. The ABCDE approach

Using the concepts discussed, the following is an example of prioritisation:

Example of prioritisation

A frail elderly gentleman is admitted with pneumonia and is currently experiencing an increase in his work of breathing. The following problems have been identified and prioritised.

1. (Patient name) is experiencing impaired gas exchange related to the accumulation of fluid and inflammation of the lungs, evidenced by decreased oxygen saturation, increased work of breathing, and crackles on auscultation.
2. (Patient name) is at risk of impaired skin integrity related to decreased mobility.
3. (Patient name) is experiencing anxiety related to current hospitalisation and separation from family, as evidenced by restlessness, the patient's statement of 'please call my daughter' and tachycardia.

The problems were prioritised based on immediacy and severity of impact on the patient, with patient safety considered first and working through the hierarchy order of ABCDE.

Development of Outcomes and Goals

Before you write a nursing goal, it is essential to know both the desired and expected outcomes. This is why we prioritise understanding these outcomes first. However, it is important to note that the goal and outcome need to be developed in combination. For this reason, we will discuss these two important stages together. This integrated approach helps in creating an effective, person-centred care plan that is tailored to the patient's needs and provides a clear pathway for evaluating progress and success.

Desired and Expected Outcomes

Outcomes in the care planning process may refer to two related but distinct concepts: the desired outcome and the expected outcome. A desired outcome is the specific result a patient would like to achieve through nursing care and intervention. It reflects the patient's personal goals and should align with the expected outcome, which is the anticipated response to nursing interventions. Expected outcomes serve as

measurable benchmarks for evaluating whether goals have been successfully met. Both types of outcomes should be specific, realistic, and measurable. Clearly defined desired outcomes help shape both short- and long-term goals, providing direction, focus, and a framework for evaluating the effectiveness of care.

Short and Long-Term Goals

The nursing goal is a broad statement of the overall direction in which the patient must progress to improve the nursing problem and is often the direct opposite of the problem. Goals may be short-term or long-term, depending on the patient's needs. Short-term goals address immediate needs, while long-term goals guide planning for discharge or ongoing care.

Example of a broad goal: *(Patient name) will achieve a state of fluid balance.*

Developing Patient-Centred Short and Long-Term Goals Aligned with Outcomes

Setting goals and outcomes gives direction for interventions and establishes standards for evaluating effectiveness. A patient-centred goal is a specific, measurable objective aimed at optimal health and independence levels. Goals require realism and need to be tailored specifically to each patient's needs, values, and cultural beliefs. To promote person-centred care the patient and family members should be included in the goal-setting process, this motivates participation and the likelihood of successfully achieving the goals.

Expected outcomes are required to determine when goals have been met. They are used to evaluate an intervention's effectiveness in resolving problems. The outcome includes the specific response desired to interventions and needs to be specific, measurable, and set within time frames.

Example of a broad goal with expected outcomes: (*Patient name) will achieve a state of fluid balance* ***(broad goal)*** *evidenced by equal input/output on fluid balance chart over the next 24 hours* ***(expected outcome)***.

The expected outcomes are linked to the broad goal with the identifying term "evidenced by", by linking these outcomes the broad goal has now become specific. In this text, we will refer to this as a goal statement. These statements should contain five components, easily remembered using the "SMART" mnemonic: Specific, Measurable, Attainable, Relevant, and Time-based.

Each of these components is further described in the following subsections.

Figure 5. SMART Goals

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Implementing Interventions

Once goals and outcomes have been established the nurse begins planning nursing interventions that are most appropriate to implement. A nursing intervention is that which is within the scope of the registered nurse's role and may include ongoing observation, assessment and evaluations, preventative measures to reduce risks of complications, treatments for physical care, education and health promotion, and referral to specialist care both within the field of nursing (e.g. wound care specialist) or the multidisciplinary team (e.g social worker) (Berman et al., 2021).

Nursing intervention, when able should target the cause of the problem (the 'related to'). When it is not possible to alleviate the causative factors then interventions are directed at the signs and symptoms. Nursing intervention selection can vary widely depending on the individual circumstances of the patient and the causative factor, therefore accuracy of problem statement development and identification of the correct cause is vital in achieving the best possible outcome.

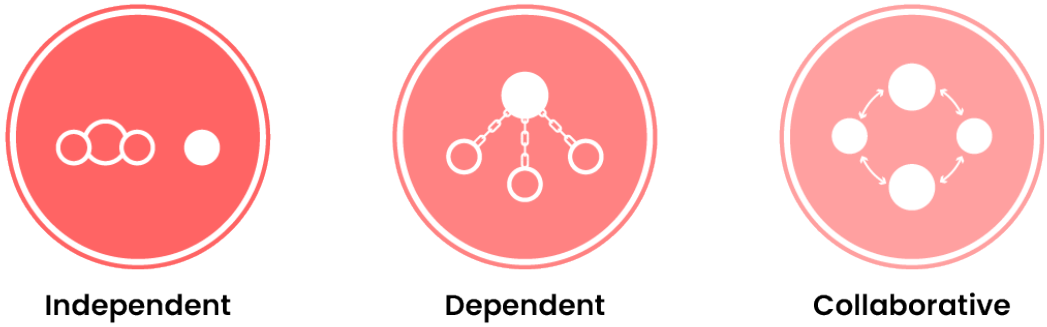

Figure 6. Nursing intervention types

There are three types of nursing interventions that may need to be coordinated or escalated by the nurse: independent, dependent, and collaborative. Click on each of the tabs below to learn more about the three types of nursing interventions:

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Creating and Recording the Plan of Care

Once interventions are determined, an overall plan of care, known as a nursing care plan, is recorded. Care plans are crucial for communicating planned care for patients, aiming to prevent incomplete, incorrect, or inaccurate care (Crisp et al., 2021). These written guides ensure continuity of care over time and among different nurses and health professionals.

The methods for recording care plans vary between facilities and can be presented in different formats depending on the services provided. Many facilities use computer-generated tools. Regardless of the format, each care plan should be individualised, including identified problems, goals of care, expected outcomes, and planned nursing interventions.

Clinical management pathways are commonly used tools that contain preplanned expected pathways for patients based on specific diagnoses or planned procedures. These plans are developed using best practices, clinical guidelines, and evidence-based practice. They clearly list treatment goals and the actions required by all healthcare team members to achieve those goals. Any variances from the plans are documented in the

appropriate section, allowing for individualised care. The plans also include evaluation criteria to assess the effectiveness of the planned care.

Documentation of the interventions and patient responses is an essential part of this phase. During implementation, the nurse must critically think and use clinical judgement. Continual reassessment of the patient during the phase is necessary to detect any changes in the patient's condition that may require modification of the plan. The need for continual patient reassessment underscores the dynamic nature of the nursing process and is crucial to providing safe care.

Implementing the Interventions

Implementation requires several steps and this includes reassessing the person, determining nurses' needs for assistance, the act of implementing intervention, and documenting the activities (Berman et al., 2021).

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Integral to this phase is the ability to make decisions about delegation of interventions if and when appropriate. The Decision-Making Framework, developed by the NMBA used in conjunction with the standards for practice, policies, regulations and legislation, supports nurses and midwives in making consistent, safe, person-centred, and evidence-based decisions regarding the scope of practice, delegation, and supervision (NMBA, 2020). To read this document and understand more about decision-making and the scope of practice relevant to your role, you can access the framework on the Frameworks page of the Nursing and Midwifery Board website.

Evaluation

Figure 7. Nursing evaluation types

Evaluation, the fifth and final step of the care planning process, aligns with Standard 7 of the NMBA Registered Nurse Standards for Practice: Evaluates outcomes to inform nursing practice. Nurses assess the patient's response to interventions, reevaluate the data, and compare the outcomes with the expected results. If needed, modifications to the plan of care are made to promote better patient outcomes and address any new or evolving health needs.

Reassess to Determine if Outcomes are Achieved

In this step, the nurse conducts a thorough reassessment of the patient to determine the extent to which the established outcomes have been achieved. They assess whether the patient's health has improved, stabilised, or deteriorated based on the identified criteria. They compare the patient's current status with the expected outcomes defined in the planning phase. This reassessment involves collecting new data, evaluating changes in the patient's condition, and reviewing any documentation or feedback from the patient. By evaluating the progress made toward achieving the outcomes, nurses can determine if the interventions have been effective in addressing the identified concerns.

Revise or Terminate Nursing Plan of Care

Based on the evaluation findings, nurses determine whether revisions to the nursing plan of care are necessary or if the plan can be terminated. If the outcomes have been achieved, the plan may be concluded, and the nurse focuses on discharge planning or transition to ongoing care. However, if the outcomes have not been met, the nurse revises the plan by identifying new interventions or modifying existing ones to better support the patient's progress toward achieving the desired outcomes. Nurses continue to reassess and evaluate the patient's condition at regular intervals, adjusting the plan of care as needed to optimise outcomes and address any emerging concerns.

Case Study: Putting it all Together

Instructions: Apply what you've learned in this chapter by creating a nursing care plan using the following scenario. To assist with your nursing care plan, answer the critical thinking questions below:

The patient, Mark S., is a 57-year-old male who was admitted to the hospital with "severe" abdominal pain that was unable to be managed in the Emergency Department. The physician has informed Mark that he will need to undergo some diagnostic tests. The tests are scheduled for the morning.

After receiving the news about his condition and the need for diagnostic tests, Mark begins to pace the floor. He continues to pace constantly. He keeps asking the nurse the same question ("How long will the tests take?") about his tests over and over again. The patient also remarked, "I'm so uptight I will never be able to sleep tonight." The nurse observes that the patient avoids eye contact during their interactions and that he continually fidgets with the call light. His eyes keep darting around the room. He appears tense and has a strained expression on his face. He states, "My mouth is so dry." The nurse observes his vital signs to be: T 98, P 104, R 30, BP 180/96. The nurse notes that his skin feels sweaty (diaphoretic) and cool to the touch.

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The Clinical Reasoning Cycle

Evidence indicates that, despite the presence of warning signs preceding adverse events, at-risk patients are not consistently identified or managed effectively. According to Levett-Jones et al. (2010, p. 516), clinical reasoning is defined as 'the process by which nurses (and other clinicians) collect cues, process the information, come to an understanding of a patient problem or situation, plan and implement interventions, evaluate outcomes, and reflect on and learn from the process'. The development of the

Clinical Reasoning Cycle stems from the recognition that deficiencies in clinical reasoning skills significantly contribute to nurses' inability to recognise and appropriately respond to patient deterioration, a phenomenon referred to as "failure to rescue." This highlights the critical need for educational strategies to enhance clinical reasoning skills in nursing practice (Levett-Jones et al., 2010, p. 515).

The Clinical Reasoning Cycle is a dynamic and reflective tool for guiding complex clinical decisions, while the Care Planning Process provides a more structured, linear framework for delivering care. Together, these approaches complement each other in promoting high-quality, evidence-based nursing practice and person-centred care.

The CRC figure outlines the intricate nature of a nurse's decision-making, clinical reasoning, and care planning process, which is divided into eight phases. Click or tap on the '+' buttons for a summary of these eight phases.

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The CRC in Action

Let's take a closer look at the Clinical Reasoning Cycle by applying it to a case study.

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Many of these phases closely align with the nursing process discussed earlier in this chapter, reflecting similar steps. However, the CRC stands out in its value for managing more complex patient cases and includes an additional step: reflection. This crucial element of nursing practice fosters deeper learning and professional growth. Now it is time to apply your newfound knowledge with a case study. Read the following ISBAR handover, then answer the questions in the activity that follows.

Case Study – Mr James

ISBAR handover for Mr James

Introduction: This is Mr James

Situation: A 72-year-old male admitted with complaints of shortness of breath and fatigue. He has a history of COPD.

Background: Mr James is on home oxygen therapy and typically uses 2L oxygen via nasal cannula. His last ABG, done two months ago, showed mild hypoxaemia. He has been increasingly tired over the past 24 hours, with worsening breathlessness.

Assessment: On assessment, his respiratory rate is 24/min, and his SpO2 is 88% on 2L oxygen. He appears fatigued but is responsive. He denies chest pain. Lungs show reduced air entry bilaterally with no wheezes noted. He has no fever.

Recommendation: We might need to review his oxygen therapy.

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Summary

The care planning process and clinical reasoning cycle are both essential frameworks for delivering safe, effective, and patient-centred care. These two frameworks complement each other, involving a systematic approach to assess patients, plan and implement care, and evaluate outcomes. You have now learned how to perform each step of the care planning process and clinical reasoning cycle. Regardless of which process or cycle you use, critical thinking, clinical reasoning, and clinical judgement are essential when assessing the patient, creating a nursing care plan, and implementing interventions. Frequent reassessment, with revisions to the care plan as needed, is important to help the patient achieve expected outcomes. Throughout the entire process, the patient always remains the cornerstone of nursing care. Providing individualised, patient-centred care and evaluating whether that care has been successful in achieving patient outcomes is crucial for delivering safe, professional nursing practice.

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INFECTION PREVENTION AND CONTROL

Leisa Sanderson and Penelope Coogan

Learning Outcomes

In this chapter, you will learn how to:

- Explain the process of infection transmission using the chain of infection concept
- Identify the body's normal defences against infection
- Identify nursing interventions that reduce the transmission of infection
- Demonstrate understanding of standard and transmission-based precautions
- Demonstrate effective hand hygiene, donning and removing personal protective equipment (PPE)
- Recognise key concepts related to asepsis, aseptic fields, and Aseptic Non-Touch Technique (ANTT).

Introduction

Infection prevention and control refers to practices that can prevent or reduce the risk of **transmission** of microorganisms. Evidence-based best practices for infection prevention and control provide guidelines to healthcare providers to ensure safe, quality care is provided to patients, visitors, healthcare providers, and the healthcare environment. When infection prevention and control practices are used consistently, the transfer of **healthcare-associated infections** (HAIs) can be prevented in healthcare settings.

Nurses are on the front line of **infection prevention and control**. Nurses play an essential role in the prevention of infectious diseases and therefore it is crucial for nurses to understand how infectious diseases spread to ensure vigilance in performing proactive initiatives to prevent and control infections. **Microorganisms** play a major role in the transmission of diseases and by understanding the conditions that foster the spread of infection, nurses can implement evidence-based interventions to break the cycle and stop the chain of infection. The process of infection control includes handwashing, environmental sanitising, proper waste management, and adherence to isolation precautions. The main goal of infection prevention for nurses is to prevent the transmission of diseases. Nurses must understand how infections

occur and how infection-prevention protocols work to prevent such infections. In doing so, they will ultimately protect themselves and their patients against exposure to infectious agents. Such knowledge includes an understanding of the infection cycle, how and why infections manifest, use of personal protective equipment (PPE), use of aseptic and sterile techniques, and the most effective way to control infections. While proper handwashing is a critical component of infection prevention, there are also several other ways that nurses can stem the spread of infection and protect themselves and their patients.

Chain of Infection

The presence of a pathogen does not always lead to infection. For infection to occur a cyclic process is required. This cyclic process is called the chain of infection and consists of the following:

- Infectious agent
- Reservoir
- Portal of exit
- Mode of transmission
- Portal of entry
- Susceptible host.

An understanding of how an infectious agent travels throughout the cycle is required to determine how to break the chain and prevent the transmission of an infectious disease. If a part of the chain of transmission is broken, the infection will not occur. Routine practices and additional precautions are used to break or minimise the chain of infection.

Click or tap on the '+' buttons below for detailed information on each link in the chain of infection and how nurses can assist in breaking these links.

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The spread of germs in healthcare settings can occur through various routes, including direct contact, airborne particles, and contaminated surfaces.

Nature of Infection

An infection is the invasion and growth of a microorganism within the body. Infection can lead to **disease**

that causes signs and symptoms, resulting in a deviation from the normal structure or functioning of the host. Infection occurs when nonspecific innate immunity and specific adaptive immunity defences are inadequate to protect an individual against the invasion of a pathogen. The ability of a microorganism to cause disease is called **pathogenicity**, and the degree to which a microorganism is likely to become a disease is called **virulence**. Virulence is a continuum, on one end of the spectrum are organisms that are not harmful, but on the other end are organisms that are highly virulent. Highly virulent pathogens will almost always lead to a disease state when introduced to the body, and some may even cause multi-organ and body system failure in healthy individuals. Less virulent pathogens may cause an initial infection but may not always cause severe illness. Pathogens with low virulence usually result in mild signs and symptoms of disease, such as a low-grade fever, headache, or muscle aches, and some individuals may even be asymptomatic.

Depending on the extent of the infection, infections can be described in three ways:

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Stages of Infection

All infections progress through a predictable course of four stages. Each pathogen can produce distinct and diverse symptoms. An individual's immune response to the pathogen will determine the length and intensity of each stage and account for variability seen between one individual and another.

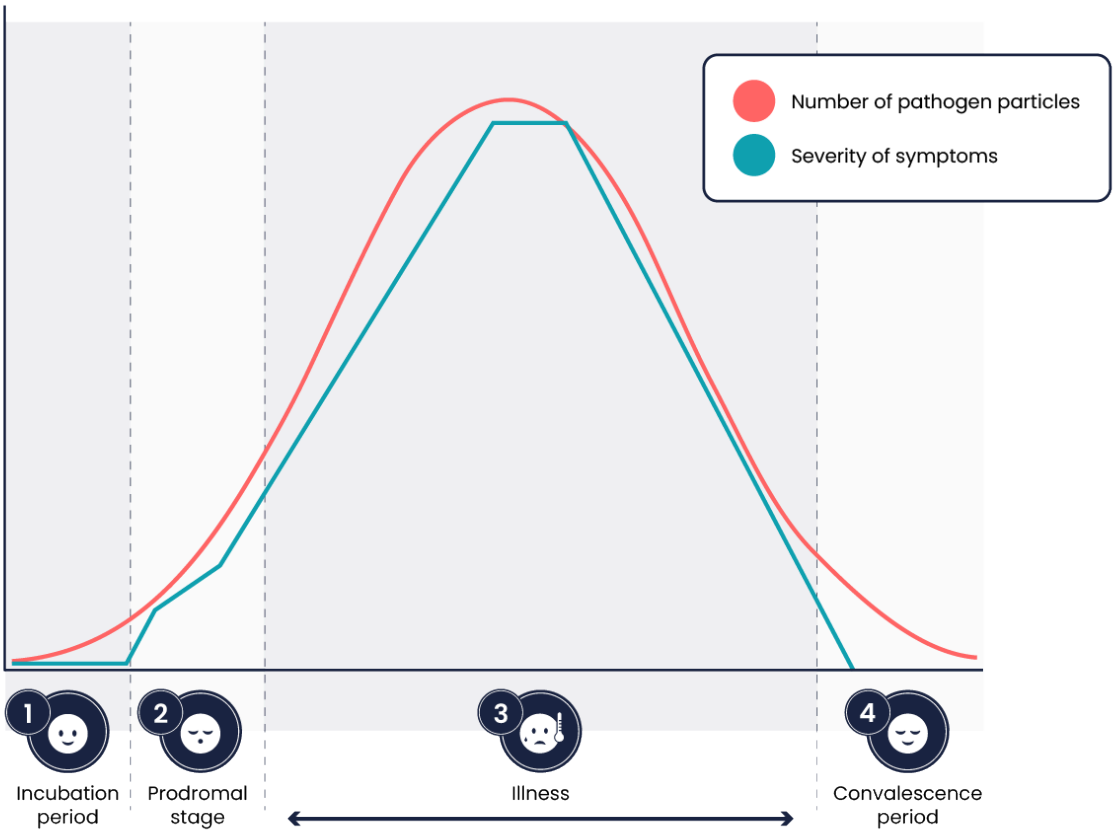

Figure 1. Progress of pathogen particles and severity of symptoms across four stages of infection

Incubation Period

The stage of infection known as the incubation period begins once a pathogen successfully enters a new host. During the incubation period, a person does not show signs and symptoms of an infection because there are not enough pathogens to cause symptoms. The person therefore does not suspect they have been infected. One example is the common cold. The patient feels healthy for one to three days but then starts to demonstrate symptoms of illness once the level of pathogen has increased in their system. Despite being asymptomatic those first few days, pathogens are continually multiplying and can still be spread to other hosts. Because of this, the longer the incubation period is, the more likely a person is to be unknowingly spreading infection to other people. The incubation period can vary from as little as one day, as with the influenza virus, to two to three months, as with the hepatitis B virus. It can even last years, as with the human immunodeficiency virus.

Prodromal Stage

The stage of infection called the prodromal period begins at the initial appearance of mild or vague symptoms. These symptoms arise from activation of the immune system and typically present as fever, pain, soreness, or inflammation. Symptoms at this stage are often too general to indicate a specific disease. An example case is the patient exposed to the common cold, after one to three days of feeling healthy, they may then have symptoms such as a headache, scratchy throat, and watery eyes. Though present, these symptoms are nonspecific and could be associated with a variety of other illnesses. This stage can vary in its duration, but it is typically shorter than the incubation period.

Illness

The illness period stage of infection begins when a person experiences the specific signs and symptoms of a certain disease. This period represents the peak of the infection, and it is during this time that a person is highly contagious. In this stage, our patient who was exposed to the common cold will start to show specific symptoms such as mild hacking cough, sneezing, achy muscles and bones, and low-grade fever. If the individual's immune system (with or without medical intervention) can combat the pathogens, a period of decline in the pathogens begins. The infection begins to weaken, and symptoms decrease.

Convalescent Period

The final stage of infection is the convalescent period. This is the stage where recovery and healing begin. Closing out our example of the patient who has the common cold, the patient's symptoms will fade, and the patient will report feeling back to baseline. During this time, a person is gradually able to return to their normal functions; some infections, however, can result in permanent damage from which the body is unable to repair and recover.

Body's Natural Defence Mechanism Against Infection

The human body's immune system provides a mechanism for staying healthy through protection against

harmful pathogens. An immune response can be classified as either nonspecific, meaning it targets pathogens in a nonspecific, less effective manner, or specific, which allows for a high level of adaptation and effectiveness. Nonspecific immunity includes physical, chemical, and cellular defences that are classified as either primary or secondary. Secondary defences are broken down further into inflammatory and immune responses. The specific defence would be **antibodies** from the immune system targeting a specific antigen that they are designed to identify and destroy.

Primary Defences

Primary defence barriers prevent pathogens from entering the body through structural barriers, destroy them once they have entered the body, or flush them out of the body. These barriers are not triggered as a response to pathogens but instead, serve as a continuous first line of defence against infection.

The tabs below outlines the key primary defence barriers, detailing their functions and how they help protect the body from infection.

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Secondary Defence Barriers to Infection

Pathogens that are not stopped by primary mechanisms are able to enter the body triggering a second set of defences. Nonspecific, innate immune responses work to recognise and eliminate pathogens. These secondary defences include the inflammatory response, which helps isolate and eliminate pathogens, and the immune response, which targets and destroys specific invaders to protect the body.

An interactive H5P element has been excluded from this version of the text. You can view it online here:
https://jcu.pressbooks.pub/nursing-skills-foundations/?p=36#h5p-86

Healthcare-Associated Infections

Healthcare-associated infections (HAIs), also known as nosocomial infections, are those that are acquired

in healthcare facilities or because of healthcare interventions, which may become evident after people leave the healthcare facility (Shaban et al., 2023). Although preventable, HAIs are some of the most common complications for patients within a healthcare setting and can prolong hospital stays and recovery time. In Australia, there are approximately 165,000 HAIs in acute care facilities each year (Mitchell et al., 2017). Common types of HAIs include Urinary Tract Infections (UTI), Surgical Site Infections (SSI), Pneumonia, Bloodstream infection, Central line and peripheral line associated bloodstream infection, multi-resistant organisms (MROs), infections associated with prosthetics/implantable devices and gastrointestinal infection. Infections can occur with or without an invasive device. Devices where infection is commonly introduced include Urinary catheters, central and peripheral lines, ventilatory support and prosthetic/implantable devices (Australian Commission on Safety and Quality in Health Care [ACSQHC], 2018).

The risk of developing an HAI is dependent on the infection-control policies within a facility and the degree of adherence to them. Additional risk factors include a patient's immune status, age, underlying comorbidities, and the prevalence of pathogens within the environment. The length of hospitalisation, number of invasive procedures, and amount of antibiotic therapy received all increase a patient's risk for acquiring an HAI.

Link to Learning

The Global Alliance for Infections in Surgery has outlined seven strategies to prevent healthcare-associated infections in the healthcare setting.

Multi-Resistant Organisms

An organism that develops resistance to one or more classes of antimicrobials is considered a multi-resistant organism. People infected with multi-resistant organisms are more likely to have longer, more expensive hospital stays and may be more likely to die as a result of an infection.

Many factors contribute to resistance, including overprescription of antibiotics for nonbacterial infections, use of inappropriate antibiotics for the infectious microorganism, and lack of completion of prescribed antibiotic therapy. Misuse of antimicrobials is considered one of the world's most pressing public health problems.

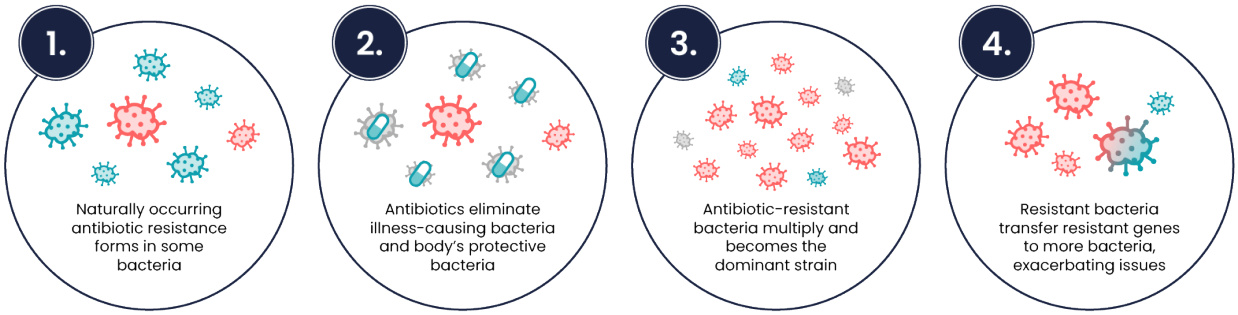


Figure 2. Antibiotic resistance

Examples of MRO include *Methicillin-resistant Staphylococcus aureus* (MRSA), *Vancomycin-resistant Enterococci* (VRE) and *Clostridium difficile (C. Diff).*

An interactive H5P element has been excluded from this version of the text. You can view it online here:
https://jcu.pressbooks.pub/nursing-skills-foundations/?p=36#h5p-2

Antimicrobial Stewardship

Antimicrobial stewardship (AMS) are coordinated programs that promote appropriate prescribing and use of antimicrobials (including antibiotics). Programs have shown to improve patient outcomes, reduce microbial resistance rates and reduce healthcare cost.

In Australia, AMS is a requirement under the National Safety and Quality Health Service (NSQHS) Prevention and Controlling Healthcare-Associated Infection Control standard and is supported by the ACSQHC Antimicrobial Stewardship Clinical Care standard (ACSQHC, 2020).

The nurse plays an important role in antimicrobial stewardship through patient education. For example, many patients expect to receive an antibiotic when they seek treatment for an illness or symptom. However, because antibiotics are only effective in treating bacteria, the patient should be educated regarding effective treatment for the type of pathogen causing their symptoms. If an antibiotic is prescribed, patients should be advised to complete the entire course of therapy or contact their provider if they are unable to do so. For example, patients often feel better after a few days of treatment and decide not to take the remaining medication, or they may experience side effects from the antibiotic (such as nausea and diarrhoea) and stop taking the medication. All these behaviours can lead to antibiotic resistance and should be addressed when educating patients about prescribed antibiotic therapy.

Preventing Healthcare-Associated Infections

The role of nursing in patient safety and infection prevention is significant. Nurses provide care at the bedside and have the direct ability to impact care and influence positive patient outcomes by helping to identify and prevent the spread of infectious agents. The interventions implemented by a nurse have an integral role in infection prevention. Nurses are part of the team responsible for executing appropriate isolation protocols, modelling infection-control measures, monitoring others for safe practice, identifying barriers to appropriate practice, and educating patients and other interdisciplinary team members as needed. Specific protocols for isolation and infection control will depend on several factors including mode of transmission, environmental circumstances, and available resources.

The National Health and Medical Research Council (NHRMC) in consultation with the ACSQHC provide guidelines regarding the prevention and control of infection in healthcare. You may access the Australian Guidelines for the Prevention and Control of Infection in Healthcare on the NHMRC website.

To successfully prevent the transmission of infection, evidence-based infection control practices need to be implemented. These practices are carried out using a two-tiered approach of standard and transmission-based precautions.

Standard precautions are those that are always applied to all people all the time, regardless of their diagnosis or presumed infection status. These standards provide a basic level of protection that reduce the transmission of organisms from one area to another. Transmission-based precautions are required to be implemented in circumstances where standard precautions alone may not prevent the transmission of infection. These precautions are specific to infections and should be implemented immediately following the patient presenting with signs and symptoms of the particular infection. The precautions include contact precautions, droplet precautions and airborne precautions.

Figure 3. Four precaution signs provided by the ACSQHC. To read a clear copy of these signs, visit the ACSQHC resource library

Standard Precautions

Figure 4. Standard precautions

Hand Hygiene

Hand hygiene is the single most important practice to reduce the transmission of infectious agents in healthcare settings and is an essential element of standard precautions. Hand hygiene refers to the action of cleaning your hands by applying an alcohol-based hand rub (ABHR) or washing your hands with soap or soap solution (ACSQHC, 2024).

The National Hand Hygiene Initiative (NHHI), established by the ACSQHC, was introduced to prevent and reduce HAI incidents in Australian healthcare settings. The initiative's key elements are to promote the use of ABHR at the point of care, ensure standardised hand hygiene and infection prevention and control education, monitor hand hygiene compliance, and identify targeted opportunities to improve compliance (ACSQHC, 2024).

The 5 moments of hand hygiene is the theoretical model recommended by the NHHI are based on guidelines produced by the World Health Organisation (WHO). The model considers five of the most critical moments in care where transmission of microorganisms may occur and aims to reduce or prevent transmission at these points (ACSQHC, 2024). Click or tap on the '+' buttons below to read more about the five moments of hand hygiene.

An interactive H5P element has been excluded from this version of the text. You can view it online here:
https://jcu.pressbooks.pub/nursing-skills-foundations/?p=36#h5p-92

Link to Learning

Every moment of hand hygiene matters.

The following series of videos produced by the ACSQHC explores the 5 moments of hand hygiene and explains why it matters.

Hand Hygiene Moments video series [Each video is 0:49 to 1:16 long]

Alcohol–Based Hand Rub

According to the ACSQHC (2024), ABHR is the gold standard in hand hygiene practice and hand washing should be reserved for situations when hands are visibly soiled. This is due to AHBR resulting in a greater reduction of bacterial load, less time required to perform, being gentler on the skin and being more readily accessible. The exception to this is when caring for patients with Clostridioides difficile, non-enveloped viruses, tropical parasites, and protozoan oocysts where soap and water is currently the preferred method.

When using the alcohol-based hand rub method, the following steps are recommended:

- **Apply** product to the palm of one hand in an amount that will cover all surfaces.
- **Rub** hands together, covering all the surfaces of the hands, fingers, and wrists until the hands are dry. Surfaces include the palms and fingers, between the fingers, the backs of the hands and fingers, the fingertips, and the thumbs.
- The process should take about 20–30 seconds, and the solution should be dry.

Please note: There is no maximum number of times that ABHR can be used before hands need to be washed with soap and water (ACSQHC, 2024).

Alcohol-based hand rub is the hand hygiene product of choice for all standard aseptic technique procedures (ACSQHC, 2024).

Figure 5. The WHO handrub poster

Soap and Water Hand Wash

Soap and water hand wash is recommended when hands are visibly soiled or when caring for patients in which ABHR has demonstrated decreased effectiveness such as Clostridioides difficile, non-enveloped viruses, tropical parasites, and protozoan oocysts.

When washing with soap and water, the following steps are recommended:

- **Wet** hands with warm or cold running water and apply facility-approved soap.
- **Lather** hands by rubbing them together with the soap. Use the same technique as the handrub process to clean the palms and fingers, between the fingers, the backs of the hands and fingers, the fingertips, and the thumbs.
- **Scrub** thoroughly for at least 40–60 seconds.
- **Rinse** hands well under clean, running water.
- **Dry** the hands using disposable towelling.
- **Use** a clean paper towel to shut off the faucet.

Please note: Wet hands more readily spread microorganisms therefore the complete drying of hands is a vital component to the effectiveness of the procedure (ACSQHC, 2024).

Figure 6. The WHO handwash poster

Link to Learning

Please watch this video about hand hygiene [2:01]:

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://jcu.pressbooks.pub/nursing-skills-foundations/?p=36

Personal Protective Equipment

Personal protective equipment (PPE) includes gloves, gowns, face shields, goggles, and masks used to prevent the spread of infection to and from patients and healthcare providers. When used for a patient with transmission-based precautions, PPE supplies are typically stored in an isolation trolley next to the patient's room, and a sign is posted on the door alerting staff and visitors to precautions needed before entering the room. The following section provides detailed information on the proper selection, use, and disposal of PPE to ensure effective infection prevention and control.

Gloves

Figure 7. Gloves, including non-sterile medical gloves

Gloves protect both patients and healthcare workers from exposure to infectious material that may be carried on the hands. Gloves are used to prevent contamination of healthcare workers' hands during activities such as the following:

- Anticipating direct contact with blood or body fluids, mucous membranes, nonintact skin, and other potentially infectious material
- Having direct contact with patients who are colonised or infected with pathogens transmitted by the contact route, such as *Vancomycin-resistant enterococci* (VRE), *Methicillin-resistant staphylococcus aureus* (MRSA), and *Respiratory syncytial virus* (RSV)
- Handling or touching visibly or potentially contaminated patient care equipment and environmental surfaces.

Non-sterile disposable medical gloves for routine patient care are made of a variety of materials, such as latex, vinyl, and nitrile. Many people are allergic to latex, therefore clarifying latex allergies for the patient and other healthcare professionals prior to use is required.

The wearing of gloves does not eliminate the need for hand hygiene. The 5 moments of hand hygiene should continue to be followed. Hand hygiene should occur prior to donning and after removing gloves. Gloves are considered single-use and must not be washed for subsequent reuse as microorganisms cannot be reliably removed from glove surfaces, and continued glove integrity cannot be ensured. Gloves may need to be changed when providing care to a single patient to prevent cross-contamination between body sites. It is also necessary to change gloves if the patient interaction requires touching portable computer keyboards or other mobile equipment that is transported from room to room. Discarding gloves between patients is necessary to prevent transmission of infectious material.

Applying Medical Gloves (Non-Sterile):

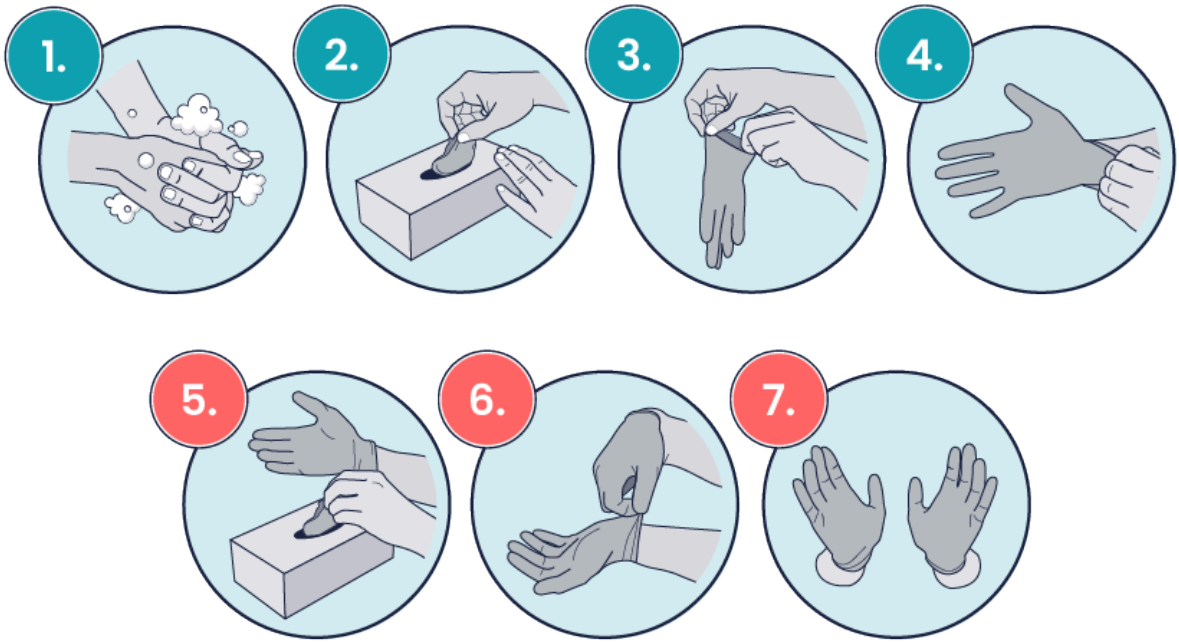


Figure 8. How to don non-sterile gloves

1. Before donning gloves, use an alcohol-based handrub or soap and water to perform hand hygiene.
2. Take out a glove from its original box.
3–4. Touch only the top edge of the glove corresponding to the wrist to don the first glove.
5–6. Take the second glove with your ungloved hand and touch only part of the glove corresponding to the wrist. While donning the second glove, hook the fingers of your gloved hand on the external part of the glove to avoid touching your forearm.
7. Once gloved, do not touch anything that is not assigned for appropriate glove use.

When gloves are worn in combination with other PPE, they are put on last. Gloves that fit snugly around the wrist should be used in combination with isolation gowns because they will cover the gown cuff and provide a more reliable continuous barrier for the arms, wrists, and hands.

Removing Medical Gloves

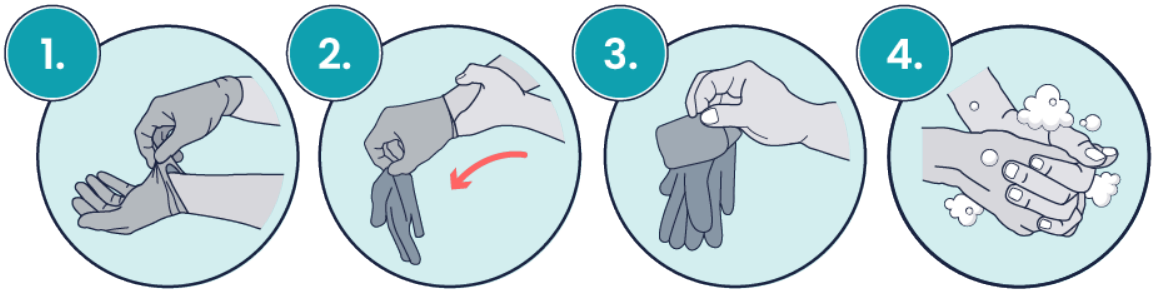


Figure 9. How to remove non-sterile gloves

1. Pinch one glove at the wrist level to remove it, without touching the skin of the forearm, and peel away from the hand, thus allowing the glove to turn inside out.
2. Hold the removed glove in the gloved hand and slide the fingers of the ungloved hand inside between the glove and the wrist. Remove the second glove by rolling it down the hand and fold into the first glove.
3. Discard the removed gloves.
4. Perform hand hygiene by rubbing with an alcohol-based handrub or by washing with soap and water.

Gowns

Protective clothing (apron/gowns) are recommended for healthcare workers in the following situations:

- Will come into close contact with patients, material, or equipment that may lead to contamination of skin or clothing
- At risk of exposure to blood, body substances, or excretions
- Required for contact-based transmission precautions.

Aprons/gowns are provided in several forms and will be selected depending on the activity to be undertaken and the patient's infectious status.

Types of aprons/gowns available include:

- Plastic apron: Worn when there is a low risk of exposure to blood or body substance to protect the healthcare worker's clothing
- Gown: Worn to protect the healthcare worker's body areas and clothing from blood, body substance, and potential infectious material when splashing is likely
- Full body gown: Worn when extensive skin-to-skin contact is expected or there is a likelihood of extensive splashing of body substances
- Sterile gown: Worn when a surgical aseptic field is required.

All gowns used in clinical settings should be impervious to fluid.

Isolation gowns are used to protect the healthcare worker's arms and exposed body areas and to prevent contamination of their clothing with blood, body fluids, and other potentially infectious material. When using standard precautions, an isolation gown is worn only if contact with blood or body fluid is anticipated. However, when contact transmission-based precautions are in place, donning both gown and gloves upon room entry is indicated to prevent unintentional contact of clothing with contaminated environmental surfaces.

Gowns are usually the first piece of PPE to be donned. Isolation gowns should be removed before leaving the patient's room to prevent possible contamination of the environment outside. Isolation gowns should be removed in a manner that prevents contamination of clothing or skin. The outer, "contaminated," side of the gown is turned inward and rolled into a bundle, and then it is discarded into a designated container to contain contamination. See donning and doffing your PPE for further instructions.

Figure 10. Nurse wearing an isolation gown

Masks

The mucous membranes of the mouth, nose, and eyes are susceptible portals of entry for infectious agents. Masks are used to protect these sites from entry of large infectious droplets. Masks have three primary purposes in healthcare settings:

- Used by healthcare personnel to protect them from contact with infectious material from patients (e.g., respiratory secretions and sprays of blood or body fluids), consistent with standard precautions and droplet transmission precautions
- Used by healthcare personnel when engaged in procedures requiring sterile technique to protect patients from exposure to infectious agents potentially carried in a healthcare worker's mouth or nose
- Placed on coughing patients to limit potential dissemination of infectious respiratory secretions from the patient to others in public areas (i.e., respiratory hygiene).

Masks may be used in combination with goggles or a face shield to provide complete protection for the face. General surgical masks differ from respirators which are used during airborne transmission-based precautions to prevent inhalation of small, aerosolised infectious droplets.

Figure 11. Nurse wearing a surgical mask

It is important to properly wear and remove masks to avoid contamination. Some considerations when wearing a mask include:

- Change mask between patients and when soiled or wet
- Masks are single-use, do not reapply once removed
- Do not dangle the mask under the nose, chin, around the neck or store it on arms/elbows
- Once applied, do not touch the front of the mask

- Perform hand hygiene upon touching or discarding a used mask. (NHMRC, 2019).

Figure 12. Examples of how a nurse should not use a mask

Particle Filter Respirators

P2 or N95 respirators are worn to provide respiratory protection to healthcare workers during procedures that are likely to involve aerosolisation of pathogens, and/or when caring for patients with a known or suspected airborne transmission agent. A respirator mask such as the P2 or N95 has significantly higher particle filtration than a standard surgical mask; however, it must be fitted correctly for maximum effectiveness. A formal 'fit test' for these masks is a common annual requirement in many Australian healthcare facilities. Fit checking is required as part of the standard donning process. It is important to apply, wear, and remove respirators appropriately to avoid contamination. The following considerations should be made when wearing a Respirator:

- If a good seal cannot be made, an alternative should be considered.
- Respirators require changing when they become moist.
- Respirators should not be reused.
- Do not wear a respirator under the nose, around the neck, or stored on arms/elbows.
- Hand hygiene is required after the touching/disposal of the respirator (NHMRC, 2019).

To apply and fit check your P2 or N95 mask correctly:

- Perform hand hygiene
- Select an appropriately sized P2/N95 mask
- Separate the edges and straps
- Hold respirator on face
- Place the top strap above the ears on top of the head
- Place the bottom strap below the ears
- Conform nose piece to shape of nose using fingertips of both hands *(avoid pinching with one hand)*
- Once a good facial fit is achieved, perform a fit check
    - Exhale sharply. The respirator should fill with air—adjust if there is leakage.
    - Inhale deeply. The respirator should draw in and slightly collapse towards the face—adjust if air

entry occurs through gaps (NHMRC, 2019).

Figure 13. Examples of how a nurse should put on a mask

Goggles/Face Shields

Eye protection may be required for situations where exposure through splashing may occur. The chosen protection will depend upon circumstances such as risk of exposure, other PPE used, and personal vision needs. Personal eyeglasses and contact lenses are not considered adequate eye protection. Most goggles will fit over prescription eyewear. For goggles to be efficient, they must fit snuggly, particularly from the corners of the eye and across the brow (NHMRC, 2019). Face shields can offer additional protection to other parts of the face as well as the eyes if required.

Figure 14. A healthcare worker wearing a face shield and a N95 respirator

How to Put On (Don) PPE

More than one donning method for putting on PPE may be acceptable. Follow facility policy for donning PPE according to transmission-based precautions. The following order of application is currently recommended by the NHMRC (2019):

1. Identify and gather the proper PPE to don. Ensure the gown size is correct.
2. Perform hand hygiene using ABHR or soap and water *(ABHR is the preferred hand hygiene method unless hands are visibly soiled).*
3. Put on the isolation gown. Tie all the ties on the gown. Assistance may be needed by other healthcare personnel to tie back ties.
4. Based on specific transmission-based precautions and facility policy, put on a surgical mask or P2/N95 respirator. The top strap should be placed on the crown (top) of the head, and the bottom strap should be at the base of the neck. If the mask has loops, hook them appropriately around your ears. Masks and respirators should extend under the chin, and both your mouth and nose should be protected. Perform a user-fit check each time you put on a respirator. If the respirator has a

nosepiece, it should be fitted to the nose with both hands, but it should not be bent or tented. Masks typically require the nosepiece to be moulded to fit around the nose but do not pinch the nosepiece of a respirator with one hand.

5. Put on a face shield or goggles when indicated. When wearing an N95 respirator with eye protection, select eye protection that does not affect the fit or seal of the respirator and one that does not affect the position of the respirator. Goggles provide excellent protection for the eyes, but fogging is common. Face shields provide full-face coverage.
6. Put on gloves. Gloves should cover the cuff (wrist) of the gown.
7. You may now enter the patient's room.

How to Remove (Doff) PPE

More than one doffing method for removing PPE may be acceptable. Use the facility policy for the doffing procedure. The following order of removal is currently recommended by the NHMRC (2019):

1. Remove the gloves as per the instructions above.
2. Perform hand hygiene.
3. Remove the gown by unfastening the ties. Pull away from the neck and shoulders touching only the inside of the gown. While pulling the gown down from the shoulders/arms, turn the gown inside out, then roll it into a bundle and dispose of it in an appropriate waste receptacle.
4. Perform hand hygiene.
5. Carefully remove the face shield or goggles by grabbing the strap and pulling upwards and away from the head. Do not touch the front of the face shield or goggles.
6. If the PPE was contaminated perform hand hygiene.
7. Remove the respirator or face mask. Do not touch the front of the respirator or face mask. Remove the bottom strap by touching only the strap and bringing it carefully over the head. Grasp the top strap and bring it carefully over the head, and then pull the respirator away from the face without touching the front of the respirator. For masks, carefully untie (or unhook ties from the ears) and pull the mask away from your face without touching the front. Discard it in the appropriate waste receptacle.
8. Perform hand hygiene.

Removal of PPE should be carried out at the doorway of the patient's room just prior to leaving or immediately outside the room.

Link to Learning

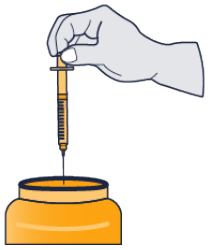
Donning and doffing PPE: Standard precautions

The following video created by the Department of Health, Tasmania, provides a clear demonstration of donning and doffing your PPE [7:23]:

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://jcu.pressbooks.pub/nursing-skills-foundations/?p=36#oembed-1

Handling and Disposal of Sharps

Injuries due to needles and other sharps have been associated with the transmission of blood-borne infectious agents, including hepatitis B virus, hepatitis C virus, and human immunodeficiency virus (HIV) to healthcare personnel. The prevention of sharps injuries is an essential element of standard precautions and includes measures to handle needles, scalpels and other sharp instruments/devices in a manner that will prevent injury to the user and to others who may encounter the device during or after a procedure.



Safety devices should be considered that minimise the risk of injury. Standard measures to decrease the risk of injury include:

- Avoid using needles where safe and use effective alternatives when available *(needleless port access systems).*
- Needles should never be recapped.
- Use instruments designed to grasp needles, retract tissue, and load/unload needles and scalpels rather than fingers.
- Give verbal announcements when passing sharps.
- Avoiding hand-to-hand passage of sharp instruments by using a Hands-Free Passing Technique (HFPT) or neutral zone.
- Use round-tipped scalpel blades instead of pointed sharp-tipped blades.
- Any person who uses a disposable sharp instrument or equipment must be responsible for its safe management and immediate disposal after use.
- Ensure every used sharp is disposed of correctly and immediately in puncture-resistant sharps containers located at the point-of-use.
- Sharps containers must be appropriately placed so that they are at an accessible height for healthcare workers but out of reach of children.
- Sharps containers must not be filled above the maximum fill level mark. Change/ dispose of containers as per facility policy (NHMRC 2019).

If you do sustain a needle stick or other sharp injury or are exposed to blood or other potentially infectious materials in your eyes, nose, mouth, or on broken skin, immediately flood the exposed area with water and clean any wound with soap and water. Do not squeeze the affected area. Report the incident immediately

to your supervisor and seek immediate medical attention according to facility policy. Complete appropriate accident/incident forms.

Figure 15. A sharps disposable container

Environmental Control

Transmission of infectious agents from the environment can occur either directly or indirectly. Routine cleaning and disinfecting of all surfaces in patient-care areas is required. The level of cleaning required is determined by the object involved and the risk of contamination. Frequently touched surfaces, especially those closest to the patient, such as bedrails, bedside tables, commodes, doorknobs, sinks, surfaces, and equipment used in patient care, require more frequent cleaning than general surfaces and fittings. Thorough cleaning of all areas is undertaken between patients in acute care settings.

Shared medical equipment and instruments/devices must be cleaned between patient use to prevent patient-to-patient transmission of infectious agents. For example, stethoscopes, blood pressure cuffs and thermometers should be cleaned before and after use for all patients. Patients who have transmission-based precautions should have dedicated medical equipment that remains in their room (e.g., stethoscope, blood pressure cuff, thermometer). When dedicated equipment is not possible, such as a unit-wide bedside blood glucose monitor, disinfection after each patient's use must be performed according to agency policy.

Process of Spills Management

Decontamination is required when spills of blood or body substances (e.g., vomit, urine) occur. Strategies for management will depend on the setting in which it occurs and the size of the spill. Manage small spills by spot cleaning with a detergent solution. Large spills require more extensive cleaning. Spill kits are readily available in each clinical area, and spills are managed per that clinical area protocol (e.g. Oncology will have a cytotoxic spill kit requirement). A spill kit, in general, contains a scoop and scraper, single-use gloves, protective apron, surgical mask, eye protection, absorbent agent, clinical waste bags and ties, and detergent. All parts are disposable to decrease the risk of cross-contamination (NHMRC, 2019).

When attending to a large spill, the healthcare worker should:

- Utilise the spill kit available
- Select appropriate PPE
- Cover the area of the spill with an absorbent clumping agent and allow it to absorb
- Use a disposable scraper and pan to scoop up absorbent material and any unabsorbed blood or body substances
- Place all contaminated items into an impervious container or plastic bag for disposal
- Discard contaminated materials
- Mop the area with a detergent solution
- Wipe the area with sodium hypochlorite (or facility-approved agent) and allow it to dry
- Perform hand hygiene (NHRMC, 2019).

Reprocessing of Reusable Equipment and Instruments

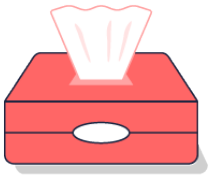
The reprocessing requirement for medical devices that are classed as reusable depends on the degree to which the item poses a risk of causing infection. Medical devices fall into one of the following categories and must be reprocessed accordingly.

- Critical items pass into sterile tissue or enter the vascular system. These items must be sterile when used. Examples include various surgical equipment such as laparoscopes, arthroscopes, ultrasound probes.
- Semi-critical items contact mucous membranes or non-intact skin. These items require sterilisation after each use; in some cases, high-level disinfection may be acceptable. Examples include respiratory therapy and anaesthesia equipment, transrectal/transvaginal probes, and cystoscopes.
- Non-critical items contact intact skin only; they do not contact mucous membranes. These items require thorough cleaning after each use. Examples include stethoscopes, sphygmomanometers, commodes, and bedpans.

Reusable medical devices require Therapeutic Goods Administration (TGA) approval and must be reprocessed according to manufacturer advice. No item marked as single-use should be reprocessed (NHRMC, 2019).

Respiratory Hygiene and Cough Etiquette

Respiratory hygiene targets patients, accompanying family members and friends, and healthcare workers with undiagnosed transmissible respiratory infections. It applies to any person with signs of illness, including cough, congestion, rhinorrhoea, or increased production of respiratory secretions when entering a healthcare facility.



The elements of respiratory hygiene include the following:

- Cover the nose and mouth with disposable tissue when coughing, sneezing, wiping, and blowing nose
- Use tissues to contain respiratory secretions
- Dispose of tissues in the nearest waste receptacle after use
- If no tissue is available, cough or sneeze into the inner elbow rather than the hand
- Perform hand hygiene after contact with respiratory secretions and contaminated material
- Keep contaminated waste away from mucous membranes
- In healthcare facilities, those with respiratory symptoms should sit as far away from others as possible (NHRMC, 2019).

As a registered nurse, you can assist in etiquette compliance by educating other healthcare facility staff, patients, and visitors. Ensure signage is viewable in language(s) appropriate to the population served, with instructions to patients and accompanying family members or friends. Provide control measures for a coughing person (e.g., covering the mouth/nose with a tissue when coughing and prompt disposal of used tissues or applying surgical masks on the coughing person to contain secretions). Ensure spatial separation is possible for persons with respiratory infections in common waiting areas when possible. Undertake good hand hygiene and encourage others to do the same.

Healthcare personnel with viral respiratory infections are advised to remain home until symptoms are resolved (NHRMC, 2019).

Aseptic Technique

In addition to using standard precautions and transmission-based precautions, aseptic technique is used to prevent contamination and transfer of pathogens to the patient from caregiver hands, surfaces, and equipment during routine care or procedures. For example, a nurse administering parenteral medication or performing urinary catheterisation will use the aseptic technique. When performed correctly, the aseptic technique reduces the amount of potential pathogenic microorganisms in an area to an amount insufficient to cause infection and prevents the transfer of those pathogens to a susceptible host.

There is often a misunderstanding between aseptic and sterile techniques in the healthcare setting. To gain an understanding, it may be best to first define the terms Aseptic and sterile.

Asepsis is defined as freedom from infection or pathogenic material. The term sterile refers to an area or item free from all microorganisms. As is seen, asepsis and sterility are closely related, with the shared concept being the removal of harmful microorganisms that can cause infection. Aseptic technique involves minimising the number of harmful pathogens in an area and creating protective barriers to prevent the spread of pathogens.

Sterile technique on the other hand seeks to eliminate every potential microorganism in and around a sterile field while also maintaining objects as free from microorganisms as possible. Sterile conditions are difficult to create and are only truly achievable in controlled environments with the use of laminar flow hoods or in operating theatres.

Principles of Aseptic Non-Touch Technique

The aseptic non-touch technique (ANTT) is a commonly used aseptic technique framework in the healthcare setting and is considered a global standard. There are two types of ANTT: standard-ANTT and surgical-ANTT.

ANTT starts with a few concepts that must be understood before it can be applied. For all invasive procedures, the "ANTT-approach" identifies key parts and key sites throughout the preparation and implementation of the procedure. A key part is any sterile part of equipment used during an aseptic procedure, such as needle hubs, syringe tips, needles, and dressings. A key site is any nonintact skin, potential insertion site, or access site used for medical devices connected to the patients. Examples of key sites include open wounds and insertion sites for intravenous (IV) devices and urinary catheters.

Preparing and Preventing Infections Using Aseptic Technique

The aseptic technique requires five essential principles to be effective:

- Sequencing
- Environmental control
- Hand Hygiene
- Maintenance of aseptic fields
- PPE.

An interactive H5P element has been excluded from this version of the text. You can view it online here:
https://jcu.pressbooks.pub/nursing-skills-foundations/?p=36#h5p-93

When planning for any procedure, careful thought and preparation of many infection control factors must be considered beforehand. While keeping standard precautions in mind, identify anticipated key sites and key parts to the procedure. Consider the degree to which the environment must be managed to reduce the risk of infection, including the expected degree of contamination and hazardous exposure to the healthcare provider. Finally, review the expected equipment needed to perform the procedure, the complexity of the procedure and the level of key part or key site handling that will be required.

Aseptic Fields

An aseptic field is a controlled workspace created for the management of key parts or key sites during clinical procedures. The complexity of the procedure will determine which of the three commonly used fields is required.

- **Critical aseptic fields** are used when a procedure is considered technically complex, resulting in difficulties in protecting multiple key sites or key parts individually with caps or covers. It is the workspace where sterile equipment is placed and manipulated during aseptic procedures. It requires the use of sterile gloves to assist in manipulating the equipment to maintain sterility and the field itself is managed as a key part.
- **Micro critical aseptic fields** are the small parts of equipment that must remain sterile during an aseptic procedure. Micro critical fields are protected by a sheath, caps or covers. Micro critical fields may be used in isolation or within critical and general aseptic fields.
- **General aseptic fields** are used when a procedure is considered technically simple and key parts can be protected easily with micro critical aseptic fields and a non-touch technique.

Creating and maintaining the aseptic field is foundational to the aseptic technique and encompasses practice standards that are performed immediately prior to and during a procedure to reduce the risk of infection, these include:

- Handwashing
- Using sterile barriers, including drapes and appropriate personal protective equipment
- Preparing the patient, including use of approved antimicrobial products
- Maintaining sterility of the field and objects within it
- Using aseptically safe techniques.

An interactive H5P element has been excluded from this version of the text. You can view it online here:
https://jcu.pressbooks.pub/nursing-skills-foundations/?p=36#h5p-94

Sterile Gloves

Sterile gloves are required to meet TGA requirements for sterilisation and are used for invasive procedures or when contact with a sterile site, tissue, or body cavity is anticipated. Sterile gloves are used in these instances to prevent transient flora and reduce resident flora contamination during a procedure, thus preventing the introduction of pathogens. For example, sterile gloves are required when performing central line dressing changes, insertion of urinary catheters, and during invasive surgical procedures.

Sterile gloves are not typically required in a standard ANTT procedure, however, they are required for surgical ANTT procedures (NHMRC 2019).

Sterile gloves are typically donned in an open manner in the general clinical environment. In the surgical environment when sterile gowns are also required, a closed donning method is utilised.

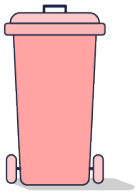
Applying Sterile Gloves

View the steps below for donning sterile gloves.

An interactive H5P element has been excluded from this version of the text. You can view it online here:
https://jcu.pressbooks.pub/nursing-skills-foundations/?p=36#h5p-95

Clinical Waste and Linen

Clinical waste requires careful disposal according to healthcare facility policies. Australian healthcare facilities' waste management policies are guided by each state and territory legislation and regulations.



In general, the Australian guidelines for the prevention and control of infection (2019) recommend the following apply when managing waste:

- Use standard precautions to avoid exposure to blood and bodily fluids when handling waste; wash hands after the procedure.
- Sort waste at the point where it is created.
- Place waste in the correct container (identified by colour and label) and dispose of it following the facility's waste management plan.
- Ensure healthcare workers are trained in proper waste handling procedures. No matter where the waste comes from (like isolation rooms or routine care areas), the criteria for classifying it as clinical or general waste are consistent.

Contaminated waste should be placed in leak-resistant biohazard bags, securely closed, and placed in

labelled, leakproof, puncture-resistant containers in appropriate storage areas. Sharps containers are used to dispose of sharp items such as discarded tubes with small amounts of blood, scalpel blades, needles, and syringes.

Linen or soiled textiles, including bedding, towels, and patient or resident clothing, may be contaminated with pathogenic microorganisms. The risk of disease transmission is negligible if they are handled, transported, and laundered safely. It is recommended that items are not shaken or handled in a manner that would aerosolise microorganisms in the environment. Individual healthcare facility policy should be followed with the Australian guidelines for the prevention and control of infection (2019) suggesting the following principles be applied:

- Wear appropriate personal protective equipment (PPE) when handling soiled linen to protect skin and mucous membranes from exposure to blood and body fluids.
- Place used linen directly into an appropriate laundry receptacle at the point of use.
- Avoid rinsing or sorting used linen in patient-care areas, and do not wash it in domestic washing machines.
- Linen contaminated with body fluids should be placed in leak-proof laundry bags for safe transport.
- Perform hand hygiene immediately after handling used linen.
- Clean linen should be stored in a clean, dry location that protects it from contamination by aerosols, dust, moisture, and pests. It must be kept separate from used linen.

Transmission Based Precautions

Patients who have known or suspected infection or colonisation of highly transmissible pathogens will require additional transmission precautions, which are dependent on the route of transmission involved. A combination of additional precautions may be utilised. These include:

- Additional PPE such as gloves, apron/gowns. Surgical mask or P2 respirators, and protective eyewear
- Dedicated equipment
- Single room or cohorting of patients
- Enhanced cleaning and disinfection of patient environment
- Restricted transfer of patients within and between facilities (NHMRC, 2019).

Contact Precautions

The use of contact precautions is indicated for patients who have known or suspected infections that can be transmitted through direct skin-to-skin contact or indirect contact with environmental surfaces or equipment. Patients in acute care should be placed in a single patient room if available. Cohorting of

patients is recommended if a single room is not available. The following should be included in the care of the patient:

- Rooms/space needs to be clearly signed.
- Patient notes/charts are kept outside the room/space.
- PPE should be applied before entering the room/space.
- Standard precautions continue, and glove change/hand hygiene is required between multiple tasks on the same patient.
- PPE should be removed and hand hygiene performed before leaving the patient room/space.
- Hands should be disinfected before documenting in the chart.

The PPE needed when treating patients in contact isolation includes gloves and an isolation gown whenever touching the patient. Disposable or dedicated patient equipment should be used for the patient. When it is unavoidable to utilise common-use equipment, ensure it has been properly cleaned and disinfected before use on another patient.

Figure 16. Contact precautions

Droplet Precautions

Droplet precautions are implemented when patients are known or suspected to be infected with pathogens transmitted by respiratory droplets from coughing, sneezing, and talking. They are intended for infectious agents that are spread through close respiratory or mucous membrane contact. Examples include influenza, norovirus, and meningococcus. Patients in acute care should be placed in a single patient room if available. Cohorting of patients is recommended if a single room is not available. The following should be included in the care of the patient:

- The room/space needs to be clearly signed.
- The surgical mask should be worn upon entry to the patient space.
- Hand hygiene should occur before applying the mask and upon removal.
- Respiratory hygiene and cough etiquette should be explained to patients.
- Gloves and gown are worn as per standard precautions.
- If a patient on droplet precautions requires an aerosol-generating procedure, the precaution should be raised to airborne. If cohorted, the patient should be moved to the treatment room for the duration of the procedure (NHMRC, 2019).
- If transport outside the room is necessary, the patient should wear a surgical mask.

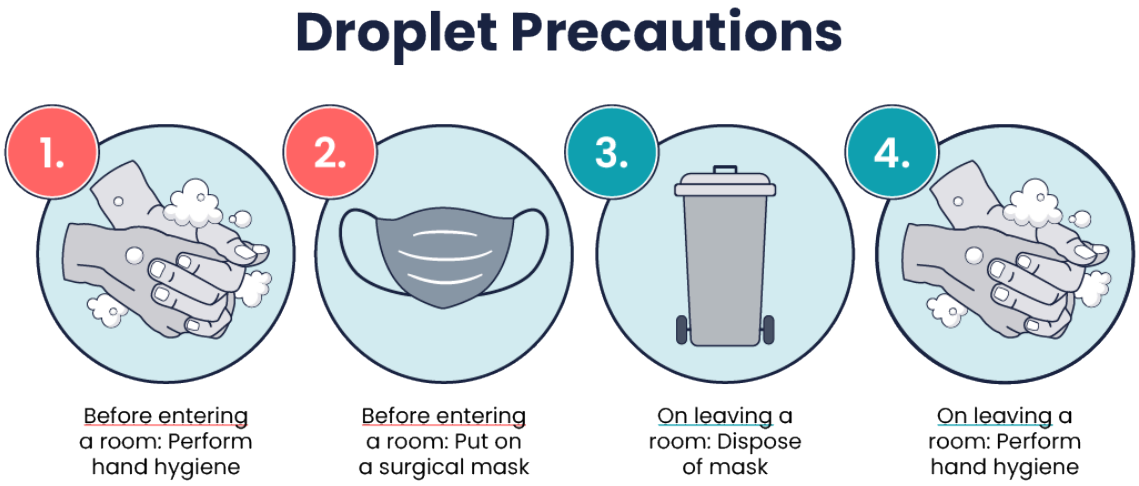


Figure 17. Droplet precautions

Airborne Precautions

When a patient is known or suspected to be infected with pathogens transmitted through droplet nuclei, airborne precautions should be used. Patients on airborne precautions, such as those being treated for Pulmonary Tuberculosis (TB), chicken pox, or measles, should be placed in negative pressure rooms. If a negative pressure room is unavailable, the patient should be masked and placed in a private room with the door closed.

- Rooms need to be clearly signed.
- Hand hygiene should occur before entering and leaving the room.
- A fit-tested P2/NP5 respirator should be applied before entry into the patient's room.
- The fit-tested P2/NP5 respirator should be removed after exiting the patient's room.
- Respiratory hygiene and cough etiquette should be explained to patients.
- Gloves and gown are worn as per standard precautions.
- The door should remain closed in the negative pressure room.
- If transport outside the room is necessary, the patient should wear a surgical mask (NHMRC, 2019).

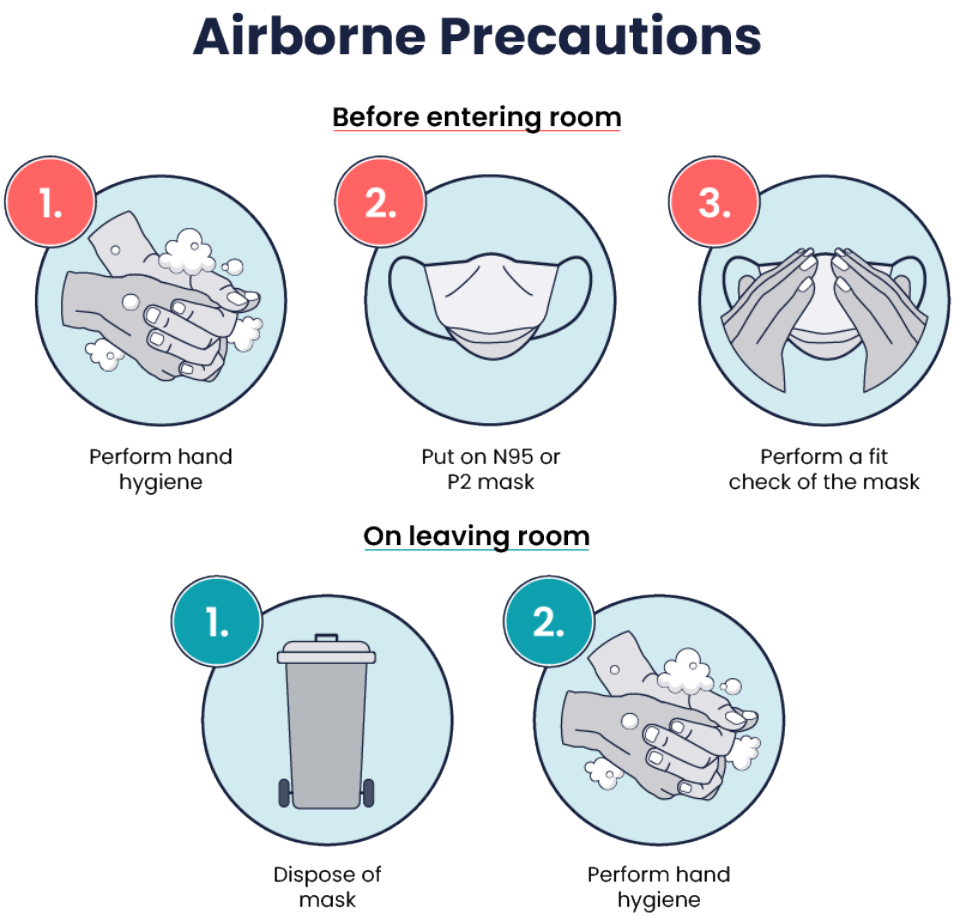
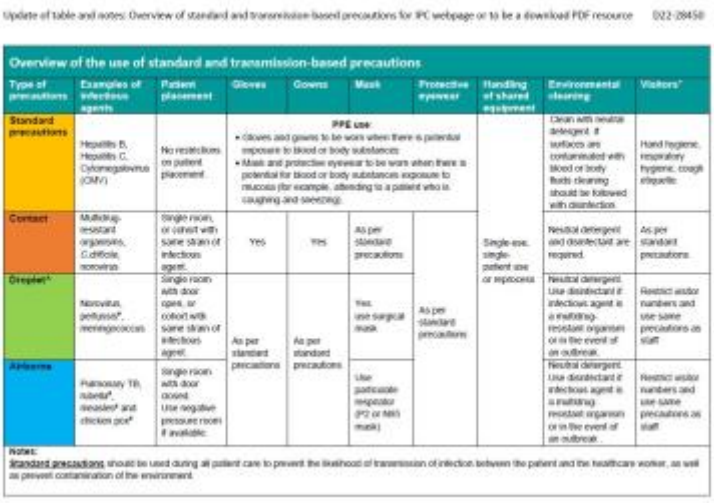


Figure 18. Airborne precautions

Use of Standard and Transmission-Based Precautions



Update of table and notes: Overview of standard and transmission-based precautions for IPC webpage or to be a download PDF resource (22-28450)

Overview of the use of standard and transmission-based precautions

Type of precautions	Examples of infectious agents	Patient placement	Gloves	Gowns	Mask	Protective eyewear	Handling of shared equipment	Environmental cleaning	Visitors*
Standard precautions	Hepatitis B, Hepatitis C, Cytomegalovirus (CMV)	No restrictions on patient placement	PPE use • Gloves and gowns to be worn when there is potential exposure to blood or body substances • Mask and protective eyewear to be worn when there is potential for blood or body substances exposure to mucosa (for example, attending to a patient who is coughing and sweating)				Single-use, single-patient use or reprocess	Clean with neutral detergent. If surfaces are contaminated with blood or body fluids cleaning should be followed with disinfection.	Hand hygiene, respiratory hygiene, cough etiquette
Contact	Multidrug-resistant organisms, C.difficile, norovirus	Single room, or cohort with same strain of infectious agent.	Yes	Yes	As per standard precautions	As per standard precautions		Neutral detergent and disinfectant are required.	As per standard precautions
Droplet*	Norovirus, pertussis*, meningococcus	Single room with door open, or cohort with same strain of infectious agent.	As per standard precautions	As per standard precautions	Yes, use surgical mask			Neutral detergent. Use disinfectant if infectious agent is a multidrug-resistant organism or in the event of an outbreak.	Restrict visitor numbers and use same precautions as staff
Airborne	Pulmonary TB, rubella*, measles* and chicken pox*	Single room with door closed. Use negative pressure room if available.			Use particulate respirator (P2 or N95 mask)			Neutral detergent. Use disinfectant if infectious agent is a multidrug-resistant organism or in the event of an outbreak.	Restrict visitor numbers and use same precautions as staff

Notes:
Standard precautions should be used during all patient care to prevent the likelihood of transmission of infection between the patient and the healthcare worker, as well as prevent contamination of the environment.

Figure 19. Overview of standard and transmission-based precautions. Click or tap on the image to download the PDF of this table

Key Takeaways

In this chapter, we covered:

- Nurses play an essential role in the prevention of infectious diseases and therefore it is crucial for nurses to understand how infectious diseases spread.
- Microorganisms' potential to cause disease is dependent on the number of organisms, virulence of the organism, its ability to survive in the host and the susceptibility of the host.
- Six specific phases must be completed for an infection to develop. These six phases process known as the Chain of infection are infectious agent, reservoir, portal of exit, mode of transmission, portal of entry, and susceptible host. Breaking this chain at any point can stop the spread of infection.
- By understanding the conditions that foster the spread of infection, nurses can implement evidence-based interventions to break the cycle and stop the chain of infection. Nurses must thoroughly understand how to protect themselves and their patients from exposure to harmful pathogens.
- Routine practices and additional precautions are used to break or minimise the chain of

infection.

- Standard precautions are applied to all people at all times, regardless of their diagnosis or presumed infection status. These standards provide a basic level of protection that reduces the transmission of organisms from one area to another.
- Additional precautions may be required to be implemented in circumstances in which standard precautions alone may not prevent the transmission of infection. These precautions include Contact precautions, Droplet precautions, and Airborne precautions.
- Hand Hygiene is one of the most important techniques in preventing and controlling transmission of infection.
- The aseptic technique is used to prevent contamination and transfer of pathogens to the patient from healthcare worker hands, surfaces, and equipment during routine care or procedures that are considered part of standard precautions.

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HEALTH ASSESSMENT, PART ONE: HEALTH HISTORY ASSESSMENT

Amy McCrystal and Jessica Best

Learning Outcomes

In this chapter you will learn how to:

- Identify the key components of a health history
- Demonstrate effective techniques for conducting a health history.

The Health History

The complete subjective health assessment is commonly referred to as a health history. It provides an overview of the patient's current and past health and state of illness. You conduct it by interviewing the patient, asking them questions, and listening to their narrative.

This information is often shared verbally with you or in a way that the patient can best communicate. It is also sometimes collected through a standardised form that the patient completes. In some cases, it also includes information shared by a family member, friend, or another health professional when the patient is unable to communicate.

The complete subjective health assessment is part of the assessment step and first component of the Care Planning Process (assessment, problem identification, planning interventions, implementing interventions and evaluating outcomes).

Figure 1. The subjective and objective assessment types as part of the care planning process

As illustrated in Figure 1, the assessment phase of the Care Planning Process involves collecting subjective data (information that the patient shares) and objective data (information that you collect when performing a physical exam).

Subjective and Objective Data

As the word "subjective" suggests, this type of data refers to information that the patient voluntarily shares with you, either spontaneously or in response to your questions. Subjective data can include information about both symptoms and signs. In the context of subjective data, symptoms are experiences that the patient feels and you would only know about them if the patient discloses them to you. Signs, on the other hand, observable by the nurse, such as a rash, bruising, or perspiration. Although signs can be observed, they fall under subjective data when the patient provides additional context. For example, the nurse may

observe a rash and the patient may state that the rash is itchy, this would be considered subjective data. In this case, the rash is a sign, but the itching is a symptom as it is something the patient feels and cannot be directly observed by the nurse.

Categories

Categories of the complete subjective health assessment (as illustrated in Figure 2) vary depending on the framework you follow but generally include:

Figure 2. Subjective assessment categories

The assessment begins with an introduction, followed by the collection of demographic and biographic data, as well as the patient's primary health needs. After this initial stage, there is no fixed order in which other categories must be assessed. The sequence often depends on the patient's main health concerns or reasons for seeking care and may also be influenced by the natural flow of conversation. Sensitive topics and culturally relevant health questions are generally addressed later in the assessment once a level of trust has been established with the patient.

When introducing yourself, always state your full name, designation, and pronouns, and then ask the patient which name and pronouns they prefer you to use. It's important to note that the term "preference" should not be used when referring to pronouns and gender, as these are not simply preferences.

In addition to the general categories, you may include subjective questions related to each body system in a phase known as the Review of Systems. These questions provide valuable insight into the function and condition of various systems (e.g., skin, eyes, cardiovascular, musculoskeletal). Depending on the

patient's responses and any cues that raise concerns, you may need to ask follow-up questions for further clarification.

Demographic and Biographic Data

Introductory information refers to the demographic and biographic data that you collect from the patient. This data provides you with basic characteristics about the patient, such as their name, contact information, birthdate and age, gender, gender pronouns, allergies, languages spoken and preferred language, relationship status, occupation, and resuscitation status. While this data is concise, the intent of collecting it is meant as a brief overview of the patient. This data provides you with basic characteristics about the patient, such as their name, contact information (including next of kin in an emergency) and any allergies to be aware of.

Contact information and emergency information

- What is your full name? What name do you prefer to be called by?
- What is your address?
- What is your phone number?
- Who can we contact in an emergency? What is their relationship to you? What number can we reach them at?

Birthdate and age

- What is your birthdate?
- What is your age?

Gender

- Tell me what gender you identify with.
- Not everyone uses a gender pronoun, but if you do, what gender pronouns do you use? (If the person asks you to use a pronoun that you are not familiar with, it is okay for you to respectfully respond, "I am not familiar with that pronoun. Can you tell me more about it?")

Allergies

- Do you have any allergies?
- If so, what are you allergic to?
- How do you react to the allergy?
- What do you do to prevent or treat the allergy?

Note. You may need to prompt for information on medications, foods, insects, etc.

Languages spoken and preferred language

- What languages do you speak?
- What language do you prefer to communicate in (verbally and written)?

Note. You may need to inquire and document if the patient requires an interpreter.

Relationship status

- Tell me about your relationship status.

Note. Avoid questions such as "Are you married?" or "Do you have a boyfriend?" or "Do you have a wife?" as they assume normative behaviour and heterosexuality.

Occupation/school status

- What is your occupation? Where do you work?
- Do you go to school?

Note. Reassure the patient that this information provides insight into the nature of their work (e.g., the physical or psychological impact) and environmental exposures and that the question is not intended to evaluate the patient.

Resuscitation status

We ask all patients about their resuscitation status, which refers to medical interventions that are used or not used in the case of an emergency (such as if your heart or breathing stops). Reassure the patient that it is okay to take more time to think about this, and that they may want to speak with someone they trust like a family member or friend. You should also make it clear that they can change their mind. A discussion might include questions such as: "At this point, if any of this happens, would you like us to intervene?"

Note. Depending on the patient's answer, you will need to collaborate with the broader healthcare team, explore the details of the patient's wishes further, and have them complete a requisite resuscitation form, depending on your organisational policy.

Main Health Needs (Reason for Seeking Healthcare)

The patient's main health needs are referred to in a variety of ways depending on the environment or institution that you work in. At the first point of contact, "main health needs" are often referred to as "reasons for seeking care" or "main concerns or issues." In an institution where the patient is already admitted, "main health needs" is more commonly used. Whichever term is used, it recognises that patients are complex beings, with potentially multiple co-existing health needs, and often there is a pressing issue that requires most immediate care. This is not to suggest that other issues be ignored, but rather it allows providers, patients, and care partners to stay focused. See below for an example of how you might ask a patient about their main health needs.

Patient is presenting to a clinic or a hospital emergency or urgent care (first point of contact)

- Tell me about what brought you here today.
  - Tell me more.
  - How is that affecting you?

Patient is already admitted, and you are starting your shift

- Tell me about your main health concerns today.
  - Tell me more.
  - How is that affecting you?

Current and Past Health

Understanding the patient's current and past health is important and may provide an explanation or rationale for the patient's current health status. Furthermore, these data can provide insight into health promotion needs and co-morbidities. It is helpful to understand the current and past health profiles before assessing other aspects of health, as the information will inform subsequent questions. The order of the questions about current and past health, and the detail elicited, often depends on the patient's main health needs and developmental status. Not all questions apply to every patient; their use and phrasing are contingent on the individual patient and their situation. As you develop your clinical judgment, which comes with practice, you will become more astute about which questions are appropriate and how to frame these questions. Sample questions are provided below for assessing current and past health, but other questions may arise that you may need to ask depending on the patient's main health needs and their responses.

Current health

Issues other than their previously noted main health needs/reasons for seeking care.

- Are there any other issues affecting your current health?
  - Tell me more.
  - How is that affecting you?

Note. Although the patient may not have made the connection, other health issues are sometimes related to their main health need. For example, they may report a fever in addition to an earache.

Childhood illnesses

Type, timing, treatment, hospitalisations, complications, disability

- Tell me about any significant childhood illnesses that you had.
- When did it occur?
- How did it affect you?
- How did it affect your day-to-day life?
- Were you hospitalised? Where? How was it treated?
- Who was the treating practitioner?
- Did you experience any complications?
- Did it result in a disability?

Note. The probing questions may be more important to ask when the illnesses may impact the patient later in life, for example, Rheumatic Heart Disease (RHD).

Chronic illnesses

Type, timing, impact, treatment, hospitalisations, complications, disability

- Tell me about any chronic illnesses you currently have or have had (e.g., cancer, cardiac, hypertension, diabetes, respiratory, arthritis.

Note. Chronic illnesses can significantly impact a patient's life both physically and psychosocially.

Acute illnesses, accidents, or injuries

Type, timing, treatment, hospitalisations, complications, disability

- Tell me about any acute illnesses that you have had.
- Tell me about any accidents or injuries you currently have or have had.

Note. Acute and Chronic illnesses can significantly impact a patient's life both physically and psychosocial.

Obstetrical health

Number of pregnancies, full-term deliveries, pre-term deliveries, number of living children, fertility treatments, miscarriages, termination of pregnancy, and other data related to current or past pregnancy

- Have you ever been pregnant?
- Do you have plans to get pregnant in the future?
- Tell me about your pregnancies.
- Have you ever had difficulty conceiving?
- How was your labour and delivery?
- Tell me about your postpartum experience.
- Were there any issues or complications?

Note. These questions do not apply to all patients. Additionally, you should be aware that the feelings about pregnancy can be complex and may not always be happy.

Mental Health and Well-Being

A patient's mental health refers to their emotional and psychological well-being that affects their day-to-day functioning. Mental health is often under-screened, which reveals a significant gap, considering that stress is pervasive in society. Mental illness includes conditions such as depression, anxiety, addiction, schizophrenia, and post-traumatic stress disorder, among others. Mental illness is a disruption in everyday function, which means a person's employment, relationships, and civil participation can all be impaired by mental illness. It is important to assess a patient's mental health, and if present, mental illnesses. You want to begin this component of the assessment with a statement such as, "Mental health is an important part of our lives and so I ask all patients about their mental health and any concerns or illnesses they may have."

See below for a selection of questions and statements that you may ask patients to elicit data about their mental health. Note also that there are many other factors that influence mental health, such as violence and trauma, which are addressed under the next section, Functional Health.

Tell me about your mental health

This question broadly focuses on health and invites a dialogue. The statement should not be asked in isolation or as a one-off question, as societally and culturally there are different meanings of what constitutes mental health, and a patient may not identify themselves as having mental health issues. If a patient responds "Good," consider probing a bit further with "Tell me about how so," or "What do you mean by good?" which allows them to respond in more depth.

Tell me about the stress in your life

Stress, by and large, is a relatable term that many patients have experienced and that is something they are likely more comfortable talking about than more difficult health issues because it is so ubiquitous. It's important to be attentive to the patient's language and consider terms they may use, such as "extreme stress," "severe stress," "unmanaged stressed," or "debilitating stress," as these may indicate an underlying mental health issue or stress that requires intervention.

How does stress affect you?

Understanding how stress affects the patient provides insight into the mental, physical, and social impact on them. You may need to probe about how stress affects the patient physically, mentally, and socially.

How do you cope with this stress?

This question invites discussion about coping strategies. It is important to be attentive to any self-harm coping strategies such as substance abuse, isolation/disengagement, food restriction, purging, cutting, compulsions, and phobias as these could indicate a mental health issue.

Functional Health

Functional health involves the assessment of the patient's physical and mental capacity to participate in day-to-day activities. It includes assessment of:

- Activities of Daily Living (ADL) are basic tasks fundamental to everyday functioning (e.g., hygiene, elimination, dressing, eating, ambulating/moving).
- Instrumental Activities of Daily Living (iADL) are more complex daily tasks that allow patients to function independently (e.g., managing finances, paying bills, purchasing and preparing meals, managing one's household, taking medications, facilitating transportation). Assessment of iADL may be particularly important to inquire about with adolescents or young adults who have just moved into their first place and patients who are older and/or have disabilities.

It is important to assess functional health because the data collected could expose an opportunity for preventive action and health promotion, palliation, or assistance. Because health extends beyond the absence of disease, it is important to consider broader dimensions of health as a holistic and complete

assessment. You may start this section of the interview by saying, "Next, I would like to ask you some questions related to your day-to-day life and factors that affect your ability to function in your day-to-day life." Different questions and considerations on functional health are presented below.

Nutrition

Refers to food and fluid intake, financial ability to purchase food, time and knowledge to prepare and make meals, and appetite or change in appetite. You also want to elicit data related to a patient's usual diet and goals related to their nutrition. Additionally, you need to probe so that an adequate amount of detail is obtained.

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Elimination

Refers to the removal of waste products through the urine and stool. Healthcare providers refer to urinating as "voiding." A stool is referred to as a "bowel movement." You want to assess urine concentration, frequency, and odour. For stool, you want to assess frequency, colour, and consistency. You want to use terminology that patients understand. Thus, you may find yourself using less medicalised terms, such as "pee" and "poo" when speaking with some patients.

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Sleep and rest

Refer to a patient's pattern of rest and sleep and any associated routines or aids. Although it varies for everyone, it is suggested that people should get approximately eight hours of sleep per night.

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Mobility, activity, exercise

Mobility refers to a patient's ability to move around (e.g., sit up, sit down, stand up, walk).
Activity and exercise refer to informal and/or formal activity (e.g., walking, swimming, yoga, strength training).

Note: In addition to exercise, it is important to assess activity because some people may not engage in exercise but still have an active lifestyle (e.g., walking to school, working in a physically demanding job).

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Violence and trauma

There are many types of violence, including abuse and neglect, physical, sexual, psychological, and financial. Trauma can be a result of violence or other distressing events in a life.

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Relationships and resources

Refer to influential relationships in the patient's life, whether positive or negative.

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Intimate and sexual relationships

Refer to sexual feelings, attractions, and preferences toward other people. It involves a combination of emotional connection and, physical companionship (holding hands, hugging, kissing) and sexual activity. It is also linked with a person's identity and part of their physical and mental health.

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Substance use

Refers to the intake of alcohol, tobacco products (e.g., smoking, chewing tobacco), cannabis, or any illegal drugs (e.g., cocaine, heroin, meth, inhalants, fentanyl). Assess the type, frequency, quantity, and patterns while making a distinction between use and abuse. Substance misuse typically constitutes a disruption in everyday function because of a dependence on a substance (e.g., loss of employment, deterioration of relationships, loss of home or precarious living circumstances).

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Environmental health and home/occupational/school health

Environmental health refers to the safety of a patient's physical environment, which is a determinant of health. Examples include exposure to community violence, air pollution, and insect infestations. This may include health and safety in the school and workplace (e.g., hazardous materials, noise, body mechanics).

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Self-concept and self-esteem

Self-concept refers to all the knowledge a person has about themselves that makes up who they are (i.e., their identity). Self-esteem refers to a person's self-evaluation of these items as being worthy or unworthy. It is best to assess these items toward the end of the interview because you will already have collected data that potentially contributes to an understanding of the patient's self-concept and self-esteem.

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Other iADL

Refers to more complex daily tasks that allow patients to function independently.

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Preventative Treatments and Examinations

Assessing other preventative treatments and examinations includes gathering data on medications, examination and diagnostic tests, and vaccinations. You might begin this section by asking the patient, "What are the ways that are most important for you to optimise your health?" (you may have already discussed this as part of the functional health section).

It is important to ask the patient about their current, past, and known future medication regime, examinations, and vaccinations to form a profile of the treatment that the patient has received and plans to receive. This information will tell you a lot about the patient's current health status based on the care they have and will receive.

Medications

Name, dose, frequency, reason for taking it, when they first started taking it, and whether they take it as prescribed. This applies to both prescribed and over-the-counter medications, such as vitamins, pain relievers, homeopathic medicines, and cannabis.

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Examination and diagnostic dates

Primary care provider (physician or nurse practitioner), specialists, blood pressure, blood tests, chest radiographic, electrocardiogram, dental, vision, or hearing.

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Vaccinations

Type, date received, and any significant reactions.

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Family Health

Assessing the current and past health of a patient's family is important because diseases sometimes have a genetic component. This data provides you with a risk profile for inherited conditions. While it is important to understand the risk and likelihood of illness based on family health, these factors do not determine health and wellness. You want to ask questions that elicit information about the health status, age, and if applicable, cause of death and age at the time of death of blood relatives (parents, grandparents, siblings, children, nieces, nephews). Questions to ask include:

- Tell me about the health of your blood relatives.
  - Do they have any chronic or acute diseases (e.g., cardiac, cancer, mental health issues)?
  - Of any blood relatives who have passed away, do you know the cause of death?
  - And at what age did they pass?

You also want to assess the health status of non-blood relatives and individuals that patients have had close encounters with or live with; this can be an important part of the assessment, particularly in terms of communicable diseases (i.e., diseases spread through air, food, physical contact, contaminated surfaces, and insect and animal bites). Questions to ask include:

- Tell me about the health status of those you live with.
  - Has anyone been sick recently?
  - If so, do you know the cause?
  - What symptoms have they had?
- Have you been around anyone else who was sick recently (e.g., at work, at school, in a location that involved a close encounter such as a plane or an office)?

Cultural Health

Assessing cultural health involves gathering data on factors related to a person's cultural background that may influence their health and illness status. An open-ended question allows the patient to share what they believe to be most important.

An example

You may ask, "I am interested in your cultural background as it relates to your health. Can you share with me what is important about your cultural background that will help me care for you?"

Note. It is best to let patients spontaneously answer this question. Give them time to think. You should explore any factors that they choose to share (e.g., "Tell me more." "How does that affect your health and illnesses?" "Is there anything else you want to share about how these factors act as resources in your life?".

Assessing cultural health once meant having a checklist about different cultural groups. This approach is antiquated because it assumes **culture** is static and measurable. It is important to encourage each patient to speak about what is important to them. You may find that patients speak about information related to how they grew up and their way of life, their values and beliefs, traditions related to food, and their spirituality or religion, among many other things.

Key Takeaways

- A subjective health assessment (health history) is the first step in the Nursing Care Planning Process, gathered through patient interviews and active listening.

- It includes demographic and biographic data, main health needs, current and past health history, mental health, functional health, preventative treatments and examinations, and family and cultural health.
- Demographic and biographic data provides essential details like name, age, gender, contact information, pronouns, allergies, languages, and resuscitation status.
- Main health needs focus on the patient's primary reasons for seeking care or their main concerns.
- Understanding a patient's current and past health helps explain their present health status and guide care planning.
- Mental health reflects the patient's emotional and psychological well-being, impacting daily functioning.
- Functional health evaluates the patient's ability to perform activities of daily living (ADLs) and instrumental ADLs (iADLs).
- Preventative treatments and examinations involve assessing medications, screenings, diagnostic tests, and vaccinations.
- Family health history helps identify genetic risks and inherited conditions, shaping the patient's health profile.
- Cultural health includes factors from the patient's cultural background that may influence their health and care preferences.

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HEALTH ASSESSMENT, PART TWO: PHYSICAL HEALTH ASSESSMENT – EXAMINATION TECHNIQUES, PRIMARY AND GENERAL SURVEY, AND VITAL SIGNS

Amy McCrystal and Jessica Best

Learning Outcomes

In this chapter you will learn how to:

- Describe the four objective assessment techniques (inspection, palpation, percussion, and auscultation) and demonstrate their accurate application in practice
- Implement the primary survey approach (ABCDE) as the foundation for systematic patient health assessment
- Accurately measure vital signs, including respirations, oxygen saturation, blood pressure, pulse, and temperature, and interpret findings within normal parameters.

Physical Examination Techniques

Before moving on to physical health assessment, it is vital to understand the four objective assessment techniques: Inspection, palpation, percussion, and auscultation (IPPA). These involve your senses of sight, hearing, and touch. You should also be aware of your sense of smell when conducting any physical assessment, as certain odours can act as a cue; for example, a foul odour may indicate an infection.

- Inspection involves your visual sense to observe the patient.
- Palpation involves your sense of touch to physically feel areas of the body.
- Percussion involves a combination of touch and hearing, but your focus is on hearing sounds when tapping the areas of the body.
- Auscultation involves your sense of hearing while listening to areas of the body with a stethoscope.

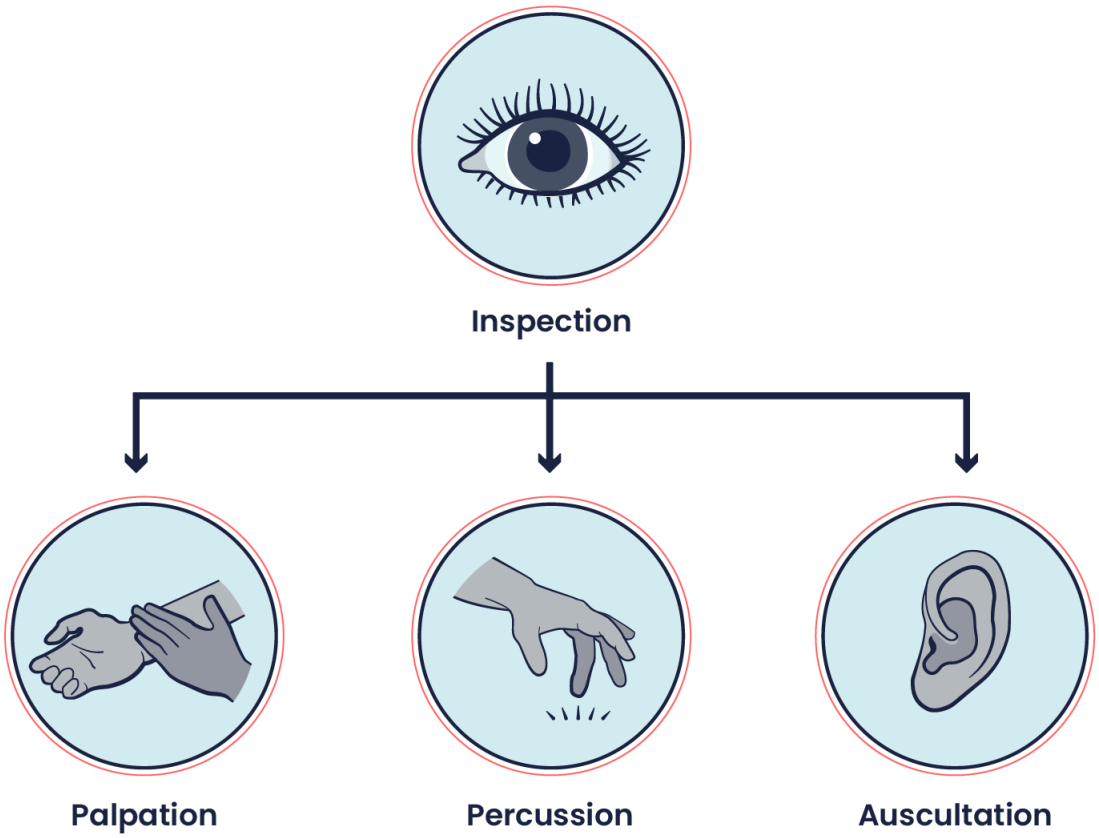

Figure 1. Objective assessment techniques

These techniques should be performed with methodical and deliberate action. Always perform inspection first because it is the least invasive and does not involve physical touch. Inspection also allows you to establish a baseline for your assessment. For example, if you observe someone crouched over in pain, this will inform the sequence of your subsequent assessment techniques. Typically, palpation, percussion, and then auscultation follow inspection. The sequencing of techniques may be rearranged for several reasons, including which system is being assessed and for safety reasons. For example, when assessing the abdomen, auscultation is generally performed before percussion and palpation. Patient safety and comfort also influence the sequence of objective techniques. For example, with a sleeping infant, you should perform inspection and auscultation while the child is calm and to avoid awakening the patient. You will learn more about modifications to the sequencing of techniques as you learn about specific body systems. Determining technique sequence also comes with experience.

When applicable, these IPPA techniques are used to assess body systems (e.g., eyes, ears, heart and neck vessels, lungs and thorax, abdomen, and musculoskeletal). However, not all techniques are applicable to all systems. For example, you would not auscultate an eye because it does not emit a sound that would give you relevant data.

Inspection

Inspection is the technique of purposeful and systematic observation of the patient—note that this does not involve touching, but only careful visual observation. It begins as soon as the patient walks in the room, or you enter the patient's room, and it ends when you or the patient leaves the room. You should maintain inspection constantly throughout the examination.

While inspecting, you should note both normal and abnormal findings. When doing so, you should complete a bilateral comparison in which you compare the left side of the body to the right side for comparison. For example, if you notice that the upper left eyelid is drooping, is this the same for the upper right eyelid? This comparison is helpful because symmetry is usually expected, whereas asymmetry should draw your attention as a potential cue for an abnormal finding.

The systematic process involves inspecting the patient overall to gain a general impression, and then inspecting specific body areas and body systems to focus your assessment. For example, when inspecting the patient overall, you may assess the following:

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Inspect specific body areas as you assess each body system. For example, you will inspect the chest area when you assess the cardiac system (i.e., the heart). Doing so in a systematic manner will allow you to only expose the area that you are assessing while ensuring appropriate draping.

Palpation

Palpation is the technique of using your hands/fingers to assess the patient based on your sensation of touch. It provides the opportunity to use your sense of touch to assess the body and further examine cues that were identified during inspection.

As you prepare to touch the patient, it is important that you:

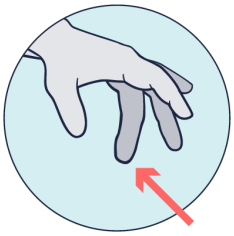
- Ask permission to touch. Touch can sometimes be misinterpreted, so it is essential to be purposeful with each movement and explain what you are doing.
- Consider the warmth of your hands. Cold hands can be uncomfortable for the patient. Do not blow on your hands to warm them up as this will transfer bacteria from your mouth to your hands. Instead, rub your hands together to create heat.

- Avoid staccato touch unless indicated. The jerk-like movement can be difficult to anticipate for the patient. When touching the patient, use firm pressure unless otherwise indicated. Light pressure can be ticklish. In this case, consider sometimes incorporating the patient's hands, where possible, into your palpation technique to reduce tickling.

Palpation provides useful information to assess and evaluate findings related to temperature, texture, moisture, thickness, swelling, elasticity, contour, lumps/masses/deformities, consistency/density, organ location and size, vibration, crepitation, and presence of pain. See below for specifics of how to conduct palpation based on what you are attempting to assess.

The dorsal aspect of your hand has thin skin relative to the rest of your hand and is therefore more sensitive to temperature.

Temperature refers to the degree of heat or cold an object holds. Use the dorsal surface of your own hands (i.e., the back of the hands), to assess the temperature of a surface (e.g., skin). For example, findings may include "warm skin temperature on arms, equal bilaterally."



Your fingertips are densely innervated and therefore sensitive to tactile discrimination. Recall your thumb has a pulse and therefore is not ideal for assessing pulsatility (e.g., pulses) of the patient. Considerations when using fingertips to inspect are presented below.

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Cupping of the hand or grasping with fingers and thumbs will allow you to gain coverage of an anatomical area while feeling for abnormalities.

Bones and muscles (and associated deformities) as well as the trachea and testicles are often assessed using a gentle grasping motion of the fingers and thumbs.

Another type of crepitation is an abnormal grating or crunching sound or sensation felt and heard over joints at the location where bones meet. It occurs when the articular surface of bones grinds together. This is different to the sounds made when a person cracks their fingers or joints (which are caused by the slipping of tendons/ligaments over bony surfaces). Listen and place your hand on (i.e., cup your hand over) the joint, or grasp the joint with your fingers and thumb, while asking the patient to move their joints through a range of motion. This will be discussed in more detail when you learn about the musculoskeletal system.

The metacarpophalangeal joints (base of fingers on the palmar surface) or ulnar surface of hands/fingers (are the most sensitive to movement discrimination (vibration and pulsatility).

Vibration is a subtle oscillating movement that resembles a quivering or shaking motion. It may be comparable to the sensation of an off-balanced washing machine, standing on a platform when the train is entering, or the sensation of a mild earthquake. Vibrations may be felt over the lungs, termed tactile fremitus; this will be discussed in more detail when you learn about the respiratory system.

Pulsatility, also referred to as abnormal pulsations felt over the heart, can be assessed with the ulnar surface of your hands or the palmar surface of your metacarpophalangeal joints. These abnormal pulsations are referred to as "thrills" and will be discussed in more detail when you learn about the cardiovascular system. For example, findings may include "a thrill was palpated over second intercostal space left sternal border."

Percussion

Percussion involves tapping the body to elicit sounds and determining whether the sounds are appropriate for a particular organ or area of the body. Try tapping different surfaces with your fingertips and compare the sounds: a firm hard surface like a wood desk or table, a thick textbook, a window, or even a drum. As you tap these surfaces, you can hear that each surface elicits a different sound based on the object's consistency. This concept also applies to the body.

Each body part that you percuss provides information about the consistency as well as the size and borders of the underlying structure. For example, the percussion sounds can tell you if the organ is:

- Air filled (e.g., lungs)
- Fluid filled (e.g., bladder and stomach)
- Dense (e.g., liver).

Percussion can also help reveal the presence of masses, particularly if they are close to the surface of the body.

There are three approaches to percussion, but the most widely used is indirect percussion (Figure 2), which is the application of a mediated force using parts of both hands.

Figure 2. Nurse using the percussion technique

Indirect percussion is often used to assess the lungs and the abdomen (e.g., bowels, bladder, liver). The steps of this technique are as follows:

1. Non-dominant hand: with your hand parallel to the body, place the distal interphalangeal joint of the pleximeter (middle) finger of your non-dominant hand firmly on the body region to percuss. Ensure that only your interphalangeal joint is touching the body (and not the rest of the hand) and that the finger is fully extended.
2. Dominant hand: flex (bend) the pleximeter finger of your dominant hand and with the tip of your finger, tap twice on the distal interphalangeal joint of your non-dominant hand. The pleximeter finger of your dominant hand should be at a 90-degree angle to the surface of the body. The motion should be firm and quick with a very short duration. To optimise this motion, the wrist of your dominant hand should be relaxed and loose with your forearm parallel to the person's body. This skill requires lots of practice, so start by practising the technique on a table or your own leg.

As a nurse, you need to become familiar with the expected percussion sounds so that you can identify what is normal and what is abnormal. See Figure 3 for the expected location of percussion sounds and the tabs below for an explanation of the types of percussion sounds heard including resonance, hyperresonance, tympany, dullness, and flatness.

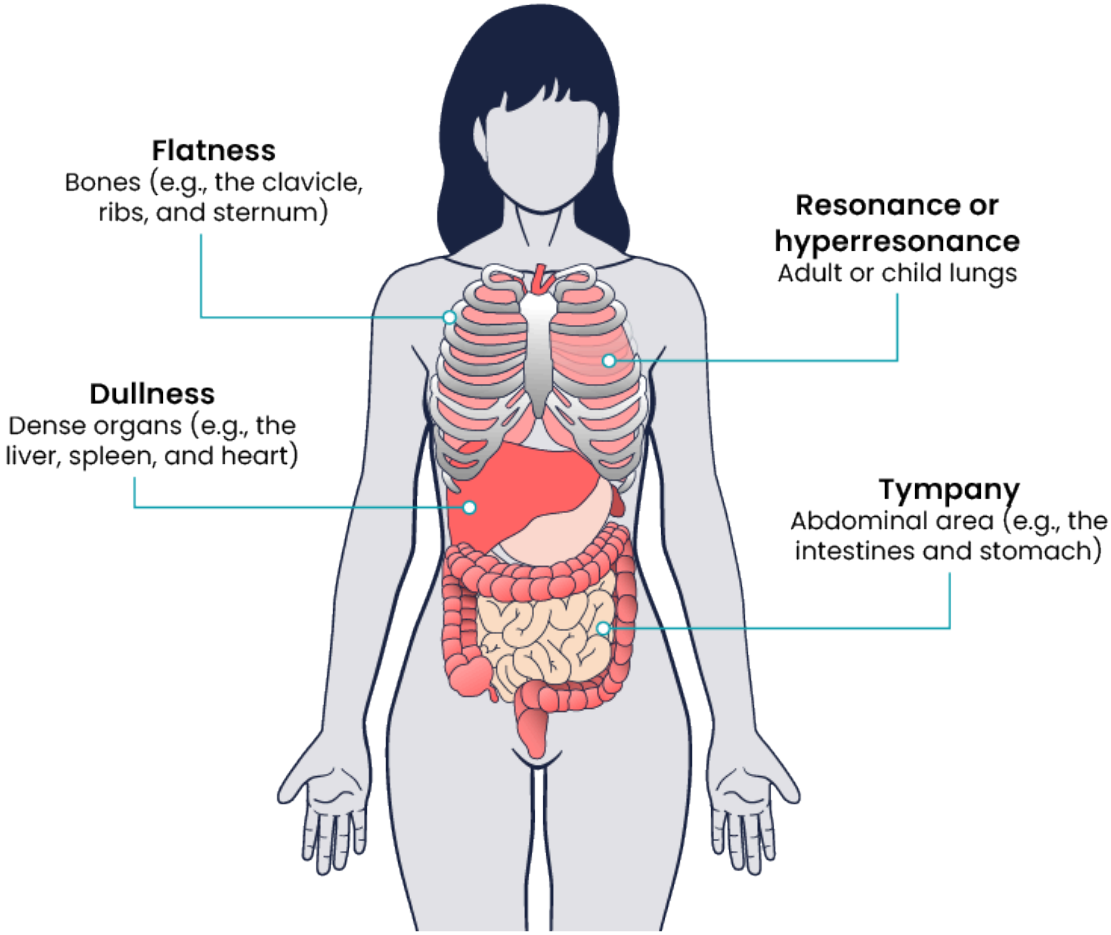

Figure 3. Percussion locations

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Another form of indirect percussion is used to assess the kidneys; this technique will be discussed in more detail when you learn about abdominal assessment.

Direct percussion involves an unmediated approach with the use of only one of your hands; it is used to assess pain/tenderness associated with the sinuses or asses a newborn/infant's lungs. The steps of this technique involve flexing the index and pleximeter fingers of your dominant hand, and directly tapping the body's surface with the tips of these fingers at a 90-degree angle.

A third approach, tool-facilitated percussion, involves using an instrument to tap the body (e.g., a reflex hammer); this technique will be discussed in more detail when you learn about neurological assessment.

Auscultation

The assessment technique of auscultation involves listening to the body. Although this is typically performed with a stethoscope, you can sometimes hear sounds from the body using just your ear. For example, you have probably heard your own or another person's stomach growling; another example is heavy breathing after exercise.

You can perform auscultation on the body to hear several sounds including:

- High-pitched sounds like lung sounds, bowel sounds, and some heart sounds
- Low-pitched sounds like some heart sounds, as well as sounds associated with abnormal vascular sounds of the carotid arteries and the aorta.

To perform auscultation, you need a high-quality stethoscope with a separate diaphragm on one side and a bell on the other side. The diaphragm is used for auscultating high-pitched sounds, while the bell is used for auscultating low-pitched sounds. Another option is an acoustic stethoscope in which the diaphragm and bell are manufactured as one piece: using this type of stethoscope, you can alternate pressure to auscultate for high- or low-pitched sounds, using light pressure to accentuate low-pitched sounds and firmer pressure to accentuate high-pitched sounds. There are also electronic stethoscopes to help amplify sounds for people with hearing loss.

Figure 4. Littmann stethoscope featuring a bell and diaphragm

Primary Survey

The primary survey, often referred to as the ABCDE approach (Airway, Breathing, Circulation, Disability, and Exposure), forms the crucial first step in the assessment process. Nurses should perform an ABCDE assessment on patients during every encounter, not only at the first presentation but also during every subsequent contact. This quick primary survey ensures the patient is medically stable. If any signs indicate patient distress, appropriate escalation and emergency care are initiated. The ABCDE components are initially assessed, and emergency actions are taken as needed. Mental status, behaviour, mobility and communication can be assessed after the initial survey.

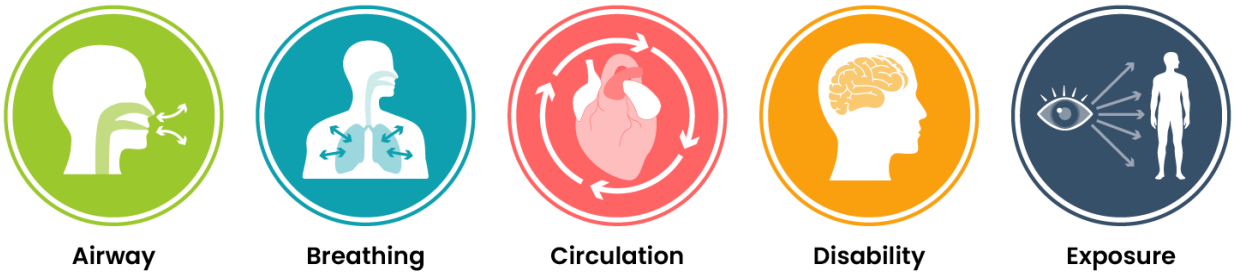

Figure 5. The ABCDE survey approach

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General Survey

General Appearance

After ensuring your patient is medically stable by completing a primary survey, a general survey consists of using your senses to observe a patient's general appearance, behaviour, mobility, and communication. Items to consider when assessing general appearance include the following:

- Signs of pain or distress: Patients may exhibit signs of pain or distress that should be reported such as grimacing, moaning, or increased anxiety. Set the priorities for your focused assessments based on any signs of distress demonstrated by your patient.
- Age: Observe if the patient appears to be their stated age. Chronic disease can cause a patient to appear older than their age. Factors can occur with older adults that may influence how well the

patient can participate in the assessment, such as hearing, vision, or mobility impairments.

- Body type: No patient is the same which can be due to genetics (eg/height) or lifestyle factors.
- Hygiene, grooming, and dress: Observe the overall cleanliness of the patient's hair, face, and nails and note any odours. Odours can indicate poor hygiene or various disease states. Validate odours by performing additional focused assessments as needed. Note the appearance of the patient's clothing; is it clean and appropriate for the season? If not, findings can reflect on a patient's cognitive abilities, emotional state, and ability to complete daily activities.

Mental Status

When assessing a patient's overall mental status, it is important to compare findings to their known baseline if this information is known or available. Are they orientated to person, place, and time, meaning can they tell you their name, location, and the day of the week? If you are concerned about a sudden change in a patient's mental status, obtain emergency assistance according to your organisational policy.

Behaviour

While observing the patient, note their behaviours during your interaction. Consider the following items:

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Mobility

Observe your patient's body movements, noting posture, gait, and range of motion:

Posture: Patients with normal sitting and standing posture are upright and have a parallel alignment from the shoulders to the hips. Note if the patient is hunched, slumped, contracted, or rigid.

Gait and balance: Observe how the patient walks or stands. Are the movements organised, coordinated, or uncoordinated? Are they able to maintain balance while standing without leaning on or touching anything? Healthy people walk with a smooth gait and arms moving freely at their sides and can stand unassisted. A change in gait or balance often signifies underlying health conditions and increases the risk of falling.

Range of motion and mobility: Observe the patient moving their extremities. Do extremities on the right and left sides move equally? Note any tremors or movements that are not purposeful. Are the patient's abilities appropriate for their age? Is the patient moving normally or do they have specific limitations? Does the patient use any assistive devices such as a cane or walker? Mobility is a key component in being able to care for oneself independently, so note any potential concerns for adults that may impact their ability to complete activities of daily living.

Communication

- Speech: Observe how your patient is speaking during your interaction. Are they speaking in an understandable tone and even pace, or is it garbled or difficult to understand? Neurological disorders can cause speech to be slow, slurred, and hard to understand. Is there an emotional component to their words? Is there a language barrier requiring an interpreter?
- Response to commands: Does the patient follow instructions you are providing during your assessment, or do they have difficulty understanding or cooperating?

Lifespan Considerations During a General Appearance Assessment

Children: When performing a general survey on a child, be aware of their developmental stages to establish expectations for normal findings. Use a calm and gentle tone to establish trust. Demonstrations using dolls or stuffed animals before performing procedures are often helpful. Be aware that the parents of toddlers and school-aged children will provide most of the information during an assessment.

Adolescents: Adolescents may refrain from sharing essential information related to their care in front of their parents, especially regarding high-risk behaviours such as smoking, alcohol or drug use, sexual activity, or suicidal thoughts. It is often helpful to allow time to interview the adolescent privately, in addition to gathering information when the parent is present.

Older Adults: Recognise normal changes associated with ageing when performing a general survey. If your patient wears glasses or hearing aids, be sure they are in place before asking questions. You may need to allow extra time for your assessment, depending on the abilities of your patient. If an older adult cannot communicate effectively, nurses may also consult sources such as family members and electronic medical records for more information.

Vital Signs

Vital signs are typically obtained prior to performing a physical assessment. Vital signs include temperature, pulse, respiratory rate, blood pressure, and oxygen saturation (Figure 6). A pain assessment can be conducted when taking a patient's vital signs. This is covered further in the Pain Assessment chapter.

Figure 6. A vital sign machine shows a patient's oxygen saturations, heart rate, and blood pressure

Respiration

Respiration refers to a person's breathing and the movement of air into and out of the lungs. The respiratory system provides oxygen to body tissues for cellular respiration, removes the waste product carbon dioxide, and helps maintain acid–base balance. Inspiration is the process that causes air to enter the lungs, and expiration is the process that causes air to leave the lungs. A respiratory cycle (or one breath while you are measuring respiratory rate) is one sequence of inspiration and expiration.

Respiration is assessed for quality, rhythm, and rate. The quality of a person's breathing is normally relaxed and silent. Nurses assess the use of accessory muscles in the neck and chest and indrawing of intercostal spaces (also referred to as intercostal tugging), which can indicate respiratory distress. Respiratory distress can also cause nasal flaring, and the person often moves into a tripod position. The tripod position involves leaning forward and placing arms/hands and/or upper body on one's knees or on the bedside table. Respiration normally has a regular rhythm. A regular rhythm means that the frequency of the respiration follows an even tempo with equal intervals between each respiration. If you compare this to music, it involves a constant beat that does not speed up or slow down but stays at the same tempo.

Ranges

Estimated respiratory rates vary based on the source. It is important to consider the patient and the situation to determine whether the respiratory rate is normal. Always check with the institution where you work about their normal respiratory rate ranges. Nurses consider the patient's health and illness state and determinants such as rest/sleep, awake/active, pain, and crying when assessing the respiratory rate. The following respiratory rate ranges (breaths per minute) are listed according to age below:

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Technique

The respiratory rate is counted after taking the pulse rate so that the patient is not aware that you are taking it. Once you have finished counting the pulse, leave your fingers in place and then begin assessing respiration. It is best to assess the patient in an upright position (sitting or high Fowlers) so that the lungs can fully inflate. Observe the chest or abdomen rise and fall. One respiration includes a full respiratory cycle (including both inspiration and expiration). Thus, the rise and the fall of the abdomen or chest is counted as one full breath. Count for 30 seconds if the rhythm is regular or for a full minute if irregular. Report the respiration as breaths per minute, as well as whether breathing is relaxed, silent, and has a regular rhythm. Report whether chest movement is symmetrical.

What Should the Nurse Consider?

Assess the movement of the chest with adults and the abdomen with newborns and infants. Adults are normally thoracic breathers (the chest moves) while infants are normally diaphragmatic breathers (the abdomen moves). Some adults are abdominal breathers. Breathing rates are counted for one minute with infants because the respiratory rhythm (tempo) can vary significantly. For example, the breathing rates of infants can speed up and slow down with some short periods of apnea (pauses in breathing).

When assessing respiration, ensure that thick and bulky clothing is removed so you can clearly see the rise and fall of the chest or abdomen. Although respiratory rates are best counted at rest, sometimes this is not possible (e.g., in an emergency and with a child who is crying). In this case, document the situation. While assessing respirations, it is important to note signs of respiratory distress, which can include loud breathing, nasal flaring, and intercostal retractions.

Oxygen Saturations

Oxygen saturation refers to the percentage of haemoglobin molecules saturated with oxygen. Haemoglobin molecules can each carry four oxygen molecules; the oxygen binds or attaches to haemoglobin molecules. Oxygen saturation provides information about how much haemoglobin is carrying oxygen, compared to how much haemoglobin is not carrying oxygen. Healthcare providers measure oxygen saturation because it provides information about a patient's state of health. The body's tissues and organs require oxygen for metabolism, and oxygen saturation can reveal whether there is sufficient oxygen in the blood or whether the patient is in a state called hypoxaemia (insufficient oxygen in the blood).

Oxygen saturation levels can influence clinical decisions about whether the patient is receiving sufficient oxygen and/or requires supplemental oxygen. Oxygen saturation levels are also monitored during and after surgeries and treatments, and to assess a patient's capacity for increased activity.

How is Oxygen Saturation Measured?

Oxygen saturation can be measured using a pulse oximetry device (Figure 7). It is a non-invasive method that gives an instant estimate of arterial oxygen saturation levels. In critically ill patients, a more accurate, but invasive approach is drawing arterial blood or using a continuous monitoring system to measure arterial blood gases through an arterial line. An arterial line is a catheter that is inserted into an artery, usually the radial artery. It provides a way to access blood gases including arterial oxygen saturation (SaO2). Here, we focus on pulse oximetry because it is identified as a vital sign.

A pulse oximetry device includes a sensor that measures light absorption of haemoglobin and represents arterial SpO2. An earlobe clip is another useful device for patients who cannot tolerate the finger or toe clip or have a condition that could affect the results, such as vasoconstriction and poor peripheral perfusion.

Figure 7. Pulse oximeter

Ranges

Normal oxygen saturation ranges from 97–100% in a healthy individual. However, there are reasons why a lower range occurs and, in some cases, why it is sometimes acceptable. Older adults typically have lower oxygen saturation levels than younger adults. For example, someone older than 70 years of age may have an oxygen saturation level of about 95%, which is an acceptable level. It is important to note that the oxygen saturation level varies considerably based on a person's state of health. Thus, it is important to understand both baseline readings and underlying physiology associated with certain conditions to interpret oxygen saturation levels and changes in these levels.

- People who are obese and/or have conditions such as lung and cardiovascular diseases, emphysema, chronic obstructive pulmonary disease, congenital heart disease, and sleep apnea tend to have lower oxygen saturation levels.
- Smoking can influence the accuracy of pulse oximetry in which the SpO2 is low or falsely high depending on whether hypercapnia is present. With hypercapnia, it is difficult for the pulse oximeter to differentiate oxygen in the blood from carbon monoxide (caused by smoking).
- Oxygen saturation levels may decrease slightly when a person is talking.
- Oxygen saturation may remain normal (e.g., 97% and higher) for people with anemia. However, this may not indicate adequate oxygenation because there is less hemoglobin to carry an adequate supply of oxygen for people who have anemia. The inadequate supply of oxygen may be more prominent

during activity for people with anemia.

- Falsely low oxygen saturation levels may be associated with hypothermia, decreased peripheral perfusion, and cold extremities. In these cases, an ear lobe pulse oximeter device or arterial blood gases would provide a more accurate oxygen saturation level. However, arterial blood gases are usually only taken in critical care or emergency settings.

Blood Pressure

A blood pressure reading is the measurement of the force of blood against the walls of the arteries as the heart pumps blood through the body. It is reported in millimetres of mercury (mmHg). This pressure changes in the arteries when the heart is contracting compared to when it is resting and filling with blood. Blood pressure is typically expressed as the reflection of two numbers, systolic pressure and diastolic pressure. The systolic blood pressure is the maximum pressure on the arteries during systole, the phase of the heartbeat when the ventricles contract. This is the top number of a blood pressure reading. Systole causes the ejection of blood out of the ventricles and into the aorta and pulmonary arteries. The diastolic blood pressure is the resting pressure on the arteries during diastole, the phase between each contraction of the heart when the ventricles are filling with blood. This is the bottom number of the blood pressure reading. Therefore, 120/80 indicates the systolic blood pressure is 120 mmHg, and the diastolic blood pressure is 80 mmHg.

Blood pressure measurements are obtained using a stethoscope and a sphygmomanometer (Figures 8 and 9) also called a blood pressure cuff. The first appearance of sounds, called Korotkoff sounds, are noted as the systolic blood pressure reading. Korotkoff sounds are named after Dr. Korotkoff, who first discovered the audible sounds of blood pressure when the arm is constricted. The blood pressure cuff continues to be deflated until Korotkoff sounds disappear. The last Korotkoff sounds reflect the diastolic blood pressure reading. Blood pressure readings are documented as systolic blood pressure/diastolic pressure, for example, 120/80 mmHg.

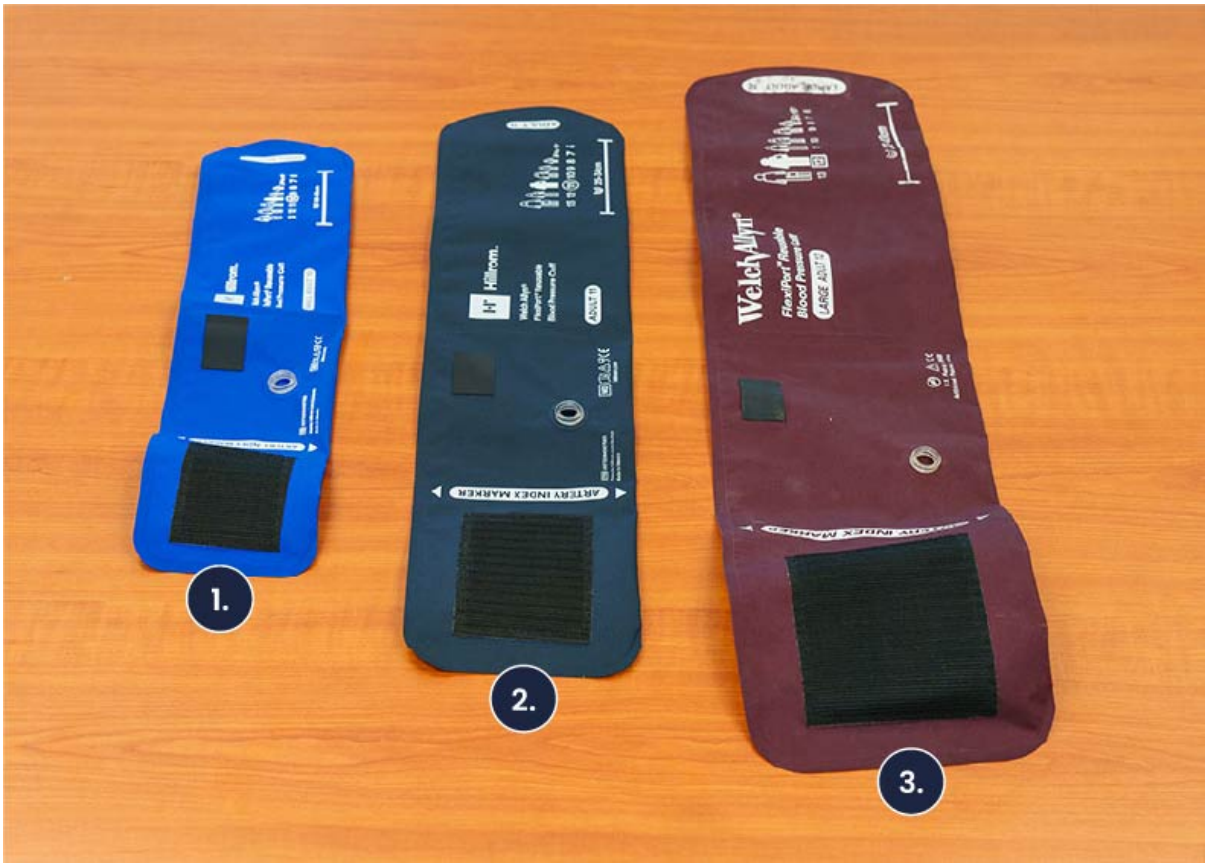

Figure 8. Blood pressure cuffs of varying sizes. Cuff 1 is a small adult 10, cuff 2 is an adult 11, and cuff 3 is a large adult 12 size

Why is Blood Pressure Measured?

- A person's blood pressure provides insight into the functioning of the body.
- The findings can provide information about the integrity of arteries and heart functioning, which can lead the healthcare provider to conduct additional assessments.
- High blood pressure can cause the arteries to become weak and damaged and cause the heart to become weak and enlarged.
- Low blood pressure can decrease the perfusion of nutrients and oxygen to the body's cells, influencing the ability to function and potentially cellular death.
- Chronic high blood pressure can contribute to conditions such as vascular disease, myocardial infarction, cerebral stroke, kidney disease, and dementia.

Abnormal blood pressure readings can signify an area of concern and a need for intervention. Normal adult blood pressure is less than 120/80 mmHg. Hypertension is the medical term for elevated blood pressure readings of 130/80 mmHg or higher. Before diagnosing a person with hypertension, the nurses will calculate an average blood pressure based on two or more blood pressure readings obtained on two or more occasions. Some causes of hypertension can include (but are not limited to): Age (risk increases

with age), race, overweight/obesity, certain health conditions such as diabetes, chronic kidney disease, pregnancy, unhealthy eating patterns, low potassium levels, or family history.

Hypotension is the medical term for low blood pressure readings between 85-110 systolic (depending on usual blood pressure) or lower. Hypotension can be caused by dehydration, bleeding, cardiac conditions, and the side effects of many medications. Hypotension can be of significant concern because of the potential lack of perfusion to critical organs when blood pressure is low. Orthostatic hypotension is a drop in blood pressure that occurs when moving from a lying down (supine) or seated position to a standing (upright) position. When measuring blood pressure, orthostatic hypotension is defined as a decrease in blood pressure by at least 20 mmHg systolic or 10 mmHg diastolic within three minutes of standing. When a person stands, gravity moves blood from the upper body to the lower limbs. As a result, there is a temporary reduction in the amount of blood in the upper body for the heart to pump, which decreases blood pressure. Normally, the body quickly counteracts the force of gravity and maintains stable blood pressure and blood flow. In most people, this transient drop in blood pressure goes unnoticed. However, some patients with orthostatic hypotension can experience light-headedness, dizziness, or fainting. This is a significant safety concern because of the increased risk of falls and injury, particularly in older adults. Orthostatic hypotension is also called postural hypotension. When obtaining orthostatic vital signs, the pulse rate may also be collected.

Method

The accurate measurement of blood pressure is important for ensuring patient safety and optimising body system function. It is crucial to follow the proper steps to obtain a patient's blood pressure to ensure the care team has accurate data to help make healthcare decisions and determine a plan of care.

Before taking a person's blood pressure, it is important to determine if they have a history of elevated blood pressure or if they are taking any blood pressure medication. It is helpful to establish a baseline by asking about their usual blood pressure reading or reviewing previous records in their chart. It is also important to determine if there are any arm restrictions such as those due to a fistula, mastectomy, stroke, or IV line before measuring blood pressure.

Steps for taking accurate blood pressure

1. Gather supplies: blood pressure cuff and stethoscope. (Select an appropriately sized cuff for the patient.)

- The width of the cuff should be 40% of the person's upper arm length, and the length of the cuff's bladder should be 80–100% of the person's arm circumference.

2. Perform safety steps:

- Perform hand hygiene
- Check the room for transmission-based precautions
- Introduce yourself, your role, the purpose of your visit, and an estimate of the time it will take
- Confirm patient ID using two patient identifiers (e.g., name and date of birth)
- Explain the process to the patient, gain consent and ask if they have any questions
- Be organised and systematic
- Use appropriate listening and questioning skills
- Listen and attend to patient cues
- Ensure the patient's privacy and dignity
- Assess ABCs.

3. Cleanse the stethoscope and blood pressure cuff prior to placing it on the patient's skin.

4. Place the patient in a relaxed reclining or sitting position. The patient should be seated quietly for at least five minutes in a chair prior to blood pressure measurement. Ask the patient which arm they prefer to use. Be aware of conditions that contraindicate the use of an arm for blood pressure measurement, such as a previous mastectomy or the presence of a fistula. During the procedure, both feet should be on the floor and the arm should be supported at heart level.

- Adapt the procedure to lifespan considerations of the patient.

5. Remove or rearrange clothing so the cuff and the stethoscope are on bare skin.

6. Centre the bladder of the blood pressure cuff over the brachial artery with the lower margin above the antecubital space. Fit the cuff evenly and snugly. Palpate the brachial artery in the antecubital space.

7. Locate the radial pulse.

8. Inflate the cuff rapidly (while palpating the radial or brachial pulse) to the level at which pulsations are no longer felt and inflate the cuff 30 mmHg above the palpated pressure or the patient's usual blood pressure. Note the level and rapidly deflate the cuff; wait 30 seconds.

9. With the ear tips of the stethoscope placed downward and forward, place the bell/diaphragm lightly on the brachial artery and rapidly inflate the cuff to 30 points above where the brachial or radial pulse is no longer felt. (Figure 9)

10. Deflate the cuff gradually at a constant rate by opening the valve on the bulb (2–3 mmHg/second) until the first Korotkoff sound is heard. Note the systolic pressure.

11. Continue to deflate the cuff slowly at 2 mmHg/second. Note the point at which Korotkoff sounds disappear completely as the diastolic pressure.

12. Deflate the cuff completely and remove the cuff from the patient's arm.

13. Inform the patient of the blood pressure reading.

14. Cleanse the stethoscope and blood pressure cuff.

15. Perform proper hand hygiene.

16. Ensure safety measures when leaving the room:

- Call light: Within reach
- Bed: Low and locked (in lowest position and brakes on)
- Side rail: Secured
- Table: Within reach
- Room: Risk-free for falls (scan room and clear any obstacles).

17. Document findings and report significant deviations from norms according to agency policy.

Figure 9. Manual blood pressure methods

Pulse

Pulse refers to a pressure wave that expands and recoils the artery when the heart contracts/beats. It is palpated at many points throughout the body. The most common locations to accurately assess pulse as part of vital sign measurement include radial, brachial, carotid, and apical pulse. The techniques vary according to the location (Figure 10).

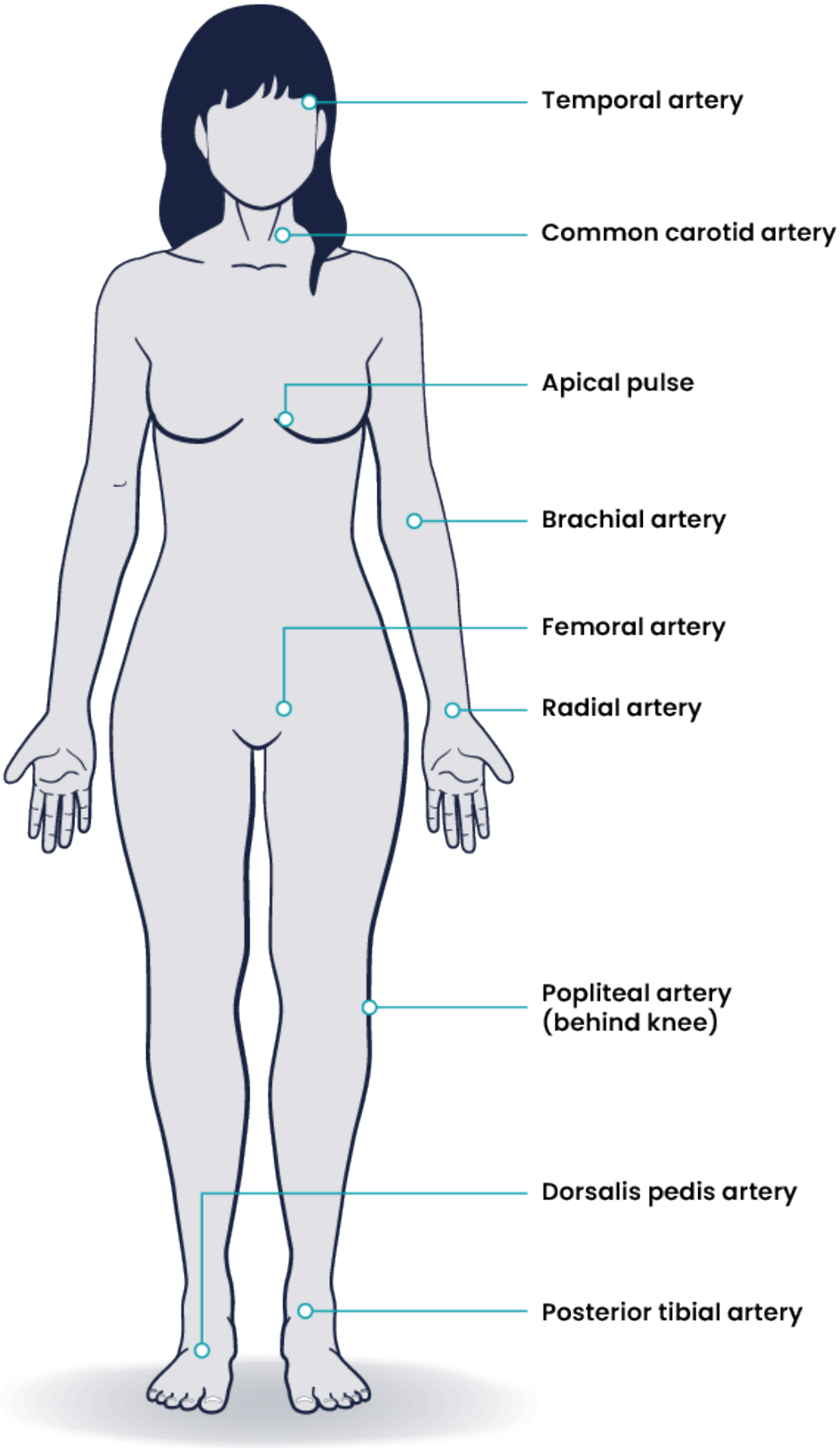

Figure 10. Pulse locations. The pulse is most readily measured at the radial artery but can be

measured at any of the pulse points shown

The heart pumps a volume of blood per contraction into the aorta. This volume is referred to as stroke volume. Age is one factor that influences stroke volume, which ranges from 5–80 mL from newborns to older adults.

Pulse is measured in beats per minute, and the normal adult pulse rate (heart rate) at rest is 60–100 beats per minute. Newborn resting heart rates range from 100–175 bpm. Heart rate gradually decreases until young adulthood and then gradually increases again with age. A pregnant woman's heart rate is slightly higher than her pre-pregnant value (about 15 beats). The following heart rate ranges (beats per minute) are listed according to age below:

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The pulse rhythm, rate, force, and equality are assessed when palpating pulses. The normal pulse rhythm is regular, meaning that the frequency of the pulsation felt by your fingers follows an even tempo with equal intervals between pulsations. If you compare this to music, it involves a constant beat that does not speed up or slow down but stays at the same tempo. Thus, the interval between pulsations is the same. However, sinus arrhythmia is a common condition in children, adolescents, and young adults. Sinus arrhythmia involves an irregular pulse rhythm in which the pulse rate varies with the respiratory cycle; the heart rate increases at inspiration and decreases back to normal upon expiration. The underlying physiology of sinus arrhythmia is that the heart rate increases to compensate for the decreased stroke volume from the heart's left side upon inspiration.

You count the pulse rate for thirty seconds if the rhythm is regular (even tempo) and multiply by two to report in beats per minute. Count for one minute if the rhythm is irregular. In children, pulse is counted for one minute considering that irregularities in rhythm are common. When the clock is at zero, you say zero and then, the first beat felt by your fingers is counted as one.

The pulse force is the strength of the pulsation felt when palpating the pulse. For example, when you feel a patient's pulse against your fingers, is it gentle? Can you barely feel it? Alternatively, is the pulsation very forceful and bounding into your fingertips? The force is important to assess because it reflects the volume of blood, the heart's functioning and cardiac output, and the arteries' elastic properties. Remember, stroke volume refers to the volume of blood pumped with each contraction of the heart (i.e., each heartbeat). Thus, pulse force provides an idea of how hard the heart must work to pump blood out of the heart and through the circulatory system.

Pulse force is recorded using a four-point scale:

- 3+ Full, bounding
- 2+ Normal/strong
- 1+ Weak, diminished, thready
- 0 Absent/non-palpable.

Practice with many people to become skilled in measuring pulse force. While learning, it is helpful to assess pulse force along with an expert because there is a subjective element to the scale. A 1+ force (weak and thready) may reflect a decreased stroke volume and can be associated with conditions such as heart failure, heat exhaustion, or hemorrhagic shock, among other conditions. A 3+ force (full and bounding) may reflect an increased stroke volume and can be associated with exercise and stress, as well as abnormal health states including fluid overload and high blood pressure.

Pulse equality refers to whether the pulse force is comparable on both sides of the body. For example, palpate the radial pulse on the right and left wrist at the same time and compare whether the pulse force is equal. Pulse equality is assessed because it provides data about conditions such as arterial obstructions and aortic coarctation. However, the carotid pulses should never be palpated at the same time as this can decrease and/or compromise cerebral blood flow.

Technique

Use the pads of your first three fingers to gently palpate the radial pulse. The pads of the fingers are placed along the radius bone, which is on the lateral side of the wrist (the thumb side; the bone on the other side of the wrist is the ulnar bone). Place your fingers on the radius bone close to the flexor aspect of the wrist, where the wrist meets the hand and bends. Press down with your fingers until you can best feel the pulsation. Note the rate, rhythm, force, and equality when measuring the radial pulse.

You may need to adjust the pressure of your fingers when palpating the radial pulse if you cannot feel the pulse. For example, sometimes pressing too hard can obliterate the pulse (make it disappear). Alternatively, if you do not press hard enough, you may not feel a pulse. You may also need to move your fingers around slightly. Radial pulses are difficult to palpate on newborns and children under five, so healthcare providers usually assess the apical pulse or brachial pulse of newborns and children.

Temperature

Nurses measure a patient's temperature because it can give information about their state of health and influence clinical decisions. Accurate measurements and interpretation are vital so that hyperthermia and hypothermia can be identified, and appropriate interventions determined.

Hyperthermia refers to an elevated body temperature. It can be related to an internal or external source.

External sources that increase body temperature could include exposure to excessive heat on a hot day or being in a sauna or hot tub. Internal sources that may increase body temperature include fever caused by an infection or tissue breakdown associated with physical trauma (e.g., surgery, myocardial infarction) or some neurological conditions (e.g., cerebral vascular accident, cerebral oedema, brain tumour). Hyperthermia associated with an infectious agent, such as a bacteria or virus (e.g., the flu) is referred to as febrile. Unresolved hyperthermic body states can lead to cell damage.

Hypothermia refers to a lowered body temperature. It is usually related to an external source like being exposed to the cold for a long time. Hypothermia is sometimes purposefully induced during surgery or, for certain medical conditions, to reduce the body's need for oxygen. Unresolved hypothermic body states can slow cellular processes and lead to loss of consciousness.

Method

Methods of measuring a patient's body temperature vary based on developmental age, cognitive functioning, level of consciousness, state of health, safety, and agency/unit policy. The nurse chooses the best method after considering patient safety, accuracy, and least invasiveness, all contingent on the patient's health and illness state. Methods of measurement include oral, axillary, tympanic, rectal, and dermal routes (Figure 11). It is best to engage in a discussion with the institution and the unit that you work in about what methods they use and why.

Figure 11. Examples of thermometers used to take temperature via the tympanic, oral, and dermal route

Oral temperature can be taken with patients who can follow instructions, so this kind of measurement is common for patients over the age of four, or even younger children if they are cooperative. Usually with a stable child or in a routine situation (and the patient can follow instructions – about age four), then, most likely, you would do oral temperature. However, you would avoid an oral route with a confused patient who may not understand the purpose of placing an item in their mouth and risk biting the thermometer. In these cases, you may take a tympanic or axillary route; these routes are also preferable when a patient is on oxygen delivered via a face mask (a mask that covers the nose and mouth) because this can alter the temperature. Tympanic routes are common in the adult population both in primary settings and acute settings.

For children younger than four who are stable, axillary temperature is commonly measured unless a more

accurate reading is required. Tympanic measurement is fast and convenient and therefore is an appropriate choice if paediatric equipment is available. Rectal temperatures are most accurate however due to the invasiveness and risk of injury during this procedure are only to be used when other options are exhausted.

Dermal routes are alternative methods of measurement that may be used in some agencies and practice areas. This method can involve holding the device and sliding it over the skin of the forehead and then down over the temporal artery in one motion. Dermal strips can also be placed on the forehead to measure skin temperature, but are not yet widely used, and the accuracy of this method has not yet been verified. More recently, there has been an increase in non-contact infrared thermometers particularly in the era of COVID-19 and other highly transmissible diseases. Depending on the type, these thermometers can be held at a short distance from the forehead or temporal area to measure temperature. Alternatively, some handheld thermal scanners that use an infrared camera can be held at a greater distance to screen large masses of people. Please refer to the manufacturer's suggested reference range for non-contact infrared thermometers and thermal scanners.

Temperature Ranges

The human body's core temperature (internal body temperature) is measured in degrees Celsius (ºC).

In adults, the normal core body temperature (referred to as normothermia or afebrile) is 36.5–37.5ºC. (Figure 12).

A wider temperature range is acceptable in infants and young children and can range from 35.5–37.7ºC. Infants and children have a wider temperature range because their heat control mechanisms are less effective. They are at risk for heat loss for many reasons including having less subcutaneous fat than adults, a larger body surface area in comparison to weight (and larger head size in proportion to the rest of the body), immature metabolic mechanisms (e.g., inability to shiver), and limited ability to produce heat through activity. They are also at risk of excessive heat production due to crying and restlessness as well as external factors such as being wrapped in too many blankets. The following temperature methods and normal ranges are listed below according to the method:

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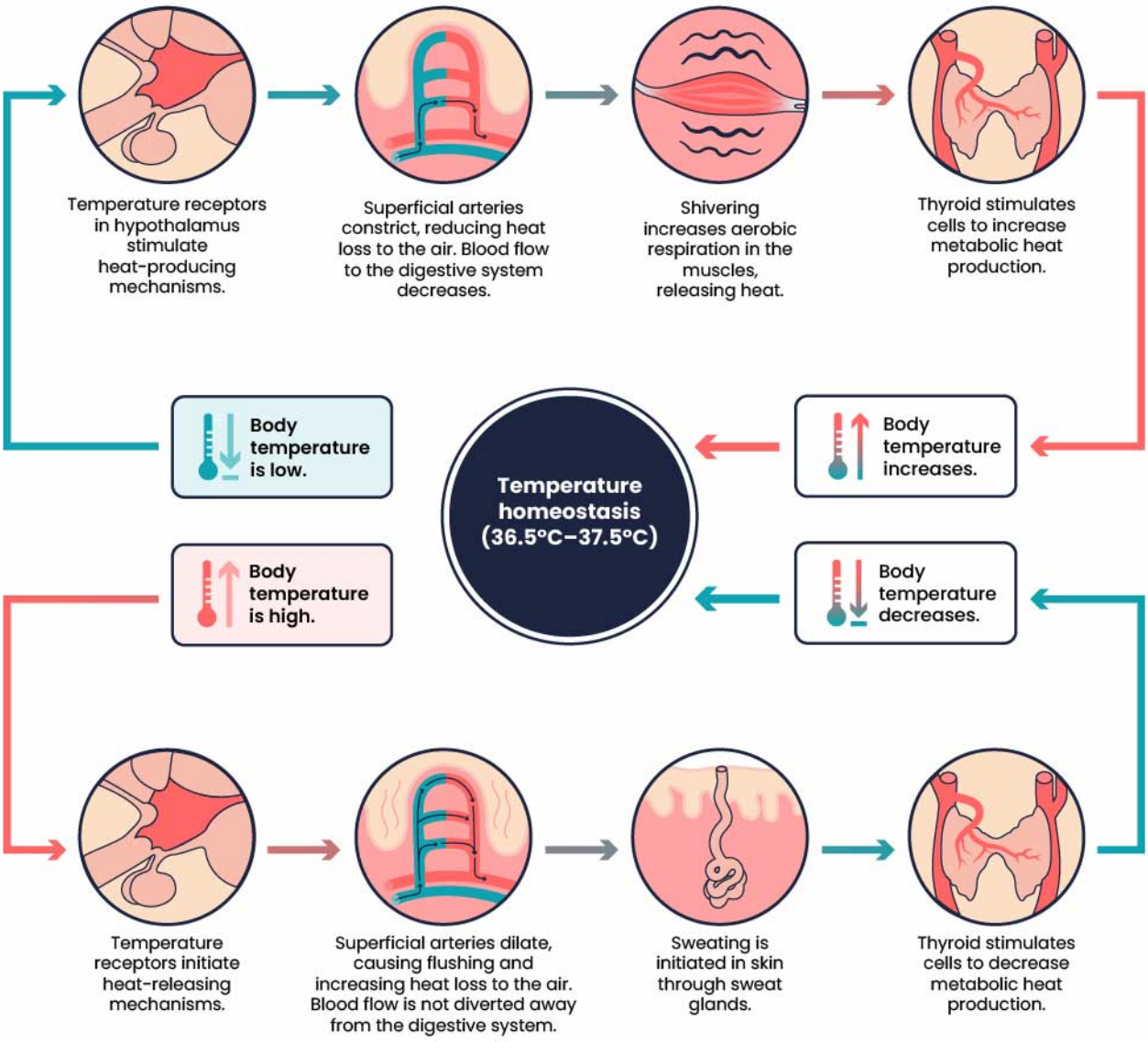

Figure 12. Temperature regulation. The hypothalamus is responsible for thermoregulation and homeostasis

Key Takeaways

In this chapter, we covered:

- The four objective assessment techniques are: inspection (visual observation), palpation (touching to assess characteristics), percussion (tapping to identify sounds), and auscultation (listening with a stethoscope).

- Inspection involves observing body position, posture, gait, symmetry, skin condition, behaviour, and hygiene.
- Palpation helps assess temperature, texture, moisture, swelling, elasticity, lumps, organ size, density, and pain.
- Percussion involves tapping the body to produce sounds that reveal the nature of organs (air-filled, fluid-filled, or dense) and help identify abnormal masses, organ enlargement, or the presence of fluid.
- Auscultation uses a stethoscope to listen for high-pitched and low-pitched sounds in places like the lung, bowel, and heart to identify normal and abnormal physiological sounds, such as breath sounds, bowel activity, and heart murmurs.
- The primary survey (Airway, Breathing, Circulation, Disability, and Exposure) is the first step in the objective assessment.
- After stabilising the patient, a general survey is performed, focusing on appearance, behaviour, mobility, and communication.
- Vital signs: How to assess a patients temperature, pulse, respiratory rate, blood pressure and oxygen saturation along with understanding the different ranges for each.
- Lifespan considerations (children, adolescents, and older adults) require adapting the assessment techniques as appropriate.

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HEALTH ASSESSMENT, PART THREE: PHYSICAL HEALTH ASSESSMENT – SYSTEMS-BASED/FOCUSED ASSESSMENT

Amy McCrystal and Jessica Best

Learning Outcomes

In this chapter you will learn how to:

- Define a systems-based/focused assessment and explain its purpose in patient care
- Perform a systems-based/focused assessment using appropriate techniques
- Analyse the findings from a systems-based/focused assessment to inform the development of a nursing care plan.

A "head-to-toe approach" is used by nurses and refers to a comprehensive assessment that systematically examines a patient's entire body, from the top of their head to the tips of their toes, to thoroughly assess their overall health status and identify any potential issues.

Neurological Assessment

The physical examination of the neurological system includes assessment of the central and peripheral nervous systems. A routine neurological exam usually starts by assessing the patient's mental status followed by evaluation of sensory function and motor function. Comprehensive neurological exams may further evaluate cranial nerve function and deep tendon reflexes.

Assessing Mental Status

Routine assessment of a patient's mental status by registered nurses includes evaluating their level of consciousness, overall appearance, behaviour, affect and mood, speech, and cognitive performance.

Level of consciousness refers to a patient's level of arousal and alertness. Assessing a patient's orientation to time, place, and person is a quick indicator of cognitive functioning. Level of consciousness is typically evaluated on admission to a facility to establish a patient's baseline status, and it is then frequently monitored every shift for changes in condition. To assess a patient's orientation status, ask, "What is your name? Where are you? What day is it?" If the patient is unable to recall a specific date, it may be helpful to ask them the day of the week, the month, or the season to establish a baseline of their awareness level.

A normal level of orientation is typically documented as, "Patient is alert and oriented to person, place, and time," or by the shortened phrase, "Alert and oriented x 3." If a patient is confused, an example of documentation is, "Patient is alert and oriented to self, but disoriented to time and place."

There are many screening tools that can be used to further objectively assess a patient's mental status and cognitive impairment. Common screening tools used frequently by registered nurses to assess mental status include the Glasgow Coma Scale, the National Institutes of Health Stroke Scale (NIHSS), and the Mini-Mental State Exam (MMSE).

Glasgow Coma Scale

The Glasgow Coma Scale (GCS) is a standardised tool used to objectively assess and continually monitor a patient's level of consciousness when damage has occurred, such as after a head injury or a cerebrovascular accident (stroke). Three primary areas assessed in the GCS include the eye-opening response, verbal response, and motor response (Figure 1). Scores are added from these three categories to assign a patient's level of responsiveness. Scores ranging from 15 or higher are classified as the best response, less than 8 is classified as comatose, and 3 or less is classified as unresponsive.

GLASGOW COMA SCALE

Behaviour	Response	Score
Eye-opening response	Spontaneously	4
	To speech	3
	To pain	2
	No response	1
Best verbal response	Oriented to time, place, and person	5
	Confused	4
	Inappropriate words	3
	Incomprehensible sounds	2
	No response	1
Best motor response	Obey commands	6
	Moves to localised pain	5
	Flexion withdrawal from pain	4
	Abnormal flexion (decorticate)	3
	Abnormal extension (decerebrate)	2
	No response	1
Total score	Best response	15
	Comatose client	8 or less
	Totally unresponsive	3

Figure 1. The GCS is a scoring tool used to assess a person's level of consciousness

Assessing Motor Strength

A brief musculoskeletal assessment is performed as part of the neurological assessment to determine the neurological stimulation of bilateral strength. Unequal extremity motor strength can indicate underlying neurological disease or injury. Assessing motor strength includes comparing bilateral hand grasps, upper extremity strength, and lower extremity strength. Keep in mind that extremities on the dominant side are usually slightly stronger than the nondominant side.

Hand Grasps

To perform a hand grasp test, extend two fingers on both hands toward the patient. Ask the patient to

squeeze both of your hands and compare for similar bilateral strength. An example of this is provided in Figure 5 below.

Upper Extremity Strength

To test upper extremity strength, ask the patient to extend their forearms with palms facing upwards. Place your hands on their inner forearms and ask them to pull their arms toward them while you provide resistance. An expected finding is the patient strongly bilaterally pulls against resistance with both arms.

An alternative test is to ask the patient to put their hands in the air with their palms facing you. Place your palms against theirs and ask them to push while you provide resistance.

Lower Body Strength

To assess lower body strength while the patient is in a seated position, place your hands behind their calves. Ask them to pull backwards with their lower legs while you provide resistance in the opposite direction.

Alternative tests are to place your hands on the patient's lower thighs and ask them to lift their legs upwards while you provide downward resistance or place your hands on the top of their feet and ask them to pull their toes upwards while you provide resistance. In a similar manner, you can also place your hands underneath their feet and ask them to press downwards "like pressing the gas pedal of a car," while providing resistance. Compare lower extremity strength on both sides.

Assessing Pupil Response

The size, shape, and reactivity of the pupils are assessed during a neurological assessment as it can provide valuable information about a patient's neurological status.

Pupil size and shape: Inspect both pupils for symmetry, size, and shape. Pupil size ranges from 1 mm (smallest) to 6 mm (largest). Normal pupils are round and equal in size. Unequal pupils can indicate neurological impairment due to pressure, hypoxia or injury to the brain.

Pupil reaction to light: Shine a light into each eye separately and observe the response. Both pupils should constrict briskly and equally in response to light. An absent (fixed) or slow (sluggish) response can indicate neurological damage due to pressure, hypoxia or injury to the brain.

Table 1: Expected Versus Unexpected Findings on Adult Neurological Assessment

Expected Findings From the Inspection Stage of Assessment	Unexpected Findings (Document and notify provider if new finding*)
• Alert and oriented to person, place, and time • Symmetrical facial expressions • Clear and appropriate speech • Ability to follow instructions • PERRLA (Pupils are equal, round, and reactive to light and accommodation) • Cranial nerves all intact • Negative Romberg test • Sensory function present • Cortical functioning (indicated by stereognosis) intact • Good balance • Coordinated gait with equal arm swing • Finger-to-nose, rapid alternating arm movements, and heel-to-shin performance intact • Negative pronator drift test • Motor strength in upper and lower extremities equal bilaterally • Deep tendon reflexes intact	• Not alert and oriented to person, place, and/or time • Asymmetrical facial expressions • Garbled speech • Inability to follow directions • Pupils' unequal in size or reactivity • Deficits in one or more cranial nerve assessments • Positive Romberg test • Sensory function impaired in one or more areas • Stereognosis not intact • Poor balance • Shuffled or asymmetrical gait with unequal arm swing • Unable to complete finger-to-nose, alternating arm movement, or heel-to-shin tests • Positive pronator drift test • Unequal strength of upper and/or lower extremities • One or more deep tendon reflexes are not reactive
***Critical findings to report immediately and/or obtain emergency assistance:**	Change in mental status, pupil responsiveness, facial drooping, slurred words or inability to speak, or sudden unilateral loss of motor strength

Cardiovascular Assessment

Assessing the cardiovascular system includes performing several subjective and objective assessments. At times, assessment findings are modified according to lifespan considerations.

Subjective Assessment

The subjective assessment of the cardiovascular and peripheral vascular system is vital for uncovering signs of potential dysfunction. To complete the subjective cardiovascular assessment, the nurse begins with a focused interview. The focused interview explores past medical and family history, medications, cardiac risk factors, and reported symptoms. Symptoms related to the cardiovascular system include chest pain, peripheral oedema, unexplained sudden weight gain, shortness of breath (dyspnea), irregular pulse rate or rhythm, dizziness, or poor peripheral circulation. Any new or worsening symptoms should be documented and reported to the healthcare provider.

SAFETY NOTE: If findings indicate current severe symptoms suggestive of myocardial infarction or another critical condition, suspend the remaining cardiovascular assessment and obtain immediate assistance according to agency policy.

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Objective Assessment

The physical examination of the cardiovascular system involves the interpretation of vital signs, inspection, palpation, and auscultation of heart sounds as the nurse evaluates for sufficient perfusion and cardiac output. Inspection considerations are provided below:

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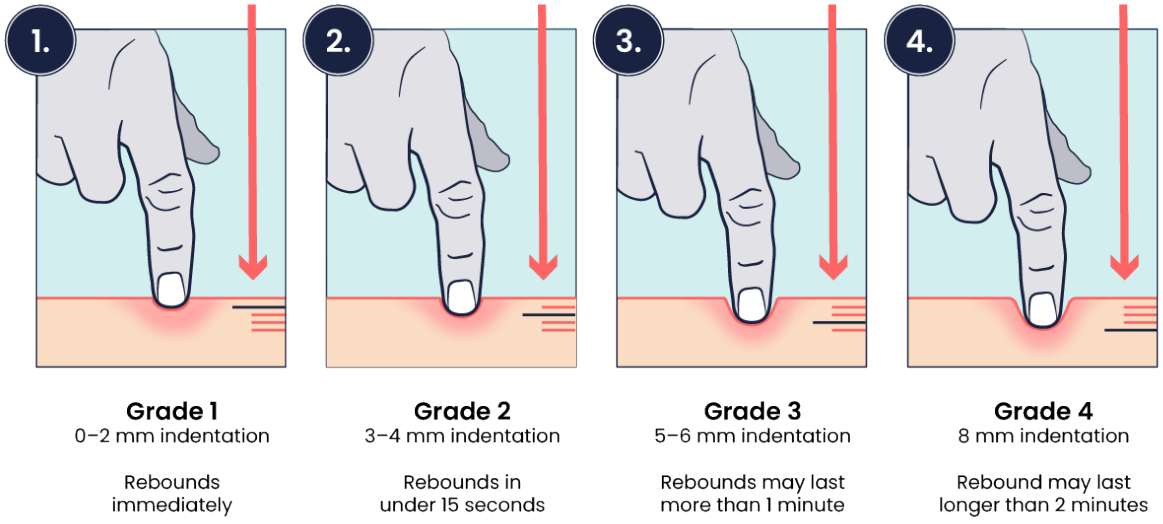


Figure 2. Oedema is measured by placing slight pressure on the area of swelling, releasing and then determining the lapse in recovery

Auscultation

Heart Sounds

Auscultation is routinely performed over five specific areas of the heart to listen for corresponding valvular sounds. These auscultation sites are often referred to by the mnemonic "APE To Man," referring to aortic, pulmonic, Erb's point, tricuspid, and mitral areas. The aortic area is the second intercostal space to the right of the sternum. The pulmonic area is the second intercostal space to the left of the sternum. Erb's point is directly below the pulmonic area and located at the third intercostal space to the left of the sternum. The tricuspid (or parasternal) area is at the fourth intercostal space to the left of the sternum. The mitral (also called apical or left ventricular area) is the fifth intercostal space at the midclavicular line.

Auscultation usually begins at the aortic area (upper right sternal edge). Use the diaphragm of the stethoscope to carefully identify the S1 and S2 sounds. They will make a "lub-dub" sound. Note that when listening over the area of the aortic and pulmonic valves, the "dub" (S2) will sound louder than the "lub" (S1). Move the stethoscope sequentially to the pulmonic area (upper left sternal edge), Erb's point (left third intercostal space at the sternal border), and tricuspid area (fourth intercostal space. When assessing the mitral area for female patients, it is often helpful to ask them to lift their breast tissue so the stethoscope can be placed directly on the chest wall. Repeat this process with the bell of the stethoscope. The apical pulse should be counted over 60 seconds. For an adult, the heart rate should be between 60 and 100 with a regular rhythm to be considered within a normal range. The apical pulse is an important assessment to obtain before the administration of many cardiac medications.

The first heart sound (S1) identifies the onset of systole when the atrioventricular (AV) valves (mitral and tricuspid) close and the ventricles contract and eject the blood out of the heart. The second heart sound (S2) identifies the end of systole and the onset of diastole when the semilunar valves close, the AV valves open, and the ventricles fill with blood. S1 corresponds to the palpable pulse. When auscultating, it is important to identify the S1 ("lub") and S2 ("dub") sounds, evaluate the rate and rhythm of the heart, and listen for any extra heart sounds. An example of an extra heart sound is a murmur which is a blowing or whooshing sound that signifies turbulent blood flow often caused by a valvular defect. New murmurs not previously recorded should be immediately communicated to the medical staff.

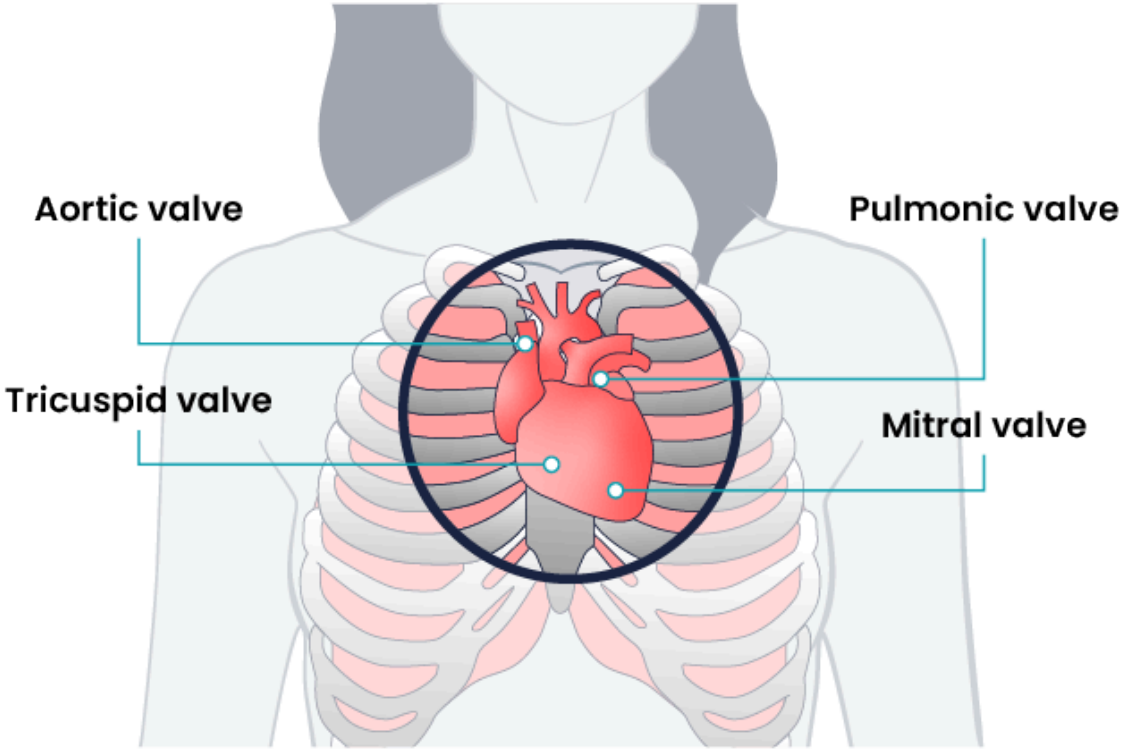


Figure 3. Heart valve landmarks

Carotid Sounds

The carotid artery may be auscultated for bruits. Bruits are a swishing sound due to turbulence in the blood vessel and may be heard due to atherosclerotic changes.

Palpation

Palpation evaluates peripheral pulses, capillary refill, and oedema. When palpating these areas, also pay attention to the temperature and moisture of the skin.

Pulses

Compare the rate, rhythm, and quality of arterial pulses bilaterally, including the carotid, radial, brachial, posterior tibialis, and dorsalis pedis pulses. Bilateral comparison for all pulses (except the carotid) is important for determining subtle variations in pulse strength. Carotid pulses should be palpated on one side at a time to avoid decreasing perfusion of the brain. The posterior tibial artery is located just behind the medial malleolus. It can be palpated by scooping the patient's heel in your hand and wrapping your fingers around so that the tips come to rest on the appropriate area just below the medial malleolus. The dorsalis pedis artery is located just lateral to the extensor tendon of the big toe and can be identified by asking the patient to flex their toe while you provide resistance to this movement. Gently place the tips of your second,

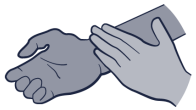
third, and fourth fingers adjacent to the tendon, and try to feel the pulse. See Health Assessment, Part Two, figure 10 for pulse locations.

The quality of the pulse is graded on a scale of 0 to 3, with 0 being absent pulses, 1 being decreased pulses, 2 being within normal range, and 3 being increased (also referred to as "bounding"). If unable to palpate a pulse, additional assessment is needed. First, determine if this is a new or chronic finding. Second, if available, use a Doppler ultrasound to determine the presence or absence of the pulse. Many agencies use Doppler ultrasound to document if a nonpalpable pulse is present. If the pulse is not found, this could be a sign of an emergent condition requiring immediate follow-up with the medical team.

Capillary Refill

The capillary refill test is performed on the nail beds to monitor perfusion (the amount of blood flow to the tissue). Pressure is applied to a fingernail or toenail until it pales, indicating that the blood has been forced from the tissue under the nail. This paleness is called blanching. Once the tissue has blanched, pressure is removed. Capillary refill time is defined as the time it takes for the colour to return after pressure is removed. If there is sufficient blood flow to the area, a pink colour should return within three seconds after the pressure is removed.

Table 2: Expected Versus Unexpected Findings on Cardiac Assessment

Assessment	Expected Findings	Unexpected Findings (Document and notify the provider if this is a new finding*)
Inspection	Apical impulse may or may not be visible	• Scars not previously documented that could indicate prior cardiac surgeries • Heave or lift observed in the precordium • Chest anatomy malformations
Palpation 	Apical pulse felt over midclavicular fifth intercostal space	• Apical pulse felt to the left of the midclavicular fifth intercostal space • Additional movements over precordium such as a heave, lift, or thrill
Auscultation	S1 and S2 heart sounds in a regular rhythm	• New irregular heart rhythm • Extra heart sounds such as a murmur, S3, or S4

Assessment	Expected Findings	Unexpected Findings (Document and notify the provider if this is a new finding*)
***CRITICAL CONDITIONS to report immediately** 		• Symptomatic tachycardia at rest (HR>100 bpm) • Symptomatic bradycardia (HR<60 bpm) • New systolic blood pressure (<100 mmHg) • Orthostatic blood pressure changes • New irregular heart rhythm • New extra heart sounds such as a murmur, S3, or S4 • New abnormal cardiac rhythm changes • Reported chest pain, calf pain, or worsening shortness of breath

Respiratory Assessment

With an understanding of the basic structures and primary functions of the respiratory system, the nurse collects subjective and objective data to perform a focused respiratory assessment.

Subjective Assessment

Collect data using interview questions, paying attention to what the patient reports. The interview should include questions regarding any current and past history of respiratory health conditions or illnesses, medications, and reported symptoms. Consider the patient's age, gender, family history, race, culture, environmental factors, and current health practices when gathering subjective data. The information discovered during the interview process guides the physical exam and subsequent patient education.

Table 3: Initial Interview Questions for Subjective Assessment of the Respiratory System

Interview Questions	Follow-up
• Have you ever been diagnosed with a respiratory condition, such as asthma, COPD, pneumonia, or allergies? • Do you use oxygen or peak flow meter? • Do you use home respiratory equipment like CPAP, BiPAP, or nebuliser devices?	• Please describe the conditions and treatments.

Additional questions and follow-up actions are displayed below.

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Objective Assessment

A focused respiratory objective assessment includes interpretation of vital signs; inspection of the patient's breathing pattern, skin colour, and respiratory status; palpation to identify abnormalities; and auscultation of lung sounds using a stethoscope. The nurse must understand what is expected for the patient's age, gender, development, race, culture, environmental factors, and current health condition to determine the meaning of the data being collected.

Inspection

Inspection during a focused respiratory assessment includes observation of the level of consciousness, breathing rate, pattern and effort, skin colour, chest configuration, and symmetry of expansion.

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Palpation

Palpation of the chest may be performed to investigate for areas of abnormality related to injury or procedural complications. For example, if a patient has a chest tube or has recently had one removed, the nurse may palpate near the tube insertion site to assess for areas of air leak or crepitus. Crepitus feels like a popping or crackling sensation when the skin is palpated and is a sign of air trapped under the subcutaneous tissues. If palpating the chest, use light pressure with the fingertips to examine the anterior and posterior chest wall. Chest palpation may be performed to assess specifically for growths, masses, crepitus, pain, or tenderness.

Confirm symmetric chest expansion by placing your hands on the anterior or posterior chest at the same level, with thumbs over the sternum anteriorly or the spine posteriorly. As the patient inhales, your thumbs should move apart symmetrically. Unequal expansion can occur with pneumonia, thoracic trauma, such as fractured ribs, or pneumothorax.

Auscultation

Using the diaphragm of the stethoscope, listen to the movement of air through the airways during inspiration and expiration. Instruct the patient to take deep breaths through their mouth. Listen through the entire respiratory cycle because different sounds may be heard on inspiration and expiration. Allow the patient to rest between respiratory cycles, if needed, to avoid fatigue with deep breathing during auscultation. As you move across the different lung fields, the sounds produced by airflow vary depending on the area you are auscultating because the size of the airways changes.
Listen to normal breath sounds on inspiration and expiration.

Accurate and Quality Assessment

Correct placement of the stethoscope during auscultation of lung sounds is important to obtain a quality assessment. The stethoscope should not be placed over clothes or hair because these may create inaccurate

sounds from friction. The best position to listen to lung sounds is with the patient sitting upright; however, if the patient is acutely ill or unable to sit upright, turn them side to side in a lying position. Avoid listening over bones, such as the scapulae or clavicles or over the female breasts to ensure you are hearing adequate sound transmission. Listen to sounds from side to side rather than down one side and then down the other side. This side-to-side pattern allows you to compare sounds in symmetrical lung fields. See Figure 4 for landmarks of stethoscope placement over the anterior and posterior chest wall.

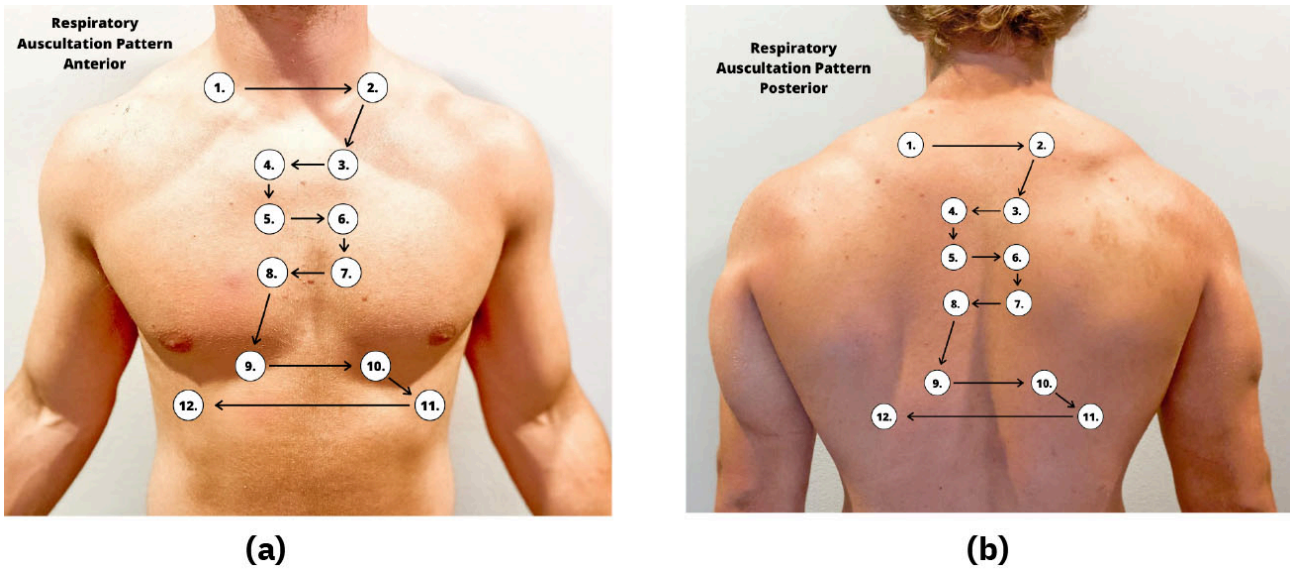


Figure 4. Anterior (a) and (b) posterior chest wall auscultation landmarks

Expected Breath Sounds

It is important upon auscultation to have awareness of expected breath sounds in various anatomical locations.

- Bronchial breath sounds are heard over the trachea and larynx and are high-pitched and loud.
- Bronchovesicular sounds are medium-pitched and heard over the major bronchi.
- Vesicular breath sounds are heard over the lung surfaces, are lower-pitched, and are often described as soft, rustling sounds.

Adventitious Lung Sounds

Adventitious lung sounds are sounds heard in addition to normal breath sounds. They most often indicate an airway problem or disease, such as accumulation of mucus or fluids in the airways, obstruction, inflammation, or infection. These sounds include rales/crackles, rhonchi/wheezes, stridor, and pleural rub:

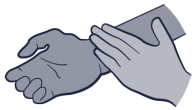
- Coarse crackles, also called rhonchi, are low-pitched, loud, continuous sounds frequently heard on expiration. They are a sign of turbulent airflow through secretions in the large airways.

- Fine crackles, also called rales, are popping or crackling sounds heard on inspiration. They occur in association with conditions that cause fluid to accumulate within the alveolar and interstitial spaces, such as heart failure or pneumonia. Fine crackles are soft, high-pitched, and very brief. For this reason, it is essential to listen to lung sounds with the stethoscope placed on the patient's skin and not over their clothing or hospital gown. The sound is like that produced by rubbing strands of hair together close to your ear.
- Wheezes are whistling-type noises produced during expiration (and sometimes inspiration) when air is forced through airways narrowed by bronchoconstriction or associated mucosal oedema. For example, patients with asthma commonly have wheezing.
- Stridor is heard only on inspiration. It is associated with mechanical obstruction at the level of the trachea/upper airway.
- Pleural rub may be heard on either inspiration or expiration and sounds like the rubbing together of leather. A pleural rub is heard when there is inflammation of the lung pleura, resulting in friction as the surfaces rub against each other.

Percussion

Percussion is an advanced respiratory assessment technique used by advanced practice nurses and other healthcare providers to gather additional data on the underlying lung tissue. By striking the fingers of one hand over the fingers of the other hand, a sound is produced over the lung fields that helps determine if fluid is present. Dull sounds are heard in high-density areas, such as pneumonia or atelectasis, whereas clear, low-pitched, and hollow sounds are heard in normal lung tissue.

Table 4: Expected Versus Unexpected Respiratory Assessment Findings

Assessment	Expected Findings	Unexpected Findings (Document and notify the provider if a new finding*)
Inspection 	Work of breathing effortless Regular breathing pattern Respiratory rate within normal range for age Chest expansion symmetrical Absence of cyanosis or pallor Absence of accessory muscle use, retractions, and/or nasal flaring Anteroposterior: transverse diameter ratio 1:2	Laboured breathing Irregular rhythm Increased or decreased respiratory rate Accessory muscle use, pursed-lip breathing, nasal flaring (infants), and/or retractions Presence of cyanosis or pallor Asymmetrical chest expansion Clubbing of fingernails
Palpation 	No pain or tenderness with palpation. Skin warm and dry; no crepitus or masses	Pain or tenderness with palpation, crepitus, palpable masses, or lumps
Percussion 	Clear, low-pitched, hollow sound in normal lung tissue	Dull sounds heard in high-density areas, such as pneumonia or atelectasis

Assessment	Expected Findings	Unexpected Findings (Document and notify the provider if a new finding*)
Auscultation 	Bronchovesicular and vesicular sounds heard over appropriate areas Absence of adventitious lung sounds	Diminished lung sounds Adventitious lung sounds, such as fine crackles/rales, wheezing, stridor, or pleural rub
***CRITICAL CONDITIONS to report immediately** 		Decreased oxygen saturation <92% Pain Worsening dyspnoea Decreased level of consciousness, restlessness, anxiousness, and/or irritability

Musculoskeletal Assessment

Subjective Assessment

Collect subjective data from the patient and pay particular attention to what the patient is reporting about current symptoms, as well as history of musculoskeletal injuries and disease. Information during the subjective assessment should be compared to expectations for the patient's age group or that patient's baseline. For example, an older patient may have a chronic limited range of motion in the knee due to osteoarthritis, whereas a child may have a new, limited range of motion due to a knee sprain that occurred during a sports activity.

Objective Assessment

A routine physical exam of the musculoskeletal system by a registered nurse is to assess function and screen for abnormalities. Most information about function and mobility is gathered during the patient interview, but the nurse also observes the patient's posture, walking, and movement of their extremities during the physical exam.

During a routine assessment of a patient during inpatient care, a registered nurse typically completes the following musculoskeletal assessments:

- Assess gait
- Inspect the spine
- Observe the range of motion of joints
- Inspect muscles and extremities for size and symmetry
- Assess muscle strength (Figures 5 and 6)
- Palpate extremities for tenderness.

While assessing an older adult, keep in mind they may have limited mobility and range of motion due to age-related degeneration of joints and muscle weakness. Be considerate of these limitations and never examine any areas to the point of pain or discomfort. Support the joints and muscles as you assess them to avoid pain or muscle spasms. Compare bilateral sides simultaneously and expect symmetry of structure and function of the corresponding body area.

Figure 5. A nurse tests a patient's hand and upper-body strength

Figure 6. A nurse tests a patient's leg and feet for strength and mobility

Inspection

General inspection begins by observing the patient in a standing position for postural abnormalities. Observe their stance and note any abnormal curvature of the spine such as kyphosis, lordosis, or scoliosis. Ask the patient to walk away from you, turn, and walk back toward you while observing their gait and balance.

Ask the patient to sit. Inspect the size and contour of the muscles and joints and if the corresponding parts are symmetrical. Notice the skin over the joints and muscles and observe if there is tenderness, swelling, erythema, deformity, or asymmetry. Observe how the patient moves their extremities and note if there is pain with movement or any limitations in active range of motion (ROM). Active range of motion is the degree of movement the patient can voluntarily achieve in a joint without assistance.

Palpation

Palpation is typically done simultaneously during the inspection. As you observe, palpate each joint for warmth, swelling, or tenderness. If you observe a decreased active range of motion, gently attempt a passive range of motion by stabilising the joint with one hand while using the other hand to gently move the joint to its limit of movement. Passive range of motion is the degree of range of motion demonstrated in a joint when the examiner is providing the movement. You may hear crepitus as the joint moves. Crepitus sounds like a crackling, popping noise, which is considered normal if not associated with pain. As the joint moves, there should not be any reported pain or tenderness.

Table 5: Expected Versus Unexpected Findings on Musculoskeletal Assessment

Assessment	Expected Findings	Unexpected Findings (Document and notify the provider if a new finding*)
Inspection 	Erect posture with good balance and normal gait while walking. Joints and muscles are symmetrical with no swelling, redness, or deformity. Active range of motion of all joints without difficulty. No spine curvature from the posterior view.	Spinal curvature is present. Poor balance or unsteady gait while walking. Swelling, bruising, erythema, or tenderness over joints or muscles. Deformity of joints. Decreased active range of motion. Contracture or foot drop present.
Auscultation 	Not applicable	Crepitus associated with pain on movement.
Palpation 	No palpable tenderness or warmth of joints, bones, or muscles. Muscle strength 5/5 against resistance.	Warmth or tenderness on palpation of joints, bones, or muscles. Decreased passive range of motion. Muscle strength of 3/5 or less.
***CRITICAL CONDITIONS to report immediately**		Hot, swollen, painful joint. Suspected fracture, dislocation, sprain, or strain.

Gastrointestinal and Genitourinary Assessment

The gastrointestinal (GI) system is responsible for the ingestion of food and the absorption of nutrients. Additionally, the GI and genitourinary (GU) systems are responsible for the elimination of waste products. Therefore, during the assessment of these systems, the nurse collects subjective and objective data regarding the underlying structures of the abdomen and the normal functioning of the GI and GU systems.

Subjective Assessment

A focused gastrointestinal and genitourinary subjective assessment collects data about the signs and symptoms of GI and GU diseases, including any digestive or nutritional issues, relevant medical or family history of GI and GU diseases, and any current treatment for related issues.

Gastrointestinal

Pain is the most common complaint related to abdominal problems and can be attributed to multiple underlying etiologies. Because of the potential variability of contributing factors, a careful and thorough assessment of this chief complaint should occur. Additional associated questions include asking if bloody stools (haematochezia); dark, tarry stools (melaena); bloating (abdominal distention); or vomiting of blood (hematemesis) are occurring.

Nausea, vomiting, diarrhea, and constipation are common issues experienced by hospitalised patients due to adverse effects of medications or medical procedures. It is important to ask a patient daily about the date of their last bowel movement and flatus so that a bowel management program can be initiated if necessary. If a patient is experiencing diarrhea, it is important to assess and monitor for signs of dehydration or electrolyte imbalances. Dehydration can be indicated by dry skin, dry mucous membranes, or sunken eyes. These symptoms may require reporting to medical staff for further treatment.

Additional specialised assessments of GI system function can include examination of the oropharynx and oesophagus. For example, patients who have experienced a cerebrovascular accident (CVA), also called a "stroke," may have trouble swallowing (dysphagia). The nurse is often the first to notice these difficulties in patients who are swallowing pills, liquid, or food and can advocate for treatment to prevent complications, such as unintended weight loss or aspiration pneumonia.

Genitourinary

The nursing assessment of the genitourinary system generally focuses on bladder function. Ask about urinary symptoms, including dysuria, urinary frequency, or urinary urgency. Dysuria is any discomfort

associated with urination and often signifies a urinary tract infection. Patients with dysuria commonly experience burning, stinging, or itching sensations. In elderly patients, changes in mental status may be the presenting symptom of a urinary tract infection. In women with dysuria, asking whether the discomfort is internal or external is important because vaginal inflammation can also cause dysuria as urine passes by the inflamed labia.

Abnormally frequent urination (e.g., every hour or two) is termed urinary frequency. In older adults, urinary frequency often occurs at night and is termed nocturia. The frequency of normal urination varies considerably from individual to individual depending on personality traits, bladder capacity, or drinking habits. It can also be a symptom of a urinary tract infection, pregnancy in females, or prostate enlargement in males.

Urinary urgency is an abrupt, strong, and often overwhelming need to urinate. Urgency often causes urinary incontinence, a leakage of urine. When patients experience urinary urgency, the desire to urinate may be constant with only a few millilitres of urine eliminated with each voiding.

Objective Assessment

Physical examination of the abdomen includes inspection, auscultation, palpation, and percussion. Note that the order of physical assessment differs for the abdominal system compared to other systems. Palpation should occur after the auscultation of bowel sounds so that accurate, undisturbed bowel sounds can be assessed. The abdomen is roughly divided into four quadrants: right upper, right lower, left upper, and left lower. When assessing the abdomen, consider the organs located in the quadrant you are examining (Figure 7).

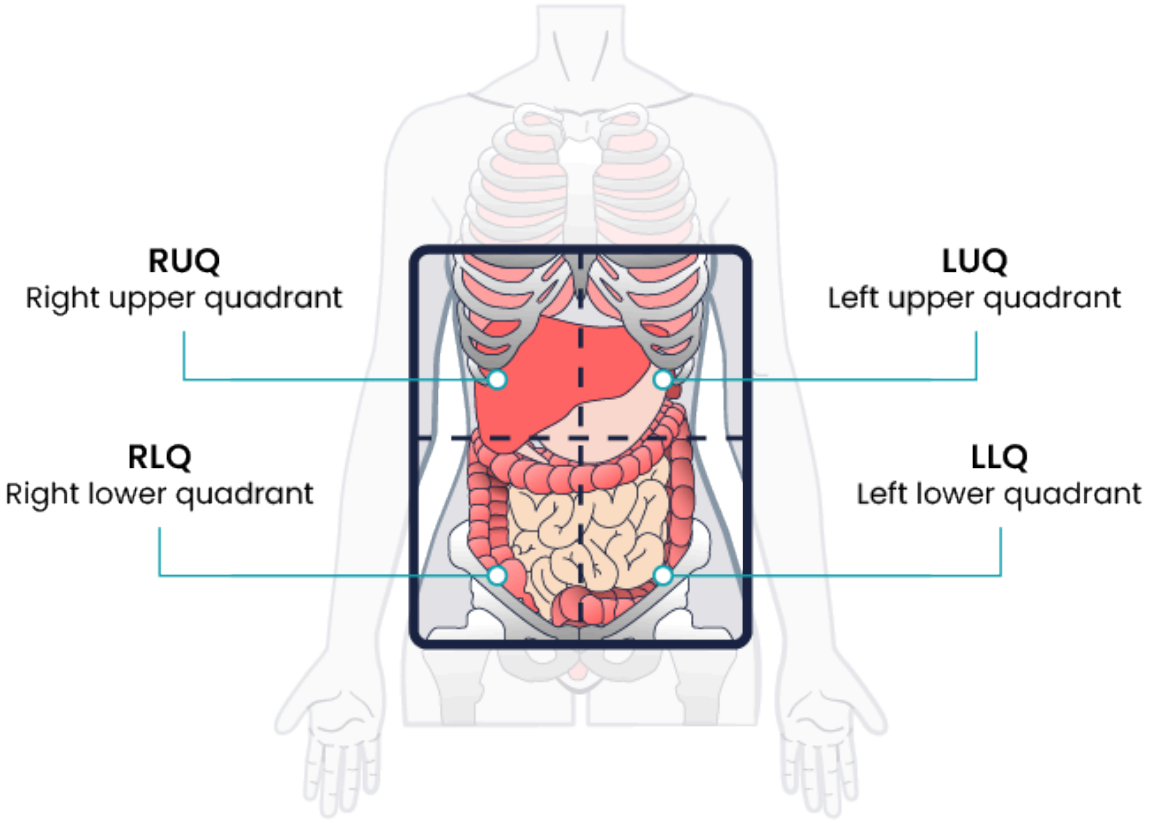


Figure 7. Abdomen quadrants when completing an abdominal assessment

In preparation for the physical assessment, the nurse should create an environment in which the patient will be comfortable. Encourage the patient to empty their bladder before the assessment. Warm the room and stethoscope to decrease tensing during assessment.

Inspection

The abdomen is inspected by positioning the patient supine on an examining table or bed. The head and knees should be supported with small pillows or folded sheets for comfort and to relax the abdominal wall musculature. The patient's arms should be at their side and not folded behind the head, as this tenses the abdominal wall. Ensure the patient is covered adequately to maintain privacy, while still exposing the abdomen as needed for a thorough assessment. Visually examine the abdomen for overall shape, masses, skin abnormalities, and any abnormal movements.

- Observe the general contour and symmetry of the entire abdominal wall. The contour of the abdomen is often described as flat, rounded, scaphoid (sunken), or protuberant (convex or bulging).
- Assess for distention. Generalised distention of the abdomen can be caused by obesity, bowel distention from gas or liquid, or fluid buildup.
- Assess for masses or bulges, which may indicate structural deformities like hernias or related to disorders in abdominal organs.

- Assess the patient's skin for uniformity of colour, integrity, scarring, or striae. Striae are white or silvery elongated marks that occur when the skin stretches, especially during pregnancy or excessive weight gain.
- Note the shape of the umbilicus; it should be inverted and midline.
- Carefully note any scars and correlate these scars with the patient's recollection of previous surgeries or injuries.
- Document any abnormal movement or pulsations. Visible intestinal peristalsis can be caused by intestinal obstruction. Pulsations may be seen in the epigastric area in patients who are especially thin, but otherwise should not be observed.

Auscultation

Auscultation, or the listening of the abdomen, follows inspection for a more accurate assessment of bowel sounds. Use a warmed stethoscope to assess the frequency and characteristics of the patient's bowel sounds, which are also referred to as peristaltic murmurs.

Begin your assessment by gently placing the diaphragm of your stethoscope on the skin in the right lower quadrant (RLQ), as bowel sounds are consistently heard in that area. Bowel sounds are generally high-pitched, gurgling sounds that are heard irregularly. Move your stethoscope to the next quadrant in a clockwise motion around the abdominal wall.

It is not recommended to count abdominal sounds because the activity of normal bowel sounds may cycle with peak-to-peak periods as long as 50 to 60 minutes. Most peristaltic murmurs are produced by the stomach, with the remainder from the large intestine and a small contribution from the small intestine. Because the conduction of peristaltic murmur is heard throughout all parts of the abdomen, the source of peristaltic murmur is not always at the site where it is heard. If the conduction of peristaltic sounds is good, auscultation at a single location is considered adequate.

Hyperactive bowel sounds may indicate bowel obstruction or gastroenteritis. Sometimes you may be able to hear a patient's bowel sounds without a stethoscope, often described as "stomach growling" or borborygmus. This is a common example of hyperactive sounds. Hypoactive bowel sounds may be present with constipation, after abdominal surgery, peritonitis, or paralytic ileus. As you auscultate the abdomen, you should not hear vascular sounds. If heard, this finding should be reported to the healthcare provider.

Palpation

Palpation, or touching, of the abdomen involves using the flat of the hand and fingers (not the fingertips) to detect palpable organs, abnormal masses, or tenderness. When palpating the abdomen of a patient reporting abdominal pain, the nurse should palpate that area last. Light palpation is primarily used by bedside nurses to assess for musculature, abnormal masses, and tenderness. Deep palpation is a technique used by advanced practice clinicians to assess for enlarged organs. Lightly palpate the abdomen by pressing

into the skin about one centimetre beginning in the RLQ. Continue to move around the abdomen in a clockwise manner.

Palpate the bladder for distention. Palpate gently from the umbilicus down toward the pelvis feeling for a full bladder. The bladder is not normally palpable, but a distended bladder may reach the umbilicus. A full bladder presents as a pelvis mass, which is typically regular, smooth, firm, and oval-shaped. It arises in the midline. Note the patient's response to palpation, such as pain, guarding, rigidity, or rebound tenderness. Voluntary guarding refers to the voluntary contraction of the abdominal wall musculature, usually due to fear, anxiety, or the touch of cold hands. Involuntary guarding is the reflexive contraction of overlying abdominal muscles as the result of peritoneal inflammation. Rigidity refers to involuntary contraction of the abdominal musculature in response to peritoneal inflammation, a reflex the patient cannot control. Rebound tenderness is another sign of peritoneal inflammation or peritonitis. To elicit rebound tenderness, the nurse maintains pressure over an area of tenderness and then withdraws the hand abruptly. If the patient winces with pain upon withdrawal of the hand, the test is positive.

Percussion

You may observe advanced practice nurses and other healthcare professionals percussing the abdomen to obtain additional data. Percussing can be used to assess the liver and spleen or to determine if costovertebral angle (CVA) tenderness is present, which is related to inflammation of the kidney.

Table 6: Expected Versus Unexpected Gastrointestinal and Genitourinary Assessment Findings

Assessment	Expected Findings	Unexpected Findings (Document and notify the provider of any new findings*)
Inspection	• Symmetry of shape and colour • Flat or rounded contour (protuberant in children until age 4) • No visible lesions • Intact skin	• Asymmetry • Distension • Scars • Wounds • Skin breakdown • Pulsations • Visible peristalsis
Auscultation	• Presence of normoactive bowel sounds	• Hypoactive bowel sounds • Hyperactive bowel sounds • Absent bowel sounds
Palpation	• Absence of pain or tenderness • Absence of masses • Voluntary guarding	• Pain on palpation • Involuntary guarding • Rigidity • Rebound tenderness • Masses noted that are not previously documented

Assessment	Expected Findings	Unexpected Findings (Document and notify the provider of any new findings*)
Genitourinary	• Clear, pale-yellow urine • Absence of pain, urgency, frequency, or retention • Nondistended bladder	• Dark or bloody urine, foul odour, or sediment present • Dysuria • Urinary frequency • Urinary urgency • Urinary retention, indicated by distended bladder and/or tenderness on palpation
***CRITICAL CONDITIONS to report immediately** 		• New or worsening melaena • Bloody stools • Hematemesis • Signs of dehydration associated with diarrhea and vomiting, such as <30mL urine/ hour

Integumentary Assessment

A routine integumentary assessment by a registered nurse in an inpatient care setting typically includes inspecting overall skin colour; inspecting for skin lesions and wounds; and palpating extremities for oedema, temperature, and capillary refill.

Subjective Assessment

Begin the assessment by asking focused interview questions regarding the integumentary system.

Objective Assessment

There are five key areas to note during a focused integumentary assessment: colour, skin temperature, moisture level, skin turgor, and any lesions or skin breakdown. Certain body areas require observation because they are more prone to pressure injuries in locations such as bony prominences, skin folds, perineum, between digits of the hands and feet, and under any medical device that can be removed during routine daily care. The following inspection procedures should be considered:

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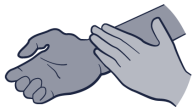
Table 7: Expected Versus Unexpected Findings on Integumentary Assessment

Assessment	Expected Findings	Unexpected Findings (Document and notify the provider if a new finding*)
Inspection 	Skin is the expected colour for ethnicity without lesions or rashes.	• Jaundice • Erythema • Pallor • Cyanosis • Irregular-looking mole • Bruising (ecchymosis) • Rashes • Petechiae • Skin breakdown • Burns
Palpation 	Skin is warm and dry with no oedema. Capillary refill is less than 3 seconds. Skin has normal turgor with no tenting.	• Diaphoretic or clammy • Cool extremity • Oedema • Lymphedema • Capillary refill greater than 3 seconds • Tenting

Assessment	Expected Findings	Unexpected Findings (Document and notify the provider if a new finding*)
***CRITICAL CONDITIONS to report immediately** 		• Cool and clammy • Diaphoretic • Petechiae • Jaundice • Cyanosis • Redness, warmth, and tenderness indicate a possible infection

Key Takeaways

In this chapter, we covered:

- A "head-to-toe approach" refers to a comprehensive assessment that systematically examines a patient's entire body, from the top of their head to the tips of their toes, to thoroughly assess their overall health status and identify any potential issues.
- Conducting a systems-based assessment using a head-to-toe approach helps in developing a nursing care plan to meet individual patient needs
- This comprehensive assessment includes neurological, cardiovascular, respiratory, musculoskeletal, gastrointestinal, genitourinary and integumental system assessments.
- Neurological assessment involves a focused history, assessing level of consciousness using tools such as the Glasgow Coma Scale, motor strength and pupillary size and response to light.
- Cardiovascular assessment involves a focused history, interpretation of vital signs such as HR and BP, auscultation of heart sounds, palpation of rate, rhythm and quality of arterial pulses, peripheral oedema and capillary refill.
- Respiratory assessment involves a focused history, interpretation of vital signs such as RR and O2 sats, inspection of the patient's breathing pattern, skin colour, and respiratory status, palpation to identify abnormalities, auscultation of lung sounds and percussion of underlying lung tissue.
- Musculoskeletal assessment involves focused history, inspection of posture, gait and range of motion of extremities and palpation of warmth, swelling and tenderness of joints.
- Gastrointestinal assessment involves focused history such as bowel function, abdominal pain, nausea, vomiting, diarrhoea, constipation and nutrition, inspection of the contour of the abdomen, auscultation of the four quadrants of the abdomen for bowel sounds, careful palpation of the abdomen and percussion of the abdomen.
- Genitourinary assessment involves focused history such as urinary function, pelvic pain. Objective assessment is performed during the gastrointestinal assessment during palpation of the abdomen including palpation of the bladder and pelvic area.
- Integumentary assessment involves focused history and assessment of skin colour, temperature, moisture level, skin turgor, and any lesions or skin breakdown.

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PAIN ASSESSMENT AND MANAGEMENT

Amy McCrystal and Jessica Best

Learning Outcomes

In this chapter you will learn how to:

- Describe the four processes involved in nociception and how pain interventions can work during each process
- Differentiate types of pain
- Understand factors that may impact pain (eg/ lifespan, sociocultural, gender considerations, stressors, etc.)
- Accurately assess pain and utilise appropriate assessment methods.

Pain is a complex and subjective experience that varies greatly among individuals, making its assessment and management a critical component of nursing practice. Margo McCaffery, a highly recognised nurse and pioneer pain educator, defined pain as "... whatever the experiencing person says it is, existing whenever he/she says it does." In other words, pain is personal. You, the person experiencing it, define it and translate it (McCaffery, 1968). This chapter provides an overview of the physiological and psychological aspects of pain, explores evidence-based approaches to pain assessment, and discusses strategies for effective pain management. By understanding the principles of pain management, nurses can deliver compassionate, patient-centred care that alleviates suffering and enhances quality of life.

Pain Classifications

Pain can be classified in many ways. Several classifications are presented below. It is important to recognise that these are not mutually exclusive, and a person may experience multiple classifications of pain at the same time.

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Concepts Related to Pain

This section provides a basic introduction to the concept of pain as it relates to pharmacology. The concept of pain is defined as "an unpleasant sensory and emotional experience associated with actual or potential tissue damage". The concept map below provides a summary of the key information necessary to understand pain informed by several resources.

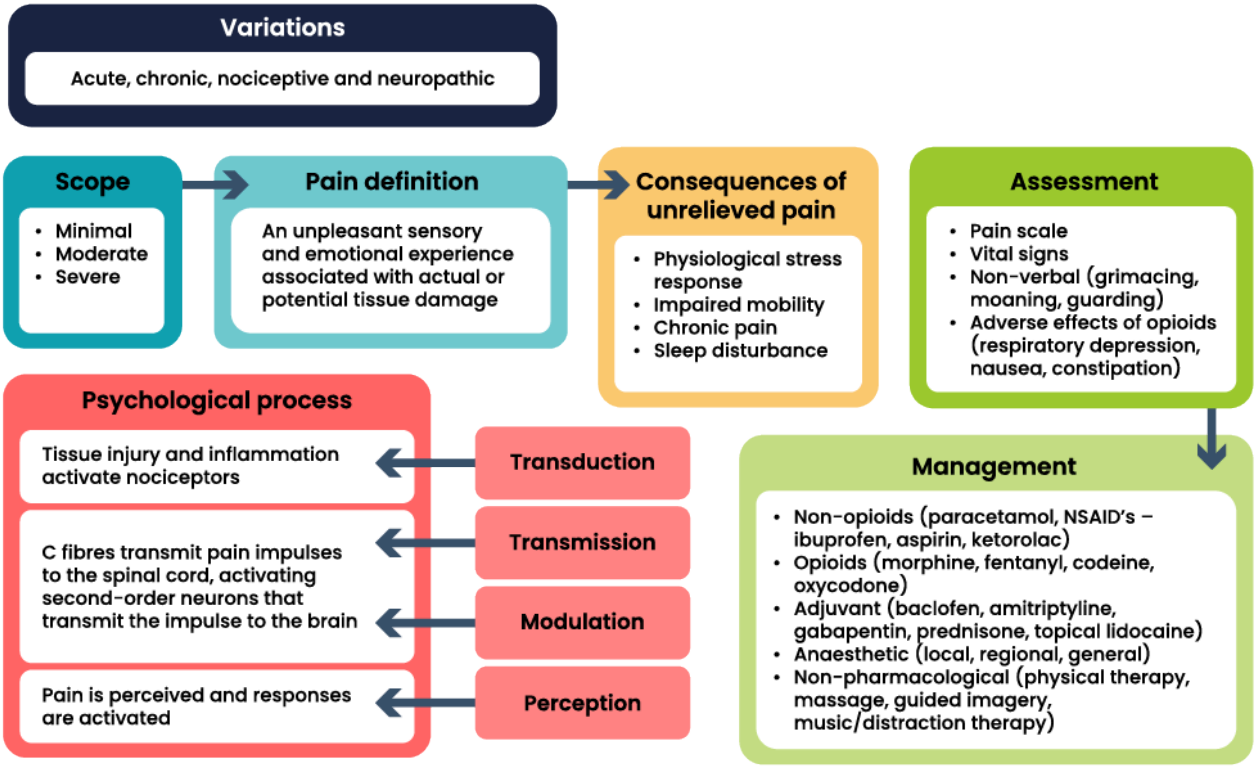

Figure 1. The pain concept map

Physiology of Pain

Before addressing the medications used to manage pain, it is essential to understand the physiology of pain. Pain is a complex experience that arises when tissue damage occurs within the body. This tissue damage activates pain receptors located in peripheral nerves, known as nociceptors. These specialised nerve

endings are distributed throughout various tissues, including arterial walls, joint surfaces, muscle fascia, periosteum, skin, and soft tissue; however, they are relatively sparse in most internal organs.

Tissue damage can result from a variety of causes, which can be classified as either physical or chemical. Physical factors include heat, cold, pressure, stretching, spasms, and ischaemia, while chemical factors involve the release of pain-producing substances into the extracellular fluid surrounding the nerve fibres that transmit pain signals. These substances not only activate pain receptors but also heighten their sensitivity and stimulate the release of inflammatory mediators such as prostaglandins. Additionally, pain can trigger the physiological stress response.

For an individual to experience pain, the signal generated by nociceptors in peripheral tissues must be effectively transmitted to the spinal cord and subsequently to the hypothalamus and cerebral cortex of the brain. This transmission is facilitated by two primary types of nerve fibres: A-delta fibres, which are responsible for sharp, immediate pain, and C fibres, which convey dull, persistent pain. The dorsal horn of the spinal cord serves as a relay station for information from these nerve fibres.

Within the brain, the thalamus acts as a critical relay station for incoming sensory stimuli, including pain. Once the signals reach the thalamus, they are transmitted to the cerebral cortex, where they are consciously perceived. This process involves four key stages of nociception:

1. **Transduction**: This initial stage occurs when nociceptors are activated by a noxious stimulus such as heat, pressure, or chemical irritation. The painful stimuli are converted to electrical impulses (action potential) that signify the possibility of actual or potential tissue damage (Lee & Neumeister, 2020).
2. **Transmission**: The electrical signals generated during transduction are transmitted along the A-delta and C fibres to the spinal cord. Here, the signals are relayed to the brain via the dorsal horn (Lee & Neumeister, 2020).
3. **Perception**: This stage occurs in the cerebral cortex, where the brain interprets and consciously perceives the pain. This stage is influenced by a range of factors, including emotional and psychological components (Lee & Neumeister, 2020).
4. **Modulation**: Throughout this pathway, pain transmission can be modified via various factors. Inhibitory interneurons in the spinal cord can dampen pain signals, and the brain can also send descending signals that modulate the perception of pain through neurotransmitters like serotonin and norepinephrine (Lee & Neumeister, 2020). These neurotransmitters can either amplify or inhibit the pain signals, influencing the overall perception of pain.

The four processes of nociception; transduction, transmission, perception and modulation are demonstrated in Figure 2 below.

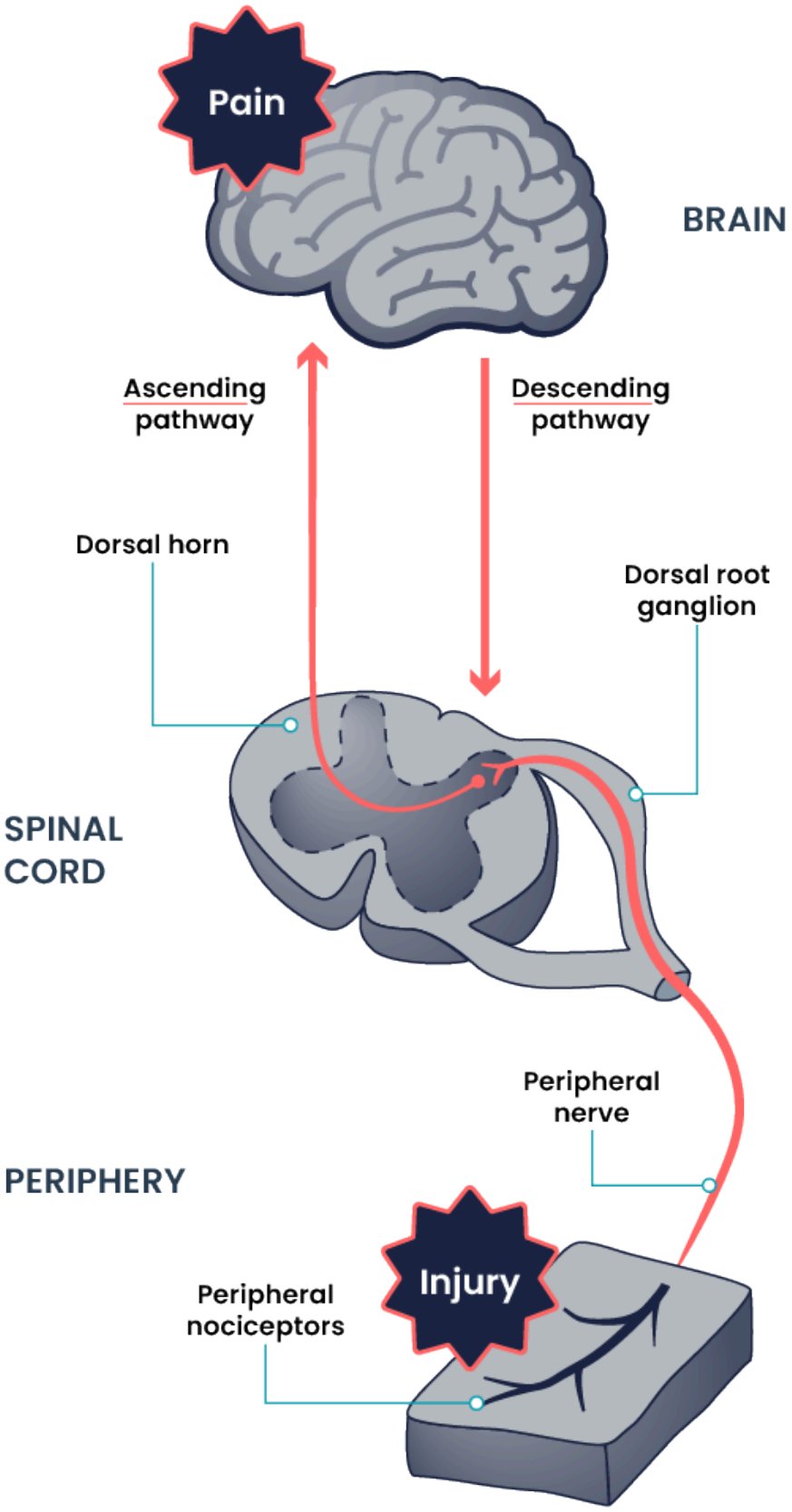

Figure 2. The four processes of nociception

Pain Assessment Methods

Effective pain assessment is essential for understanding a patient's experience and guiding appropriate management strategies. Nurses use a variety of methods to evaluate pain, including self-reports, observational tools, and physical assessments. These methods help identify the type, intensity, and impact of pain on a patient's daily life. A thorough assessment ensures that pain management interventions are tailored to the individual's needs, promoting better outcomes and improved quality of care.

Subjective Pain Assessment Methods

The numeric rating scale (NRS) is a pain screening tool commonly used to assess pain severity at that moment in time. The nurse will ask a patient to rate the severity of their pain on a scale from 0 to 10, with "0" being no pain and "10" being the worst pain imaginable is a common question used to screen patients for pain. This question can be used to initially screen a patient for pain, but a thorough pain assessment is required. Additionally, the patient's comfort-function goal must be assessed and documented. This individualised comfort-function goal provides the basis for the patient's pain treatment plan and is used to evaluate the effectiveness of interventions and make changes as needed.

OPQRSTUV

The OPQRSTUV mnemonic is a systematic approach used to collect key information required for a comprehensive pain assessment. The framework guides the nurse through the key aspects of a pain evaluation by considering the following:

- **Onset:** When was the beginning of the pain?
- **Provocative/palliative factors:** Factors that bring the pain on, or make it worse and factors that reduce or alleviate the pain.
- **Quality/quantity:** Characteristics and nature of the pain.
- **Region/radiation:** Location and spread of pain.
- **Severity**: Intensity level of the pain.
- **Timing:** Duration of the pain.
- **Understanding:** Patient's interpretation of the pain.
- **Values**: Impact on pain on the person's values.

Figure 3. The OPQRSTUV pain assessment approach

When assessing the person, nurses should apply a holistic approach and use open-ended questions from this framework to gather detailed information, if responses seem inconsistent, they then employ follow-up questions to validate the data. For example, if a patient states that "the pain is tolerable" but rates the pain as a "7" on a 0 to 10 pain scale, further questioning may reveal the pain varies with activity, such as being higher during physiotherapy but is manageable during rest. This additional information allows the nurse to customise pain management strategies to the patient's needs and therefore provide more effective interventions. Sample questions when using the OPQRSTUV assessment are included below.

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FACES Scale

The FACES scale is a visual tool for assessing pain in children and others who cannot quantify the severity of their pain on a scale of 0 to 10. See Figure 4 for the FACES Pain Rating Scale. To use this scale, use the following evidence-based instructions. Explain to the patient that each face represents a person who has no pain (hurt), some pain, or a lot of pain. "Face 0 doesn't hurt at all. Face 2 hurts just a little. Face 4 hurts a little more. Face 6 hurts even more. Face 8 hurts a whole lot. Face 10 hurts as much as you can imagine, although you don't have to be crying to have this worst pain." Ask the person to choose the face that best represents the pain they are feeling. Note that the person reports which face best represents how they are feeling, and the nurse does not select a face based on how the person appears to feel.

Figure 4. The Wong–Baker Pain Rating Scale

FLACC Scale

The FLACC scale (i.e., the Face, Legs, Activity, Cry, Consolability scale) is a measurement used to assess pain for children between the ages of two months and seven years or individuals who are unable to verbally communicate their pain. The scale has five criteria, which are each assigned a score of 0, 1, or 2. The scale is scored in a range of 0 to 10 with "0" representing no pain. See Table 2 for the FLACC scale. Like all behavioural tools, the FLACC cannot distinguish between pain and other forms of distress. Think critically when interpreting behaviours that may be pain-related and when making treatment decisions based on the FLACC total score. You should observe the patient for at least two to five minutes before assigning a score.

Table 2. The FLACC Scale

Criteria	Score 0	Score 1	Score 2
Face	No particular expression or smile	Occasional grimace or frown, withdrawn, or uninterested	Frequent to constant quivering chin; clenched jaw
Legs	Normal position or relaxed	Uneasy, restless, or tense	Kicking or legs drawn up
Activity	Lying quietly, normal position, and moves easily	Squirming, shifting, back and forth, or tense	Arched, rigid, or jerking
Cry	No cry (awake or asleep)	Moans or whimpers or occasional complaint	Crying steadily, screams or sobs, or frequent complaints
Consolability	Content and relaxed	Reassured by occasional touching, hugging, or being talked to; distractible	Difficult to console or comfort

Pain Assessment in Advanced Dementia (PAINAD) Scale

The Pain Assessment in Advanced Dementia (PAINAD) Scale is a simple, valid, and reliable instrument for assessing pain in noncommunicative patients with advanced dementia. See Table 3 for the items included on the scale. Each item is scored from 0 to 2, and when totalled, the score can range from 0 (no pain) to 10 (severe pain).

Table 3. The PAINAD Scale

Item	0	1	2
Breathing independent of vocalisation	Normal	Occasional laboured breathing. Short period of hyperventilation.	Noisy laboured breathing. Long period of hyperventilation. Cheyne-Stokes respirations.
Negative vocalisation	None	Occasional moan or groan. Low-level speech with a negative or disapproving quality.	Repeated troubled calling out. Loud moaning or groaning. Crying.
Facial Expression	Smiling or inexpressive	Sad. Frightened. Frown.	Facial grimacing.
Body language	Relaxed	Tense. Distressed pacing. Fidgeting.	Rigid. Fists clenched. Knees pulled up. Pulling or pushing away. Striking out.
Consolability	No need to console	Distracted or reassured by voice or touch.	Unable to console, distract, or reassure.

Download the full PAINAD scale from The Hartford Institute for Geriatric Nursing.

Pain Assessment in Patients with Impaired Cognition (PAIC15)

The PAIC15 Scale is a recently developed tool for use with individuals who are cognitively impaired, particularly those with dementia. It was developed through a large multidisciplinary collaboration of clinical, research, and methodological experts, including nurses, from several European countries. The team of experts developed this new meta-tool over a period of seven years, during which team members empirically evaluated items from all existing pain-related observational tools and reached a consensus on the 15 most promising items, based on validity and reliability.

As shown in the tool, the PAIC15 includes 15 descriptors with five items each for:

- Facial expression
- Body movements
- Vocalisation.

The PAIC15 is helpful when you have limited time with the patient, as you can quickly assess pain either at rest or with movement. Download the full PAIC15 scale.

Objective Pain Assessment Methods

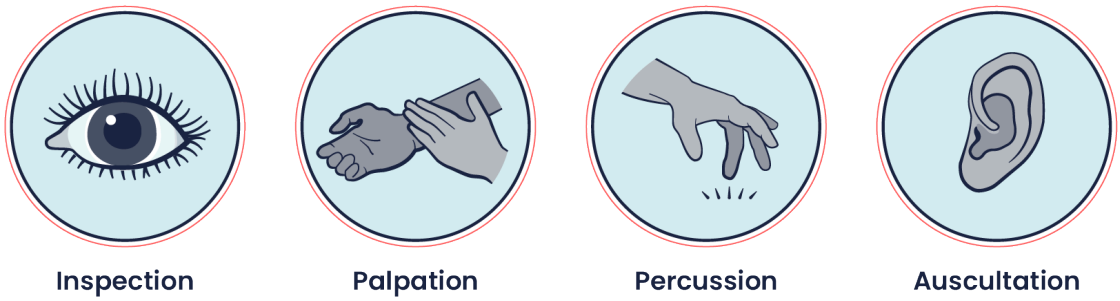

Figure 5. Remembering the four objective assessment techniques

It is always important to perform an objective assessment following a subjective assessment, but this is particularly the case for infants, young children, and non-verbal patients who may have difficulties with self-reporting.

The type of objective assessment used will depend on the location of the pain, the related body systems, and the acuity of the situation. Focused assessments of the body system may be necessary. For example, if a person describes knee pain, you should do a focused assessment of the musculoskeletal system. If a patient describes chest pain, you should do a focused assessment of the cardiovascular system, the respiratory system, and possibly the musculoskeletal system.

The objective assessment does not follow a specific order; it depends on the acuity of the situation and the stability of the patient. Common components of an objective assessment of pain include the following.

Full Set of Vital Signs

Vital signs can be affected by pain, particularly acute pain. Collection and assessment of vital sign data may provide important information related to the patient's stability and the potential for clinical deterioration. Vital signs are also an important component of pain tools that include physiological measures; these can be particularly helpful in patients who are pre-verbal or non-verbal such as newborns, young children, patients that may have a developmental challenge, and unconscious patients. However, vital sign changes cannot help you differentiate between pain and other forms of distress such as fear and anxiety. You should always consider the context when interpreting vital signs because they can be affected by the level of consciousness, medications, and sedation. Therefore, your clinical judgement will be based on a comprehensive subjective and objective assessment, along with critical thinking.

Inspection of the area: Typically, you will inspect the area on the body where a patient indicates they are having pain. Inspection is performed bilaterally in which you compare the left side to the right side. For example, if a patient is having eye pain, you should compare the left eye to the right eye. Inspect for and note any abnormalities such as discolouration (e.g., redness), bruising, swelling, scarring, incisions, masses, deformities, asymmetry, lesions, non-intact skin, and pressure injuries.

Palpation of the area: After conducting a subjective assessment, you should palpate the area (and related areas) in which the patient is having pain. Palpation is performed bilaterally: compare the left side to the right side. For example, if a patient is having left shoulder pain, you should palpate the right shoulder first and then the painful left shoulder. You should also observe any signs of pain during palpation, such as a change in respiration (e.g., holding their breath), facial grimacing, withdrawing their body/limb, and guarding.

Perform **auscultation** and **percussion** when a patient is describing chest or abdominal pain. For example, with chest pain, you should auscultate the lungs and the apical pulse and cardiac valves.

Priorities of Care

Some of the main priorities of care related to pain assessment include:

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Spiritual, Mental and Behavioural (including Gendered) Considerations of Pain

When we first see a patient, we tend to make assumptions about the presence and even the severity of pain based on readily available cues (e.g., facial expression, body positioning, vocalisations). These assumptions are rooted in our biases regarding what pain looks and even sounds like. These biases may emerge from our own experiences. Our initial impressions of a patient's pain can form what is called an "anchor" or have an "anchor effect" in which all additional assessments of the patient's pain are influenced by these initial impressions (Rivi et al., 2011). These assumptions can also be based on ageist ideas, for example, that older people or newborns do not feel pain. Another biased assumption is that people living with cognitive impairment (such as dementia) do not feel pain in the same way as others because they may have difficulty articulating that pain.

Patients with mental health disorders may be seen as behavioural as opposed to being in pain. These assumptions can mean that pain is under-assessed and undertreated in certain populations. It is also very important to be aware that some people may openly talk about their pain and cry out in agony, while others may be stoic and hide their pain. Some people may stay home in bed when they are in pain while others may continue with their daily life and go to work. A patient's spiritual beliefs may also influence how they communicate their pain.

Gender is a sociocultural construct, related to, but not interchangeable with biological sex, that has significant implications on how individuals experience pain. Studies have shown that sociocultural influences, such as gender roles, expectations, and social learning, contribute to gender differences in the pain experience (Pedulla et al., 2024). According to some studies, Females tend to experience pain more intensely and have lower pain tolerances and thresholds than males (Pedulla et al., 2024). Additionally, differences in pain outcomes between men and women have been attributed to psychological differences such as decreased self-efficacy, differing pain coping strategies, and higher pain-catastrophising levels in women than men. The proposed mechanisms for these sex differences in the experience of pain have been widely researched and are attributed to several biopsychosocial factors. Understanding the gender roles can enhance person-centred interaction and care-plans.

Comfort-Function Goals

Comfort-function goals encourage the patient to establish the level of comfort needed to achieve functional goals based on their current health status. For example, one patient may be comfortable ambulating after surgery and their pain level is 3 on a 0-to-10 pain intensity rating scale. In contrast, another patient desires a pain level of 0 on a 0-to-10 scale to feel comfortable ambulating. To properly establish a patient's comfort-function goal, nurses must first describe the essential activities of recovery and explain the link between pain control and positive outcomes. If a patient's pain score exceeds their comfort-function goal, nurses must implement an intervention and follow up within 1 hour to ensure the intervention was successful. Using the previous example, if a patient had established a comfort-function goal of 3 to ambulate and the current pain rating was 6, the nurse would provide appropriate interventions, such as medication, application of cold packs, or relaxation measures. The nurse would then perform a follow-up assessment within an hour to evaluate the effectiveness of these interventions. Documentation of the comfort-function goal, pain level, interventions, and follow-up are key to effective, individualised pain management.

Pain Management Strategies

Pain can be challenging for patients, and understanding how to manage it is crucial. Holistic Nursing is defined as "all nursing practice that has healing the whole person as its goal" (Thornton, 2019). As pain can impact a patient not just physically, but affect mental health, sleep, social life, etc., a holistic

approach to nursing care plays a major role in enabling positive outcomes for patients experiencing pain. It is also important to include a patient in their care, for example, in the planning and evaluating of pain management strategies along with setting goals. The following section will look at various pain management strategies that are important to providing effective nursing care. Two main strategies will be explored; this includes pharmacological and non-pharmacological therapies. Effective pain management will often use a combination of these strategies.

Pharmacological Therapy

Pharmacological therapy can be very effective in treating pain. Pharmacological therapy is the use of medication to treat a disease, illness, or medical condition. The type of medication depends on the type, duration, and severity of the pain (Ford, 2019). There are three main types of pain medications: opioid analgesics, non-opioid analgesics, and adjuvants. An analgesic is a medication used to relieve pain. When administering pain medications, the nurse must consider the patient's goals for pain relief and determine if past medications have been effective. The nurse must also consider if the patient is experiencing any side effects that may impact the patient and be aware of contraindications. Patients should be involved and engaged in their pain management plan. Research has shown improved patient outcomes when patients work together with the healthcare team to manage their pain.

In 1986, the World Health Organisation (WHO) proposed the WHO analgesic ladder to provide adequate pain relief for cancer patients (Aabha et al., 2023). The ladder mainly consists of three steps:

- **First Step** – Mild pain: non-opioid analgesics such as nonsteroidal anti-inflammatory drugs (NSAIDs) or acetaminophen with or without adjuvants
- **Second Step** – Moderate pain: weak opioids (hydrocodone, codeine, tramadol) with or without non-opioid analgesics and with or without adjuvants
- **Third Step** – Severe and persistent pain: potent opioids (morphine, methadone, fentanyl, oxycodone, buprenorphine, tapentadol, hydromorphone, oxymorphone) with or without non-opioid analgesics, and with or without adjuvants

This analgesic path, developed following the recommendations of an international group of experts, has undergone several modifications over the years and is currently applied for managing cancer pain but also acute and chronic non-cancer painful conditions due to a broader spectrum of diseases such as degenerative disorders, musculoskeletal diseases, neuropathic pain disorders, and other types of chronic pain (Aabha et al., 2023). The fundamental concept of the ladder is that it is essential to have adequate knowledge about pain, to assess its degree in a patient through proper evaluation, and to prescribe and administer appropriate medications.

Opioid Analgesics

An opioid analgesic is a powerful prescription medication that helps reduce pain by blocking pain signals. Common opioids include codeine, morphine, fentanyl, oxycodone, and tramadol. Different opioids have different amounts of analgesia, ranging from codeine used to treat mild to moderate pain, to morphine used to treat severe pain. Opioids are commonly administered orally or intravenously, but can also be administered rectally, subcutaneously, intramuscularly, or through the skin. The following are some common opioid analgesics.

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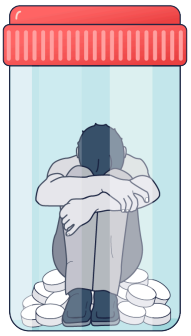
Opioid Risks

Opioids have a high risk of addiction and overdose, so it is important to consider other forms of pain management before prescribing opioids (National Center for Injury Prevention and Control, 2022). The Centers for Disease Control and Prevention (CDC) recommends avoiding opioids for pain management in patients younger than 18 years old, and avoiding opioids as first-line therapy for chronic pain (Dowell et al., 2022). First-line therapy is medical treatment that is recommended as the best option for the initial treatment of a disease or medical condition.



It is important that patients are informed about the side effects and risks of opioids. Side effects of opioids include the following:

- Addiction
- Confusion
- Constipation
- Drowsiness
- Itching
- Nausea and vomiting
- Overdose
- Physical dependence
- Respiratory depression
- Tolerance.

Constipation, nausea, and vomiting are common side effects of opioids. Opioids slow peristalsis and cause increased reabsorption of fluid into the large intestine, resulting in slow-moving, hard stools. Nurses should educate patients on preventing constipation with a bowel management program including stool softeners, fluids, a well-balanced diet, and physical activity (as allowed with pain/postsurgical restrictions) to aid

in preventing constipation. Because opioids slow gastrointestinal mobility, nausea and vomiting can also occur when taking opioids. Typically, patients will build enough tolerance against nausea and vomiting after taking opioids for a few days. Respiratory depression is one of the most serious potential side effects of opioids. Nurses must closely monitor patients receiving opioids for respiratory depression and administer naloxone to reverse the opioid effects if needed.

As important as pain management is, it is also crucial that healthcare providers are mindful of prescribing opioids to treat pain due to the high risk of addiction and overdose. Addiction is a chronic disease of the brain pursuing reward and/or relief by substance use. Patients who have an addiction have trouble stopping the use of opioids and often struggle with addiction for the rest of their lives. Patients can also struggle with tolerance and physical dependence on opioid misuse. Tolerance is when the body builds up resistance to a medication. Physical dependence is when the patient experiences physical symptoms of withdrawal, such as anxiety, diaphoresis, and muscle cramps when stopping a medication (National Center for Injury Prevention and Control, 2022). Opioids can be very effective in pain management when used appropriately, but healthcare providers must monitor for serious side effects (ANA Center for Ethics and Human Rights, 2018).

Nursing Considerations for Opioids

The nurse should do the following for patients who are taking an opioid:

- Assess the patient's pain before and after administering an opioid to determine its efficacy in treating the patient's pain.
- Watch for adverse effects, including sedation, ataxia (a term for a group of disorders that affect coordination, balance and speech), slurred speech, and shallow breathing, which could require the use of antidotal therapy or respiratory support.
- With chronic use of opioids, ask about the patient's bowel movements because constipation is very common with these medications and could be a source of abdominal pain.
- Ensure that naloxone is readily available in the event of opioid toxicity or overdose.
- Provide patient teaching regarding the drug and when to call the healthcare provider.

Patient-Controlled Analgesia

Hospitalised patients with severe pain may receive patient-controlled analgesia (PCA), which allows the patients to safely self-administer opioid medications using a programmed pump. PCA is used to treat acute, chronic, labour, and postoperative pain. A computerised pump contains an opioid analgesic that is connected directly to a patient's intravenous (IV) line. Doses of medication can be self-administered as needed by the patient by pressing a button. However, the pump is programmed to only allow the administration of medication every set number of minutes with a dose of medication every hour. These pump settings, and the design of the system requiring the patient to be alert enough to press the button, are safety measures to prevent overmedication that can cause sedation and respiratory depression. For this

reason, no one but the patient should press the button for administration of medication (not even the nurse). In other cases, the PCA pump delivers a small, continuous flow of pain medication intravenously with the patient self-delivering additional medication as needed, according to the limits set on the pump. PCA is useful for patients who have acute pain due to conditions such as trauma, burns, or pancreatitis (Pastino & Lakra, 2023).

The ability of the patient to self-administer pain medication has been shown to increase patient satisfaction and deliver timely pain interventions (Pastino & Lakra, 2023). It also alleviates the burden on both the nurse and the patient of adhering to a strict dosing schedule for PRN analgesics, which may not always provide sufficient pain relief. PCA may be appropriate for patients who are unable to tolerate oral pain medications or for patients who have breakthrough pain and need frequent dosing. The patient can time their medication according to the pain severity for better pain reduction and control.

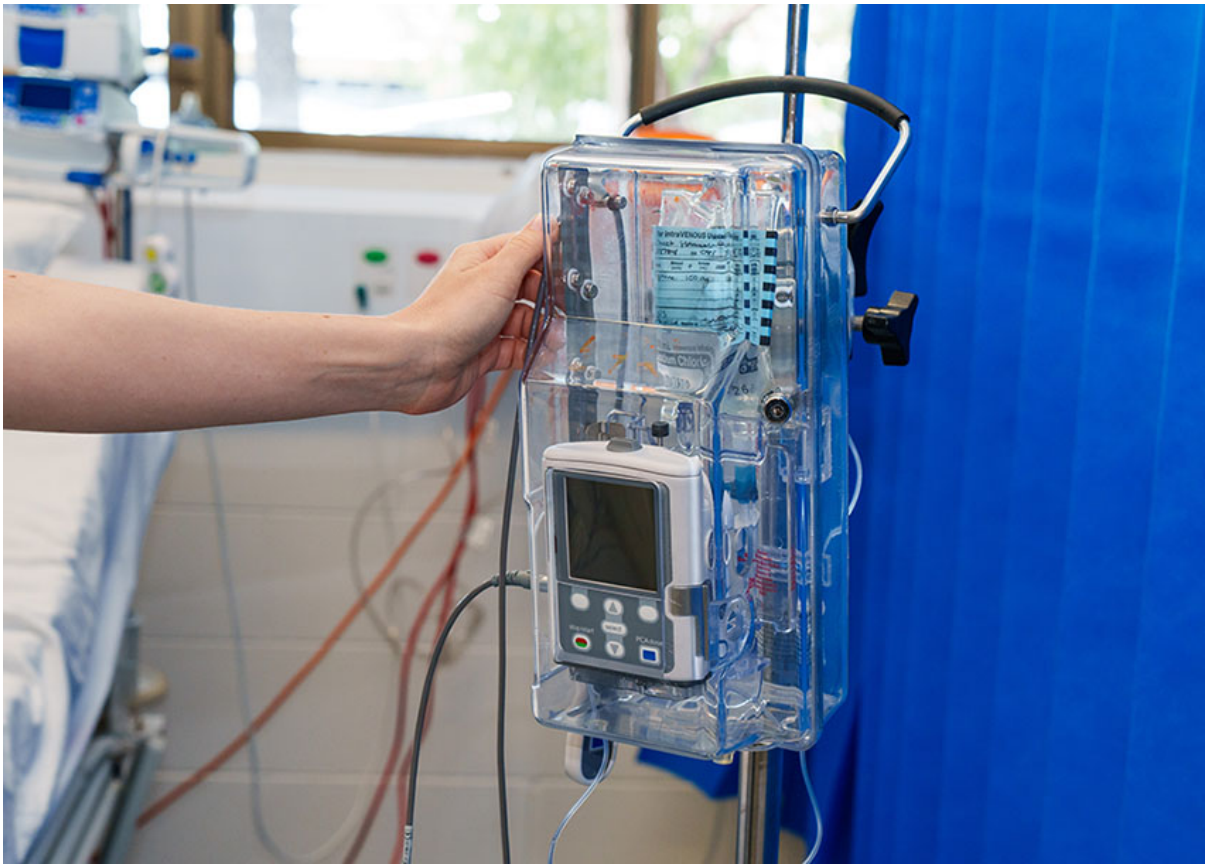


Figure 6. A PCA pump

Nursing Considerations for a PCA

PCA pumps must have certain orders relating to the bolus dose, basal rate, and lockout time. The bolus dose is the dose the patient receives each time they press the button on the PCA pump and is used for breakthrough pain. The basal rate is the continuous rate of the medication that maintains effective pain management. The lockout time is the amount of time after a bolus dose that the pump will not administer medication to the patient, even if they press the button, to prevent overdose. The PCA doses may be dependent on the type of medication, IV site, patient's weight, current research, and facility guidelines

(Pastino & Lakra, 2023). It is important to review your facility's guidelines when programming PCA dosing.

There are contraindications for PCA. If the patient cannot understand how the PCA works and follow directions, such as understanding how and when to press the button, they would not be good candidates for PCA. Allergies, infection, increased intracranial pressure, disability, chronic kidney failure, and bleeding disorders are also contraindications for PCA (Pastino & Lakra, 2023).

Side effects of PCA use are the same as opioids and include constipation, nausea and vomiting, urinary retention, and pruritus (itching). The most serious potential adverse effect of opioids is respiratory depression. Respiratory depression is usually preceded by sedation. The nurse must carefully monitor patients receiving opioids for oversedation, which results in a decreased respiratory rate. Patients at greatest risk are those who have never received an opioid and are receiving their first dose, those receiving an increased dose of opioids, or those taking benzodiazepines or other sedatives concurrently with opioids. If a patient develops opioid-induced respiratory depression, the opioid is reversed with naloxone (Narcan) which immediately reverses all analgesic effects.

Nurses must follow facility guidelines when administering PCA and ensure that the pump is set up correctly. Many facilities have safeguards in place such as a dual nurse sign-off, scanning medications into the electronic medication administration record (eMAR), and guardrails on the pumps to prevent medication errors. To document the amount and frequency of pain medication the patient is receiving, as well as to prevent drug diversion, the settings on the pump are checked at the end of every shift by the nurse as part of the bedside report. The incoming and outgoing nurses double-check and document the pump settings, the amount of medication administered during the previous shift, and the amount of medication left in the syringe.

Non-Opioid Analgesics

A non-opioid analgesic refers to any pharmacologic agent that treats the symptoms of pain and does not involve the activation of opioid receptors. These agents generally work by inhibiting cyclooxygenase (COX), a major pro-inflammatory enzyme that causes many signs and symptoms of inflammation, including redness, swelling, and sensitisation of nociceptors, thereby increasing the transmission of painful signals to the brain. COX causes this increase in inflammation and pain by increasing the production of cytokines such as prostaglandins, prostacyclin, and thromboxane. It is also partly responsible for the pyrexia that occurs with infection, which is why many non-opioid analgesics that block the activity of COX also work as antipyretics to reduce fever.

Cyclooxygenase has two major isoforms: COX-1 and COX-2. COX-1 helps with normal homeostatic functions in the body, including maintaining normal platelet and renal functions. It also is important for producing prostaglandins that stimulate production of the mucosal barrier that protects the stomach from its acids. If COX-1 is inhibited through the actions of medications such as glucocorticoids or nonsteroidal

anti-inflammatory drugs (NSAIDs), this protective barrier can erode, which is a major cause of peptic ulcers. COX-2 is responsible for much of the inflammation and pain brought about by tissue injury. Other non-opioid analgesics may serve as adjunctive agents for treating neuropathic sources of pain. These include antidepressant drugs (e.g., duloxetine, amitriptyline), antiseizure drugs (e.g., carbamazepine, pregabalin), and local anaesthetics (e.g., lidocaine and bupivacaine). These are useful because they target the abnormal neuronal function that is the source of neuropathic pain.

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Adjuvant Analgesics

An adjuvant analgesic is a type of medication that is not classified as an analgesic but has been found to have an analgesic effect along with opioids. Adjuvant medications include antidepressants and anticonvulsants such as gabapentin and amitriptyline. Adjuvant analgesics can be very effective for neuropathic pain but may not be as effective for somatic or visceral pain (Jacques, 2022). Antidepressants can help control how pain signals are delivered to and processed by the brain. Amitriptyline is a tricyclic antidepressant that can help treat neuropathic pain. Amitriptyline can cause sedative effects, so it is usually administered at bedtime. Anticonvulsants can block certain types of pain signals and help decrease neuropathic pain (Jacques, 2022). Gabapentin is an anticonvulsant that can also treat neuropathic pain and restless leg syndrome. Side effects of gabapentin include mental health changes, drowsiness, and weakness. Other medications such as corticosteroids, muscle relaxants, and topical agents can also help reduce pain. Corticosteroids decrease inflammation and topical agents can be directly applied to the skin to decrease pain (Jacques, 2022). Adjuvant analgesics can help reduce pain in a variety of ways but are not always effective on their own.

Non-Pharmacological Therapy

A type of therapy called non-pharmacological therapy can be very effective when used in conjunction with pharmacological therapy. Non-pharmacological therapy is any intervention that helps reduce pain without using medication. Non-pharmacological therapy can include psychological, emotional, and environmental therapies. Psychological and emotional therapies can be incorporated into the daily lives of patients and can be especially useful in treating chronic pain. Psychological and emotional therapy can include relaxation techniques, music, breathing, art therapy, distraction, meditation, or cognitive behavioural therapy. Changing the environment can also help patients manage their pain. Adjusting lighting, sounds, and temperature to a more relaxing environment has been shown to reduce pain (Ford, 2019). Exercise and

physical therapy can also help reduce pain without the side effects of pharmacological therapy. Patients can easily incorporate non-pharmacological therapy such as physical therapy into their daily lives without risks.

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Key Takeaways

In this chapter, we covered:

- How pain can be classified in many ways including acute pain, chronic pain, nociceptive pain, neuropathic pain, nociplastic pain, idiopathic pain and referred pain
- How nurses can use a variety of assessment methods to evaluate pain. These include subjective pain assessment methods such as 0-10 rating, OPQRSTUV, FACES scale, FLACC scale, PAINAD scale and the PAIC15 scale. Objective pain assessment methods such as inspection, palpation, percussion and auscultation as well as vital signs
- Priorities of care related to pain assessment include chest pain, a significant increase in pain, inadequately managed postoperative pain, pain unrelieved by opioid analgesia in limb injury and back pain
- The physiology of pain and the four key stages of nociception: transduction, transmission, perception, and modulation
- Pain management strategies such as pharmacological therapy. This includes opioid analgesics and the risks around these medications; patient-controlled analgesia (PCA) and nursing considerations; non-opioid analgesics and adjuvant analgesics.
- How non-pharmacological therapy can be effective when used in conjunction with pharmacological therapy. Some examples are: cold and heat, physical therapy, massage, guided imagery and distraction.

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ASSESSMENT OF THE INTEGUMENTARY SYSTEM

Kate Hurley and Sandra Dash

Learning Outcomes

In this chapter, you will learn how to:

- Describe the integumentary system and its function
- Define the layers of the skin and examine their unique function
- Describe the changes that occur in the integumentary system during the ageing process
- Describe the process of skin assessment and identify factors that impact skin integrity
- Recognise several common diseases, disorders, and injuries that affect the integumentary system.

The integumentary system is the largest and most visible body organ and is composed of the skin, hair, nails, sebaceous glands, eccrine and apocrine sweat glands. In the adult human body, the skin makes up about 15% of body weight and covers an area of 1.5 to 2 square metres (Carville, 2024). In fact, the skin and accessory structures are the largest organ systems in the human body. As such, the skin protects your inner organs, and it needs daily care and protection to maintain its health.

Conducting a routine head-to-toe assessment requires the nurse to assess the skin, hair, and nails. During inpatient care, a comprehensive skin assessment on admission establishes a baseline for the condition of a patient's skin and is essential for developing a care plan for the prevention and treatment of skin injuries.

This chapter will introduce the structure and functions of the integumentary system, as well as some of the diseases, disorders, and injuries that can affect this system.

The Skin Layers

The skin and its accessory structures make up the **integumentary system**, which provides the body with overall protection. The skin is made of multiple layers of cells and tissues, which are held to underlying

structures by connective tissue (Figure 1). The deeper layer of skin is well vascularised (has numerous blood vessels). It also has numerous sensory, and autonomic and sympathetic nerve fibres ensuring communication to and from the brain.

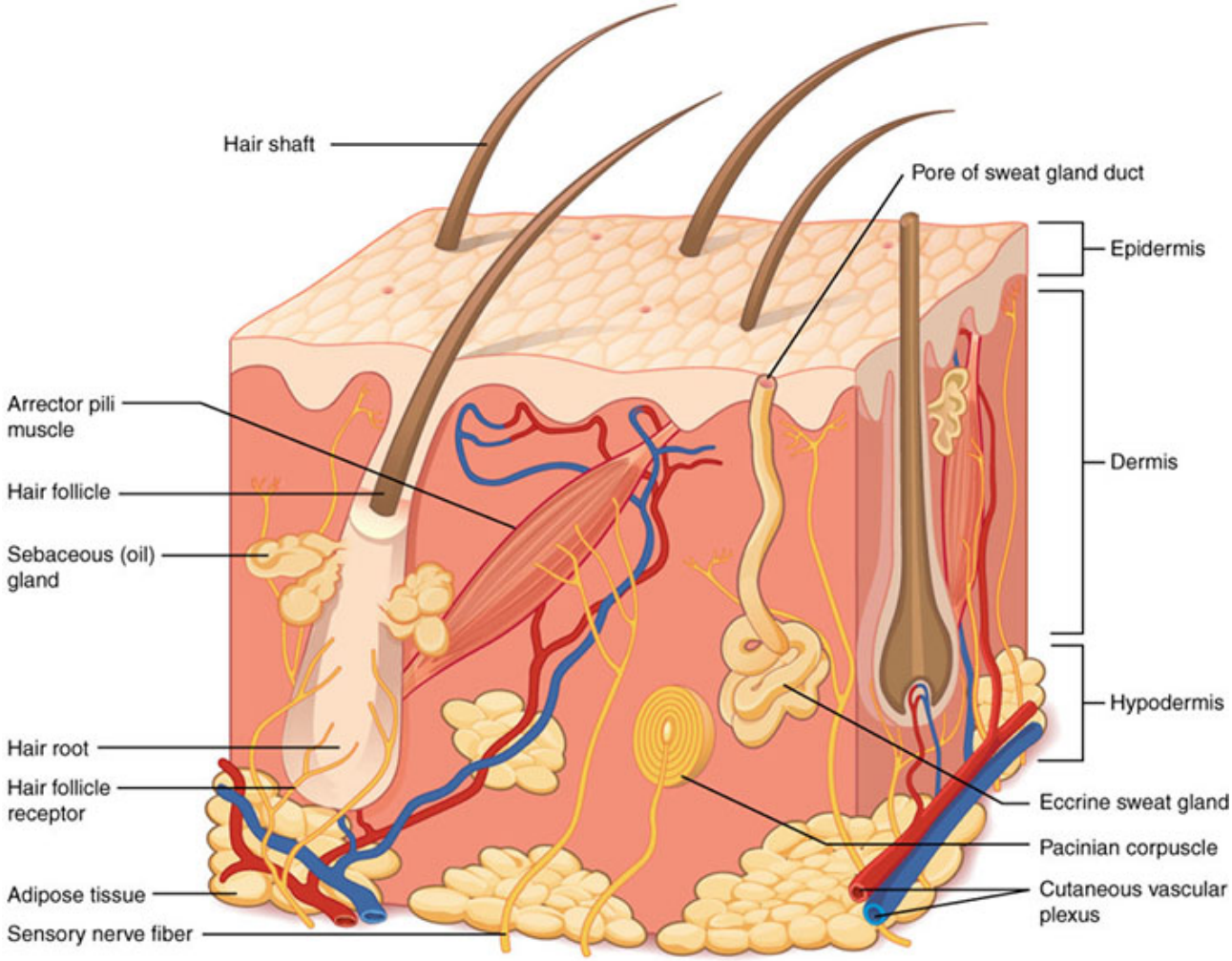

Figure 1. The skin is composed of two main layers: the epidermis, made of closely packed epithelial cells, and the dermis, made of dense, irregular connective tissue that houses blood vessels, hair follicles, sweat glands, and other structures. Beneath the dermis lies the hypodermis, which is composed mainly of loose connective and fatty tissues.

Epidermis

The **epidermis** is composed of keratinised, stratified squamous epithelium. It is made of four or five layers of epithelial cells, depending on its location in the body. It does not have any blood vessels within it (i.e., it is avascular). Skin that has four layers of cells is referred to as "thin skin." From deep to superficial, these layers are the stratum basale, stratum spinosum, stratum granulosum, and stratum corneum. Most of the skin can be classified as thin skin. "Thick skin" is found only on the palms of the hands and the soles of the feet. It has a fifth layer, called the stratum lucidum, located between the stratum corneum and the stratum granulosum.

Dermis

The **dermis** might be considered the "core" of the integumentary system (derma- = "skin"), as distinct from the epidermis (epi- = "upon" or "over") and **hypodermis** (hypo- = "below"). It contains blood and lymph vessels, nerves, and other structures, such as hair follicles and sweat glands. The dermis is made of two layers of connective tissue that compose an interconnected mesh of elastin and collagenous fibres, produced by fibroblasts (see Figure 2).

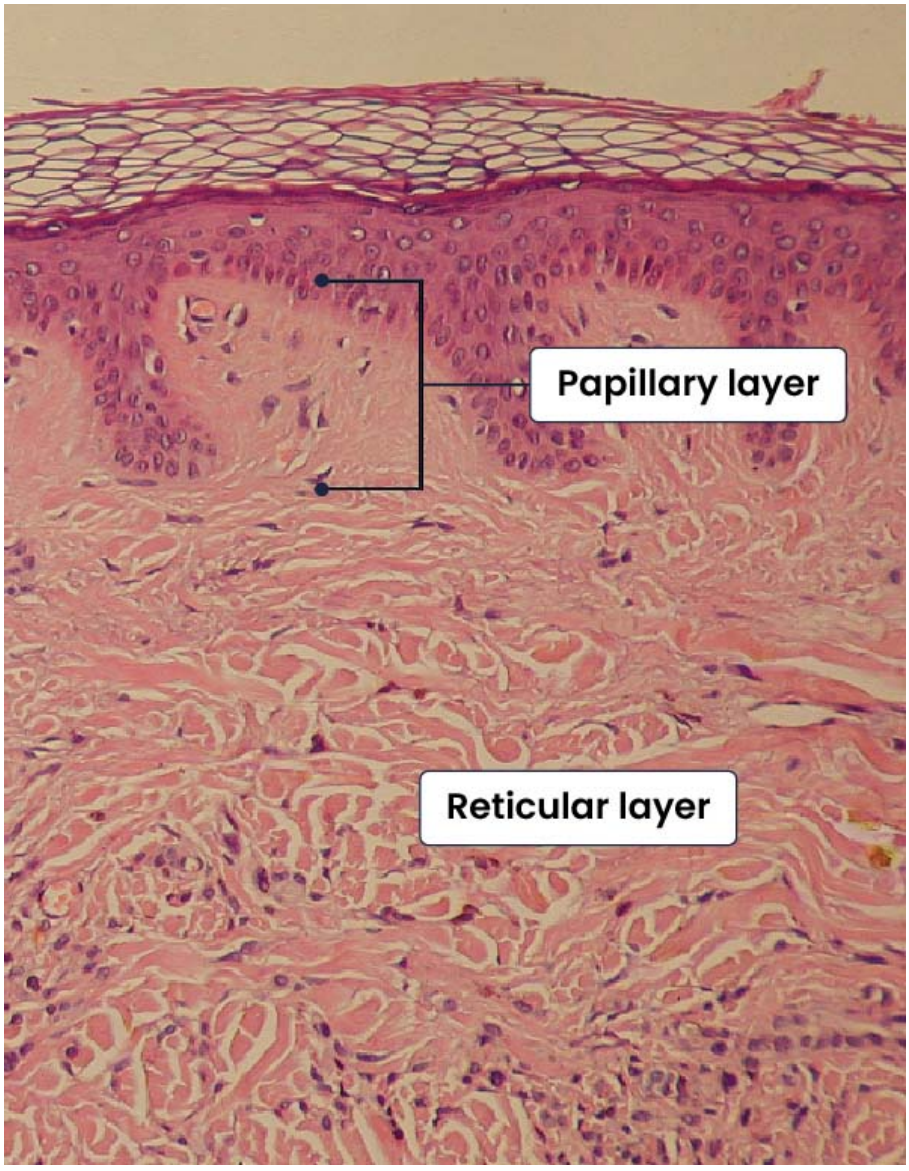

Figure 2. This stained slide shows the two components of the dermis—the papillary layer and the reticular layer. Both are made of connective tissue with fibres of collagen extending from one to the other, making the border between the two somewhat indistinct. The dermal papillae extending into the epidermis belong to the papillary layer, whereas the dense collagen fibre bundles below belong to the reticular layer. LM × 10. (Modification of work by "kilbad"/Wikimedia Commons).

Hypodermis

The hypodermis (also called the subcutaneous layer or superficial fascia) is a layer directly below the dermis and serves to connect the skin to the underlying fascia (fibrous tissue) of the bones and muscles. It is not strictly a part of the skin, although the border between the hypodermis and dermis can be difficult to distinguish. The hypodermis consists of well-vascularised, loose, areolar connective tissue and adipose tissue, which functions as a mode of fat storage and provides insulation and cushioning for the integument.

Pigmentation

The colour of skin is influenced by a number of pigments, including **melanin**, carotene, and haemoglobin. Melanin is produced by cells called melanocytes, which are found scattered throughout the stratum basale of the epidermis. The melanin is transferred into the keratinocytes via a cellular vesicle called a melanosome (see Figure 3).

Melanin occurs in two primary forms. Eumelanin exists as black and brown, whereas pheomelanin provides a red colour. Dark-skinned individuals produce more melanin than those with pale skin. Exposure to the UV rays of the sun or a tanning salon causes melanin to be manufactured and built up in keratinocytes, as sun exposure stimulates keratinocytes to secrete chemicals that stimulate melanocytes. The accumulation of melanin in keratinocytes results in the darkening of the skin, or a tan. This increased melanin accumulation protects the DNA of epidermal cells from UV ray damage and the breakdown of folic acid, a nutrient necessary for our health and well-being. In contrast, too much melanin can interfere with the production of vitamin D, an important nutrient involved in calcium absorption. Thus, the amount of melanin present in our skin is dependent on a balance between available sunlight and folic acid destruction, and protection from UV radiation and vitamin D production.

Too much sun exposure can eventually lead to wrinkling due to the destruction of the cellular structure of the skin, and in severe cases, can cause sufficient DNA damage to result in skin cancer. When there is an irregular accumulation of melanocytes in the skin, freckles appear. Moles are larger masses of melanocytes, and although most are benign, they should be monitored for changes that might indicate the presence of cancer.

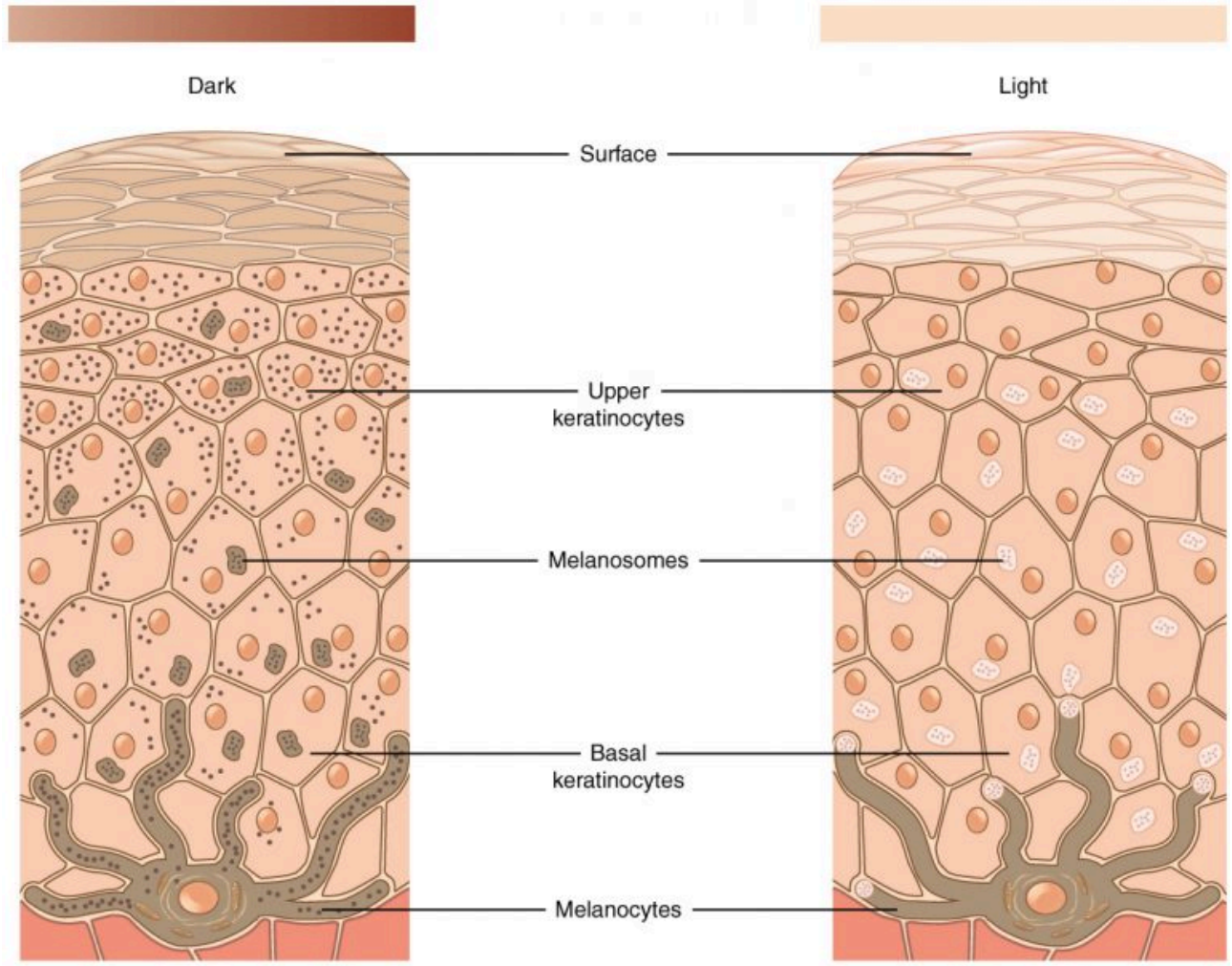

Figure 3. Skin Pigmentation: The relative colouration of the skin depends of the amount of melanin produced by melanocytes in the stratum basale and taken up by keratinocytes

Accessory Structures

Accessory structures of the skin include hair, nails, sweat glands, and sebaceous glands. These structures embryologically originate from the epidermis and can extend down through the dermis into the hypodermis.

Hair

Hair is a keratinous filament growing out of the epidermis. It is primarily made of dead, keratinised cells. Strands of hair originate in an epidermal penetration of the dermis called the **hair follicle**. The **hair shaft** is the part of the hair not anchored to the follicle, and much of this is exposed at the skin's surface. The rest of the hair, which is anchored in the follicle, lies below the surface of the skin and is referred to as the **hair root**. The hair root ends deep in the dermis at the **hair bulb** and includes a layer of mitotically active basal

cells called the **hair matrix**. The hair bulb surrounds the **hair papilla**, which is made of connective tissue and contains blood capillaries and nerve endings from the dermis (see Figure 4).

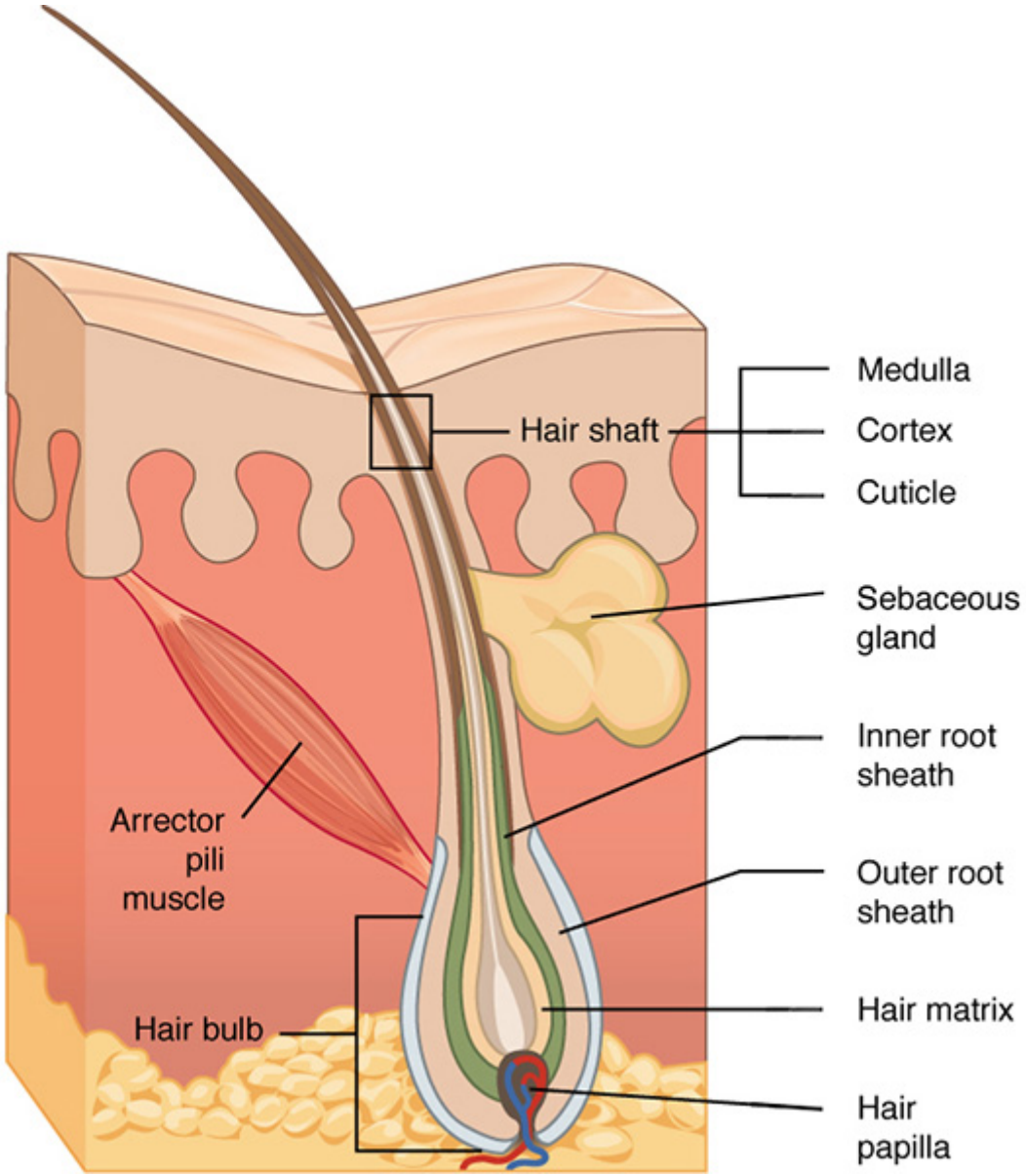

Figure 4. Hair follicles originate in the epidermis and have many different parts

Hair serves a variety of functions, including protection, sensory input, thermoregulation, and communication. For example, hair on the head protects the skull from the sun. The hair in the nose and ears, and around the eyes (eyelashes) defends the body by trapping and excluding dust particles that may contain allergens and microbes. The hair of the eyebrows prevents sweat and other particles from irritating the eyes. Hair also has a sensory function due to sensory innervation by a hair root plexus surrounding the base of each hair follicle. Hair is extremely sensitive to air movement or other disturbances in the environment, much more so than the skin surface. This feature is also useful for the detection of the presence of insects or other potentially damaging substances on the skin surface.

Nails

The nail bed is a specialised structure of the epidermis that is found at the tips of our fingers and toes. The **nail body** is formed on the **nail bed** and protects the tips of our fingers and toes as they are the farthest extremities and the parts of the body that experience the maximum mechanical stress (Figure 5). In addition, the nail body forms a back-support for picking up small objects with the fingers. The nail body is composed of densely packed dead keratinocytes. The epidermis in this part of the body has evolved a specialised structure upon which nails can form.

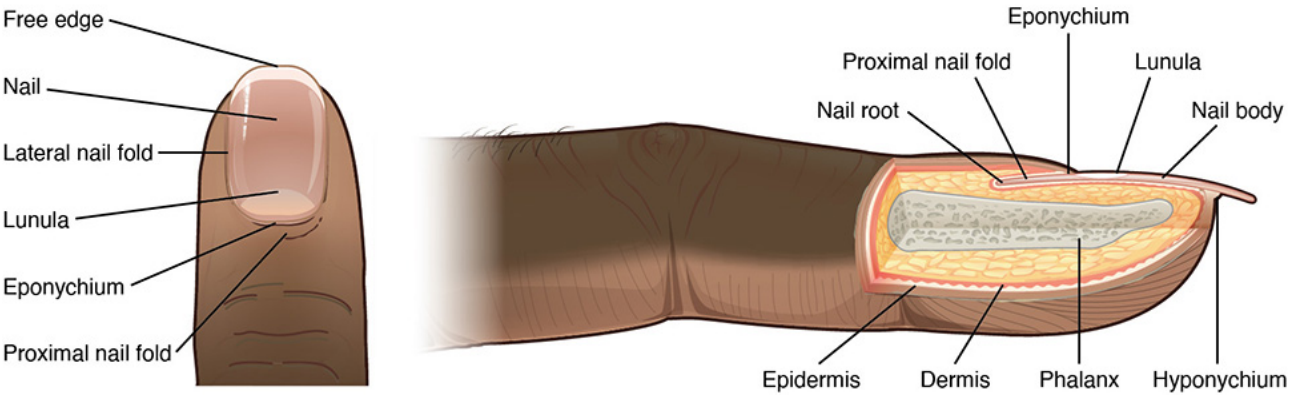

Figure 5. The nail is an accessory structure of the integumentary system

Sweat Glands

Sweat glands develop from epidermal projections into the dermis and are classified as merocrine glands; that is, the secretions are excreted by exocytosis through a duct without affecting the cells of the gland. There are two types of sweat glands, each secreting slightly different products.

An **eccrine sweat gland** is a type of gland that produces a hypotonic sweat for thermoregulation (Figure 6). These glands are found all over the skin's surface but are especially abundant on the palms of the hand, the soles of the feet, and the forehead. An **apocrine sweat gland** is usually associated with hair follicles in densely hairy areas, such as armpits and genital regions. Apocrine sweat glands are larger than eccrine sweat glands and lie deeper in the dermis, sometimes even reaching the hypodermis, with the duct normally emptying into the hair follicle.

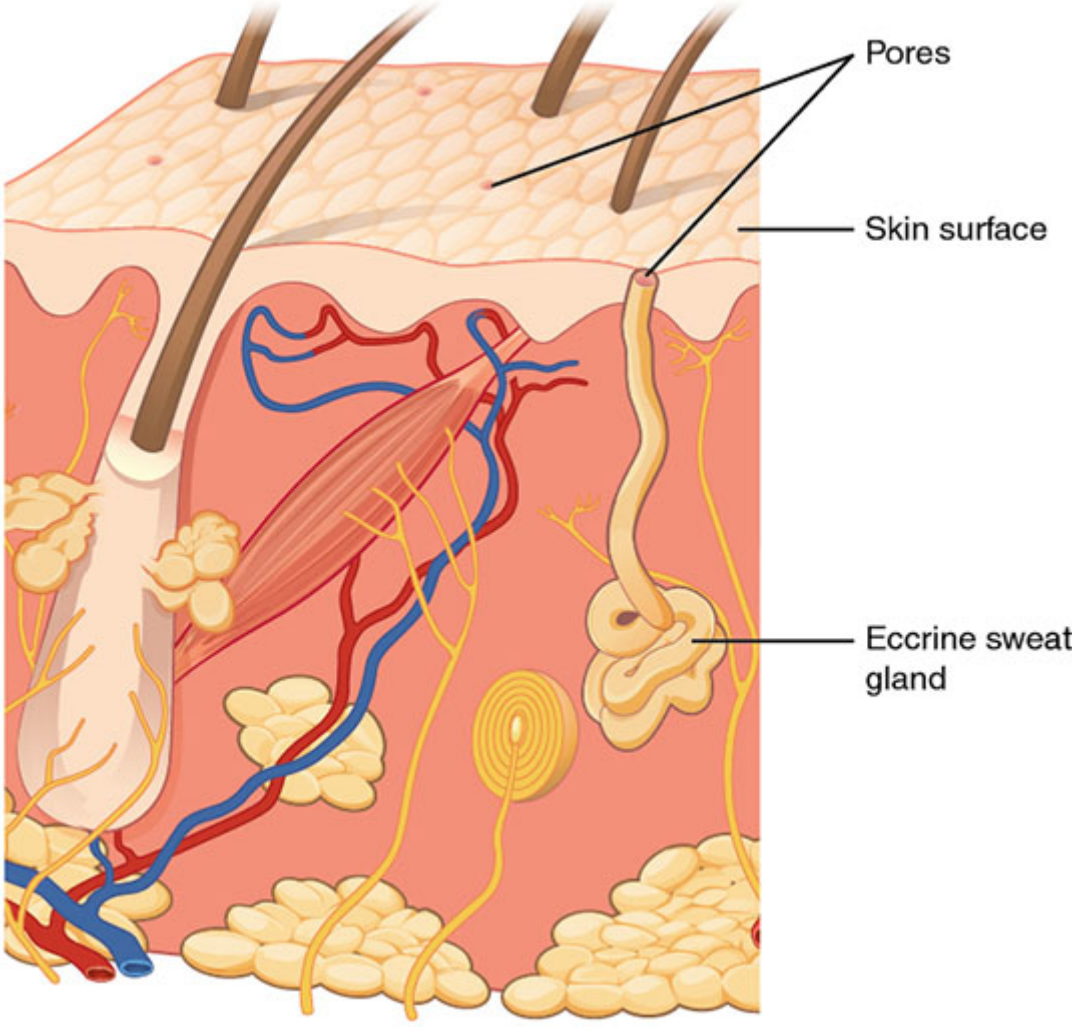

Figure 6. Eccrine glands are coiled glands in the dermis that release sweat that is mostly water

Sebaceous Glands

A sebaceous gland is a type of oil gland that is found all over the body and helps to lubricate and waterproof the skin and hair. Most sebaceous glands are associated with hair follicles. They generate and excrete sebum, a mixture of lipids, onto the skin surface, thereby naturally lubricating the dry and dead layer of keratinised cells of the stratum corneum, keeping it pliable.

Diseases, Disorders and Injuries

The integumentary system is susceptible to a variety of diseases, disorders, and injuries. These range from annoying but relatively benign bacterial or fungal infections that are categorised as disorders, to skin cancer and severe burns, which can be fatal. In this section, you will learn about several of the most common skin conditions.

Diseases

One of the most talked about diseases is skin cancer. Cancer is a broad term that describes diseases caused by abnormal cells in the body dividing uncontrollably. Most cancers are identified by the organ or tissue in which the cancer originates. One common form of cancer is skin cancer. According to The Cancer Council, Australia has one of the highest instances of skin cancer worldwide and diagnosis of skin cancer accounts for around 80% of newly diagnosed cancers each year (Cancer Council, 2024). The degradation of the ozone layer in the atmosphere and the resulting increase in exposure to UV radiation has contributed to its rise. Overexposure to UV radiation damages DNA, which can lead to the formation of cancerous lesions. Although melanin offers some protection against DNA damage from the sun, often it is not enough. The fact that cancers can also occur on areas of the body that are normally not exposed to UV radiation suggests that there are additional factors that can lead to cancerous lesions.

In general, cancers result from an accumulation of DNA mutations. These mutations can result in cell populations that do not die when they should and uncontrolled cell proliferation that leads to tumours. Although many tumours are benign (harmless), some produce cells that can mobilise and establish tumours in other organs of the body; this process is referred to as metastasis. Cancers are characterised by their ability to metastasise.

Cancer Affecting the Skin

Basal cell carcinoma is a form of cancer that affects the mitotically active stem cells in the stratum basale of the epidermis. It is the most common of all cancers that occur in Australia and is frequently found on the head, neck, arms, and back, which are areas that are most susceptible to long-term sun exposure. Between 95% and 99% of skin cancers in Australia are caused by exposure to the sun (Cancer Council, 2024). UV rays and exposure to other agents, such as radiation and arsenic, can also lead to this type of cancer. Wounds on the skin due to open sores, tattoos, burns, etc. may be predisposing factors as well. Basal cell carcinomas start in the stratum basale and usually spread along this boundary. Basal cell carcinoma generally has no symptoms and tends to grow slowly without spreading to other parts of the body. It can often be distinguished as a pearly lump or a dry, scaly area that is shiny or pale in colour (Cancer Council, 2024). A biopsy is used to diagnose a basal cell carcinoma and like most cancers, basal cell carcinomas respond best to treatment when caught early. Treatment options include surgery, freezing (cryosurgery), and non-surgical management such as radiotherapy (Cancer Council, 2024).

Squamous cell carcinoma is a cancer that affects the keratinocytes of the stratum spinosum and is usually found on skin that has had sun exposure, such as the scalp, ears, and hands. Squamous cell carcinoma accounts for about 30% of non-melanoma skin cancers diagnosed in Australia annually (Cancer Council, 2024). These types of cancer are generally more aggressive than basal cell carcinoma and grow over a period of weeks to months (Cancer Council, 2024). If not removed, these carcinomas can metastasise. Surgery and radiation are used to cure squamous cell carcinoma.

A **melanoma** is a cancer characterised by the uncontrolled growth of melanocytes, the pigment-producing cells in the epidermis. Melanoma is the third most commonly diagnosed cancer in Australia with the average age of diagnosis at 65 years of age (Cancer Council, 2024). The risk of melanoma increases with exposure to UV radiation, having a high amount of moles on the body, a high number of unusual moles on the body, a decreased immune system, or a family history of melanoma (Cancer Council, 2024). Often melanoma has no symptoms, however, the first sign is generally a change in the appearance of an existing mole or the appearance of a new mole or freckle. The changes observed in an existing mole can be a change in colour, size, shape or elevation. The site may also become irritated and itch or bleed (Cancer Council, 2024). Melanomas usually appear as asymmetrical brown and black patches with uneven borders and a raised surface. Treatment typically involves surgical excision and immunotherapy.
The factors to observe when diagnosing a potential melanoma include:

- **A**symmetry – the two sides are not symmetrical
- **B**orders – the edges are irregular in shape
- **C**olour – the colour is varied shades of brown or black
- **D**iameter – is it larger than 6 mm or growing larger?
- **E**levated – is it raised?
- **F**irm – is it firm to touch?
- **G**rowing – is it growing quickly?

(Cancer Council, 2024).

Disorders of the Skin

There are many common skin disorders that affect individuals. Three common conditions are **eczema**, **acne** and **scabies**. Eczema is an inflammatory condition that occurs in individuals of all ages. Acne involves the clogging of pores, which can lead to infection and inflammation and is often seen in adolescents. Scabies is a parasitic skin infestation, that is highly contagious. Other disorders, not discussed here, include seborrheic dermatitis, psoriasis, cold sores, impetigo, hives, and warts.

Eczema

Eczema is an allergic reaction that manifests as dry, itchy patches of skin that resemble rashes (Australian Society of Clinical Immunology and Allergy [ASCIA], 2024; see Figure 7). It may be accompanied by swelling of the skin, flaking, and in severe cases, bleeding. Eczema is more likely to develop in people who have allergies or a family history of allergy and studies have shown that infants with eczema, with a family history of allergies, will develop a food allergy as they develop, with a further 40% of these infants developing asthma and/or allergic rhinitis (hayfever; ASCIA, 2024). "Flares" or a worsening of eczema symptoms usually occur due to skin becoming increasingly dry, exposing the skin to allergens or irritants that can exacerbate itchiness. Symptoms are usually managed with good skin hygiene including avoiding soaps or body wash that dry the skin, avoiding excessive swimming in chlorinated pools, using non-fragranced moisturises and bathing in lukewarm water (ASCIA, 2024).

Figure 7. Eczema on extremities

Acne

Acne is a skin disturbance that typically occurs on areas of the skin that are rich in sebaceous glands (face and back; see Figure 8). It is most common along with the onset of puberty due to associated hormonal changes but can also occur in infants and continue into adulthood. Hormones, such as androgens, stimulate the release of sebum. An overproduction and accumulation of sebum along with keratin can block hair follicles. This plug is initially white. The sebum, when oxidised by exposure to air, turns black. Acne results from infection by acne-causing bacteria (Propionibacterium and Staphylococcus), which can lead to redness and potential scarring due to the natural wound healing process.

Figure 8. Acne on the face

Scabies

Scabies is a parasitic skin infection that is highly contagious. It is primarily transferred between humans by touch (skin-to-skin contact) and caused by small mites (Sarcoptes scabiei), that are barely visible to the naked eye. The incubation period can vary, and those who have had scabies before have a shorter incubation period (1–4 days) compared with those who have not previously been infected (2–6 weeks; Department of Health, 2024). The infection presents on the skin as elevated, whitish brown tunnels that generally contain mites and eggs, usually affecting spaces between the fingers, wrists, axillae, and abdomen. Itching varies but can be severe and scratching itchy areas can lead to secondary bacterial infections (Department of Health, 2024). Over time, the areas usually become inflamed, making the burrows less visible. Infestations that turn severe may cause areas of crusted, thickened skin that does not itch.

Injuries

The skin is vulnerable to injury as it protects the body from external sources, including sharp objects, heat, excessive pressure or **friction**. Skin injuries set off a healing process that occurs in several overlapping stages. The first step to repairing damaged skin is the formation of a blood clot that helps stop the flow of blood and scabs over time. Many different types of cells are involved in wound repair, especially if the surface area that needs repair is extensive. Before the basal stem cells of the stratum basale can recreate the epidermis, fibroblasts mobilise and divide rapidly to repair the damaged tissue by collagen deposition, forming **granulation tissue**. Blood capillaries follow the fibroblasts and help increase blood circulation and oxygen supply to the area. Immune cells, such as macrophages, roam the area and engulf any foreign matter to reduce the chance of infection.

Burns

A burn results when the skin is damaged by intense heat, radiation, electricity, or chemicals (World Health Organisation, 2024). The damage results in the death of skin cells, which can lead to a large loss of fluid. Dehydration, electrolyte imbalance, and renal and circulatory failure follow, which can be fatal. Burn patients are treated with intravenous fluids to offset dehydration, as well as intravenous nutrients that enable the body to repair tissues and replace lost proteins. Another serious threat to the lives of burn patients is infection. Burned skin is extremely susceptible to bacteria and other pathogens, due to the loss of protection by intact layers of skin.

Types of Burns

Burns are sometimes measured in terms of the size of the total surface area affected. This is referred to as the "rule of nines," which associates specific anatomical areas with a percentage that is a factor of nine (see Figure 9). Burns are also classified by the degree of their severity.

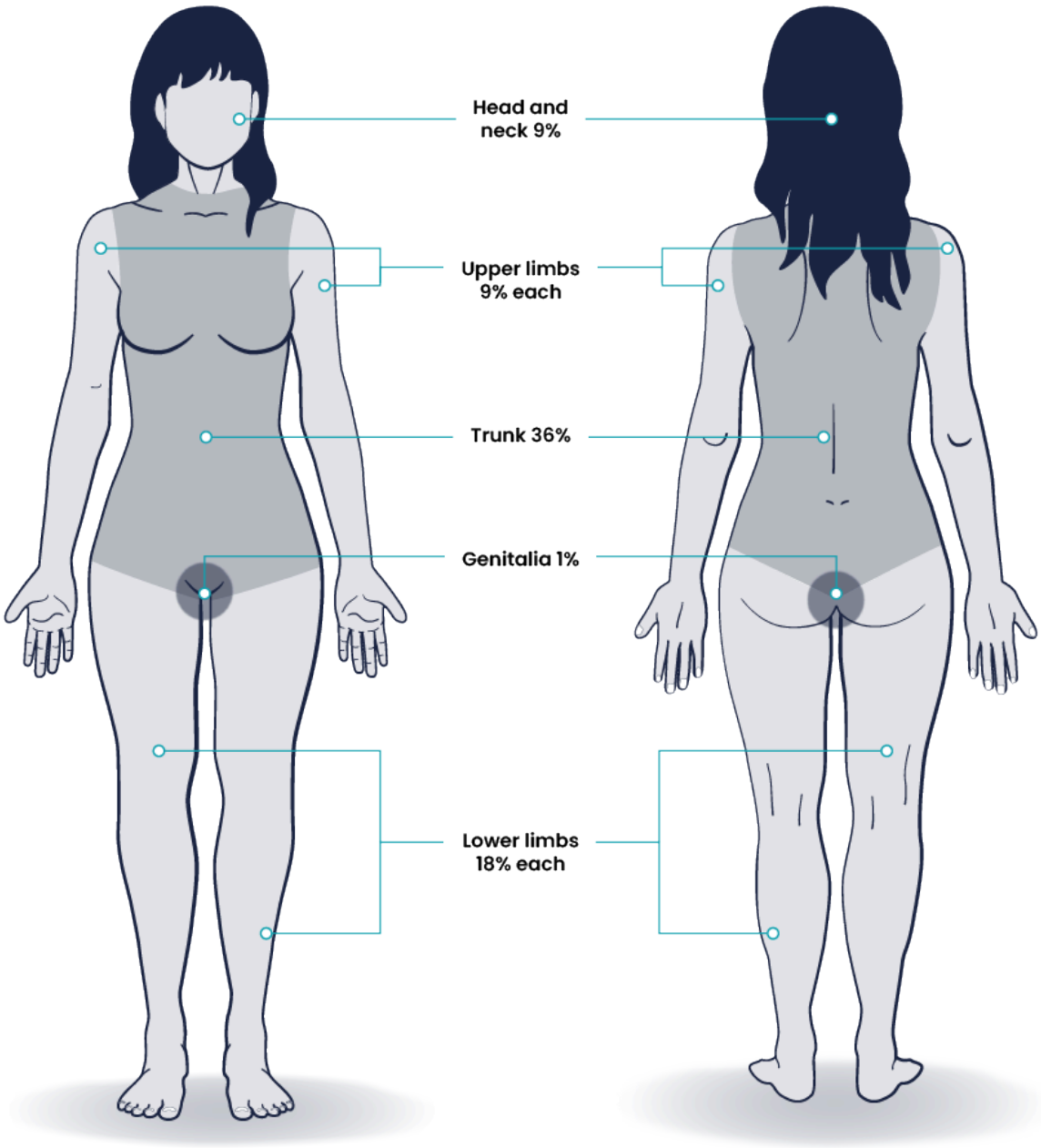

Figure 9. Calculating the size of a burn

An interactive H5P element has been excluded from this version of the text. You can view it online here:
https://jcu.pressbooks.pub/nursing-skills-foundations/?p=42#h5p-113

Scars and Keloids

Most cuts or wounds, apart from ones that only scratch the surface (the epidermis), lead to scar formation.

A **scar** is collagen-rich skin formed after the process of wound healing that differs from normal skin. Scarring occurs in cases in which there is repair of skin damage, but the skin fails to regenerate the original skin structure. Fibroblasts generate scar tissue in the form of collagen, and the bulk of repair is due to the basket-weave pattern generated by collagen fibres and does not result in regeneration of the typical cellular structure of skin. Instead, the tissue is fibrous in nature and does not allow for the regeneration of accessory structures, such as hair follicles, sweat glands, or sebaceous glands. Sometimes, there is an overproduction of scar tissue, because the process of collagen formation does not stop when the wound is healed; this results in the formation of a raised or hypertrophic scar called a **keloid** (National Health Service [NHS], 2023). In contrast, scars that result from acne and chickenpox have a sunken appearance and are called atrophic scars.

Scarring of skin after wound healing is a natural process and does not need to be treated further. The application of mineral oil and lotions may reduce the formation of scar tissue. However, modern cosmetic procedures, such as dermabrasion, laser treatments, and filler injections have been invented as remedies for severe scarring. All of these procedures try to reorganise the structure of the epidermis and underlying collagen tissue to make it look more natural.

Stretch Marks

The skin can be affected by pressure associated with rapid growth. A **stretch mark** results when the dermis is stretched beyond its limits of elasticity, as the skin stretches to accommodate the excess pressure (American Academy of Dermatology Association, 2025). Stretch marks usually accompany rapid weight gain during puberty and pregnancy. They initially have a reddish hue but lighten over time. Other than for cosmetic reasons, treatment of stretch marks is not required. They occur most commonly over the hips and abdomen.

Corns and Calluses

Corns and calluses are hard or thick areas of skin that can be painful but are usually not serious (NHS, 2022). Corns generally present as small lumps of hard skin, while calluses present as larger patches of rough, thick skin forming most commonly on the feet, toes, and hands (NHS, 2022). For example, constant abrasion on toes, usually experienced if shoes do not fit correctly, can form a **callus** at the point of contact. This occurs because the basal stem cells in the stratum basale are triggered to divide more often to increase the thickness of the skin at the point of abrasion to protect the rest of the body from further damage. This is an example of a minor or local injury, and the skin manages to react and treat the problem independently of the rest of the body. Calluses can also form on your fingers if they are subject to constant mechanical stress, such as long periods of writing, playing string instruments, or video games (NHS, 2022). A **corn** is a specialised form of callus. Corns form from abrasions on the skin that result from an elliptical-type motion.

Skin Assessment

A routine integumentary assessment by a registered nurse in an inpatient care setting typically includes inspecting overall skin colour, inspecting for skin lesions and wounds, and palpating extremities for **oedema**, temperature, and capillary refill. The standard for documentation of skin assessment is within 24 hours of admission to inpatient care. Skin assessment should also be ongoing in inpatient and long-term care.

Palpation

Palpation of the skin includes assessing temperature, moisture, texture, skin turgor, capillary refill, and oedema. If **erythema** or rashes are present, it is helpful to apply pressure with a gloved finger to further assess for blanching (whitening with pressure). See Figure 10 for an example of palpation of an oedematous leg.

Figure 10. Oedema in the lower extremities

Capillary Refill

The capillary refill test is a test done on the nail beds to monitor perfusion, or the amount of blood flow to tissue. Pressure is applied to a fingernail or toenail until it turns white, indicating that the blood has been

forced from the tissue under the nail. This whiteness is called **blanching**. Capillary refill is defined as the time it takes for colour to return to the tissue after pressure has been removed that caused blanching. If there is sufficient blood flow to the area, a pink colour should return within 2 seconds after the pressure is removed.

Subjective Assessment

Table 1. Focused interview questions regarding the integumentary system.

Table 1. Focused Interview Questions Regarding the Integumentary System

Questions	Follow-up
Are you currently experiencing any skin symptoms such as itching, rashes, or an unusual mole, lump, bump, or nodule?	Use the PQRSTU method to gain additional information about current symptoms.
Have you ever been diagnosed with a condition such as acne, eczema, skin cancer, pressure injuries, **jaundice**, oedema, or **lymphedema**?	Please describe.
Are you currently using any prescription or over-the-counter medications, creams, vitamins, or supplements to treat a skin, hair, or nail condition?	Please describe.

Objective Assessment

Several factors place a patient at risk of experiencing skin breakdown or developing a pressure injury. Certain body areas require observation because they are more prone to pressure injuries, such as bony prominences, skin folds, perineum, between digits of the hands and feet, and under any medical device that can be removed during routine daily care. Most pressure injuries and skin tears can be prevented by maintaining good skin hygiene, mobility, and nutrition (Department of Health, 2024).

Key Inspection Areas

There are four key areas to note during a focused integumentary assessment:

1. Colour
2. Temperature, moisture, and texture
3. Skin turgor
4. Lesions or breakdown. (Department of Health, 2024)

Colour

The skin colour is a predominant feature and is largely determined by race. Skin colour can change in relation to anatomical location (sun-exposed versus sun-protected), genetics, perfusion, hepatic obstruction or respiratory conditions (Carville, 2024). The combination of haemoglobin, oxyhaemoglobin, melanin, and carotenoids influences the colour of the skin. For example, pink-toned Caucasian skin is due to the levels of haemoglobin and oxyhaemoglobin, creating red tones due to the absorption of certain light (Carville, 2024). When assessing the skin, a healthcare provider must inspect the colour of the patient's skin and compare findings to what has been previously recorded for the patient and what is expected for their skin tone.

Temperature, Moisture, and Texture

Fever, decreased perfusion of the extremities, and local inflammation in tissues can cause changes in skin temperature. For example, a fever can cause a patient's skin to feel warm and sweaty (diaphoretic). Decreased perfusion of the extremities can cause the patient's hands and feet to feel cool, whereas local tissue infection or inflammation can make the localised area feel warmer than the surrounding skin. While assessing skin temperature, also assess if the skin feels dry or moist and the texture of the skin. Skin that appears or feels sweaty is referred to as being **diaphoretic**.

Skin Turgor

Skin turgor is the skin's elasticity. Its ability to change shape and return to normal may be decreased when the patient is dehydrated. To check for skin turgor, gently grasp skin on the patient's lower arm between two fingers so that it is tented upwards, and then release. Skin with normal turgor snaps rapidly back to its normal position, but skin with poor turgor takes additional time to return to its normal position.

Lesions and Skin Breakdown

Note any **lesions**, skin breakdown, or unusual findings, such as rashes, petechiae, unusual moles, or burns. Be aware that unusual patterns of bruising or burns can be signs of abuse that warrant further investigation and reporting according to agency policy and state regulations.

Lifespan Considerations

Neonates

Neonatal skin is thinner and has less sweat and fewer sebaceous glands compared with more mature skin. A neonate skin will commonly comprise of:

- Generalised erythema on the hands and feet. This is caused by vasomotor instability and usually fades within 24 hours, although mottling skin can occur due to temperature fluctuations.
- Jaundice presents as a yellowing of the skin and occurs when an infant has elevated levels of bilirubin in the blood due to an increase in the number of red blood cells following birth. Jaundice can affect 60–80% of neonates and is generally more obvious 3–4 days after birth.
- Mongolian spots are blue/purple patches of discoloured skin that occur at the sacrogluteal region in babies that have a darker skin complexion. This occurs as a result of concentrated pigmented cells which take 3–5 years to fade.
- Stork bites are pink discoloured patches commonly found on a baby's neck due to a concentration of immature dilated blood vessels. These spots are generally more evident when a baby is crying and should fade entirely over time.
- Vernix caseosa is a white, paste-like substance on the skin protecting the foetus from amniotic fluid while in utero. This odourless substance is more prominent for premature infants and is usually absorbed or removed within 24–48 hours.
- Lanugo is fine soft hair commonly found on the forehead, buttocks, ears, and back. It assists in binding the vernix caseosa to the skin of the foetus and is commonly more evident in premature infants. (Carville, 2024)

Child and Adolescent

Over the course of a lifespan, the colour of an individual's skin can regularly change. During childhood, skin will change as a result of sun exposure, trauma or infectious diseases, such as measles. As an individual enters pubescence, they will experience changes in their integumentary system including enlargement of breasts, changes to genitalia, increased sweat production and changes in the odour of body sweat, increased hair growth and increased sebaceous gland activity, particularly on the face, which can contribute to an individual developing acne (Carville, 2024). Beyond pubescent changes, other changes to the skin as an adult are generally related to lifestyle choices such as sun exposure, diet and medication use.

Older Adults

Older adults have several changes associated with ageing that are apparent during assessment of the integumentary system. They often have cardiac and circulatory system conditions that cause decreased perfusion, resulting in cool hands and feet. They have decreased elasticity and fragile skin that often tears more easily. The blood vessels of the dermis become more fragile, leading to bruising and bleeding under the skin. The subcutaneous fat layer thins, so it has less insulation and padding and reduced ability to maintain body temperature. Growths such as skin tags, rough patches (keratoses), skin cancers, and other **lesions** are more common. Other factors that can impact skin integrity in older adults are poor nutrition, dehydration, swallowing or dental problems, balance or mobility problems, cognitive impairment, dexterity problems and medications (Department of Health, 2024).

Risk Factors Affecting Skin Health

Several risk factors place a patient at increased risk for altered skin health and delayed wound healing. Risk factors include impaired circulation and oxygenation, impaired immune function, diabetes, inadequate nutrition, obesity, exposure to moisture, smoking, and age. Each of these risk factors is discussed in more detail in the following subsections.

Impaired Circulation and Oxygenation

Skin, like every other organ in the body, depends on good blood perfusion to keep it healthy and functioning correctly. Cardiovascular circulation delivers important oxygen, nutrients, infection-fighting cells, and clotting factors to tissues. These elements are needed by skin, tissues, and nerves to properly grow, function, and repair damage. Without good cardiovascular circulation, skin becomes damaged. Damage can occur from poor blood perfusion from the arteries, as well as from poor return of blood through the veins to the heart. Common medical conditions that decrease cardiovascular circulation include cardiac disease, diabetes, and peripheral vascular disease (PVD). PVD includes two medical conditions **arterial insufficiency** and **venous insufficiency**.

Arterial Insufficiency

Arterial insufficiency refers to a lack of adequately oxygenated blood movement in arteries to specific tissues (Zemaitis et al., 2023). Arterial insufficiency can be a sudden, acute lack of oxygenated blood, such as when a blood clot in an artery blocks blood flow to a specific area. Arterial insufficiency can also be a chronic condition caused by peripheral vascular disease (PVD). As a person's arteries become blocked with plaque due to atherosclerosis, there is decreased blood flow to the tissues. Signs of arterial insufficiency are cool skin temperature, pale skin colour, pain that increases with exercise, and possible arterial ulcers.

When oxygenated blood flow to tissues becomes inadequate, the tissue dies. This is called **necrosis**. Tissue death causes the skin and tissue to become necrotic (black). Necrotic tissue does not heal, so surgical debridement or amputation of the extremity becomes necessary for healing. See Figure 11 for the different stages of arterial insufficiency.

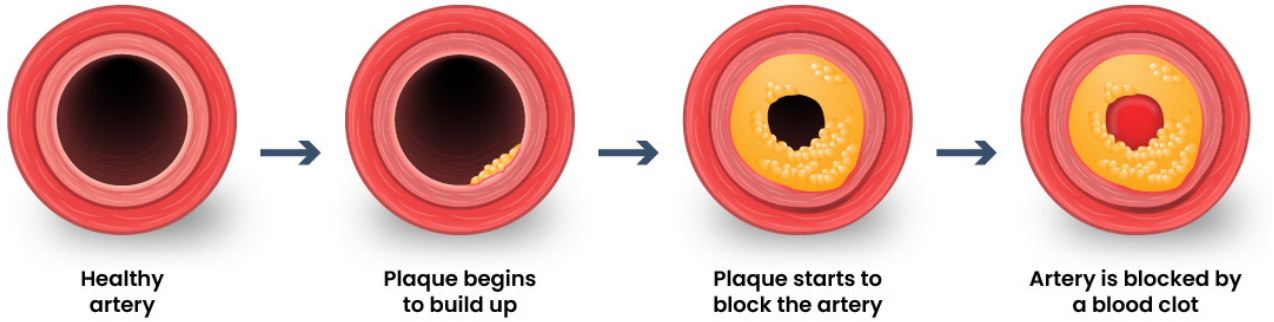

Figure 11. Stages of arterial insufficiency

Venous Insufficiency

Venous insufficiency occurs when the cardiovascular system cannot adequately return blood and fluid from the extremities to the heart. Venous insufficiency can cause stasis dermatitis when blood pools in the lower legs and leaks out into the skin and other tissues. Signs of venous insufficiency are oedema, a brownish-leathery appearance to skin in the lower extremities, and venous ulcers that weep fluid. Causes of venous insufficiency are hypertension, obesity, lack of exercise, family history of the condition, blood clots, and swelling of the veins (phlebitis; John Hopkins Medicine, 2025). See Figure 12 for venous insufficiency in the lower extremities.

Figure 12. Venous insufficiency in the lower extremities

Impaired Immune Function

Skin contributes to the body's immune function and is also affected by the immune system. Intact skin provides an excellent first line of defence against microorganisms entering the body. This is why it is essential to keep skin intact. If skin does break down, the next line of defence is a strong immune system that attacks harmful invading organisms. However, if the immune system is not working well, the body is much more susceptible to infections. This is why maintaining intact skin, especially in the presence of an impaired immune system, is imperative to decrease the risk of infections.

Stress can cause an impaired immune response that results in delayed wound healing. Being hospitalised or undergoing surgery triggers the stress response in many patients. Medications, such as corticosteroids, also affect a patient's immune function and can impair wound healing. When assessing a chronic wound that is not healing as expected, it is important to consider the potential effects of stress and medications.

Diabetes

Diabetes can cause wounds to develop, as well as delayed healing of wounds. This is due to elevated blood glucose causing stiffening of arterial walls, resulting in decreased circulation and tissue hypoxia. Elevated

blood glucose also reduces leukocyte function, directly affecting wound healing and risk for infection (Joseph, 2019). Additionally, if patients with diabetes also have diabetic neuropathy, they do not feel pain associated with skin injuries, resulting in delayed treatment and further risk of infection. The instances of diabetes are expected to rise in conjunction with the ageing population and increased incidences of obesity, with a projected global prevalence of 4.4% by 2036 (Joseph, 2019).

Inadequate Nutrition

A healthy diet is essential for maintaining healthy skin, as well as maintaining an appropriate weight. Nutrients that are particularly important for skin health include protein; vitamins A, C, D, and E; and minerals such as selenium, copper, and zinc.

Nutritional deficiencies can have a profound impact on wound healing and must be addressed for chronic wounds to heal. Protein is one of the most important nutritional factors affecting wound healing. For example, in patients with pressure injuries, 30 to 35 kcal/kg of calorie intake with 1.25 to 1.5g/kg of protein and micronutrient supplementation are recommended daily. In addition, vitamin C and zinc have many roles in wound healing. It is important to collaborate with a dietician to identify and manage nutritional deficiencies when a patient is experiencing poor wound healing.

Obesity

Obesity has become more prevalent in the global population and is associated with diseases, such as diabetes, heart disease and metabolic syndrome. Obesity can affect wound healing due to changes in the vasculature, decreased production of growth factors, and poor-quality granulation tissue (Cotterell et al., 2024). In the same way, a balanced diet is vital for healthy skin, a healthy weight is also imperative. Obesity can change the pressure in the tissues and obese individuals usually have increased tissue pressure, due to excess adipose tissue in cutaneous skin (Cotterell et al., 2024). Obese individuals are at increased risk for fungal and yeast infections in skin folds caused by increased moisture and friction. See Figure 13 for an image of a fungal infection in the groin. Symptoms of yeast and fungal infection include redness and scaliness of the skin associated with itching.

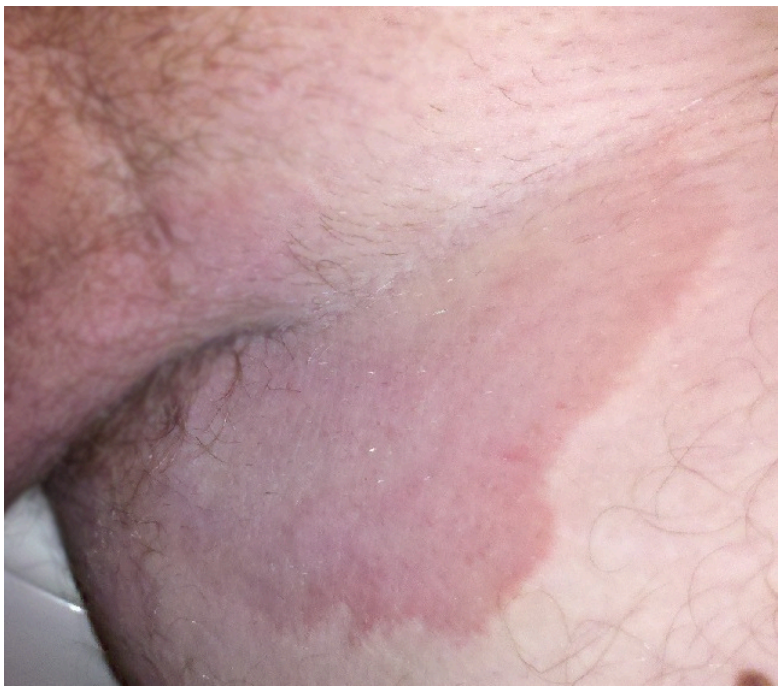

Figure 13. Fungal infection in the groin

Obese patients also are at higher risk for wound complications due to a decreased supply of oxygenated blood flow to adipose tissue. Potential complications include infection, **dehiscence** (separation of the edges of a surgical wound), haematoma formation, pressure injuries, and venous ulcers. Evisceration is a rare but severe complication when an abdominal surgical incision separates, and the abdominal organs protrude or come out of the incision. Nurses can educate patients about making healthy lifestyle choices to reduce obesity and the risk of dehiscence. More information on dehiscence is provided in the Introduction to Wound Care Principles chapter.

Exposure to Moisture

Healthy skin needs good moisture balance. If too much moisture (i.e., sweat, urine, or water) is left on the skin for extended periods of time, the skin will become soggy, wrinkly, and turn whiter than usual and is called **maceration**. A simple example of maceration is when you spend too much time in a bathtub and your fingers and toes turn white and get "pruney." If healthy skin is exposed to moisture for an extended period of time, such as when a moist wound dressing is incorrectly applied to healthy skin, the skin will break down. This type of skin breakdown is called excoriation. **Excoriation** refers to the removal of the topmost surface of the skin, which results in redness and abrasions. See Figure 14 for an image of maceration.

Figure 14. Macerated skin

The opposite occurs when skin lacks proper moisture. Skin becomes flaky, itchy, and cracked when it becomes too dry. Conditions such as decreased moisture in the air during cold winter months or bathing in hot water can worsen skin dryness. Dry skin, especially when accompanied by cracking, breaks the protective barrier and increases the risk of infection. It is important for nurses to apply emollient cream to patients' areas of dry skin to maintain the protective skin barrier.

Smoking

Tobacco smoking contains numerous harmful substances, such as mutagens and carcinogens. Smoking can cause short-term and long-term issues, including yellowing of the fingers and nails, discolouration of the teeth, dry skin, baggy eyes, and deeper facial wrinkles (American Osteopathic College of Dermatology [AOCD], n.d.).

Smoking has been associated with health complications, including cancer as well as premature ageing of the skin and delayed wound healing (AOCD, n.d.). Smoking impacts the **inflammatory phase of the wound healing** process, which can result in poor wound healing and an increased risk of infection, wound dehiscence, and **necrosis** (AOCD, n.d.). This is likely due to tissue hypoxia caused by toxins in tobacco smoke such as carbon monoxide and hydrogen cyanide, as well as vasoconstriction caused by nicotine.

Age

Older adults have thin, less elastic skin that puts them at increased risk for injury. They also have an altered inflammatory response that can impair wound healing. Additionally, the elderly are at risk for poor nutrition which contributes to poor wound healing. Nurses can educate older patients about the importance of exercise for skin health and improved wound healing as appropriate.

Key Takeaways

In this chapter, we covered:

- The integumentary system is the largest and most visible organ in the body, comprised of the skin and accessory structures.
- The integumentary system has three main layers – the epidermis, the dermis and the hypodermis.
- The colour of the skin can change based on environmental factors, such as UV exposure, but skin colour is largely a result of different pigments in the cells.
- Skin cancer accounts for around 80% of newly diagnosed cases annually, and Australia has one of the highest instances of skin cancer in the world.
- A routine skin assessment by a registered practitioner typically includes inspecting overall skin colour, checking for skin lesions or wounds, and palpating extremities for oedema, temperature, and capillary refill.
- The integumentary system experiences significant changes throughout a lifetime, and the skin of a neonate differs from that of an older adult.
- Risk factors such as diabetes, impaired nutrition and smoking can place a patient at increased risk for altered skin health and delayed wound healing.

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INTRODUCTION TO WOUND CARE PRINCIPLES

Kate Hurley and Sandra Dash

Learning Outcomes

In this chapter you will learn how to:

- Identify common wound types and recognise the different phases of wound healing
- Recognise common wound complications and the factors that can affect wound healing
- Complete a wound assessment and document findings to manage external and internal factors that can compromise wound healing
- Identify and apply wound care dressings commonly used in practice.

Introduction

Wound healing is a complex physiological process that restores function to skin and tissue that have been injured. The healing process is affected by several external and internal factors that either promote or inhibit healing. When providing wound care to patients, nurses, in collaboration with other members of the health care team, assess and manage external and internal factors to provide an optimal healing environment.

Complex wounds often require care by specialists. Certified wound care nurses assess, treat, and create care plans for patients with complex wounds, ostomies, and incontinence conditions. They act as educators and consultants to staff nurses and other healthcare professionals. This chapter will discuss wound care basics for entry-level nurses.

Basic Concepts Related to Wounds

Phases of Wound Healing

When skin is injured, there are four phases of wound healing that take place: haemostasis, inflammatory, proliferative, and maturation. The phases of wound healing are described below.

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When performing dressing changes, it is essential for the nurse to protect this granulation tissue and the associated new capillaries. Healthy granulation tissue appears pink, moist, and is painless to the touch due to the new capillary formation. Unhealthy granulation tissue is dark red and painful. It bleeds easily with minimal contact and may be covered by shiny white or yellow fibrous tissue referred to as **biofilm** that must be removed because it impedes healing.

Complications in Wound Healing

Haematoma

A **haematoma** is an area of blood that collects outside of the larger blood vessels. A haematoma is more severe than ecchymosis (bruising) that occurs when small veins and capillaries under the skin break. The development of a haematoma at a surgical site can lead to infection and wound dehiscence.

Figure 1. An example of haematoma

Infection

A break in the skin allows bacteria to enter and begin to multiply. Microbial contamination of wounds can progress from localised infection to systemic infection, sepsis, and subsequent life- and limb-threatening infection. Signs of a localised wound infection include redness, warmth, increased drainage and tenderness around the wound. Signs that a systemic infection is developing and requires urgent medical management include the following:

- Fever over 38° C
- Overall malaise (lack of energy and not feeling well)
- Change in level of consciousness/increased confusion
- Increasing or continual pain in the wound
- Expanding redness or swelling around the wound
- Loss of movement or function of the wounded area.

Dehiscence

Dehiscence refers to the separation of the edges of a surgical wound. To prevent wound dehiscence, surgical patients must follow all post-op instructions carefully. The patient must move carefully and protect the skin from being pulled around the wound site. A dehisced wound can appear fully open where the tissue underneath is visible, or it can be partial where just a portion of the wound has opened.

Wound dehiscence is always a risk in a surgical wound, but the risk increases if the patient is obese, smokes, or has other health conditions, such as diabetes, that impact wound healing. Additionally, the location of the wound and the amount of physical activity in that area can also increase the chances of wound dehiscence. See Figure 2 for an image of dehiscence in an abdominal surgical wound in a 50-year-old obese female with a history of smoking and malnutrition.

Figure 2. Obese patient with wound dehiscence

Wound dehiscence can occur suddenly, especially in abdominal wounds when the patient is coughing or straining. Evisceration is a rare but severe surgical complication when dehiscence occurs, and the abdominal organs protrude out of the incision. Signs of impending dehiscence include redness around the wound margins and increasing drainage from the incision. Suture breakage can be a sign that the wound has minor dehiscence or is about to dehisce and the wound will also likely become increasingly painful.

Assessing Wounds

Wounds should be assessed and documented at every dressing change. Wound assessment should include the following components:

- Anatomic location
- Type of wound (if known)
- Degree of tissue damage
- Wound bed

- Wound size
- Wound edges and surrounding skin
- Signs of infection
- Amount and type of exudate
- Pain.

These components are further discussed in the following sections.

Anatomic Location and Type of Wound

The location of the wound should be documented using correct anatomical terms and numbering. In practice, a wound care assessment document will be used to chart the appearance of the wound and the required dressing regime. The wound care assessment document would record information such as a description of the wound, a description of the surrounding skin, the position of the wound, and the type and amount of exudate. Clear and concise documentation of a wound and relevant features, means the wound is consistently monitored and treated appropriately.

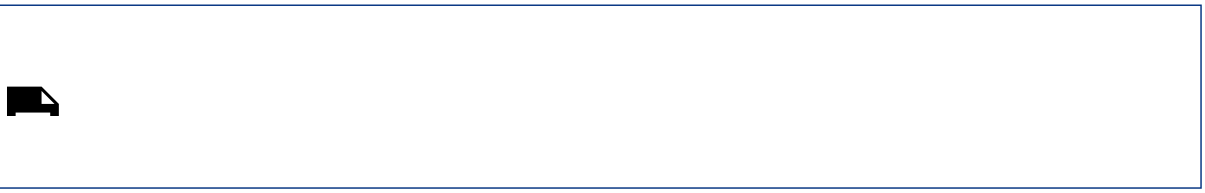
The location of a wound also provides information about the cause and type of a wound. For example, a wound over the sacral area of an immobile patient is likely a pressure injury, and a wound near the ankle of a patient with **venous insufficiency** is likely a **venous ulcer**. For successful healing, different types of wounds require different treatments based on the cause of the wound.

Wound Base

Assess the colour of the wound base. Healthy granulation tissue appears pink due to the new capillary formation, and it is moist, and painless to the touch. Conversely, unhealthy granulation tissue is dark red and painful. It bleeds easily with minimal contact and may be covered with biofilm. The appearance of **slough** (yellow) or **eschar** (black) in the wound base should be documented and communicated to the health care provider because it likely will need to be removed for healing.

Type and Amount of Exudate

The colour, consistency, and amount of exudate should be assessed and documented at every dressing change. The amount of drainage from wounds is categorised as scant, minimal, moderate, or large. Use the following descriptions to select the appropriate terms:



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The type of wound drainage should be described using medical terms such as serosanguinous, sanguineous, serous, or purulent.

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If a moderate to large amount of exudate is expected, a surgical drain will be placed into the wound bed during a procedure. These drains allow the exudate to drain away from the wound, allowing wound healing to take place. There are many different types of wound drains in practice, and these are generally removed a few days after a surgical procedure.

Wound Size

Wounds should be measured on admission and during every dressing change to evaluate for signs of healing. Accurate wound measurements are vital for monitoring wound healing. Measurements should be taken in the same manner by all clinicians to maintain consistent and accurate documentation of wound progress. This can be difficult to accomplish with oddly shaped wounds because there can be confusion about how to consistently measure them. Wounds should be described by length by width, with the length of the wound based on the head-to-toe axis. The width of a wound should be measured from side to side laterally. If a wound is deep, the deepest point of the wound should be measured to the wound surface using a sterile, cotton-tipped applicator.

Tunnelling

Tunnelling can occur in a full thickness wound that can lead to abscess formation. The depth of tunnelling can be measured by gently probing the tunnelled area with a sterile, cotton-tipped applicator from the wound base to the end of the tract. When probing a tunnel, it is imperative to not force the swab but only insert it until resistance is felt to prevent further damage to the area. The location of the tunnel

in the wound should be documented using the analogy of a clock face, with 12:00 pointing toward the patient's head.

Undermining

Undermining occurs when the tissue under the wound edges becomes eroded, resulting in a pocket beneath the skin at the wound's edge. Undermining is measured by inserting a probe under the wound edge directed almost parallel to the wound surface until resistance is felt. The amount of undermining is the distance from the probe tip to the point at which the probe is level with the wound edge. The analogy of a clock face, with 12:00 pointing toward the patient's head, is used to identify the area of undermining.

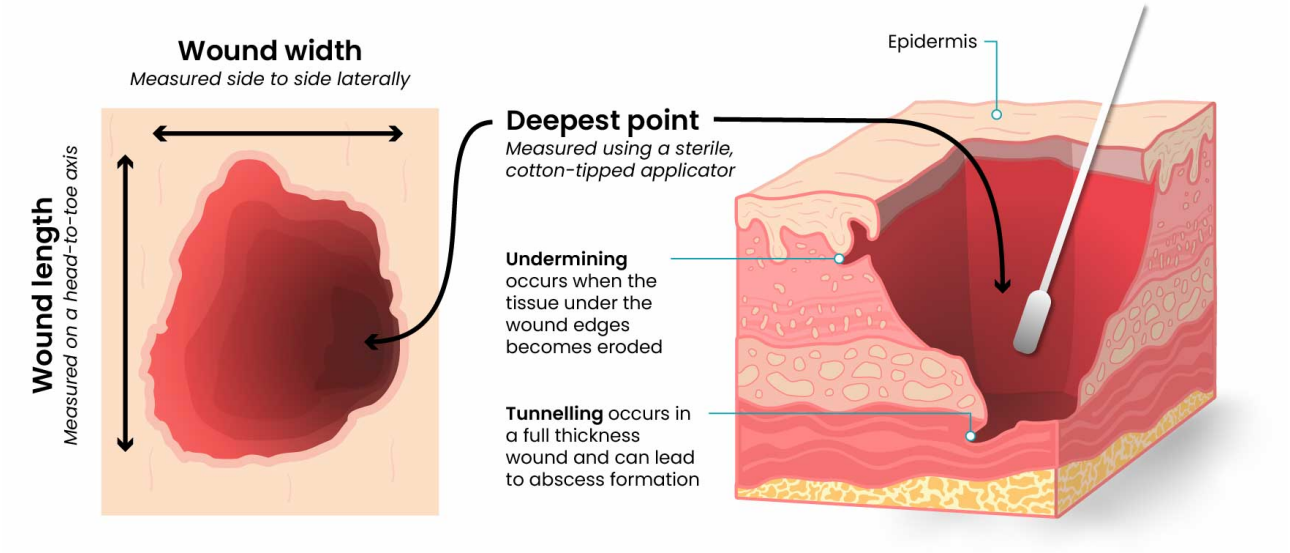

Figure 3. Measuring a wound with tunnelling and undermining

Wound Edges and Periwound Skin

If the wound is healing by **primary intention**, it should be documented if the wound edges are well-approximated (closed together) or if there are any signs of dehiscence. The skin outside the outer edges of the wound called the periwound skin, provides information related to wound development or healing. For example, when a wound has excess exudate, it can **macerate** the periwound skin, giving it a waterlogged appearance that is light grey in colour. See Figure 4 for an image of erythematous periwound with partial dehiscence.

Figure 4. Periwound surrounding an open wound

Signs of Infection

Wounds should be continually monitored for signs of infection. Signs of localised wound infection include **erythema**, **induration**, pain, **oedema**, purulent**, exudate** (yellow or green drainage), and wound odour. Signs of infection should be reported to the medical team and a swab of the wound site should be conducted.

Pain

The intensity of pain that a patient is experiencing with a wound should be assessed and documented. If a patient experiences pain during dressing changes, it should be managed with the administration of pain medication before scheduled dressing changes. Be aware that the degree of pain may not correlate to the extent of tissue damage. For example, **skin tears** are often painful because the nerve endings are exposed in the dermal layer, whereas patients with severe diabetic ulcers on their feet may experience little or no pain because of existing neuropathic damage.

Types of Wound Healing

Primary Intention

There are three types of wound healing: primary intention, **secondary intention**, and **tertiary intention**. Healing by primary intention means that the wound is sutured, stapled, glued, or otherwise closed so the wound heals beneath the closure. This type of healing occurs with clean-edged lacerations or surgical incisions, and the closed edges are referred to as approximated. See Figure 5 for an image of a surgical wound healing by primary intention.

Figure 5. Primary intention wound healing

Secondary Intention

Secondary intention occurs when the edges of a wound cannot be approximated (brought together), so the wound fills in from the bottom up by the production of granulation tissue (e.g. pressure injuries). Wounds that heal by secondary intention are at higher risk for infection and must be protected from contamination. See Figure 6 for an image of a wound healing by secondary intention.

Figure 6. Secondary intention wound healing

Tertiary Intention

Tertiary intention wound healing occurs when there is a delay to primary wound healing or primary wound healing has not been successful. The treatment team make the decision to stop or skip secondary intention, as the wound often requires cleaning, remodelling and/or debridement before being mechanically closed. See Figure 7 for an image of a wound healing by tertiary intention.

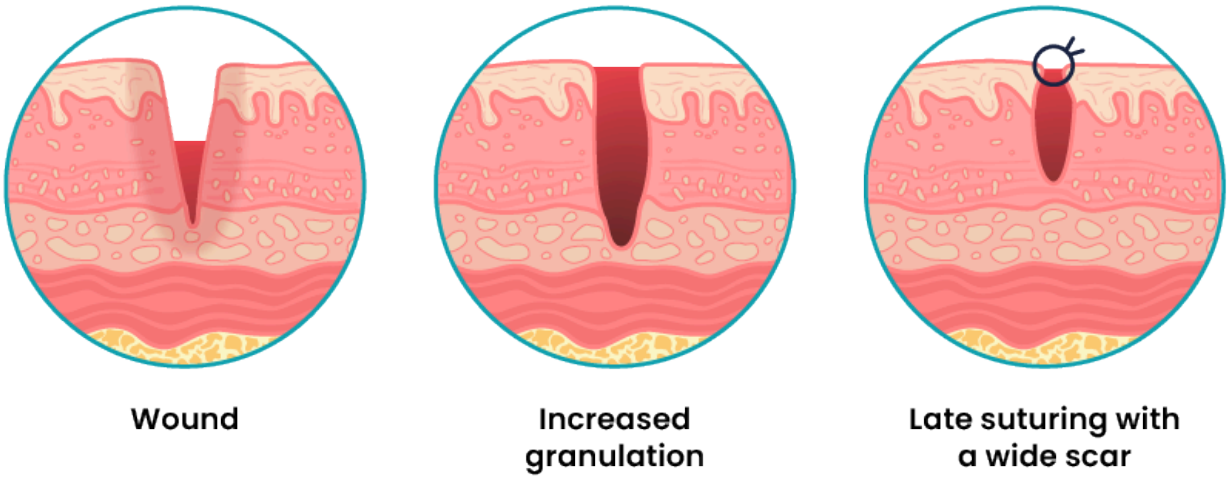

Figure 7. Tertiary intention wound healing

Wound Closures

Lacerations and surgical wounds are typically closed with sutures or staples. See Figure 8 for an image of sutures and Figure 9 for an image of staples. Sutures and staples generally stay in place until the wound has healed underneath and can be removed with an order provided by the medical team.

Figure 8. A wound closed with sutures

Figure 9. A wound closed with staples

Common Types of Wounds

It is important to understand different types of wounds when providing wound care because each type of wound has different characteristics and treatments. Treatments that may be helpful for some wounds, can be harmful for other types of wounds. The most common types of wounds include skin tears, venous ulcers, **arterial ulcers**, diabetic foot wounds, and pressure injuries.

Skin Tears

Skin tears are wounds caused by mechanical forces such as **shear**, friction, or blunt force. They typically occur in the fragile, nonelastic skin of older adults or in patients undergoing long-term corticosteroid therapy. Skin tears can be caused by the simple mechanical force used to remove an adhesive bandage or from friction as the skin brushes against a surface. Skin tears occur in the epidermis and dermis but do not extend through the subcutaneous layer. The wound bases of skin tears are typically fragile and bleed easily.

Venous Ulcers

Venous ulcers are caused by insufficient circulation, or a lack of blood return to the heart causing the pooling of fluid in the veins of the lower legs. The resulting elevated hydrostatic pressure in the veins causes fluid to seep out, macerate the skin, and cause venous ulcerations.

Venous ulcers typically occur on the medial lower leg and have irregular edges due to the maceration. There is often discolouration of the lower legs, due to blood pooling and leakage of iron into the skin called hemosiderin staining. For venous ulcers to heal, compression dressings must be used, along with multilayer bandage systems, to control oedema and absorb large drainage. See Figure 10 for an image of a venous ulcer.

Figure 10. Venous ulcer on lower extremity

Arterial Ulcers

Arterial ulcers are caused by a lack of blood flow and decreased oxygenation to tissues. They typically occur in the distal areas of the body such as the feet, heels, and toes. Arterial ulcers have well-defined borders with a "punched out" appearance where there is a localised lack of blood flow. They are typically painful due to the lack of oxygenation in the area. The wound base may become **necrotic** due to tissue death from **ischemia**. Wound dressings must maintain a moist environment, and treatment must include the removal of necrotic tissue. In severe arterial ulcers, vascular surgery may be required to reestablish blood supply to the area. See Figure 11 for an image of an arterial ulcer on a foot.

Figure 11. Arterial ulcer on lower extremity

Diabetic Ulcers

Diabetic ulcers are also called neuropathic ulcers because **peripheral neuropathy** is commonly present in patients with diabetes. Peripheral neuropathy is a medical condition that causes decreased sensation of pain and pressure, especially in the lower extremities. Diabetic ulcers typically develop on the plantar aspect of the feet and toes of a patient with diabetes due to a lack of sensation of pressure or injury. Wound healing is compromised in patients with diabetes due to the disease process. In addition, there is a higher risk of developing an infection that can reach the bone requiring amputation of the area. To prevent diabetic ulcers from occurring, individuals need to care for their feet, including well-fitting shoes. See Figure 12 for an image of a diabetic ulcer.

Figure 12. Diabetic ulcer on a person's foot

Factors Affecting Wound Healing

Multiple factors affect a wound's ability to heal and are referred to as local and systemic factors. Local factors refer to factors that directly affect the wound, whereas systemic factors refer to the overall health of the patient and their ability to heal. Local factors include localised blood flow and oxygenation of the tissue, the presence of infection or a foreign body, and venous sufficiency. Venous insufficiency is a medical condition where the veins in the legs do not adequately send blood back to the heart, resulting in a pooling of fluids in the legs. Systemic factors that affect a patient's ability to heal include nutrition, mobility, stress, diabetes, age, obesity, medications, alcohol use, and smoking. When a nurse is caring for a patient with a wound that is not healing as anticipated, it is important to assess the wound for potential impact of these factors:

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Wound Therapy

Wound therapy is often prescribed by a multidisciplinary team that can include the provider, a wound care nurse, a dietician, and the bedside nurse who performs dressing changes. Topical dressings should be selected that create an environment conducive to healing the specific type of wound and its causes. It is important to perform the following actions when providing wound care. Each of these objectives is further discussed below.

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Figure 13. A surgical debridement of a wound on a person's shin

Wound Dressings

Common Wound Dressings

Wound dressings should be selected based on the type of the wound, the cause of the wound, and the characteristics of the wound. A specialised wound care nurse should be consulted, when possible, for appropriate selection of dressings for chronic wounds. Common wound care dressings are films, sterile gauze, foam, and alginate/hydrofibers.

Films: an adherent dressing that is permeable to gas, but impermeable to bacteria and fluid. This type of dressing is useful for superficial wounds with minimum exudate. This dressing can stay in situ for 1–4 days.

Sterile gauze: a nonadherent dressing used on moderate to highly exudative wounds. This dressing type is generally nontraumatic to the wound bed and promotes a moist wound environment for healing. This dressing can stay in situ for 1–4 days.

Foam: a nonadherent dressing used on moderate to high exudative wounds. Foam dressings are nontraumatic to the wound bed and promote a moist wound environment for healing. This dressing can stay in situ for up to 7 days.

Alginate/hydrofibers: a nonadherent dressing used on highly exudative wounds. Alginate and hydrofibers are nontraumatic to the wound bed and highly absorptive, meaning they can be used to pack a wound if required. This dressing can stay in situ for up to 2 days.

Negative Pressure Wound Therapy

Negative pressure wound therapy (NPWT), is commonly used to treat complex wounds which are non-healing or at risk of non-healing (Zaver & Kankanalu, 2023). NPWT is a broad term to describe a system that optimises healing by applying pressure to help reduce inflammatory exudate and promote the growth of granulation tissue (Zaver & Kankanalu, 2023). There are numerous different NPWT appliances available. In Australia, a wound vacuum is commonly used for acute, complex wounds.

Wound Vacuum

A common NPWT appliance utilised in Australia is a wound vacuum. The term wound vacuum refers to a device used with special foam dressings and suctioning to remove fluid and decrease air pressure around a wound to assist in healing. The foam is placed into an open wound and sealed with a thin film. The film has an opening that rubber tubing fits through to connect to a vacuum pump. Once connected, the vacuum pump removes fluid from the wound while also helping to pull the edges of the wound together. This dressing is typically insitu 24 hours a day while the wound is healing. See Figure 14 Wound healing using a wound vacuum system.

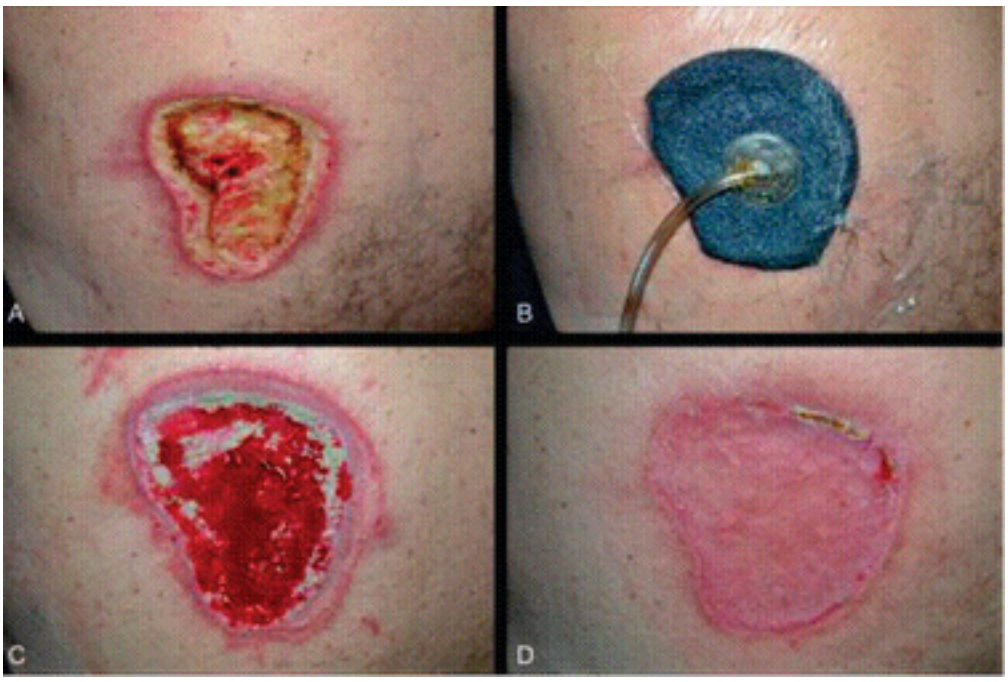

Figure 14. Wound progression of healing with a wound vacuum

Key Takeaways

In this chapter, we covered:

- Four key phases to wound healing occur over a period of days to weeks – haemostasis, inflammation, proliferation and maturation.
- A wound assessment should be completed and documented at each dressing change, checking components such as location of the wound, type of wound, degree of tissue damage, wound bed, size of the wound, health of the wound edges and surrounding skin, signs of infection, amount and type of exudate and pain.
- The level of type of exudate from a wound can vary, and the colour, consistency and amount of exudate should be assessed and documented at every dressing change.
- There are three main types of wound healing – primary intention (simple suture line), secondary intention (lower leg ulcer) and tertiary intention (medical closure).
- Many factors can affect or delay wound healing, including smoking, stress, nutritional status, obesity and alcohol consumption.

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PRESSURE INJURY PREVENTION AND MANAGEMENT

Sandra Dash and Kate Hurley

Learning Outcomes

In this chapter you will learn how to:

- Identify people at risk of developing pressure injuries
- Describe the stages of pressure injury development
- Describe interventions to prevent and manage pressure injuries
- Document actions taken and observations of pressure injuries using appropriate tools.

Pressure Injuries

Pressure injuries occur when there is prolonged pressure, especially over bony prominences, causing localised damage to the skin or underlying soft tissue. Pressure injuries generally form when the skin layer of tissue gets caught between an external hard surface, such as a chair, and the internal hard surface of the bone. Pressure injuries are commonly found on the sacrum, heels, ischia, and coccyx.

Risk Factors

There are many risk factors that can cause pressure injuries:

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Friction and shear are common factors that cause a patient to develop a pressure injury in the healthcare setting. See Figure 1 for a visual representation of how friction and shear can impact skin integrity.

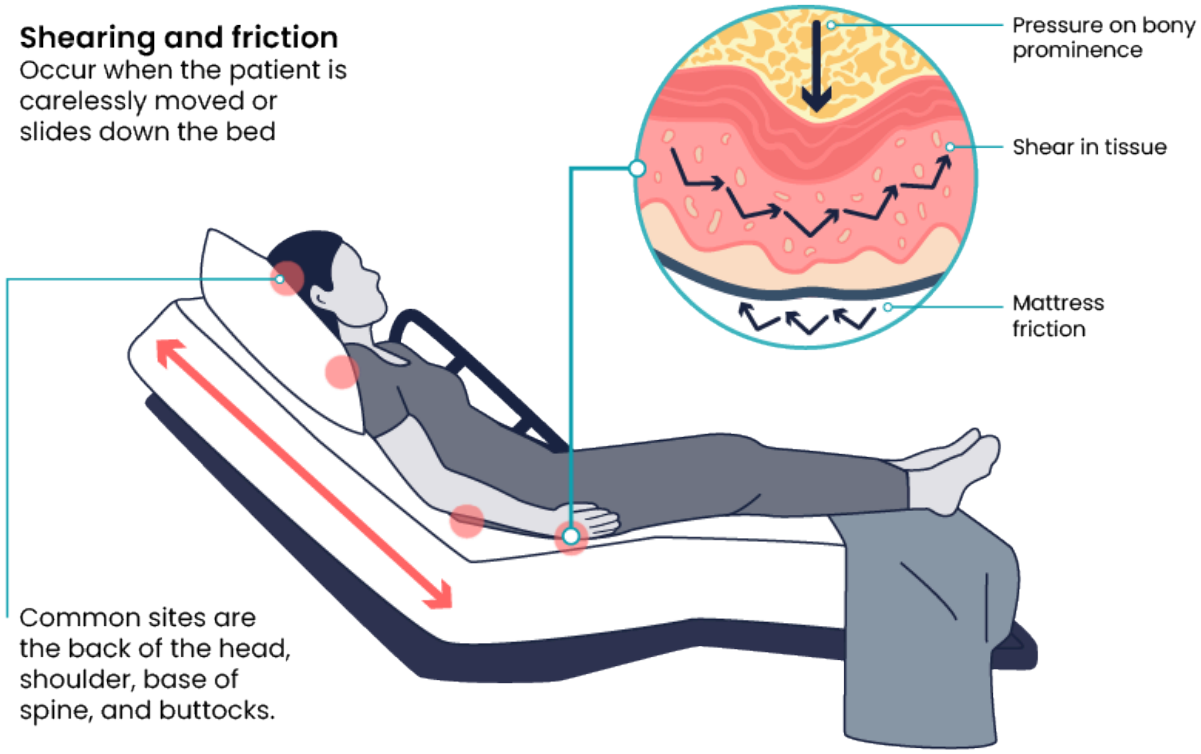


Figure 1. Shear force and shear force closeup

Common Pressure Injury Sites

Pressure injuries can occur over any bony prominences, especially areas such as heels, elbows, hips, buttocks and the sacrum. However, pressure injuries can also occur on any area that has continued pressure.

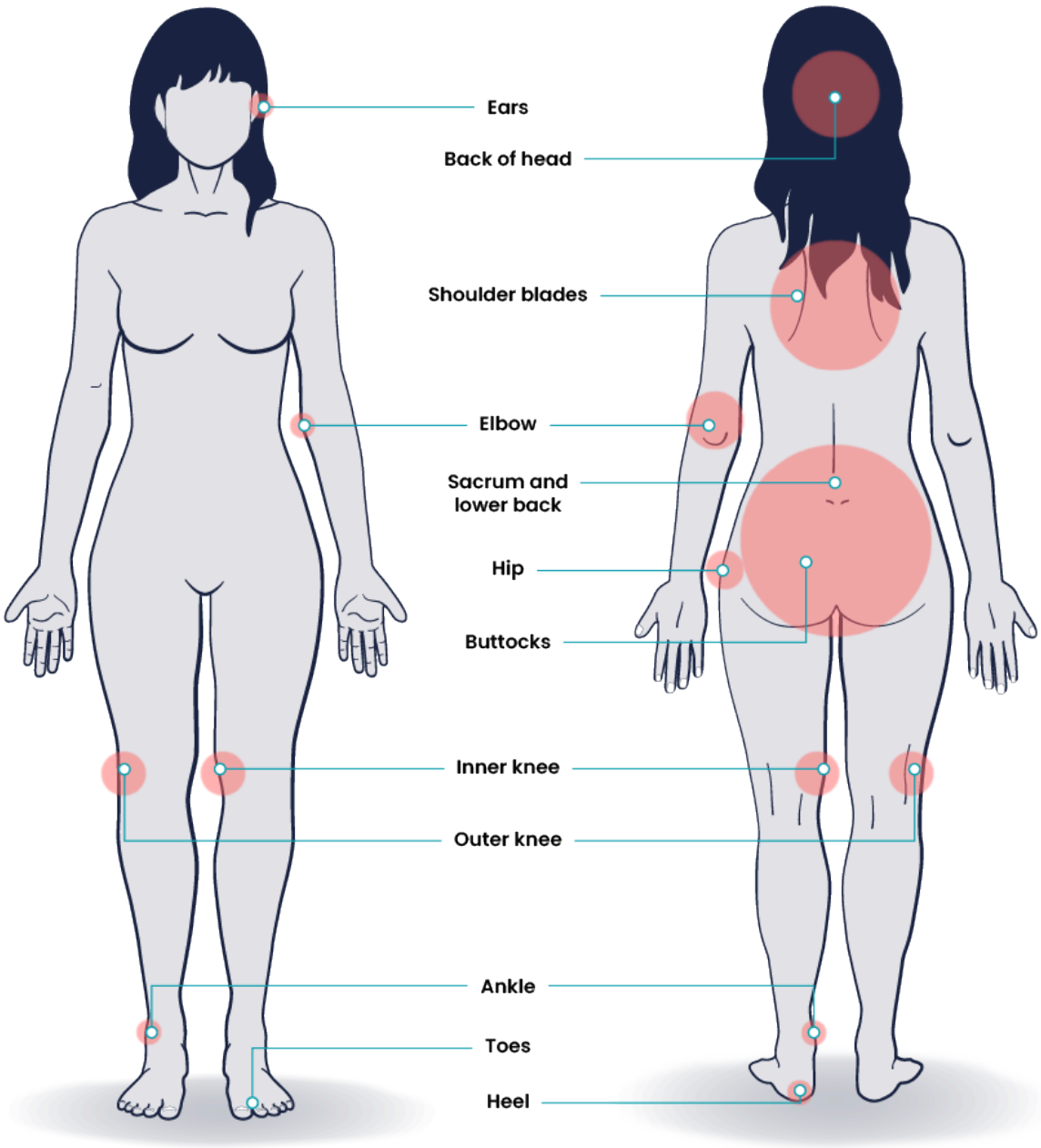


Figure 2. Pressure injury sites

Pressure Injury Assessment

To correctly assess whether a wound is a pressure injury, several elements need to be noted, such as:

- Location of the pressure injury
- Size in centimetres with the height being from head to toe and length being from side to side. The depth is also measured using a cotton-tipped swab
- Presence of undermining or tunnelling
- The stage of the pressure injury
- The colour of the pressure injury/wound bed and location of any necrosis or eschar

- Integrity of the surrounding skin
- Any signs of infection.

Assessment Tools

Braden Scale

The Braden Scale is a standardised, evidence-based assessment tool commonly used in the healthcare setting to assess and document a patient's risk for developing pressure injuries.

Scoring

Several factors place a patient at risk for developing pressure injuries, including nutrition, mobility, sensation, and moisture. The Braden Scale is a tool commonly used in health care to provide an objective assessment of a patient's risk for developing pressure injuries. The six risk factors included on the Braden Scale are sensory perception, moisture, activity, mobility, nutrition, and friction/**shear**, and these factors are rated on a scale from 1-4 with 1 being "completely limited" to 4 being "no impairment." The scores from the six categories are added, and the total score indicates a patient's risk for developing a pressure injury.

- Mild risk = 15–18
- Moderate risk = 13–14
- High risk = 10–12
- Severe risk = less than 9.

Nurses create care plans using these scores to plan interventions that prevent or treat pressure injuries.

Sensory Perception

The sensory perception risk factor is defined as the ability to respond meaningfully to pressure-related discomfort. If a patient is unable to feel pressure-related discomfort and respond to it appropriately by moving or reporting pain, they are at high risk of developing a pressure injury. This risk category describes two different issues that affect sensory perception. The first description refers to the patient's level of consciousness, and the second description refers to the patient's ability to feel cutaneous sensation. See Table 1 for a description of each level of risk and their associated interventions.

Table 1. Description and Interventions by Level of Risk for Sensory Perception

Assessment Category	Rating Description	Interventions
Sensory perception	**4 – No Impairment:** Responds to verbal commands. Has no sensory deficit that would limit ability to feel or voice pain or discomfort.	• Encourage the patient to report pain over bony prominences. • Check heels daily.
	3 – Slightly Limited: Responds to verbal commands but cannot always communicate discomfort or the need to be turned. OR Has some sensory impairment that limits the ability to feel pain or discomfort in 1 or 2 extremities.	• Assess and inspect skin every shift. Pay attention to heels. • Elevate heels and use protectors.
	2 – Very Limited: Responds only to painful stimuli. Cannot communicate discomfort except by moaning or restlessness. OR Has a sensory impairment that limits the ability to feel pain or discomfort over half of the body.	All interventions mentioned in 3 – Slightly Limited plus: • Consider a specialty mattress or bed.
	1 – Completely Limited: Unresponsive (does not moan, flinch, or grasp) to painful stimuli, due to diminished level of consciousness or sedation. OR Limited ability to feel pain over most of the body.	All interventions mentioned in 2 – Very Limited plus: • Use pillows between knees and bony prominences to avoid direct contact.

Moisture

The moisture risk factor is defined as the degree to which skin is exposed to moisture. Prolonged exposure to moisture increases the probability of skin breakdown. Moisture can come from several sources, such as perspiration, urine incontinence, stool incontinence, or wound drainage. Frequent surveillance, removal of wet or soiled linens, and use of protective skin barriers greatly reduce this risk factor. See Table 2 for a description of the level of moisture and their associated interventions.

Table 2. Description and Interventions by Level of Risk for Moisture

Assessment Category	Rating Description	Interventions
Moisture	**4 – Rarely Moist:** Skin is usually dry; linen only requires changing at routine intervals.	• Encourage the patient to use lotion to prevent skin cracks. • Encourage the patient to report any moisture problem (such as under breasts).
	3 – Occasionally Moist: Skin is occasionally moist, requiring an extra linen change approximately once per day.	All interventions mentioned in 4 – Rarely Moist plus: • Use moisture barrier ointments (protective skin barriers). • Moisturise dry unbroken skin. • Avoid hot water. Use mild soap and soft cloths or packaged cleanser wipes. • Routinely check incontinence pads. • Avoid use of adult diapers but if necessary, check frequently (every 2–3 hours) and change as needed. • If stool incontinence, consider bowel training and toileting after meals.
	2 – Often Moist: Skin is often but not always moist. Linen must be changed at least once per shift.	All interventions mentioned in 3 – Occasionally Moist plus: • Check incontinence pads frequently (every 2–3 hours). • Consider a low air loss bed.
	1 – Constantly Moist: Skin is kept moist almost constantly by perspiration, urine, etc. Dampness is detected every time the patient is moved or turned.	All interventions mentioned in 2 – Often Moist plus: • Assess and inspect skin every shift. • Check incontinence pads frequently (every 2–3 hours) and change as needed. • Apply condom catheter if appropriate. • If stool incontinence, consider bowel training and toileting after meals or rectal tubes if appropriate.

Activity

The activity risk factor is defined as the degree of physical activity. For example, walking or moving from

a bed to a chair reduces the risk of developing a pressure injury by redistributing pressure points and increasing blood and oxygen flow to areas at risk. The level of activity is defined by how frequently the patient is able to get out of bed, move into a chair, or ambulate with or without help. See Table 3 for a description of each level of risk and their associated interventions.

Table 3. Description and Interventions by Level of Risk for Activity

Assessment Category	Rating Description	Interventions
Activity	**4 – Walks Frequently:** Walks outside the room at least twice a day and inside the room at least once every two hours during waking hours.	• Encourage ambulation outside the room. • Check skin daily. • Monitor balance and endurance.
	3 – Walks Occasionally: Walks occasionally during the day, but for very short distances, with or without assistance. Spends the majority of each shift in bed or chair.	• Provide a structured mobility plan. • Consider a chair cushion. • Consider physical therapy consult.
	2 – Chair Fast: Ability to walk is severely limited or nonexistent. Cannot bear their own weight and/or must be assisted into chair or wheelchair.	• Consider a specialty chair pad. • Consider postural alignment, weight distribution, balance, stability, and pressure relief when positioning individuals in chairs or wheelchairs. • Instruct the patient to reposition every 15 minutes when in the chair. • Stand every hour. • Pad bony prominences with foam wedges, rolled blankets or towels. • Consider physical therapy consult for conditioning and wheelchair assessment.
	1 – Bedfast: Confined to bed.	• Perform skin assessment and inspection every shift. • Position prone if appropriate or elevate head of bed no more than 30 degrees. • Position with pillows to elevate pressure points off the bed. • Consider specialty beds. • Elevate heels off bed and/or use heel protectors. • Consider physical therapy consult for conditioning and wheelchair assessment. • Turn/reposition every 1–2 hours. • Post turning schedule. • Teach or do frequent small shifts of body weight.

Mobility

The mobility risk factor is defined as the patient's ability to change or control their body position. For

example, healthy people frequently change body position by rolling over in bed, shifting weight in a chair after sitting too long, or by moving their extremities. However, tissue damage will occur if a patient is unable to reposition on their own power unless caregivers frequently change their position. See Table 4 for a description of each level of risk for mobility and their associated interventions.

Table 4. Description and Interventions by Level of Risk for Mobility

Assessment Category	Rating Description	Interventions
Mobility	**4 – No Limitations:** Makes major and frequent changes in position without assistance.	• Check skin daily. • Encourage ambulation outside the room at least twice daily. • No interventions required.
	3 – Slightly Limited: Makes frequent though slight changes in body or extremity position independently.	• Check skin daily. • Turn/reposition frequently. • Teach frequent small shifts of body weight. • Consult physical therapy for strengthening/conditioning. • Use a gait belt for assistance.
	2 – Very Limited: Makes occasional slight changes in body or extremity position but unable to make frequent or significant changes independently.	• Perform skin assessment and inspection every shift. • Turn/reposition 1–2 hours. • Post turning schedule. • Teach or do frequent small shifts of body weight. • Elevate heels. • Consider a specialty bed.
	1 – Completely Immobile: Does not make even slight changes in body or extremity position without assistance.	Same interventions as for 2 – Very Limited

Nutrition

Adequate nutrition and fluid intake are vital for maintaining healthy skin. Protein intake, in particular, is very important for healthy skin and wound healing. The nutrition risk factor is defined by two categories of descriptions. The first category measures the amount and type of oral intake. The second category is used for patients receiving tube feeding, total parenteral nutrition (TPN), or are prescribed clear liquid diets or nothing by mouth (NBM). See Table 5 for a description of each level of risk for nutrition and their associated interventions.

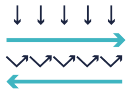
Table 5. Description and Interventions by Level of Risk for Nutrition

Assessment Category	Rating Description	Interventions
Nutrition	**4 – Excellent:** Eats most of every meal. Never refuses a meal. Usually eats a total of 4 or more servings of meat and dairy products. Occasionally eats between meals. Does not require supplementation.	• Move the patient out of bed for all meals. • Provide food choices. • Offer nutrition supplements. • Discuss a plan with the provider if the patient is NPO for greater than 24 hours. • Record dietary intake.
	3 – Adequate: Eats over half of most meals. Eats a total of 4 servings of protein (meat and dairy products) each day. Occasionally refuses a meal, but will take a supplement if offered OR Is on a tube feeding or TPN regimen that most likely meets most of nutritional needs	• Observe and monitor nutritional intake. • Discuss a plan with the provider if the patient is NPO for greater than 24 hours. • Record dietary intake and input and output (I&O), if appropriate.
	2 – Probably Inadequate: Rarely eats a complete meal and generally eats only about half of any food offered. Protein intake includes only 3 servings of meat or dairy products per day. Occasionally will take a dairy supplement OR Receives less than optimum amount of liquid diet or tube feeding.	All interventions mentioned in 3 – Adequate plus: • Encourage fluid intake as appropriate. • Obtain nutritional/dietary consult. • Offer nutrition supplements and water. • Encourage family to bring favorite foods. • Provide small, frequent meals.
	1 – Very Poor: Never eats a complete meal. Rarely eats more than one third of any food offered. Eats two servings of protein (meat or dairy products) per day. Takes fluids poorly. Does not take a liquid dietary supplement OR Is NPO and/or maintained on clear liquids or IV for more than 5 days.	All interventions mentioned in 2 – Probably Inadequate plus: • Perform skin assessment and inspection every shift.

Friction/Shear

Friction and shear are significant risk factors for producing pressure injuries. This section is scored based on whether an individual has a problem, potential problem, or no apparent problem in this area. See Table 6 for a description of each level of risk for friction/shear and their associated interventions.

Table 6. Description and Interventions by Level of Risk for Friction/Shear

Assessment Category	Rating Description	Interventions
Friction/ shear 	**3 – No Apparent Problem:** Moves in bed and chair independently and has sufficient muscle strength to lift up completely during move. Maintains good position in bed or chair at all times.	Keep bed linens clean, dry, and wrinkle-free.
	2 – Potential Problem: Moves feebly or requires minimal assistance. During a move, skin probably slides to some extent against sheets, chair, restraints, or other devices. Maintains a relatively good position in a chair or bed most of the time but occasionally slides down.	All interventions mentioned in 3 – No Apparent Problem plus: • Avoid massaging pressure points. • Apply transparent dressing or elbow/heel protectors to intact skin over elbows and heels.
	1 – Problem: Requires moderate to maximum assistance in moving. Complete lifting without sliding against sheets is impossible. Frequently slides down in bed or chair, requiring frequent repositioning with maximum assistance. Spasticity, contractures, or agitation leads to almost constant friction.	All interventions mentioned in 2 – Potential Problem plus: • Perform skin assessment and inspection every shift. • Use a minimum of two people assisting plus a draw sheet in pulling the patient up in bed. • Keep bed linens clean, dry, and wrinkle-free. • Apply elbow/heel protectors to intact skin over elbows and heels. • Elevate head of bed 30 degrees or less to reduce shear when feasible.

Link to Learning

Follow the link to this copy of the Braden Risk Assessment Tool. You may find others with a simple internet search. To complete each component of the tool, watch Pressure Wounds: The Braden Scale [5:15].

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://jcu.pressbooks.pub/nursing-skills-foundations/?p=46#oembed-1

Waterlow Scale

The Waterlow assessment tool is one of three assessment scales used to determine the risk of pressure injury. (See an example of the tool used by Queensland Health). The Waterlow is used within the first eight hours of admission with repeated assessments throughout the admission as required (Queensland Health, 2019). The assessment tools used for assessing pressure injuries are part of the Comprehensive Care Standard (Standard 5) of the National Safety and Quality Health Service Standards (NSQHS). The Comprehensive Care Standard aims to provide care that meets the individual needs of the patient and ensures that harm is prevented. There are several sections within this standard that pertain specifically to pressure injuries.

- **Action 5.10**: This action identifies patients at risk of pressure injuries and plans for comprehensive care.
- **Action 5.12**: This action ensures that the risk factors and decisions regarding care are documented.
- **Action 5.21**: The organisation has systems for prevention and management of pressure injuries that follow best practice guidelines.
- **Action 5.22**: Clinicians providing care for patients at risk of pressure injuries conduct skin assessments within a timely manner as indicated in best practice guidelines.
- **Action 5.23**: The health organisation is required to provide education to patients and families on pressure injuries. Equipment used to prevent pressure injuries is based on best practice guidelines. (Australian Commission on Safety and Quality in Health Care, 2024)

These actions are incorporated into hospitals, day procedure services, MPS and small hospitals.

Staging Pressure Injuries

Pressure injuries commonly occur on the sacrum, heels, ischial tuberosity, and coccyx. In 2021 in Australia,

an advisory panel of national experts formed the Australian Pressure Injury Treatment Advisory (PITA) group. This group developed a guideline to assess and manage pressure injuries. Pressure injuries are staged based on the extent of tissue damage. For example, Stage 1 pressure injuries have reddened but intact skin and Stage 4 pressure injuries have deep, open ulcers affecting underlying tissue and structures such as muscles, ligaments, and tendons. See the interactive below for an image and description of the stages of pressure injuries.

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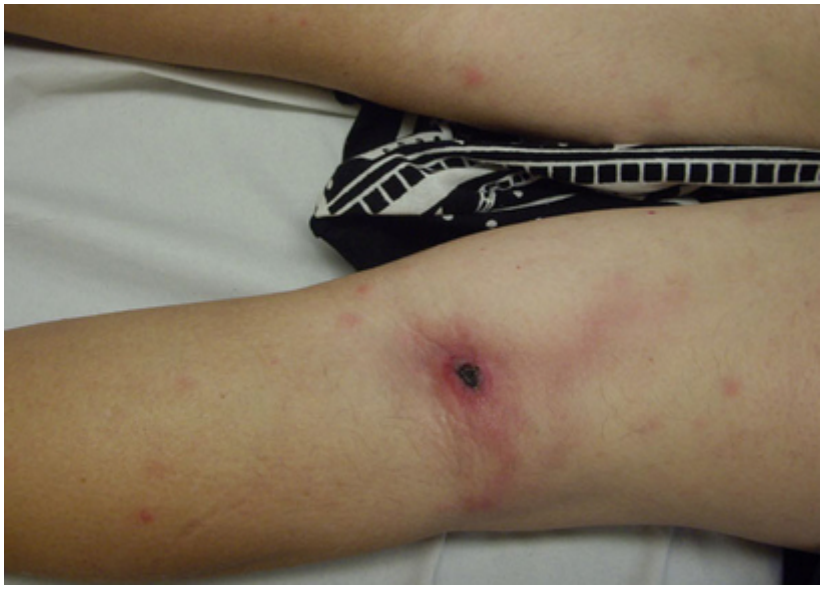

Figure 3. An unstageable pressure injury

Prevention and Treatment

Strategies for Prevention

There are many strategies that can be implemented to prevent pressure injuries, including:

1. Maintain regular skin inspections every day and with each repositioning or turn, monitor for signs of pressure injury, with a particular focus on high-risk areas such as bony prominences.
2. Skin hygiene should be maintained to preserve skin integrity, including removing soiled clothing, providing a stable environment and consistent temperature, maintaining skin integrity and moisture

and a normal pH level.

3. Prevent friction and shear by elevating the foot of the bed to reduce the risk of the patient sliding. Use correct manual handling techniques, including slide sheets or equipment to transfer patients to reduce the level of risk of friction and shear. See Figure 4 for a suitable position for a patient resting in bed.
4. Monitor nutrition and hydration status and refer the patient to a dietician if there are concerns about the nutritional status of a patient.
5. Avoid rubbing or massaging bony prominences as this increases the risk of tissue damage. Using pressure relieving devices such as pillows or foam wedges can reduce pressure if used correctly. See Figure 5 for a wedge used to relieve pressure on the heels of a patient.

Figure 4. A patient rests in bed with elevated head and feet

Figure 5. Wedge used to relieve pressure on a heel

Support Surfaces

Pressure injury prevention and management requires a collaborative approach. The patient's risk status and risk factors provide a foundation for an individualised care plan that can record their risk of developing pressure injuries or manage already developed pressure injuries. An optimal support surface is one that relieves pressure, shear and friction and maintains a stable skin temperature (Australian Wound Management Association [AWMA] et al., 2012). Speciality beds and sleeping surfaces are designed for patients at a very high risk of pressure injury and are recommended in cases where patients are either prone to developing a pressure injury (previous pressure injuries, age, skin integrity) or have a pressure injury that is being actively treated.

Comfort Equipment

Comfort equipment is suitable for those patients who are at low risk of developing a pressure injury and include overlays and cushions filled with foam, gel or air. These devices increase the level of comfort a patient experiences and may provide a degree of pressure reduction and reduce shearing and friction due to their low-resistance or non-abrasive properties (Parker & Kaim, 2021).

Constant Low-Pressure Devices

Constant low-pressure devices conform to body contours and aim to redistribute weight over a wider area, thereby reducing tissue interface pressure (AWMA et al., 2012). These devices may be powered

or non-powered and include foam-filled mattresses, water beds, air overlays and mattresses with both a static/constant air and low-air-loss (Parker & Kaim, 2021). See Figure 6 for an image of a foam mattress commonly used in healthcare organisations.

Figure 6. Foam mattress

Alternating Pressure Devices

Alternating pressure devices generate alternating high and low pressure between the body and the support surface by periodically deflating air cells under the body and redistributing the pressure on the tissue, which encourages perfusion (Queensland Health, 2009). These support surfaces are most appropriate for those at a very high risk of pressure injury and are recommended in cases where patients are either prone to developing a pressure injury (previous pressure injuries, age, skin integrity) or have a pressure injury that is being actively treated.

Ongoing Management and Treatment

The ongoing management and treatment of pressure injuries is multifactorial including:

- Promoting adequate nutrition
- Maintaining skin hygiene through the application of barrier films
- Keeping skin clean and dry and minimal use of powders and lotions
- Limiting massage over bony prominences

- Avoiding skin trauma by ensuring wrinkle-free linen
- Correct turning procedures (using lifting devices or slide sheets)
- Frequent turning (every 2 hours)
- Using supportive devices such as air-alternating mattresses, memory foams, pillows or heel protectors to support the tissue over bony prominences.

Figure 7. A foam dressing commonly applied to heels or bony prominences

Kennedy Ulcer

The Kennedy ulcer is not a pressure injury like the others already mentioned. Kennedy ulcers occur at the end of life as part of the dying process due to end-of-life disease, hypoperfusion and multiorgan failure. A Kennedy ulcer can occur on any part of the body; however, the most common sites include sacrum and coccyx. Kennedy ulcers will occur regardless of the assessments and preventative measures applied. The Kennedy ulcer remains a misunderstood phenomenon with lack of awareness of correct diagnosis, clinical research and understanding of the etiology.

Key Takeaways

In this chapter, we covered:

- Pressure injuries occur when there is prolonged pressure causing localised damage to the skin or underlying soft tissue.
- Many risk factors can cause pressure injuries, including friction, shear, immobility,

nutritional status, incontinence, mental status, age and chronic conditions.

- The Braden Scale and Waterlow Tool are two common pressure injury assessment tools used in the Australian healthcare context.
- A staging system is used to categorise pressure injuries with stage 1 involving intact skin that is non-blanchable and stage 4 involving full-thickness tissue loss. Unstageable pressure injuries occur when the extent of tissue damage cannot be defined due to the amount of slough or eschar present.
- To prevent pressure injuries, conduct regular skin assessments, use appropriate support surfaces to alleviate pressure(low-pressure devices or gel cushions), maintain skin hygiene, prevent friction and shear, monitor nutrition and hydration and avoid rubbing or massaging at-risk areas (bony prominences).

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ASSESSING AND SUPPORTING MOBILITY

Leisa Sanderson

Learning Outcomes

In this chapter you will learn how to:

- Describe the impact of immobility on body systems
- Implement nursing interventions to prevent complications of immobility
- Assess a patient's mobility status and level of assistance required when transferring or mobilising
- Select and utilise appropriate manual handling assistive devices
- Demonstrate safe technique during all manual handling procedures
- Explain key strategies related to falls prevention.

Mobility, which includes moving one's extremities, changing positions, sitting, standing, and walking, helps avoid degradation of many body systems and prevents complications associated with immobility. A person may find themselves with impaired mobility due to illness, injury, surgery, or chronic musculoskeletal conditions. Nurses assist patients to be as mobile as possible based on their individual circumstances, to achieve their highest level of independence, prevent complications, and promote a feeling of well-being. This chapter will discuss nursing assessments and interventions related to promoting mobility.

Mobility

As a nurse, it is important to understand the importance of mobility, how internal and external factors can affect patient mobility, and how immobility affects the body. Proper understanding and assessment of a patient's mobility can help guide their plan of care and shape realistic outcome goals in treatment.

A person's mobility is the ability of a patient to change and control their body position. Physical mobility

requires sufficient muscle strength and energy, along with adequate skeletal stability, joint function, and neuromuscular synchronisation. Anything that disrupts this integrated process can lead to impaired mobility or immobility. Mobility exists on a continuum ranging from no impairment (the patient can make major and frequent changes in position without assistance) to being completely immobile (the patient is unable to make even slight changes in body or extremity position without assistance). Factors that affect a patient's mobility status can be internal or external.

Internal Factors

An internal factor that affects mobility is a factor that influences the patient from within, such as a physiological, sociocultural, psychological, or spiritual factor that is specific to each individual. Examples include hearing and visual function, chronic disease, congenital abnormalities, fatigue, stress, balance issues and previous falls history, personal attitude toward self-care, and mental health. These factors can vary in the degree to which they affect each patient. One patient may be mildly affected, only requiring minor alterations to lifestyle, while another patient may be so affected they require total care to function.

Congenital Abnormalities

A patient can suffer from impaired mobility due to a congenital abnormality. Congenital abnormalities are impairments of body function or structure present at birth (Table 1).

Table 1. Congenital Abnormalities and Their Effect on Mobility

Congenital Abnormality	Effects on Mobility
Cerebral palsy	• Poor motor coordination • Muscle stiffness and weakness • Involuntary movements.
Club foot	• Restriction of normal foot movement • Prevention of proper weight distribution on feet.
Congenital heart defects	• Low tolerance for activity • Increased fatigue.
Muscular dystrophy	• Muscle weakness • Possible deformity.
Spina bifida	• Leg weakness • Paralysis.

Muscle, Bone, and Joint Development

Joint structure, connective tissue, and changes in elasticity and flexibility of ligaments and tendons play a role in impaired mobility. As a patient ages, muscle is replaced with fibrous connective tissue and **adipose tissue**. Fibrous connective tissue protects, supports, and holds bones, muscles, organs, and other tissues within the body in place. Loss of bone mass begins to occur among individuals after the age of 40 (Campbell, 2021).

Osteoporosis is an age-related disorder that causes the gradual loss of bone density and strength. When the thoracic vertebrae are affected, there can be a gradual collapse of the vertebrae. This results in kyphosis, an excessive curvature of the thoracic region. Other factors that can impact mobility include excessive adipose bulk, which can impede **range of motion** (ROM); a lack of functional activities or exercises to promote flexibility and balance; and injury to muscle, joints, or connective tissues (Table 2).

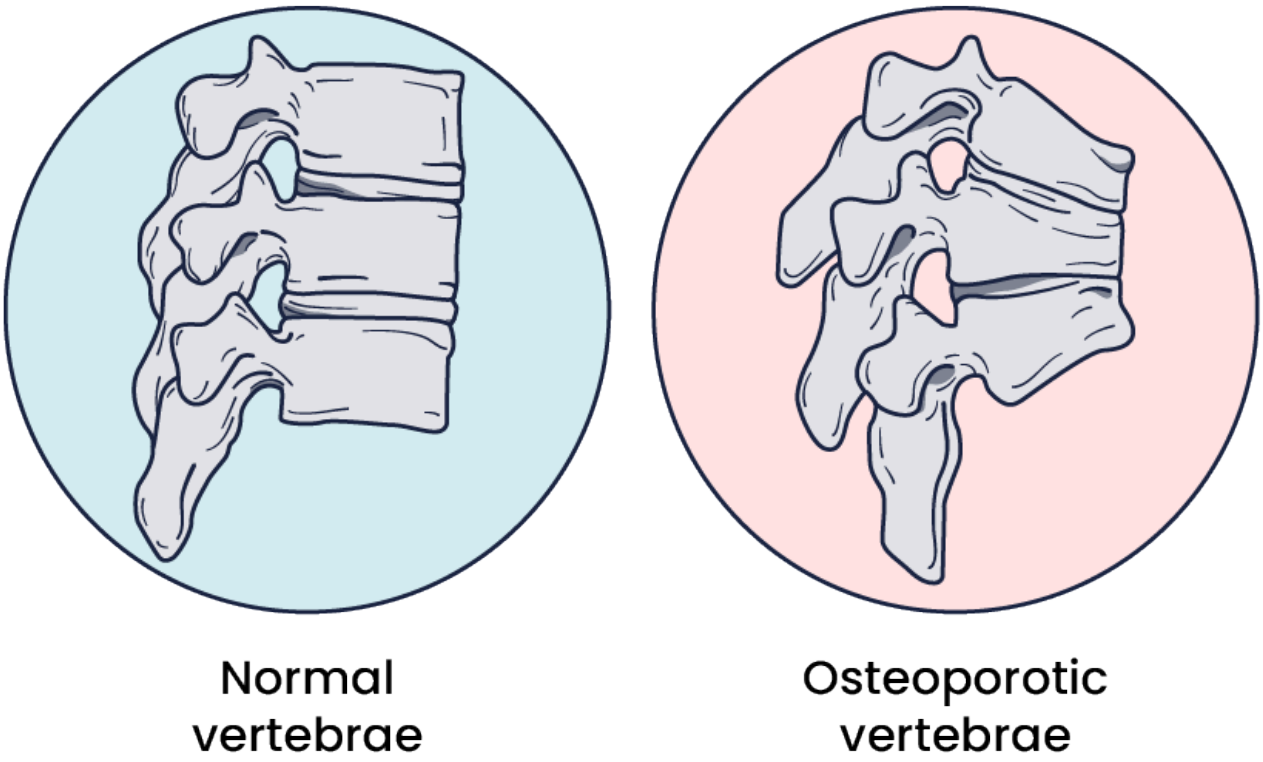

Figure 1. Osteoporotic vertebrae

Table 2. Disorders that Affect Mobility

Muscle, Bone, Joint Disorders	Effects on Mobility
Osteoporosis	Progressive bone loss leads to decrease in bone strength.
Muscle loss	Ageing results in loss of muscle mass.
Increased fibrous connective tissue	Fibrous connective tissue protects, supports, and holds bones, muscles, organs, and other tissues. Ageing results in fibrous connective tissue replacing muscle mass.
Increased adipose tissue	Body fat begins to replace muscle mass in ageing.

Fatigue and Stress

Fatigue often occurs secondary to physical or emotional stress from comorbidities, medication, poor nutrition, inactivity, or a substandard environment. A person experiencing fatigue for extended periods may see a decrease in normal activity patterns that results in decreased muscle strength and physical endurance. This physical decline in mobility impacts a person's ability to carry out activities of daily living and therefore compromises their independence (Knoop et al, 2021).

External Factors

An external factor can also cause mobility issues. External factors are those that surround the patient and affect mobility, such as climate, terrain, housing design, neighbourhood safety, local laws, social attitudes, and support. **Social determinants of health** (SDOH) may also influence mobility. For example, a patient who lives on a street without sidewalks or with sidewalks that have been destroyed by tree roots and not maintained will not have the same access to walk as someone who lives on a street with maintained sidewalks. In assessing patients, nurses should ask questions about the patient's social situations, their support systems, and access to resources that contribute to a healthy lifestyle.

Effects of Immobility

Immobility can pose a significant problem for all major body systems. Prolonged immobilisation can affect every organ system and result in complications, including increased morbidity and mortality, prolonged length of stay at facilities, and increased healthcare costs (Brennan, 2023). These complications can considerably affect a person's quality of life and daily functioning. Immobility has negative effects on a patient's psychological, cardiovascular, respiratory, gastrointestinal, metabolic, genitourinary, musculoskeletal, and integumentary functions.

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Assessing Body Movement

When patients are unable to ambulate or have an injury to specific extremities, they are at risk of losing normal range of motion in joints. It is therefore important that assessment and movement of limbs/joints is performed to prevent complications such as **contractures**.

Assisting with Range of Motion

Range of motion (ROM) exercises are often prescribed through collaboration with the medical staff and physiotherapist. ROM exercises facilitate the movement of specific joints and promote mobility of the extremities. Because changes in joints can occur shortly after injury or periods of immobility, ROM exercises should be commenced as soon as possible.

A person's range of motion (ROM) is the extent to which a part of the body can be moved around a joint or a fixed point. ROM is assessed during active ROM, active-assisted ROM, and passive ROM. Performing ROM exercises are undertaken in the same manner.

Active ROM is ROM that is done independently by the patient. Patients who can contract, control, and coordinate movement around a joint are able to participate in active ROM exercises. In active ROM exercise, the patient will demonstrate flexion, extension, hyperextension, or rotation of the associated joint independently without external assistance.

Active-assisted ROM is ROM performed with partial assistance from an external force; the patient is asked to perform ROM but additional assistance is provided if they encounter a point of difficulty, such as pain or weakness.

Passive range of motion ROM is movement to a joint or body part solely by another person or by a passive-motion machine. When the passive range of motion is applied, the joint of an individual receiving exercise is completely relaxed while the outside force moves the body part while they are lying in bed.

Things the nurse can assess while ROM exercises are performed include:

- Any onset of pain, including where or when the pain occurs
- Any restrictions to movement, and if there is a pattern
- If movement intensifies pain
- How the patient feels after ROM is complete.

With this assessment information, nurses can collaborate with the medical officer and physiotherapists to determine why any ROM deficits are occurring and create therapeutic interventions to support optimal ROM goals.

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Posture and Gait

A person's posture and the postural system are a fundamental mechanism to ensure balance against gravity, align the body, and assist in external environmental perception and action. Posture is not simply the act of "sitting up straight" but rather a central, dynamic process that relates to other physical processes such as sensory detection and coordination with the nervous system. A neutral posture is when a person's upper trunk and head are at zero degrees in relation to the vertebral column. When a person stands the nurse

should assess body alignment. This includes if the shoulders and hips are level: Do the toes point forward and is the spine straight or curved to either side? Take note if a slumped posture is present where the neck and/or shoulders are flexed forward, and the abdomen protrudes. If the patient's posture deviates from a neutral position this could be due to deficiencies in postural control and postural orientation and can lead to damage and misalignment of vertebrae. Posture has a direct effect on the movements during gait.

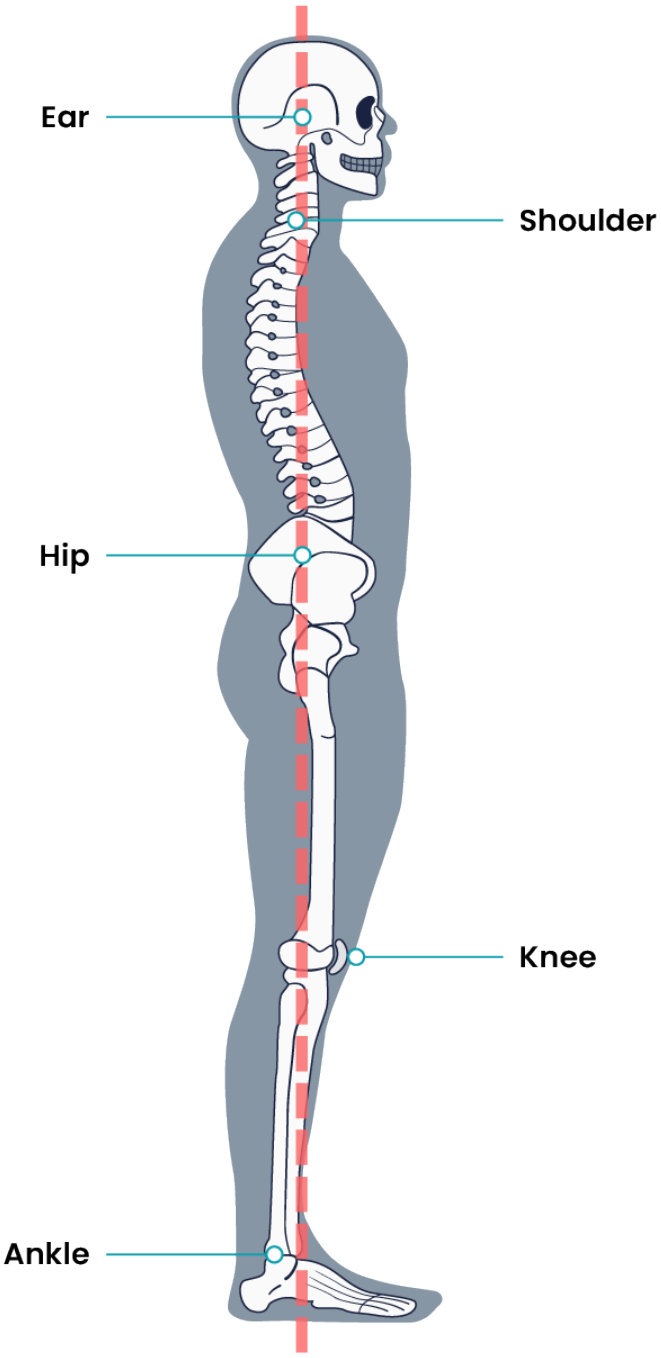

Figure 2. A neutral spine posture that aligns the body's centre of gravity

The body's gait is defined as a manner of walking or moving on foot. A person has a gait pattern – a series

of rhythmical, alternating movements of the trunk and the limbs – that results in a forward progression. Generally, a person's gait consists of a stance phase and a swing phase. Any pathological issue can affect this gait pattern, leading to abnormal gait patterns. Examples include joint deformities, muscle weakness, loss of motor function, and pain. Age and pregnancy can also affect gait with declines in walking speeds and changes in centres of gravity.

Assess gait by observing the patient's stance phase and swing phase. When one leg is in the swing phase the other is in the stance phase. Through the stance phase, the heel should strike the ground and the ball of the foot takes the spread of body weight while the other heel pushes off and leaves the ground, this swing leg then moves forward in front of the body and the process continues. An example of this is provided in the video below. In these phases, different body positions help to propel a person forward. In observing the gait, take note of the patient's posture, centre of gravity, and arm and leg movements. The patient's posture should be neutral, with slight swaying in the standing position. A patient's gait should be smooth and rhythmic, with their arms swinging at the sides.

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Coordination and Balance

A person's coordination is the organisation of different elements of the complex body, including muscular, skeletal, and sensory functions, that enable the elements to work together effectively. Evaluate coordination by having the patient rapidly touch each finger with the thumb, rapidly pat the hand on the thigh, and tap the foot on the floor (or against your hand, if the patient is supine). Repeat the sequence on the opposite limb. Normally, the movements would be coordinated. If the patient is unable to perform these movements, it may indicate disorder of the upper motor neurons or cerebellum.

The body's balance is defined as a state of equilibrium. When a person's centre of gravity falls outside its base of support (a stance with two feet evenly stable on the ground), they can become unstable. Proper coordination and balance are essential for gait stability and posture alignment. The Romberg test is commonly used to test balance. Ask the patient to stand with their feet together and eyes closed. Stand nearby and be prepared to assist if the patient begins to fall. It is expected that the patient will maintain balance and stand erect. A positive Romberg test occurs if the patient sways or is unable to maintain balance. The Romberg test is also a test of the body's proprioception. **Proprioception** is the body's ability to sense movement, action, and location of parts of the body. The sensations come from sensory receptors in the muscle, joints, and central nervous system signals to motor output. These sensory signals help patients perceive limb movements and positions, force, heaviness, and stiffness, and they help locate

external objects relative to the body. A person's vestibular function is their body's ability to compensate in response to self and external forces and keep balance. If the vestibular system has any damage, it can affect balance, control of eye movements while the head is moving, and a sense of orientation to space. Finally, visual perception is a person's ability to see and interpret the surrounding environment.

Figure 3. A nurse stands behind a patient during a Romberg test to make sure the patient does not fall

Strength

Posture, gait, coordination, and balance are all affected by strength, which is the quality or state of being strong. Strength is foundational for the body to dynamically adjust and compensate to achieve balance and stability, coordinate parts of the torso and limbs, enhance posture, and correct gait.

Lifespan consideration

Adults lose muscle mass as they age and can be seen in even healthy adults from around the age of 30. By age 80 it can be expected up to 50% decrease in muscle strength (Marieb & Hoehn, 2023). Muscle mass declines because of a reduction in muscle fibres and fibre size. In addition, the ability of muscles to repair damage also decreases. This process occurs as someone ages because of fluctuations in hormones, including estrogen, testosterone, dehydroepiandrosterone, growth hormone, and insulin-like growth factor. Assessment of strength is important to establish a baseline for intervention evaluations.

Muscle strength should be equal bilaterally, and the patient should be able to fully resist an opposing force. Muscle strength varies among people depending on their activity level, genetic predisposition, lifestyle, and history. A common method of evaluating muscle strength is the Medical Research Council Manual Muscle Testing scale.

Table 3. Medical Research Council manual muscle testing scale

Stage	Description
0	No muscle contraction
1	Trace muscle contraction, such as a twitch
2	Active movement only when gravity eliminated
3	Active movement against gravity but not against resistance
4	Active movement against gravity and some resistance
5	Active movement against gravity and examiner's full resistance

This method involves testing key muscles from the upper and lower extremities against gravity and the examiner's resistance and grading the patient's strength on a scale of 0 to 5. For example, to assess upper extremity strength, first begin by assessing bilateral hand grip strength. Extend your index and second fingers on each hand toward the patient and ask them to squeeze them as tightly as possible. Then, ask the patient to extend their arms with their palms up. As you provide resistance on their forearms, ask the patient to pull their arms toward them. Finally, ask the patient to place their palms against yours and press while you provide resistance.

Figure 4. A nurse tests a patient's hand grip, ability to push away from themselves, and ability to pull towards themselves

Assessing Mobility Status and Need for Assistance

A patient's mobility status and their need for assistance affect nursing care decisions, such as handling and transferring procedures, ambulation, and implementation of fall prevention activities. Initial mobility assessments are typically performed on admission to a facility and then updated if conditions change such as postoperatively. Initial assessments are generally undertaken by a physiotherapist (PT). As defined by the Clinical Excellence Commission, patients may be categorised into one of the following levels of assistance required:

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In addition to the amount of assistance required, physiotherapists in consultation with medical staff may determine a patient's weight-bearing status. For example, patients with lower extremity fractures or those recovering from knee or hip replacement often progress through stages of weight-bearing activity. Typical weight-bearing statuses are as follows.

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Overall health status is considered in patients before mobilising to identify potential barriers to safe movement. Factors to consider include pain levels, cognitive function, vital signs, nutritional and hydration status. It is important to recognise that patients may have unrecognised physical deconditioning from the

disease or injury that necessitated hospitalisation, or they may have developed new cognitive impairments related to the admitting diagnosis or their current medications. In addition to reviewing orders regarding weight-bearing status and required assistance, the nurse should perform an independent assessment of the patient's abilities before undertaking any mobility or repositioning intervention.

Objective Mobility Screening Test

A Timed Up and Go Test begins by having the patient stand up from the chair or bed, walk three metres, turn around, walk back to the chair or bed, and sit down at their normal pace. The patient may use assistive devices if required. During the activity, the nurse takes note of the posture, gait, stride length, and balance. The activity is timed, patients taking longer than 12 seconds to complete are considered a high risk of falling. The assessment does not provide guidance on what the nurse should do if the patient cannot maintain seated balance, weight-bear, or stand and walk. Therefore, there are limitations on its use in the acute care setting.

Link to Learning

Watch a demonstration of the Timed up and go Test [1:29]:

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The Banner Mobility Assessment Tool (BMAT) was developed to provide guidance regarding safe patient handling and mobility (SPHM). It is used as a nurse-driven bedside assessment of patient mobility and walks the patient through a four-step functional task list that identifies the mobility level the patient can achieve. It then provides guidance regarding the SPHM technology needed to safely transfer and mobilise the patient.

Links to Learning

- View the Banner Mobility Assessment Tool 2.0 for Nurses.
- Watch the instructional video on how to complete a mobility assessment using the BMAT [4:35]:

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://jcu.pressbooks.pub/nursing-skills-foundations/?p=48#oembed-2

Assisting Mobility – Safe Patient Handling

Patient handling comes with risk to both patients and healthcare workers. Healthcare workers need to take precautions to reduce risk to themselves and patients through correct manual handling techniques. No lift policies are common in Australian healthcare facilities, these recommend no healthcare worker fully lifts a person, with the exception of small children, without the assistance of mechanical aids, devices, or other healthcare workers (Worksafe, 2017).

To reduce the risk of injury the healthcare worker should undertake the following before movement:

- Perform a risk assessment of the patient to be mobilised. Consider the patient's weight, size, strength, balance, medical condition, level of consciousness, behaviour predictability, willingness to assist and ability to communicate/understand.
- Perform a risk assessment of the environment ensuring adequate lighting, non-slip floors, handrails and obstacle-free paths
- Have awareness of attached medical devices such as intravenous therapy, indwelling catheters and drains
- Maximise opportunity for the patient to assist in movement through education and supply of assistive devices
- Be well educated in the correct use of assistive devices
- Ensure ease of access to assistive devices
- Apply proper body mechanics throughout the procedure. (Worksafe, 2017)

Assistive Devices

There are several types of assistive devices that a nurse may incorporate during safe patient handling and

mobility. An assistive device is an object or piece of equipment designed specifically to help a patient with activities of daily living. These can be broken into two categories:

1. Ambulatory assistive devices: Walking cane/stick, wheeled walkers/frames, crutches, wheelchairs, electronic kneel scooters.
2. Manual handling tools: **Walk belts**, slide boards, Slide sheets, mechanical lifting devices.

Ambulatory Assistive Devices

Crutches

Crutches are an aid used for standing, walking, and mobility for patients who cannot support the weight of their bodies with their leg, knee, or ankle. The patient's weight-bearing status will determine how much pressure can be put on the affected limb. There are three types of crutches: axilla, forearm, and gutter. Sizing equipment accurately and educating in the correct usage is an important aspect of patient safety.

Axillary (underarm) crutch should be two fingers distant between the axilla and axilla pad of the crutch. The patient's weight should be focused where their hands grip the crutch and not under their armpits. This is to prevent axillary nerve damage.

Forearm (Canadian) crutches have a forearm cuff and handgrip. These are often used long-term in patients with lower extremity disabilities.

Gutter crutches are modified forearm crutches and a modified hand grip for patients who may not have mobility and strength in their hands. This type of crutch can be recommended for patients with rheumatoid arthritis. Crutches should be tailored to the patient and fit according to their height.

Link to Learning

The following links to learning provide guides on using axillary, forearm, and gutter crutches:

- How to Walk with Crutches includes sizing and different gait techniques for axillary crutches [3:29]
- How to Use Forearm Crutches demonstrates how to safely and properly use forearm crutches [2:39]
- The gutter crutches demonstration below shows patients ambulating using gutter crutches [1:20]:

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Knee walkers (knee scooters or mobility scooters) are used as well to help with lower limb mobility. This wheeled crutch alternative allows the injured foot and/or leg to be elevated on a padded platform. The patient can balance naturally on two legs and can move by pushing with the good leg and steering with the handlebar.

Link to Learning

This knee walker demonstration shows how to adjust and use a knee walker [1:29]:

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Walker and Walking Stick

A walker is an aide that has four points of contact with the ground. Walkers provide a greater base of support, assisting in stability for balance and mobility. There are many types of walkers including standard, two-wheeled, upright, and four-wheeled walkers. Standard four-point walkers (four-point or Zimmer frame) are used with the patient taking one step forward and then the patient moving into the walker. Two-wheeled walkers are used the same way except the walker can slide forward instead of the patient needing to pick it up because there are two front wheels. Four-wheeled walkers have handles to control brakes and may also have a seat, tray, or basket. The patient must remember to lock the brakes when stationary to avoid the risk of a fall. The gutter frame walkers are wheeled and adapted to patients who need more support. Forearm supports fix the elbows at 90 degrees.

A walking stick is a singular assistive device that assists in balance when walking or helps compensate for an

injury or disability. A walking stick can either have a single tip or four points that touch the ground, called a four-pronged stick. The four-pronged stick provides a broader base of support. The grip on walking sticks can vary by size and material. Some may be made of foam or plastic, and sizes may vary for arthritic hands. The patient's elbow bend and wrist height should be taken into consideration when fitting a walking stick for a patient. The elbow should bend at a comfortable angle, approximately 15 degrees, and the top of the walking stick should line up with the crease on the patient's wrist. Patients should hold the walking stick in the opposite hand of the weak or painful limb. The walking stick should move with the affected leg.

(a) **(b)**

Figure 5. A two-wheeled walker and four-wheeled walker

Figure 6. Patient being assisted as they use a walking stick and a four-point walker, also known as a four-point or a Zimmer frame walker

Manual Handling Assistive Devices

Walk Belts

Walk belts should be used to ensure stability when assisting patients to stand, ambulate, or transfer from bed to chair. Walk belts will vary in appearance and come in various sizes to appropriately suit the patient. It may or may not have handles. It is placed around a patient's waist and fastened with velcro or buckle. The walk belt should be applied on top of clothing or a gown to protect the patient's skin.

Figure 7. Walk belts being used as nurse assists a patient

Link to Learning

Watch the following two videos demonstrating how to correctly apply and use a walk belt:

How to apply a walk belt [1:52]

How to hold a walk belt [1:47].

Patient Transfer Boards

A patient transfer board, commonly called a slide board, is used to transfer mobility-restricted patients from one surface to another. Slide boards are available in different sizes that are selected for the purpose of transfer. A small transfer board may be utilised to assist a patient slide from one seated position to another such as chair to wheelchair. A larger full-length board may be used to slide a patient from a laying position to another laying position such as a stretcher to bed.

Figure 8. Patient transfer using a full-length slide board and slide sheet

Slide Sheets

Specifically designed sheets that will slide smoothly aiding the transfer of patients without the need to lift. The sheets are commonly used in conjunction with slide boards or used independently to reposition the patient in the bed.

Manual Handling – Mechanical Lifting Devices

Various lifting devices, (commonly referred to as a hoist), are available to assist patients who weigh more than 20 kgs and who cannot assist in moving or transferring themselves (Worksafe, 2017). Devices include: mobile floor-based lifting device, ceiling-mounted lifting device, sit-to-stand lifts and lifting frames. Air-assisted lifting devices are also available.

The lifting device will contain a main hoisting frame and often have several attachments that assist achieve the movement required. This may include hoisting slings to move the fully dependent person from one area to another such as bed to chair, or lifting frames (commonly referred to as a Jordan frame) to lift the patient in a lying position from a surface while specific care is carried out. There are many different brands and styles of devices. Healthcare workers should be fully trained in the use of the devices utilised in the facility where they are working and ensure they follow manufacturer instructions. Healthcare workers should ensure that they only use genuine attachments designed for the specific hoist they are using.

Figure 9. Example of a mechanical lifting device

Hoisting Sling

A hoisting sling is used to move patients who cannot bear weight or have a medical condition that does not allow them to stand or assist with moving. The hoisting sling will attach to the lifting hoist which may be a portable device or permanently attached to the ceiling. The sling may be utilised to lift a patient from the floor, bed, or chair in either sitting or lying position.

Sit-to-Stand Lifts

Sit-to-stand lifts (commonly referred to as standing hoists) are mobility devices that assist weight-bearing patients who are unable to transition from a sitting position to a standing position using their own strength. They are used to safely transfer patients who have some muscular strength but not enough strength to safely change positions by themselves.

Patient Positioning

Repositioning an immobile patient maintains body alignment and prevents pressure injuries, foot drop, and contractures. Proper positioning also provides comfort for patients who have decreased mobility related to a medical condition or treatment. When repositioning a patient in bed, supportive devices such

as pillows, rolls, and blankets can aid in providing comfort and safety. There are several potential positions that may be used based on the patient's medical condition, preferences, or treatment related to an illness. It is important to reposition patient appropriately to prevent neurological injuries that can occur, such as if a patient is inadvertently positioned on their arm.

Patient Positions in Bed

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When positioning the patient, careful consideration should be given to potential pressure injury development. Protective booties, a heel wedge or protective dressings on pressure points, such as the heels, elbows or sacrum, can be used to prevent pressure injuries in patients who have restricted movement or are immobile.

Transfer Techniques

First, determine the level of assistance needed to provide optimal patient care. It is vital to prevent friction and **shear** when moving a patient up in bed to prevent pressure injuries. If a patient is unable to assist with repositioning in bed, follow agency policy regarding using lifting devices and mechanical lifts. If the patient can assist with repositioning and minimal lifting by carers is required, use the following guidelines.

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Falls Prevention

Seventy-seven percent of hospitalisations related to injury are caused by falls (Australian Institute of Health and Welfare [AIHW], 2022). Falls may occur for many reasons and in any age group however, the prevalence is higher in the older population. In Australia, the definition of 'older person' is 65+ for the non-indigenous population and 50+ for Aboriginal and Torres Strait Islander peoples (Australian

Commission on Safety and Quality in Health Care [ACSQHC], 2024). A fall in this age group is more likely to see hospitalisation or death as a result (AIHW, 2023). In response to these facts, the ACSQHC developed a series of fall guidelines for Australian hospitals, residential care facilities and community care titled *Preventing falls and Harm from falls in older people: Best practice guidelines* (ACSQHC, 2009).

Resulting in increased length of stay, loss of independence and sometimes death, falls are a major concern in hospitals (ACSQHC 2024). This chapter will look at falls prevention of the hospitalised patient. For further information on residential and community care refer to the guidelines mentioned above.

Best practice approach for preventing falls in hospitals includes four key components:

- Identification of falls risk
- Implementation of standard falls prevention strategies
- Implementation of interventions targeting these risks to prevent falls
- Prevention of injury to those people who do fall.

Identification of Falls Risk Factors

Understanding why an individual may be at risk of a fall allows the nurse to personalise care plans and implement appropriate targeted interventions. Risk factors for falls can be influenced by both intrinsic and extrinsic factors.

Intrinsic Factors

Older people, people with a cognitive or mobility disability, and those with a history of previous falls are considered at risk. Other contributing factors that increase risk include: poor vision, cognitive impairment such as confusion, disorientation, impaired memory or judgement, postural instability or muscle weakness, postural hypotension, urinary frequency or incontinence, and current medication regime.

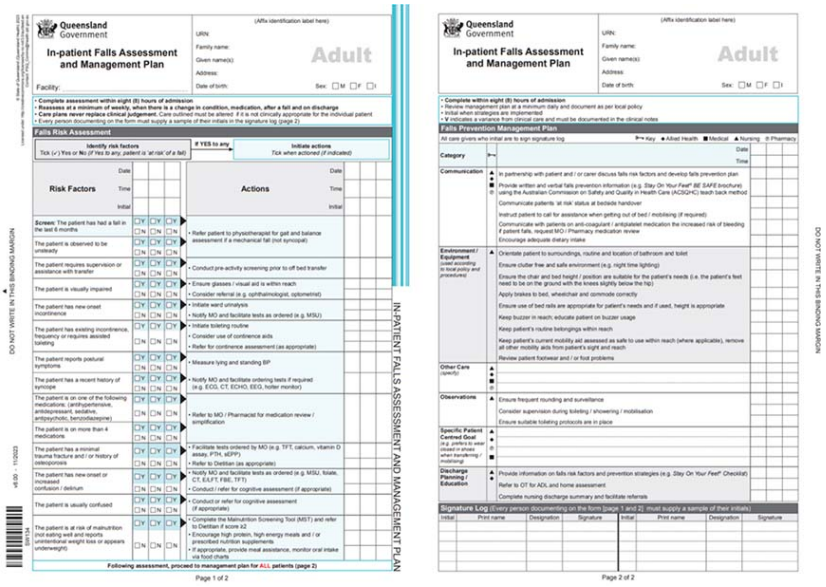
Extrinsic Factors

Extended periods of hospitalisation, the environment in which care is provided and the time of day can all contribute to increased falls risk (ACSQHC 2024).

Implementing Standard Falls Prevention Strategies in the Acute Care Setting

Falls Prevention Strategies – Standard

Standard practices should be applied to all persons at risk of falls. The first recommendation of standard falls prevention practices is that all patients are screened on admission to hospital and those considered at-risk groups have a falls assessment and management plan implemented. It is recommended that healthcare facilities utilise validated falls assessment and management plan tools to screen and assess patients (ACSQHC, 2009). These tools vary from state to state but overall the purpose remains the same. One such example is the In patient falls assessment and management plan developed by the Queensland Government for use in Queensland Health facilities.


Queensland Government

In-patient Falls Assessment and Management Plan

Adult

Page 1 of 2

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Figure 10. Inpatient falls assessment and management plan, Queensland Health. Click on the image to see the original.

In general, the frequency of screening will be dependent on the facility in which the patient is entering, and local policy should be followed. Typically, at a minimum, all patients considered at risk are assessed on entry and then repeated weekly or when there is a change in condition, medication, following a fall, and/or on discharge. Falls management plans should be reviewed daily at a minimum while a patient is receiving care in hospital. Other standard falls prevention strategies include:

- Communicate clearly at bedside handover a patient's falls risk status
- Orientate patient and family to the environment, including bathroom and toilet
- Educate patient and family regarding falls risks and falls prevention strategies
- Inform patient and family of ward routines, mealtimes, and buzzers
- Ensure environment is clutter free, safe and has adequate lighting

- Ensure bed heights and chairs are suitable for the patients' needs
- Apply brakes on beds, wheelchairs, and commodes
- Bed rails should be used with caution and at appropriate height according to the patient needs
- Ensure buzzer is within easy reach of patient
- Ensure patient can reach personal belongings with ease
- Mobility aids should be kept within reach
- Footwear should be well-fitting and non-slip
- Frequent rounding should be attended.

BE SAFE (Buzzer, Environment, Shoes, Ask, Fluids and Educate)

Educating and keeping patients well-informed about their care is a key strategy in falls prevention. As part of a Queensland Government initiative, 'Stay on Your Feet QLD', all at-risk patients should be provided a Stay on your feet BE SAFE patient brochure on entry to healthcare. BE SAFE advises the patient to BUZZ for assistance and wait for help. Ensure they familiarise themselves with the unit ENVIRONMENT in which they are admitted. Wear low-heeled, non-slip SHOES that fit well. ASK for assistance, especially when getting out of bed. Drink plenty of FLUIDS unless contraindicated, and EDUCATE yourself on balance, strength, and exercise.

A fall can happen to anyone in hospital

A previous fall increases the chance of another fall.

Seventy per cent of falls in hospital affect people aged over 65.

Some fall incidents are the result of muscle weakness, or impaired balance from medication.

Some side effects and combinations of medicines can increase your risk of a fall.

- Do you have a medical condition such as diabetes, arthritis, Parkinson's disease, problems with your heart, dementia or have you had a stroke?
- Do you find it difficult to get up from a chair?
- Do you have an eye condition?
- Are you in pain, or taking pain relief?
- Are you taking four or more medicines?
- Are you taking sleeping tablets, sedatives or anti-depressants?

If you answered 'YES' to any of these questions you may be at risk of falling.

The good news is that there are steps you can take to BE SAFE in hospital.

BE SAFE in hospital

Buzzer: Know how to contact hospital staff using the buzzer. Ask for assistance and wait for help.

Environment: Familiarise yourself with the room, including the bathroom, lighting and furniture.

Shoes: Bring and wear low heeled, non-slip shoes that fit well.

Ask for assistance: Especially when getting in and out of bed, putting on your footwear, walking using mobility aids and using the bathroom.

Fluids: Drink plenty of fluids, like water, unless your fluid intake is limited (staff will tell you this).

Educate: Learn about balance, strength and exercise and when you may need help.

If there are issues about your health please talk to us. Tell the staff if you have problems with your sight or with walking.

Why do people sometimes fall in hospital?

- The environment is not familiar
- You may be feeling unwell
- You may have just had surgery and be feeling weak
- You may have had a change of medications
- Not seeking assistance with mobility and toileting when needed.

Watch this video about Top Toileting Tips to help you Stay On Your Feet®

Features of a good shoe include:

- Slightly rounded heel less than 2.5cm high
- Non-slip sole that bends
- Soles that are not too slip resistant
- Shoes that conform to the shape of your foot
- Shoes that are fastened by laces, zips or velcro.

Watch this video about Falls Prevention Tips to help you Stay On Your Feet®

Queensland Stay on Your Feet®

Figure 11. The BE SAFE brochure. Click on the thumbnail image to see the original.

Falls Prevention Strategies – Targeted

Targeted practices will be triggered by the person's risk factors identified in the falls assessment. The following table identifies risk factors and suggests additional actions to take to reduce the likelihood of a fall occurring.

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Prevention of Injury to those People who do Fall

Unfortunately, despite fall prevention strategies and programs in place, falls do, on occasion, still occur. The ACSQHC (2024) recommends practices be established that will assist in mitigating harm caused by falls in high-risk patients. The registered nurse should familiarise themselves with policy within their facility if a fall were to occur. Considerations for high-risk falls patients include:

Hip protector: Consider hip protectors for older patients who are known to have frequent falls, osteoporosis, or low body mass index.

Figure 12. Hip protector

Vitamin D and Calcium: Consider the use of Vitamin D and Calcium to increase muscle strength and maintain bone density.

Osteoporosis: Consider bone mineral density (BMD) in the likelihood of fractures occurring during falls. Refer for BMD testing. Incorporate strategies that strengthen and protect bone from injury. Review medicines associated with osteoporosis risk.

The Falling Patient

If you are witness to a patient fall while ambulating or while transferring a patient from one surface to another, it is recommended that you do not attempt to stop the fall or catch the patient because this risks

injury to yourself. Instead, attempt to control the fall by lowering the patient to the floor. When the patient starts to fall, if able, move behind the patient and take one step back. Support the patient around the waist or hip area or grab the walk belt. Bend one leg and place it between the patient's legs. Slowly slide the patient down your leg, lowering yourself to the floor at the same time. Always protect the head first. Once the patient is on the floor, utilise the steps below in post-fall management.

Figure 13. Lowering a patient to the floor

Post-Fall Management

Actions taken immediately following a fall should be aimed at reducing harm. Immediate action is to assess using DRABCD (Danger, Response, Airway, Breathing, CPR, Defibrillate). Call for the assistance of a second person if there is no indication for resuscitation. A medical emergency call should be activated if the Glasgow Coma Scale (GCS) is altered from previous assessments or resuscitation is required. It is recommended to not move the patient until injury assessment is complete. Observe closely for head injury and/or musculoskeletal injury and notify a medical officer for review.

The following In-patient post fall clinical pathway is an example of a procedure recommended post-fall.

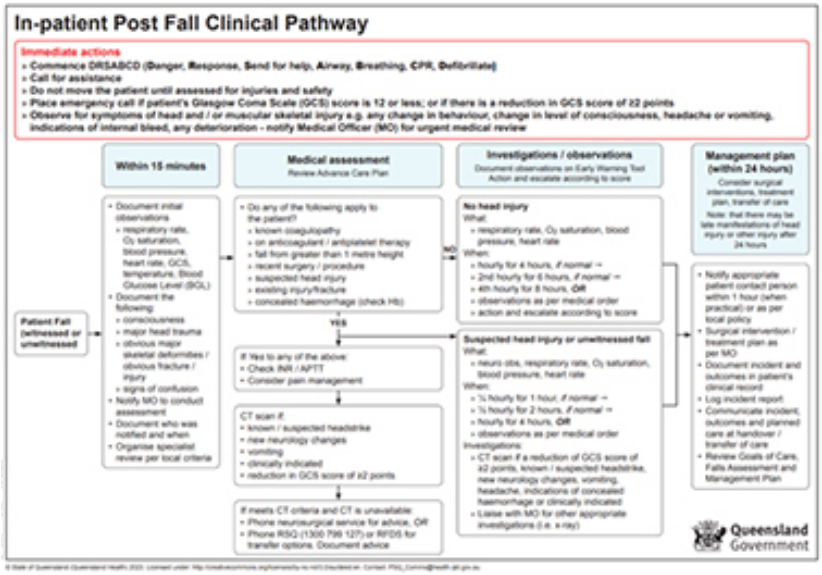

Figure 14. In-patient Post Fall Clinical Pathway flowchart. Click on the image to see the original.

Key Takeaways

- Mobility refers to the capacity to alter and manage body position. It necessitates muscle strength, energy, skeletal stability, joint function, and neuromuscular coordination.
- Mobility, including the movement of extremities, changing positions, sitting, standing, and walking, is essential for preventing the degradation of various body systems and avoiding complications associated with immobility.
- Immobility can adversely affect psychological, cardiovascular, respiratory, gastrointestinal, metabolic, genitourinary, musculoskeletal, and integumentary functions.
- Factors influencing mobility can be internal, such as physiological, psychological, or spiritual aspects, or external, including climate, terrain, and social attitudes.
- Proper patient positioning is essential for maintaining body alignment and preventing pressure injuries and contractures. Common positions include the supine, prone, lateral, Sims, Fowler's, semi-Fowler's, Trendelenburg, and tripod positions.
- Evaluating mobility status and the requirement for assistance is crucial for ensuring safe handling, transfers, ambulation, and fall prevention for both nurses and patients. Assessments encompass a range of motion, posture, gait, coordination, balance, and strength. Other factors to consider include pain levels, cognitive function, vital signs, nutritional and hydration status, use of assistive devices, and environmental safety.
- Nurses utilise various interventions to promote mobility and movement. These include

range of motion exercises, assisting patients with walking or repositioning, and encouraging the use of assistive devices.

- The best practice approach for preventing falls in hospitals includes four key components: implementing standard falls prevention strategies, identifying fall risks, applying interventions targeting these risks to prevent falls, and preventing injury in individuals who do fall.

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ASSESSING AND SUPPORTING HYGIENE

Amy McCrystal; Tracey Gooding; and Jessica Best

Learning Outcomes

In this chapter, you will learn how to:

- Explain the rationale for assisting individuals with personal hygiene, emphasising its role in maintaining health and preventing infections
- Identify the various factors that influence personal hygiene practices, including cultural, developmental, and individual preferences
- Demonstrate the methods and techniques nurses use to provide hygiene assistance, ensuring patient comfort, safety, and dignity
- Evaluate key considerations when assessing and assisting patients with hygiene care, tailored to their specific needs and developmental stages.

Introduction

Personal hygiene is a fundamental aspect of healthcare that plays a crucial role in maintaining overall health and preventing infections. Assisting individuals with personal hygiene is not only about cleanliness but also about promoting well-being and dignity. This chapter aims to provide a comprehensive understanding of the importance of personal hygiene and the various factors that influence hygiene practices. This chapter explores the importance of hygiene care, factors influencing practices (such as culture, development, and patient goals and preferences), and fundamental nursing techniques to assist in hygiene care while highlighting how to tailor care to individual needs, ensuring safe, respectful, and effective hygiene assistance.

Hygiene

Hygiene refers to the practices that promote health and prevent disease through cleanliness. When individuals perform these practices to maintain their own well-being, it is known as personal hygiene,

which is an essential component of Activities of Daily Living (ADL). This includes tasks such as bathing, oral care, toileting, grooming, shaving and hair care (Cremer et al., 2023). Although these may seem basic, they are vital for preserving health.

Various factors, including ageing, socio-economic conditions, and illness, can impact a person's ability to maintain personal hygiene independently (Cremer et al., 2023; Somrongthong, 2017). In a hospital setting, patients often experience functional decline due to illness and reduced physical activity (Verstraten et al., 2020). Nurses play a crucial role in supporting patients' self-care by promoting mobility, preserving dignity, and maintaining autonomy (Cremer et al., 2023; Verstraten et al., 2020). Assisting with hygiene also allows nurses to assess a patient's ability to perform ADLs during recovery and prepare them for discharge.

While some patients require minimal support, others may be fully dependent on nurses for essential tasks such as bathing, elimination, bed-making, and oral care. The type of care provided depends on the perceived level of dependence and care goals, such as maintaining functional status or ensuring comfort (Cremer et al., 2023; Goldenhart & Nagy, 2022). In providing this care, nurses must respect patient preferences, ensure privacy, and consider both physical and emotional well-being. By doing so, they help maintain patient dignity and enhance overall quality of life.

Figure 1. Nursing assisting a child with personal hygiene

Assessing Personal Hygiene

Good hygiene can not only protect an individual from becoming ill, it can help to prevent hospital-associated infections (HAIs) and prevent individuals from spreading infection to others (Australian Commission on Safety and Quality in Health Care [ACSQHC], 2021). Good hygiene also promotes self-esteem and can boost a patient's mood, resulting in improved mental health (Goldenhart & Nagy, 2022). Assessing hygiene involves evaluating multiple areas of the body to ensure overall health and well-being. Key considerations include the condition of the skin, hair, nails, oral cavity, and perineum.

Skin

The skin is the largest organ and the body's first line of defence. This organ provides a barrier to protect the body from invasion of bacteria or other potential environmental hazards and is integral to physical and psychosocial health (Mitchell, 2022). The skin houses various functional body structures, such as capillaries, vessels, and glands. For example, the dermis layer of the skin contains sebaceous glands. These glands release sebum, an oily secretion that hydrates and protects the skin. It is important to note this glandular function, as inadequate hygiene may lead to excess sebum and skin breakouts. As skin ages, it becomes more prone to dryness, itching, cracks, and tears. These issues are common among older adults, impacting their quality of life and increasing the risk of skin breakdown. This can lead to greater dependency, prolonged hospital stays, and higher financial and caregiving burdens (Bonifant & Holloway, 2019; Cowdell et al., 2023).

Proper hygiene practices can help promote and maintain skin integrity and allow the skin to properly perform the functions of protection, sensation, heat regulation, excretion, secretion, and absorption (Mitchell, 2022). In addition, the regular practice of skin hygiene allows for early detection and intervention of abnormal skin conditions such as incontinence-associated dermatitis (IAD), skin tears or pressure injuries (ACSQHC, 2020; Cowdell, 2023; McNichol et al., 2021). Skin breakdown refers to damage or injury to the skin and underlying tissue due to prolonged pressure, friction, shear, or moisture. Examples of skin breakdown include burns, scrapes, cuts, blisters, incontinence-associated dermatitis (Figure 2) and pressure injuries. Factors associated with skin breakdown include immobility, certain medications, incontinence, altered mental status, loss of sensation, or inadequate nutrition (ACSHQHC, 2020).

In a hospital setting, regular and thorough documentation of skin assessments is vital, as it establishes a baseline for each patient's skin condition, facilitates early detection of changes, and guides appropriate interventions to prevent complications. Often, the best time to do a thorough skin assessment is during hygiene care. Additionally, skin hygiene practices are critical in patients at increased risk of skin breakdown or injury such as those with diabetes, circulatory insufficiency, increased body temperature and a lack of nutrition (ACSQHC, 2020). Comprehensive skin assessments should be conducted upon admission, daily, and during any transitions in care, with frequency adjusted based on individual risk factors and

clinical settings (Mitchell, 2022). It is important to note that cleansing skin vigorously is never appropriate in a healthcare setting as this can cause skin irritation, damage the protective barrier, and increase the risk of infections, especially for patients with fragile or sensitive skin (McNichol et al., 2021). Evidence also suggests that using emollient products, such as moisturising products and lotions, may improve clinical measures of skin dryness which can increase risk of skin breakdown, compared to no intervention or standard care (Cowdell et al., 2020).

Figure 2. Example of incontinence-associated dermatitis

Hair

Hair is a large part of the integumentary system and has several functions. First, hair has a protective function. By trapping bacteria, debris, and harmful particles, the hair does not allow these offensive agents to enter the skin. Hair also blocks sunlight from the scalp, protecting against excess exposure to ultraviolet radiation. Hair provides warmth by trapping air close to the skin. Hair grows from the skin and when the skin produces sebum, it can build up on the hair shaft. An overabundance of sebum can build up if the hair or body is not regularly washed.

A common skin condition is folliculitis, which happens when hair follicles become inflamed; it can occur when the hair follicles become infected due to the buildup of sebum. When the scalp of the head is not regularly washed, dead skin, product residue, sweat, and dirt may also build, which results in an increased risk for infection, and unpleasant and greasy hair. In addition, prolonged periods of not washing the hair on the head can damage hair and impede its ability to grow. When the body is not regularly washed, the overproduction of sebum found on the skin can lead to oily skin or acne. Proper hair hygiene supports reducing those risks and aids in reducing bacterial and fungal growth. Bacteria and fungus can cause conditions such as ringworm, which is a common fungal infection of the skin, hair, or nails.

Nails

Proper nail hygiene prevents the spread of infection through bacteria hidden under the fingernails. Additional benefits of nail hygiene include preventing fungal infections under the nails, reduced risk of ingrown nails, and promoting proper nail growth. Therefore, proper cleaning under the fingernails and keeping the nails trimmed using clean tools are essential practices. Another benefit of properly trimmed nails is the minimised risk of lacerations that can result from a patient using unkept nails to scratch themselves or others. While assessing finger and toenails helps detect infections and issues with nail and skin integrity, in hospital settings, nail care is typically provided by specialist practitioners trained in foot and nail care (McNichol et al., 2021). Timely reporting of any concerns, such as discolouration, thickening, swelling, or signs of infection, is essential for ensuring prompt referral and appropriate intervention, helping to prevent further complications.

Oral Cavity

Good oral hygiene aids in maintaining the mouth, gums, lips, and teeth. A thorough oral hygiene assessment involves evaluating the patient's mouth, teeth, gums, and overall oral health. This helps identify potential issues such as mouth dryness, infections such as candida albicans, ulcers, or plaque buildup, ensuring appropriate care is provided.

In Australia, the Oral Health Assessment Tool (OHAT) is a commonly used clinical tool for evaluating oral health, particularly in aged care facilities. It assesses eight key areas: lips, tongue, gums, saliva, natural teeth, dentures, oral cleanliness, and dental pain (Chalmers et al., 2005; Lewis & Fricker, 2008). While this tool was first validated in 2005 (Chalmers et al., 2005), OHAT is still frequently used in residential care settings, particularly for older adults, to identify and manage oral health concerns for non-dental professionals such as nurses and other healthcare workers (Pritchard et al., 2025).

When assessing oral hygiene, it is important to check for, document and report signs of oral health issues, including mouth soreness, inflammation, bad breath, dry oral tissues, thick saliva, bleeding gums, loose or broken teeth, oral pain, difficulty eating or speaking, and poor oral cleanliness. If dentures are used, assess for damage, missing parts, or identification markings (SA Dental, n.d). For guidance on how to perform an oral health assessment, watch the following video [6:32].

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Assessing and providing oral health care can be particularly challenging when additional obstacles, such as cognitive decline, are prevalent. SA Health (Lewis & Fricker, 2008) has provided a publicly available resource that explains the OHAT and how to deal with the challenges of assessing and providing oral health care. You can access Oral Health Assessment Toolkit for Older People here.

Poor oral health can have many effects on an individual. For example, studies have shown the impact of oral health on the quality of life and well-being of individuals, including interference with eating, chewing and swallowing, resulting in nutritional issues and concerns with appearance, leading to embarrassment and social withdrawal (Pritchard et al., 2025). Good oral hygiene can give a patient a sense of well-being and positive self-esteem, resulting in improved mental health (Rasmussen et al., 2023). There is also an emerging body of evidence linking the effectiveness of oral care in clinical care settings to hospital-acquired pneumonia (HAP), ventilator-associated pneumonia (VAP), and other systemic health problems, highlighting the importance of oral care in reducing the incidence of these infections, improving patient outcomes, and decreasing healthcare costs through preventative oral hygiene practices. (Gallione et al., 2024; Hua et al., 2020; Tehan et al., 2024).

Despite the obvious importance of oral health, studies have shown that oral care is a commonly missed care which is a risk to patient safety, with one study finding oral care the third highest missed nursing care in an acute care setting after pressure area care and mobilising (Dagnew et al., 2020; Gallione et al., 2024). Additionally, ensuring the patient is involved in assessing oral care and their oral care needs, including allowing them to do as much as possible, has also been considered necessary in the literature (Koistinen et al., 2021; Rasmussen et al., 2023). Oral health assessment and care planning should consider patients' perceptions and existing routines, and collecting oral health histories can support this person-centred approach (Murray et al., 2024). A recent study revealed the main barriers to providing oral care included patient uncooperativeness, inadequate staffing, and lack of oral hygiene resources. The most helpful strategies considered to facilitate improvement in oral care included patient reminders, prompts, and providing toothbrushes (Tehan et al., 2024).

Regular teeth brushing removes plaque, bacteria, and food particles to prevent tooth decay. These measures also massage the gums, help break up tissue or bacteria, increase blood flow, and relieve discomfort caused by unpleasant odours and tastes. Patients who are nil by mouth (NBM) or on a ventilator require frequent oral care every 2–4 hours to maintain oral hygiene and reduce infection risk. While mouth swabs can help with regular oral care, brushing the teeth with a toothbrush remains essential and should be performed at least twice daily to ensure thorough cleaning.

Figure 3. Child brushing their teeth while supported by a nurse

Perineum

The perineum includes the genital and rectal areas of the body, including the area in between. Because the perineal area is warm, dark, and moist, these areas become an optimal breeding ground for bacteria. Good perineal hygiene prevents infections such as urinary tract infections, removes discharges, eliminates bad odour, promotes comfort, alleviates itching, and reduces the risk of chafing and skin rashes. When assessing the perineum, it is important to check the skin's condition in this area, looking for redness, swelling, rashes, irritation and any skin breakdown or pressure injuries, particularly for immobile patients. Also, observe for any signs of infection, discharge, odour, unusual colouring, excess moisture or dryness. Ask the patient if they are experiencing any pain, itching, burning or tenderness. Document any abnormalities thoroughly, as this information is crucial for developing an appropriate care plan. Based on the assessment, interventions such as increasing the frequency of perineal care or using lotions, barrier creams, specialised wipes, or medications as prescribed, can be implemented to address discomfort and prevent complications.

Mental Health

Poor hygiene can be a sign of self-neglect and may be affected by mental health (Ghassemi et al., 2023). Personal hygiene and grooming issues have been shown to negatively impact mood, motivation, social and work engagement, self-worth and self-esteem and engagement with treatment and subsequent recovery (Stewart et al., 2022). Those with obsessive-compulsive disorder may overindulge in hygiene practices, which can take up much of their time as well as lead to skin breakdown or pain, depending on their compulsions. As previously discussed, poor oral hygiene can lead to tooth decay or bad breath. This can have a negative impact on self-esteem as one may be embarrassed to smile or socialise with others. Research supports the effectiveness of person-centred approaches in assessing, engaging with, and intervening when a decline in personal hygiene and grooming is observed (Stewart et al., 2022). Good hygiene and self-care practices can improve mood, decrease stress levels, provide a sense of well-being, and prevent or limit anxiety while boosting an individual's self-esteem and confidence. Regular assessment of hygiene practices

allows healthcare providers to identify challenges early, offer appropriate support, and implement person-centred interventions that promote dignity, independence, and overall well-being (Stewart et al., 2022).

Factors Affecting Hygienic Practices

Hygiene measures and practices can promote health and prevent disease. These measures and practices may differ among various groups and people. It is important to remain culturally sensitive when encountering preferences that may differ from your own. Respecting patient differences and preferences in hygiene practices while remaining unbiased is essential to nursing practice. Nurses must also remember to provide care and education to patients in a nonjudgmental manner.

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Psychological Factors Affecting Personal Hygiene

Psychological factors that may affect personal hygiene include cognitive diseases as well as an individual's mental health status. The psychological factors will impact a person's ability to perform hygiene as well as the patient's motivation for or memory of these practices. It is imperative the nurse assesses any psychological factors that might inhibit a person's personal hygiene habits.

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The Nurses' Role in Hygiene

Nurses play a critical role in assessing a patient's preferences, physical limitations, and cognitive status to develop and implement an individualised hygiene and health care plan. When planning hygiene care, it is essential to consider the patient's level of independence, which may range from complete independence to requiring partial or full assistance from a nurse or nursing assistant. Ensuring patient safety is a primary concern when scheduling and providing hygiene care.

This section will examine the key steps for assisting patients with hygiene, with considerations specific to older adults, and strategies for promoting healthy hygiene practices through patient education.

Assisting with Patient Hygiene

When assisting the patient with hygiene, the nurse must integrate the individual's preferences into the plan of care. The nurse performs a physical assessment to determine the adequacy of the patient's hygiene practices. For the recognised practices to be deemed inadequate, a distinct health threat must exist. For example, upon examining the oral cavity, if gingivitis or periodontitis is visible, the patient may be at a higher risk for conditions such as heart disease, stroke, arthritis, and diabetes if left untreated.

For patients with intravenous (IV) access, the bag of IV fluids and IV tubing may be threaded through the sleeve of the gown to keep the system intact. There are covers available to keep the site dry during bathing. Dressing changes for the IV must follow facility protocols. Finally, the nurse must try to preserve the patient's privacy throughout the bathing process. To accomplish such privacy, a nurse should reveal only the areas about to be cleaned and keep the rest of the body covered, ensuring the door and/or curtains remain closed. The nurse needs to encourage the individual to perform all tasks as independently as appropriate. Using the bath or various hygienic procedures is an excellent opportunity for the nurse to assess the person's skin, cognition, and mobility status. These simple tasks can reveal subtle changes in the patient's status and allow for early intervention.

In addition, whether the individual is conscious or not, the nurse must introduce themselves and always inform the patient of what is about to happen and why. This will obtain consent and complement the nurse's professional demeanour. Research suggests that unconscious patients may hear what others are saying. Nurses who continue to introduce themselves and explain procedures before proceeding will decrease the stress on the individual through their journey to consciousness in a strange and foreign environment.

When a patient requires assistance with showering, the nurse must ensure a safe and comfortable experience while respecting the individual's dignity and preferences. The following step-by-step process outlines key considerations for preparing the environment, providing support, and maintaining patient safety throughout the showering process.

Procedure For Assisting with a Shower

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There are several reasons why a patient may be unable to wash themselves and require a bed bath. Patients who are critically ill or have severe physical limitations, such as those recovering from surgery, experiencing significant pain, or suffering from conditions like stroke or paralysis, may lack the strength or mobility to perform self-care tasks. Additionally, patients with cognitive impairments, such as dementia or delirium, may be unable to understand or remember how to bathe themselves. Bed baths are also necessary for patients who are on strict bed rest due to medical conditions like severe heart failure or respiratory distress, where movement could exacerbate their condition. Providing a bed bath not only ensures the patient's hygiene but also offers an opportunity for nurses to assess the patient's skin condition, promote comfort, and maintain their dignity.

When a patient is unable to wash themselves independently, the nurse must follow a structured approach to ensure thorough hygiene while maintaining the patient's comfort, dignity, and safety. The following step-by-step process outlines best practices for providing a bed bath, including preparation, technique, and considerations for patient privacy and skin integrity.

Procedure for Bed Bathing a Dependent Person

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When a full bed bath is not practical on a daily basis, or when a quick cleanse is needed, such as after surgery, heated bed bath wipes offer a convenient and effective solution (Sharp & Campbell, 2022).

Figure 4. Examples of bed bath wipes used

To use heated bed bath wipes, follow these steps:

1. Warm the wipes according to the manufacturer's instructions, typically using a microwave or a specialised warmer.
2. Ensure the wipes are at a safe and comfortable temperature before applying them to the patient's skin.
3. Gently clean the patient's body, starting from the face and moving downwards, using a new wipe for each area to prevent cross-contamination.
4. Pay special attention to skin folds and areas prone to moisture buildup, such as under the armpits, breasts and in the groin area.
5. After cleaning, allow the skin to air dry.

In some cases, a shower bed can be used to take a patient to the shower. This approach allows patients who have limited mobility but are still able to be transported, to experience the benefits of a full shower. Using a shower bed can help improve the patient's overall hygiene, boost their morale, and provide a sense of normalcy and dignity. It also allows for a more thorough cleaning compared to a bed bath, which can be particularly beneficial for patients with skin conditions or those who are prone to infections. Additionally, the warm water and the act of showering can have therapeutic effects, promoting relaxation and comfort.

Figure 5. Example of a shower bed

Maintaining a clean and hygienic environment in a hospital is paramount for preventing the spread of infections and ensuring patient comfort. As a nurse, it is essential to change bed sheets at least daily or whenever they become soiled. The following sections outline the procedures for making an unoccupied bed and for making an occupied bed when patients cannot easily be moved out of the bed. These tasks are fundamental responsibilities for nurses, ensuring that patients receive the highest standard of care and hygiene.

Procedure for Making an Unoccupied Bed

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Procedure for Making an Occupied Bed

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Oral Care

Care of the oral cavity, oral hygiene, helps preserve a healthy state of the lips, gums, teeth, and mouth. Brushing the teeth removes plaque, food particles, and bacteria as well as massages the gums and alleviates any discomfort that may be caused by tastes or unpleasant odours. Patients should be encouraged to brush their own teeth when possible. Independent individuals should be offered supplies to also carry out personal hygiene needs as appropriate. If the patient is unable to do so independently, the nurse or appropriate delegate (i.e., the person who is delegated a responsibility by the nurse) will need to assist with or perform the oral care for this individual. Patients who are unable to perform their own oral care may require care every one to two hours, if and as necessary. Individuals who are either unable to breathe through the nose or are mouth breathers will need more frequent oral care. More frequent care will ensure that the integrity of the oral mucous is maintained. The nurse must ensure that suction equipment is available to prevent aspiration, raise the head of the bed to 30–45 degrees, use suction to remove excess fluid/secretions, routinely moisten the mouth, and apply lip balm to prevent lips from cracking.

Teeth should be brushed twice daily, and the mouth should be rinsed with water after meals. The toothbrush should be soft-bristled and reach all the teeth. Automatic toothbrushes may be adequate substitutes for patients with arthritis or other conditions that impair their ability to brush adequately. Because the toothbrush cannot reach the areas between the teeth, flossing is recommended once a day to remove food particles and plaque. Water picks, pressured water spray units, and cone-shaped brushes may be used when patients are unable to use floss or perform their own oral hygiene. Toothpaste and other powders aid in the brushing process. Mouthwashes may also be used to reduce bacteria, plaque, tartar, and gingivitis. Many mouthwashes also freshen breath and can protect tooth enamel.

The following step-by-step process outlines how to safely and effectively support a patient with oral care, ensuring comfort, preventing complications, and promoting good hygiene practices.

Procedure for Assisting a Person with Oral Care

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Denture Care

Artificial teeth not permanently implanted, called dentures, are the patient's personal property and must be handled with care. Dentures should soak in a labelled, enclosed cup to be stored when not being worn. Many patients do not wear dentures when sleeping, and dentures must be removed for surgeries or other diagnostic procedures. Many patients also prefer to wear dentures as soon as they wake up or come out of a procedure to avoid embarrassment due to feeling self-conscious without them. If the patient goes for long periods of time without wearing the dentures, the gum line may change and affect the fit of the dentures. It is also recommended that dentures not be worn twenty-four hours a day, seven days a week. Patients are usually familiar with the necessary care of dentures to prevent infection and irritation and prefer to perform denture care according to standard practice at home.

Procedure for Providing Denture Care

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Eyes, Ears, and Nose

Special attention is given to care of the eyes, ears, and nose due to the sensitivity of these areas, and taking exceptional care to avoid injury is important. The nurse should ask the patient about any specific care the patient normally performs in relation to the eyes, ears, and nose. For example, some people prefer using cotton swabs to clean the outer parts of the ears. The nurse should also be aware of any use of hearing or visual aids, such as eyeglasses, hearing aids, or contacts. The nurse should also ask the patient about any history or treatments of eye, ear, or nose problems. The circular areas around the eyes are usually cleaned during the bath with the use of a clean washcloth, moistened with warm water. Soap may cause burning or irritation, so avoiding soap around the eyes is advisable.

The eye should be cleaned from the inner to outer canthus. A separate section of the washcloth should be used each time to avoid the risk of spreading infection. If the patient has dried exudate (dried or crusty fluid) that is not easily loosened, try placing a damp gauze or cotton ball on the lid margins to loosen secretions. Avoid applying direct pressure over the eyeball as this may cause injury. Remove any exudate from the eyes carefully and as often as needed to keep the eye clean. Unconscious patients may require more frequent eye care due to the buildup of secretions from the absence of the blink reflex. eye care is essential for patients who are unconscious or dependent, such as those in a coma, under sedation, or with severe physical or cognitive impairments. These patients are unable to blink or close their eyes effectively, which can lead to dryness, irritation, and potential infections. Proper eye care helps maintain eye health and prevent complications in these vulnerable individuals. Click or press on the steps below to understand the process of providing eye care for a dependent patient.

Procedure for Providing Eye Care for an Unconscious or Dependent Person

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The ears are also cleansed during a shower or bed bath. The ear canal should be cleaned with a gentle rotation using a moistened washcloth. A cotton swab is useful for cleaning the pinna or outer aspects of the external ear. Educating patients to never use toothpicks, cotton swabs, or any other device to clean the internal auditory canal is important, as the tympanic membrane can easily be damaged through this action.

Care of the nose includes clearing secretions. Most patients can gently blow into a disposable paper tissue. The individual should avoid harsh blowing as this can cause pressure capable of injuring the nasal mucosa, sensitive eye structures, and the tympanic membrane. The patient should blow with both nostrils open to avoid forcing debris into the eustachian tubes. If the external nares are crusted, a warm, moist compress may be used to help soften and remove any exudate. A moist washcloth or cotton swab may be used to clean the opening of the nares but should never exceed past the nares to avoid injury.

Contacts and Glasses

Eyeglasses are often expensive and are the patient's personal property. Therefore, eyeglasses should be stored in a case or bedside drawer when not in use to prevent damage or loss. Eyeglasses may require special cleaning with the use of cloths made of soft microfiber, cleansing solutions, or lens wipes. Washcloths, paper towels, and tissue paper should be avoided because they can scratch the lenses. Various types of

contact lenses are available, ranging from daily, weekly, or even monthly use. Some patients may sleep in contact lenses, while others cannot or prefer not to leave these lenses in the eyes overnight. The nurse must assess the type of contacts the person wears and any preferred special care measures.

Several products are available for lens care, such as saline solutions and hydrogen peroxide solutions. Most patients will prefer to care for their own lenses but should not wear these contacts if unable to independently insert and remove the lenses. Contacts should remain clean and sterile. Reusable lenses should soak in a solution of the owner's choosing when not in use to keep the lens from drying out. Hand hygiene when inserting or removing contacts is essential to prevent infection. A towel may be placed in the sink to prevent a dropped contact from accidentally falling into the drain.

Hearing Aids

Hearing loss is a common health problem. The ability to hear impacts a person's ability to communicate and react appropriately to things in their environment, and many patients have hearing aids. The care of hearing aids includes battery care, proper insertion, and routine cleanings. The nurse should determine the patient's normal method of cleaning the hearing aids. In addition, the nurse should assess the quality of the patient's hearing with the use of the devices to ensure effectiveness and functionality. Hearing aids should not be used when water exposure is a risk to avoid damage to the devices. When hearing aids are not in use, the devices should be labelled and stored in a case or a safe place to avoid damage or loss. The battery should also be removed or turned off when not in use to preserve battery life. The hearing aids may be cleaned with a dry, soft cloth.

Hair

Hair care will depend greatly on the patient's preferences, culture, and physical and cognitive limitations. Hair should be shampooed as often as necessary or per individual preference. The brush and comb should be washed each time the hair is washed, or as appropriate. Prior to shampooing the hair, brush or comb the hair to stimulate the scalp and untangle the hair. Whenever possible, encourage the patient to brush and wash their own hair. In the event regular shampooing is contraindicated for various conditions, bedside products such as foams, dry powders, or concentrates that do not require rinsing may be used.

Shampoo caps are also available and should be warmed in the microwave if they are not stored in a warmer. Once the cap is on the patient's head, massage the hair and scalp to lather the shampoo according to the manufacturer's directions, and discard after use. Towel dry the hair after each type of cleansing, followed by combing and styling to the patient's preference. If a hair dryer is not appropriate or available, the hair should be covered with a towel until dry to minimise the individual becoming chilled. Some healthcare facilities may have beauticians or barbers to assist with hair care, but this does not dismiss the nurse's obligation.

Hair type should also be considered with hair care. For tightly curled hair, a wide-toothed comb is best to untangle the hair, working from the neckline to the forehead. This hair type may also prefer small braids that do not need to be undone for shampooing. Application of a lubricant oil should be applied to the braids to prevent hair breakage. Those individuals with alopecia and/or baldness should still cleanse and moisturise the scalp to prevent dryness. Dandruff may also be present and is not considered contagious or infectious. Dandruff and hair loss may be embarrassing for a patient, so the nurse must remain professional and preserve the person's dignity.

If a patient is unable to wash their hair independently or cannot get out of bed, the nurse may need to assist with washing their hair. The following step-by-step process outlines how to properly wash a patient's hair in bed.

Procedure for Washing a Person's Hair in Bed

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While washing a patient's hair in bed may be therapeutic and comforting for a patient, this process can be quite time-consuming and not always practical. Shampoo caps are a convenient and effective solution for maintaining hair hygiene in hospital settings, especially for patients who are bedridden or have limited mobility. These caps allow for a thorough hair wash without the need for water or rinsing, making the process quick and comfortable for the patient.

Figure 6. Examples of a shower cap

To wash a patient's hair using a shampoo cap is extremely easy. You can watch an instructional video here [1:29], or follow the simple instructions below:

1. Place the cap over the patient's head, ensuring all hair is tucked inside.
2. Gently massage the cap, distributing the cleansing solution evenly through the hair.
3. Continue massaging for 1–3 minutes to ensure thorough cleaning.
4. Carefully remove the cap, wiping away excess moisture if needed.
5. Use a towel to pat hair dry or allow it to air dry.

Nails

Nails may harbour bacteria, so maintaining nail care to prevent the risk of infection or injury from scratching is crucial. Nurses must follow the agency's policy related to nail care, as some facilities do not allow nail trimming by clippers. If allowed, nails should be trimmed straight across and then rounded at the tips in a gentle curve. The nails should not be trimmed too short as the skin and cuticles may become injured. Hangnails, which are broken pieces of cuticle, should be cut off with cuticle scissors and not torn or ripped off. Cuticles should be gently pushed back, after softening by washing with warm water, using a cloth or blunt instrument. A moisturiser or emollient may be applied to the nails and cuticle to prevent hangnails. The underside of the nails should be cleaned with a blunt instrument or nail brush. Damaging the area where the underlying tissue and nail are attached by being forceful is discouraged. Once the care is completed, a massage of the hands using lotion may increase blood flow and provide comfort.

Feet

Feet also require special attention to prevent odours, injury, and infection. Poor care of the feet may result in conditions such as calluses, neuropathy, pain, ingrown toenails, or deformities. Feet may be cleaned in the shower or using a basin with tepid water and mild soap for bedside baths. The feet should not be soaked. Feet should be dried immediately after being washed. Lotion may be applied and massaged on the feet to promote circulation and provide comfort. Toenails should also be kept short to minimise bacteria underneath the nail. Care of the toenails is very similar to the care of fingernails.

Patients with diabetes may have reduced sensation in their feet and must be taught how to examine and care for their feet daily. Some patients may need to see a podiatrist for treatment of corns, calluses, or bunions. The nurse should also educate the individual or ensure the use of cotton socks for warmth and perspiration absorption, as well as the importance of properly fitting footwear to avoid complications.

Perineal Care

Perineal care, also known as peri-care, includes hygiene care of the genital and rectal areas of the body,

including the area in between. Perineal care is a vital aspect of personal hygiene, especially for individuals who are bedridden, incontinent or have limited mobility. It involves cleansing and maintaining the skin around the genital and anal areas to prevent infection, discomfort, and skin breakdown. Since this area is prone to infection, it should be cleaned at least once daily and more frequently if the individual experiences incontinence. Regular perineal care has been shown to reduce the risk of catheter-associated Urinary Tract Infections (CAUTI) and incontinence-associated dermatitis (IAD) (Crowson et al., 2023; McNichol et al., 2021; Queensland Health, 2023).

Perineal care is typically provided during daily bathing, after bedpan use, and after incontinence episodes to maintain hygiene and prevent infection. Patients who can perform hygiene independently may prefer to cleanse on their own, however, may need prompting. Patients unable to perform this practice independently may request someone of the same gender to assist with perineal care or a bath in general. This request must be communicated and followed as best as possible. Patients who require help may include those who have physical or cognitive limitations. Individuals who are postpartum, recovering from rectal or genital surgery, suffer from incontinence or have an indwelling catheter require meticulous care to avoid infection (Crowson et al., 2023; Girsang & Elfirae, 2023; McNichol et al., 2021).

Other instances that may also cause vaginal or perineal problems include douching, some sexually transmitted infections (STI), diabetes mellitus, and urinary or faecal incontinence. Maintaining a professional attitude, preserving the patient's dignity, ensuring privacy, and gaining permission to touch the patient is important when aiding in perineal care regardless of consciousness. The nurse needs to remember to always clean from the least contaminated areas to the most contaminated areas to prevent infection.

Click or press on the following steps detailing the procedure for providing perineal care in a hospital setting for individuals unable to manage their own hygiene.

Procedure for Providing Perineal Care

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The buttocks, groin and any skin folds may need extra protection against moisture and potential skin breakdown. Barrier wipes can provide a protective layer on the skin to prevent irritation and breakdown. Multifunction products such as these can be used to cleanse and protect the skin by utilisation of a moisture barrier skin protectant and are particularly beneficial for patients who are incontinent, bedridden, or have sensitive skin, as these individuals are more prone to developing pressure injuries, incontinent-

associated dermatitis and skin infections (McNichol et al., 2021). Additionally, research has shown that barrier wipes can significantly reduce IAD prevalence compared to the standard practice of water and pH-neutral soap (Beekman et al., 2011). The wipes effectively create a barrier that shields the skin from moisture and other irritants, helping to maintain skin integrity and promote healing.

Figure 7. Example of barrier wipes

Sitz baths may also be used after childbirth, rectal surgery, or vaginal surgery. This treatment may also be used to relieve discomfort from fissures or haemorrhoids. A sitz bath is most often performed on the toilet with a tub lining the bowl. The tub is filled with three to four inches of warm, not hot, water. The patient will submerge the pelvic area for twenty to thirty minutes to reduce inflammation. Other options for cleansing the perineal and vaginal areas of a patient who is postpartum include either a shower or sitting on a stool using a perineal irrigation bottle.

Catheter Care

Indwelling catheters (IDCs) are associated with urinary tract infection (UTI) and therefore require particular hygiene care to prevent complications. When a catheter is considered the cause of a UTI, this is called catheter-associated UTI (CAUTI). Catheter care is usually performed after perineal care and is generally ordered twice daily. Prior to performing routine catheter care, practitioners should always pay close attention to how long the catheter has been inserted, consider whether the catheter is needed, and

request confirmation from the medical officer as to whether it is still required or if it can be removed. Prompt removal and precise cleaning can help to avoid an associated infection (ACSQHC, 2021).

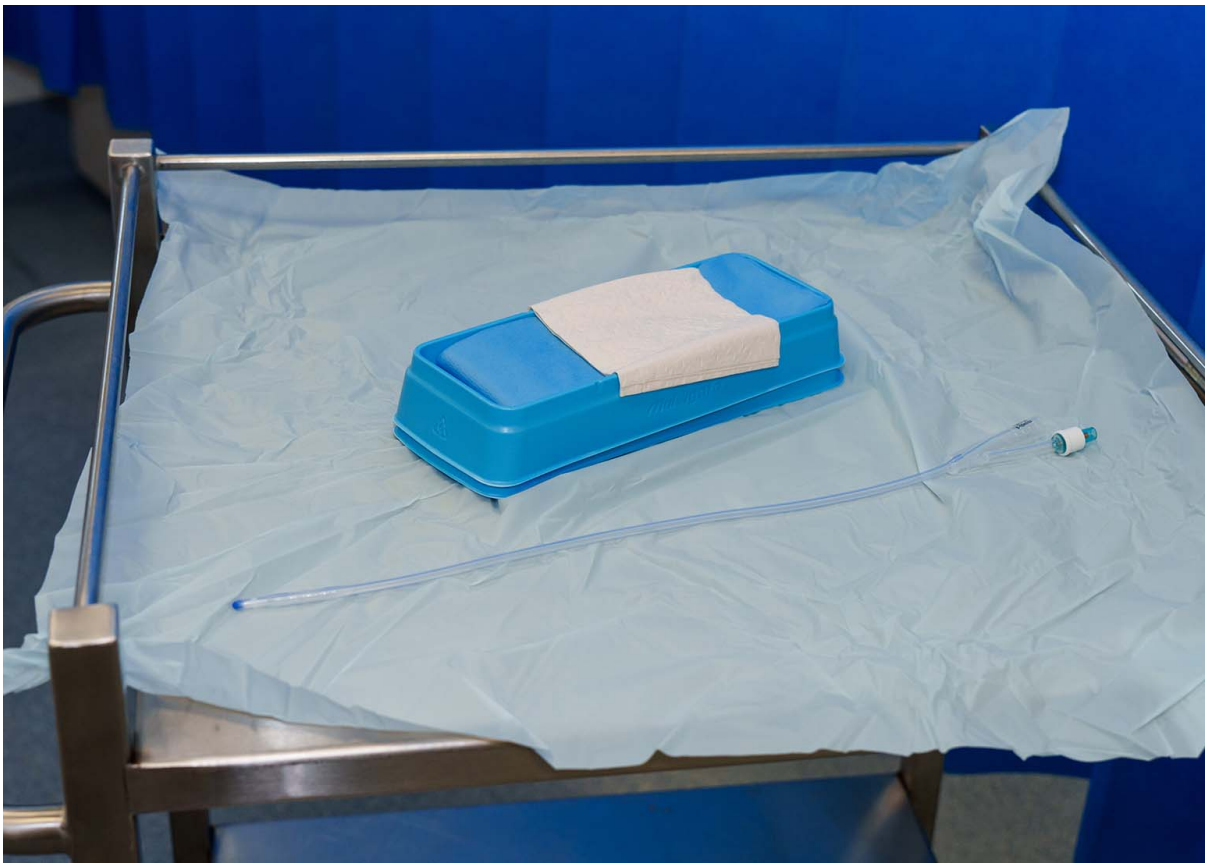

Figure 8. Catheter care

According to the Australian Guidelines for the Prevention and Control of Infection in Healthcare, nurses and other healthcare workers should be familiar with the policies and procedures for the safe insertion, maintenance and removal of IDCs (ACSQHC, 2019). When maintaining the care of an IDC, the following should be performed (ACSQHC, 2019):

- Conduct a daily review to assess the need for the urinary catheter
- Ensure the catheter remains continuously connected to the drainage system
- Educate patients on their role in preventing urinary tract infections; if not possible, perform daily perineal hygiene and catheter care
- Empty urinary drainage bags frequently to maintain urine flow and prevent reflux
- When emptying catheter bags, use a separate urine collection container for each patient, preventing contact between the drainage bag and the container
- Before catheter care, perform hand hygiene and wear gloves, an apron, and goggles; remove the gloves and apron and perform hand hygiene afterwards.

Click or press on the steps below for a detailed guide on providing catheter care.

Procedure for Providing Catheter Care

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Lifespan Considerations

Older Adults

Lifespan considerations for the older adult include age-related changes that require special focus and nursing strategies. Age-related changes include impaired physical mobility, impaired oral mucous membranes, and an increased risk for impaired skin integrity. Older adults are also more likely to become chilled when left uncovered during bathing. The room should be maintained at a warmer temperature, and drapes should be used during care to provide modesty and avoid chilling. Older adults also may experience neurologic changes or impaired circulation that impede the ability to sense temperature changes in water. Using caution to prevent burns or injury to the skin is also important to remember. In addition, frequent bathing and use of soaps may have harmful effects on the skin.

Impaired physical mobility related to ageing includes decreased dexterity and muscle strength, compromised functional mobility, and decreased range of motion. Examples of chronic conditions that compromise functional ability include heart disease, diabetes mellitus, rheumatoid arthritis (RA), coronary heart disease, chronic obstructive pulmonary disease (COPD), and osteoarthritis. Patients with deficits after a stroke, Parkinson's disease, or other neurologic disorders may also experience physical limitations. Part of the ageing process also includes a loss of elasticity, reduced blood supply to connective tissue, and degeneration of epithelial cells that lead to impaired mucous membranes.

Older patients are also likely to have impaired oral mucous membranes due to the decreased production of saliva and medications that cause dry mouth. For example, decongestants, antidepressants, antihistamines, blood pressure medications, Alzheimer's disease medications, analgesics, and diuretics may cause dry mouth. Older adults are also at risk for impaired skin integrity due to the loss of elasticity, thinning of the epidermis and subcutaneous fat, and dryness caused by decreased activity of oil and sweat glands. The older adult's nails may become opaque, brittle, scaly, tough, or hypertrophied. These skin-related changes may also be visible in the feet. Older adults are at an increased risk of friction shear and pressure ulcers due to age-related skin changes and impaired mobility.

Infants and Children

When providing hygiene care for infants and children, it is essential to consider their unique developmental needs and ensure a compassionate and supportive approach. Effective communication, comfort, safety, privacy, and parental involvement are crucial elements in delivering high-quality care. Tailoring hygiene practices to the child's age and developmental stage not only enhances their comfort and cooperation but also fosters a positive and trusting relationship between the child, their caregivers, and healthcare professionals. The following considerations outline key strategies for addressing these aspects during hygiene care procedures.

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Promoting Hygiene Health Education

One of the most essential roles nurses have in disease prevention and health promotion is through education. The nurse should assess a patient's knowledge about hygiene as well as individual cultural and personal preferences. The nurse should educate people on the importance of good hygiene practices. In addition, good hygiene can aid in preventing the spread of diseases to others, promote self-esteem, and boost mood. Once the nurse assesses the patient's knowledge and ensures understanding, the nurse should educate the person on the steps needed to perform hygiene to avoid infection or injury. The nurse should also assess a patient's ability to perform care independently by performing a head-to-toe assessment. The nurse should reinforce proper steps as needed while educating and giving instructions on the importance of diet and nutrition to promote healthy skin and mobility.

Consolidating your Knowledge

This clinical scenario is designed to help you apply your knowledge of hygiene care in a practical, patient-centred context. As you read through the case of Mr George Reynolds, consider the importance of comprehensive hygiene assessment and individualised care planning in maintaining patient comfort, dignity, and health.

Clinical Scenario: Addressing the hygiene needs of Mr George Reynolds

Name: Mr George Reynolds
Age: 78
Medical history: Type 2 diabetes, mild cognitive impairment, and limited mobility due to a recent stroke.
Current status: Admitted to the medical ward for management of a urinary tract infection (UTI) and ongoing rehabilitation.

Scenario:
During your morning round, Mr Reynolds appeared uncomfortable and restless. He expressed

itching and tenderness in his perineal area and mentioned he hadn't had his oral care attended to since the previous evening. On assessment, his skin was dry and flaky, and his perineal area showed signs of redness and irritation. His oral cavity was dry, and food residue was present, suggesting inadequate oral hygiene.

You recognise that Mr Reynolds' hygiene needs require immediate attention to prevent further skin breakdown and infection. You develop a personalised hygiene plan.

Questions for reflection:

Create a care plan for Mr Reynolds' hygiene needs. To prioritise his hygiene needs you should:

- Identify any further assessments you would undertake
- Identify problems and potential problems
- Formulate care goals for Mr Reynolds and expected outcomes
- Identify the interventions you would implement.

NB: You might like to follow the nursing care planning process from the Developing Person-Centred Care Plans through Clinical Reasoning chapter to assist in formulating Mr Reynolds's hygiene care plan.

1. What steps would you take to address Mr Reynold's hygiene needs while maintaining his dignity and comfort?
2. How would you assess and document his skin, perineal area, and oral health?
3. What interventions would you implement to manage his dry skin and prevent infection?
4. How would you involve Mr Reynolds in his hygiene care plan to promote independence and person-centred care?

Key Takeaways

In this chapter, we covered:

- What hygiene is and the various factors that impact a person's ability to maintain personal hygiene independently such as cultural preferences, socioeconomic status, developmental level, personal preference and impaired mobility
- How to assess personal hygiene including observing: skin, hair, nails, oral cavity and perineum
- Psychological factors that affect personal hygiene including cognitive diseases, mental

health and body image
- The nurses role in hygiene such as procedures for assisting with a shower, bed bathing a dependent person, making an occupied and unoccupied bed, assisting with oral care and denture care, eye care, washing a person's hair in bed, providing perineal care, and catheter care.
- Considerations for different lifespans such as the older adult and age related changes that can affect hygiene practices and approaches for assisting infants and children
- Promoting hygiene health education to ensure understanding of the importance of good hygiene practices.

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ASSESSING AND SUPPORTING NUTRITION

Amy McCrystal; Leisa Sanderson; and Jessica Best

Learning Outcomes

In this chapter you will learn how to:

- Describe the structure and function of the gastrointestinal/digestive system and identify the essential nutrients that are required for growth, energy and bodily processes
- Recognise various risk factors that can impact an individual's nutritional status
- Develop the skills necessary to assess an individual's nutritional status utilising the ABCDE (Anthropometric, Biochemical, Clinical, Dietary, and Environmental) approach, including the ability to calculate body mass index (BMI)
- Explain the different options available for nutritional support, including oral, enteral, and parenteral nutrition, and their indications and applications in clinical practice
- Identify and apply nursing interventions that can effectively improve an individual's nutritional status, considering personalised care and patient education.

Introduction

Good nutrition is essential for a healthy life, providing the necessary substances to sustain life, support growth, and maintain bodily functions. Adequate nutrition plays a crucial role in overall health by preventing and treating diseases, promoting normal growth, maintaining a healthy weight, enhancing resistance to infection, and protecting against chronic diseases and premature death (National Health and Medical Research Council [NHMRC], 2013). According to the NHMRC (2013), diet is one of the most important modifiable risk factors for health.

Nurses play a vital role in promoting healthy nutrition to prevent disease, assist recovery from illness and surgery, and manage chronic illnesses with healthy food choices. Healthy nutrition helps prevent obesity and chronic diseases like diabetes and cardiovascular disease. Nurses encourage healthy eating habits, knowing it is easier to maintain health than to regain it after disease onset. They also promote good nutrition during recovery, even when patients have poor appetites or nausea. For chronic diseases, nurses educate patients on prescribed diets, such as low carbohydrate for diabetes or low fat, salt, and cholesterol for cardiovascular disease.

Nurses advocate for patients with nutritional deficits, identifying issues like difficulty swallowing and making appropriate referrals. They also administer alternative nutrition forms, such as enteral or parenteral feedings. This chapter will cover the nutritional requirements for good health, factors affecting nutritional status, and nutritional assessments and interventions.

Nutrition

Digestive System

Before exploring good nutrition and discussing assessments and interventions, it is important to review the structure and function of the digestive system and the role it plays in breaking down food, absorbing nutrients, and eliminating waste.

The digestive system breaks down food and then absorbs nutrients into the bloodstream via the small intestine and large intestine. Good health depends on good nutrition, therefore any disorder affecting the functioning of the digestive system can significantly impact overall health and well-being and increase the risk of chronic health conditions.

Structure and Function

The gastrointestinal system (also referred to as the digestive system) is responsible for several functions, including digestion, absorption, and immune response. Digestion begins in the upper gastrointestinal tract at the mouth where chewing of food occurs. This is called mastication. Mastication results in mechanical digestion when food is broken down into small chunks and swallowed. Masticated food is formed into a bolus as it moves toward the pharynx in the back of the throat and then into the oesophagus. Coordinated

muscle movements in the oesophagus called peristalsis move the food bolus into the stomach where it is mixed with acidic gastric juices and further broken down into chyme through a chemical digestion process. As chyme is moved out of the stomach and into the duodenum of the small intestine, it is mixed with bile from the gallbladder and pancreatic enzymes from the pancreas for further digestion (LibreTexts, 2024).

Absorption is a second gastrointestinal function. After chyme enters the small intestine, it comes into contact with tiny finger-like projections along the inside of the intestine called villi. Villi increase the surface area of the small intestine and allow nutrients, such as protein, carbohydrates, fat, vitamins, and minerals, to absorb through the intestinal wall and into the bloodstream. Absorption of nutrients is essential for metabolism to occur because nutrients fuel bodily functions and create energy. Peristalsis moves leftover liquid from the small intestine into the large intestine, where additional water and minerals are absorbed. Waste products are condensed into faeces and excreted from the body through the anus (LibreTexts, 2024). See Figure 1 for labelled parts of the gastrointestinal system.

In addition to digestion and absorption, the gastrointestinal system is also involved in immune function. Good bacteria in the stomach create a person's gut biome. Gut biome contributes to a person's immune response through antibody production in response to foreign materials, chemicals, bacteria, and other substances (Keeton & Hightower, 2025). For example, clients may develop Clostridium difficile (C-diff) after taking antibiotics that kill these beneficial bacteria in the gut.

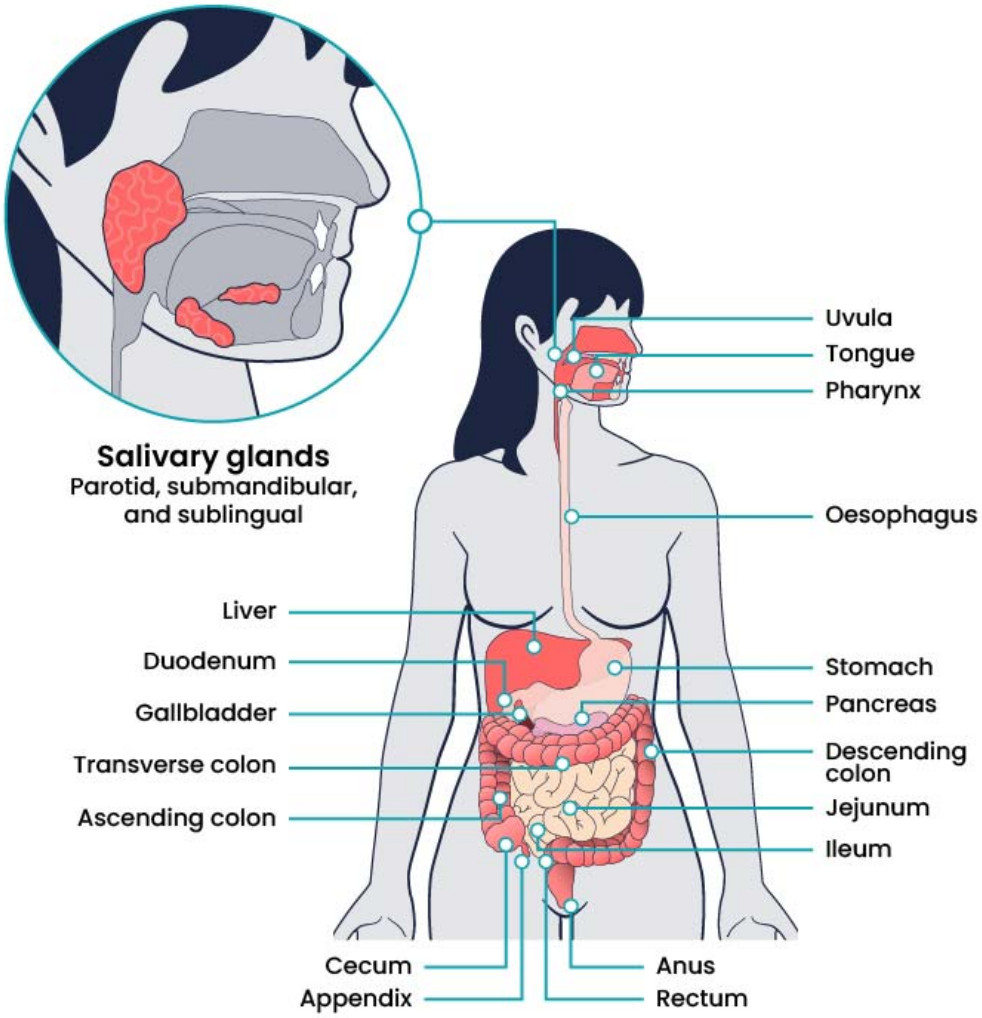

Figure 1. The gastrointestinal system

Essential Nutrients

Nutrients from food and fluids are used by the body for growth, energy, and bodily processes. Essential nutrients refer to nutrients that are necessary for bodily functions but must come from dietary intake because the body is unable to synthesise them. Essential nutrients include vitamins, minerals, some amino acids, and some fatty acids (Youdim, 2019). Essential nutrients can be further divided into macronutrients and micronutrients.

Macronutrients

Macronutrients make up most of a person's diet and provide energy, as well as essential nutrient intake. Macronutrients include carbohydrates, proteins, and fats. However, too many macronutrients without associated physical activity cause excess nutrition that can lead to obesity, cardiovascular disease, diabetes

mellitus, kidney disease, and other chronic diseases. Too few macronutrients result in undernutrition, which contributes to nutrient deficiencies and malnourishment (Youdim, 2019).

Carbohydrates

Carbohydrates are sugars and starches and are an important energy source that provides 17 kJ per gram of energy. Simple carbohydrates are small molecules (called monosaccharides or disaccharides) and break down quickly. As a result, simple carbohydrates are easily digested and absorbed into the bloodstream, so they raise blood glucose levels quickly. Examples of simple carbohydrates include table sugar, syrup, and fruit juice. Complex carbohydrates are larger molecules (called polysaccharides) that break down more slowly, which causes slower release into the bloodstream and a slower increase in blood sugar over a longer period of time. Examples of complex carbohydrates include whole grains, beans, and vegetables (Youdim, 2019).

Foods can also be categorised according to their glycemic index, a measure of how quickly glucose levels increase in the bloodstream after carbohydrates are consumed. The glycemic index was initially introduced as a way for people with diabetes mellitus to control their blood glucose levels. For example, processed foods, white bread, white rice, and white potatoes have a high glycemic index. They quickly raise blood glucose levels after being consumed and also cause the release of insulin, which can result in more hunger and overeating. However, foods such as fruit, green leafy vegetables, raw carrots, kidney beans, chickpeas, lentils, and bran breakfast cereals have a low glycemic index. These foods minimise blood sugar spikes and insulin release after eating, which leads to less hunger and overeating. Eating a diet of low glycemic foods has been linked to a decreased risk of obesity and diabetes mellitus (Youdim, 2019). See Figure 2 for an image of the glycemic index of various foods.

Figure 2. A glycemic index of various foods

Proteins

Proteins are peptides and amino acids that provide 17kJ/g of energy. Proteins are necessary for tissue repair and function, growth, energy, fluid balance, clotting, and the production of white blood cells. Protein status is also referred to as nitrogen balance. Nitrogen is consumed in dietary intake and excreted in the urine and faeces. If the body excretes more nitrogen than it takes in through the diet, this is referred to as a negative nitrogen balance. Negative nitrogen balance is seen in clients with starvation or severe infection. Conversely, if the body takes in more nitrogen through the diet than what is excreted, this is referred to as a positive nitrogen balance (Youdim, 2019). During positive nitrogen balance, excess protein is converted to fat tissue for storage.

Proteins are classified as complete, incomplete, or partially complete. Complete proteins must be ingested

in the diet. They have enough amino acids to perform necessary bodily functions, such as growth and tissue maintenance. Examples of foods containing complete proteins are soy, quinoa, eggs, fish, meat, and dairy products. Incomplete proteins do not contain enough amino acids to sustain life. Examples of incomplete proteins include most plants, such as beans, peanut butter, seeds, grains, and grain products. Incomplete proteins must be combined with other types of proteins to add to amino acids and form complete protein combinations (Brazier, 2020). For example, vegetarians must be careful to eat complementary proteins, such as grains and legumes, or nuts and seeds, to create complete protein combinations during their daily food intake. Partially complete proteins have enough amino acids to sustain life, but not enough for tissue growth and maintenance. Because of the similarities, most sources consider partially complete proteins to be in the same category as incomplete proteins. See Figure 3 for an image of protein-rich foods.

Figure 3. Protein-rich foods

Fats

Fats consist of fatty acids and glycerol and are essential for tissue growth, insulation, energy, energy storage, and hormone production. Fats provide 38kJ/g of energy (Youdim, 2019). While some fat intake is necessary for energy and uptake of fat-soluble vitamins, excess fat intake contributes to heart disease and obesity.

Fats are classified as saturated, unsaturated, and trans fatty acids. Saturated fats come from animal products, such as butter and red meat (e.g., steak). Saturated fats are solid at room temperature. Recommended intake of saturated fats is less than 10% of daily calories because saturated fat raises cholesterol and contributes to heart disease (Healthwise, 2020).

Unsaturated fats come from oils and plants, although chicken and fish also contain some unsaturated fats. Unsaturated fats are healthier than saturated fats. Examples of unsaturated fats include olive oil, canola oil, avocados, almonds, and pumpkin seeds. Fats containing omega-3 fatty acids are considered polyunsaturated fats and help lower LDL cholesterol levels. Fish and other seafood are excellent sources of omega-3 fatty acids.

Trans fats are fats that have been altered through a hydrogenation process, so they are not in their natural state. During the hydrogenation process, fat is changed to make it harder at room temperature and have a longer shelf life. Trans fats are found in processed foods, such as chips, crackers, and cookies, as well as in some margarines and salad dressings. Minimal trans-fat intake is recommended because it increases cholesterol and contributes to heart disease (Healthwise, 2020).

Micronutrients

Micronutrients include vitamins and minerals.

Vitamins

Vitamins are necessary for many bodily functions, including growth, development, healing, vision, and reproduction. Most vitamins are considered essential because they are not manufactured by the body and must be ingested in the diet. Vitamin D is also manufactured through exposure to sunlight (Johnson, 2022).

Vitamin toxicity can be caused by overconsumption of certain vitamins, such as vitamins A, D, C, B6, and niacin. Conversely, vitamin deficiencies can be caused by various factors, including poor food intake due to poverty, malabsorption problems with the gastrointestinal tract, drug and alcohol abuse, proton pump inhibitors, and prolonged parenteral nutrition. Deficiencies can take years to develop, so it is often a long-term problem for people (Johnson, 2022).

Vitamins are classified as water soluble or fat soluble. Water-soluble vitamins are not stored in the body and include vitamin C and B-complex vitamins: B1 (thiamine), B2 (riboflavin), B3 (niacin), B6 (pyridoxine), B12 (cyanocobalamin), and B9 (folic acid). Additional water-soluble vitamins include biotin and pantothenic acid. Excess amounts of these vitamins are excreted through the kidneys in urine, so toxicity is rarely an issue, though excess intake of vitamin B6, C, or niacin can result in toxicity (Healthwise, 2020). See below for a list of selected water-soluble vitamins, their sources, and their function.

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Fat-soluble vitamins are absorbed with fats in the diet and include vitamins A, D, E, and K. They are stored in fat tissue and can build up in the liver. They are not excreted easily by the kidneys due to storage in fatty tissue and the liver, so overconsumption can cause toxicity, especially with vitamins A and D (Healthwise, 2020). See below for a list of selected fat-soluble vitamins, their sources, their function, and manifestations of deficiencies and toxicities.

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Minerals

Minerals are inorganic materials essential for hormone and enzyme production, as well as for bone, muscle, neurological, and cardiac function. Minerals are needed in varying amounts and are obtained from a well-rounded diet. In some cases of deficiencies, mineral supplements may be prescribed by a health care provider. Deficiencies can be caused by malnutrition, malabsorption, or certain medications, such as diuretics.

Minerals are classified as either macrominerals or trace minerals. Macrominerals are needed in larger amounts and are typically measured in milligrams, grams, or milliequivalents. Macrominerals include sodium, potassium, calcium, magnesium, chloride, and phosphorus.

Trace minerals are needed in tiny amounts. Trace minerals include zinc, iron, chromium, copper, fluorine, iodine, manganese, molybdenum, and selenium (US National Library of Medicine, 2024). See below for a list of selected macrominerals and trace minerals.

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Dietary Guidelines

The Australian Dietary Guidelines produced by the NHMRC offer advice about the amount and kinds of foods required to eat for health and well-being and give several recommendations for adults to maintain good health. The guidelines emphasise enjoying a wide variety of nutritious foods from the five food groups daily. The groups include:

- Vegetables of different types and colours, and legumes/beans
- Fruit
- Grain (cereal) foods, mostly wholegrain and/or high cereal fibre varieties, such as breads, cereals, rice, pasta, noodles, polenta, couscous, oats, quinoa, and barley
- Lean meats and poultry, fish, eggs, tofu, nuts and seeds, and legumes/beans
- Milk, yoghurt, cheese and/or alternatives, mostly reduced fat.

Further advice is to drink plenty of water and limit the intake of foods containing saturated fat, added salt, added sugars, and alcohol.

To achieve and maintain a healthy weight, a person needs to be physically active and choose nutritious foods and drinks that meet energy needs. Maintaining a healthy weight requires a diet in which nutrient requirements are met and total energy intake does not often exceed total energy expenditure (NHMRC, 2013).

Link to Learning

Read the Eat For Health Australian Dietary Guidelines summary from the National Health and Medical Research Council (2013) for further insight into evidence-based advice on dietary requirements.

Factors Affecting Nutrition

Many factors can cause altered nutrition, such as physiological factors, cultural and religious beliefs, economic resources, drug and nutrient disorders, surgery, altered metabolic states, alcohol and drug abuse, and psychological states.

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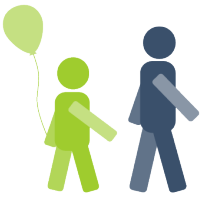
Lifespan Considerations

Newborns and Infants

A crucial amount of growth and development happens between birth to age two. For proper growth, development, and brain function, this age group requires nutrient-dense food choices, primarily because they eat so little compared to adults, but also because of their rapid growth rate that is higher than any other time of development. Ideally, newborns through age six months should be fed exclusively human breast milk, if possible, to develop immunity. Vitamin D and iron supplementation may be needed. For the first two to three days after birth, human milk contains colostrum, a thick yellowish-white fluid rich in proteins and immunoglobulin A (IgA). There are many reasons infants may not be breastfed, including insufficient breast milk production, a personal choice not to breastfeed, or adoption of the newborn. If breastfeeding is not an option, an iron-fortified commercial infant formula should be used exclusively through at least six months of age. Infants fed 100% commercial infant formula will not need vitamin D supplementation.

After about six months of age, infants should begin to be introduced to additional nutrient-dense complementary foods that are developmentally appropriate. Foods should be introduced one at a time to monitor for food sensitivities. Introducing food at this time is to provide a varied diet, additional nutrients, and an introduction to different flavours and textures of food. Research shows that introduction to certain allergy-risk foods, such as peanut butter prior to one year of age, helps decrease the risk of developing a peanut allergy later in life (Australasian Society of Clinical Immunology and Allergy, 2024). It is important to strictly avoid honey and other unpasteurised food and drink before one year of age to prevent botulism and other bacteria due to immature gut immunity. Additionally, cow's milk, fortified soy drinks, and fruit or vegetable juices should not be introduced before one year of age.



Children and Adolescents

Growth rate continues to be rapid from ages one through five, requiring adequate nutrition to meet these growth and metabolic demands. Kilojoule and nutritional intake requirements increase proportionately with age, but unfortunately, the quality of diet tends to decrease proportionately with age. This is in part due to younger children being dependent on adults for nutritional choices and intake while older children and adolescents begin to make their own food choices as they enter school. Healthy dietary habits formed in childhood through adolescence help prevent obesity, cardiovascular disease, diabetes mellitus, and other chronic diseases later in life. It is important to provide children with a variety of different foods prepared in different ways to increase the likelihood of children accepting and growing accustomed to different foods. It is common for children to become picky in their food choices or decide to only eat one or a few different food items over a period of time. Allowing children to help select and prepare food can increase their acceptance of different food choices.

Adults

A major limiting factor to healthy nutrition in adults is the development of poor nutritional habits early in life. These unhealthy diet habits can be very difficult to change due to food preferences, as well as lack of knowledge about proper nutrition. Metabolic rate and kilojoule needs decrease with increasing age. Females tend to require less kilojoule intake than males, though kilojoule and nutritional needs increase with pregnancy and breastfeeding. Without appropriate dietary intake or activity, weight gain will occur that can lead to obesity and other chronic diseases. Education regarding a healthy diet, including appropriate kilojoules, saturated fat, sugar, and sodium intakes, helps improve health in adults.

Pregnancy and Lactation

A well-balanced, healthy diet is essential during pregnancy and lactation to prevent maternal, foetal, and newborn problems. Nutritional requirements, such as kilojoules, vitamins, and minerals, increase during pregnancy and lactation. Increased kilojoule needs should be met with nutrient-dense foods rather than kilojoule-dense foods that are higher in fats and sugars. Prenatal vitamins and mineral supplements are often prescribed during pregnancy and lactation, in addition to a nutrient-rich diet, to help ensure women meet requirements for folic acid, iron, iodine, choline, and vitamin D. Folic acid is necessary to prevent neural tube defects in the foetus during the first trimester of pregnancy. Iron requirements increase during pregnancy to support foetal development and prevent anaemia. Iodine requirements increase during pregnancy and lactation for foetal neurocognitive development.

Older Adults

Older adults are more likely to suffer from chronic illness and disease. Older adults have lower kilojoule needs than younger people, though they still need a diet full of nutrient-dense foods because their nutrient needs increase. Kilojoule needs decrease due to decreased activity, decreased metabolic rates, and decreased muscle mass. Chronic disease and medication can contribute to decreased nutrient absorption. Protein and vitamin B12 are commonly underconsumed in older adults. Protein is necessary to prevent loss of muscle mass. Vitamin B12 deficiency can be a problem for older adults because absorption of vitamin B12 decreases with age and with certain medications. Adequate hydration is also a concern for older adults because feelings of thirst decrease with age, leading to poor fluid intake. Additionally, older adults may be concerned with bladder dysfunction so they may consciously choose to limit fluid intake. Loneliness, ability to chew and swallow, and poverty can also decrease dietary intake in older adults.

Altered Nutrition

Malnutrition

Malnutrition is defined as a deficiency in nutrients such as energy, protein, vitamins, and minerals, leading to adverse impacts on body composition, function, or clinical outcomes (Australian Commission on Safety and Quality in Health Care [ACSQHC], 2018). It encompasses both undernutrition and overnutrition and can both cause and result from poor health (ACSQHC, 2018). Patients who are malnourished require more substantial care, rely more heavily on hospital resources, have higher healthcare costs, and face the possibility of longer hospital stays with increased risk of morbidity and mortality (Cass and Charlton, 2022). Consequently, Australian hospitals now incorporate nutrition screening into their admission protocols, focusing on identifying and managing undernourished patients and addressing malnutrition in those below a healthy weight (Elliot et al., 2023).

Malnutrition Screening

Malnutrition screening is a key component of nutritional care, particularly for older adults and hospitalised patients. Screening identifies individuals who are malnourished or at risk of malnutrition so that further assessment and intervention plans can be implemented (Dent et al., 2023). With malnutrition in acute hospitals estimated at approximately 40% (ACSQHC, 2018), it is recommended that hospitals have systems in place that identify, prevent and manage malnutrition.

Link to Learning

Read the ACSQHC factsheet, Hospital-Acquired Complication – 13. Malnutrition, about selected best practice and suggestions for improvement of hospital-acquired malnutrition to learn more about recommendations for malnutrition in hospitalised patients.

Screening Tools

Several screening tools exist, and their use will depend on the health facility. Nurses need to understand nutritional assessment and be able to perform a basic evaluation, identify those at risk, and refer them for further assessment by a dietitian. A valid tool should be used for screening; however, no one tool can be recommended over the other (Moola, 2022).
Tools that may be used include:

- Malnutrition Screening Tool (MST): A validated and reliable tool for adult acute hospital patients.
- Malnutrition Universal Screening Tool (MUST): Consists of three items: weight loss, acute disease, and BMI. A maximum score of 6 indicates a high risk of malnutrition.
- Mini Nutritional Assessment–Short Form (MNA-SF): A common nutritional screening tool for older populations.
- Subjective Global Assessment (SGA): A tool that subjectively considers functional capacity, weight loss history, changes in dietary intake, comorbidities, gastrointestinal issues, and physical features.

By incorporating these screening tools into the admission process, healthcare providers can ensure that patients receive the necessary nutritional care to support their overall health and recovery.

Dysphagia

Dysphagia, also known as difficulty swallowing, is common in a range of conditions such as stroke, dementia, Parkinson's disease, and head and neck cancers (McIntosh, 2023). This condition puts the patient at risk of malnutrition, dehydration, aspiration pneumonia and airway obstruction (McIntosh, 2023; Heaton et al., 2020).

Detection and Management of Dysphagia

Nurses play a vital role in the detection and management of dysphagia.

Detection

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Management

The main goal in the management of dysphagia includes reducing the risk of aspiration and ensuring adequate nutrition and hydration. Nurses' responsibility is to provide oral and airway care, safe feeding practices and respiratory monitoring (Rose et al., 2025).

The nurse can implement the following interventions to reduce the risk of aspiration.

- Emergency suction equipment should be checked and nearby.
- Ensure appropriate oral hygiene and assist where required.
- Position the person at 30 to 45 degrees, especially if they are receiving tube feeds (Rose et al., 2025).
- Ensure the person is fully alert prior to commencing meals.
- Sit the person out of bed in a chair for meals when possible.
- Provide a quiet and distraction-free environment during meals.
- Ensure meals supplied meet prescribed diet requirements (IDDSI framework see below).
- Guide patient to take small mouthfuls, and to complete mouthful prior to the next.
- If choking or coughing occurs, remove food and reassess swallow.
- Check mouth for residual food after completion of meal.
- Keep person in upright position for approximately 20-30 minutes post eating to prevent regurgitation (McIntosh, 2023).

Modified Diet for Dysphagia

The International Dysphagia Diet Standardised initiative (IDDSI) framework was adopted in Australia in 2019 for the labelling and testing of modified texture of food and fluids. The framework is endorsed by Speech Pathology Australia and the Dieticians Association of Australia.

The IDDSI framework consists of eight levels (0–7) describing texture-modified foods and thickened liquids used for individuals with dysphagia. Click or tap on the "+" buttons below to read more about these levels.

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Link to Learning

For a more detailed description of the levels please see the Complete IDDSI Framework Detailed Definitions 2.0.

Prescribed Special Diets

Patients may be prescribed a special diet to treat a disease process, to prepare for examination or surgery or to allow rest and recovery of organs. Diets may be modified in texture, energy, nutrients, seasoning or consistency. See Table 1 for variations in prescribed special diets.

Table 1. Commonly Prescribed Special Diets

Diet	Description	Example	Indication
NBM	Nothing by mouth–no food or drink allowed	Oral care only	Before and after surgery or procedures. When peristalsis is absent, or during severe nausea or vomiting episodes.
Clear Fluids	Fluids or solids that are liquid at room temperature, without residue, clear, or see-through	Water, apple juice, black tea or coffee, jelly, ice-blocks, and broth	After surgery, when peristalsis is slow and diet is being advanced from NBM status
Full Fluids	Fluids with residue	Creamed soups, milk, custard, ice-cream, orange juice, and creamed cereals	Next step after clear fluids, as diet is being advanced
Lite diet	Normal consistency foods with low residue containing low seasoning fats and salt	Reduced fat, reduced salt plain foods	May be prescribed following full fluids before advancing to Full diet.
Full diet	There is no restriction on diet	No restriction	No indication requiring restriction
Minced diet	Chopped, ground, pureed foods that break apart easily without a knife	Soft cheeses, cottage cheese, ground meat, broiled or baked fish, cooked vegetables, and fruit	Poor or absent dentition; dysphagia
Pureed	Spoon thick with consistency of baby food	Applesauce, mashed potatoes, pureed meats, vegetables, and fruit	Dysphagia
Restrictive	Modified dependent on disease process	Diabetic: controlled amount of carbohydrates	Diabetes mellitus

	Cardiac: low fat and no added salt	Heart disease
	Renal: low-sodium and low-potassium containing foods	Renal failure or dialysis

Assessing Nutrition

While a full nutritional assessment is often conducted by a dietitian, nurses are required to screen nutritional status and refer for further assessment if needed. Kesari and Noel (2023) indicate that a systematic approach to nutritional assessment should be undertaken, which includes clinical examination, diagnostic tests, and dietary assessments. One such approach is the ABCDE approach to nutritional assessment: anthropometric, biochemical, clinical, dietary, and environmental factors.

General Information – the Health Interview

Begin the health interview by collecting information on the patient's age, sex, medication history, past medical, surgical history, current activity levels, and overall general health status.

Figure 4. Nurse gathering nutritional information from a patient during interview

ABCDE Approach to Nutritional Assessment

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Height, Weight and BMI Measurements

Figure 5. Nurse measuring a patient's height and weight

Height and weight should be accurately measured and documented. Height should be measured with the patient standing whenever possible. Weight is most accurately assessed in the morning prior to any dietary input. It should be taken on the same scale with similar weight clothing and at the same time on each occasion. Weight of the patient is normally recorded on admission and weekly thereafter if considered for weight management. If weight is required for fluid management, then it is taken daily.

Height and weight in infants and children are plotted on a growth chart to give a percentile ranking. The infant or child should show a trend of consistent height and weight increase.

Height and weight in adults are used to calculate a patient's Body Mass Index (BMI). BMI is a body composition measure comparing weight relative to height.

- BMI = weight (kg)/height (m2)

To calculate BMI using a BMI table, the person's height is plotted on the horizontal axis and their weight is plotted on the perpendicular axis. The BMI is measured where the lines intersect. See Figure 6 for an image of a BMI table. BMI is interpreted using the following ranges:

- Less than 18.5: Underweight
- 18.5-24.9: Desirable range
- 25-29.9: Overweight
- Equal or greater than 30: Obese

Please note, although commonly used in healthcare settings, BMI is not indicative of an individual's overall health status and can be inaccurate for certain populations.

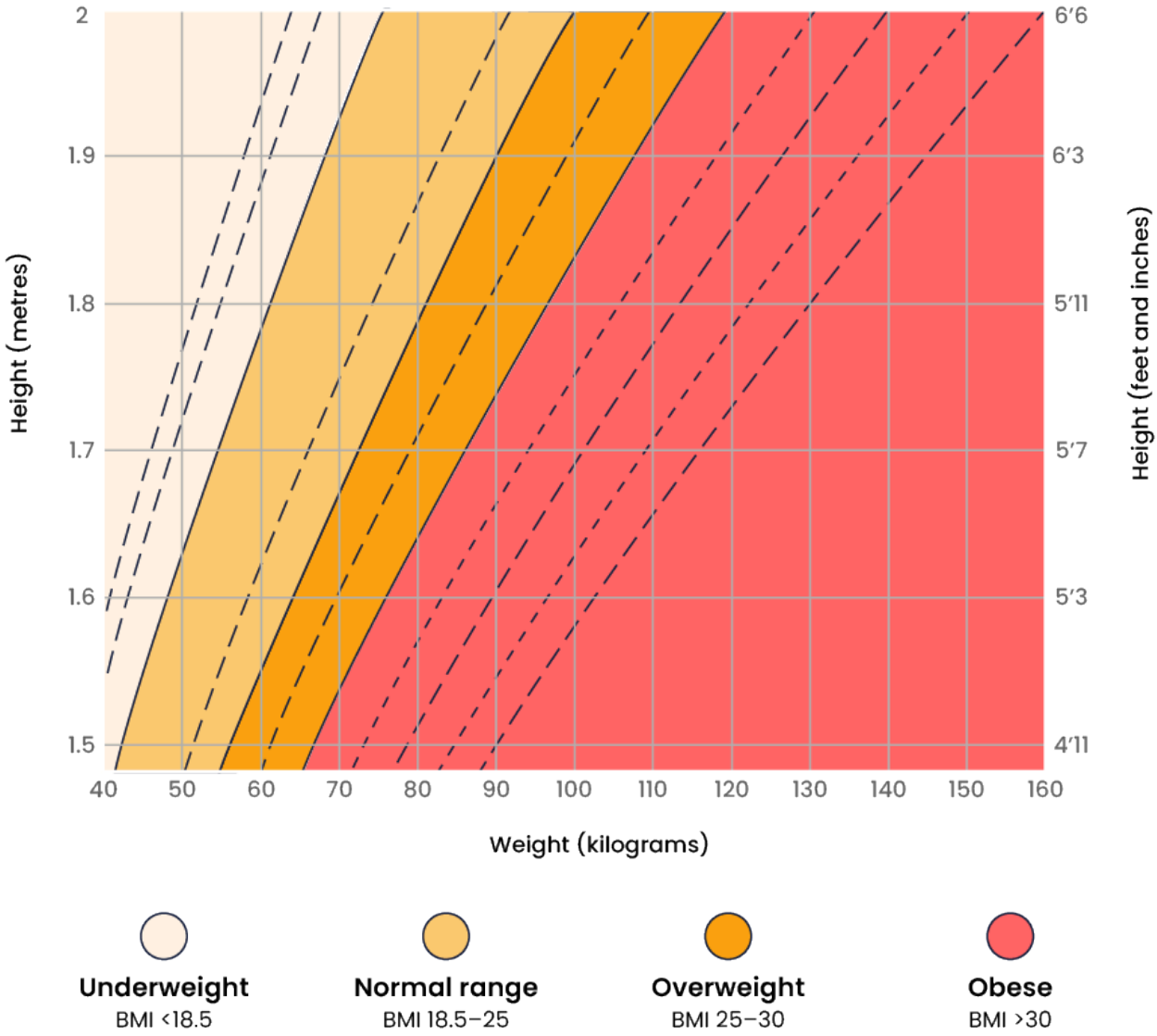

Figure 6. BMI chart

Enteral Nutrition

Enteral nutrition is administered directly to a patient's gastrointestinal tract while bypassing chewing and

swallowing. Enteral feedings are prescribed for patients when chewing and/or swallowing are impaired or when there is poor nutritional intake and/or malnutrition. Examples of enteral tube access are:

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See Figure 7 for an illustration of common enteral tube placement.

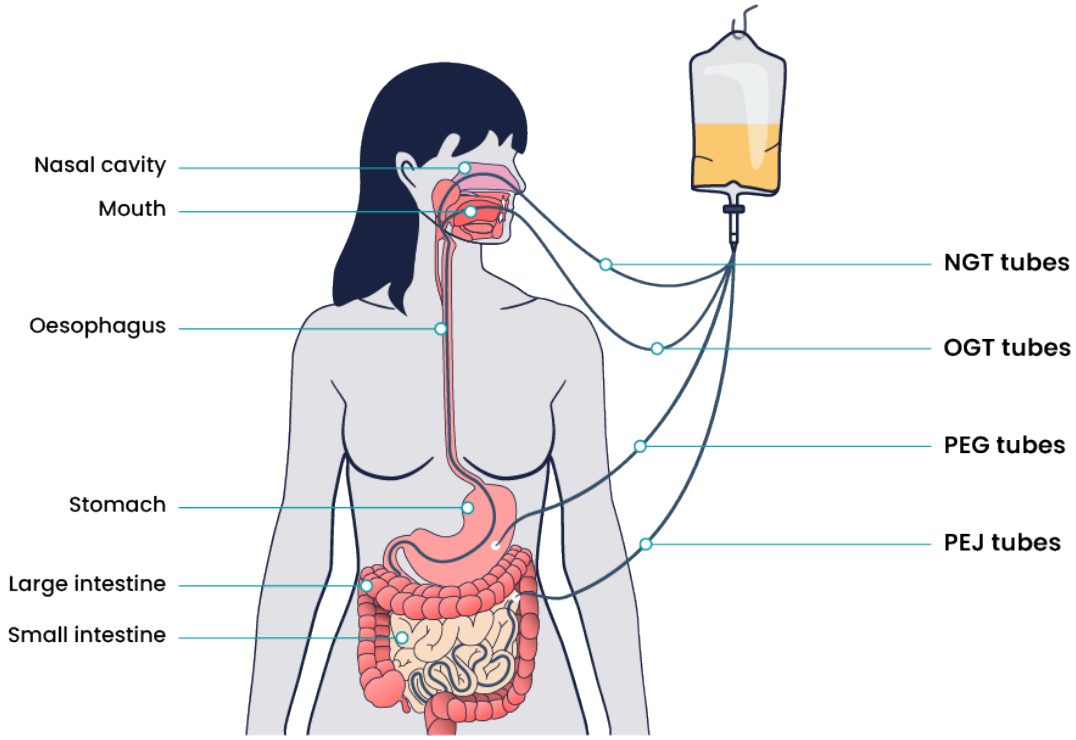

Figure 7. Enteral tube access

Management and Monitoring of Enteral Feeding

There are several safety considerations for nurses to implement when enteral nutrition is being administered to prevent aspiration and dehydration. Tube placement must be verified after insertion, as well as before every medication or feeding is administered, to prevent inadvertent administration into the lungs if the tube has migrated out of position. Follow your organisational policy regarding checking placement. Generally, this is checked by measuring the visible tube length and comparing it to the length documented during X-ray verification. Older methods of checking tube placement included observing aspirated GI contents or the administration of air with a syringe while auscultating (commonly referred

to as the "whoosh test"). However, research has determined these methods are unreliable and should no longer be used to verify placement.

In addition to verifying tube placement before administering feedings or medications, nurses perform additional interventions to prevent aspiration. The following guidelines help to reduce the risk of aspiration:

- Maintain the head of the bed at 30°–45° unless contraindicated
- Use sedatives as sparingly as possible
- Assess feeding tube placement at four-hour intervals
- Observe for change in the amount of external length of the tube
- Assess for gastrointestinal intolerance at four-hour intervals.

Gastric residual volume (GRV) monitoring is used in patients receiving enteral nutrition (EN) to assess feeding tolerance and absorption of feeds to reduce the risk of vomiting and possible aspiration. GRV is checked by aspirating all gastric contents of the stomach. The aspirated volume is measured and recorded. The number of millilitres of fluid aspirated from the stomach is noted and depending on the hospital policy, the GRV will either be returned (if acceptable volume) or discarded (if high volume) and the feed either ceased to rest the gut (if high volume), continued at current rate (if acceptable GRV), or increased if goal rate of feeds is not yet achieved. Determination of intolerance should be done in conjunction with other signs such as abdominal bloating, nausea, vomiting, diarrhoea, cramping, and constipation.

The nasogastric feed procedure is discussed below.

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Total Parenteral Nutrition (TPN)

Parenteral nutrition is nutrition delivered through a central intravenous line, generally the subclavian or internal jugular vein, to patients who require nutritional supplementation but are not candidates for enteral nutrition. Parenteral nutrition is an intravenous solution containing glucose, amino acids, minerals, electrolytes, and vitamins. A lipid solution is typically given in a separate infusion in a hospital setting. This combination of solutions is called total parenteral nutrition because it supplies complete nutritional support. Parenteral nutrition is administered via an IV pump. Because parenteral nutrition consists of concentrated glucose, amino acids, and minerals, it is very irritating to the blood vessels. For this reason,

a large central vein must be used for administration. The patient's pathology results must also be closely monitored for signs of nutrient excesses.

Parental nutrition is generally made up of three compartments: one with glucose, one with amino acids, and one with lipids. The three compartments are kept separate to enable storage at room temperature but are mixed together before use. Parenteral nutrition is typically used when the patient's intestines or stomach is not working properly and must be bypassed, such as during paralytic ileus where peristalsis has completely stopped, or after postoperative bowel surgeries, such as bowel resection. It may also be prescribed for severe malnutrition, severe burns, metastatic cancer, liver failure, or hyperemesis with pregnancy.

Nursing Interventions

Promoting Appetite and Providing Meal Assistance

Provide foods that patient enjoys. If unavailable in the facility, suggest to the family to bring foods from home. (Be conscious of any diet restrictions.)

Provide hygiene. Assist to wash hands. Provide oral hygiene to enhance the ability to taste.

Ensure comfort during meals. Manage symptoms of pain or nausea prior to mealtimes. Offer to use the restroom if needed.

Avoid procedures immediately prior to meals. Schedule wound dressing or invasive procedures that may impact appetite after meals when able.

Remove any unpleasant odours or sights. Remove any urinals, bedpans, commodes from the area and ensure the area is free from clinical waste.

Position the patient. Assist them to sit in a chair or sit in high Fowler's position in bed. Set the meal tray on an overbed table and open containers as needed.

Encourage independence. Utilise modified utensils to assist and maintain independence if required. Options include grip mats, plates with grip edges, cups with lids and easy grip, wide grip cutlery (See Figure 8 below).

Assisting the patient. Ask the patient what food they would like and when. Do not rush the patient, allow them to eat at their own pace with time between bites for thorough chewing and swallowing.

Vision impairment. Explain the location of the food using the clock method. For example, "Your vegetables are at 3 o'clock, your potatoes are at 9 o'clock, and your meat is at 12 o'clock." (See Figure 9 below)

Safety. Monitor for signs of difficulty swallowing, such as coughing or gagging. If it occurs, stop the meal and notify the medical staff of suspected swallowing difficulties.

Figure 8. Example of eating utensils

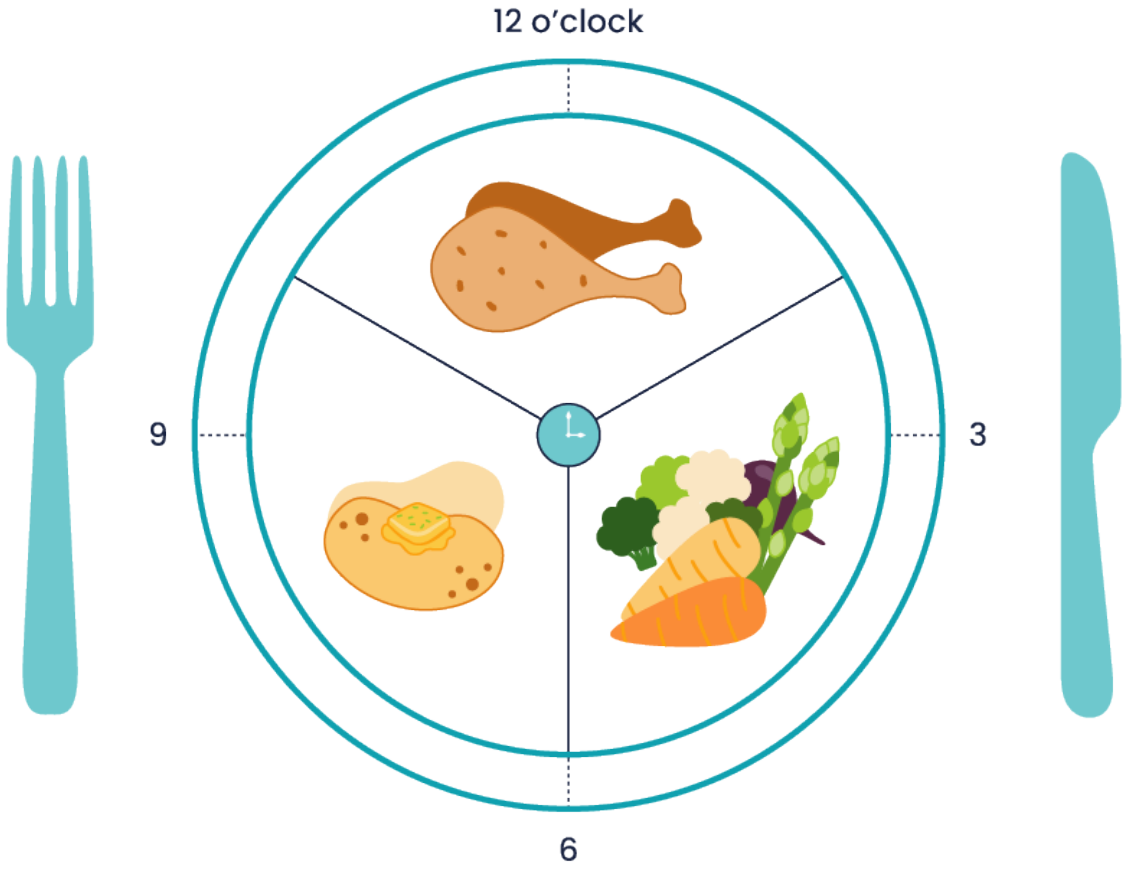

Figure 9. Food location on plate

Blood Glucose Monitoring

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https://jcu.pressbooks.pub/nursing-skills-foundations/?p=53#h5p-203

Key Takeaways

In this chapter, we covered:

- The importance of nutrition and how it plays a vital role in overall health and well-being by assisting in the prevention and treatment of disease
- The structure and function of the gastrointestinal/digestive system
- Essential nutrients and how they are used by the body for growth, energy and bodily processes. These include Macronutrients (carbohydrates, protein, fats) and Micronutrients (vitamins and minerals).
- Factors affecting nutrition such as growth and development, gender, health status, cultural and religious beliefs, socioeconomic status, medication, surgery, alcohol consumption and psychological factors
- Lifespan considerations of newborns and infants, children and adolescents, adults, pregnancy and lactation, and older adults for nutritional requirements
- Alteration in nutrition, such as malnutrition, and screening tools for this, as well as dysphagia and its detection and management
- Commonly prescribed diets such as NBM, clear fluids, full fluids, mechanical soft, pureed, restrictive and thickened fluids
- How to assess nutritional status with the ABCDE approach along with height, weight and BMI measurements
- Different ways to deliver nutrition, including enteral nutrition, nasogastric tubes (NGT), orogastric tubes, percutaneous endoscopic gastrostomy (PEG) tubes, as well as total parenteral nutrition
- Nursing interventions to promote good nutrition and assist patients with feeding to promote independence.

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ASSESSING AND SUPPORTING ELIMINATION

Kate Hurley and Sandra Dash

Learning Outcomes

In this chapter you will learn how to:

- Describe the different components of the urinary system and gastrointestinal system
- Recognise common complications in elimination and understand how to promote urinary and bowel elimination
- Examine lifespan considerations and how these can impact the elimination system
- Describe general ostomy care and identify the common sites for stoma formation
- Understand fluid balance and document actions and observations appropriately on recognised tools.

Introduction

Elimination is a basic human function of excreting waste through the bowel and urinary system. The process of elimination depends on many variables and intricate processes that occur within the body. Many medical conditions and surgeries can adversely affect the processes of elimination, so nurses must facilitate their patients' bowel and urinary elimination as needed. Common nursing interventions related to facilitating elimination include inserting and managing urinary catheters, obtaining urine specimens, caring for ostomies, providing patient education to promote healthy elimination, and preventing complications. In this chapter, we will discuss the technical skills used to support bowel and bladder function, as well as the application of the nursing process while doing so.

Basic Concepts

Before discussing specific procedures related to facilitating bowel and bladder function, let's review basic

concepts related to urinary and bowel elimination. When facilitating alternative methods of elimination, it is important to understand the anatomy and physiology of the gastrointestinal and urinary systems, as well as the adverse effects of various conditions and medications on elimination. Use the information below to review these topics.

Urinary System

The urinary system, also referred to as the renal system or urinary tract, consists of the kidneys, ureters, bladder, and urethra. The purpose of the urinary system is to eliminate waste from the body, regulate blood volume and blood pressure, control levels of electrolytes and metabolites, and regulate blood pH. The kidneys filter blood in the nephrons and remove waste in the form of urine. Urine exits the kidney via the ureters and enters the urinary bladder, where it is stored until it is expelled by urination (also referred to as voiding or micturition). See Figures 1 and 2 for an image of the female and male urinary system.

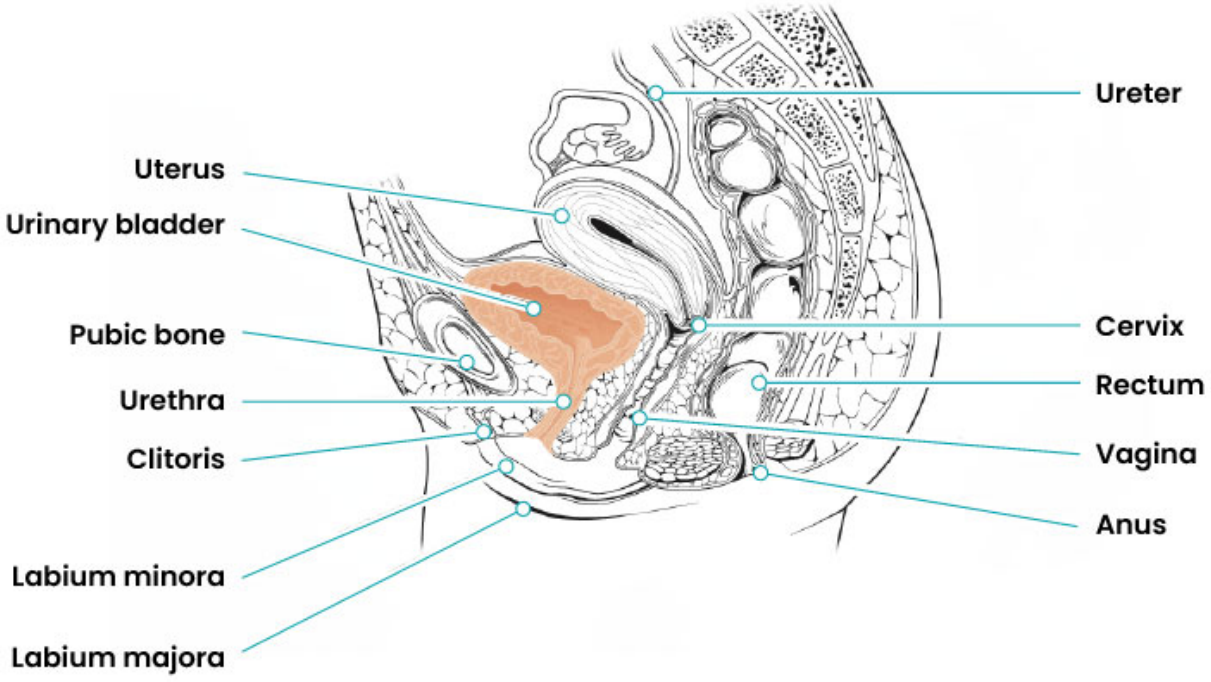

Figure 1. The female urinary system

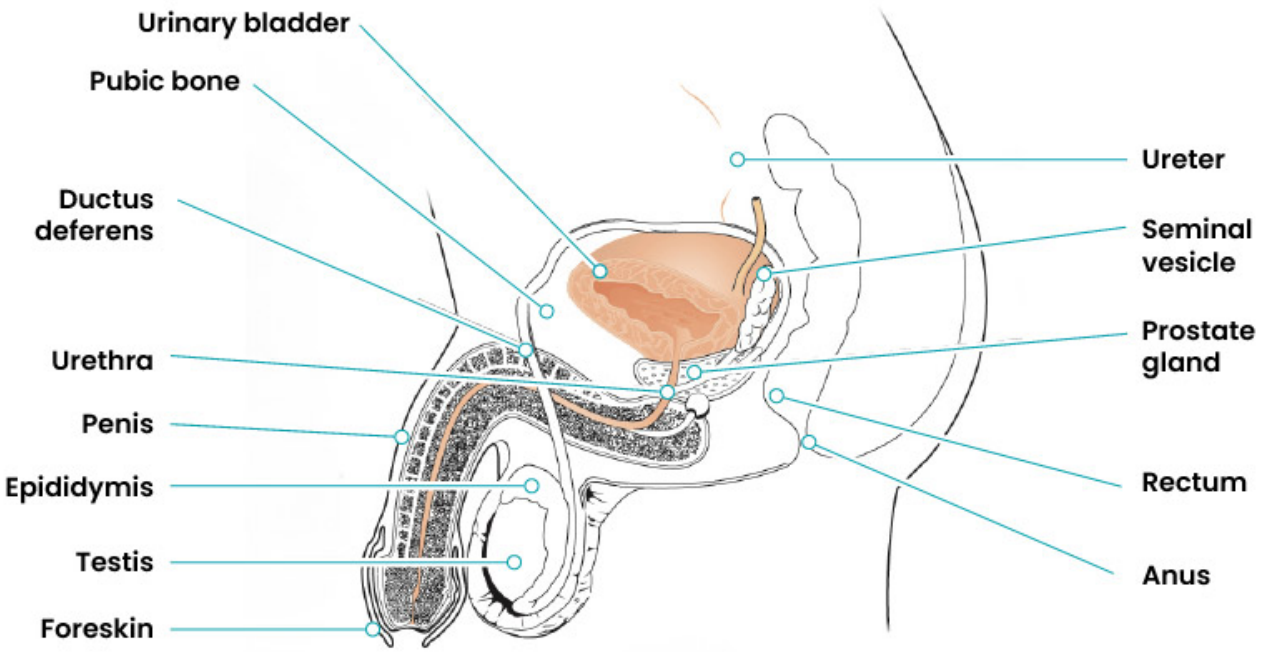

Figure 2. The male urinary system

A healthy adult with normal kidney function produces 800-2,000 mL of urine per day, depending on fluid intake, as well as the amount of fluid lost through sweating and breathing. A bladder can hold approximately 350 – 500mLs of urine at any time and when emptied there should be no residual urine remaining. Normal urine should be clear, pale to light yellow in colour, and not foul-smelling. However, some foods or medications may change the smell or colour of urine. Infections such as a **urinary tract infection** will change the colour of the urine to a darker colour and will produce an odour. Nurses frequently monitor and document a patient's urine output as part of the overall plan of care. This nurse may use various devices such as urinals, pans, specifically designed containers, and catheters to capture and measure urine amount accurately. For infants and toddlers, the number of daily wet nappies provides a general measure of urine output.

Lifespan Considerations

Newborns

Bowels: Meconium-first bowel movement. Other bowel movements depend on the mode of feeding.

Urine: Urination could be anywhere between every 1–3 hrs or 4–6 times per day.

IDC (indwelling catheter): Parent/caregiver must be present when inserting.

Toddlers

Bowels: Toilet training period.

Urine: Toilet training period. Enuresis occurs (bed wetting). Limited verbal communication and immature neuromuscular control.

IDC (indwelling catheter): Parent/caregiver must be present when inserting.

Children

Bowels: Risk of constipation due to not going at school.

Urine: Peer pressure on bathroom habits at school, body image concerns, and irregular fluid intake.

IDC (indwelling catheter): Parent/caregiver must be present when inserting. Blowing into straws helps relax pelvic muscles.

Adults

Bowels: At risk of lifestyle changes such as Crohn's disease, diverticulitis and irritable bowel syndrome.

Urine: Females have risk of urinary incontinence and males have risk of urgency and urinary retention. Work, study, and social activities can affect voiding patterns. Limited restroom access in some jobs.

IDC (indwelling catheter): Female genital mutilation and childbirth can alter anatomy.

Older Adults

Bowels: Peristalsis slows and there is risk of constipation.

Urine: Increased risk of UTIs. Age-related muscle weakening. Reduced mobility. Increased medication use. Diminished sensory perception. Chronic conditions and comorbidities.

IDC (indwelling catheter): Possible urogenital tissue atrophies in older women.

Urinary Elimination Devices

This section will focus on the devices used to facilitate urinary elimination. Some common types of devices used to collect waste will be presented, including a focused section on urinary catheterisation.

A patient hospitalised without a urinary catheter, can eliminate waste (urine or faeces) with the assistance of various other aids. A bed pan is an continence aid that is regularly used to toilet patients who are not able to mobilise to the toilet, either as a result of surgery or other medical conditions. Figure 3 shows one type of bed pan. This particular bed pan is referred to as a slipper pan and has a cardboard insert which is easily destroyed in the macerator or sluice after use. This pan "slips" under the patient whilst they are lying down and can easily be removed once the patient has eliminated their waste (urine and/or stool).

Figure 3. Bed pan

A commode chair is another type of continence aid that is mobile and on wheels (Figure 4). This device is appropriate for a patient who is unable to mobilise or finds mobilisation difficult. For ease of use, the chair can be wheeled over the toilet, the brakes on the wheels engaged, giving the patient privacy to eliminate their bowels and/or bladder.

Figure 4. Commode chair

A male urine bottle is another commonly used continence aid (Figure 5) for patients that are not able to void into the toilet or are required to measure the amount of urine they are passing. This elimination device works by placing the penis into the top of the bottle and collecting the urine eliminated from the patient. The measurement indicators on the side of the bottle making this device appropriate to use if there is a requirement to measure the urine output of a patient. This urinary device can only be used by male patients and should only be used on individuals who are alert and conscious of their movements, as the bottles can spill easily.

Figure 5. Urinal bottle

Urinary Catheters

Urinary catheterisation is the insertion of a catheter tube into the urethral opening and placing it in the neck of the urinary bladder to drain urine. There are several types of urinary elimination devices, such as indwelling catheters, intermittent catheters, suprapubic catheters, and external devices. Each of these types of devices is described in the following subsections.

Indwelling Catheter

An indwelling catheter, often referred to as a "Foley catheter," refers to a urinary catheter that remains in place after insertion into the bladder for the continual collection of urine. It has a balloon on the insertion tip to maintain placement in the neck of the bladder. The other end of the catheter is attached to a drainage bag for the collection of urine. See Figure 6 for an illustration of the anatomical placement of an indwelling catheter in the bladder neck.

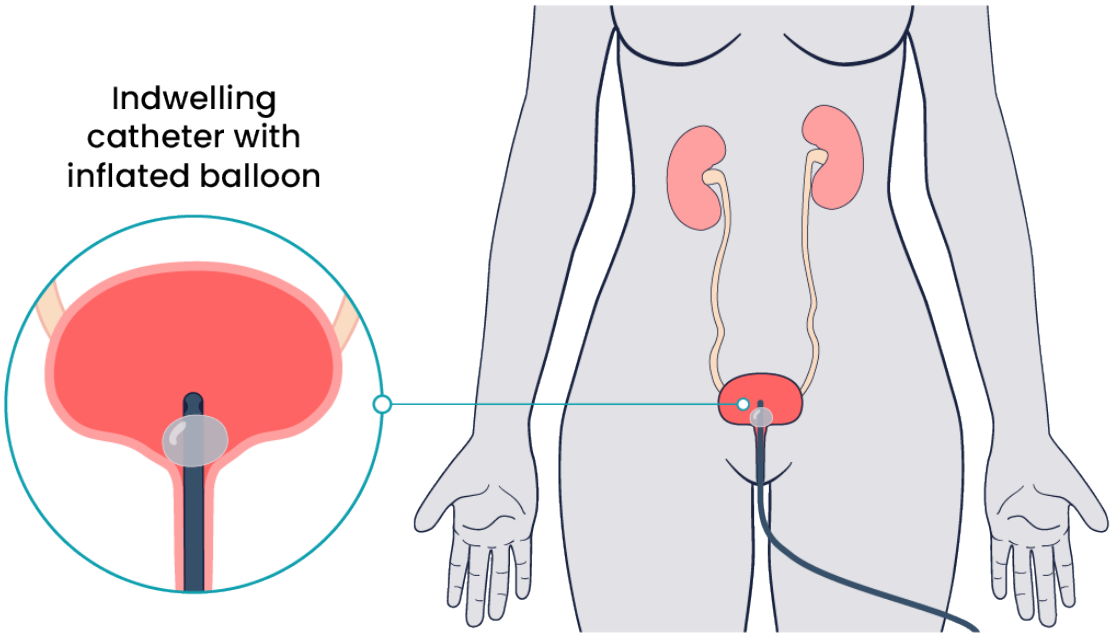

Figure 6. Placement of an indwelling catheter

The distal end of an indwelling catheter has a urine drainage port that connects to a drainage bag. The size of the catheter is marked at this end using the French catheter scale. A balloon port is also located at this end, where a syringe is inserted to inflate the balloon after it is inserted into the bladder. The balloon port is marked with the amount of fluid required to fill the balloon. See Figure 7 for an image of the parts of an indwelling catheter.

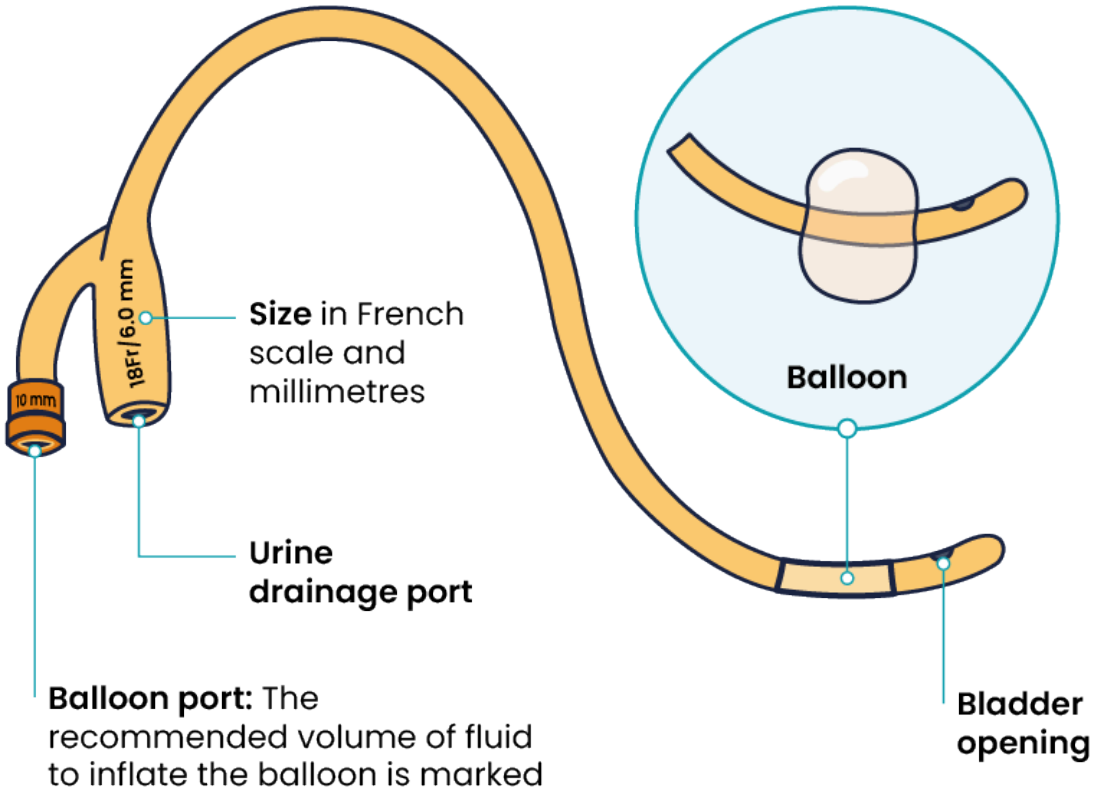

Figure 7. Parts of an indwelling catheter

Catheters have different sizes, with the larger the number indicating a larger diameter of the catheter. See Figure 8 for an example of the French catheter scale.

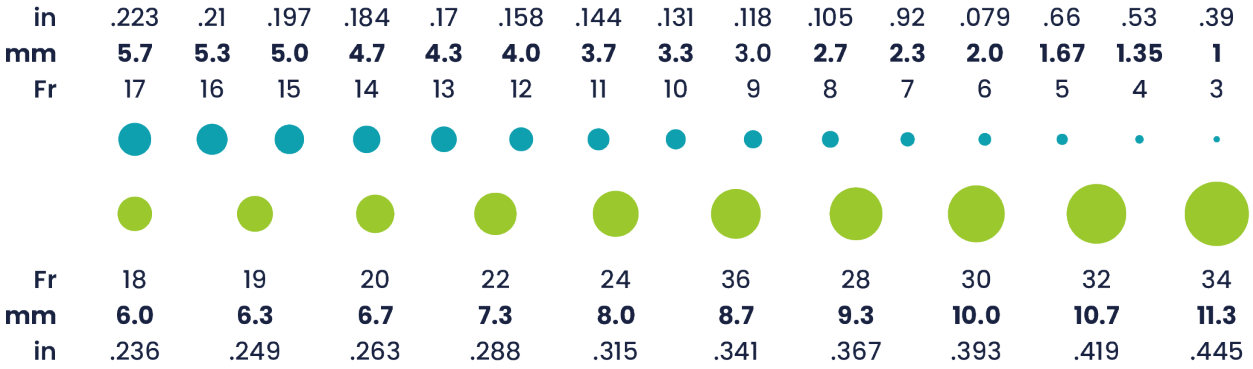

Figure 8. Catheter sizes found on a French catheter scale

There are two common types of bags that may be attached to an indwelling catheter. During inpatient or long-term care, larger collection bags that can hold up to two litres of fluid are used. These bags should be emptied when they are half to two-thirds full to prevent traction on the urethra from the bag. When collecting urine, the collection bag should always be placed below the level of the patient's bladder so that urine flows out of the bladder and urine does not inadvertently flow back into the bladder. The tubing

should be checked regularly to ensure it is not coiled, kinked, or compressed, obstructing the flow of urine into the collection bag. The tubing from the bladder to the bag should not be pulled tight to ensure it remains in situ and does not injure the patient's urethra. To prevent the development of a urinary tract infection, the bag should not touch the floor. See Figure 9 for an image of a typical collection bag attached to an indwelling catheter.

Figure 9. Urine collection bag

See Figure 10 for an illustration of the placement of the urine collection bag when the patient is lying in bed.

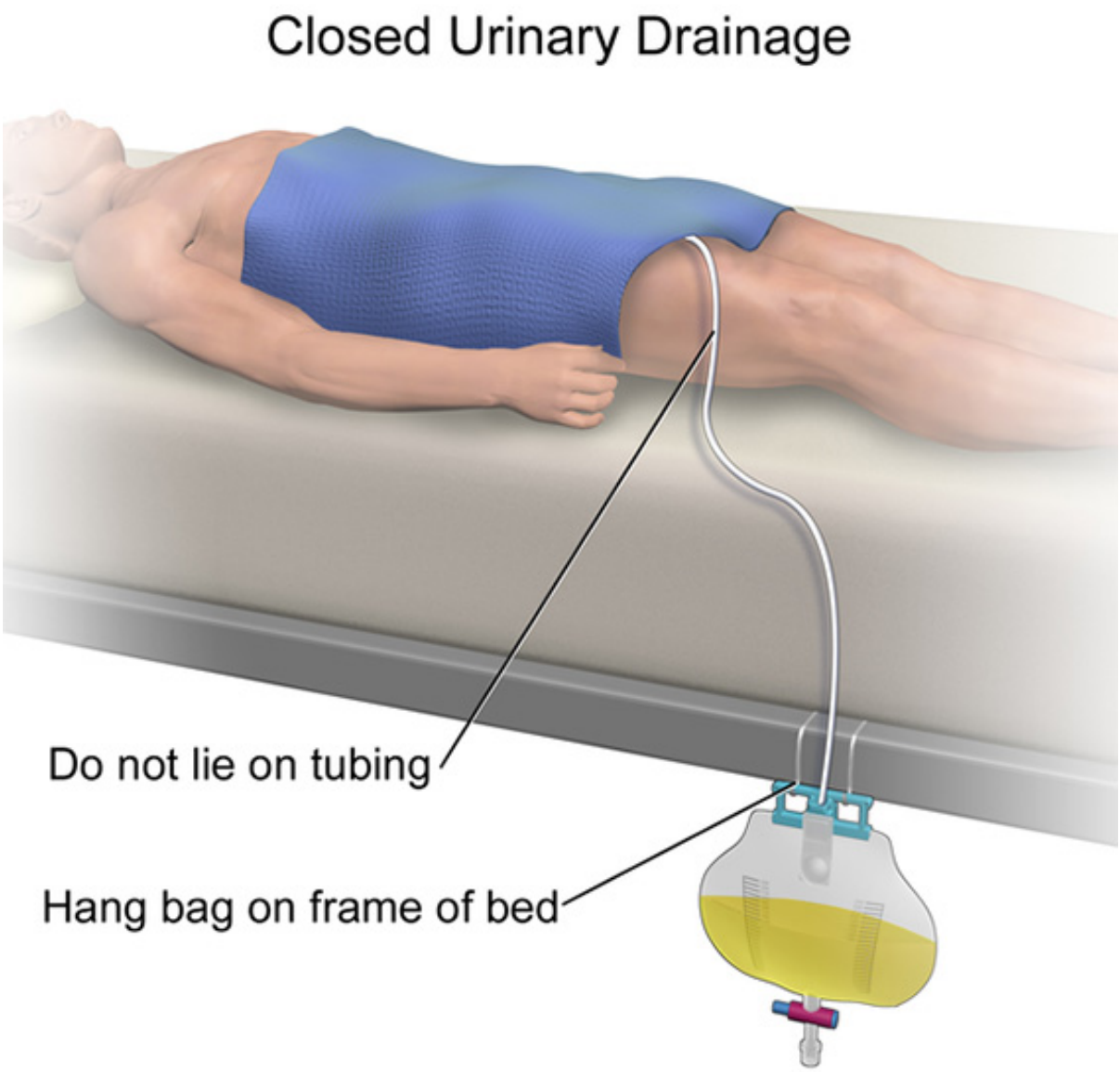

Figure 10. Placement of urine collection bag

A second type of urine collection bag is a leg bag (Figure 11). A leg bag can provide discretion when the patient is in public because it can be worn under clothing. A leg bag is smaller and must be emptied more frequently to avoid overfilling.

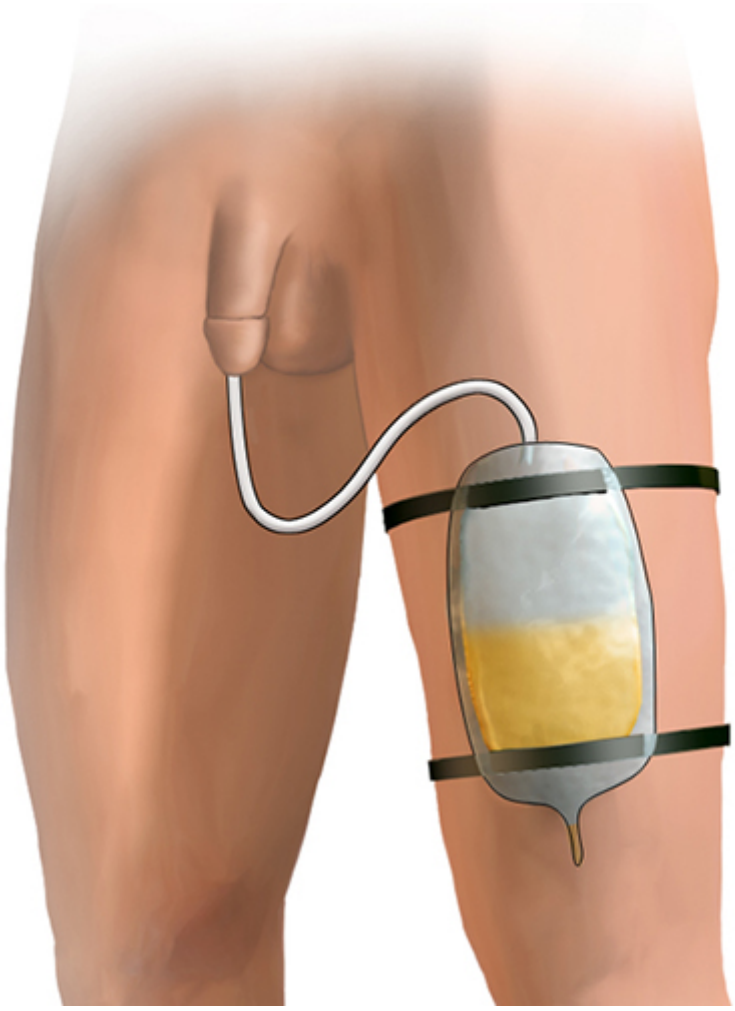

Figure 11. Indwelling catheter attached to leg

Straight Catheter

A straight catheter (Figure 12) is used for intermittent urinary catheterisation. The catheter is inserted to allow for the flow of urine and then immediately removed, so a balloon is not required at the insertion tip. Intermittent catheterisation is used for the relief of **urinary retention**. It may be performed once, such as after surgery when a patient is experiencing urinary retention because of anaesthesia or performed several times a day to manage chronic urinary retention. Some patients may also independently perform self-catheterisation at home to manage chronic urinary retention caused by various medical conditions.

Figure 12. Female straight catheter

Irrigation Catheters

Irrigation catheters are typically used after prostate surgery to flush the surgical area. These catheters are larger to allow for irrigation of the bladder to help prevent the formation of blood clots and to flush them out.

Suprapubic Catheters

Suprapubic catheters are surgically inserted through the abdominal wall into the bladder. This type of catheter is typically inserted when there is a blockage within the urethra that does not allow the use of a straight or indwelling catheter. Suprapubic catheters may be used for a short period of time for acute medical conditions or may be used permanently for chronic conditions. See Figure 13 for an image of a suprapubic catheter. The insertion site of a suprapubic catheter must be cleaned regularly according to agency policy with appropriate steps to prevent skin breakdown.

Figure 13. Suprapubic catheter

Male Condom Catheter

A condom catheter is a noninvasive device used for males with incontinence. It is placed over the penis and connected to a drainage bag. This device protects and promotes healing of the skin around the perineal area and inner legs and is used as an alternative to an indwelling urinary catheter. See Figure 14 for an image of a condom catheter.

Figure 14. Condom catheter

Collecting and Assessing Urine Quality

Analysing the characteristics of a urine sample is a crucial aspect of assessing and recognising cues for impaired urinary elimination. A diagnostic examination of a urine sample to assess various aspects of a person's health is called urinalysis. This routine medical test provides valuable information about kidney function, hydration status, and the presence of underlying health conditions. Urine is collected in a number of ways depending on the patient's condition. To collect a sample for urinalysis, patients can urinate into a urine specimen jar (see Figure 15) or urine can be collected aseptically from an indwelling catheter. The nurse will test the uncontaminated specimen by inserting a urine specimen stick, ensuring all indicators are covered, to examine the quality of the urine (Figure 16). The length of time required to complete the assessment and display accurate results depends on the type of urinalysis device used, and this information is generally displayed on the packaging. The examination assesses various aspects, including the physical properties of urine, such as colour, clarity, and odour, as well as chemical and microscopic elements such as pH levels, specific gravity, and the presence of proteins, glucose, blood cells, and crystals.

Normal urine should be clear, pale to light yellow in colour, and not foul-smelling. Alterations in the urine collected may indicate disease or acute illness, such as:

- **Urine colour** such as darker urine, can signal issues like dehydration, haematuria, or liver dysfunction.
- **Urine clarity** such as cloudy urine can signal conditions like urinary tract infections.
- **Urine odour** such as abnormal or foul smelling, can signal conditions like infections or metabolic disorders.
- **Urine concentration** such as changes in specific gravity can signal kidney impairment.
- **Other changes** such as urine sediment or crystals should be assessed as an additional step in pinpointing particular kidney disorders or impairments.

Figure 15. Urine specimen jar

Figure 16. Urine specimen sticks

Measuring Fluid Balance

As urine is a part of the fluid being removed from the body, it needs to be calculated appropriately, especially for those with catheters to avoid potential fluid deficit. Not all catheters will require measurement of drainage, and this will depend on the clinical status of the patient. For those that do need measuring, fluid balance charts are the most common form of measurement tool used. Table 2 below shows the fluid balance chart commonly used in healthcare institutions (adapted from Walker, 2018).

Table 2. Fluid balance chart

TIME	INPUT		OUTPUT			
	ORAL	IVT	URINE	VOMITUS	FAECES	DRAINS
0800						
0900						
1000						
1100						
1200						
1300						
1400						
1500						
SUBTOTAL						
1600						

Common Diseases and Disorders

Endocrine Disorders

These diseases can range in severity and include symptoms of urinary retention, decreased urinary output, and **polyuria**. Endocrine disorders include but are not limited to diabetes, polycystic ovary syndrome and hypothyroidism.

Renal Disorders

These include chronic kidney disease, acute kidney disease and nephrotic syndrome, all of which can affect the production, filtering and composition of urine. Symptoms can include high blood pressure, changes in the appearance of the urine, changes in the amount voided, puffiness in the legs or ankles and pain in the kidney area.

Cancers

There are many different cancers that can affect the function of the genitourinary system, including bladder cancer, renal cell carcinoma, testicular cancer, penile cancer and urethral cancer. One of the most common kinds of cancers that can affect the urinary system is prostate cancer. This disease involves a mutation

in prostate cells resulting in overproduction of cancerous cells. Depending on the stage of the cancer, symptoms include **hematuria**, increased urinary **frequency** and **nocturia**.

Common Complications

Urinary Tract Infection

Infections can affect several parts of the urinary tract, but the most common type is a bladder infection (cystitis). Kidney infections (pyelonephritis) are more serious than bladder infections because they can have long-lasting effects on the kidneys.

Some people are at higher risk of developing a UTI. UTIs are more common in females because their urethras are shorter and closer to the rectum, which makes it easier for bacteria to enter the urinary tract. Other factors that can increase the risk of UTIs include the following:

- A previous UTI
- Sexual activity, especially with a new sexual partner
- Pregnancy
- Age
- Structural problems in the urinary tract, such as prostate enlargement.

Symptoms of a UTI include the following:

- Pain or burning while urinating (**dysuria**)
- Frequent urination (frequency)
- **Urgency** with small amounts of urine
- Bloody urine
- Pressure or cramping in the groin or lower abdomen
- Confusion or altered mental status in older adults.

Symptoms of a more serious kidney infection (pyelonephritis) include fever above 38.3 degrees C (101 degrees F), shaking chills, lower back pain or flank pain (i.e., on the sides of the back), and nausea or vomiting. It is important to remember that older adults with a UTI may not exhibit these symptoms but often demonstrate an increased level of confusion. Sometimes UTIs can spread to the blood (septicaemia), leading to a life-threatening infection called sepsis.

When a patient presents with symptoms of a UTI, the medical team will order diagnostic tests, such as a urinalysis, or urine culture.

Interventions

Antibiotics are prescribed for urinary tract infections. Nurses provide important health teaching to patients with a UTI, such as the importance of finishing their antibiotic therapy as prescribed, even if they begin to feel better after a few days, to minimise the risk of developing antibiotic-resistant microorganisms. Patients should also be encouraged to drink extra fluids to help flush bacteria from the urinary tract. Additional health teaching regarding preventing future UTIs includes the following:

- Urinate after sexual activity to flush bacteria away from the urethra.
- Stay well-hydrated and urinate regularly.
- Take showers instead of baths to minimise irritation and bacterial contamination of the urethra.
- Minimise douching, sprays, or powders in the genital area to prevent altering the pH and normal flora of this area.
- Teach females to wipe front to back to minimise contamination of the urethra with bacteria from the anus.

Urinary Retention

Urinary retention can be acute (i.e., the sudden inability to urinate after receiving anaesthesia during surgery) or chronic (i.e., a gradual inability to completely empty the bladder due to enlargement of the prostate gland in males). Urinary retention is caused by a blockage that partially or fully prevents the flow of urine or the bladder not being able to create a strong enough force to expel all the urine. In addition to causing discomfort, urinary retention increases the patient's risk for developing a urinary tract infection because bacteria from the urethra can move up toward the bladder and multiply in retained urine. See Figure 17 for an image of an enlarged prostate gland blocking the flow of urine from the bladder into the urethra.

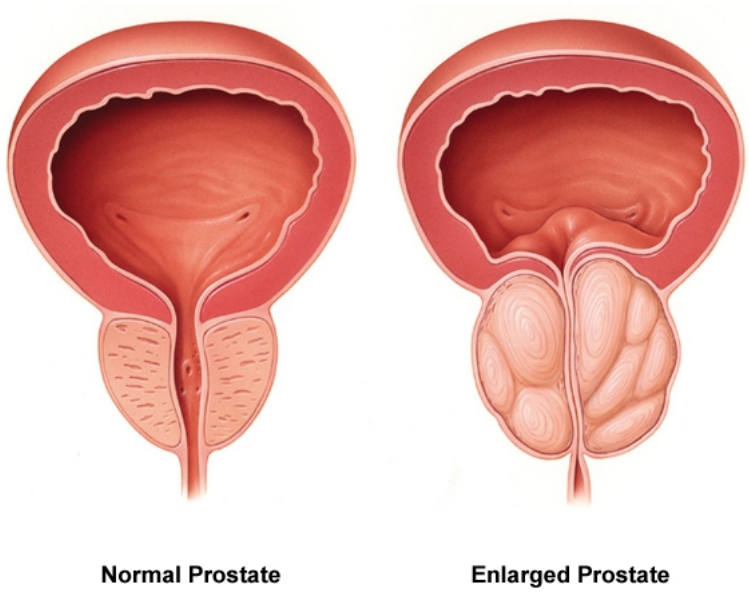

Figure 17. Enlarged prostate gland

Interventions

Symptoms of urinary retention can range from none to severe abdominal pain. Healthcare providers use a patient's medical history, physical assessment, and diagnostic tests to find the cause of urinary retention. Nurses typically receive orders to measure post-void residual amounts when urinary retention is suspected. These measurements are taken after a patient has voided by using a bladder scanner or inserting a straight urinary catheter to determine how much urine is left in the bladder.

Catheter-Associated Urinary Tract Infection

A catheter-associated urinary tract infection (CAUTI) is a common, life-threatening complication caused by indwelling urinary catheters. The development of a CAUTI is associated with patients' increased length of stay in the hospital, resulting in additional hospital costs and a higher risk of death. Catheter-associated UTIs are the most prevalent of all hospital-acquired UTIs in Australia, accounting for 80% of hospital-acquired UTIs (Australian Commission on Safety and Quality in Health Care, 2018). The main risk factor for a CAUTI is unnecessary catheterisation. However, CAUTIs are the most preventable types of UTIs. The duration of catheterisation and the place where the catheter was inserted in the hospital, as well as gender (female) and other comorbidities (diabetes), also may increase a patient's risk of acquiring a CAUTI during their hospital stay. For a CAUTI to occur, microorganisms need to enter the catheter system either externally (contamination of the catheter at the time of insertion by microflora and other organisms from

the perineal region) or internally (contamination caused by the manipulation of the catheter or drainage system post insertion).

Key strategies to prevent CAUTIs include:

- Insert catheters only for clinically appropriate indications under aseptic technique.
- Select the most appropriate catheter for the patient in terms of size, length, material and drainage system.
- Ensure that catheter insertion is done only by clinicians who have demonstrated competence in aseptic technique and catheter insertion.
- Clearly document the indication for the catheter insertion, review or removal time, and details of the insertion (person responsible for inserting the catheter, date and time of insertion and the gauge of the catheter used).
- Following catheter insertion:
    - Ensure the catheter is secured to the patient at all times
    - Maintain a closed drainage system and unobstructed urine flow (that is, no kinking, no backflow, drainage bag should not be more than ¾ full at any time)
    - Only handle catheters and the drainage system using aseptic technique and use the sampling port to collect samples if required
    - Ensure that the insertion site and peri-urethral area are cleaned and checked daily.
- Leave the catheters in place only for as long as needed and review the need for catheterisation regularly (daily).
- Use portable ultrasound devices to assess urine volumes.
- Adopting quality-improvement practices to reduce the incidences of CAUTI.
- Protocols for nurse-directed removal of unnecessary catheters.

Practices that are not recommended:

- Changing urethral catheters at routine, fixed intervals (clinical indications include infection, obstruction, or compromise of the closed system)
- Routine antimicrobial prophylaxis for catheter insertion
- Bladder irrigation with antimicrobials
- Routine screening for asymptomatic bacteriuria.

Urinary Incontinence

Although abnormal, urinary incontinence is a common symptom that can seriously affect the physical, psychological, and social well-being of individuals of all ages. Some believe it's a normal part of ageing and that they have to live with it. The result can be isolation and depression when they limit their activities and social interactions because of embarrassment due to incontinence. Nurses can greatly improve the quality

of life for these patients by assessing for **urinary incontinence** in a sensitive manner and then providing health teaching about methods to prevent and/or manage incontinence.

Types of Urinary Incontinence

Continence is achieved through an interplay of the physiology of the bladder, urethra, sphincter, pelvic floor, and the nervous system coordinating these organs. A disruption in any of these areas can cause several types of urinary incontinence:

An interactive H5P element has been excluded from this version of the text. You can view it online here:
https://jcu.pressbooks.pub/nursing-skills-foundations/?p=55#h5p-140

It is important for nurses to understand the different types of incontinence so that appropriate interventions can be targeted to the cause.

Assessment of Incontinence

- Screening questions such as pain or problems experienced before, during or after urinating
- Ascertaining when and how much the patient urinates
- Urinary leakage and what the patient was doing when it happened (for example, running, biking, laughing)
- Sudden urges to urinate
- How often the patient wakes at night to use the bathroom
- Type and volume of food and beverages, and the time of intake
- Medication use, such as diuretics, and the timing of administration.

Treatment of Incontinence

Nurses should use therapeutic communication with patients experiencing urinary incontinence to help them feel comfortable in expressing their fears, worries, and embarrassment about incontinence and work toward improving their quality of life. Patient education should include information about pelvic floor muscle training exercises, timed voiding, lifestyle modification, and incontinence products.

Nurses play an important role in educating patients about bladder control training to prevent incontinence. Bladder control training includes several techniques:

- Pelvic muscle exercises (also known as Kegel exercises) work the muscles used to stop urination, which can help prevent stress incontinence.
- Timed voiding can be used to help a patient regain control of the bladder. Timed voiding encourages the patient to urinate on a set schedule, for example, every hour, whether they feel the urge to urinate or not. The time between bathroom trips is gradually extended with the general goal of achieving four hours between voiding. Timed voiding helps to control urge and overflow incontinence as the brain is trained to be less sensitive to the sensation of the bladder walls expanding as they fill.
- Lifestyle changes can help with incontinence. Losing weight, drinking less caffeine (found in coffee, tea, and many sodas), preventing **constipation**, and avoiding lifting heavy objects may help with incontinence. Limiting fluid intake before bedtime and scheduling prescribed diuretic medication in the morning or early afternoon are also helpful.
- Protective products may be needed to protect the skin from breakdown and prevent leakage onto clothing. Incontinence underwear has a waterproof liner and built-in cloth pad to absorb large amounts of urine to protect skin from moisture and control odour.
- If bladder training and medications are not effective, surgery may be performed, such as a sling procedure or a bladder neck suspension.

Gastrointestinal System

The gastrointestinal (GI) system includes the mouth, oesophagus, stomach, small intestine, large intestine, and anus. Ingested food and liquid are pushed through the GI tract by peristalsis, the involuntary contraction and relaxation of muscle creating wave-like movements of the intestines. The stomach and small intestine mix food and liquid with digestive enzymes to digest food. The walls of the small intestine absorb water and the digested nutrients into the bloodstream. As peristalsis continues, the waste products of the digestive process move into the large intestine. The large intestine absorbs water and changes the waste into stool. The rectum, at the lower end of the large intestine, stores stool until it is pushed out of the anus during a bowel movement. See Figure 18 for a complete picture of the gastrointestinal system.

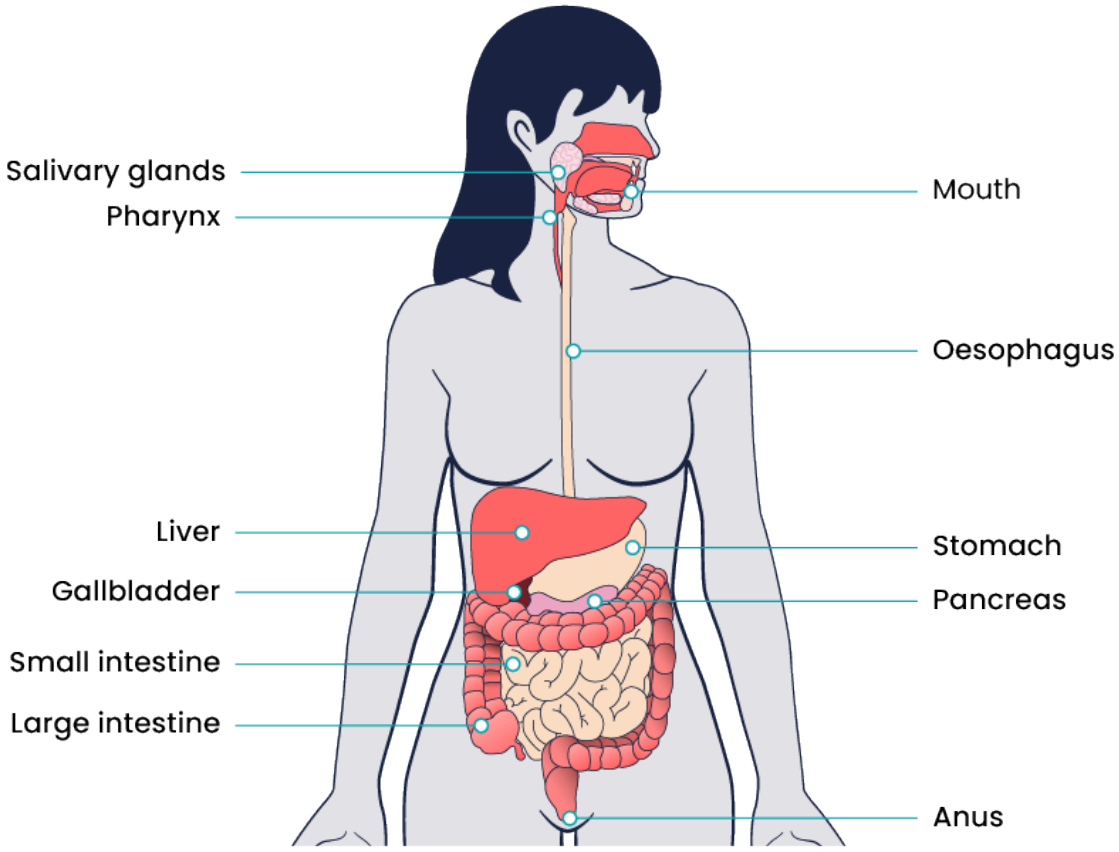

Figure 18. Gastrointestinal system

Documenting Output

Gastrointestinal waste can vary depending on different factors, including dietary intake, age, acute or chronic illness or disease and lifestyle factors such as exercise. A Bristol Stool Chart is commonly used to communicate or document the consistency of waste in the healthcare setting. See Figure 19 for the Bristol Stool Chart used to assess the characteristics of stools, ranging from constipation to diarrhoea. Normal bowel function should include faecal output between the level of type 3 and type 4.

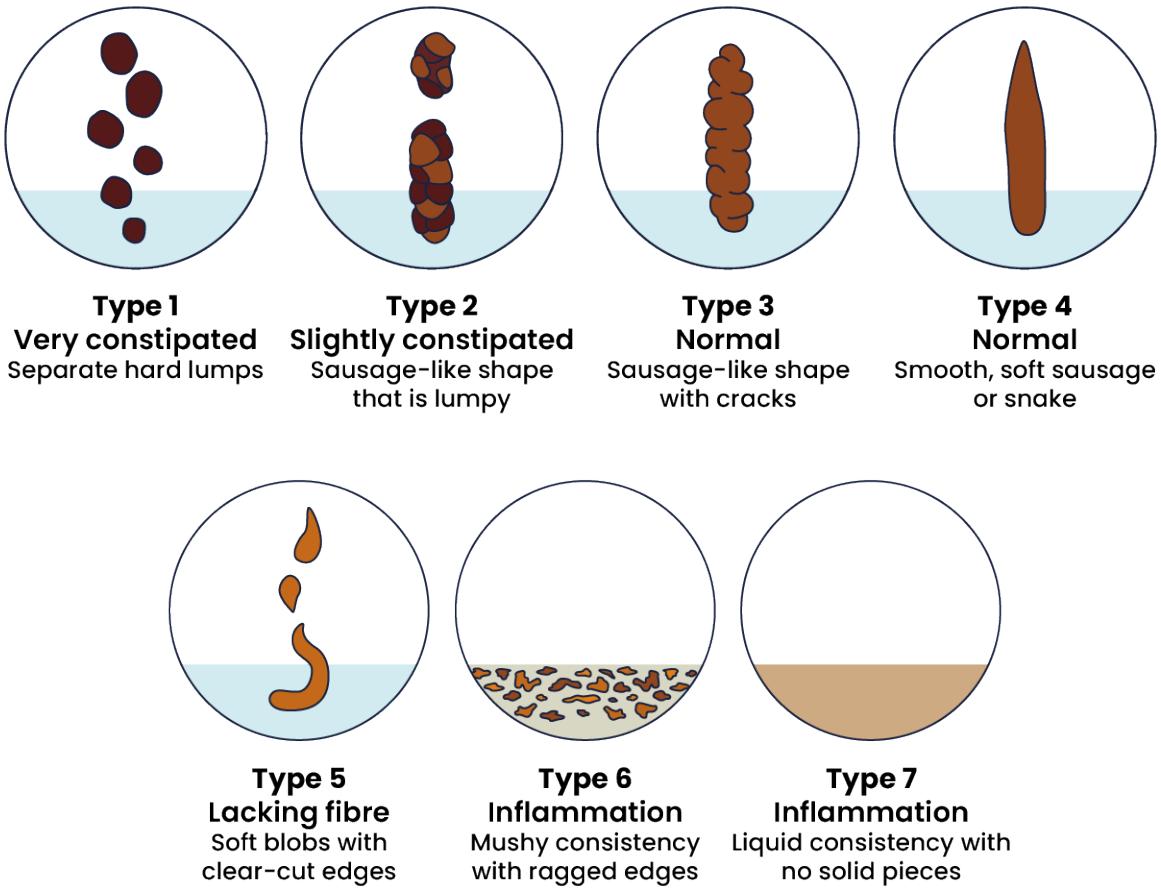

Figure 19. Example of the Bristol stool chart

Common Complications

Constipation

A patient is usually diagnosed with constipation if they have less than three bowel movements per week. Constipation can be caused by slowed peristalsis due to decreased activity, dehydration, lack of fibre, medications such as opioids, or surgical procedures in the abdominal area. As the stool moves slowly through the large intestine, additional water is reabsorbed, resulting in the stool becoming hard, dry, and difficult to move through the lower intestines.

Faecal impaction occurs when hardened faecal matter is unable to be evacuated with regular peristalsis activity and is retained in the rectum. The patient may experience symptoms such as rectal pressure, abdominal cramps, bloating, distension, and straining. A patient with faecal impaction often will experience liquid loss, which can result in a misdiagnosis of diarrhoea. The compacted stool must be removed to maintain the health of the colon (Setya et al., 2023). If prolonged faecal impaction is

experienced, the patient may suffer from bowel obstruction, bowel perforation, peritonitis, ulcers or dehydration.

Treatment

The goal when treating constipation is to establish what is considered a normal bowel pattern for each person and to set an expected outcome of a bowel movement at least every 72 hours, regardless of intake. Treatment typically includes a prescribed daily bowel regimen, such as oral stool softeners and a mild stimulant laxative. Stronger laxatives, rectal suppositories, or enemas are implemented when oral medications are not effective. When treating severe faecal impaction, manual disimpaction may be needed, requiring a qualified healthcare practitioner to manually remove impacted stool.

Patients should be educated about the importance of adequate fluid intake, dietary requirements and remaining active to prevent constipation.

Intestinal Obstruction or Paralytic Ileus

Intestinal Obstruction

Intestinal obstruction is a partial or complete blockage of the intestines so that the contents of the intestine cannot pass through it. Intestinal obstruction can be caused by **adhesions**, **hernias**, **tumours**, **volvulus**, **intussusception** and certain inflammatory conditions, such as **diverticulitis**. When the intestinal tract becomes blocked or obstructed, the bowel tissue can become ischaemic, causing that section of the bowel to become necrotic and need removal. The symptoms of a bowel obstruction include:

- Abdominal pain or cramping
- Bloating or distention (swollen abdomen)
- Nausea and vomiting
- Inability to pass stool or gas
- Constipation
- Diarrhoea.

If a patient is suspected of suffering from a bowel obstruction, they must undergo a physical examination, imaging tests and a blood test to look for signs of occlusion, dehydration and bowel sounds.

A bowel obstruction can lead to serious complications if not treated promptly, including:

- Dehydration and electrolyte imbalances
- Infection
- Perforation

- Ischemia
- Sepsis.

Paralytic Ileus

Other types of obstruction or disruption to normal functioning can be caused by paralytic ileus, a condition where peristalsis is not moving the contents through the intestines. Patients who have undergone abdominal surgery or received general anaesthesia are at increased risk for paralytic ileus. Other risk factors include the chronic use of opioids, electrolyte imbalances, bacterial or viral infections of the intestines, decreased blood flow to the intestines, or kidney or liver disease. If an obstruction blocks the blood supply to the intestine, it can cause infection and tissue death.

Symptoms of a paralytic ileus include:

- Abdominal distention or bloating
- Abdominal pain or cramping
- Inability to pass gas
- Nausea and vomiting
- Constipation or diarrhoea
- Absence of bowel sounds.

Bowel sounds must be assessed for abnormal findings. It can be difficult to accurately interpret changes in bowel sounds, so any change in bowel sounds accompanied by other symptoms should be reported to the health care provider. Absent bowel sounds can indicate an ileus or mechanical bowel obstruction. Paralytic ileus is generally a temporary condition experienced by postoperative patients, and commonly dietary restrictions are not lifted until a postoperative patient passes wind.

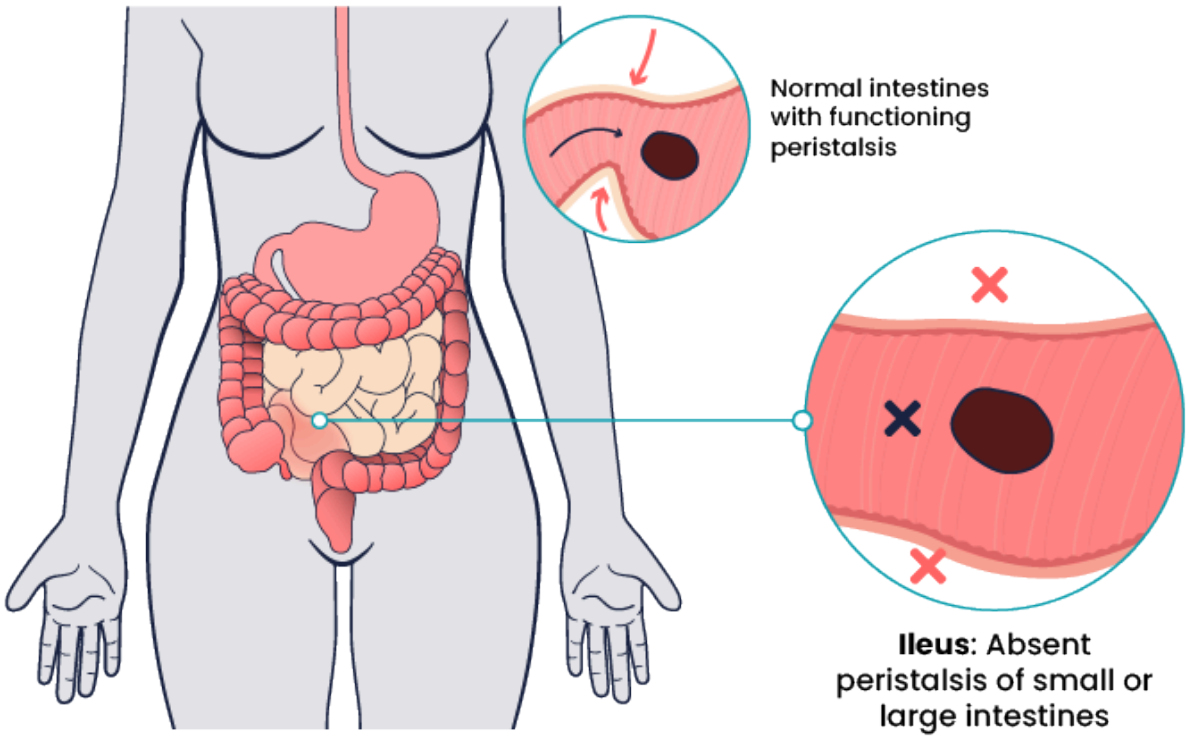

Figure 20. Absent peristalsis

Treatment

Treatment includes maintaining strict NBM (nil by mouth) status and typically includes insertion of a naso-gastric (NG) tube attached to suction to help relieve abdominal distention and vomiting until peristalsis returns. Patients suffering from an ileus will generally have intravenous fluids, medications to stimulate peristalsis and regular and early mobilisation.

Diarrhoea

Diarrhoea is defined as having more than three unformed stools in 24 hours. Diarrhoea is caused by increased peristalsis, causing the stool to move too quickly through the large intestines so that water is not effectively reabsorbed, resulting in loose, watery stools. It can cause dehydration, skin breakdown, and electrolyte imbalances. Many conditions can cause diarrhoea, such as bacterial or viral infections, food poisoning, medications, food intolerances, allergies, anxiety, and medical conditions like irritable bowel disease and Crohn's disease.

Treatment

Treatment of diarrhoea includes promoting hydration with fluids that improve electrolyte status. Intravenous fluids may be required if the patient becomes dehydrated. Medications such as loperamide, psyllium, and anticholinergic agents may be prescribed to treat diarrhoea causing dehydration.

Bowel Incontinence

Bowel incontinence is the accidental loss of bowel control causing the unexpected passage of stool. Incontinence can range from leaking a small amount of stool or gas to not being able to control bowel movements. The rectum, anus, pelvic muscles, and nervous system must work together to control bowel movements.

Causes of bowel incontinence include the following:

- Ongoing (chronic) constipation, causing the anus muscles and intestines to stretch and weaken, leading to diarrhoea and stool leakage
- Faecal impaction with a lump of hard stool that partly blocks the large intestine
- Long-term laxative use
- Colectomy or bowel surgery
- Lack of sensation of the need to have a bowel movement
- Gynecological, prostate, or rectal surgery
- Injury to the anal muscles in women due to childbirth
- Nerve or muscle damage from injury, a tumour, or radiation
- Severe diarrhoea that causes leakage
- Severe haemorrhoids or rectal prolapse
- Stress of being in an unfamiliar environment
- Emotional or mental health issues.

Treatment

Many people feel embarrassed about bowel incontinence and do not share this information with their healthcare provider. It is essential for nurses to communicate therapeutically with patients experiencing bowel incontinence and let them know it can often be treated with simple interventions such as diet changes, **bowel retraining**, pelvic floor exercises, or referral for surgical review if indicated.

Ask the patient to track the foods eaten to determine if certain types of foods cause problems. Foods that may lead to incontinence in some people include the following:

- Alcohol
- Caffeine
- Dairy products (due to lactose intolerance)
- Fatty, fried, or greasy foods
- Spicy foods
- Cured or smoked meats
- Sweeteners such as fructose, mannitol, sorbitol, and xylitol.

Bowel retraining involves teaching the body to have a bowel movement at a certain time of the day. This also includes encouraging the patient to go to the bathroom when feeling the urge to do so and not ignoring it. Encourage patients with bowel incontinence to use special pads or undergarments to help them feel protected from accidents when they leave home. These products are available in pharmacies and in many other stores.

Cultural Considerations

When dealing with patients and their elimination needs there are cultural considerations that need to be identified by the nurse. Such considerations include cultural taboos surrounding discussing body function, disparities in healthcare access, gender sensitivity, alternative medication practices, family involvement and dietary and lifestyle practices. Procedures such as catheter insertion, stoma care and insertion of suppositories can cause emotional distress, especially if the patient has experienced any history of abuse or trauma.

Ostomies

An **ostomy** is a surgical procedure that creates an opening (stoma) from an area inside the body to the outside of the body. In ostomies related to elimination, a stoma is an opening on the abdomen that is connected to the gastrointestinal or urinary system to allow waste (i.e., urine or faeces) to be collected in a

pouch. There are several different kinds of ostomies related to elimination. It is important for the nurse to understand the site of a patient's ostomy because the location will impact the characteristics of the waste excreted. For example, due to the natural digestive process of the colon and absorption of water, waste from an **ileostomy** or a colostomy placed in the anterior ascending colon will be watery compared to waste from an ostomy placed in the descending colon. A stoma can be permanent, such as when an organ is removed, or temporary, such as when an organ requires time to heal. Ostomies are created for patients with conditions such as cancer of the bowel or bladder, inflammatory bowel diseases, or perforation of the colon.

Appearance

The tissue of a stoma is very delicate. Immediately after surgery, a stoma is swollen, but it will shrink in size over several weeks. A healthy, healed stoma appears moist and dark red or pink in colour. Stomas that are swollen; dry; have malodorous discharge; or are bluish, purple, black, or pale should be reported to the provider.

The skin surrounding a stoma can easily become irritated from the pouch adhesive or leakage of fluid from the stoma, so the nurse must perform interventions to prevent skin breakdown. Any identified signs of skin breakdown should be reported to the provider. If the surrounding skin becomes excoriated, securing the appliance to the stoma will become difficult and often result in further leakage.

Individuals with colostomies, ileostomies, and urostomies have no sensation and no control over the output of the stoma. Depending on the type of system, the ostomy appliance can last from four to seven days, but the pouch must be changed if there is leaking, odour, excessive skin exposure, or itching or burning under the skin barrier. Patients with pouches can swim and take showers with the pouching system on.

Colostomy

A colostomy is an ostomy formed in the large intestine, designed to bypass the rectum and/or anus. As a colostomy is located towards the end of the gastrointestinal tract, the waste excreted from a colostomy usually is a similar consistency to that of a formed stool. A colostomy can be permanent or temporary and is generally formed as a result of:

- A birth defect
- Diverticulitis
- Inflammatory bowel disease
- Injury to the colon or rectum
- Cancer
- Partial or complete intestinal blockage
- Wound or fistula.

Depending on the medical reason for the colostomy and if it is temporary or permanent, there are several different sites the stoma can be formed. See Figure 21 for the different sites where a colostomy can be formed.

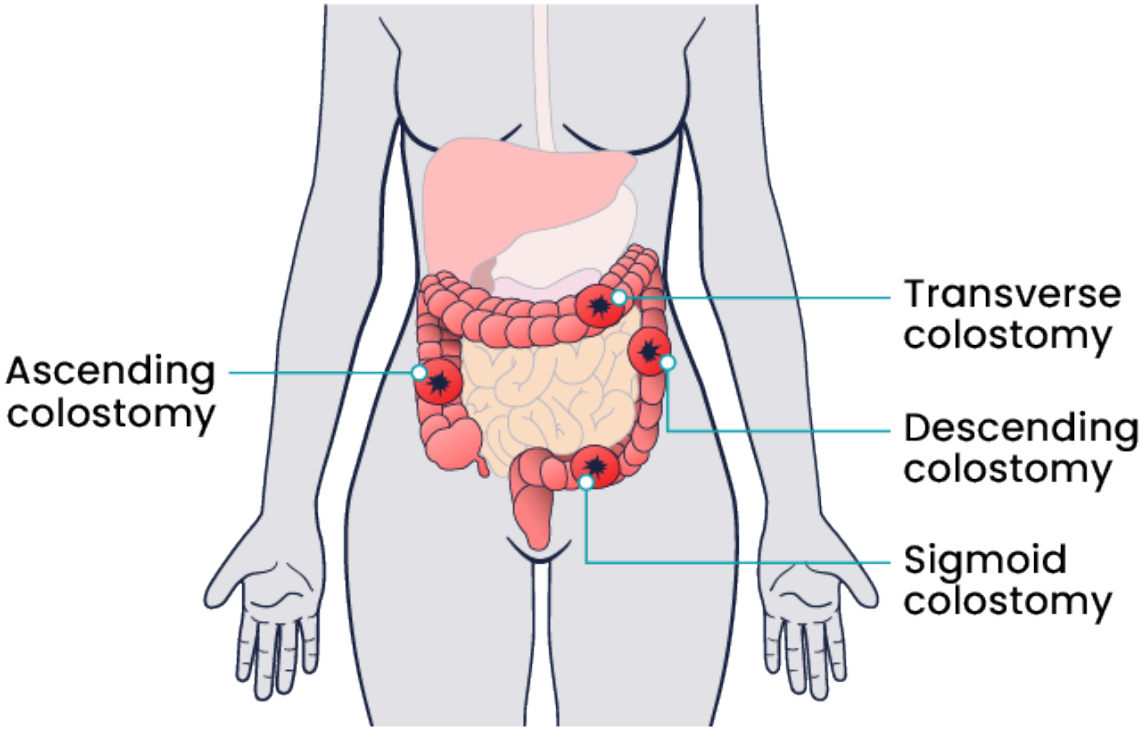

Figure 21. Colostomy

Ileostomy

An ileostomy is an ostomy formed in the small intestine, designed to bypass the colon and rectum. As an ileostomy is located at the beginning of the intestinal tract, the waste excreted from an ileostomy is usually thin and water-like in appearance. An ileostomy can be temporary or permanent and is generally formed as a result of:

- Congenital condition
- Crohn's disease
- Cancer
- Ulcerative colitis
- Trauma, injury or perforation of the bowel
- Diverticulitis.

An ileostomy is generally formed on the right-hand side of the abdomen with the lower end of the small intestine (ileum) attached to a stoma to bypass the colon, rectum, and anus.

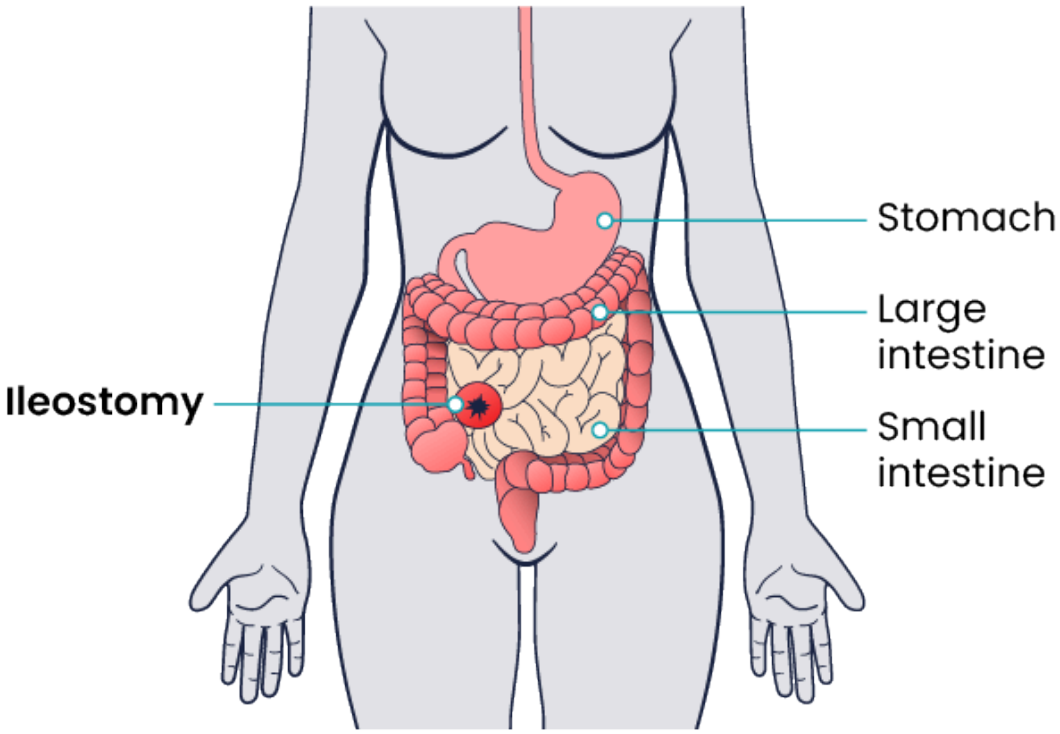

Figure 22. Ileostomy

Urostomy

A urostomy is an ostomy formed as another way for someone to excrete urine. When forming a urostomy, the ureters (tubes that carry urine from the kidney to the bladder) are attached to a stoma to bypass the bladder. A urostomy patient has no voluntary control of urine, so the pouching system must be emptied regularly. The pouch may also be attached to a drainage bag for overnight drainage. Patients with a urostomy are at risk for urinary tract infections (UTIs), so it is important to educate them regarding the signs and symptoms of an infection. A urostomy is usually formed as a result of:

- Chronic, long-term incontinence
- Congenital defects
- Spinal cord injuries
- Cancer
- Damaged urethras.

There are different types of urostomies that can be formed by a surgeon, including ileal conduit, colonic conduit or a continent urostomy.

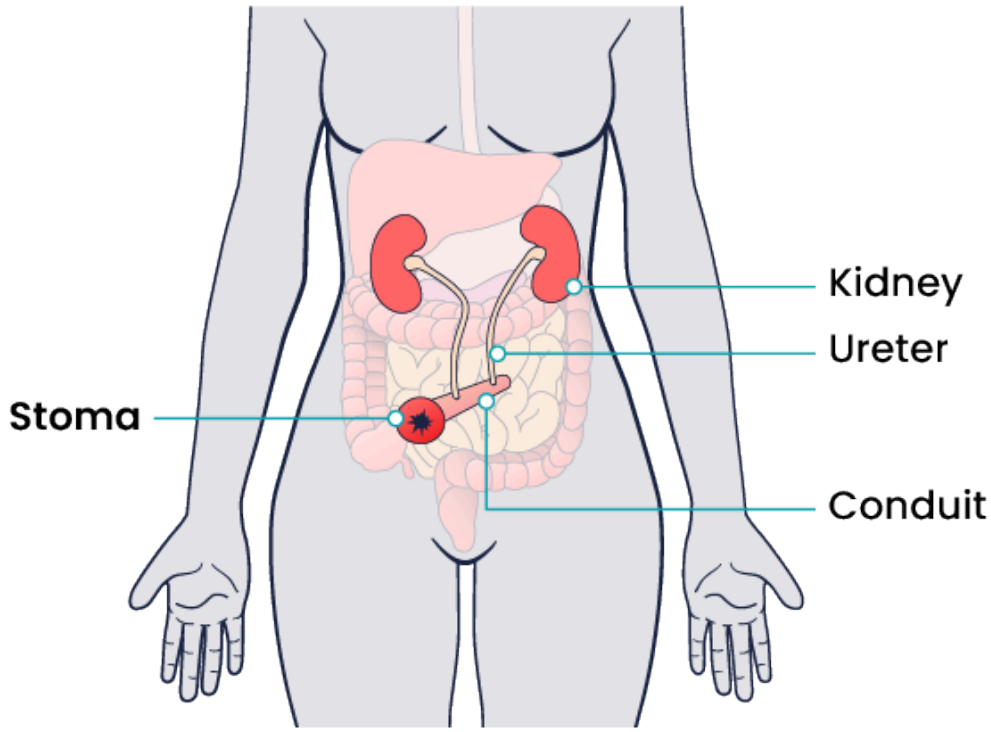

Figure 23. Urostomy

Stoma Appliance

Stoma appliances are supplied as a one or two-piece set. A two-piece set consists of an ostomy barrier (also called a wafer) and a pouch. The ostomy barrier is the part of the appliance that sticks to the skin with a hole that is fitted around the stoma. The pouch collects the waste and must be emptied regularly. The pouching system must be completely sealed to prevent leaking of the waste and to protect the surrounding peristomal skin. The pouch has an end with an opening where the waste can be emptied and is closed using a plastic clip or seal. In the one-piece stoma appliance set, the ostomy barrier and the pouch are one piece. See Figure 24 for an image of a stoma with an ostomy barrier in place. See Figure 25 for an image of a patient with an ileostomy appliance with a pouch attached.

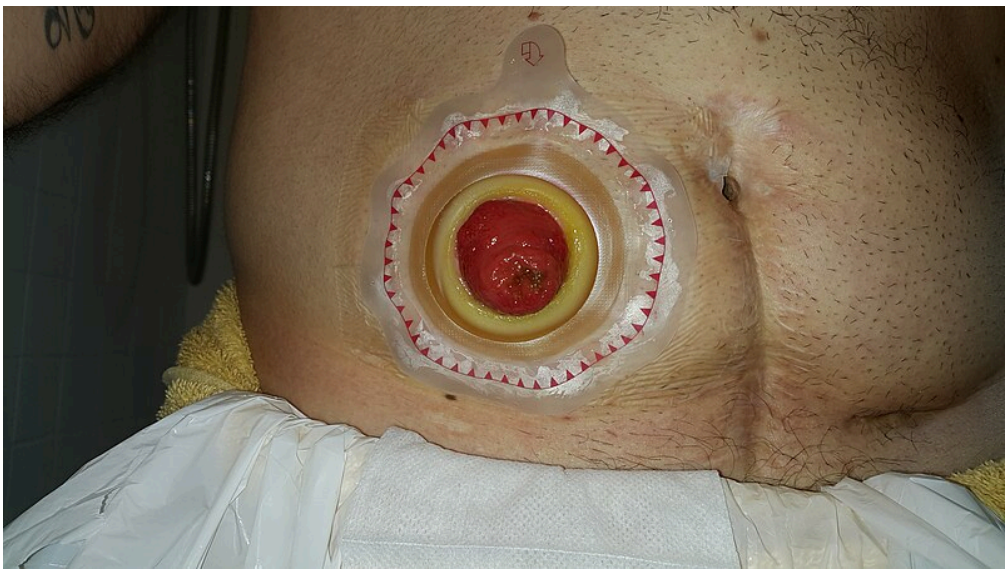

Figure 24. Stoma with a wafer barrier

Figure 25. Ileostomy appliance with a pouch attached

When changing an ostomy appliance, the ostomy barrier is cut to fit closely around the stoma without impinging on it. The nurse measures the stoma with a template and then cuts and fits the ostomy barrier to a size that is 2 mm larger than the stoma. See Figure 26 for an image of a nurse measuring and cutting the ostomy barrier to fit around a stoma.

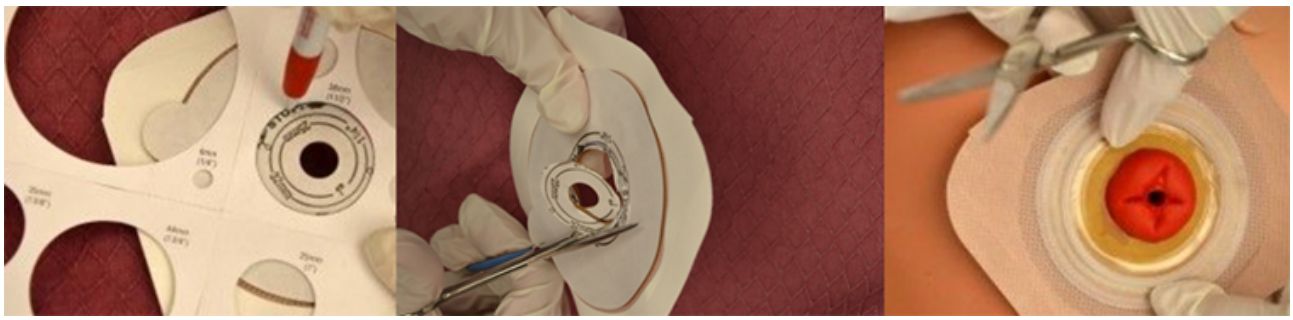

Figure 26. Fitting barrier to stoma

After the skin barrier is applied to the skin, the pouch is snapped to the barrier. See Figure 27 for an image of applying the pouch.

Figure 27. Applying an ostomy pouch

Physical and Emotional Assessment

Patients may have other medical conditions that affect their ability to manage their ostomy care. Conditions such as arthritis, vision changes, Parkinson's disease, or post-stroke complications can hinder a patient's coordination and ability to manage the ostomy. In addition, the emotional burden of coping with an ostomy may be devastating for some patients and may affect their self-esteem, body image, quality of life, and ability to be intimate. It is common for patients with ostomies to struggle with body image and their altered pattern of elimination.

Nurses can promote healthy coping by ensuring the patient has appropriate referrals to a wound/ostomy nurse specialist, a social worker, and support groups. Nurses should also be aware of their nonverbal cues when assisting a patient with their appliance changes. It is vital not to show signs of disgust at the appearance of the ostomy or at the odour that may be present when changing an appliance or pouching system.

Key Takeaways

In this chapter, we covered:

- Elimination is a basic human function of excreting waste through the urinary and bowel systems. This process can differ between individuals due to a range of intricate variables such as medical conditions, diet and exercise, and surgical procedures.
- The urinary system is often referred to as the renal system and consists of the kidneys, ureters, bladder and urethra. Its purpose is to eliminate urine from the body, regulate blood volume and pressure, control levels of electrolytes and metabolites, and regulate blood pH.
- There are many devices used to facilitate urinary elimination, and most catheter appliances use a tube to drain the urine from the bladder and deposit it into a drainage or collection bag.
- Many complications or disorders can disrupt elimination from the urinary system, including renal disorders, cancer, urinary tract infections, and catheter-associated urinary tract infections.
- The gastrointestinal system includes the mouth, oesophagus, stomach, small intestine, large intestine, and anus and is responsible for involuntarily moving food and liquid by peristalsis through the gastrointestinal tract.
- Many complications or disorders can disrupt elimination from the gastrointestinal system, including constipation, cancer, paralytic ileus, and diarrhoea.
- An ostomy is a surgical procedure that creates an opening (stoma) from an area inside the body to the outside of the body to excrete waste.
- There are several different types of ostomies, including ileostomy, colostomy and urostomy, and the location of the ostomy generally determines the type of stoma.

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PROMOTING SLEEP

Penelope Coogan and Kate Hurley

Learning Outcomes

In this chapter you will learn how to:

- Identify factors putting people at risk for sleep and rest problems across the lifespan
- Identify cues related to sleep and rest problems
- Identify nonpharmacological interventions to promote sleep and rest
- Contribute to a plan of care for people with sleep and rest alterations
- Recognise the physiological considerations affecting sleep and the influence this can have on one's health and wellbeing
- Understand the importance of sleep hygiene and recognise the influence common sleep disorders can have on one's health and wellbeing.

Maslow's Hierarchy of Needs indicates sleep as one of our physiological requirements. Getting enough quality sleep at the right times according to our circadian rhythms can protect mental and physical health, safety, and quality of life. Conversely, chronic sleep deficiency increases the risk of heart disease, kidney disease, high blood pressure, diabetes, and stroke, as well as weakening the immune system. This chapter will review the physiology of sleep and common sleep disorders, as well as interventions to promote good sleep.

What Causes Sleep?

There are two internal biological mechanisms that work together to regulate wakefulness and sleep referred to as circadian rhythms and sleep-wake homeostasis.

Circadian rhythms direct a wide variety of body functions, including wakefulness, core temperature, metabolism, and the release of hormones. The control of circadian rhythms is initiated within the

hypothalamus, where there are centres for sleep and wakefulness. These are set to respond to light and darkness through messages from the retinas. The results include feeling sleepy, physiologically welcoming the onset of sleep two or three hours after dark, and naturally awakening shortly before, or at sunrise.

Sleep-wake homeostasis keeps track of a person's need for sleep. The pressure to sleep builds with every hour that a person is awake, reaching a peak in the evening when most people fall asleep.

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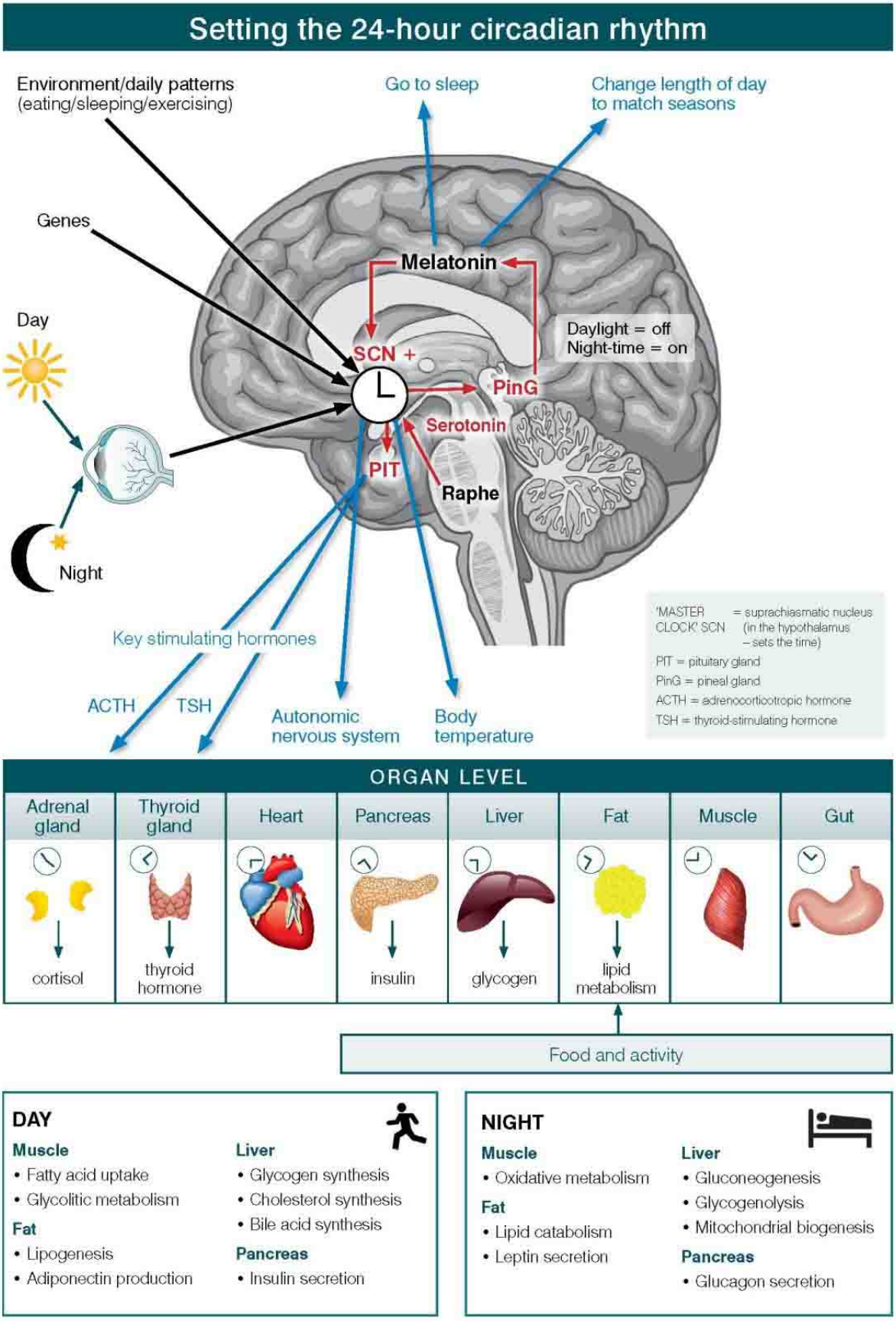

Figure 1. The master circadian clock in the human brain

Sleep Phases and Stages

A full sleep cycle takes 80 to 100 minutes to complete, and most people typically cycle through four to six cycles per night. When sleeping, individuals cycle through two phases of sleep:

- Rapid eye movement (REM)
- Non-REM sleep.

Non-REM Sleep

Restoration takes place mostly during slow-wave non-REM sleep, during which the body's temperature, heart rate, and brain oxygen consumption decrease. Brain activity decreases, so this stage is also referred to as slow-wave sleep and is observed during sleep studies. Non-REM sleep has these three stages:

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REM Sleep

During REM sleep, a person's heart rate and respiratory rate increase. Eyes twitch as they rapidly move back and forth, and the brain is active. Brain activity measured during REM sleep is similar to activity during waking hours. Dreaming occurs during this phase, and muscles normally become limp to prevent acting out one's dreams. People typically experience more REM sleep as the night progresses. However, hot and cold environments can affect a person's REM sleep because the body does not regulate temperature well during REM sleep.

Shift Work and Circadian Rhythms

Night shift workers often have trouble falling asleep when they go to bed and may have trouble staying awake at work because their natural circadian rhythm and sleep-wake cycle are disrupted. Jet lag also disrupts circadian rhythms. When flying to a different time zone, a mismatch is created between a person's internal clock and the actual time of day.

Why Is Sleep Important?

Sleep plays a vital role in good health and well-being. Getting enough quality sleep at the right times protects mental health and physical health. Lack of sleep affects daytime performance, quality of life, and safety. The way a person feels while awake depends on what happens while they are sleeping. During sleep, the body is working to support healthy brain function and maintain physical health.

Healthy Brain Function and Emotional Well-Being

Sleep helps the brain work properly. While sleeping, the brain is forming new pathways to help a person learn and remember information. Sleep helps a person pay attention, make decisions, and be creative. Conversely, sleep deficiency alters activity in some parts of the brain, causing difficulty in making decisions, solving problems, controlling emotions and behaviour, and coping with change. Sleep deficiency has also been linked to depression, suicide, and risk-taking behaviour.

Physical Health

Sleep also plays an important role in physical health. Ongoing sleep deficiency is linked to an increased risk of heart disease, kidney disease, high blood pressure, diabetes, and stroke. Sleep helps maintain a healthy balance of the hormones that cause hunger (ghrelin) or a feeling of fullness (leptin). When a person doesn't get enough sleep, the level of ghrelin increases and the level of leptin decreases, causing a person to feel hungry when sleep deprived. The way the body responds to insulin is also affected, causing increased blood sugar.

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Sleep Patterns Across the Lifespan

Individuals need more sleep early in life when they're growing and developing. For example, newborns may sleep more than 16 hours a day, and preschool-aged children need to take naps and tend to sleep more in the early evening.

During growth and development phases, sleep patterns change. For example, teenagers fall asleep later at

night than younger children and adults because melatonin is released and peaks later in the 24-hour cycle for teens. As a result, it's natural for many teens to prefer later bedtimes at night and sleep later in the morning than adults. With advancing age, the need for sleep tends to lessen to some extent, from the majority of a twenty-four-hour period to about eight hours. Older adults will tend to go to bed earlier and wake up earlier.

Gender also has some general differences, with men in Stage 1 sleep and waking more times overnight than women. Women tend to take longer entering sleep and spend longer in SWS. Pregnancy and the postpartum period bring their own challenges, with more sleepiness during the day and struggles to find comfortable positions in the advanced stages of pregnancy.

For people in healthcare facilities, sleep and rest patterns may alter due to the effects of their illness/injury, the unfamiliar environment and the disruption of monitoring by healthcare providers.

The different sleep cycles experienced over a lifetime are outlined below.

Neonate (0–2 months)

- Circadian rhythms not developed
- Irregular sleep patterns, especially in first weeks
- Sleep sixteen to eighteen hours/day in divided (2.5- to 4-hour) episodes
- Three sleep types:
  - active sleep—similar to NREM
  - quiet sleep—similar to REM
  - indeterminate sleep
- Onset of sleep through quiet sleep/REM
- Only one to two sleep cycles per episode.

Infant (2–12 months)

- By approximately 2–3 months:
  - circadian rhythms develop
  - duration of sleep at night increases
- At approximately 3 months:
  - melatonin and cortisol release starts
  - onset of sleep through NREM
- At approximately 6 months:
  - sleep duration approximately six hours per episode; fourteen to fifteen hours per day
- At approximately 12 months:
  - sleep twelve to fifteen hours per day with only two stages during daytime.

Toddler (1–3 years)

- At approximately 2–5 years:
  - sleep needs decrease by approximately two hours, from thirteen to eleven hours.

Child (3–9 years)

- At approximately 6 years:
  - development of sleep phase preferences and tendencies: “night owl” or “early bird”
  - begin shorter REM with more time in stage 3 NREM.

Adolescent (10–18 years)

- Require nine to ten hours of sleep
- Hormone changes lead to less stage 3 NREM/SWS and more stage 2 NREM
- Increased sleepiness during day
- Typical preference for staying up later and sleeping later in morning.

Young or Middle-Aged Adult (18–65 years)

- Require seven to nine hours of sleep
- Earlier sleep time (bedtime)
- Less consolidated sleep (more frequent awakenings).

Older Adult (65+ years)

- Require seven to eight hours of sleep
- Pattern changes to waken approximately 1.5 hours earlier (than young adults) and bedtime approximately one hour earlier than when in 20s and 30s. (Johnson, 2024; Nunez & Lamoreux, 2023; Patel et al., 2024)

Physiological Considerations Affecting Sleep

There are various physiological considerations when it comes to sleep. This section explores influences on sleep, including developmental sources, illness, medications, and culture.

Illness

Chronic illness or episodes of acute illness are frequent contributors to disruptions of normal sleep patterns. Some of these circumstances increase sleep, such as when the immune system is combatting an infection or recovering from surgery or trauma. Other circumstances involve less sleep or poor-quality sleep, which does not achieve the rejuvenation and restful state normally associated with sleep. If a person is unable to sleep adequately, sleep is not restorative. Table 2 outlines the way different disorders or conditions can affect an individual's ability to sleep.

Table 2. Disorders and Sleep Patterns

Disorder	More Sleep	Less Sleep	Notes
Bipolar disorder	X	X	Changes in sleep pattern often occurs prior to cycling of manic or depressive episode (especially mania). Depression is associated with an increase or decrease of sleep; mania is associated with decreased sleep.
Chronic obstructive pulmonary disease (COPD)		X	Especially in advanced stages, COPD affects sleep position; it may cause air hunger and frequent awakenings.
Depression	X	X	Depression is commonly accompanied by sleep disorder, with either more or less sleep.
Diabetes mellitus (DM)		X	Episodes of poor control (hyperglycaemia) are characterised by polyuria, polydipsia, and polyphagia, which can all disrupt sleep patterns.
Heart failure (HF)		X	Like COPD, in advanced stages, HF affects sleep position, and it may cause air hunger and frequent awakenings. Treatment may cause frequent urination.
Infection	X	X	Infection and related symptoms (e.g., fever, pain, mental status change) may increase or decrease sleep. Sleep may be disrupted and of poor quality.
Narcolepsy	X		Narcolepsy is associated with unexpected and sudden sleep episodes during the day. Sleep quality is not necessarily restful or restorative.
Pain		X	Pain often causes sleep disruptions and an inability to sleep deeply. Treatment may cause drowsiness but sleep quality may still be hindered.
Restless leg syndrome (RLS)		X	RLS tends to hinder falling asleep but can also wake a person from sleep.
Sleep apnoea		X	Episodes of apnoea cause frequent awakenings and inhibit achieving deep levels of sleep; restorative rest is reduced.

Medications

There are some medications designed to assist with sleep and others designed to maintain alertness and stay awake. Medications for sleep work with the central nervous system (CNS) in some capacity, to improve entry to sleep, to help maintain sleep or both. Nurses should engage patients in a discussion about the use of available choices, as a combination of natural supplements or other medications of any sort, should be approved by the healthcare prescriber.

Lifestyle, Habit, and Cultural Considerations

Sleep is an essential component of physical and emotional wellbeing (Gardiner et al., 2023). Certain habits,

lifestyle choices, and different cultures can influence sleep, including factors such as physical exercise, age, and lifestyle choices. Sleep quality and quantity change across the lifespan in complex ways due to the ageing process. The need for sleep is continuous throughout a lifetime, but the ability to achieve adequate sleep decreases as a result of the ageing process (Dzierzewski et al., 2021). The ability to fall asleep and stay asleep for long periods can be impacted by lifestyle choices such as the consumption of certain substances and electronic use or physical activity and increased stress. Some of these factors are discussed below.

Electronic Use

Electronics have become a universal part of most lives. For many, electronic connectivity has become such a central part of life they are viewing their screens right before bed and perhaps responding to message alerts when they would previously have been entering deep sleep cycles. Research demonstrates that reading from an electronic device, rather than a printed book, can decrease the feeling of sleepiness and make it more difficult to fall asleep (Dzierzewski et al., 2021). Using an electronic device can impact sleep onset and potentially impact sleep quality due to a reduction of melatonin production due to the additional light exposure (AlShareef, 2022; Casiraghi et al., 2021).

Physical Activity

Enhanced sleep quality can lower the risk of developing sleep disorders such as insomnia and can naturally improve sleep health (Alnawwar et al., 2023). Exercise tends to have general health benefits and promote psychophysiological homeostasis. Physical activity contributes to a body's normal functioning by maintaining flexibility, improving oxygenation and perfusion, and fostering other metabolic actions and reactions. Exercise aids sleep by increasing the production of melatonin, reducing stress and improving mood (Alnawwar et al., 2023). Although an appropriate amount of physical activity is usually associated with positive results, excessive activity may lead to strained muscles or injuries that may cause pain, which can disrupt sleep patterns.

Substances Affecting Sleep

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Hospitalisation and Sleep

Since the days of Florence Nightingale, sleep has been recognised as beneficial to health and of great importance during nursing care due to its restorative function. It is common for sleep disturbances and changes in sleep patterns to occur in connection with hospitalisation. Patients in medical and surgical units often report disrupted sleep, not feeling refreshed by sleep, wakeful periods during the night, and increased sleepiness during the day. Illness and the stress of being hospitalised are causative factors, but other reasons for insufficient sleep in hospitals may be due to an uncomfortable bed, being too warm or too cold, environmental noise such as IV pump alarms, disturbance from healthcare personnel and other patients, and pain. The presence of intravenous catheters, a urinary catheter, and drainage tubes can also impair sleep. Increased daytime sleepiness, a consequence of poor-quality sleep at night, can cause decreased mobility and slower recovery from surgery.

Figure 2. Sleep disturbances are common in the hospital

Effects of Sleep Deficiency

Insufficient sleep caused by either a total lack of sleep or a lack of quality sleep can affect people in many ways. For children, sleep insufficiency may influence growth and development, and, for both children and adults, sleep inadequacy can have behavioural, psychological, and physiological implications.

Insufficient Sleep in Children

Problems sleeping affect 25 to 50 per cent of young children, and approximately 40 percent of adolescents (Pacheco, 2023). If left unmanaged, results of insufficient sleep start to become apparent in growth and development, mental health, behaviour, and performance issues. It also places these children at higher risk for obesity and related health concerns.

Growth and Development

Inadequate sleep has direct effects on cognitive operations, alertness, the ability to focus and pay attention, the acquisition of vocabulary, and memory (Liu et al., 2024; Pacheco, 2023). Growth hormone has a relationship to circadian rhythms, with typical release during sleep. In infancy, if sleep is not adequate, it can result in the secretion of insufficient amounts of growth hormone, therefore potentially impacting normal growth at such a critical time (Pacheco, 2023). Chronic lack of growth hormone results in reduced growth, impaired focus and alertness, and inability to regulate moods or positively adapt and develop resiliency. For toddlers, napping is needed to consolidate memories and develop motor skills and high-level attention.

The impact of insufficient sleep on adolescents is seen physically through the development of risk factors for, or diagnosis of, cardiovascular, metabolic, and inflammatory disorders. Hypertension, cardiovascular disease, and diabetes mellitus (especially Type 2) are becoming more commonplace in adolescence and even childhood, and insufficient sleep is one major factor (Liu et al., 2024; Pacheco, 2023). Behavioural, mental health, and performance issues in this age group are also associated with sleep insufficiency.

Behavioural and Mental Health Concerns

Insufficient sleep can impact the behaviour and mental health of children in many ways. It has the potential to influence the ability to:

- Pay attention
- Focus
- Plan
- Tolerate frustrating circumstances
- Regulate moods
- Adapt
- Develop resilience.

Depression, anxiety, mood disorders, and attention deficit hyperactivity disorder (ADHD) are examples of psychological disorders commonly impacted by lack of sleep (Suni, 2024). Physiological issues that may have a connection to sleep deprivation include cardiovascular, respiratory, gastrointestinal, and metabolic disorders.

Psychological and Cognitive Concerns

Sleep insufficiency is associated with anxiety, depression, concentration, memory, and mood (Suni, 2024). This relationship sometimes occurs in a bidirectional manner, whereby lack of sleep can be both a contributor to and the effect of a mental disorder (Columbia Psychiatry, 2022; Suni, 2024). Even patients who have no history of a mental health disorder might experience issues after episodes of insomnia, especially if the sleep problems become chronic. Psychological distress and insomnia can then become a self-perpetuating problem. Treating a sleep disorder can sometimes improve the mental health problem (Suni, 2024).

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Physiological Concerns

Insufficient sleep also affects the body's physiologic responses or maintenance of homeostasis. Various neurohormonal responses occur during sleep cycles, including healing and restoring actions, as well as the secretion of hormones that sustain normal physiological functions. Sustaining the normal function of the human body involves complex, coordinated activities between the brain and the different organ systems. Sleep is necessary for these systems to perform their necessary tasks and sustain a homeostatic state.

Gastrointestinal

The gastrointestinal system is affected by quantity and quality of sleep, in a bidirectional fashion. Therefore, insufficient or poor sleep can contribute to gastrointestinal disorders, and gastrointestinal problems can result in ineffective sleep (Orr et al. 2020; Vernia et al., 2021). Gastrointestinal distress often leads to fragmented sleep which subsequently, contributes to actual and perceived gastrointestinal symptoms, such as reflux, pain, and bloating. Some of the gastrointestinal disorders commonly exacerbated by lack of sleep include:

- Gastroesophageal reflex disease (GERD)

- Irritable bowel syndrome (IBS)
- Irritable bowel disease (IBD)
- Colon cancer
- Non-alcoholic fatty liver disease (NAFLD).

There is a pathophysiological relationship observed between obstructive sleep apnoea (OSA) and NAFLD.

Nutrition is also potentially contributory to gastrointestinal health or illness. Vernia et al., (2021) noted the psychophysiological relationship between a healthy diet, lifestyle and good sleep. Dietary habits such as the following can disrupt sleep:

- Eating fast food or foods of poor quality
- Skipping meals or overeating at certain meals
- Excess caffeine and/or alcohol consumption.

Cardiovascular

The cardiovascular system is particularly sensitive to insufficient sleep and the implications of poor sleep can be seen in:

- Inflammatory responses
- The development of atherosclerosis
- Hypertension
- Hyperlipidaemia
- Hyperglycaemia/diabetes mellitus (DM)
- Obesity
- Myocardial infarction (MI)
- Stroke. (Cleveland Clinic, 2020; Suni, 2023)

More specifically, lack of sleep can result in excess calcium deposited in the coronary arteries and together with hyperlipidaemia and inflammation, contributes to plaque formation which increases the risk of MI and stroke. Chronic hypertension causes stress on the heart and can contribute to MI and heart failure (HF). Depending on the stage of HF, symptoms may include fluid retention and subsequent difficulty breathing. The kidneys and brain are also prone to damage secondary to poor perfusion (Suni, 2023).

Metabolic Syndrome

Metabolism is influenced by sleep and insufficient sleep in a few ways. The intermittent hypoxia involved in OSA is related to such metabolic disorders as insulin resistance and hyperlipidaemia (Orr et al., 2020).

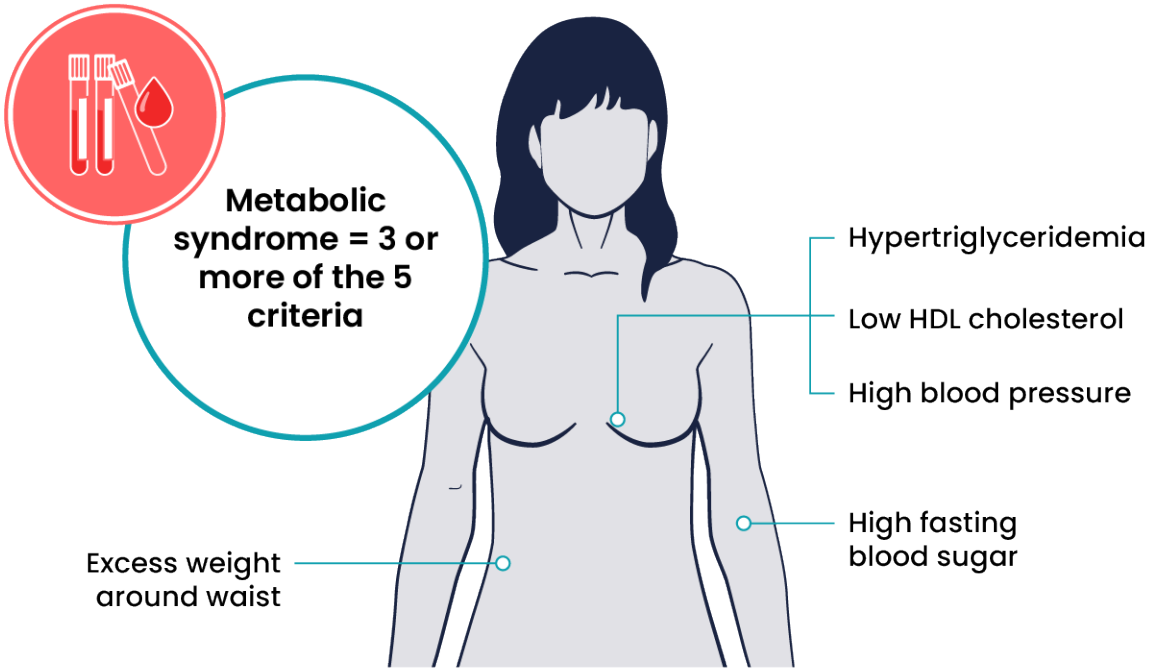

Figure 3. Metabolic syndrome

Diet is also influenced by sleep as the lower levels of the hormones ghrelin and leptin result in not feeling full and food cravings for choices high in fats and carbohydrates.

Lipid abnormalities associated with metabolic syndrome and diabetes mellitus include:

- Combination of high triglycerides and low high-density lipoprotein (HDL)
- Insulin resistance
- Hyperglycaemia
- Hypertension
- Weight gain. (Chasens et al., 2021)

Those who sleep less than five hours, or more than nine hours per day, are at elevated risk of developing metabolic syndrome.

Immunity

Sleep fosters normal immune function, and insufficient sleep is related to both adaptive and innate immune function alterations (Garbarino et al., 2021). Sleep supports the body's immunological memory. Immune cells are among those produced primarily during sleep (Heid, 2023). Adequate sleep is necessary for the maintenance of normal immune function, homeostasis, the ability to fight microbial invasions, and/or to mount a normal and effective inflammatory response. Patients who do not receive the sleep they need are more susceptible to infections, autoimmune reactions, and exaggerated inflammatory responses, resulting in infections and chronic inflammatory responses. These may include pathological changes in the

cardiovascular and metabolic systems, autoimmune and neurodegenerative diseases, and cancers, especially colorectal, prostate, and breast cancers (Garbarino et al., 2021).

Autoimmune disorders, such as systemic lupus erythematosus (SLE) and rheumatoid arthritis (RA), are also more common in those who experience chronic sleep loss. Due to chronic illness, the normal immune response becomes unregulated and intensified, causing a more drastic inflammatory response and continuation of chronicity (Garbarino et al. 2021).

Figure 4. Sleep fosters normal immune function

Behavioural Effects of Insufficient Sleep

Decision-making can become impaired by lack of sleep, resulting in behaviour changes, including impulsive actions. Misuse of substances and risky, dangerous driving are two potentially damaging behaviours that can be associated with inadequate sleep. Additionally, hypersomnia can negatively affect all different types of behaviours.

Increased Risk for Substance Misuse

Insufficient sleep can have various psychological results, which can then impact behaviour because inadequate sleep can have deleterious effects on clear thinking, coping, and decision-making. Many people self-medicate with substances, such as alcohol, over-the-counter medications, marijuana, and other illicit

drugs, to stay awake, fall asleep, and cope with feelings of anxiety, mood changes, frustration, and insecurity. Some look for ways to feel happier, and some search for methods to calm down, even when such relief is temporary and may even result in worsening long-term effects.

Motor Vehicle Accidents

According to the Sleep Health Foundation ([SHF], 2024), driving while drowsy can impair driving performance to a similar level as having a blood alcohol concentration of 0.05%. The SHF statistics suggest that 20-30% of fatal motor vehicle crashes can be attributed to drowsy driving, and up to 1 in 4 single-vehicle accidents on country roads are due to the driver falling asleep. In a 2016 study, it was found that 29% of Australians have driven while drowsy, and 20% reported having fallen asleep while driving (SHF, 2024).

Driving while drowsy is preventable but requires the necessary recognition and respect for its influence on safe driving. The SHF (2024) states that most crashes occur when:

- The driver has had less than 6 hours of sleep
- Has been awake for longer than 17 hours
- Has had less than 3–5 hours of sleep within a 24-hour period.

Common Sleep Disorders

Insomnia

Insomnia is an inability to fall asleep, to stay asleep, or to achieve good quality sleep. Lack of sleep results in feeling fatigued and sleepy, often throughout the day, and can hinder the ability to complete activities and obligations. Insomnia often affects concentration, moods, and energy levels (Roddick & Cherney, 2024). Sleep disruptions are also associated with some cognitive disorders, including Alzheimer's disease and the risk of developing certain disorders, such as hypertension, coronary artery disease, diabetes mellitus, cancer, depression, and anxiety, is higher for those who experience chronic insomnia. Sleep problems can occur at any age but most commonly start in young adulthood (American Psychiatric Association [APA], 2024).

Insomnia can be acute or chronic. Acute or short-term insomnia is temporary and may occur in response to a stressful situation or a change to a person's sleep schedule, such as a later night than usual or having to get up earlier than expected. Chronic insomnia lasts longer than three months and/or occurs more than three nights per week.

Symptoms of Insomnia

- Lying awake for a long time before falling asleep.
- Sleeping for only short periods due to waking up often during the night or being awake for most of the night.
- Waking up too early in the morning and not being able to get back to sleep.
- Experiencing poor quality of sleep that causes one to wake up feeling unrested.

Diagnosis

To be diagnosed with insomnia, a comprehensive assessment must be completed, including a physical exam, a sleep diary and clinical testing. For a sleep assessment to take place, sleep difficulties must occur at least three nights a week for at least three months and cause significant distress or problems at work, school or other important areas of a person's daily functioning (APA, 2024).

Management and Treatment

Lifestyle changes often help improve the quality of sleep due to short-term insomnia. Good sleep hygiene is recommended for those suffering from insomnia, including:

- Make your bedroom sleep-friendly. Sleep in a cool, quiet place. Avoid artificial light from the TV or electronic devices, as this can disrupt your sleep-wake cycle.
- Go to sleep and wake up around the same time each day, even on the weekends. If you can, avoid night shifts, irregular schedules, or other things that may disrupt your sleep schedule.
- Avoid caffeine, nicotine, and alcohol before bedtime. Although alcohol can make it easier to fall asleep, it triggers sleep that tends to be lighter than normal. This makes it more likely that you will wake up during the night.
- Get regular physical activity during the daytime (at least five to six hours before going to bed). Exercising close to bedtime can make it harder to fall asleep.
- Avoid daytime naps, especially in the afternoon. This may help you sleep longer at night.
- Eat meals on a regular schedule and avoid late-night dinners to maintain a regular sleep-wake cycle.
- Limit how much fluid you drink close to bedtime. This may help you sleep longer without having to use the bathroom.
- Learn new ways to manage stress. Follow a routine that helps you wind down and relax before bed.
- Avoid certain over-the-counter and prescription medicines that can disrupt sleep (for example, some cold and allergy medicines)

Link to Learning

Watch this video on insomnia [4:46] that includes a description, possible causes and treatment.

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Parasomnia

Parasomnias are abnormal behaviours while a person is asleep, such as dreams, movement and vocalisation while the person is falling asleep or sleeping. With many of the parasomnia behaviours, the person does not remember the activities. Associated dreams may be recalled immediately upon waking, but most are not remembered long-term. There is an almost cyclical relationship between insomnia and parasomnias, as lack of sleep can contribute to the occurrence of parasomnias, and parasomnias may result in a lack of sleep.

Obstructive Sleep Apnoea (OSA)

OSA is common and involves the relaxation of the muscles of the posterior pharynx (back of the throat; see Figure 5.) and presents as repeated episodes of snoring, snorting, gasping or breathing pauses (APA, 2024). If these muscles relax excessively, they do not support structures within the mouth and throat, including the soft palate, tongue, and sides of the throat, which can compromise airflow. The impaired breathing causes an accumulation of carbon dioxide (CO2), which, upon reaching a certain level, causes the brain to wake the individual, open the airway, and take a deep breath. Depending on the level of CO2 and oxygen (O2), it may take a few deep breaths to normalise the blood gases. Many people have no recollection of the frequent awakenings as they return to sleep quickly. Nonetheless, if their sleep is disrupted several times each hour, it fragments their sleep, and they may be very drowsy during the day, have mood swings, and find it difficult to concentrate on tasks and thoughts.

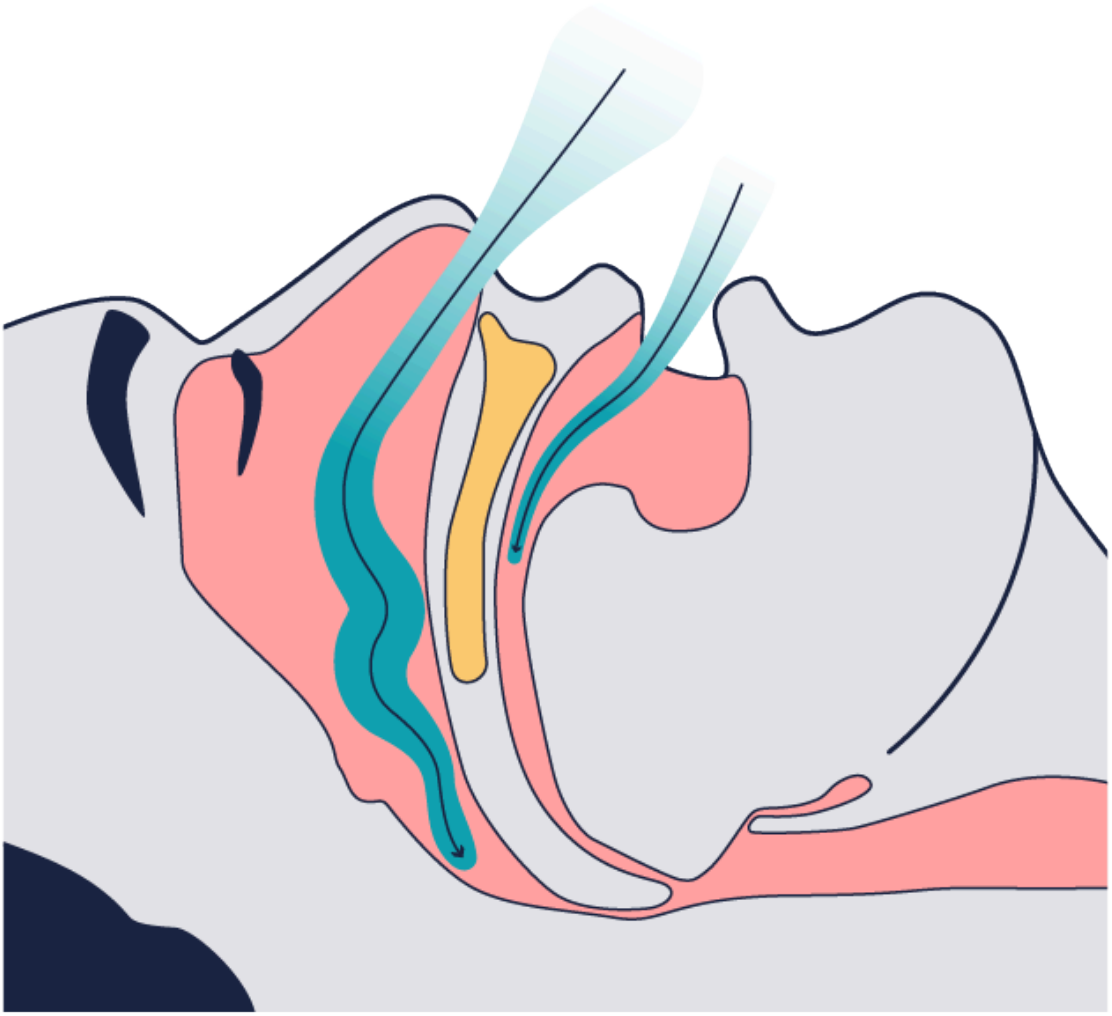

Figure 5. A patient with OSA. The flow of air is impeded by structures within the mouth and throat, such as the tongue, soft palate, and sides of the throat.

Symptoms of OSA

- Reduced or absent breathing, known as apnoea events
- Frequent loud snoring
- Gasping for air during sleep
- Excessive daytime sleepiness and fatigue
- Decreases in attention, vigilance, concentration, motor skills, and verbal and visuospatial memory
- Dry mouth or headaches when waking
- Sexual dysfunction or decreased libido
- Waking up often during the night to urinate.

Management and Treatment

- Lifestyle changes such as losing weight or certain sleeping positions.
- Continuous positive airway pressure device (CPAP)
- Custom-fit mouthpiece or device.

Continuous positive pressure airway (CPAP) is a breathing device commonly prescribed to treat OSA. This device uses mild pressure to keep the airways open while the person is sleeping. Figure 6 below depicts a CPAP machine and how it attaches to a patient.

A mouthpiece and oral appliance (Figure 6) are devices that are prescribed to assist individuals with mild OSA. The oral appliance is custom-fit to prevent the jaw or tongue from occluding the airway while a person is sleeping. gives examples of common mouth or oral appliances used for patients with mild OSA.

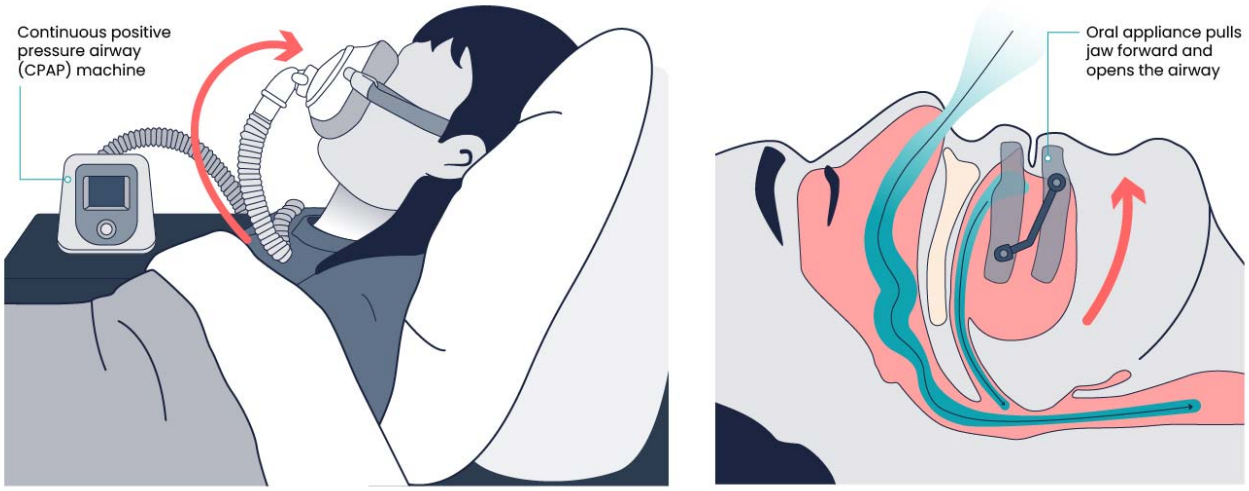

Figure 6. The CPAP machine and oral appliance being used by a patient

Central Sleep Apnoea (CSA)

CSA is less common than OSA. It involves a lack of communication between the brain stem and the muscles involved in breathing as the airway remains open, but the impaired messaging causes frequent apnoeic episodes throughout a sleep cycle (APA, 2024). Patients with CSA tend to experience the same fragmented sleep as those with OSA, but they also may notice nighttime discomfort in the chest, headaches in the morning, and insomnia.

Narcolepsy

Narcolepsy is an uncommon sleep disorder that causes periods of extreme daytime sleepiness and sudden, brief episodes of deep sleep during the day. People with narcolepsy have episodes of cataplexy, a brief, sudden loss of muscle tone triggered by laughter or joking. This can result in head bobbing, jaw-dropping, or falls. Individuals are awake and aware during cataplexy (APA, 2024).

Narcolepsy is rare, affecting less than 1% of the adult general population. It typically begins in childhood, adolescence or young adulthood (APA, 2024). Narcolepsy is diagnosed based on medical history, family history, a physical exam, and a sleep study. The sleep study looks at daytime naps to identify disturbed sleep or a quick onset of rapid eye movement (REM) sleep.

Symptoms of Narcolepsy

- Extreme daytime sleepiness
- Falling asleep without warning
- Difficulty focusing or staying awake during the day
- Frequent night waking
- Hallucinations
- Sleep paralysis (lying awake and unable to move for several minutes).

Management and Treatment

- Medications include stimulants, CNS depressants and sedatives.
- Good sleep hygiene should be promoted to improve the quality of sleep experienced at night.
- Regular naps throughout the day, in combination with good sleep quality overnight.

Other Sleep Disorders

There are several other breathing disorders associated with sleep as well. Sleep-related hypoventilation means shallow and unusually slow respirations while asleep. Such inadequate breathing allows for the patient to develop hypercapnia, or elevated blood CO2. Sleep-related hypoxaemia (low level of O2 in the blood) is typically not a primary disorder but the result of another condition, usually respiratory, such as chronic obstructive pulmonary disease.

Diagnostic Testing for Sleep Disorders

Sleep Study

A sleep study may be ordered for an individual suspected of having a sleep disorder and can be performed at a specialist centre or in the patient's home. Polysomnography simultaneously records physiologic monitoring, including EEG for recording brain waves, ECG for the electrical cardiac cycle, EOG for recording eye movements, EMG for recording muscle movements, and SaO2. Monitoring leads for this recording are placed at locations on the scalp, face, eyelids, chest, and limbs, and a pulse oximeter is placed on a finger. Results display on a hypnogram and contribute to diagnosis of insomnia, sleep apnoea, narcolepsy, somnambulism, and RLS. See Figure 7 for an image of a patient with sensors in place for a sleep study.

Figure 7. Patient participating in a sleep study

Assessment for Sleep Disturbances

Initial Data Collection

Nurses play an important role in caring for patients with sleep disturbances. Through the data collection

(assessment) phase, patient education to improve sleep, and medication administration and education, nurses are involved directly in engaging with patients. Nursing assessment should also include inquiry as to any changes the patient has noticed—psychologically or physiologically—that could be a result of the lack of sleep. The patient may have made the connection or may not have considered sleep as the root of the changes. The nurse may be the first to recognise the link, particularly if already familiar with disorders that are often related to sleep disturbances.

Assessment and Education

Nurses can gather vital information about a patient's personal and family history, advise about keeping a sleep log, and provide information about sleep studies for those who are prescribed such diagnostic testing. The role of the nurse often includes educating patients about issues they are experiencing and ideally helping identify methods to improve problems.

Nursing care begins with the assessment—gathering necessary and helpful information upon which to build care planning—and continues with prioritising patient problems, identifying ways to approach them, implementing the identified actions, and evaluating the outcome(s). In the case of sleep disturbances, data collection begins with a detailed family and personal history focused on particular factors that may influence rest and sleep.

Patient Assessment

Patients who have been experiencing insufficient sleep are often asked to keep a sleep log, and the nurse is able to analyse this diary of events, providing important information to the prescriber. Some patients are prescribed a sleep study, and nurses can educate the patient prior to such a study and assist with post-study follow-up with the patient and family if indicated.

Collect a Detailed History

Family and patient history, including diagnoses, surgeries, and medications, is a starting point for assessment. The nurse should perform a focused assessment, exploring sleep patterns, hours of sleep, and whether the patient or significant other reports loud snoring or apnoeic periods followed by episodes of gasping as the body works to recover from the apnoea-related hypoxia. For those who work nights, times for sleep may need to be adjusted, or follow-up questions may be added about time at work versus time off.

It is also helpful to determine the effects of caffeine intake and medications on a patient's sleep pattern. If a patient provides information causing concern for impaired sleep patterns or a sleep disorder, it is helpful to encourage them to create a sleep diary to share with a healthcare provider.

Nurses also perform objective assessments of a patient's sleep patterns during inpatient care. The number of hours slept, wakefulness during the night, and episodes of loud snoring or apnoea should be documented. Note physical (e.g., sleep apnoea, pain, and urinary frequency) or psychological (e.g., fear or anxiety) circumstances that interrupt sleep, as well as sleepiness and napping during the day.

The table below includes guiding questions and can be modified to fit the practice needs of individual nurses.

Table 2. Guiding Sleep Questions

Questions	Normal Findings
How many hours do you sleep on an average night?	7–8 hours for adults
During the past month, how would you rate your sleep quality overall?	Very good or fairly good
Do you go to bed and wake up at the same time every day, even on weekends?	Yes, they generally maintain a consistent sleep schedule
How likely is it for you to fall asleep during the daytime without intending to? Do you struggle to stay awake while you are doing things?	Unlikely
How often do you have trouble going to sleep or staying asleep?	Never, rarely, or sometimes
During the past two weeks, how many times did you have loud snoring while sleeping? Note: It is helpful to ask the patient's sleep partner this question.	Never

Good Sleep Hygiene

Sleeping whilst unwell or receiving medical treatment in a healthcare setting is difficult. As healthcare

practitioners, there are some interventions we can put in place to improve sleep hygiene for those in our care.

- Close window curtains if external light shines through
- Close curtains between people to create a feeling of privacy
- Reduce or eliminate overhead lighting and provide a night light if light overnight is necessary
- Use a torch to check on patients, including checking drainage bags to limit disruptions
- Ensure a clear pathway around the bed to avoid bumping into personal belongings or hospital equipment to avoid disrupting sleep
- Close the door to the room if possible
- Be mindful of noise made in communal staff areas, such as ringing phones, paging systems, and communication between staff
- Perform only essential tasks during sleeping hours or while patients are resting.

Sleep cycles are a complex process managed by specialised areas in the brain stem and are influenced by an individual's circadian rhythm. Regular, sufficient sleep is needed for optimal physiological and psychological functioning. Insufficient sleep can disrupt functional ability, adversely impacting overall health.

Figure 8. Perform only essential tasks while patients are resting

Key Takeaways

In this chapter, we covered:

- Circadian rhythms and sleep-wake homeostasis are the two internal biological mechanisms that work together to regulate sleep and wakefulness.
- A full sleep cycle takes between 80-100 minutes to complete, and most people typically cycle through four to six cycles per night. When sleeping, individuals cycle through two phases of sleep – REM and non-REM sleep.
- While sleeping, the brain is forming new pathways to allow a person to learn and remember, helping a person to be attentive, make decisions and be creative while awake.
- Many factors can affect the quality and quantity of sleep, including illness, physical activity, mental status, substance use, stress and culture.
- Insufficient sleep can affect growth and development, behavioural and mental health, psychological and cognitive functioning, anxiety, depression, concentration and mood. It can also negatively affect the gastrointestinal system, cardiovascular system, and immunity.

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RECOGNISING AND RESPONDING TO THE DETERIORATING PATIENT

Tracey Gooding and Jessica Best

Learning Outcomes

In this chapter, you will learn how to:

- Conduct comprehensive safety checks and identify potential hazards to ensure readiness for patient deterioration
- Predict potential complications and develop strategies to prevent or prepare for patient deterioration
- Recognise and escalate patient deterioration, including physiological and psychological acute deterioration
- Perform emergency assessments on the deteriorating patient, including a primary and secondary survey
- Apply effective communication techniques such as ISBAR to escalate and hand over care of the deteriorating patient, PACE for graded assertiveness and closed-loop communication
- Perform Basic Life Support (BLS) procedures, including the steps of DRSABCD, to provide immediate and effective care in emergency situations for adult and paediatric patients
- Discuss the importance of Advanced Resuscitation Plans and transitioning to end-of-life care when appropriate for the deteriorating patient.

Introduction

In the often unpredictable healthcare environment, a nurse's ability to recognise and respond to a **deteriorating patient** is a crucial skill. Early recognition and timely interventions can significantly improve patient outcomes, reduce length of stay, and prevent adverse events. This chapter aims to equip nurses with the knowledge and skills to prevent and predict deterioration, identify early signs of patient

deterioration, effectively respond and escalate care of the deteriorating patient, and implement appropriate assessment and management strategies in emergency situations, including end-of-life care.

Figure 1. Benefits of early detection and effective intervention

Why Early Intervention Matters

In 2023, 28,112 deaths in Australia were classified as potentially avoidable (Australian Bureau of Statistics, 2024). Enhancing the early detection of patient deterioration and ensuring timely interventions are important strategies for addressing this issue. Research highlights that many adverse outcomes could be mitigated if early warning signs were more effectively identified and acted upon (Massey et al., 2017), underscoring the need for continued focus on proactive patient care to predict, recognise and respond appropriately to patient deterioration and system improvements.

Links to Learning

These insights contributed to establishing a national standard in Australia: Standard 8 – Recognising and Responding to Acute Deterioration Standard, the Australian National Consensus Statement: Essential elements for recognising and responding to acute physiological deterioration and the Australian National Consensus Statement: Essential elements for recognising and responding to deterioration in a person's mental state.

These documents highlight the importance of promptly recognising physical and cognitive deterioration signs and provide a guide to identifying deterioration and instigating an effective clinical response. The objective is to ensure that these warning signs are detected early and that qualified healthcare professionals carry out timely, effective interventions to improve patient outcomes.

Factors Influencing Early Intervention

Research by Anstey et al. (2019) revealed that a significant number of nursing staff believed that the Recognising and Responding to Acute Deterioration standard has improved the recognition and response to deteriorating patients in their health service with the most cited benefits being enhanced vital signs monitoring, increased escalation of care and improved ward management of the deteriorating patient. A large Australian focus group study identified that a standardised approach, workplace culture and teamwork, confidence and experience and communication were considered vital to responding and escalating care of the deteriorating patient (Newman et al., 2023).

The implementation of **Rapid Response Systems**(RRSs) was another response to the statistics on deteriorating patients as they were adopted throughout Australia and continue to provide a safety net to identify deteriorating patients and ensure they receive appropriate care (Clinical Excellence Commission, n.d.). RRSs provide a structured approach to responding to patients experiencing acute clinical deterioration. Its primary goal is to prevent adverse events, such as **cardiac arrest,** unplanned intensive care unit (ICU) admissions, or death, by intervening early when warning signs of deterioration are identified. Knowing when and how to escalate care through this standardised system is an important factor in its success.

A trigger mechanism such as an **Early Warning Score** (EWS), may be used to detect deterioration first, and then escalation of care occurs through a standardised communication platform such as a number to call or a paging system, to a team of multi-disciplinary practitioners experienced in recognising and responding to deterioration. These teams are usually known as **Rapid Response Teams** (RRT) or **Medical Emergency Teams** (MET). Research has shown a correlation between implementing RRSs and reductions in in-hospital mortality and cardiac arrest rates. These findings highlight the effectiveness of RRSs in improving patient safety and outcomes within hospital settings (Jones, 2023).

Since nurses are the healthcare professionals most frequently responsible for assessing vital signs, the effectiveness of hospital rapid response systems (RRSs) largely relies on their ability to perform accurate patient assessments, interpret data correctly, and escalate care when signs of deterioration are detected (Chua et al., 2019; Considine & Currey, 2015; Padilla & Mayo, 2018). Although vital signs are heavily relied upon to identify clinical deterioration and trigger a response for deteriorating patients in hospital settings, nurses' documentation of vital signs and their use in activating rapid response systems remain poorly understood (Considine et al., 2024). This highlights the vital role that education and training for ward staff have in ensuring early detection of the deteriorating patient and triggering escalation of care. Understanding the steps and strategies that can prevent a failure to recognise and respond to acute deterioration, is crucial for improving patient outcomes, enhancing quality of care, and reducing preventable deaths in healthcare settings. These steps can be summarised as the 3Ps and 3Rs: predict, prepare, prevent, recognise, relay and respond.

The 3Ps and 3Rs

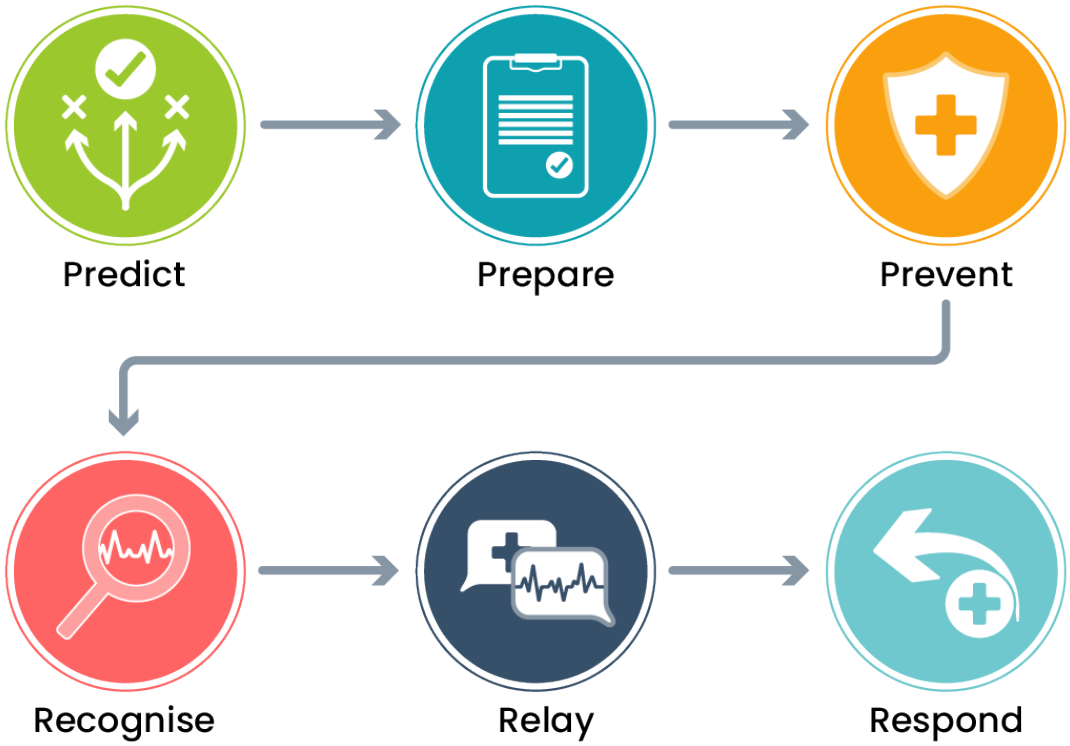


Figure 2. The 3Ps and 3Rs

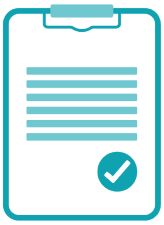
Predict

In the presence of known problems, nurses must predict the most common and dangerous complications associated with each problem and proactively prepare for potential worst-case scenarios. By analysing patterns and trends in vital signs, laboratory results, and other data, clinicians can identify patients at risk of deterioration before it occurs. Prediction requires healthcare professionals to anticipate potential complications or risks based on patient history, current condition, and clinical trends. The nurse must always be thinking two steps ahead. While it sounds daunting, most people use this thinking in daily life without realising it.

For novice nurses, developing this foresight begins with building a strong foundation of clinical knowledge and critical thinking skills. It involves learning to recognise patterns, understanding the progression of various conditions, and familiarising oneself with evidence-based practices. Moreover, fostering effective communication and collaboration with the healthcare team ensures that potential issues are addressed

collaboratively and efficiently. Over time, with experience and reflection, this proactive approach becomes second nature, enabling nurses to provide high-quality, responsive care that prioritises patient safety.

Prepare



Being prepared for emergencies is a critical aspect of nursing care, especially when managing deteriorating patients. Preparation involves ensuring that you have the necessary resources, training, and systems to identify and respond effectively to patient deterioration.

Safety Checks

Before assessing a patient, it is crucial to ensure that you are fully prepared for any potential emergencies or deterioration. This involves conducting pre-emptive safety checks and ensuring that all necessary equipment and resources are readily available and in working condition. Preparedness can make a significant difference in the speed and effectiveness of your response to a deteriorating patient.

Pre-emptive safety checks are essential to create a safe environment for both patients and healthcare providers. These checks help identify and mitigate potential hazards, ensuring that the care team is ready to respond to any emergencies. Key steps in conducting pre-emptive safety checks include:

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Resource Management

Resource management focuses on the efficient allocation, availability and maintenance of both medical and non-medical resources that may be needed in an emergency. Having the right equipment and resources readily available is vital for managing emergencies effectively. Key considerations include:

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online here:
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Prevent

In the previous step, nurses must consider the many possible scenarios that occur as a result of patient deterioration. Prevention involves carefully implementing measures to prevent further deterioration and adverse events from occurring. Early detection and appropriate interventions can prevent or significantly reduce the risk of adverse outcomes in deteriorating patients. Studies have long revealed that in many instances these events were preceded by objective signs of clinical deterioration prior to the event (Hodgetts et al., 2002; McQuillan et al., 1998).

Many strategies have been implemented Australia-wide to reduce the risk of missing signs of deterioration and/or not escalating care for a deteriorating patient. The national standard designed to improve the recognition of, and response to deteriorating patients in acute health care facilities requires that all hospitals have a Rapid Response System (RRS), and provide initiatives that improve the detection of clinical deterioration in the period prior to Rapid Response Team (RRT)/Medical Emergency Team (MET) activation (Australian Commission on Safety and Quality in Health Care [ACSQHC], 2024b).

Key strategies for preventing further deterioration and adverse events include utilising Early Warning Scores (EWS), utilising relevant algorithms, following protocols and clinical pathways, having knowledge of the escalation protocols, and implementing rapid response systems when indicated.

Early Warning Scores (EWS)

Studies have demonstrated that utilising EWSs can effectively prevent unrecognised deterioration (Crowe et al., 2018; Warren et al., 2021). EWSs equip nurses with a tool to identify patient deterioration trends earlier for more timely interventions (Ashbeck et al., 2021). Utilising EWSs, such as the Queensland Adult Deterioration Detection System (Q-ADDS), Queensland Maternity Early Warning Tool (Q-MEWT), Children's Early Warning Tool (CEWT), Modified Early Warning Score (MEWS) or National Early Warning Score (NEWS), helps identify patients at risk of deterioration. The observation chart includes graphical information which is helpful in tracking trends over time. The scoring systems use vital signs and clinical parameters to generate an overall score that triggers specific actions based on the level of risk and clearly indicates when escalation should occur (ACSQHC, 2021; Ashbeck et al., 2021; Le Lagadec &

Dwyer, 2017). Scores are colour-coded to clearly indicate different levels of escalation. See Figure 3 for an example of a MEWS chart.

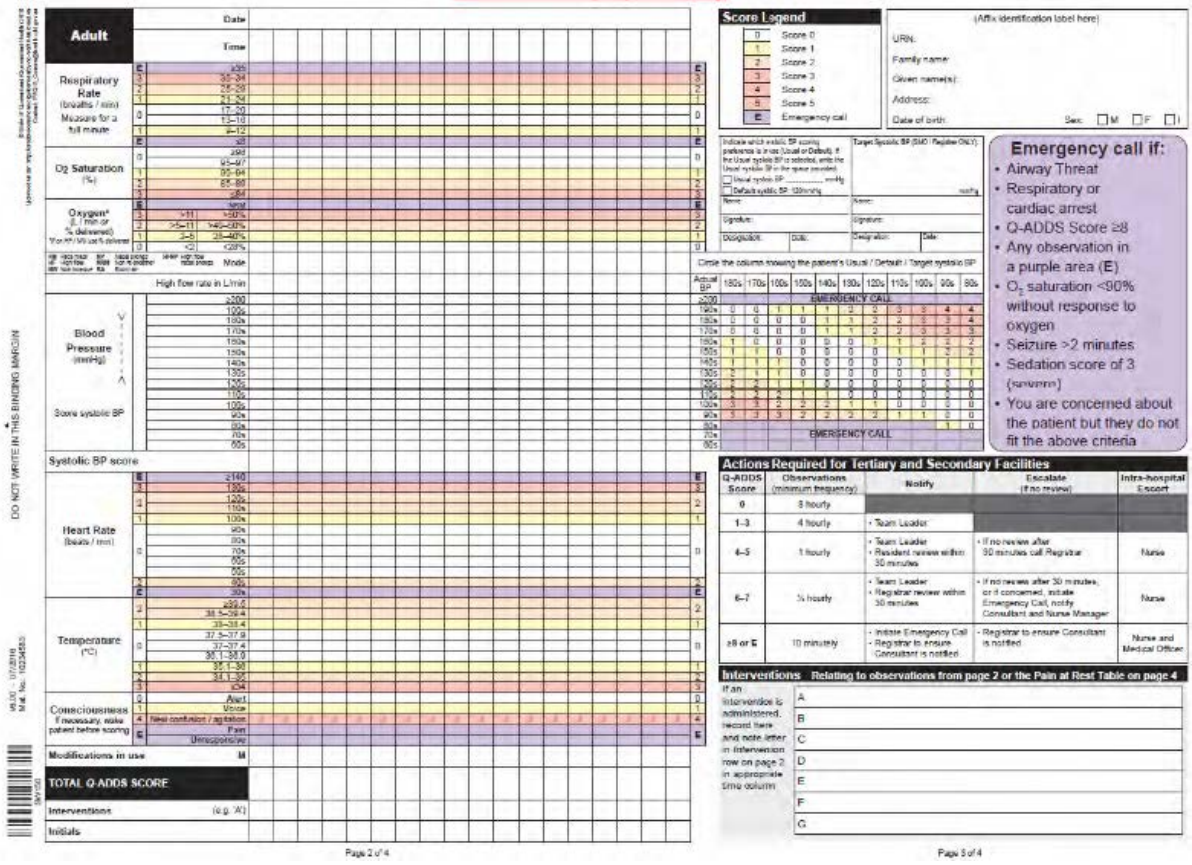

Figure 3. Example of a MEWS chart with red, yellow, and purple colour zones. Zone colours may vary for different MEWS charts.

Yellow zone

- Registered nurse review
- Increase observations
- If there are three or more observations noted in yellow zone, escalation to red zone is required.

Red zone

- Review by multidisciplinary team (at least one medical officer (MO and one RN
- Increase frequency of observations
- If there are three or more observations noted in the red zone, escalation to purple zone is required.

Purple zone

- If a patient's observations are noted in any of the purple zone, a medical emergency response is required (clinical staff with advanced life support skills)
- Senior doctor responsible for patient must be notified
- If patient not tranferred to higher care, frequency of observations must be increased until return to normal parameters (unless an end-of-life plan or modification has been initiated.

It is worth noting that while research indicates that early warning systems can assist clinicians in making decisions about escalating care, experts warn that due to the influence of human factors in the decision-making process, EWS charts should not be relied upon as a substitute for sound clinical judgment (Le Lagadec & Dwyer, 2017).

Algorithms, Protocols and Clinical Pathways

In order to prevent further deterioration in a patient, consideration needs to be given to the underlying cause. By applying **algorithms**, protocols, and **clinical pathways** that correspond to specific diagnoses such as sepsis, stroke, delirium, anaphylaxis, cardiac arrhythmias and myocardial infarction, response systems can be customised to fit the individual patient's situation and can ensure the involvement of specialists with skills and expertise in managing that particular condition (ACSQHC, 2021).

Escalation Protocols

Knowing the **escalation protocols** within the organisation and triggering these escalation pathways when appropriate helps ensure that any signs of deterioration are treated with the appropriate nursing

intervention and/or promptly communicated to the appropriate healthcare providers. This might be recommended as per the EWS or particular algorithm, protocol or clinical pathway you may be following. EWS charts will offer recommendations to escalate care as indicated for each score. This might include increased monitoring, notifying the nurse in charge, notifying or escalating review by a medical officer, or calling for an emergency response. This may also include transferring the patient to a higher level of care within or external to your facility. Despite the use of pathways and EWS recommendations, clinicians can also escalate care anytime, based on their own clinical judgement or the concerns of the family or carer. Each organisation will have their own formal, organisation-wide escalation protocol that can be triggered for all patients at any time (ACSQHC, 2021). Knowing how this is done is paramount to the safety of the deteriorating patient.

Rapid Response Systems (RRS)

Implementing RRS, such as Medical Emergency Teams (MET) or Rapid Response Teams (RRT), ensures that trained and experienced clinicians can quickly assess and manage patients showing signs of deterioration. These teams are trained to provide immediate and advanced life-saving care, stabilise patients, and prevent further decline.

Ryan's Rule

Families and caregivers often notice subtle signs of deterioration before healthcare staff do, which is why **Ryan's Rule** was introduced in Queensland to empower them to escalate concerns and ensure timely medical intervention when a patient's condition worsens. Other Australian states have similar escalation systems, but they may have different names. This rule allows patients, families, and caregivers to escalate concerns about a patient's condition if they feel their concerns are not being taken seriously by healthcare staff.

Why Ryan's Rule was created

It was introduced after the death of Ryan Saunders, a two-year-old boy who passed away from an undiagnosed streptococcal infection in 2007. His parents had concerns about his condition, but their concerns were not escalated appropriately. Ryan's Rule was implemented to ensure that similar situations do not happen again.

How Ryan's Rule works

If a patient's condition is worsening and concerns are not being addressed, they can take the following steps:

1. Talk to the nurse or doctor about concerns.
2. If still concerned, speak to the Nurse in Charge.
3. If concerns remain, call 13 HEALTH (13 43 25 84) and request a Ryan's Rule review.

An independent senior clinician will then conduct a Ryan's Rule Clinical Review to assess the situation.

You can learn more about Ryan's Rule on this web page.

(Queensland Government, 2024)

Recognise

Recognition involves identifying early signs of patient deterioration through vigilant monitoring and assessment. Nurses play a vital role in this recognition of subtle changes in vital signs, behaviour, or clinical conditions. Rapid recognition of these warning signs is essential to initiate timely interventions and improve patient outcomes. Understanding the key physiological indicators and clinical symptoms that nurses should be vigilant about when assessing patients can significantly enhance early detection of deterioration.

Physiological indicators are objective measurements that can signal a patient's deterioration. These indicators often involve changes in vital signs and other measurable parameters. Key physiological indicators include vital signs. In Australia, a complete set of vital signs comprises the following (ACSQHC, 2021):

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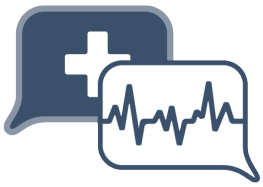
New Onset Confusion or Behaviour Change

According to the ACSQHC (2017), new onset confusion is characterised by a sudden shift in a person's mental state, often signalling the presence of delirium. This condition develops rapidly, typically over a matter of hours or days, and is distinct from any pre-existing cognitive impairment. Patients experiencing new onset confusion may exhibit (ACSQHC, 2017):

- Impaired attention, making it difficult for the patient to focus or follow conversations
- Altered consciousness, which can range from increased drowsiness to heightened agitation
- Disorganised thinking, leading to incoherent speech, difficult reasoning, or unpredictable behaviour.

Because delirium can be caused by various underlying condition, such as infection, metabolic imbalances, medication effects, or organ dysfunction, it is essential to conduct a prompt and thorough evaluation to determine the cause and initiate appropriate treatment.

Relay



Effective communication or "relaying" information ensures that critical information about a patient's condition is accurately and promptly shared among healthcare team members and escalated in a timely manner. Communication plays a crucial role in coordinating resources to the bedside when a patient begins to deteriorate (Manojlovich & Krein, 2022; Newman et al., 2023). Inadequate escalation efforts due to poor communication techniques expose patients to serious harm, highlighting the need for interventions to enhance communication efforts (Burke et al., 2022). Relaying information about patient deterioration can take various forms. There are many communication tools and techniques used in healthcare to assist with effective communication.

ISBAR

Structured tools such as ISBAR (Identification, Situation, Background, Assessment and Recommendations) can help improve the nurse's confidence, clarity and urgency of messages when escalating care (Burgess et al., 2020). Click or tap through each stage of the ISBAR handover below to understand each element of this structured approach.

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PACE

PACE (Probe, Alert, Challenge and Emergency) is a communication tool often used for graded assertiveness in healthcare. Fear of criticism or reprimand can prevent nursing staff from voicing concerns, especially in a culture that is hierarchical and discourages open communication, collaboration, or the empowerment of junior staff. This environment can contribute to failure to recognise and respond to deterioration (Burke et al., 2022).

Figure 4. The PACE Communication Tool

Probe

This is the least confrontational step, used to prompt the individual to reconsider their actions or decisions gently. It is often phrased as a question to encourage discussion and reflection.

Example: "Do you know that the patient's blood pressure has dropped significantly?"

Alert

If the initial probe does not lead to a resolution, the next step is to alert the team by suggesting a reassessment. This step signals concern without directly opposing the action.

Example: "Can we re-assess the medication dose before proceeding?"

Challenge

A more direct challenge is required if the concern remains unaddressed. This step explicitly asks the person to stop their action to ensure safety.

Example: "Please stop what you are doing while we double-check the patient's identity before administering the medication."

Emergency

The final and most assertive step is used in critical situations where immediate action is necessary to prevent harm. It is a direct command that prioritises patient safety above all else.

Example: "STOP what you are doing! That is the wrong medication!"

Closed Loop Communication

Closed loop communication is a communication technique designed to ensure clarity, prevent errors, and verify understanding, especially in high-stress or high-risk environments like healthcare. Research has shown that using closed-loop communication during a crisis can significantly reduce the time-to-task completion and decrease adverse events (Diaz & Dawson, 2020; Doorey et al., 2020; El-Shafy et al., 2017; Yemada et al., 2016). This process involves multiple steps to confirm that the message has been correctly received, interpreted, and acted upon.

Sender communicates a message
The sender (such as a healthcare provider) initiates the communication by clearly stating the message or instruction. This should be concise and unambiguous.

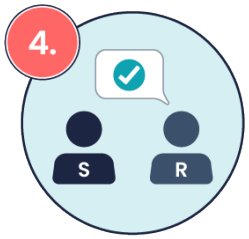
Example: "John, give 1mg adrenaline IV followed by a 20 mL normal saline flush."

Receiver interprets the message, acknowledges receipt, and communicates it back to the sender
The receiver (in this case, John) listens to the message, processes it, and then repeats it back, confirming they've understood the instruction. The receiver may paraphrase or repeat the message verbatim to ensure accuracy.

Example: "OK Mike, I am going to give 1mg adrenaline IV followed by a 20 mL normal saline flush."

Sender confirms that the intended message is received
After the receiver acknowledges the message, the sender confirms that the interpretation is correct.

Example: "That's correct, John."



Receiver reports back when the message has been acted upon
Finally, the receiver communicates the action taken to close the loop and confirm that the task has been completed as per the original message.

Example: "Mike, 1mg adrenaline IV with a 20 mL normal saline flush has been given."

Documentation

Effective documentation is a critical aspect of communication in healthcare, ensuring that accurate, relevant, and up-to-date information about a patient's care is readily accessible to support safe and high-quality clinical decisions (ACSQHC, 2024a).

According to the ACSQHC (2024a), effective documentation should meet several key standards:

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In addition to these core principles, documentation should include critical elements such as:

- **Assessments**: Details about the patient's condition at the time of each assessment, including physical examinations, laboratory results, and diagnostic findings.
- **Actions taken**: Clear records of interventions or treatments administered, such as medications, procedures, and care provided.
- **Outcomes**: Information on the effectiveness of treatments, including patient responses, improvements, or any setbacks.
- **Changes**: Any significant changes in the patient's condition, treatment plan, or response to care.
- **Follow-up processes**: Plans for ongoing care, referrals, or follow-ups, ensuring continuity in the patient's treatment.

Finally, healthcare documentation must adhere to medico-legal standards, ensuring that records are accurate, complete, and maintained in a manner that ensures quick access to accurate documentation to drive decisions in a crisis. Healthcare documentation protects both the patient's privacy and the healthcare provider's legal responsibilities. Proper documentation is not only essential for patient care but also serves as a legal record of the actions taken, which may be referenced in case of disputes, audits, or regulatory investigations (ACSQHC, 2024a).

Respond

Respond refers to the timely and appropriate actions taken to address patient deterioration once recognised. A rapid and coordinated response is crucial in preventing complications from escalating to a life-threatening state. Equipping healthcare providers with the skills and confidence to act decisively can mean the difference between recovery and preventable loss of life. Patient deterioration requiring immediate attention fall into two categories: physiological and psychological.

Acute Physiological Deterioration

An acute physiological deterioration occurs when a patient's vital functions are compromised, posing a threat to life or health. In these situations, nurses must respond swiftly and decisively to stabilise the

patient and prevent further deterioration. Utilising primary and secondary survey mnemonics helps ensure a structured and focused approach to assessment and intervention.

Primary Survey: ABCDE Assessment

The primary survey, or ABCDE assessment, is a structured, systematic approach used in healthcare settings to assess and manage patients. The goal is to swiftly identify and address immediate threats to the patient's life or health, initiating appropriate interventions to optimise outcomes and promote patient survival. This type of assessment is rapid and focused and aims to identify and address critical health issues promptly. It prioritises immediate life-threatening conditions and ensures timely intervention. This method is particularly useful in an emergency where quick decision-making is essential.

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Secondary Survey: FGHI Assessment

After completing the primary survey and implementing necessary interventions, the secondary survey (FGHI assessment) is conducted to obtain a more detailed assessment of the patient's condition and medical history and refine treatment strategies.

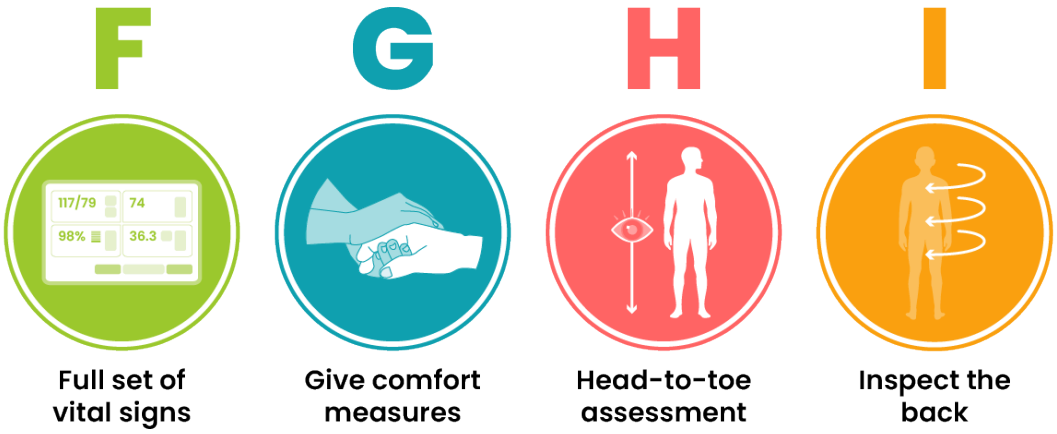
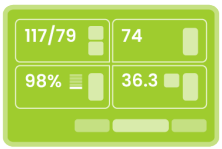


Figure 5. FHGI Assessment

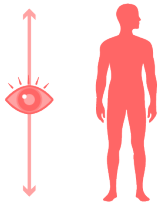


Full set of vital signs and further investigations (F)

A comprehensive set of vital signs is recorded, including blood pressure, heart rate, **respiratory rate**, temperature, and oxygen saturation. Further investigations such as **arterial blood gas** (ABG) analysis, chest X-rays, **ECGs**, and laboratory tests may be conducted to guide further treatment.

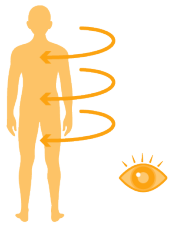
Give comfort measures (G)

Pain assessment and management are prioritised. This includes both pharmacological (analgesics, sedatives) and non-pharmacological (repositioning, reassurance) interventions. Emotional and psychological support for the patient and their family is also considered.



History and head-to-toe assessment (H)

A detailed history is obtained using the **SAMPLE** method (Signs/Symptoms, Allergies, Medications, Past medical history, Last meal, Events leading to the illness/injury). A systematic head-to-toe physical examination follows, identifying any additional injuries, abnormalities, or ongoing concerns.



Inspect the back (I)

The final step involves inspecting the patient's back, often by **log-rolling** them carefully to check for hidden injuries, **pressure injury**, or other complications. This is particularly important in trauma cases where spinal injuries or unnoticed wounds can be life-threatening.

The goal during an acute physiological deterioration is to stabilise the patient's condition, restore physiological function, and initiate appropriate interventions to prevent further harm. During a physiological crisis, nurses must communicate clearly with other healthcare team members and prioritise interventions based on the patient's condition and available resources. Multidisciplinary collaboration is crucial for timely and effective care.

Acute Psychological Deterioration

Mental health nursing is a specialised field, and nurses are not expected to be experts in managing psychological crises without proper training. However, psychological crises can occur in any healthcare environment, and recognising the early signs of acute psychological deterioration is crucial in ensuring timely escalation of care to specialised mental health professionals, which can significantly improve patient outcomes.

An acute psychological deterioration refers to a state of acute emotional or mental distress that significantly

impairs an individual's ability to cope with their current circumstances. Recognising deterioration in a person's mental state relies on identifying noticeable changes in their behaviour, cognitive abilities, perception or emotional well-being (ACSQHC, 2017).

Acute psychological deterioration may arise due to various factors such as trauma, acute stress, psychiatric disorders, substance abuse, or suicidal ideation. In such cases, the primary assessment evaluates the patient's mental status, ensures their safety, and identifies immediate psychological needs. Key components include assessing the patient's level of consciousness, cognition, thought processes, mood, and affect. While structured tools do not replace the need for clinical judgement, the use of screening tools can assist in assessing a person's mental state (ACSQHC, 2017).

The Mini-Mental State Examination (MMSE) is a brief cognitive screening tool used to assess orientation, memory, attention, language, and visuospatial skills. Click on each section to learn more about each assessment component in the MMSE:

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While useful for detecting dementia or delirium, the MMSE is not a diagnostic tool and may be influenced by education, language, and cultural factors.

Another structured approach to assessing psychological state is the ABCDE assessment, but from a mental health perspective. This quick assessment provides a straightforward framework for mental health assessment during an acute crisis:

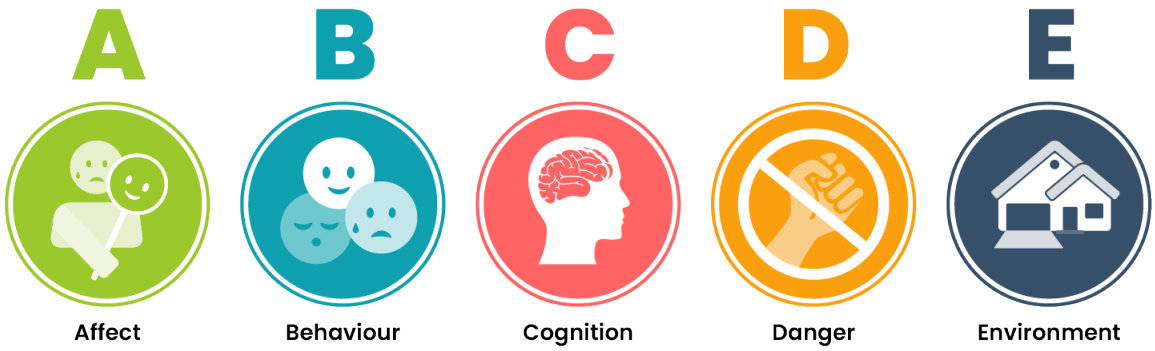

Figure 6. ABCDE Assessment for mental health

Affect

Assess the patient's emotional expression and mood. Does it match their stated mood? Is it appropriate for the situation?

Behaviour

Evaluate the patient's actions. Are they agitated, calm, withdrawn, or erratic? Is there a risk to themselves or others?

Cognition

Assess orientation, memory, and attention. Check if the patient is confused, disoriented, or experiencing hallucinations or delusions.

Danger to self or others

This is the critical component, determining the patient's risk of self-harm or harm to others.

Environment

Ensure the environment is safe for both the patient and the staff. This includes removing harmful objects and securing a calm space.

When encountering a psychological crisis, nurses must employ compassionate and effective assessment techniques to ensure the safety and well-being of the patient. Nurses utilise active listening skills to allow patients to express their feelings and concerns openly. To ensure a safe environment, the nurse may need to implement measures like constant observation if the patient poses a risk to themselves or others. Recommending a referral to mental health specialists and initiating crisis intervention protocols are often part of the response in such situations.

Basic Life Support

When patients deteriorate to the point of cardiopulmonary arrest, immediate intervention is critical. Basic Life Support (BLS) provides the foundation for sustaining life until **advanced life support** (ALS) can be administered. Recognising the signs of cardiac arrest early and responding swiftly with BLS techniques can significantly improve the chances of survival, making it an essential skill for nurses in any setting.

While the principles of BLS, including early recognition of arrest, effective chest compressions, and timely

defibrillation, remain consistent across both adult and paediatric basic life support, the specific techniques and considerations for adult and paediatric patients differ to ensure the best possible outcome for each. Understanding these distinctions is crucial for providing effective care during a cardiac arrest situation.

Adult Basic Life Support

The mnemonic **DRsABCD** is used to easily recall the steps required. Click on each step below to revise the step-by-step BLS process for adults.

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Link to Learning

Follow the link to access the ANZCOR adult basic life support guidelines.

Paediatric Basic Life Support

ANZCOR suggests that health professionals working in healthcare settings where they are responsible for the care of infants and children should be trained in Paediatric BLS (PBLS). Lay persons and other health professionals should be trained in general BLS (ANZCOR, 2021b). While the mnemonic DRsABCD still guides the basic life support (BLS) process, in PBLS, several key modifications are made. By modifying certain aspects of the BLS process, PBLS addresses the unique physiological needs of children and maximises the likelihood of a successful outcome. The following modifications are made during PBLS:

1. **Opening the airway**: Because a child's airway differs anatomically from an adult's, using a neutral position for infants or a sniffing position for older children is essential. Overextending the head can obstruct the airway rather than open it.
2. **Delivering two rescue breaths before starting chest compressions**: This adjustment ensures increased oxygen delivery, addressing the primary cause of cardiac arrest in children—hypoxia.
3. **Compression-to-ventilation ratio**: In paediatric CPR, the compression-to-ventilation ratio is also

modified to 15 compressions followed by 2 breaths. It is important to provide more frequent rescue breaths in PBLS because hypoxia (a lack of oxygen) is the most common cause of cardiac arrest in children. Unlike adults, where cardiac arrest is often caused by underlying heart conditions, paediatric cardiac arrests are typically respiratory in origin.

4. **Compressions**: The two-finger or two-thumb method is used for babies and the one-hand method or the normal two-hand method for children, depending on the size of the child and the rescuer. The depth of compressions will be about 4cm for an infant and 5cm for an older child.

Let's take a closer look at the DRsABCD algorithm for paediatric patients.

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Link to Learning

Follow the link to access the ANZCOR Paediatric Basic Life Support (PBLS) for health professionals guidelines.

Post-Resuscitation Care

Once the patient has return of spontaneous circulation (ROSC) and has been stabilised, it is essential to provide comprehensive post-resuscitation care. This includes performing a structured ABCDE assessment and closely monitoring vital signs.

Following a cardiac arrest, the healthcare team will typically initiate diagnostic investigations to identify and treat the underlying cause. These may include blood tests, arterial blood gas (ABG) analysis, chest X-rays, and other relevant investigations or procedures.

In a ward setting, patients recovering from cardiac arrest often require transfer to high-acuity areas, such as an intensive care unit (ICU) or a tertiary facility with advanced monitoring and treatment capabilities. Preparing the patient for transfer, documenting the events and preparing for handover of care will be important.

Effective communication during the handover of care is critical. Utilising the ISBAR (Introduction, Situation, Background, Assessment, Recommendation) framework facilitates a clear and structured exchange of information, supporting continuity of care and improving patient outcomes.

When to Stop CPR

The rescuer should continue performing CPR until one of the following situations occurs (ANZCOR, 2021a):

- The individual starts to respond or breathe normally
- The rescuer is physically unable to continue due to exhaustion
- A healthcare professional arrives and takes over the resuscitation efforts
- A healthcare professional instructs the rescuer to stop CPR.

Importance of Continuous Training and Practice

Continuous training and practice are essential for maintaining proficiency in BLS. Regular training sessions, simulation exercises, and refresher courses help ensure that healthcare providers are prepared to respond effectively in emergency situations. Staying updated with the latest guidelines and protocols from organisations such as the Australian and New Zealand Committee on Resuscitation (ANZCOR) is crucial.

Link to Learning

Follow the link to access numerous ANZCOR educational resources and guidelines available on first-aid management, basic life support and advanced life support.

Acute Resuscitation Plans

A key challenge in managing deteriorating patients is establishing appropriate care goals and determining the limitations of medical treatment (Jones, 2023). An Acute Resuscitation Plan (ARP) is a medical order documenting a patient's wishes regarding resuscitation and life-sustaining measures in the event of a critical

situation, essentially outlining what treatments should be provided or withheld if their health rapidly declines (Queensland Health, 2020). The form is authorised by the most senior medical practitioner available and contains important information regarding:

- The patient's current health condition
- Medically appropriate resuscitation plans in the event of an emergency
- Recommended treatments and available options
- Substitute decision-maker(s) in the event the patient is unable to make healthcare decisions
- Patient preferences concerning life-sustaining measures, including the appropriateness of administering cardiopulmonary resuscitation (CPR).

Changing Course: End-of-Life Care

The ACSQHC (2023) has recognised that care of the deteriorating patient may not always be appropriate because they are at the end of their lives.

Figure 7. End-of-life care and advocacy for the patient

While ARPs can assist in the decision to go down the **end-of-life care** pathway, advocating for the patient and knowing what to do to care for the patient with life-limiting illness can be challenging. Having a basic understanding of the principles of end-of-life care can assist with caring for the deteriorating patient on

an end-of-life care pathway. We will only briefly touch on this topic in this chapter as there is a chapter dedicated to end-of-life care later in this book.

Link to Learning

To help support quality end-of-life care, the ACSQHC has developed the following resources. Click on the links below to access and explore these resources:

- The Comprehensive Care Standard from the NSQHS standards(2nd ed.), which includes comprehensive care at end-of-life
- National Consensus Statement: Essential elements for safe and high-quality end-of-life care
- National Consensus Statement: Essential elements for safe and high-quality paediatric end-of-life care
- End-of-Life Care Audit Toolkit.

According to the National Consensus Statement, end of life is defined as "The period when a person is living with, and impaired by, a fatal condition, even if the trajectory is ambiguous or unknown" (ACSQHC, 2023, p. 27). The national consensus statement outlines 10 crucial elements for delivering safe, high-quality end-of-life care. Essential elements 1–5 describe how end-of-life care should be approached and these essential elements include: Recognising end-of-life, patient-centred communication and shared decision-making, multidisciplinary collaboration and coordination of care, providing comprehensive care and responding to concerns (ACSQHC, 2023). Included in this document are important considerations and recommendations for caring for Aboriginal and Torres Strait Islander peoples at end of life. For more information on these considerations, access the National Consensus Statement: Essential elements for safe and high-quality end-of-life care via the link above.

Management at End-of-Life Care

Although a patient may be on an end-of-life care pathway, they are still included in being recognised for deterioration, especially in the areas of pain and symptom management. End of life is associated with physical manifestations of discomfort, and can include symptoms such as dyspnoea, nausea and vomiting, cough, seizures, pain, and delirium. The focus of care shifts from curative or resuscitative efforts to ensuring comfort and dignity by managing distressing symptoms.

End-of-life deterioration often presents with physical manifestations of discomfort, including:

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By managing the pain and symptoms of end-of-life deterioration, the patient and their family can be supported to experience a dignified death of their loved one.

Key Takeaways

In this chapter, we covered:

- Early recognition and timely interventions can significantly improve patient outcomes, reduce length of stay, and prevent adverse events.
- The 3Ps and 3Rs: predict, prepare, prevent, recognise, relay and respond are strategies that can prevent a failure to recognise and respond to acute deterioration.
- Predict: By analysing patterns and trends in vital signs, laboratory results, and other data, clinicians can identify patients at risk of deterioration before it occurs.
- Prepare: Preparation involves ensuring that you have the necessary resources, training, and systems to identify and respond effectively to patient deterioration. This can be done through pre-emptive safety checks of the patient, environment and resources, and participating in training.
- Prevent: Prevention involves carefully implementing measures to prevent further deterioration and significantly reduce the risk of adverse outcomes in deteriorating patients. This can be done by utilising Early Warning Scores (EWS), algorithms, protocols and pathways, escalation protocols and rapid response systems.
- Recognise: Recognition involves identifying early signs of patient deterioration through vigilant vital signs monitoring and assessments, and understanding the key physiological indicators and clinical symptoms that can signal a patient's deterioration.
- Relay: Effective communication or "relaying" information ensures that critical information about a patient's condition is accurately and promptly shared among healthcare team members and escalated in a timely manner. Tools and strategies like ISBAR, PACE and closed-loop communication can enhance the effectiveness of this communication.
- Respond: Respond refers to the timely and appropriate actions taken to address patient deterioration once recognised. A rapid and coordinated response is crucial in preventing

complications from escalating to a life-threatening state.

- Patient deterioration requiring immediate attention falls into two categories: physiological and psychological.
- Acute physiological deterioration occurs when a patient's vital functions are compromised, posing a threat to life or health. Primary (ABCDE) and secondary (FGHI) surveys with appropriate interventions at each stage should be performed to swiftly assess, stabilise, and prevent further deterioration.
- Acute psychological deterioration refers to a state of acute emotional or mental distress that significantly impairs an individual's ability to cope with their current circumstances and can occur due to various reasons including trauma, acute stress, psychiatric disorders, substance abuse, or suicidal ideation. The primary goal in this situation is to evaluate the patient's mental status, ensure their safety, and identify immediate psychological needs.
- Basic life support (BLS) may need to be performed if the deteriorating patient goes into cardiac arrest. BLS is performed using the Danger, Response, send for Help, Airway, Breathing, Cardiopulmonary Resuscitation and Defibrillator (DRsABCD) algorithm.
- While the principles of BLS, including early recognition of arrest, effective chest compressions, and timely defibrillation, remain consistent across both adult and paediatric basic life support, the specific techniques and considerations for adult and paediatric patients differ to ensure the best possible outcome for each.
- An Acute Resuscitation Plan (ARP) is a medical order documenting a patient's wishes regarding resuscitation and life-sustaining measures in the event of a critical situation, essentially outlining what treatments should be provided or withheld if their health rapidly declines.
- When caring for the deteriorating patient, the decision may be made to go down the end-of-life pathway where the focus of care shifts from curative or resuscitative efforts to ensuring comfort and dignity by managing distressing symptoms.

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FOUNDATIONS OF MEDICATION SAFETY

Tracey Gooding; Leisa Sanderson; and Penelope Coogan

Learning Outcomes

In this chapter you will learn how to:

- Describe the impact of medication errors on patient outcomes and the healthcare system in Australia
- Describe the role of the Australian Commission on Safety and Quality in Health Care (ACSQHC) in promoting medication safety
- Analyse the medication use pathway to identify potential points of error and propose strategies to mitigate risks at each stage
- Apply the principles of safe medication administration in clinical practice
- Identify and explain the risks associated with high-risk medicines, including those classified under APINCHS, Schedule 8 (S8), and Schedule 4 (S4), to support safe medication administration
- Apply the "seven rights" and three checks of medication administration
- Demonstrate the use of ISBAR and closed-loop communication in medication-related handovers
- Evaluate the appropriateness of medication administration by integrating pharmacological principles, such as mechanism of action, indications, side effects, and interactions, with patient-specific factors including age, renal and hepatic function, and allergy status
- Demonstrate culturally safe strategies to involve patients and carers in medication administration, ensuring shared decision-making and respect for diverse health beliefs and literacy needs.

Introduction

Medication safety is a fundamental aspect of nursing practice, directly influencing patient outcomes and the overall quality of healthcare delivery. Nurses play a critical role in ensuring safe medication practices.

Through accurate administration, educating patients, monitoring responses, and recognising and reporting medication errors, nurses can make a significant difference in promoting medication safety. This chapter will explore the relevant standards, common causes of medication errors, safety strategies, and the responsibilities of nurses in promoting medication safety within the Australian healthcare context.

The Impact of Medication Errors – Australia's Response

In Australia, medication errors are among the most frequently reported clinical incidents in healthcare settings, with many being preventable. Research has shown that over 250,000 Australians are hospitalised each year due to medication errors, misuse, or adverse reactions, with two-thirds considered potentially preventable (Lim et al., 2021; Pharmaceutical Society of Australia, 2019).

Medication errors can differ in their nature, where they occur, and the effects they have. Some errors are detected before reaching the patient or cause little to no harm, while others may lead to serious, potentially life-threatening outcomes. Importantly, adverse drug events (ADEs) can result in patient harm, increased hospital admissions, and substantial healthcare costs (Lim et al., 2022). Patient harm from medication errors can come in many forms. The World Health Organization (WHO) have defined patient harm as:

> *The impairment of structure or function of the body and/or any deleterious effect arising from, or associated with, plans or actions taken during the provision of primary health care. It includes disease, injury, suffering, disability and death, and may be physical, psychological or social.* (Cooper et al., 2018, p. 502)

In 2017, the World Health Organization (WHO) launched the Global Patient Safety Challenge: Medication without Harm. This initiative aimed to reduce severe and preventable medication-related harm by 50% worldwide over the next five years. Although the initial five-year period has passed, the challenge has spurred numerous initiatives within the Australian healthcare system. These efforts, led by the Australian Commission on Safety and Quality in Healthcare (ACSQHC), continue to address medication-related harm.

In 2024, the ACSQHC published an update titled *Medication without Harm WHO Global Patient Safety Challenge: Australia's Response*. This document details the various goals and actions that emerged from the challenge and evaluates their current status as met, partially met, or not met. The primary focus of these goals is to reduce harm caused by errors or unsafe practices, which are linked to known weaknesses in the Australian healthcare system.

The initiative aims to enhance safety at every stage of the medication management pathway, including prescribing, dispensing, administering, monitoring, and use. Please review the diagram below, which outlines the many areas that can influence medication safety.

Figure 1. Strategic framework of the global patient safety challenge – Medication without harm

The ACSQHC's Role in Medication Safety

The Australian Commission on Safety and Quality in Healthcare (ACSQHC) is leading Australia's response to this challenge, with the key action areas of reducing harm from high-risk medicines, inappropriate polypharmacy and improving medication safety at transitions of care (ACSQHC, 2024b).

The ACSQHC plays a pivotal role in enhancing the safety and quality of healthcare in Australia. It develops national standards, such as the NSQHS Standards, and provides resources and tools to support their implementation. In relation to medication safety, the ACSQHC leads initiatives to reduce medication errors and adverse drug events.

The ACSQHC's initiatives include developing national medication charts, promoting the quality use of medicines, and providing guidance on high-risk medications and providing nationally consistent medication standards (ACSQHC, 2024). In particular, the National Safety and Quality Health Service (NSQHS) Medication Safety Standard, is also supported by the Clinical Governance Standard and the Partnering with Consumers Standard (ACSQHC, 2021a).

NSQHS Medication Safety Standard

The National Safety and Quality Health Service (NSQHS) Standards, developed by the ACSQHC, provide a nationally consistent framework to ensure safe and high-quality care across Australian healthcare settings. Among these, the Medication Safety Standard specifically addresses the safe prescribing, dispensing, administering, and monitoring of medicines (ACSQHC, 2021a).

Standard 4 aims to ensure that health service organisations have systems in place to reduce the risks associated with medication use. This includes implementing policies for high-risk medicines, ensuring accurate medication histories, and promoting the safe use of medicines through staff education and patient engagement (ACSQHC, 2021a).

Link to learning

Medication Safety Standard

Partnering with Consumers for Medication Safety

The Partnering with Consumers Standard, developed by the ACSQHC, is all about the importance of involving patients, their families, and carers in the planning, design, delivery, and evaluation of healthcare services. This standard aims to create mutually beneficial partnerships that enhance patient care and safety (ACSQHC, 2021b).

A central component of medication safety is ensuring that patients are actively involved in their medication management. Involving patients in the decision-making process, particularly in relation to their medications, helps prevent errors, improves adherence, and encourages shared responsibility for health outcomes (ACSQHC, 2021a). Health literacy also plays a crucial role in partnering with consumers and medication safety, as patients with limited understanding of medical terminology may struggle to follow medication instructions accurately. For this reason, patients should be encouraged to ask questions about their medications and clarify any doubts. Nurses should adapt their communication strategies to meet the health literacy needs of patients, using simple language and checking for understanding through teach-back methods. For culturally safe communication, culturally appropriate tools and strategies, such as providing medication information in multiple languages or using visual aids and interpreters to overcome language barriers, can be used. Nurses have a critical role in facilitating open and clear communication with patients, ensuring they are well-informed about the medications they are prescribed, including the reason for the

medication, potential side effects, correct dosages and timing, the expected duration of treatment and when to seek help if needed.

Link to learning

Partnering with Consumers Standard

Communicating for Medication Safety

The Communicating for Safety Standard, developed by the ACSQHC, aims to ensure timely, purpose-driven, and effective communication and documentation that support continuous, coordinated, and safe care for patients. This standard recognises that effective communication is essential throughout a patient's care journey, particularly during high-risk times such as medication administration and transitions of care, when critical information emerges or changes, and to ensure correct patient identification and procedure matching, in this case, when administering medication (ACSQHC, 2021a, ACSQHC, 2021b). By implementing systems and processes that support structured clinical handovers and the communication of critical information, this standard helps to reduce medication errors and enhance overall patient safety.

Link to learning

Communicating for Safety Standard

The Medication Management Pathway – It's Everyone's Responsibility

While nurses are often at the frontline of medication administration, all healthcare professionals share the responsibility of minimising the risk of medication errors. These errors can occur when a planned action is not completed (such as an omission) or when it is carried out incorrectly. For example, administering the wrong medication to the wrong patient, via the wrong route, at the wrong dose or at the wrong time.

Medication administration is a complex, multi-step process involving numerous individuals. This complexity introduces many potential points where errors can occur, leading to medication-related harm. The medication management pathway outlines the key stages of prescribing, dispensing, administering, and monitoring, each of which contains multiple sub-steps and decision points. The pathway provides a framework for identifying when there is potential for errors or risk of harm and responding with strategies to reduce the opportunity for error (ACSQHC, 2017b; Commonwealth of Australia Department of Health and Aged Care, 2022).

Understanding this pathway is essential for identifying where risks may arise and how they can be mitigated. Refer to the diagram below and click or press on the + sign to understand each step in the medication pathway. As you look through each stage, consider how errors could occur in each stage and reflect on the parts that you will be involved in and what you will do to prevent medication errors.

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https://jcu.pressbooks.pub/nursing-skills-foundations/?p=3392#h5p-163

As you can see, there are many steps and people involved in the safe administration of medications. It is everyone's responsibility to always remain vigilant when it comes to medication administration and ensure medications are prescribed, dispensed, administered and monitored safely. This is a big responsibility, but one that should be taken seriously, as it plays a critical role in preventing harm and ensuring quality care.

Foundations of Safe Medication Practice

Ensuring the safe administration of medications is a fundamental responsibility for Nurses. This responsibility is guided by well-established principles that aim to minimise the risk of medication errors and enhance patient outcomes. This section outlines key foundations of safe practice, including legal requirements for valid medication orders, essential pharmacological knowledge, and the "Seven Rights" of medication administration along with the broader considerations for the role of technology and effective communication in promoting safe medication practices.

What Makes a Valid and Legal Order

The National Inpatient Medication Chart (NIMC)

The National Inpatient Medication Chart (NIMC) is a nationally standardised set of medication charts, available in both paper and electronic formats, widely implemented across Australian healthcare settings

to ensure consistent presentation and communication of medication information among healthcare professionals. This standardisation helps to minimise major risks associated with medication prescribing and administration errors. It is built around uniform processes for prescribing, dispensing, administering, and reconciling medications (ACSQHC, 2019b). By using the same chart nationwide, health professionals can become familiar with its structure and underlying safety principles regardless of where they work. All public and private health services in Australia, including day procedure centres, are required to use the NIMC (ACSQHC, 2019b). The chart is grounded in evidence-based practices and best-practice guidelines and is incorporated into undergraduate health curricula and competency frameworks for safe medication management. Its primary aim is to enhance the quality and safety of medication practices and reduce the risk of medication-related errors (ACSQHC, 2019b).

There are different versions of the NIMC depending on the setting and purpose. There are NIMCs for acute care, long-stay, paediatric, paediatric long stay, GP e-version, day surgery, Cloazapine titration chart and subcutaneous insulin chart (adult).

It is important to understand the requirements for a valid medication order. A medication order is only valid if the prescriber enters all the required items. To understand the requirements for a valid order, scroll down and read the full *NIMC user guide* (ACSQHC, 2019b) below.

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https://jcu.pressbooks.pub/nursing-skills-foundations/?p=3392#h5p-168

Safe Use of Medicines Terminology

A significant contributor to medication errors is the use of unsafe abbreviations and unclear dose expressions. For this reason, Australia has established national guidelines for the terminology, abbreviations, and symbols used when prescribing and administering medications. These standards include (ACSQHC, 2024a):

- Core principles to support consistent prescribing language
- A list of recommended terms and approved abbreviations
- A compilation of high-risk abbreviations, symbols, and dose expressions known to contribute to medication errors and which should be avoided.

It is extremely important for you as a future nurse to understand these recommendations, as it is you who will be deciding whether an order is valid and correct before administration. Scroll down and read pages 3-7 of the *Recommendations for safe use of medicines terminology* to understand these best practice medication safety recommendations.

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Considerations for Electronic Medication Management Systems (EMMS)

While many healthcare organisations now use Electronic Medication Management Systems (EMMS) to streamline the prescribing, dispensing, and administration of medicines, the same legal and safety principles that apply to paper-based systems, such as those outlined in the National Inpatient Medication Chart (NIMC) above, still apply (ACSQHC, 2019b). In fact, EMMS can improve the legibility, visibility and accuracy of medication documentation (ACSQHC, 2017a). A medication order must meet legal requirements regardless of whether it is written electronically or by hand. It is also recommended that all digital medicines information be presented in full, without abbreviations (ACSQHC, 2017). EMMS are designed to support best practice and safe prescribing by incorporating these standards into their workflows, reducing the risk of error while maintaining alignment with national medication safety guidelines.

Pharmacology Basics for Safe Practice

A foundational understanding of pharmacology is critical to the safe administration of medications. Nurses need to have knowledge of how medications work, their intended purposes, side effects, and potential drug interactions to make informed decisions in their clinical practice. Additionally, patient-specific considerations, such as underlying medical conditions and age, must be taken into account when administering medications. Click on the tabs below to get an overview of the key aspects of pharmacology that contribute to safe and effective medication practice.

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The "Seven Rights" of Medication Administration

As you can see, medication safety involves a series of checks and balances designed to prevent errors. One

of the foundational principles in medication safety is the concept of the "seven rights" of medication administration. These rights are a guideline for nurses to follow, ensuring that each step in the medication administration process is carried out accurately and safely. By adhering to these principles, nurses can significantly reduce the risk of medication errors and enhance patient safety.

The "Seven Rights" of medication administration serve as a foundational framework to ensure safe and effective medication practices. Click on the + in each of the rights below to learn more about each of these "7 rights" of medication administration:

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Monitoring for the Effects of Medications

Effective monitoring is essential in ensuring the safe and therapeutic use of medications. Nurses play a critical role in observing patients for both therapeutic effects (the desired outcome of medication) and adverse effects (harmful or unintended reactions).

1. **Therapeutic Effects**: Therapeutic effects refer to the beneficial outcomes of a medication, such as pain relief from an analgesic or reduced blood pressure from antihypertensive medications. Nurses must assess and document these outcomes, ensuring that the medication is providing the desired effect. For instance, when administering insulin to a diabetic patient, the nurse should monitor blood glucose levels to ensure the drug is effectively managing the patient's condition.
2. **Adverse Effects**: Adverse effects are unwanted side effects that can occur when taking medications. Nurses must regularly monitor patients for signs of these effects and intervene as needed. For example, opioids can cause respiratory depression, which requires careful monitoring of respiratory rate and oxygen saturation, especially during the initial phases of treatment. Nurses should also educate patients about possible side effects and encourage them to report any unusual symptoms promptly.
3. **Laboratory Monitoring**: In addition to clinical observation, laboratory tests may be required to monitor for therapeutic and adverse effects. For example, when a patient is prescribed warfarin, the nurse must monitor the international normalised ratio (INR) regularly to ensure the drug's anticoagulant effect is within the therapeutic range. Laboratory tests such as liver function tests, kidney function tests, and complete blood counts are crucial for detecting potential medication complications early.

The Role of Technology in Medication Safety

The integration of technology into medication management has significantly enhanced medication safety, improving efficiency, reducing errors, and providing real-time information to healthcare professionals. This section explores the role of electronic medication management systems (EMMS), the use of barcoding and scanning for medication verification, and the benefits and limitations of digital alerts, including alert fatigue.

Electronic Medication Management Systems (EMMS) are designed to enhance medication safety by streamlining medication orders, administration, and documentation. Research has found that the introduction of EMMS can reduce rates of medication errors, and in particular, prescribing errors (Gates et al., 2021). The ACSQHC supports the implementation and use of EMMS in Australian healthcare systems to improve medication safety (ACSQHC, 2019a). EMMS can not only improve legibility, standardisation and accessibility, but it can also alert clinicians to potential drug interactions, allergies, and incorrect dosages, contributing to more accurate medication administration (ACSQHC, 2019a).

Barcoding and scanning technology play a critical role in medication verification. This system involves scanning a barcode on the patient's wristband to ensure the correct drug is administered to the right patient at the right dose and time. Barcoding medication administration (BCMA) is recognised as a valuable tool in reducing medication administration errors, but only if implemented and used correctly (Williams et al., 2025).

Effective Communication and Documentation for Medication Safety

Effective communication and documentation are essential components of safe medication practice. Accurate and timely communication between healthcare professionals, patients, and carers helps reduce medication errors, improves patient outcomes, and fosters a culture of safety within healthcare settings. This section explores the use of standardised communication tools such as ISBAR (Introduction, Situation, Background, Assessment, Recommendation) and closed-loop communication, the importance of clear and accurate documentation, and the role of patient and carer education in safe medication administration.

Using ISBAR and Closed-Loop Communication for Safe Handover and Clarification

Clear and concise communication during handover and clarification is vital in preventing medication errors. The ISBAR framework is widely used across Australian healthcare settings to structure communication during handover. ISBAR ensures that critical information is communicated in a systematic and standardised way, reducing the risk of omissions or misunderstandings (ACSQHC, 2021b).

Research indicates that using ISBAR improves communication clarity and reduces errors in patient care, including medication administration. According to Gardea-Company et al. (2023), when healthcare providers utilise ISBAR during handovers, medication-related errors decrease, as the framework helps to clarify critical medication information. ISBAR facilitates an organised exchange of information about the patient's current status, medication orders, and any changes in treatment, which is particularly important during shift changes or transfers between departments (Yulianti et al., 2025). Click or tap through each stage of the ISBAR handover below to understand each element of this structured approach.

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In addition to ISBAR, closed-loop communication is another important tool to ensure that medication orders are accurately understood. Closed loop communication is a communication technique designed to ensure clarity, prevent errors, and verify understanding, especially in high-risk tasks like medication administration (Diaz & Dawson, 2020; Doorey et al., 2020). Closed-loop communication involves the sender providing instructions, the receiver repeating those instructions back to confirm understanding, and the sender confirming that the instructions are correct. This practice is especially crucial in preventing errors in verbal orders or clarifying medication instructions. See the image below for a visual example of closed-loop communication in medication administration.

Sender communicates a message
The sender (such as a healthcare provider) initiates the communication by clearly stating the message or instruction. This should be concise and unambiguous.

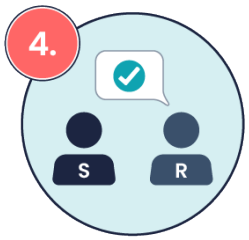
Example: "John, give 1mg adrenaline IV followed by a 20 mL normal saline flush."

Receiver interprets the message, acknowledges receipt, and communicates it back to the sender
The receiver (in this case, John) listens to the message, processes it, and then repeats it back, confirming they've understood the instruction. The receiver may paraphrase or repeat the message verbatim to ensure accuracy.

Example: "OK, Mike, I am going to give 1mg adrenaline IV followed by a 20 mL normal saline flush."

Sender confirms that the intended message has been received
After the receiver acknowledges the message, the sender confirms that the interpretation is correct.

Example: "That's correct, John."



Receiver reports back when the message has been acted upon
Finally, the receiver communicates the action taken to close the loop and confirm that the task has been completed as per the original message.

Example: "Mike, 1mg adrenaline IV with a 20 mL normal saline flush has been given."

Importance of Clear, Accurate, and Timely Documentation

Accurate and timely documentation is crucial for medication safety. Proper documentation ensures that all members of the healthcare team have access to up-to-date medication orders, patient responses, and any changes in treatment plans. It also provides a legal record of care provided and is essential in case of disputes or investigations into medication errors.

The ACSQHC emphasises the need for clear and legible documentation to ensure that healthcare providers can act on the correct information. According to the NSQHS Medication Safety Standard (ACSQHC, 2021a), healthcare organisations must implement systems to ensure that all medication-related documentation is complete, accurate, and readily accessible to all team members. This includes ensuring

that patients' medication charts are updated in real-time and include details on allergies, dosages, administration routes, and any changes in prescribed treatments.

According to the ACSQHC (2024a), effective documentation should meet several key standards:

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Communicating Medication Incidents -The Role of Incident Reporting in Medication Safety

The ACSQHC (2021b) requires health services to implement systems for reporting and managing incidents related to the use of medicines. The aim of these systems is to learn from errors and improve medication safety. According to Khalil (2020), medication errors are the second most common type of preventable incident reported in the Australian healthcare system, but it is likely that not all medication errors or near-misses are reported. Having a blame-free culture is important in encouraging staff to report errors and near-misses, which ensures that improvements in medication safety are continuously evolving. This approach fosters an environment where employees feel safe to share their experiences without fear of retribution, ultimately leading to better practices and enhanced patient care.

Principles of Safe Medication Administration

When preparing and administering medication and assessing patients after receiving medication, always follow your healthcare facility's policies and procedures to ensure safe and effective practice. These policies are designed to align with national safety standards and evidence-based guidelines, helping to minimise the risk of medication errors and patient harm. Review the table below for the common evidence-based principles of safe medication administration.

Safety Considerations:

Agency policy on medication administration and medication administration record (MAR) may vary. Always receive the required training on the use of the medication system for each agency to avoid preventable errors.

Table 1. Principles of Safe Medication Administration

Principle	Additional Information
Be vigilant when preparing medications	Minimise interruptions and distractions. Many hospitals implement "no interruption" zones (NIZ) or medication safety vests to promote uninterrupted medication preparation.
Check for allergies	Confirm allergies at each medication encounter. Check allergy documentation on the National Inpatient Medication Chart (NIMC) and electronic records.
Use three patient identifiers	Use name, date of birth, UR number, or other identifiers per hospital policy and NSQHS standards.
Assessment comes before medication administration	Conduct relevant pre-assessments (such as vital signs, lab values, BGL, drug levels, or other relevant assessments) prior to medication administration to ensure the patient is receiving the right medication for the right reason. Always evaluate whether the drug is still appropriate.
Be diligent in all medication calculations	Double-check all calculations, especially for paediatric or weight-based doses. Use calculators and seek a second check for high-risk medications.
Avoid reliance on memory; use checklists and memory aids	Slips in memory are caused by a lack of attention, fatigue, and distractions. Mistakes are often referred to as attentional behaviours, where a lack of training or knowledge is the cause of the error. Slips account for most errors in health care. If possible, follow a standard checklist of steps for every patient to reduce cognitive slips and lapses.
Communicate with your patient before and after administration	Provide information to the patient about the medication before administering it. Explain the medication's purpose, side effects, and allow time for questions. Encourage patients to be partners in care and report any concerns. Include family members if appropriate.
Avoid workarounds	A **workaround** is a process that bypasses a procedure, policy, or problem in a system. For example, a nurse may "borrow" a medication from another patient while waiting for an order to be filled by the pharmacy. These workarounds fail to follow policy to ensure safe medication practices.
Ensure medication has not expired	Always check the expiry date and appearance. Do not administer if expired or altered (e.g., discolouration, sedimentation). Medications may be inactive if expired.
Always clarify an order or procedure that is unclear	If an order is ambiguous, incomplete, or illegible, consult the prescriber, pharmacist, or senior nurse. Nurses have a legal and professional duty to question orders.
Use available technology to administer medications	Electronic medication management systems and barcode scanning improve accuracy. However, be alert to issues like alert fatigue or system overrides.

Principle	Additional Information
Report all near misses, errors, and adverse reactions	Use incident reporting systems to report all near misses, errors or adverse reactions. Reporting allows for analysis and identification of potential errors, which can lead to improvements and the sharing of information for safer patient care. Reporting improves systems and is encouraged.
Be alert to error-prone situations and high-risk medications	**High-risk medications** are those that are most likely to cause significant harm, even when used as intended. The most common high-risk medications are Anti-infectives, Potassium and other electrolytes, Insulin, Narcotics/sedatives and Neuromuscular blockers, Chemotherapy and Heparin/anticoagulants. These types of medication require extra precautions, second checks, and knowledge of institutional guidelines.
If a patient questions or expresses concern about a medication, stop and do not administer it	If a patient questions a medication, stop, listen and explore the patient's concerns, review the order, and, if necessary, notify senior nursing and medical staff. Patients often detect discrepancies; their input should always be taken seriously.

Medication Safety for High-Risk Situations

Sharps Safety

Nurses often need to use needles to administer medications. For that reason, sharps safety is a critical aspect of medication administration. Sharps, including needles, syringes, lancets, and other devices capable of cutting or piercing the skin, pose a significant risk of injury and infection if not handled correctly.

Even a single needlestick injury can have serious health, psychological, and professional consequences for a nurse and can lead to the transfer of blood-borne pathogens.

Healthcare facilities have legal and professional responsibilities under workplace health and safety regulations to:

- Provide appropriate equipment and training related to sharps safety
- Minimise the risk of exposure
- Support safe reporting and follow-up procedures
- Nurses also have a duty of care to protect themselves, their patients, and colleagues by following best practice.

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High-Risk Medications – APINCHS

The National Safety and Quality Health Service (NSQHS) Standard on Medication Safety mandates that health services must recognise high-risk medications (HRMs) utilised within their organisation and implement necessary measures to guarantee their safe storage, prescription, dispensing, and administration (ACSQHC, 2021a).

In the acute sector in Australia, the 'APINCH' acronym and classification is widely used to assist clinicians focus on a group of medicines known to be associated with high potential for medication-related harm. High-risk medicines may vary between hospitals and other healthcare settings depending on the types of medicines used and patients treated.

APINCHS is a safety acronym that helps health professionals identify medicines with a high potential for patient harm if used incorrectly. These medications are not necessarily more likely to be involved in an error. But when errors do occur, the consequences can be severe or fatal.

Click or press on each tab below to explore the high-risk medications and understand: the risks, why it is a high risk, and the associated nursing precautions you should take when dealing with these high-risk medications (ACSQHC, 2025a).

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Keep in mind that the 'APINCH' classification does not cover all high-risk medications. Other drugs or drug classes may also carry significant risks, such as neuromuscular blockers, digoxin, antipsychotics, and oral hypoglycaemics (ACSQHC, 2025a).

There are also best practice recommendations outlined by ACSQHC that are important in improving the safety of medication administration that you should be aware of. These include being aware of the recommendations related to the use of (ACSQHC, 2025b) :

- **Oral syringes** – Specially designed oral syringes, which cannot be connected to IV tubing, are used for dispensing/administering oral liquid solutions.
- **Infusion pumps** – General infusion pumps with SMART PUMP TECHNOLOGY are in use with full functionality employed to intercept and prevent wrong dose/wrong infusion rate errors due to misprogramming the pump, miscalculation, or an inaccurately prescribed dose or infusion rate.
- **Epidural pumps** – Only one type of epidural infusion pump is used and is different from general infusion devices used in the organisation.
- **Barcoding at point of care** – If bar-coding at the point-of-care is used for medication administration, an interdisciplinary team reviews metrics from the system, including the per cent of medicines with a readable barcode, scanning compliance rates, and bypassed or acknowledged alerts, and any barriers associated with using the technology are addressed to maximise the safe use of the system.

Monitored Medicines

Scheduling is a national system used to classify medicines and chemicals based on how they are made available to the public. Each substance is placed into a specific "Schedule", which reflects the degree of regulatory control needed to ensure public health and safety (TGA, n.d.) These Schedules are published in the The Poisons Standard (the SUSMP) and are given legal effect through state and territory legislation (TGA, n.d.). Monitored medicines include Schedue 8 (S8) medications, which are classed as "Controlled Drugs", and some particular medicines from Schedule 4 (S4) which are also known as "Prescription Only" medicines (TGA, n.d.). When administering monitored medicines, nurses must take extra precautions due to the increased risk of harm associated with these drugs. Schedule 8 (S8) medications, such as opioids and selected benzodiazepines, and selected Schedule 4 (S4) medicines such as codeine and most benzodiazepines, have a high potential for overdose, dependence, misuse, or diversion. These medications are regulated under each state and territory law, which defines them as posing significant risks to both patients and the wider community (Queensland Health, 2025).

Nurses are responsible for adhering to strict legal, professional, and workplace protocols when handling these medicines. This includes verifying prescriptions, double-checking doses (often with another authorised health professional), accurately recording administration in designated drug registers, securely storing the medications, and reporting any discrepancies or incidents immediately. Unauthorised access or misuse of S8 or S4 drugs can have serious legal consequences. Nurses must also be vigilant in assessing the patient's response and watching for signs of adverse effects or misuse.

It is important to note that the classification and regulatory requirements for monitored medicines vary between Australian States and Territories. For this reason, it is beyond the scope of this textbook to list all the monitored medicines. Therefore, nurses must be familiar with the specific legislation and health service policies relevant to their location and practice setting.

Special Considerations for Administering Paediatric Medications

Paediatric patients are a high-risk group when it comes to medication administration. Even small miscalculations can lead to serious harm due to their size, immature organ systems, and limited ability to communicate adverse effects. Unlike adults, paediatric doses must be individually calculated based on weight, body surface area (BSA), and sometimes gestational age.

To reduce the risk of medication errors, strict documentation and double-checking processes are required. Click each section below to expand and learn more about safe paediatric medication administration.

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Bringing it all Together: A Step-by-Step Process of Safe Medication Administration

Now that we've explored the key safety principles of medication administration, let's take a closer look at how these principles come together in practice.

Before administering any medication, it's essential to follow a structured safety process. While the core principles of safe medication administration remain consistent, specific steps may vary depending on the type of medication (e.g., oral, intravenous, or controlled drugs). You will find more nuanced step-by-step processes in the following chapters. This section will just review the basic safety checks required before medication administration. Additionally, individual hospitals and healthcare services may have their own policies and procedures. You should always follow your local hospital guidelines. Use the interactive tool below to explore each stage of the medication administration process, from reviewing the order to final documentation. Click on each section to learn what to check, consider, and do at each step.

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Key Takeaways

In this chapter, we covered:

- The impact of medication errors on patient outcomes and the healthcare system in Australia
- The World Health Organization (WHO) strategic framework for the global Medication Without Harm challenge
- The role of the Australian Commission on Safety and Quality in Healthcare (ACSQHC) in promoting medication safety and contributing to the WHO's Medication Without Harm: Global Patient Safety Challenge
- The National Safety and Quality Health Services (NSQHS) Medication Safety Standard
- The Medication Management Pathway to understand the many stages and roles involved in medication administration where errors can occur at any stage in the pathway
- The importance of understanding the pharmacology basics for safe practice, including: mechanism of action, indications, side effects, allergies, drug interactions, renal and hepatic function and age
- What makes a legal and valid order, including the importance of understanding the standardised National Inpatient and Medication Chart guidelines and the recommendations for safe use of medicines terminology developed by the ACSQHC
- The "Seven Rights" of medication administration
- The evidence-based principles of safe medication administration
- The responsibilities and strategies to avoid sharps injuries
- Medications that have been identified as high-risk medications, including APINCHS and monitored medicines – S8s and selected S4s
- Best practice recommendations related to the use of high-risk medication procedures, including the use of: dedicated oral syringes, smart pump technology, only one type of epidural pump which is different from general IV pumps, and the importance of reviewing barcoding at point of care metrics

- Special considerations for administering paediatric medicines, including documenting weight, height and BSA, weight-based dose calculations, importance of double-checking all paediatric medications, gestational age at birth considerations and the importance of family-centred care in medication administration
- Monitoring the effects of medications, including therapeutic effects, adverse effects and laboratory monitoring
- Effective communication in medication safety, including the use of ISBAR, closed-loop communication and clear, accurate and timely documentation
- A step-by-step process of safe medication administration including: review of medication order, assessing the patient, 3 medication checks and ID checks, including allergy checks, administration, documentation and evaluation
- Technology and medication safety
- The importance of partnering with consumers for medication safety
- The role of incident and near-miss reporting in improving the safety of medication administration.

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NON-PARENTERAL MEDICATION ADMINISTRATION

Leisa Sanderson; Penelope Coogan; and Tracey Gooding

Learning Outcomes

In this chapter, you will learn how to:

- Describe the nurse's responsibilities in ensuring safe and effective medication administration
- Identify different routes of medication administration, including enteral, topical, and inhaled
- Recognise common medication formulations and their appropriate administration techniques
- Demonstrate safe practices for administering medications via oral, sublingual, buccal, gastric tube, topical, and inhalation routes.

Medication Administration

Medications are available in various forms and can be administered through multiple routes. The choice of route depends on the medication's properties, the intended therapeutic effect, and the patient's physical and cognitive condition. It is the responsibility of the registered nurse to assess these factors and ensure the medication is administered via the most appropriate route for the patient's current needs.

Routes of administration can be categorised as enteral, topical, or parenteral. This chapter will outline common medication formulations, administration considerations and best practice procedures for safe and effective medication administration in relation to enteral and topical methods.

The Nurse's Role in Medication Administration

Registered nurses who prescribe or administer medications are professionally accountable for ensuring safe

and effective practice. This responsibility requires comprehensive knowledge of the medication, including its indications, therapeutic and adverse effects, and potential interactions (Frotjold & Bloomfield, 2021).

Prior to administration, the nurse must assess the patient's condition and determine the clinical need for the medication. Safe medication practices must be followed throughout the process, including accurate preparation, correct administration, and adherence to legal and ethical standards. Following administration, the nurse must evaluate the patient's response and document the outcome appropriately (Frotjold & Bloomfield, 2021).

Therapeutic Actions of Medications

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Formulations of Oral Medication

Medications are supplied in a solid or liquid form. Within each form, there are several different formulation types, each with its own administration considerations. The nurse must be familiar with the various formulations and the techniques associated with each preparation to ensure that safe medication administration practices are followed.

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Enteral Administration

Enteral administration pertains to medications administered via the gastrointestinal tract. Enteral administration includes oral, buccal, sublingual, and gastric administrations that enter directly into the stomach or intestines through feeding tubes.

Oral Medication Administration

Oral administration is the most common route for medication delivery due to its simplicity, convenience, and non-invasive nature. Medications taken orally (PO) are ingested by mouth and may be absorbed at various sites along the gastrointestinal (GI) tract. This route typically has a slower onset of action but provides a more prolonged effect compared to other routes. The typical onset is 30 to 60 minutes.

Before administering oral medications, the nurse must assess the patient for any contraindications, such as vomiting, gastric or intestinal suction, or an impaired level of consciousness that affects the ability to swallow. If dysphagia is present, consideration may be given to crushing tablets, ideally in consultation with a speech pathologist. Crushed tablets are often mixed with a soft food such as custard or stewed fruit, provided this aligns with the patient's dietary requirements and the medication's formulation.

However, not all medications are suitable for crushing. Enteric-coated and modified-release formulations must never be altered, as doing so can compromise their efficacy and safety. Suitability for crushing should be verified using a reliable source, such as the *Don't Rush to Crush* handbook or through consultation with a pharmacist.

The absorption of oral medications can be influenced by several factors, including gastric pH, the presence of food, absorption through the small bowel, and metabolism by liver enzymes, also known as first-pass drug metabolism (Kim & De Jesus, 2023). These variables can affect the onset, intensity, and duration of the medication's action and should be considered when evaluating the patient's response.

Sublingual Medication Administration

Medications ordered to be administered via the sublingual route are placed under the tongue and left to dissolve (Figure 1). These medications dissolve rapidly into the bloodstream for fast absorption and therefore are not affected by hepatic first-pass metabolism. Due to the rapid absorption, medications administered via this route are typically used to treat emergencies. Glyceryl trinitrate is one such medication that is commonly given via this route by tablet or spray to relieve those experiencing cardiac-related chest pain. It is important to educate the patient not to chew or swallow the medication and to let it completely dissolve under the tongue. Food and drink may also affect the absorption of sublingual medications; therefore, the patient should also be advised to refrain from eating or drinking until the tablet is completely dissolved.

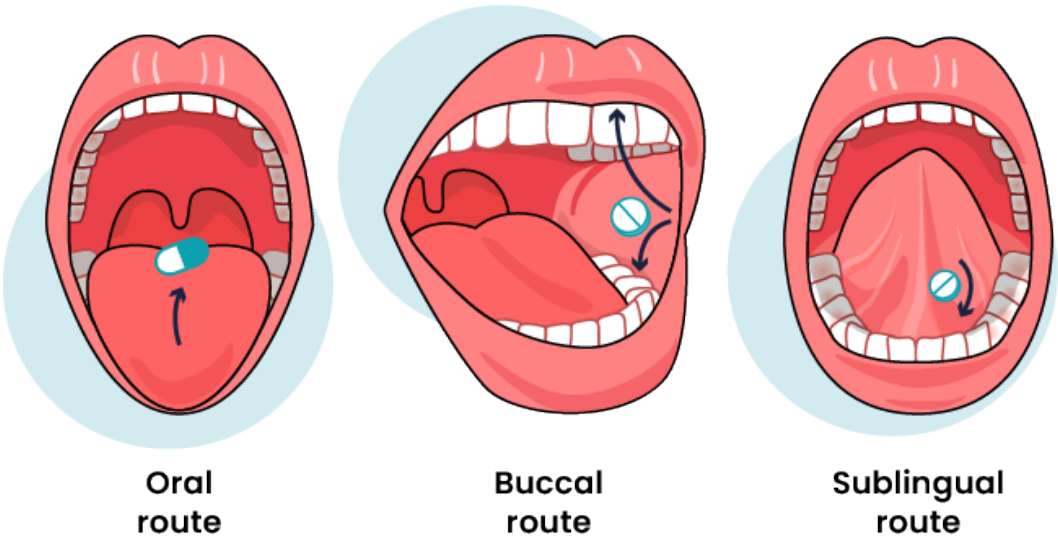


Figure 1. Oral, buccal and sublingual medication routes

Buccal Medication Administration

Medications ordered to be administered via the buccal route are placed between the gum and the cheek and left until it dissolves (Figure 1). These medications dissolve rapidly into the bloodstream for fast absorption and are not affected by hepatic first-pass metabolism. Like sublingual medications, the patient should be advised to not swallow, chew or take it with water, and should refrain from eating or drinking until the tablet is completely dissolved. To avoid mucosal irritation, the patient should be taught to alternate cheeks with each dose (Bullock & Manias, 2022).

Administering an Oral Medication

Solid medications are typically supplied in either blister packs or bottles. Blister packs are usually single-use and protect individual doses from contamination until they are opened at the patient's bedside. Bottles, on the other hand, contain multiple doses and are considered multidose packaging.

When dispensing medications, tablets and capsules should be handled as little as possible to reduce the risk of contamination. To dispense from a bottle:

- Pour the required number of tablets or capsules into the bottle cap
- Transfer them from the cap into a clean medication cup
- Only break scored tablets and do so using a pill cutter or by snapping them with gloved fingers.

For blister packs:

- Hold the packaging directly over a clean medication cup

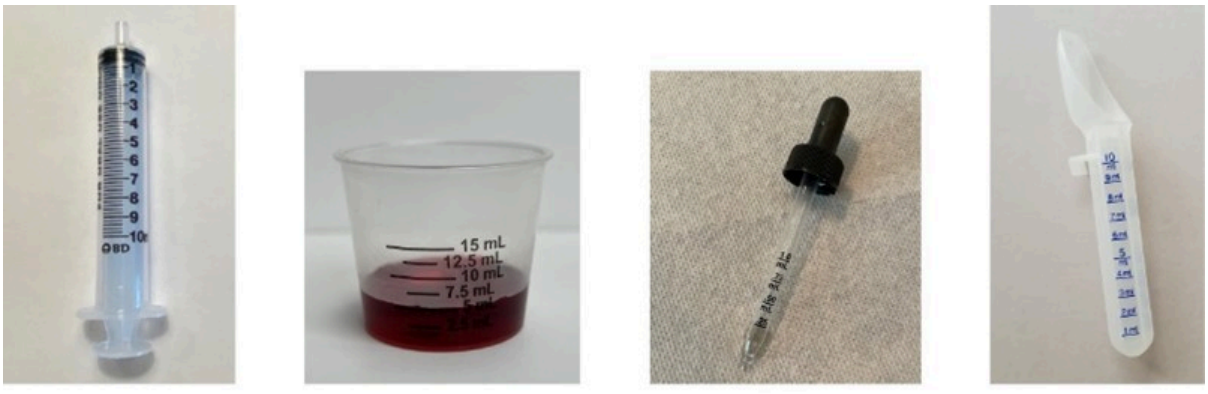
- Push the tablet or capsule through the foil into the cup, avoiding direct contact.

Figure 2. a) Solid medications may be packaged in blister packs or (b) bottles

Typically, liquid and suspension medications are prepared using an oral syringe, dosing cup, medication dropper, or medication spoon. Household spoons, such as flatware, are not recommended for measuring medications because they are not uniform in size.

When administering liquid medications, take care to avoid contaminating the bottle cap. Follow these steps:

1. Hold the medication cup at eye level
2. Pour the liquid to the desired level, ensuring the measurement is taken at the base of the meniscus for accuracy
3. For unit-dose liquids or when measuring volumes less than 10 mL, use an oral syringe (without a needle) for precise dosing.



(a) Common devices used to measure liquid and suspension medications include oral syringes, (b) dosing cups, (c) medicine droppers, and (d) dosing spoons

Safety Alert: Enteral Syringe Identification

To prevent accidental intravenous (IV) administration, colour-coded syringes are used for specific routes of medication delivery. Orange syringes are designated for oral liquid medications, while purple syringes are used for enteral (gastric tube) medications and nutrition; both are incompatible with IV systems. These visual and physical safeguards help ensure medications are administered safely and correctly

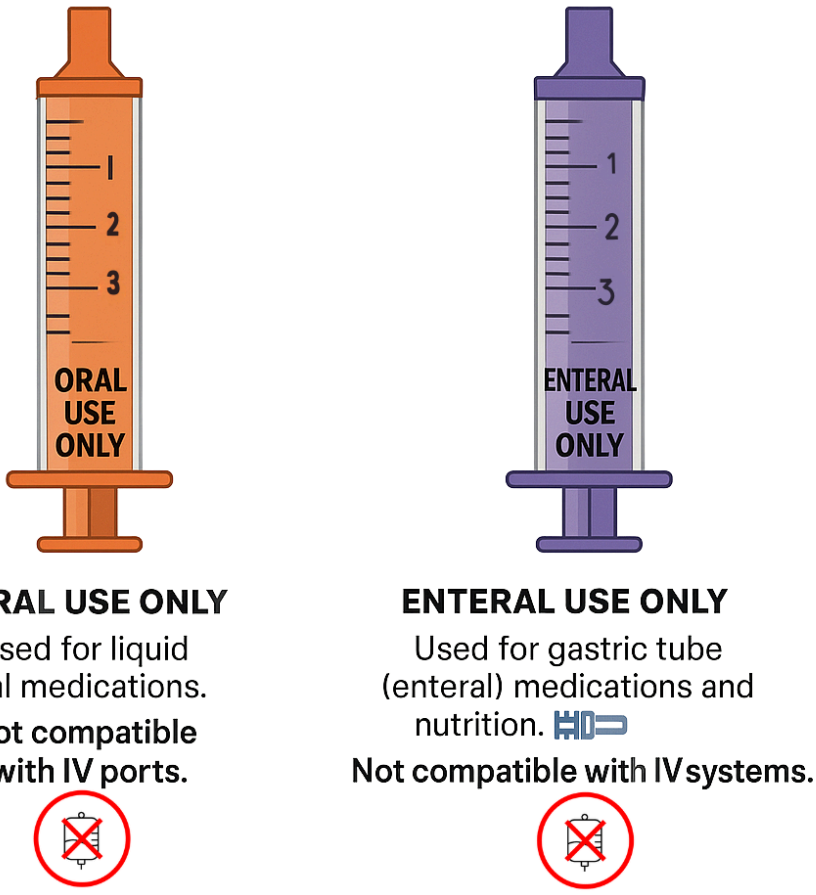


Figure 4. Syringes used for oral or enteral administration are colour coded for easy identification and protect against accidental IV administration

Oral, Sublingual, Buccal Medication Administration Procedure

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Medication Administration via Gastric Tubes

When a patient is unable to swallow safely, medications may be administered via a gastric tube, delivering the medication directly into the stomach or small intestine. This route is used only when oral administration is not feasible. A patient with a gastric tube who can swallow may still take the medication by mouth.

Gastric tubes include:

Nasogastric (NG) tube – inserted through the nose into the stomach
Gastrostomy (G) tube – inserted directly into the stomach through the abdominal wall
Jejunostomy (J) tube – inserted into the jejunum (part of the small intestine)

The location of the tube is a critical consideration, as it influences the absorption and effectiveness of the medication. For example, medications designed for gastric absorption may not be suitable for jejunal administration. In such cases, an alternative formulation or route may be required.

Additional factors to consider include the patient's fasting status. Patients who are nil by mouth (NBM) due to fasting or medical orders still require the same precautions as those receiving oral medications, including assessment of the medication's suitability and potential interactions.

Not all oral medications are intended to be administered via a gastric tube; therefore, careful consideration should be given to the compatibility of the medication to be administered via this method. Medications administered via a gastric tube need to be supplied in a liquid form, if available, or crushed and diluted if supplied in a solid form. It is also recommended that medications intended to be administered via a gastric tube be specifically ordered as such. The ordered route should state to administer the medication via the NG, PEG (Percutaneous endoscopic gastrostomy), NJ or PEJ (Percutaneous endoscopic jejunostomy) rather than PO.

Gastric Tube Medication Administration Procedure

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Topical Administration

Topical medications are applied directly to a specific area of the body to produce a local or, in some cases, systemic effect. While commonly associated with the skin, topical administration also includes applications to mucous membranes and body cavities, such as the eyes, ears, nose, rectum, and vagina.

These medications are designed to act at or just beneath the site of application. For example, skin preparations may act locally within the dermis or be absorbed into the bloodstream for systemic effects. Similarly, topical treatments can be used in the gastrointestinal tract (e.g., oral gels) or during surgical procedures (e.g., antibiotics applied to body cavities) (Bullock & Manias, 2022).

Topical routes also include inhalation therapies, where medications are delivered directly to the respiratory mucosa for rapid local or systemic action.

Skin

Topical medications are applied directly to the skin or mucous membranes to produce local or systemic effects. They may be administered through various methods, including:

- Direct application (e.g., creams, ointments)
- Transdermal patches or discs
- Medicated baths or soaks
- Moist dressings.

These applications may remain in place for as little as 12 hours or up to seven days, depending on the medication and therapeutic goal.

Figure 5. Clear transdermal patch applied to skin

Figure 6. Transdermal patch in packaging

Types of Topical Skin Preparations

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Safety Considerations for Transdermal Patches

The following section outlines important safety aspects to be considered when using transdermal patches, including how to prevent overdose, avoid burns or injury from metal components, and to ensure correct disposal.

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Topical – Skin – Medication Administration Procedure

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Eye (Ophthalmic) Administration

Ophthalmic medications are commonly used to treat a variety of eye conditions and are available in the form of drops or ointments. Eye drops are typically packaged in non-drip plastic containers, while ointments are supplied in small tubes. These medications must be isotonic to avoid causing discomfort or irritation upon application. Eye drops may be aqueous or oily solutions or suspensions and are instilled directly into the conjunctival sac (Bullock & Manias, 2022). Ointments are applied along the lower eyelid and provide longer contact time with the eye surface. In some cases, eye irrigation is used to flush out foreign bodies or chemical contaminants using large volumes of saline. The volume and duration of irrigation depend on the nature of the contaminant and the severity of exposure.

Figure 7. Nurse administering eye drops

Ear (Otic) Administration

Ear medications are typically administered as oily solutions to ensure they coat the ear canal effectively (Bullock & Manias, 2022). These medications may include antibiotics, analgesics, wax softeners, or irrigation fluids used to remove debris or wax buildup. It is important that ear drops, and irrigation fluids are at room temperature before administration, as cold solutions can cause vertigo or nausea due to the sensitivity of the inner ear structures (Bullock & Manias, 2022). Medications are instilled into the outer ear canal, with the tympanic membrane acting as a barrier to the middle and inner ear. If the tympanic membrane is perforated, instillation should only be performed using aseptic non-touch technique to prevent infection or further damage.

Nasal Administration

Nasal medications are administered via sprays, drops, or medicated packing and are commonly used to treat conditions such as nasal congestion, allergies, and sinus infections. Decongestant sprays and drops are the most frequently used forms. These medications must be isotonic to avoid irritation of the nasal mucosa. Oil-based solutions are generally avoided, as they can impair the function of the nasal cilia (Bullock & Manias, 2022). Nasal medications are typically administered using a clean technique to prevent contamination of the nasal passages.

Topical Medication – Mucous Membranes – Ophthalmic, Otic and Nasal Administration Procedures

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Vaginal Administration

Vaginal medications are used primarily for local treatment, such as hormone therapy or antifungal infections. These medications are available in various forms, including pessaries, foams, creams, jellies, and tablets. Pessaries are solid, oval-shaped preparations that melt at body temperature after insertion, allowing the medication to be absorbed by the vaginal mucosa. They are generally individually packaged and may require refrigeration to maintain their shape. Creams, foams, and jellies are administered using an applicator to ensure the medication is inserted high into the vaginal canal for maximum contact with the mucosal surface. Proper technique is essential to ensure even distribution and effectiveness of the treatment.

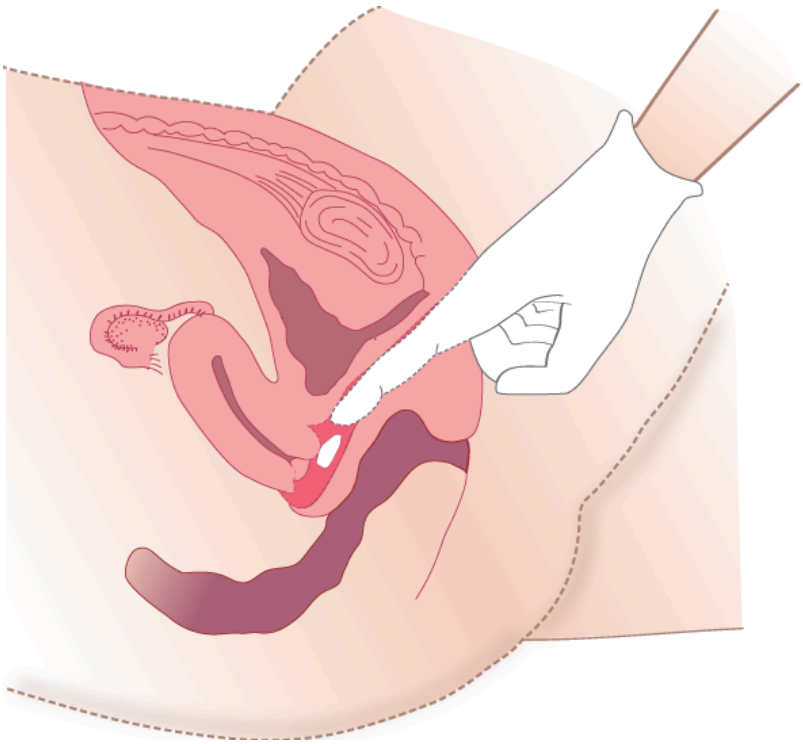

Figure 8. Administering medication vaginally without an applicator

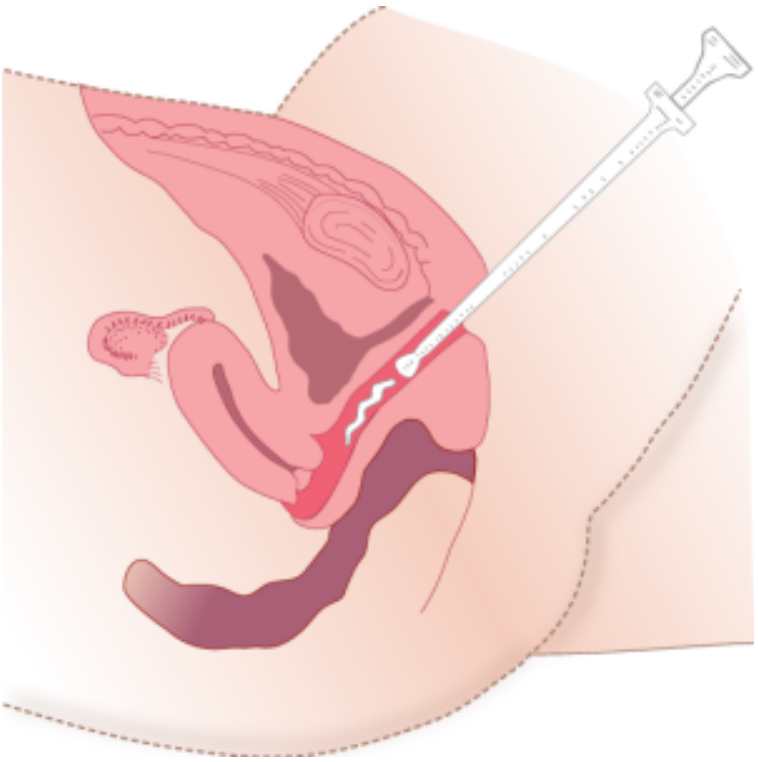

Figure 9. Administering medication vaginally using an applicator

Vaginal Medication Administration Procedure

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Rectal Administration

Rectal medications include suppositories and enemas, which may be used for both local and systemic effects. Suppositories are bullet-shaped and designed to melt at body temperature after insertion into the rectum. They are commonly used to relieve constipation, reduce fever, or manage nausea when oral administration is not possible. Suppositories often require refrigeration to maintain their form. Enemas are liquid preparations administered into the rectum, typically in disposable containers, and are used to relieve constipation or deliver medications such as corticosteroids. Rectal administration offers faster absorption and higher bioavailability than oral routes, as it bypasses the upper gastrointestinal tract and reduces gastrointestinal side effects.

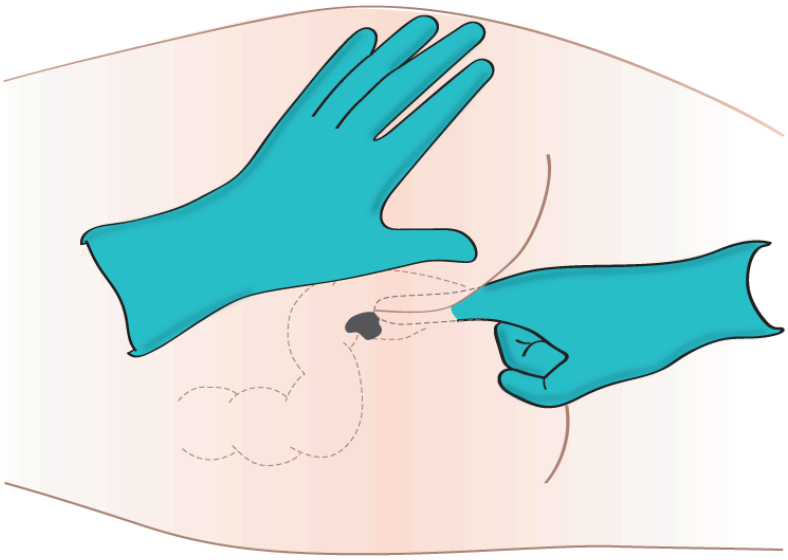

Figure 10. Administration of enema

Rectal Medication Administration Procedure

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Inhalation Administration

Inhaled medications are delivered through the nasal or oral passages, or less commonly via endotracheal tubes, and are rapidly absorbed due to the large surface area and rich vascular supply of the pulmonary tissue. These medications are administered using devices such as nebulisers, metered-dose inhalers (MDIs), dry powder inhalers (DPIs) and soft-mist inhalers. Inhalation therapy is commonly used for respiratory conditions such as asthma, chronic obstructive pulmonary disease (COPD), and allergic rhinitis. Medications delivered via inhalation may have local effects on the airways or systemic effects, such as with general anaesthetics or oxygen therapy. Proper technique is essential to ensure the medication reaches the alveoli, where absorption is most efficient.

Forms of Inhaled Medications

Inhaled medications may be administered by nebulisers or hand atomisers.

Nebuliser

A nebuliser is a process where oxygen or compressed air is used to convert medication to a fine mist for inhalation. The mist is inhaled into the lungs via a face mask or mouthpiece. Nebulisers are usually powered by a compressed air generator, or in the hospital setting, wall compressed air or oxygen may be used.

Figure 11. Nurse administering a nebuliser

Inhaled Medication – Nebuliser – Medication Administration Procedure

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Hand Atomiser

Hand atomisers (inhalers) are pocket-sized devices that deliver medications into the lungs with each activation. There are three main types of hand atomisers: metered-dose inhalers (MDI), dry powdered inhalers (DPI), and soft-mist inhalers (SMI).

Figure 12. The metered dose inhaler, dry powder inhaler and soft mist inhaler

Metered-Dose Inhaler (MDI)

A metered-dose inhaler (MDI), often referred to as a puffer, creates an aerosolised mist of medication that is inhaled through the mouth and into the lungs (Figure 12). The canister is attached to a mouthpiece, and the medication is administered into the lungs by pressing on the canister while coordinating breathing efforts. Hand-breath coordination is required to accurately administer the required dosage to the lungs and prevent wastage occurring in the oropharynx. According to the National Asthma Council Australia (2018), 10% of patients incorrectly administer inhaler medication, therefore, education is of vital importance.

Spacers

A spacer is a clear, hollow tube that attaches to an MDI, creating a chamber between the inhaler and the patient's mouth or mask (Figure 13). Spacers are particularly useful because they reduce the need for precise coordination between inhaler actuation and inhalation, a common difficulty for many patients (Rigby, 2024). By holding the medication in suspension, spacers allow more time for the patient to inhale the dose effectively.

Spacers offer several clinical benefits. They improve medication delivery by reducing oropharyngeal deposition, which helps minimise local side effects such as hoarseness or oral thrush, especially important when using inhaled corticosteroids (Rigby, 2024). They may also enhance lung deposition by slowing the aerosol cloud and allowing more time for the medication to be inhaled. Spacers are recommended for a wide range of patients, including all children (with a mask for those under 4–5 years), adults using corticosteroid preventers, individuals who struggle with the 'press and breathe' technique, and anyone using a reliever during an asthma attack (National Asthma Council [NAC], 2022).

Spacers are available in various sizes and designs, with options for mouthpieces or masks, and may include features such as valves or feedback mechanisms to support correct use (Viken & Levy, 2018).

Figure 13. Patient using MDI with spacer

Dry Powder Inhalers (DPI)

A dry powder inhaler (DPI) provides dry powder medications that are inhaled through a device in the mouth and into the lungs (Figure 12). DPIs use an inward breath to move the medications into the lungs instead of a propellant. After the dose is activated, a quick inhale activates the medication and moves it into the lungs. Typically, DPIs are easy to use, do not require a spacer, and do not require the same coordinated efforts in breathing and operating the device as MDIs. DPIs do, however, require more forceful breaths and therefore, those with a lower forced expired volume (FEV1) may not be able to inspire the medication as adequately (Mondor, 2023). DPIs can also be affected by humidity, so careful storage is required.

Soft-Mist Inhaler

A soft-mist inhaler is a handheld device that turns liquid medications into a mist cloud that can then be inhaled without a propellant (Figure 12). The medication contains more particles and leaves the inhaler more slowly than with MDIs or DPIs; therefore, more of the medication enters the lungs and a lower dose

of the medication may be used. This type of inhaler does not require coordinated breathing efforts or a spacer.

Inhaled Medications – Hand Atomisers, MDI, DPI, SMI -Administration Procedure

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Life Span Considerations

Administering Inhaled Medication to Children

When administering inhaled medications to children, it is important to choose a device that suits their age, developmental stage, and physical ability (National Asthma Council Australia [NACA], 2018). For children under five, MDIs used with spacers are recommended. Spacers allow the medication to remain suspended, enabling the child to take multiple breaths to inhale the full dose, while also reducing medication build-up in the mouth and minimising local side effects (Viken & Levy, 2018). For younger children, spacers with facemasks are often used to ensure a proper seal.

Correct inhaler technique can be challenging for young children. To support learning and reduce anxiety, caregivers can demonstrate the process using a doll or toy and allow the child to explore the equipment beforehand. Having the child sit on a parent's lap during administration can also help them feel more secure.

Key Takeaways

In this chapter, we covered:

- Nurses are responsible for ensuring safe and effective medication administration, which includes assessing the patient, understanding the medication, and evaluating outcomes post-administration.
- Medications can be administered via enteral, topical, or inhaled routes. The choice of route depends on the medication's properties, therapeutic goals, and the patient's condition.
- Enteral administration includes oral, sublingual, buccal, and gastric tube routes. Each has specific considerations, such as the impact of first-pass metabolism and the suitability of medication formulations for crushing or tube delivery.
- Topical medications are applied to the skin or mucous membranes and may have local or systemic effects. These include creams, ointments, patches, and preparations for the eyes, ears, nose, rectum, and vagina.
- Inhaled medications are delivered directly to the respiratory tract using devices such as metered-dose inhalers (MDIs), dry powder inhalers (DPIs), soft-mist inhalers, and nebulisers. Proper technique and device selection are essential for effective delivery.
- Nurses must be familiar with different medication formulations (e.g., tablets, syrups, patches) and understand how to administer each safely, including the use of tools like spacers and oral syringes.
- Patient education is a critical component of medication administration. Nurses must teach patients how to use medications correctly and adapt techniques to suit individual needs, especially in vulnerable populations like children or those with swallowing difficulties.

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PARENTERAL MEDICATION ADMINISTRATION

Penelope Coogan and Leisa Sanderson

Learning Outcomes

In this chapter you will learn how to:

- Identify the different parenteral routes of medication administration
- Describe the nurse's responsibility in ensuring safe and effective parenteral medication administration
- Recognise the equipment used for parenteral medication administration
- Demonstrate safe practices for administering medications via the intradermal, subcutaneous, intramuscular and intravenous routes to people across all stages of the lifespan
- Document actions and evaluate effectiveness.

Parenteral medication administration refers to injecting medications directly into the tissues and circulatory system, bypassing the skin, mucous membranes, and gastrointestinal tract.

Administering medications via the parenteral route may be useful when the medication is poorly absorbed orally, if the patient is unable to tolerate oral administration or when immediate or delayed onset is required.

This chapter will describe the various parental routes such as intradermal (ID), subcutaneous (Subcut), intramuscular (IM) and intravenous (IV). It will supply you with guidelines, preparing you to administer medications via this route effectively and safely.

Equipment Used for Parenteral Medication Administration

When administering medication by the parenteral route, it is essential to understand the equipment required. The following considers key equipment used, including syringes, needles, needless systems and sharp safety devices. Each has a vital role in ensuring safe, accurate and effective medication delivery while minimising the risk of harm to both the patient and nurse.

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Parenteral Medication Formulations

Parenteral medications may be supplied in a variety of packages, such as vials, glass or plastic ampoules, and prefilled cartridges. Sometimes, the medication will come prepared, ready for the nurse to administer. Other times, it may be necessary for the nurse to withdraw a dose of medication from a vial, add a liquid (diluent) to a powdered medication (solute) to form a liquid solution that may be suitable for the parenteral route, or mix multiple medications in the same syringe prior to administration.

Each of these preparations requires specific guidelines to be followed when preparing the medication.

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Link to Learning

You can view how to withdraw medication from a vial in this video demonstration [9:28].

Parenteral Routes and Administration

Intradermal (ID) Route

ID are injections administered into the dermis, just below the epidermis. The ID injection route has the longest absorption time of all parenteral routes.

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Link to Learning

You can view how to administer an intradermal medication in this video demonstration [2:48].

Subcutaneous (Subcut) Route

Medications administered via the subcut route are injected beneath the skin into the adipose tissue, just below the epidermis and dermis. Medications administered via this route have a slow, sustained rate of absorption because there are fewer blood vessels present to distribute the medication. To ensure that the medication is injected into the adipose tissue, careful consideration must be given when selecting an appropriate anatomical site for the subcut injection.

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Link to Learning

You can view how to administer a subcutaneous medication in this video demonstration [3:39].

Intramuscular (IM) Route

Medications administered via the intramuscular route are injected directly into the muscle. Muscle tissue has a large blood supply; therefore, IM medications may be absorbed faster than those injected via the subcut route and also have a reasonably prolonged action. Due to their rich blood supply, IM injection sites can absorb larger volumes of solution, and in addition, muscle tissue is less sensitive than subcutaneous tissue to irritating solutions and concentrated and viscous medications.

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Link to Learning

You can view how to administer an intramuscular medication in this video demonstration [2:44].

Intravenous (IV) Route

IV is a route for administering concentrated medications (diluted or undiluted) directly into the vein. Administering a medication intravenously eliminates the process of hepatic first-pass by depositing the medication directly into the blood. This results in the immediate elevation of serum drug levels and high drug concentrations in vital organs, such as the heart, brain and kidneys. To administer IV medications safely and effectively, nurses must follow all healthcare facility policies and use the appropriate resources, such as the Australian Injectables Handbook, to determine which medications can be given intravenously and any specific instructions about administration.

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Safety Considerations in Parenteral Administration

Compared to oral administration, medications administered via the parenteral route have a faster onset and provide stronger effects, as they bypass the gastrointestinal tract and enter directly into systemic circulation. This direct access requires nurses to consider a range of additional factors when preparing and administering medications via this route. These include the rate of absorption, potential medication interactions, safe administration of reconstituted medication, infection control measures, and the prevention of needle stick injuries.

Rate of Absorption

Medications administered via the parenteral route bypass the gastrointestinal system, eliminating the effects of first-pass metabolism. The medications are rapidly absorbed; therefore, there is an increased risk of overdose and rapid development of life-threatening adverse reactions.

The speed of absorption may make it difficult to reverse the physiological effects of the drug.

- Subcutaneous injections have the slowest absorption rate
- Intramuscular injections have a faster absorption rate
- Intravenous medications are the most rapidly absorbed.

Potential Incompatibilities

When administering any medication, it is important to consider potential incompatibilities; this is of extra importance for those delivered intravenously. Incompatibilities for the IV route can be organised into three different categories, including physical, chemical, and therapeutic issues. Click the plus signs to find out more.

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To assess medication compatibility, refer to available educational resources such as the MIMS, Australian Injectable handbook, Don't rush to crush and the Australian Medicines Handbook.

Safe Administration of Reconstituted Medications

After a medication has been reconstituted, best practice recommends that the individual who prepared the medication also administer it. However, if this is not possible, it is essential that the syringe is clearly labelled with the following information:

- The type and amount of diluent used
- The expiration date of the diluent
- The time in which the medication must be used after being reconstituted.

This practice aligns with the *National Standard for User-Applied Labelling of Injectable Medicines, Fluids and Lines*. According to the guidelines, any medication that has been removed from its original packaging, is no longer recognisable and leaves the hands of the dispenser, must be clearly labelled and identifiable (ACSQHC, 2015). For further information on correct labelling, see Safety Alert: Labelling, in the Fluid Electrolyte and Acid Base chapter.

Infection Control

As the parenteral route is an invasive procedure that requires the skin integrity to be broken, the risk of introducing infection is increased. The intravenous route poses additional risks due to providing a direct entry into the systemic circulation. To reduce the risk of infection, it is therefore vital to follow infection

control guidelines such as the 5 moments of hand hygiene and aseptic technique whenever preparing and administering medications.

In all parenteral administration procedures, multiple microcritical aseptic fields are utilised. The nurse needs to remain vigilant and consistently aware of key sites and key parts that require protection to maintain asepsis. The level of aseptic technique and the fields required to maintain asepsis will vary depending on the route and the access device used. For example, in intravenous access, a general aseptic field is established when accessing a central venous catheter (CVC) as opposed to the use of microcritical fields for a peripheral intravenous catheter (PIVC). For a reminder on Aseptic technique and Aseptic fields, revisit the Infection Prevention and Control chapter. For more information on Intravenous access devices, see Administering and Management of Intravenous Therapy (IV) in the Fluids, Electrolytes and Acid Base chapter.

Specifically, when handling needles, syringes and medication, the following aseptic principles should be applied:

- Prepare parenteral medications in a clean area on a clean surface
- Use single-use equipment (e.g., syringes, needles, IV sets) for one patient only
- Open packaging as it is designed, do not rip, tear or 'pop' open packages
- Ensure needles do not touch unsterile surfaces, such as the outside of the vial or countertop
- Disinfect vial stoppers before inserting a needle
- Ensure the tip of the needle is covered whenever it is not in use
- Avoid contaminating the length of the plunger and the Luer-lock, if using a two-piece needle and syringe (contamination of these parts has the potential to introduce contaminants into the syringe).

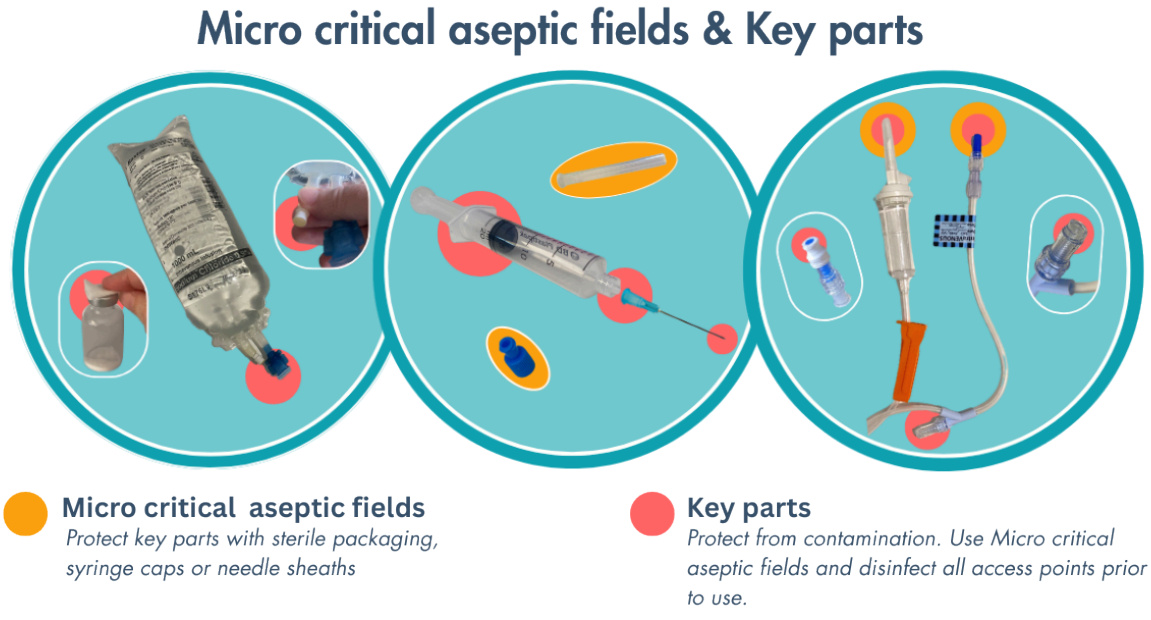

Figure 1. Use microcritical aseptic fields to protect key parts

Specific to preparing and administering IV medications, these additional steps should be followed:

- Disinfect all access points (e.g., hubs, ports, connectors) with a 70% alcohol wipe before use. Scrub for 5–15 seconds and allow to dry completely (about 5 seconds for alcohol, 20 seconds for chlorhexidine-alcohol) (NHMRC, 2019).
- Avoid disconnecting IV lines unless necessary. If disconnected, replace the administration set.

Further information can be found on infection control and safety considerations when using intravenous route in the next chapter, Fluid, Electrolyte and Acid Base.

Preventing Needle Stick Injuries

Registered nurses are at significant risk of injury when administering parenteral medications. According to the National Health and Medical Research Council (2019), 41% of sharp-related injuries occur during the use of a sharp device on a patient, 40% occur after use but before disposal, and 15% happen during or after disposal, whether appropriate or inappropriate. To reduce the risk of needlestick injury during the administration of parenteral medications, it is essential to follow established practice guidelines.

Practice Guidelines

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For more information in regards to sharp safety, revisit Sharp Safety in the Foundations of Medication Safety chapter and Handling of Disposable Sharps in the Infection Prevention and Control chapter.

Key Takeaways

In this chapter, we covered:

- Nurses are responsible for ensuring safe and effective medication administration, which includes assessing the patient, understanding the medication, and evaluating outcomes

post-administration.

- Parenteral medications can be administered via intradermal, subcutaneous, intramuscular and intravenous routes. The choice of route depends on the medication's properties, therapeutic goals, and the patient's condition.
- Parenteral medications have a relatively quick onset of therapeutic effects, and nurses must be aware of the onset, peak, and duration of all parenteral medications.
- Always consider the therapeutic effects and adverse effects when administering parenteral medications.
- Understand which medications are considered high-alert medications (APINCHS), and perform independent double checks to minimise errors.
- Report all errors, near misses, and adverse reactions to ensure knowledge is shared and to prevent further errors from occurring.

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FLUID, ELECTROLYTE AND ACID-BASE

Amy McCrystal and Leisa Sanderson

Learning Outcomes

In this chapter, you will learn how to:

- Identify the major compartments of body fluids and their composition
- Explain the physiological mechanisms that govern fluid movement within the body, including the roles of hydrostatic pressure, oncotic pressure, osmosis and active transport
- Analyse how alterations in fluid movement contribute to clinical conditions such as oedema, dehydration and fluid volume imbalances
- Differentiate between hypervolemia and hypovolemia by identifying their causes, risk factors, clinical manifestations and appropriate nursing interventions to manage fluid imbalance and prevent complications
- Describe the normal ranges, physiological functions, causes, signs and symptoms, and nursing interventions for imbalances of key electrolytes, including sodium, potassium, calcium, magnesium, and phosphorus
- Interpret arterial blood gas results to identify and differentiate between respiratory and metabolic acid-base imbalances—acidosis or alkalosis—and determine their compensation status, in order to guide appropriate nursing intervention
- Perform a comprehensive intravenous (IV) therapy assessment by identifying and documenting relevant subjective and objective data, and recognising age-specific considerations for paediatric and older adult populations
- Evaluate the integrity and safety of the entire IV infusion system in accordance with current standards and facility policy.
- Identify, assess, and initiate appropriate interventions for common local complications of peripheral IV therapy—such as phlebitis, infiltration, extravasation, haemorrhage, local infection, and nerve injury—in accordance with clinical guidelines.

Basic Fluid and Electrolyte Concepts

The human body maintains a delicate balance of fluids and electrolytes to help ensure proper functioning and homeostasis. When fluids or electrolytes become imbalanced, individuals are at risk for organ system dysfunction. Nurses must be able to recognise subtle changes in fluid or electrolyte balances in their patients so they can intervene promptly. Timely assessment and intervention prevent complications and save lives.

Before learning about how to care for patients with fluid and electrolyte imbalances, it is important to understand the physiological processes of the body's regulatory mechanisms. The body is in a constant state of change as fluids and electrolytes are shifted in and out of cells within the body in an attempt to maintain a nearly perfect balance. A slight change in either direction can have significant consequences on various body systems.

Body Fluids

Body fluids consist of water, electrolytes, blood plasma and component cells, proteins, and other soluble particles called solutes. Body fluids are found in two main areas of the body called intracellular and extracellular compartments (Figure 1).

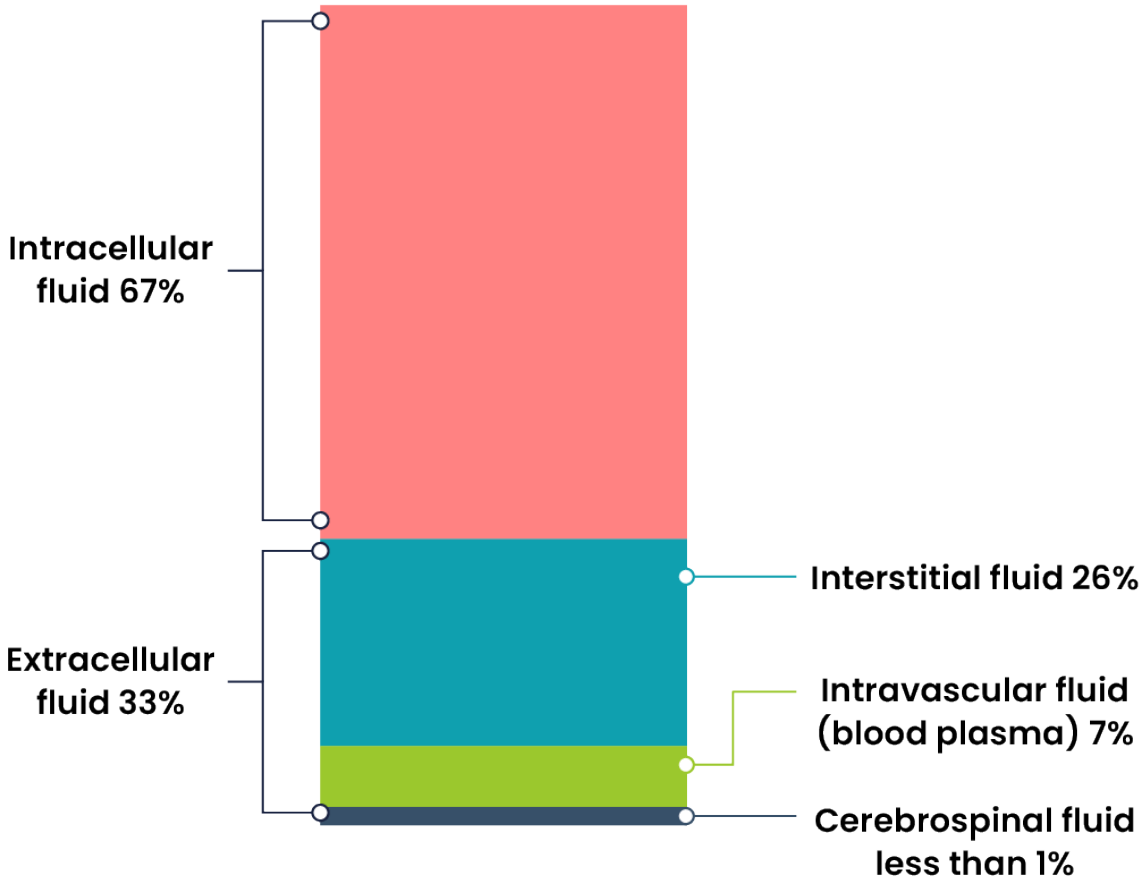

Figure 1. Intracellular and extracellular compartments

Intracellular Fluids (ICF) are found inside cells and are made up of protein, water, electrolytes, and solutes. The most abundant electrolyte in intracellular fluid is potassium. Intracellular fluids are crucial to the body's functioning and accounts for 60% of the volume of body fluids and 40% of a person's total body weight (Hryciw & Bower, 2019).

Extracellular Fluids (ECF) are fluids found outside of cells. The most abundant electrolyte in extracellular fluid is sodium. The body regulates sodium levels to control the movement of water into and out of the extracellular space due to osmosis.

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Fluid Movement

Fluid movement occurs inside the body due to osmotic pressure, hydrostatic pressure, and osmosis. Proper fluid movement depends on intact and properly functioning vascular tissue lining, normal levels of protein content within the blood, and adequate hydrostatic pressures inside the blood vessels. Intact vascular tissue lining prevents fluid from leaking out of the blood vessels. Protein content of the blood (in the form of albumin) causes **oncotic pressure** that holds water inside the vascular compartment. For example, patients with decreased protein levels (i.e., low serum albumin) experience oedema due to the leakage of intravascular fluid into interstitial areas because of decreased oncotic pressure.

Hydrostatic pressure is defined as pressure that a contained fluid exerts on what is confining it. In the intravascular fluid compartment, hydrostatic pressure is the pressure exerted by blood against the capillaries. Hydrostatic pressure opposes oncotic pressure at the arterial end of capillaries, where it pushes fluid and solutes out into the interstitial compartment. On the venous end of the capillary, hydrostatic pressure is reduced, which allows oncotic pressure to pull fluids and solutes back into the capillary (Brinkman et al., 2023).

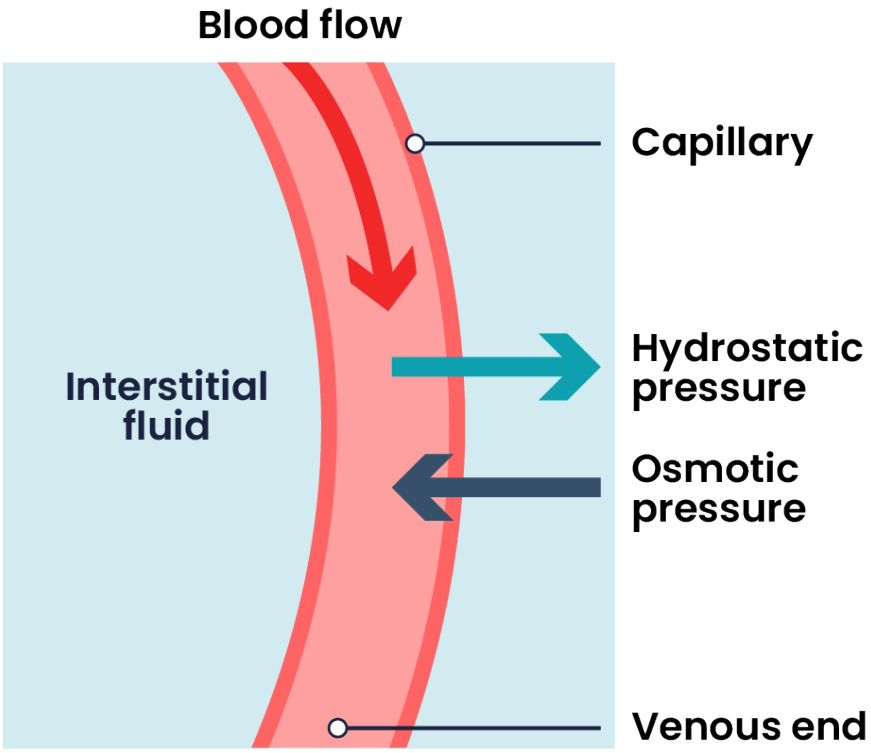

Figure 2. Hydrostatic pressure

Filtration occurs when hydrostatic pressure pushes fluids and solutes through a permeable membrane so they can be excreted. An example of this process is fluid and waste filtration through the glomerular capillaries in the kidneys. This filtration process within the kidneys allows excess fluid and waste products to be excreted from the body in the form of urine.

Fluid movement is also controlled through osmosis. Osmosis is water movement through a semipermeable membrane, from an area of lesser solute concentration to an area of greater solute concentration, in an attempt to equalise the solute concentrations on either side of the membrane. Passive transport is when osmosis causes fluid to travel due to a concentration gradient and no energy is expended during the process (Marieb & Hoehn, 2023). Figure 3 demonstrates osmosis, where water has moved to the right side of the membrane to equalise the concentration of solutes on that side with the left side.

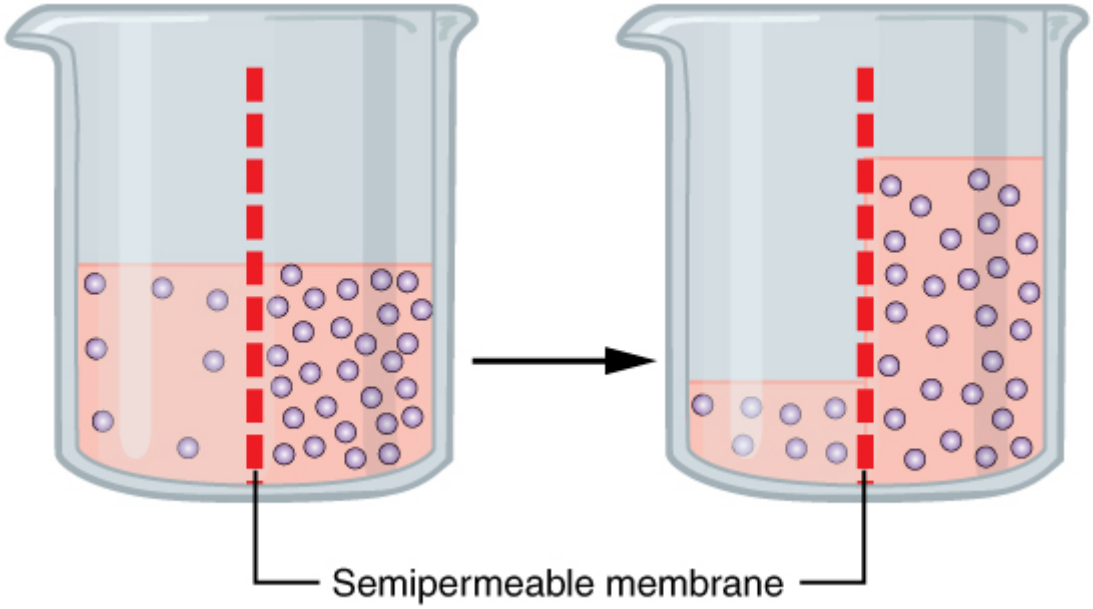

Figure 3. Osmosis

Active transport, unlike diffusion, involves moving solutes and ions across a cell membrane from an area of lower concentration to an area of higher concentration. Because active transport moves solutes against a concentration gradient to prevent an overaccumulation of solutes in an area, energy is required for this process to take place.

Fluid and Electrolyte Regulation

The body must carefully regulate intravascular fluid accumulation and excretion to prevent fluid volume excesses or deficits and maintain adequate blood pressure. Water balance is regulated by several mechanisms, including antidiuretic hormone (ADH), thirst, and the Renin-Angiotensin-Aldosterone System (RAAS).

Fluid intake is regulated by thirst. As fluid is lost and the sodium level increases in the intravascular space, serum **osmolality** increases. Serum osmolality is a measure of the concentration of dissolved solutes in the blood. Osmoreceptors in the hypothalamus sense increased serum osmolarity levels and trigger the release of ADH (antidiuretic hormone) in the kidneys to retain fluid. The osmoreceptors also produce the feeling

of thirst to stimulate increased fluid intake. However, individuals must be able to mentally and physically respond to thirst signals to increase their oral intake. They must be alert, fluids must be accessible, and the person must be strong enough to reach for fluids. When a person is unable to respond to thirst signals, dehydration occurs. The average adult intake of fluids is about **2,500 mL per day** from both food and drink. An increased amount of fluids is needed if the person has other medical conditions causing excessive fluid loss, such as sweating, fever, vomiting, diarrhea, and bleeding.

The **Renin-Angiotensin-Aldosterone System** (RAAS) plays an important role in regulating fluid output and blood pressure. When there is decreased blood pressure (which can be caused by fluid loss), specialised kidney cells make and secrete renin into the bloodstream. Renin acts on angiotensinogen released by the liver and converts it to angiotensin I, which is then converted to angiotensin II. Angiotensin II does a few important things. First, angiotensin II causes vasoconstriction to increase blood flow to vital organs. It also stimulates the adrenal cortex to release aldosterone. Aldosterone is a steroid hormone that triggers increased sodium reabsorption by the kidneys and subsequent increased serum osmolality in the bloodstream (Fountain, 2023).

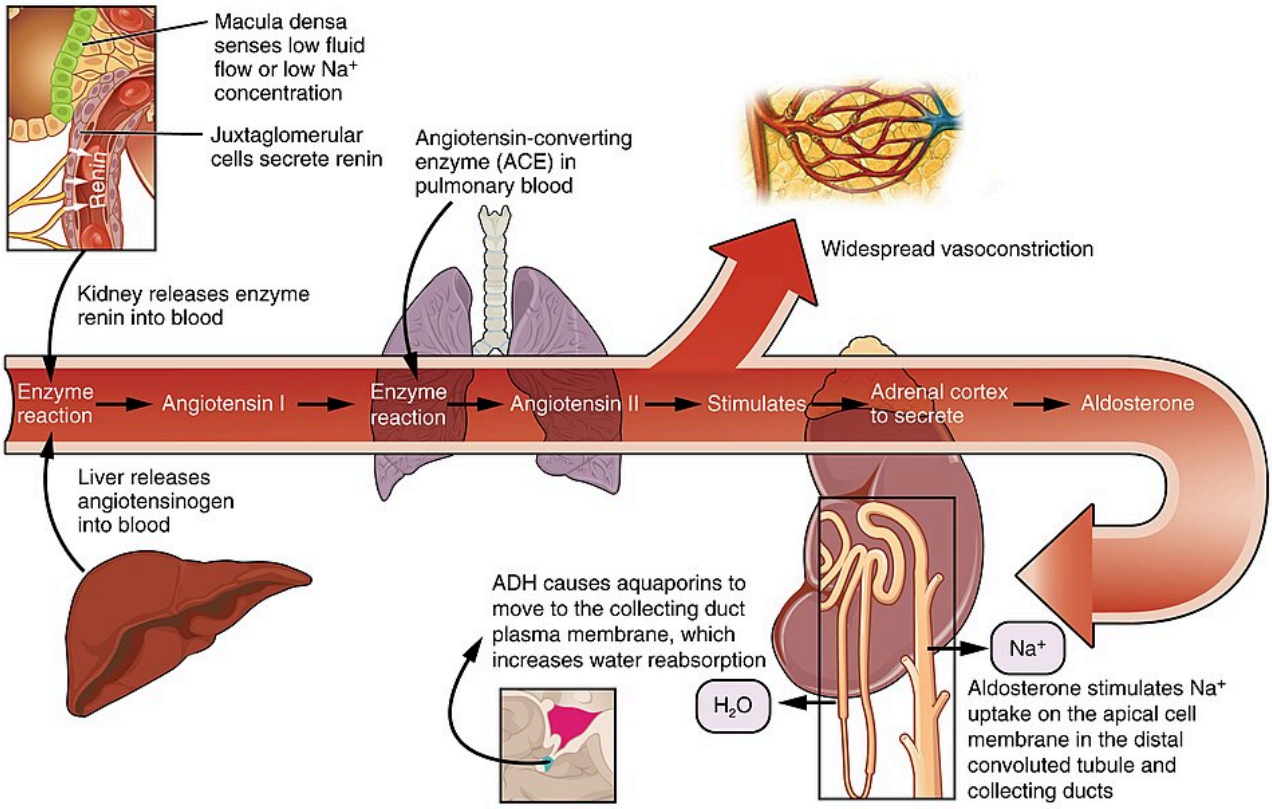

Figure 4. Renin Angiotensin Aldosterone System (RAAS)

Fluid output occurs mostly through the kidneys in the form of urine. Fluid is also lost through the skin as perspiration, through the gastrointestinal tract in the form of stool, and through the lungs during respiration. 40% of daily fluid output occurs due to these "insensible losses" through the skin, gastrointestinal tract, and lungs and cannot be measured. The remaining 60% of daily fluid output is in the form of urine. Normally, the kidneys produce about 1,500 mL of urine per day when fluid intake

is adequate or more accurately 0.5mL/kg/hr. Decreased urine production is an early sign of dehydration or kidney dysfunction. It is important for nurses to assess urine output in patients at risk. If a patient demonstrates less than 30 mL/hour (or **0.5 mL/kg/hour**) of urine output prompt action should be taken.

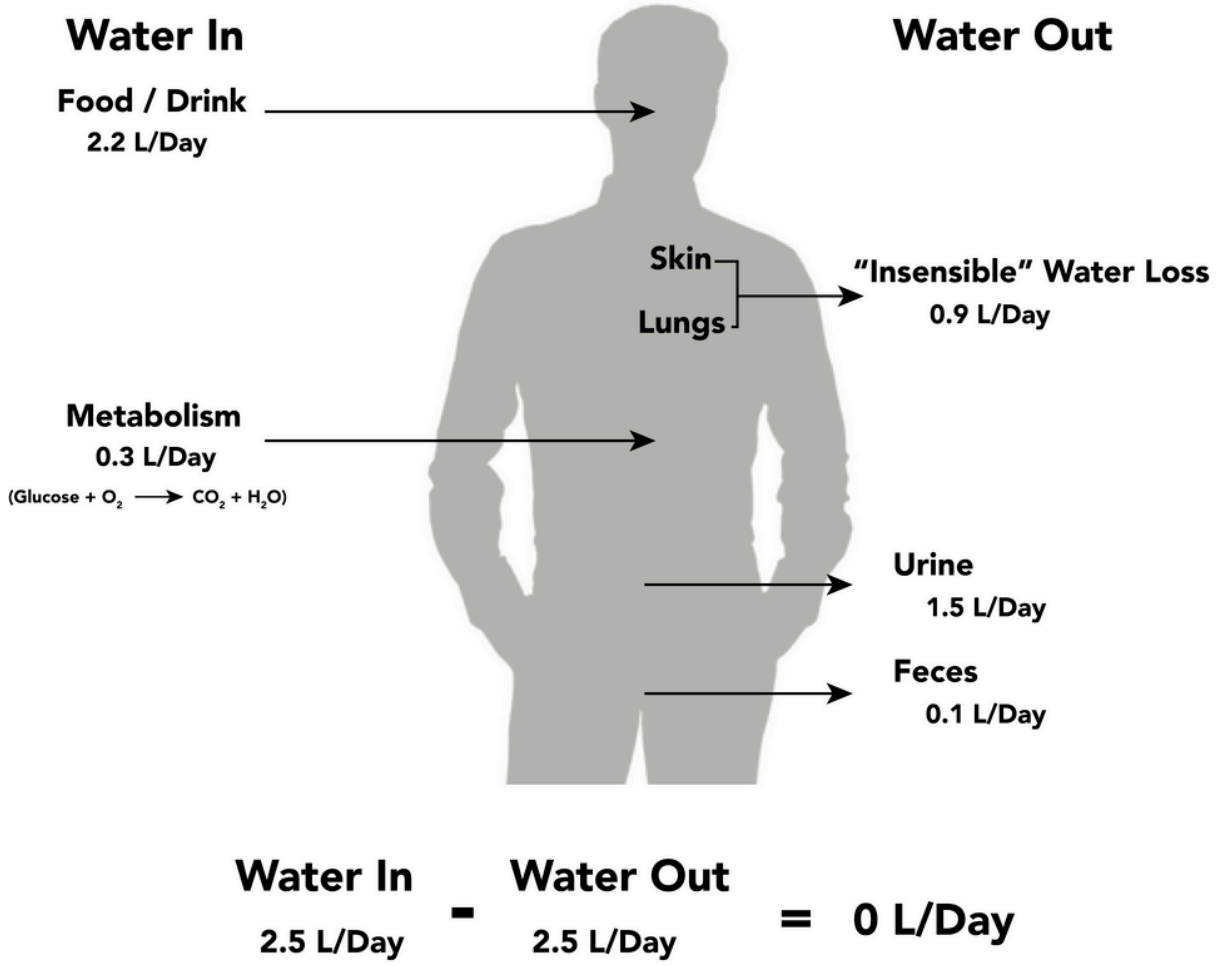

Figure 5. Water balance

Fluid Imbalance

Two types of fluid imbalances are Fluid volume Excess (also referred to as hypervolemia) and Fluid volume Deficit (also referred to as hypovolemia). These imbalances primarily refer to imbalances in the extracellular compartment but can cause fluid movement in the intracellular compartments based on the sodium level of the blood.

Fluid Volume Excess

Fluid volume excess refers to the abnormal retention of water and sodium in the intravascular compartment, resulting in an isotonic fluid imbalance. This condition may arise from excessive fluid intake, impaired fluid excretion (as seen in heart failure, renal failure, or cirrhosis), or a fluid shift from the

interstitial to the plasma space. Individuals at increased risk include those with chronic cardiac, renal, or hepatic conditions, as well as pregnant patients.

Clinical manifestations of fluid volume excess include pitting oedema, ascites, dyspnoea, and crackles on auscultation due to pulmonary congestion. Additional signs may include headache, confusion, lethargy, muscle spasms, jugular vein distension, and rapid weight gain, which is one of the most consistent indicators of fluid overload (Rateau & Hughes, 2023).

Management focuses on treating the underlying cause and may involve fluid and sodium restriction, along with the use of diuretics to promote fluid elimination.

Fluid Volume Deficit

Fluid volume deficit refers to the loss of both water and electrolytes from the extracellular fluid (ECF) in approximately equal proportions, classifying it as an isotonic imbalance. This condition can result from abnormal fluid losses through the gastrointestinal tract, such as vomiting, diarrhoea, or fistula drainage. It may also occur due to plasma or whole blood loss from haemorrhage or burns, or from excessive fluid loss through perspiration, fever, diuretic use, polyuria, or inadequate fluid intake. Additionally, a fluid shift from the intravascular to the interstitial space can contribute to fluid volume deficit (Rateau & Hughes, 2023; Willetts & Schmidt, 2021).

Although often used interchangeably, fluid volume deficit and dehydration are not the same. Dehydration specifically refers to the loss of pure water without a corresponding loss of sodium, whereas fluid volume deficit involves a combined loss of water and electrolytes.

In cases of fluid volume deficit, fluid is initially lost from the intravascular compartment, leading to a condition commonly referred to as hypovolaemia (Quinney et al., 2022). This reduction in circulating blood volume can significantly impair tissue perfusion and organ function if not promptly recognised and treated.

Dehydration

Dehydration, also referred to as a hyperosmolar imbalance, occurs when the body loses water without a corresponding loss of sodium, leading to elevated serum sodium and osmolarity. As water is lost and sodium is retained, fluid shifts from the intracellular and interstitial compartments into the vascular space, resulting in cellular dehydration (Quinney et al., 2022).

Certain populations are at increased risk of dehydration. Older adults are particularly vulnerable due to a reduced thirst sensation, which may delay fluid intake. Other high-risk groups include infants and children, individuals with chronic conditions such as diabetes mellitus or kidney disease, those taking diuretics or medications that increase urine output, and people who exercise or work in hot environments.

Dehydration may also occur in individuals who are hyperventilating, experiencing prolonged fever, in diabetic ketoacidosis, or receiving enteral nutrition without adequate water supplementation (Quinney et al., 2022).

In adults, symptoms of dehydration are as follows:

- Feeling very thirsty
- Dry mouth
- Headache
- Dry skin
- Urinating and sweating less than usual
- Dark, concentrated urine
- Feeling tired
- Changes in mental status
- Dizziness due to decreased blood pressure
- Elevated heart rate.

In infants and young children, additional symptoms of dehydration include the following:

- Crying without tears
- No wet diapers for three hours or more
- Being unusually sleepy or drowsy
- Irritability
- Eyes that look sunken
- Sunken fontane.

Electrolytes

Electrolytes play an important role in bodily functions and fluid regulation. There is a very narrow target range for normal electrolyte values, and slight abnormalities can have devastating consequences. For this reason, it is crucial to understand normal electrolyte ranges, causes of electrolyte imbalances, signs and symptoms of imbalances, and appropriate treatments. Click on the plus + sign to view more information on these important electrolytes.

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Sodium

Sodium levels in the blood typically range from 135-145 mmol/L (Quinney et al., 2022). Sodium is the most abundant electrolyte in the extracellular fluid (ECF) and is maintained by the sodium-potassium pump. Sodium plays an important role in maintaining adequate fluid balance in the intravascular and interstitial spaces.

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Potassium

Potassium levels normally range from 3.5 to 5.0 mmol/L (Quinney et al., 2022). Potassium is the most abundant electrolyte in intracellular fluid and is maintained inside the cell by the sodium-potassium pump. Potassium is regulated by aldosterone in the kidneys and is obtained in the diet through the consumption of foods such as bananas, oranges, and tomatoes. Potassium is necessary for normal cardiac function, neural function, and muscle contractility, including effective contractility of the cardiac muscles. Abnormal potassium levels can cause significantly abnormal heart rhythms and contractility. Potassium is poorly conserved by the body, and much is lost with urine output. For this reason, it is often necessary to provide potassium supplements when administering loop and thiazide diuretics because potassium is excreted from the kidneys along with water (Rateau & Hughes, 2023).

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Calcium

Calcium levels normally range from 2.1-2.6 mmol/L (Quinney et al., 2022). Calcium circulates in the bloodstream, but the majority is stored in bones. Calcium is important for bone and teeth structure, nerve transmission, myocardial contraction and muscle contraction. Calcium excretion and reabsorption are regulated by the parathyroid hormone (PTH) that is secreted from the parathyroid glands near the thyroid.

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Phosphorus

Phosphorus levels typically range from 0.8 – 1.5mmol/L (Quinney et al., 2022). Phosphorus is stored in the bones and is predominantly found in the ICF with small amounts in the ECF. Phosphorus is important in energy metabolism, RNA and DNA formation, nerve function, muscle contraction, and for bone, teeth, and membrane building and repair. Phosphorus is excreted by the kidneys and absorbed by the intestines. Dietary phosphorus sources include dairy products, red meat, fish, poultry rice and oats (Willetts & Schmidt, 2021).

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Magnesium

Magnesium levels typically range from 0.8-1.0 mmol/L (Quinney et al., 2022). Magnesium plays a role in many enzyme systems, including those responsible for carbohydrate metabolism, blood glucose control and blood pressure regulation. Magnesium is essential for normal cardiac, nerve, muscle, and immune system functioning. Around 50-60% of the body's magnesium is stored in muscle and bones. Only 1% is stored in ECF, with the remainder found in ICF (Rateau & Hughes, 2024).

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Acid-Base Balance

As with electrolytes, a correct balance of acids and bases in the body is essential to proper body functioning. Even a slight variance outside of normal can be life-threatening, so it is important to understand normal acid-base values, as well as their causes and how to correct them. The kidneys and lungs work together to correct slight imbalances as they occur. As a result, the kidneys compensate for shortcomings of the lungs, and the lungs compensate for shortcomings of the kidneys.

Arterial Blood Gases

Arterial blood gases (ABG) are measured by collecting blood from an artery, rather than a vein, and are most commonly collected via the radial artery. ABGs measure the pH level of the blood, the partial pressure of arterial oxygen (PaO2), the partial pressure of arterial carbon dioxide (PaCO2), the bicarbonate level (HCO3), and the oxygen saturation level (SaO2).

pH

pH is a scale from 0-14 used to determine the acidity or alkalinity of a substance. A neutral pH is 7, which is the same pH as water. Normally, the blood has a pH between 7.35 and 7.45. A blood pH of less than 7.35 is considered acidic, and a blood pH of more than 7.45 is considered alkaline. The pH of blood is a measure of hydrogen ion concentration. A low pH, less than 7.35, occurs in acidosis when the blood has a high hydrogen ion concentration. A high pH, greater than 7.45, occurs in alkalosis when the blood has a low hydrogen ion concentration. Hydrogen ions are by-products of the metabolism of substances such as proteins, fats, and carbohydrates. These by-products create extra hydrogen ions (H+) in the blood that need to be balanced and kept within normal range as described earlier.

PaCO2

PaCO2 is the partial pressure of arterial carbon dioxide in the blood. The normal PaCO2 level is 35-45 mmHg. CO2 forms an acid in the blood that is regulated by the lungs by changing the rate or depth of respiration. As the respiratory rate increases or becomes deeper, additional CO2 is removed, causing decreased acid (H+) levels in the blood and increased pH (i.e., the blood becomes more alkaline). As the respiratory rate decreases or becomes shallower, less CO2 is removed, causing increased acid (H+) levels in the blood and decreased pH (i.e., the blood becomes more acidic).

HCO3

HCO3 is the bicarbonate level of the blood, and the normal range is 22-26. HCO3 is a base managed

by the kidneys and helps to make the blood more alkaline. The kidneys take longer than the lungs to adjust the acidity or alkalinity of the blood, and the response is not visible upon assessment. As the kidneys sense an alteration in pH, they begin to retain or excrete HCO3, depending on what is needed. If the pH becomes acidic, the kidneys retain HCO3 to increase the amount of bases present in the blood to increase the pH (i.e., the blood becomes alkaline). Conversely, if the pH becomes alkalotic, the kidneys excrete more HCO3, causing the pH to decrease (i.e., the blood becomes more acidic).

PaO2

PaO2 is the partial pressure of arterial oxygen in the blood. It more accurately measures a patient's oxygenation status than SpO2 (the measurement of haemoglobin saturation with oxygen). Therefore, ABG results are also used to manage patients in respiratory distress.

Table 2 ABG Components, Descriptions, Adult Normal Values, and Critical Values (Source: Medline Plus, 2022)

ABG Component	Description	Adult Normal Value	Critical Value
pH	• Acidity (<7.35) or alkalinity (>7.45) of blood. • Measure of H+ ions (acids). • Affected by the lungs via hypo- or hyperventilation or the kidneys through bicarbonate retention.	7.35–7.45	**Less than 7.25** **Greater than 7.60**
PaO2	• Pressure of oxygen in the blood.	80–100 mmHg	**Less than 60 mmHg**
PaCO2	• Pressure of carbon dioxide in the blood. • CO2 is an acid managed by the lungs. • As PaCO2 increases, the blood becomes more acidic and the pH decreases. • As PaCO2 decreases, the blood becomes less acidic and more alkaline as the pH increases.	35–45 mmHg	**Less than 25 mmHg** **Greater than 60 mmHg**
HCO3	• Bicarbonate level in the blood. • HCO3 is a base managed by the kidneys. • As HCO3 increases, the blood becomes more alkaline and the pH increases. • As HCO3 decreases, the blood becomes more acidic and the pH decreases.	22–26 mmol/L	**Less than 10 mmol/L** **Greater than 40 mmol/L**
Less than 88%	• Oxygen saturation in the blood.	95–100%	**Less than 88%**

Interpreting Arterial Blood Gases

After the ABG results are received, it is important to understand how to interpret them. A variety of respiratory, metabolic, electrolyte, or circulatory problems can cause acid-base imbalances. Correct interpretation helps the nurse and other health care providers determine the appropriate treatment and evaluate the effectiveness of interventions.

Arterial blood gasses can be interpreted as one of four conditions: respiratory acidosis, respiratory alkalosis, metabolic acidosis, or metabolic alkalosis. Once this interpretation is made, conditions can further be classified as compensated, partially compensated, or uncompensated.

Respiratory Acidosis

Respiratory acidosis develops when carbon dioxide (CO2) builds up in the body (referred to as hypercapnia), causing the blood to become increasingly acidic. Respiratory acidosis is identified when reviewing ABGs and the pH level is below 7.35 and the PaCO2 level is above 45, indicating the cause of the acidosis is respiratory. Respiratory acidosis is typically caused by a medical condition that decreases the exchange of oxygen and carbon dioxide at the alveolar level, such as an acute asthma exacerbation, chronic obstructive pulmonary disease (COPD), or an acute heart failure exacerbation causing pulmonary oedema. It can also be caused by decreased ventilation from anaesthesia, alcohol, or administration of medications such as opioids and sedatives.

Signs of symptoms of hypercapnia vary depending on the level and rate of CO2 accumulation in arterial blood:

Patients with mild to moderate hypercapnia may be anxious and/or complain of mild dyspnoea, daytime sluggishness, headaches, or hypersomnolence.
Patients with higher levels of CO2 or rapidly developing hypercapnia develop delirium, paranoia, depression, confusion, or decreased level of consciousness that can progress to seizures and coma as levels continue to rise.

Treatment for respiratory acidosis typically involves improving ventilation and respiration by removing airway restrictions, reversing oversedation, administering nebuliser treatments, or increasing the rate and depth of respiration by using a BiPAP or CPAP device. BiPAP and CPAP devices provide non-invasive positive pressure ventilation to increase the depth of respirations, remove carbon dioxide, and oxygenate the patient. If these non-invasive interventions are not successful, mechanical ventilation may be necessary (Quinney et al., 2022).

Respiratory Alkalosis

Respiratory alkalosis develops when the body removes too much carbon dioxide through respiration, resulting in increased pH and an alkalotic state. When reviewing ABGs, respiratory alkalosis is identified when pH levels are above 7.45 and the PaCO2 level is below 35. With respiratory alkalosis, notice that as the PaCO2 level decreases, the pH level increases.

Respiratory alkalosis is caused by hyperventilation that can occur due to anxiety, panic attacks, pain, fear, head injuries, or mechanical ventilation. Fever, medication overdoses of salicylates and other toxins can also cause respiratory alkalosis initially and then often progress to metabolic acidosis in later stages (Czarecki et al., 2023).

Patients experiencing respiratory alkalosis often report feelings of shortness of breath, dizziness or light-headedness, chest pain or tightness, paraesthesia, and palpitations as a result of decreased carbon dioxide levels (Czarecki et al., 2023). Respiratory alkalosis is not considered life-threatening, and treatment should focus towards treating the underlying cause of hyperventilation and managing hypoxemia if present. Acute management of patients who are hyperventilating should focus on patient reassurance, an explanation of the symptoms the patient is experiencing, removal of any stressors, and initiation of breathing retraining. Breathing retraining attempts to focus the patient on abdominal (diaphragmatic) breathing.

Metabolic Acidosis

Metabolic acidosis occurs when there is an accumulation of acids (hydrogen ions) and not enough bases (HCO3) in the body. Under normal conditions, the kidneys work to excrete acids through urine and neutralise excess acids by increasing bicarbonate (HCO3) reabsorption from the urine to maintain a normal pH. When the kidneys are not able to perform this buffering function to the level required to excrete and neutralise the excess acid, metabolic acidosis results.

Metabolic acidosis is characterised by a pH level below 7.35 and an HCO3 level below 22 when reviewing ABGs. It is important to notice that both the pH and HCO3 decrease with metabolic acidosis (i.e., the pH and HCO3 move in the same downward direction). A common cause of metabolic acidosis is diabetic ketoacidosis, where acids called ketones build up in the blood when blood sugar is extremely elevated. Another common cause of metabolic acidosis in hospitalised patients is lactic acidosis, which can be caused by impaired tissue oxygenation. Metabolic acidosis can also be caused by increased loss of bicarbonate due to severe diarrhea or from renal disease that causes decreased acid elimination. Additionally, toxins such as salicylate excess can cause metabolic acidosis (Czarecki et al., 2023)

Nurses may first suspect that a patient has metabolic acidosis due to rapid breathing that occurs as the lungs try to remove excess CO2 in an attempt to resolve the acidosis. This rapid breathing is otherwise known as Kussmaul respirations (Czarecki et al., 2023). Other symptoms of metabolic acidosis include altered mental state, weakness, nausea and abdominal pain. Electrolyte imbalances, in particular hyperkalemia,

can be severe; it is therefore important to ensure prompt treatment. Treatment will be dependent on the underlying cause. Treatment includes IV fluids to improve hydration status, glucose management, and circulatory support. When pH drops below 7.1, IV sodium bicarbonate is often prescribed to help neutralise the acids in the blood (Czarecki et al., 2023).

Metabolic Alkalosis

Metabolic alkalosis occurs when there is too much bicarbonate (HCO3) in the body or an excessive loss of acid (H+ ions). Metabolic alkalosis is defined by a pH above 7.45 and an HCO3 level above 26 on ABG results. Note that both pH and HCO3 are elevated in metabolic alkalosis.

Metabolic alkalosis can be caused by gastrointestinal loss of hydrogen ions, excessive urine loss, excessive levels of bicarbonate, or a shift of hydrogen ions from the bloodstream into cells. Prolonged vomiting or nasogastric suctioning are amongst the common causative factors. Gastric secretions have high levels of hydrogen ions (H+), so as acid is lost, the pH level of the bloodstream increases (Rateau & Hughes, 2023). Intravenous administration of sodium bicarbonate can also cause metabolic alkalosis due to increased levels of bases introduced into the body.

A nurse may first suspect that a patient has metabolic alkalosis due to a decreased respiratory rate (as the lungs try to retain additional CO2 to increase the acidity of the blood and resolve the alkalosis). The patient may present with dizziness, paraesthesia, numbness and tingling in the extremities (Rateau & Hughes, 2023).

Treatment is prescribed based on the ABG results and the suspected cause. For example, treat the cause of the vomiting, stop the gastrointestinal suctioning, or stop the administration of diuretics and correct volume depletion with an isotonic sodium chloride solution. If hypokalaemia is present, replacement will be required (Rateau & Hughes, 2023).

ABG interpretation

A simple way to remember how to interpret ABGs is by using the ROME method of interpretation, which stands for Respiratory Opposite, Metabolic Equal. This means that the respiratory component (PaCO2) moves in the opposite direction of the pH if the respiratory system is causing the imbalance. If the metabolic system is causing the imbalance, the metabolic component (HCO3) moves in the same direction as the pH.

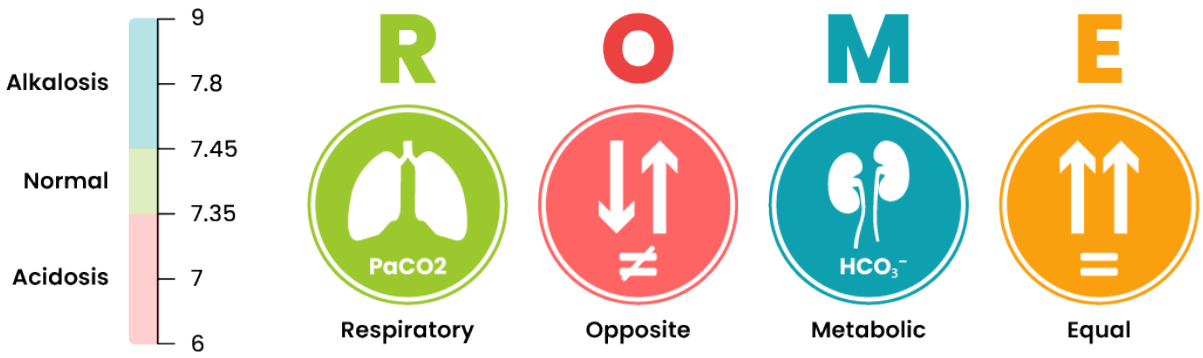

Figure 6. The ROME method of interpretation with the PH scale

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Intravenous Therapy

Intravenous (IV) fluid and electrolyte therapy is essential for managing a variety of fluid and electrolyte imbalances. Patients may require IV fluids for maintenance, when oral intake is insufficient, or for replacement, when fluid losses have occurred or are ongoing. The type and amount of IV fluid prescribed are based on the patient's daily maintenance needs and clinical assessment, including pathology results. IV fluids are classified by their tonicity—the concentration of solutes in comparison to plasma—which determines how they affect fluid movement between body compartments. The three main categories are isotonic, hypotonic, and hypertonic solutions.

Solutions for IV Administration

Isotonic solution

Isotonic solutions have a similar concentration of solutes as plasma, with an osmolarity of approximately 250–375 mOsm/L (Rateau & Hughes, 2023). These fluids expand the ECF without causing fluid shifts between compartments, making them ideal for treating ECF volume deficits.

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Hypotonic solution

Hypotonic solutions have a lower solute concentration than plasma (<250 mOsm/L), causing water to move into cells (Rateau & Hughes, 2023). These fluids are used to treat cellular dehydration and hypernatremia.

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Hypertonic solution

Hypertonic solutions have a higher solute concentration than plasma (>375 mOsm/L) (Rateau & Hughes, 2023), drawing water out of cells into the ECF. These are used to treat hyponatremia and cerebral oedema.

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Administering and Management of Intravenous Therapy (IV)

Intravenous Access

Intravenous access is established by inserting a flexible catheter into the venous system for the administration of IV therapy. Access may be gained either peripherally or centrally, depending on several

factors, including the duration of therapy, the type of solution or medication to be administered, the condition of the veins, and the overall clinical status of the patient.

Peripheral Intravenous Catheters (PIVCs)

A peripheral intravenous catheter (PIVC), commonly referred to as a cannula, is the most frequently used type of intravenous access device. Up to 70% of hospitalised patients in Australia require at least one cannula during their admission (ACSQHC, 2021). A cannula is a short, single-lumen catheter inserted into a peripheral vein, typically in the arm, hand, or foot. The size and diameter of the cannula are selected based on the intended therapy.

A PIVC is considered appropriate when therapy is short-term, the patient has suitable peripheral vasculature, and peripheral circulation is adequate (Thompson & Steinheiser, 2024). Infusion of high-osmolarity solutions can irritate peripheral veins, and prolonged administration may damage the vessel wall, potentially leading to complications such as phlebitis, thrombosis, or occlusion (NSW Agency for Clinical Innovation, 2021). Patients with poor peripheral circulation, those requiring long-term therapy (weeks to months), or those with fragile veins should be assessed for alternative vascular access devices.

The most commonly selected sites for PIVC insertion include the metacarpal, basilic, and cephalic veins, due to their accessibility and stability. While the antecubital fossa is often chosen for its ease of insertion, it is generally avoided as a primary site because frequent flexion in this area increases the risk of catheter dislodgement and related complications.

(a) **(b)**

Figure 7. Examples of intravenous cannulas

Central Venous Access Devices (CVADs)

A central venous access device (CVAD) is inserted into a large vein and advanced into the superior or

inferior vena cava. CVADs may be inserted centrally or peripherally and are classified based on the method of insertion and catheter type.

CVADs offer several advantages over PIVCs, including the ability to administer a wide range of therapies such as chemotherapy, total parenteral nutrition, long-term intravenous medications or IV therapy, and irritant solutions. Their capacity to deliver high-osmolarity substances reduces the risk of complications like phlebitis, thrombosis, and occlusion that may occur with peripheral access (NSW Agency for Clinical Innovation, 2021).

However, patients with a central line are at risk of developing a central line–associated bloodstream infection (CLABSI)—a preventable but potentially life-threatening infection. CLABSIs can result from contamination during insertion, improper maintenance, or secondary infections. Strict protocols govern the insertion, access, and management of all central lines; clinicians must refer to local facility policies for guidance.

There are three primary types of CVADs:

Central Venous Catheter (CVC):

Inserted centrally, typically via the internal jugular, subclavian, or femoral veins. CVCs usually have 2–3 lumens and are sized 7–8 French (Fr). Non-tunnelled CVCs are generally used for up to 10 days (NSW Agency for Clinical Innovation, 2021). These devices carry a higher risk of CLABSI and, in the case of subclavian insertions, an added risk of pneumothorax (Baldauf, 2025).

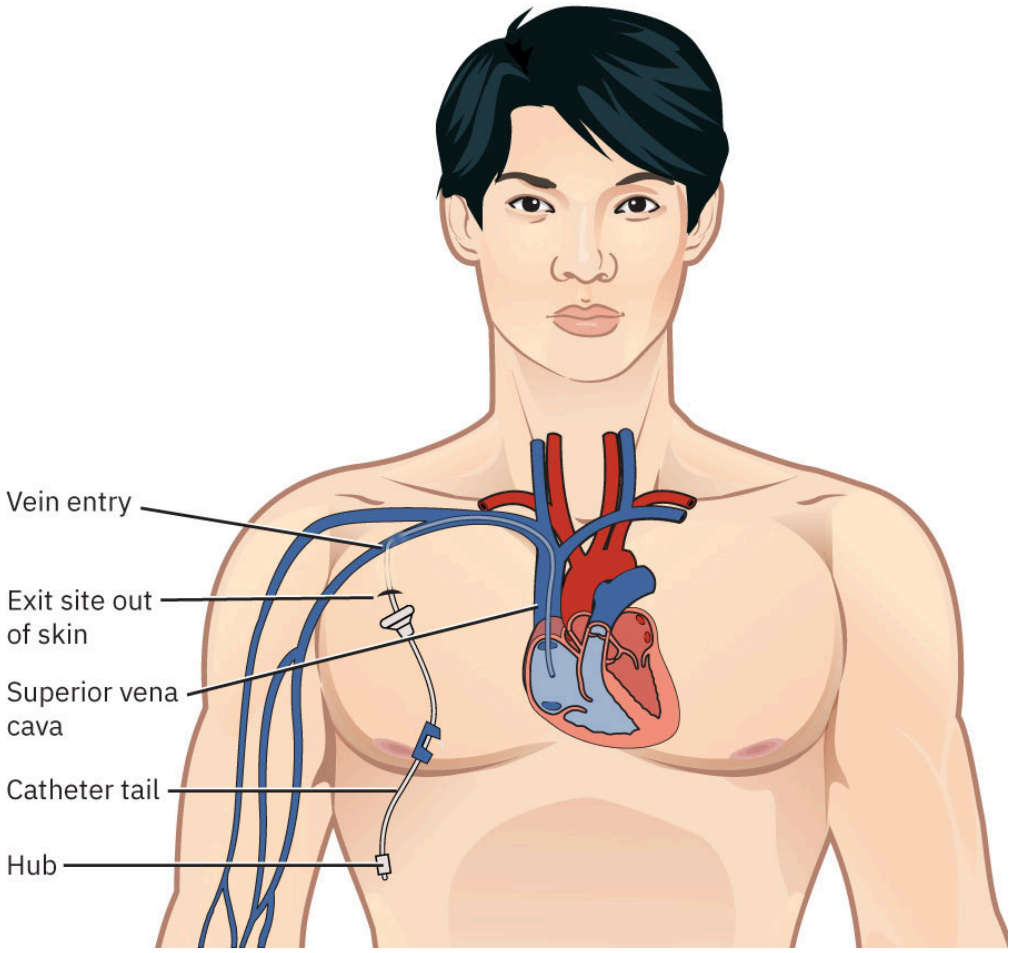


Figure 8. A nontunneled central line may be placed for short-term or emergent care when other means of access are not available or appropriate

Peripherally Inserted Central Catheter (PICC):

Inserted via a peripheral vein, most commonly the basilic vein (Kehagias et al., 2023). PICCs are smaller (3–6 Fr) and less suitable for rapid fluid resuscitation. They are designed for longer-term use, typically up to three months. While PICCs have a lower risk of CLABSI compared to CVCs, they are associated with a higher risk of catheter-related venous thrombosis (NSW Agency for Clinical Innovation, 2021).

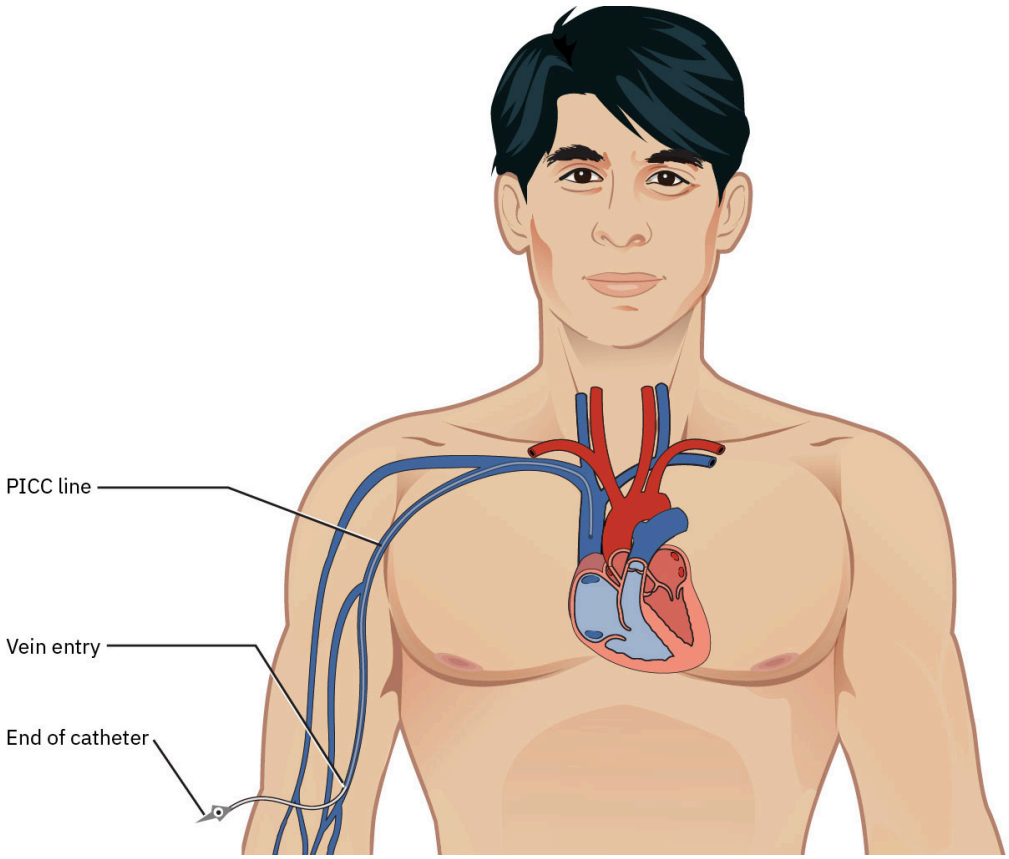


Figure 9. The catheter of a PICC line should enter the vein in the arm and extend into the superior vena cava

Port-a-Cath (Implantable Port):

A type of tunnelled CVC, usually implanted in the anterior chest near the clavicle. The port is placed in a subcutaneous pocket with no external components. Ports are typically 5–9 Fr in size and may have one or two lumens. They are intended for long-term use, particularly in patients with chronic conditions, and can remain in place for many years (Kehagias et al., 2023). The main disadvantage is the need for percutaneous access using specialised needles, which can be painful and may limit infusion rates.

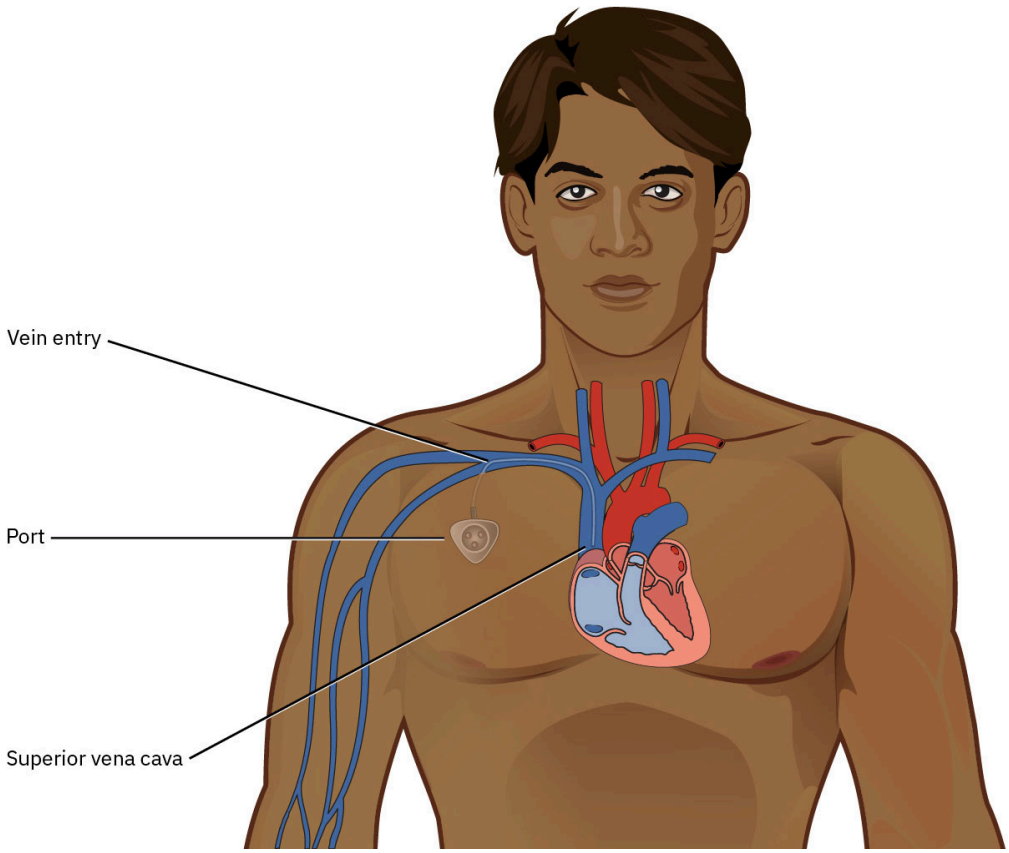
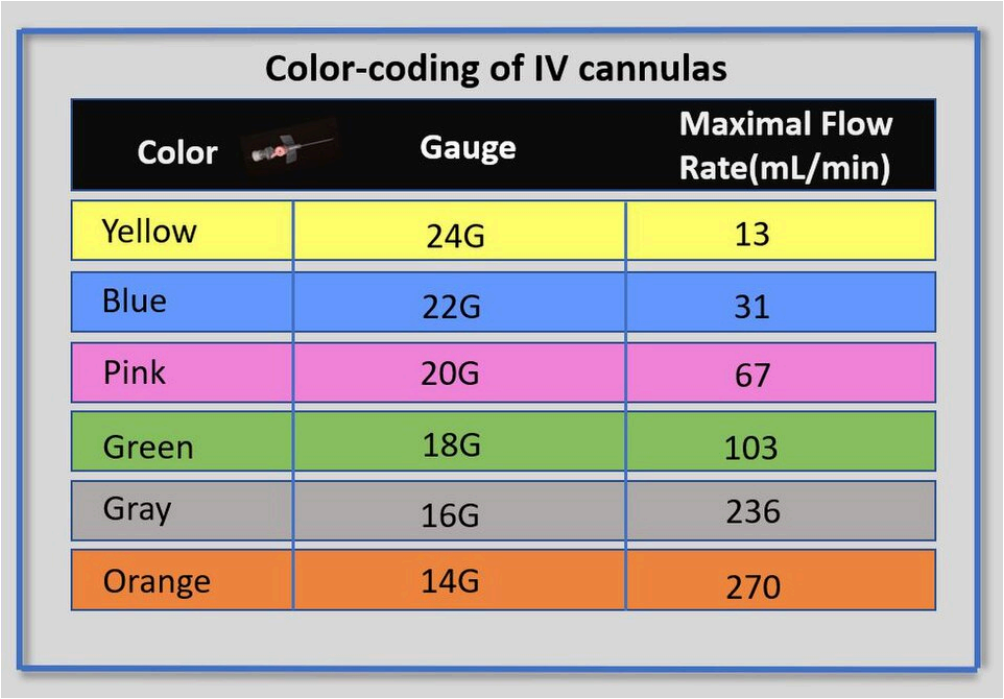


Figure 10. An implanted port is ideal central line access for long-term use, especially in patients receiving chemotherapy

Safety Alert
Due to the high-risk nature of CVAD care, student registered nurses are not permitted to access these devices prior to registration.

Peripheral Intravenous Catheter (PIVC) Size, Colours and Flow Rates

Peripheral IV catheters are available in a variety of sizes, most commonly ranging from 14 gauge to 26 gauge. Note that the lower the gauge size, the wider the diameter of the catheter, with 14-gauge catheters allowing for the greatest flow rate. Catheter sizes are colour coded to allow for easy identification of the catheter size after a vein is accessed.



Color-coding of IV cannulas

Color	Gauge	Maximal Flow Rate(mL/min)
Yellow	24G	13
Blue	22G	31
Pink	20G	67
Green	18G	103
Gray	16G	236
Orange	14G	270

Figure 11. Colour coding of IV catheters

Safety Considerations when Using Intravenous Route

When administering IV therapies, nurses should comply with safety precautions to reduce the risk of potential complications. These complications may be local or systemic and include infection, damage to the vein and surrounding tissue, air emboli, blood clots, and fluid overload. The nurse plays a key role in monitoring for signs of complications, initiating safety interventions to reduce the risk and severity of complications, and performing routine assessments of the IV. For example, replacing electrolytes such as sodium, potassium, or magnesium via the IV route is faster than the oral route; however, the nurse must be mindful of giving the correct amounts of electrolytes and maintaining therapeutic levels. The nurse will monitor the patient's sodium and potassium levels through blood tests, as well as assess the patient for symptoms of overdose or toxicity.

Infection Control in IV Therapy

Infection control is essential when preparing and administering intravenous (IV) fluids and medications. Using aseptic technique helps prevent the introduction of harmful microorganisms into the bloodstream.

Key principles:

- Hand hygiene must be performed before handling any IV equipment, medications, or fluids.
- Prepare IV therapies in a clean area on a clean surface.
- Use single-use equipment (e.g., syringes, needles, IV sets) for one patient only.
- Open packaging as it is designed, do not rip, tear or 'pop' open packages.

- Disinfect all access points (e.g., hubs, ports, connectors) with a 70% alcohol wipe before use. Scrub for 5–15 seconds and allow to dry completely (about 5 seconds for alcohol, 20 seconds for chlorhexidine-alcohol) (NHMRC, 2019).
- Avoid disconnecting IV lines unless necessary. If disconnected, replace the administration set.
- Disinfect vial stoppers before inserting a needle.
- Administration set must not be disconnected short-term and then reconnected. If disconnection is required, a new administration set must be used.
  (Nickel et al., 2024)

Monitoring for Potential Complications

Several potential complications may arise from peripheral intravenous therapy. It is the responsibility of the nurse to prevent, assess, and manage signs and symptoms of complications. Complications can be categorised as local or systemic.

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IV Administration Equipment

Intravenous (IV) substances are administered through flexible plastic tubing called an IV administration set. The IV administration set connects the bag of solution to the patient's IV access site. The set may be considered primary or secondary. The administration sets are designed to regulate fluid delivery, ensuring that you administer the correct amount at the correct rate. Failure to regulate IV flow rate appropriately can cause complications from receiving too much fluid too quickly or not enough fluid fast enough. There are several different ways of regulating IV flow rates, including gravity infusion, pump infusion, IV push, continuous single infusions, and continuous multiple infusions.

Primary Administration Sets

Primary IV administration sets are designed as the main fluid delivery device and consist of the following parts:

- Sterile spike: Used to spike the IV fluid bag and must be kept sterile.

- Roller clamp: Used to regulate the speed or stop an infusion by gravity.
- Drip chamber: Allows air to rise out from a fluid so that it is not passed onto the patient. The drip chamber should be kept ¼ to ½ full of solution. When setting a rate by gravity to "drops per minute," the dripping from this chamber is counted.
- Backcheck valve: Prevents fluid or medication from travelling up into the primary IV bag.
- Access ports: Used to infuse secondary medications and to administer IV push medications. These may also be referred to as "Y ports."

Secondary Administration Sets

Secondary IV administration sets are used to intermittently administer a secondary medication, such as an antibiotic, while the primary IV is also running. Secondary IV tubing is shorter in length than primary tubing and is connected to a primary line via an access port above the infusion pump. The infusion pump is then set at the prescribed secondary infusion rate while the secondary medication is administered. By hanging the secondary medication bag higher than the primary bag, gravity pulls fluid from the secondary bag until it is empty rather than the primary bag.

Secondary medications may be "piggybacked" into primary infusion lines so the solution from the primary fluid line can be used to prime the secondary tubing. To prime the secondary tubing, after the secondary tubing is connected to the primary tubing, the bag connected to the secondary tubing is held lower than the primary bag, causing fluid from the primary tubing to backflow up the secondary tubing. This eliminates air from the secondary tubing.

See Figure 12 for an illustration of the setup of primary and secondary administration sets for primary administration of fluids and secondary administration of medication by gravity.

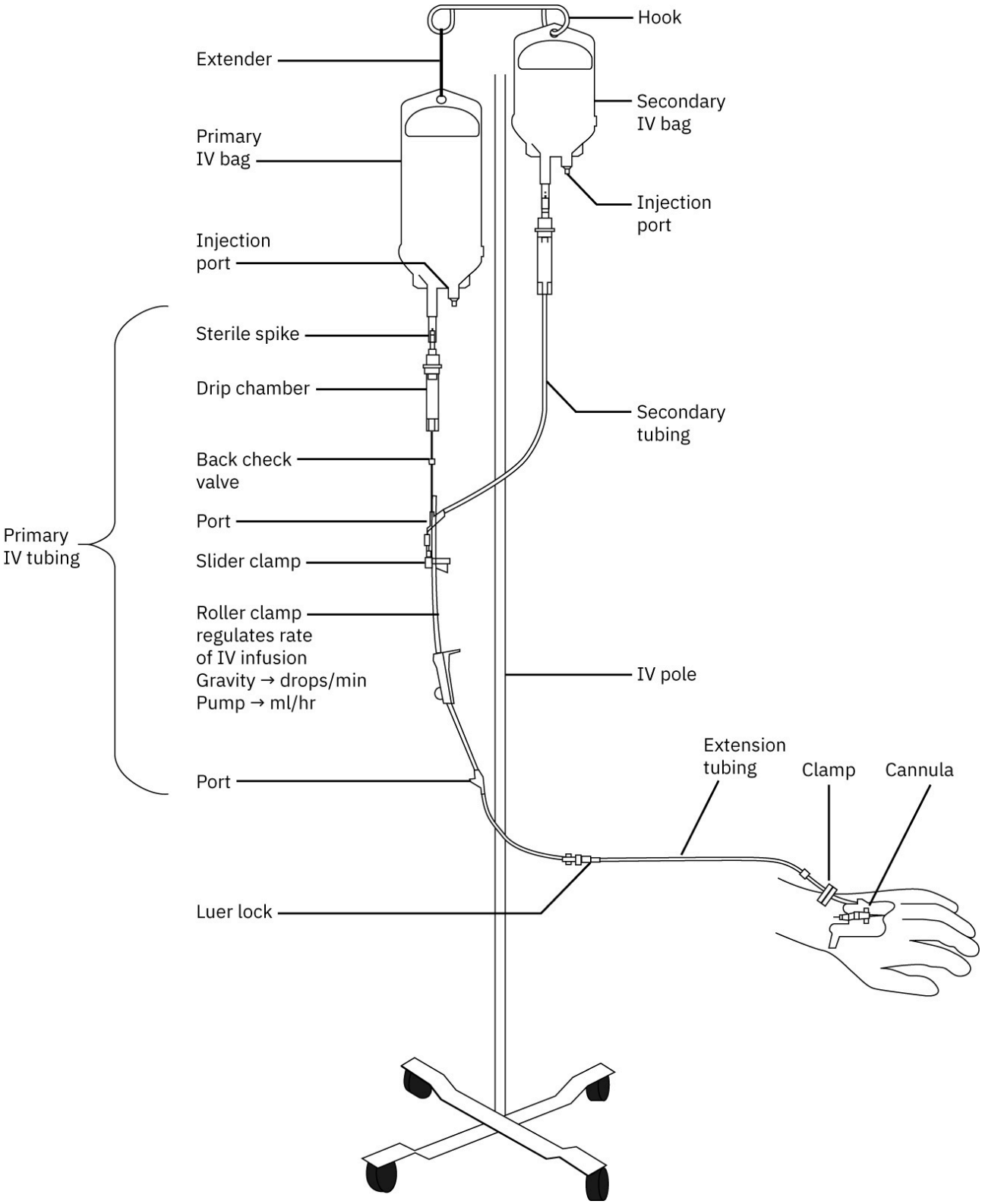

Figure 12. It is important that the nurse ensure proper setup of primary and secondary IV tubing before administering IV infusions. (credit: modification of "IV Primary and secondary tubing set up"

Priming IV Tubing

Priming refers to the process of filling the IV tubing with IV solution prior to attaching it to the patient.

Primary administration sets, secondary administration sets, and extension tubing must be primed with IV solution to prevent air from entering the patient's circulatory system and causing an air embolism.

Gravity flow Infusion

When infusing IV fluids by gravity, the nurse regulates the infusion rate by using a roller clamp on the IV tubing, which can either speed up or slow down the flow of IV fluids. An IV flow rate for gravity is calculated in drops per minute (DPM). Common drop factor rates for IV administration set in Australia include 15 DPM, 20 DPM and 60DPM. To calculate the DPM, multiply the infusion rate (mL/hr) by the IV drop factor found on the IV tubing, then divide by the infusion time in minutes. For example, a fluid that is to be infused at a rate of 100mL/hr via 20 DPM tubing would infuse at a rate of 33 drop/min [(100 × 20)/60 = 33.33 drop/min]. Drops can only be administered whole, so round up if greater than 0.5, and round down if less than 0.5.

Electronic Infusion Pumps

Electronic infusion pumps regulate the delivery of intravenous fluids and medications by controlling the infusion rate in millilitres per hour (mL/hr). Their use is recommended across all clinical settings to minimise infusion-related medication errors (Nickel, 2024). Smart pumps, or Dose Error Reduction Systems (DERS), incorporate drug libraries with predefined "soft" and "hard" limits for medication dosing and infusion rates. These systems are designed to enhance safety by preventing errors in medication selection, dosing, and administration. Nurses are responsible for selecting the correct medication, dose, and infusion duration to ensure safe and accurate delivery.

Figure 13. IV Infusion pump

IV Push Administration

Some medications may require administration via IV push, typically delivered through the access port closest to the patient on the primary IV tubing. If the patient is not receiving continuous IV fluids, the medication is administered directly via the cannula, with the site flushed both before and after administration to maintain patency and ensure complete delivery.

The method of administration should always align with facility policy and be guided by evidence-based resources such as the Australian Injectable Drugs Handbook. For further guidance on IV medication administration, refer to the Parenteral Medication Administration chapter.

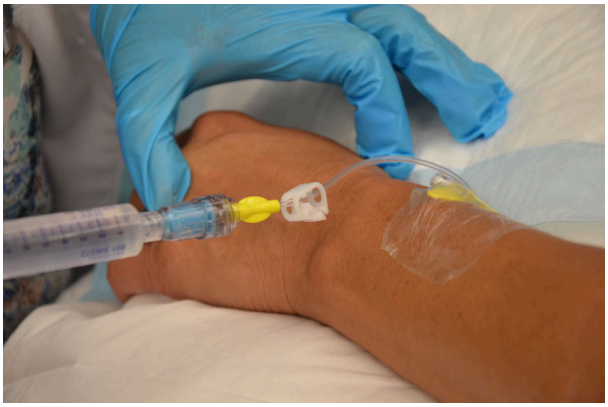

Figure 14. Part of a nurse's initial assessment includes flushing the cannula with normal saline to ensure and maintain patency

Safety Alert: Labelling of IV Fluid Lines

In accordance with the National Standard for User-Applied Labelling of Injectable Medicines, all IV fluid lines must be clearly labelled to reduce the risk of patient harm. Implementation of the Labelling Standard is a mandatory requirement for meeting the National Safety and Quality Health Service (NSQHS) Standards – in particular, NSQHS Standard 4: Medication Safety, and NSQHS Standard 5: Patient Identification and Procedure Matching (ACSQHC, 2015).

The Labelling Standard ensures that healthcare professionals can accurately identify the medicine or fluid, the route of administration, and the intended patient. This standard promotes safer use of injectable medicines by requiring consistent label format, content, and placement. All containers and conduits (e.g. IV lines) that no longer display original packaging must be labelled before leaving the hands of the person preparing the medicine. Unlabelled medicines or fluids are considered unsafe and must be discarded. Proper labelling is a critical role of the registered nurse in preventing administration errors such as wrong medicine, dose, route, or patient (ACSQHC, 2015). Further information on the labelling of IV medications and fluid can be found on the National Standard for User-applied Labelling of Injectable Medicines, Fluids and Lines webpage.

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Administration of Intravenous Fluid via PIVC

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Life Span Considerations

When caring for PIVC or delivering IVT, specific considerations are necessary for children and older adults due to their unique physiological characteristics and potential vulnerabilities.

Infants and Children

Due to their fragile skin, small veins, limited ability to communicate discomfort, and inability to understand safety aspects, extra caution is required (Nickel et al., 2024). Consider using volume-controlled infusion sets and locked infusion pumps to prevent interference or accidental changes in flow rate. Needleless systems and secure dressings help reduce the risk of dislodgement, while protective devices may prevent tampering.

Regular inspection, at least hourly during infusions, is essential to detect early signs of infiltration or extravasation. During insertion or removal of the PIVC consider age-appropriate distraction techniques, comfort positioning, involving parents, and applying pain reduction strategies such as the application of Elma cream (Thompson et al., 2024). Joint stabilisation may be required for PIVC security but should be used cautiously, ensuring it does not compromise circulation or skin integrity (Nickel et al., 2024).

Older Adults

Older adults experience age-related changes in skin and vasculature, such as reduced dermal thickness and vein fragility, increasing the risk of infiltration, extravasation, and phlebitis (Thompson et al., 2024). Frequent checks of the insertion site are necessary to detect complications early.

Assess for any deficits in cognitive ability, dexterity, and communication (e.g., changes in vision, hearing, speech) that may impact understanding and management of IV therapy (Nickel et al., 2024). Older adults may experience difficulties manipulating additional devices such as IV poles. Develop a plan of care to accommodate additional assistance with activities of daily living if required.

Considerations also include altered immune response, drug metabolism, and volume tolerance, which may affect device selection and infusion parameters. The nurse should tailor IV therapy to accommodate these physiological changes and monitor for side effects and therapeutic response (Nickel et al., 2024). IV flow rates and fluid balance must be monitored closely to avoid fluid overload.

Key Takeaways

In this chapter, we covered:

- Understanding body fluid compartments and the physiological mechanisms that regulate fluid movement—such as hydrostatic pressure, oncotic pressure, osmosis, and active transport—is essential for identifying and managing fluid imbalances like oedema, dehydration, hypervolemia, and hypovolemia.

- Each fluid imbalance has specific causes, risk factors, and clinical manifestations, requiring appropriate nursing interventions to prevent complications.
- Electrolytes such as sodium, potassium, calcium, magnesium, and phosphorus play critical roles in nerve, muscle, and cardiac function, and their imbalances can lead to serious health issues. Nurses must recognise normal ranges, symptoms, and treatment strategies for these imbalances.
- Accurate interpretation of arterial blood gases using the ROME method enables differentiation between respiratory and metabolic acidosis or alkalosis and determines the compensation status, guiding timely and effective nursing care.
- A thorough IV therapy assessment requires the nurse to gather both subjective and objective data, taking into account patient-specific risks such as allergies, chronic conditions, and age-related factors. Regular, age-appropriate monitoring of the IV site and infusion system is essential to prevent complications and ensure safe, effective treatment.
- Early recognition and prompt intervention are critical in preventing and managing complications of peripheral IV therapy. Nurses must routinely assess IV sites for signs of local issues like phlebitis, infiltration, or infection and respond immediately to reduce patient harm and prevent progression to systemic complications.

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MANAGING OXYGENATION AND PERFUSION

Leisa Sanderson and Penelope Coogan

Learning Outcomes

In this chapter, you will learn how to:

- Describe the physiological processes of oxygenation and perfusion, including the role of the respiratory and cardiovascular systems
- Identify and explain clinical indicators of ventilation/perfusion mismatch, hypoxia and hypoxemia
- Recognise lifestyle and behavioural factors that contribute to cardiopulmonary dysfunction and disease progression
- Develop knowledge of cardiopulmonary investigation that supports diagnosis and treatment planning
- Demonstrate foundational skills in performing electrocardiograms (ECGs) and rhythm strip interpretation
- Describe the principles of oxygen therapy, including flow rate, FiO2, humidification and safety precautions
- Identify common oxygen delivery devices, their indication and associated nursing considerations.

The main functions of the cardiac and respiratory systems are to supply the body's oxygen demands. The respiratory (or pulmonary) system's primary purpose is the exchange of gases that are essential for life. Gas exchange occurs at the capillary-alveolar bed (or membrane) where capillaries and alveoli meet. The process of breathing, inspiration (inhaling) and expiration (exhaling), provides O2 and removes CO2 waste. The cardiovascular system's role is to provide a means of transport for O2 and other nutrients and to remove waste products. The joining of these systems as the cardiopulmonary system combines the actions of cardiac perfusion with respiratory ventilation to provide the essential processes of oxygenation and perfusion.

It is important for nurses to have knowledge of the anatomy and physiology of the respiratory and cardiac systems in order to apply the concepts discussed in this chapter. However, you may wish to revise Chapter 18, The Cardiovascular System and Chapter 22, The Respiratory System, in *Anatomy and Physiology 2e*.

Structure and Function of the Cardiovascular System

The cardiovascular system plays a vital role in maintaining homeostasis by transporting oxygen, nutrients, and hormones to body tissues while removing carbon dioxide and other metabolic wastes. This system comprises the heart, blood vessels, and blood, and works closely with other systems, in particular the respiratory, gastrointestinal, and renal systems, to support cellular function and overall health.

An understanding of the heart's structure and function is essential for nursing practice. The heart comprises four chambers: two atria and two ventricles. The right ventricle pumps deoxygenated blood to the lungs via the pulmonary circulation, while the left ventricle pumps oxygenated blood through the aorta out to the systemic circulation. Surrounding this central pump is an extensive vascular network of arteries, veins and capillaries that facilitates the distribution of blood and the exchange of gases, nutrients, and waste products at a cellular level.

The Circulatory System

The heart, acting as the central pump, propels blood through two major systems:

- **Pulmonary circulation** – transports deoxygenated blood to the lungs, where it picks up oxygen to deliver to the heart and drops off carbon dioxide for exhalation
- **Systemic circulation** – transports oxygenated blood to all of the tissues of the body and returns deoxygenated blood and carbon dioxide to the heart to be sent back to the pulmonary circulation.

Gas exchange occurs at the alveolar-capillary membrane in the lungs, where oxygen enters the bloodstream and carbon dioxide is expelled. This close relationship between the respiratory and cardiovascular systems is essential for effective oxygenation and perfusion. Any disruption in either system can impair tissue oxygen delivery, leading to hypoxia.

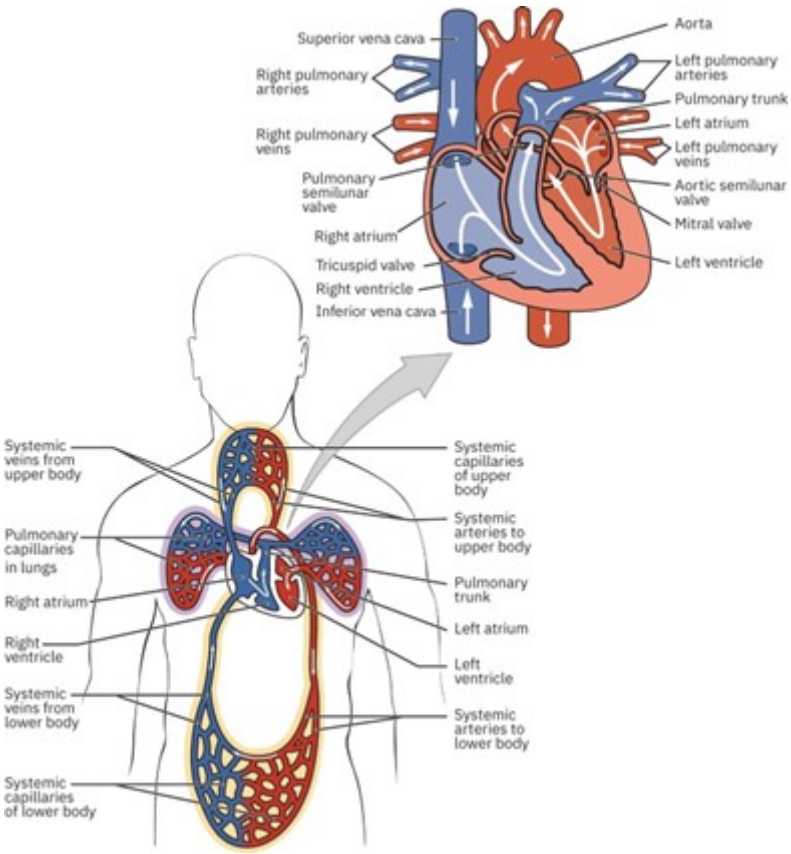


Figure 18.9 Blood flows through the cardiopulmonary circuit and the heart.

Understanding Cardiac Output and Regulation of Blood Flow

Cardiac output (CO) refers to the amount of blood the heart pumps into the circulation each minute. More specifically, it is the volume of blood ejected from the left ventricle every minute and is a key determinant of tissue perfusion.

Cardiac output is calculated using the formula **CO = HR × SV**

- **HR** is the heart rate (beats per minute)
- **SV** is the stroke volume, or the amount of blood pumped by the left ventricle with each contraction.

Stroke volume (SV) is the volume of blood expelled from the left ventricle during a single systolic contraction. It is influenced by three primary factors:

- Preload – the degree of stretch in the ventricles before contraction, related to venous return.
- Contractility – the strength or force of the ventricular contraction.
- Afterload – the resistance the ventricles must overcome to eject blood into the arteries (Betts et al., 2022).

In a healthy adult weighing approximately 70 kilograms, normal cardiac output ranges from 4 to 6 litres per minute, depending on activity level and metabolic demand. The volume of circulating blood and cardiac output fluctuates in response to the body's oxygen and metabolic requirements. For instance, during physical activity, pregnancy, or fever, the body's demand for oxygen increases, prompting the heart to pump more blood to meet these needs. Conversely, during periods of rest or sleep, metabolic activity slows, and cardiac output naturally decreases (Ingham-Broomfield, 2021). Other examples include:

- Stress or emotional responses can trigger increased heart rate and blood flow due to sympathetic nervous system activation.
- Exposure to cold may cause vasoconstriction and alter blood distribution to preserve core body temperature.
- During hemorrhagic shock, circulating volume decreases significantly, requiring compensatory mechanisms to maintain perfusion.

The Cardiac Cycle

The cardiac cycle refers to the physiological process of one complete heartbeat. It encompasses the sequence of events from the initiation of atrial contraction to the relaxation of the ventricles. Throughout this cycle, both the atria and ventricles pass through phases of contraction (systole) and relaxation (diastole), which must be precisely regulated and coordinated to ensure effective blood flow throughout the body. To achieve this, the heart relies heavily on its **electrical conduction system**, a specialised network of bundles and fibres that generate and transmit electric impulses. These impulses trigger the contraction of the myocardial muscle tissue, enabling the heart to pump blood through both the pulmonary and systemic circuits. This process maintains optimal **cardiac output** and ensures adequate **tissue perfusion**.
The efficiency of the cardiac cycle can be evaluated through clinical indicators such as:

- Heart rate
- Blood pressure
- Heart sounds (can reveal abnormalities in valve function or rhythm).

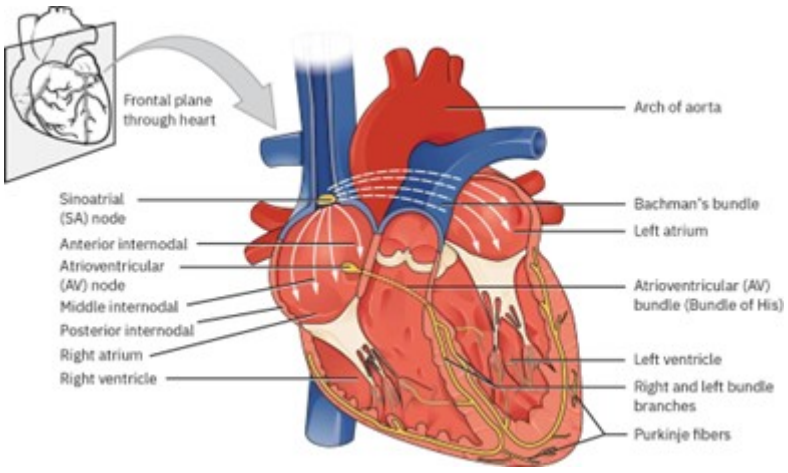


Figure 2. Electrical pathways originate in the sinoatrial node

Structure and Function of the Respiratory System

The respiratory system is made up of several key structures, including the nose and paranasal sinuses, the pharynx, the larynx, the trachea, the bronchi and their smaller branches, and the lungs, which contain tiny air sacs called alveoli. These structures are divided into two main areas known as the upper and lower respiratory systems:

The upper respiratory system includes all parts from the nose through to the larynx. Its primary role is to warm, moisten, and filter the air we breathe.

The lower respiratory system begins at the larynx and includes the trachea, bronchi, and lungs. This is further divided into two functional zones:

- **The conducting zone** comprises the airways from the nose through to the respiratory bronchioles. This zone is responsible for transporting air and continuing the process of warming, humidifying and cleansing.
- **The respiratory zone** is where the process of gas exchange takes place. It includes the alveoli and associated structures, which allow oxygen to enter the bloodstream and carbon dioxide to be removed (Marieb & Hoehn, 2023). The zone begins where terminal bronchioles meet a respiratory bronchiole. These bronchioles connect to an alveolar duct that opens into a cluster of alveoli. An alveolus is an individual, grape-like sac in the lungs, while an alveolar sac refers to a group of alveoli. Alveoli are elastic and stretch during inspiration, increasing the available surface area for gas exchange. Their thin walls and proximity to the capillaries facilitate the rapid movement of gases between the air and the blood.

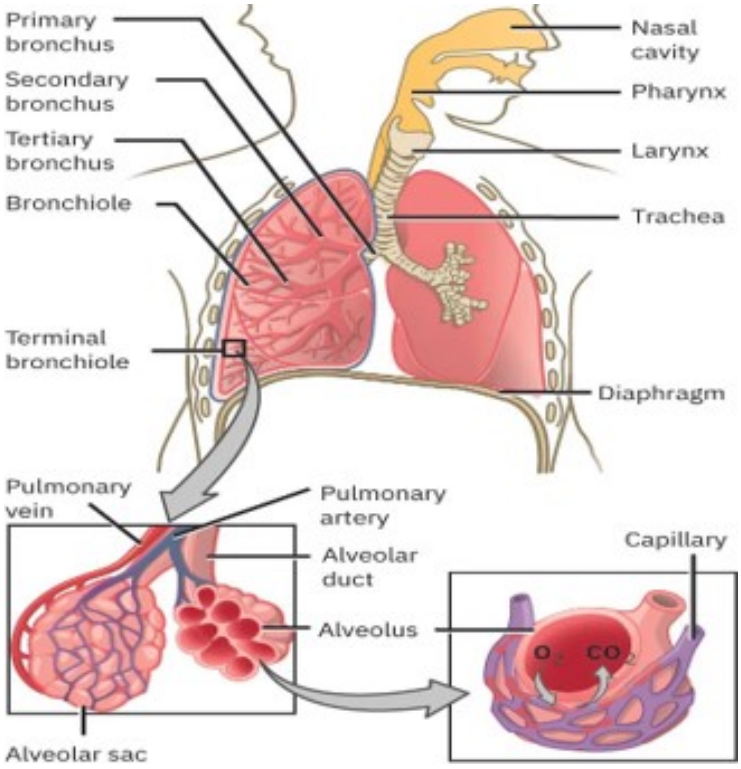


Figure 3. Air enters the respiratory system through the nasal cavity and pharynx and then passes through the trachea and into the bronchi, which brings air into the lung

Respiratory Cycle

Oxygenation involves interactions between the respiratory and cardiovascular systems, including air movement through the lungs, where O2 and CO2 are exchanged through the alveoli and capillaries as the respiratory and circulatory systems connect and interact at the alveolar-capillary bed. Physiological processes involved include ventilation and perfusion. The combination of respiratory ventilation and cardiovascular perfusion provides O2 (and other nutrients) to the body's tissues and removes waste products, including CO2, from the tissues.

Ventilation

The part of the respiratory cycle whereby the diaphragm and intercostal muscles contract, which enlarges the space within the thorax, is called inspiration. This enlargement lowers the pressure within the alveoli, and air flows into the lungs. During expiration, the muscles that expanded the thoracic cavity now relax, and elastic recoil reduces the pressures in the lungs and surrounding thorax. The pressure within the intrapulmonary system is momentarily higher than atmospheric pressure, and air is passively exhaled from the lungs. Lungs that are compliant and retain the properties of elastic recoil are able to increase and decrease in size and shape with each respiratory cycle. This movement of air into and out of the lungs is called ventilation. The effort required by the body to complete this is called the work of breathing (WOB). WOB is impacted by the degree of lung compliance, airway resistance and the need for active expiration.

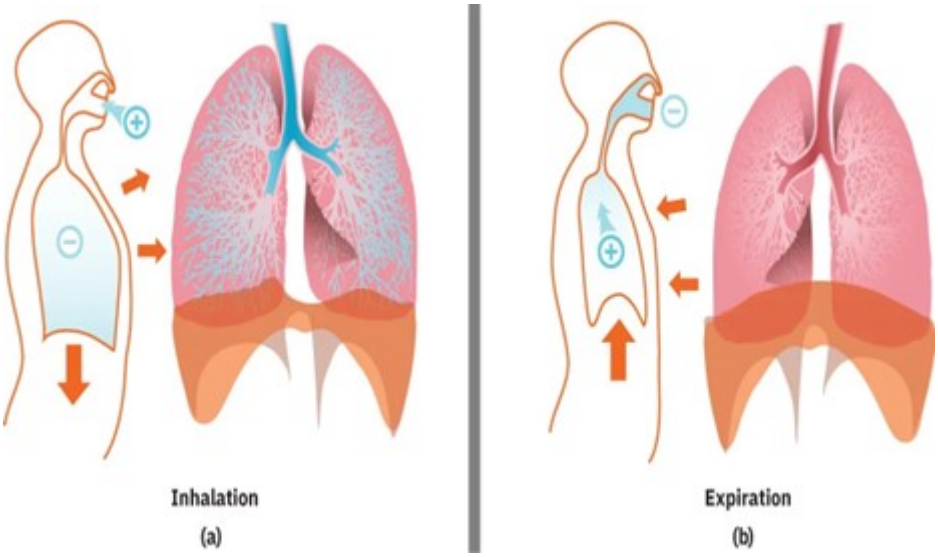


Figure 4. Orange arrows indicate chest and diaphragm movement as air is inhaled and exhaled

Oxygenation

The process when oxygen from the air moves into the bloodstream is called oxygenation. When air enters the lungs and travels to the alveoli, oxygen molecules pass into the capillaries by diffusion.

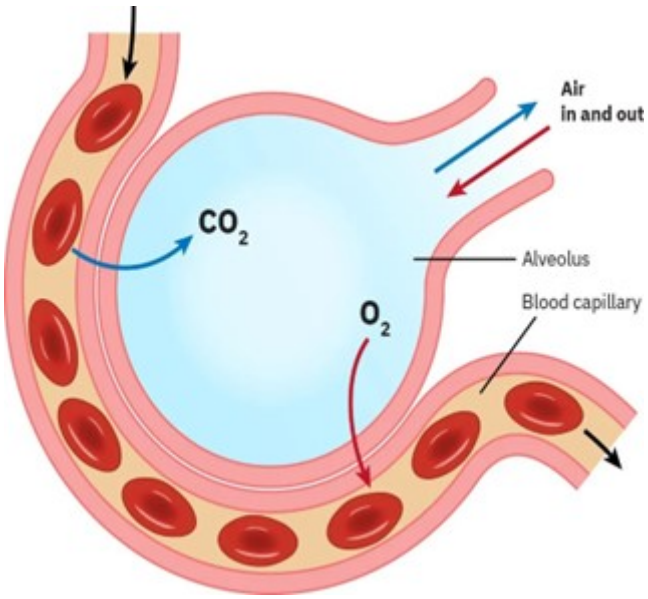


Figure 5. When air enters the lungs and travels to the alveoli, oxygen molecules pass into the capillaries by diffusion

Oxygen is poorly dissolved in blood, with only 1.5% transported in the plasma (Marieb & Hoehan, 2023). The remaining 98.5% occurs by oxygen molecules binding to haemoglobin within the red blood cells. When oxygen binds to haemoglobin, a chemical reaction occurs, and oxyhaemoglobin is formed.

Oxyhaemoglobin is a bright red molecule and contributes to the vivid red colour observed in arterial blood. Once oxygen is in the blood, it can travel through the body and be transferred to the tissues. At the tissues, O2 is released from the haemoglobin and taken up by the tissues as needed. It is also here that the waste product, CO2, returns from the body by diffusion into the bloodstream and subsequently the lungs, where it is ultimately removed from the body by exhalation

Disturbances in Pulmonary Function

Disturbances in pulmonary function generally arise from either a ventilation/perfusion (V/Q) mismatch or a reduced ability of the blood to carry oxygen.

V/Q Mismatch

A V/Q mismatch occurs when there is an imbalance between the air reaching the alveoli (V = ventilation) and the pulmonary capillary blood flow (Q = perfusion). This mismatch is often expressed as a ratio. Lower V/Q ratio reflects shunt-like states, where ventilation is reduced relative to perfusion. A higher V/Q ratio indicates dead space ventilation, where perfusion is reduced relative to ventilation. Some mismatches occur as a combination in different locations of the lung and are referred to as a mixed V/Q mismatch.

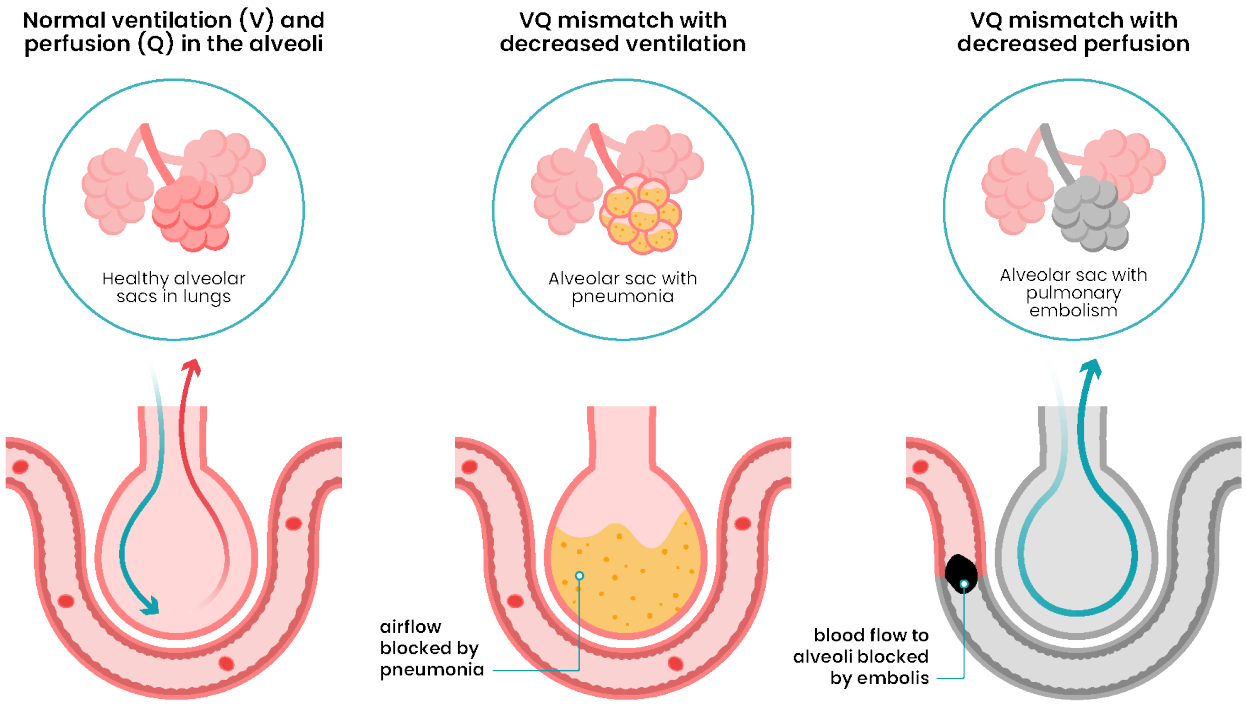


Figure 6. Example of VQ mismatch

Decreased Oxygen-Carrying Capacity

A reduced ability of the blood to transport oxygen can occur when there is a decrease in circulating haemoglobin or when a competing substance binds to haemoglobin, preventing oxygen transport. This is commonly seen in conditions such as anemia, haemorrhage, or carbon monoxide poisoning.

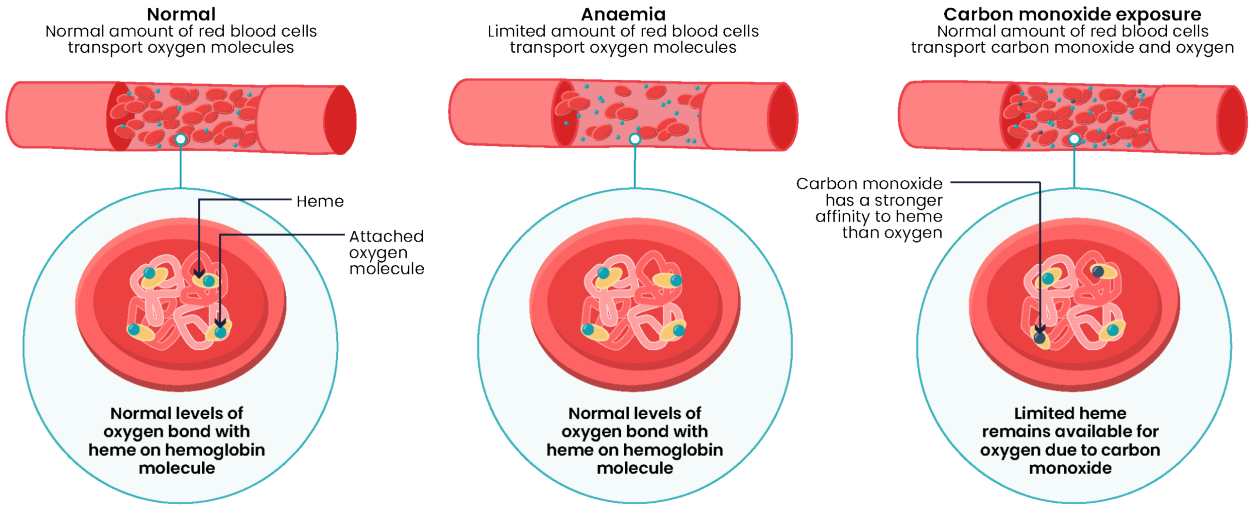


Figure 7. Example of red blood cells with varying capacity for carrying oxygen

Hypoxemia

Hypoxemia refers to a reduced level of oxygen in the arterial blood, typically measured as a low partial pressure of oxygen (PaO_2) or decreased oxygen saturation (SpO_2). It is identified through arterial blood gas (ABG) analysis or pulse oximetry. Hypoxemia results from impaired gas exchange in the lungs due to conditions such as pneumonia, chronic obstructive pulmonary disease (COPD), pulmonary embolism, or acute respiratory distress syndrome (ARDS). Unlike hypoxia, which affects tissue oxygenation, hypoxemia specifically reflects a deficiency in oxygen within the bloodstream. Clinical signs may include cyanosis, tachypnoea, restlessness, and reduced SpO_2 readings. Prompt recognition and management are essential, as hypoxemia can progress to hypoxia, leading to tissue ischemia and cell death. Treatment typically involves oxygen therapy and addressing the underlying cause of the impaired oxygenation.

Hypoxia

Hypoxia refers to an insufficient supply of oxygen to the tissues, regardless of the oxygen level in the blood. It can occur even when arterial oxygen levels are normal if there is a problem with oxygen delivery or cellular utilisation. There are several types of hypoxia, each with distinct causes.

- Hypoxic hypoxia results from low oxygen availability in the air or lungs, such as in high-altitude environments or respiratory diseases.

- Hypoxaemic hypoxia occurs when the blood's oxygen-carrying capacity is reduced, as seen in conditions like anaemia or carbon monoxide poisoning.
- Ischaemic hypoxia is due to impaired circulation, such as in heart failure, where oxygenated blood is not effectively delivered to tissues.
- Histotoxic hypoxia arises when cells are unable to use oxygen properly, such as in cyanide poisoning (Marieb & Hoehan, 2023).

Early signs of hypoxia are anxiety, confusion, and restlessness. As hypoxia worsens, the patient's level of consciousness and vital signs will worsen with an increased respiratory rate and heart rate and decreased SpO2 readings. Late signs of hypoxia include bluish discolouration of the skin and mucous membranes known as cyanosis.

Hypercapnia

Hypercapnia is an elevated level of carbon dioxide in the blood. This level is measured by the PaCO2 level in an ABG test and is indicated when the PaCO2 level is higher than 45. Hypercapnia is typically caused by hypoventilation or areas of the alveoli that are ventilated but not perfused. In a state of hypercapnia or hypoventilation, there is an accumulation of carbon dioxide in the blood. The increased carbon dioxide causes the pH of the blood to drop, leading to a state of respiratory acidosis.

Patients with hypercapnia can present with tachycardia, dyspnea, flushed skin, confusion, headaches, and dizziness. If the hypercapnia develops gradually over time, such as in a patient with chronic obstructive pulmonary disease (COPD), symptoms may be mild or may not be present at all. Hypercapnia is managed by addressing its underlying cause. A noninvasive positive pressure device, such as a BiPAP, may provide support to patients who are having trouble breathing normally, but if this is not sufficient, intubation may be required.

Factors Affecting Ventilation and Perfusion

Table 1. Causes of hypoxaemia related to ventilation/perfusion

Factor / Condition	Mechanism	Effect on Ventilation (V)	Effect on Perfusion (Q)	Disturbance
Asthma or angioedema	Increased airway resistance (airway narrowing)can limit airflow into the body, decreasing the amount of oxygen the lungs can utilise	↓ airflow (bronchoconstriction)	Normal	V/Q mismatch, hypoxaemia
COPD	Damage to alveoli and pulmonary capillaries causes loss of elastic recoil and airway collapse – decreases the areas that are available for ventilation, causing inadequate oxygenation	↓ (air trapping)	↓ (capillary damage)	V/Q mismatch; chronic hypoxaemia; hypercapnia
Atelectasis	Alveoli collapse, leaving fewer capillaries available for gas exchange	↓ (alveolar collapse)	Normal	V/Q mismatch
Neuromuscular disorders (e.g. ALS)	Reduced chest wall compliance due to impaired neuromuscular control (weak respiratory muscles)	↓ (poor lung expansion)	Normal	Hypoventilation / Respiratory failure
Chest trauma (rib fractures)	Impaired chest wall movement secondary to pain	↓ (mechanical restriction)	Normal	Hypoventilation / atelectasis
Alveolar filling disorders/ pneumonia	Ventilation is impaired due to the presence of abnormal material (fluid/ blood/pus) in the alveoli, compressing lung tissue	↓ (poor lung expansion)	Normal	V/Q mismatch
Pulmonary Embolism / Blood Clot	Perfusion impacted as unable to reach the alveoli	Normal	↓ (blocked blood flow)	V/Q mismatch
Anemia or hemorrhage	Oxygen-carrying capacity is reduced due to low circulating haemoglobin	Normal	Normal	Decreased Oxygen carrying capacity
Toxic inhalant (Carbon monoxide)	Impaired oxygen carrying capacity due to low haemoglobin availability	Normal	Normal	Decreased Oxygen carrying capacity
Sedation or CNS Depression	Suppressed respiratory centres in brainstem	↓ (suppressed respiratory drive)	Normal	Hypoventilation / hypercapnia
Obesity	Reduced chest wall compliance	↓ (poor lung expansion)	Normal	Hypoventilation (especially while sleeping)

Cardiopulmonary Function Considerations

Lifestyle and lifespan factors should be considered when assessing and managing patients with

cardiopulmonary conditions. Elements such as diet, exercise, stress and anxiety levels, smoking, alcohol and substance abuse, environmental exposures, and cultural background can all impact cardiopulmonary health and affect response to illness, and the effectiveness of treatment.

Lifestyle Factors

Nutrition

- **Obesity:** Significantly impairing cardiopulmonary function, obesity restricts lung expansion, reducing respiratory efficiency and increasing the work of breathing. Causing an increased metabolic demand, overall oxygen requirements are raised. Obese individuals have a higher risk of developing anaemia, which further compromises oxygen delivery to the tissues.
- **Malnutrition:** Malnourished individuals may experience muscle wasting, including the respiratory muscles, leading to reduced respiratory excursion and diminished cough effectiveness. This weakens the body's ability to clear secretions and maintain airway patency. Malnutrition also contributes to a higher risk of anaemia due to insufficient intake of iron and other essential nutrients required for red blood cell production (World Health Organization [WHO], 2023).
- **Dietary fat and cholesterol:** Diets high in saturated fats contribute to elevated cholesterol levels, promoting atherogenesis in the coronary arteries (Ingham-Broomfield, 2021). This causes narrowing of the vessels and impairs blood flow to the heart, increasing the risk of developing cardiovascular disease. Over time, this can reduce cardiac output, compromising oxygen delivery throughout the body.
- **Sodium intake:** Excessive sodium intake is strongly associated with hypertension, a major risk factor for cardiovascular disease (Buckley, 2019). In Australia, the Suggested Dietary Target (SDT) for sodium is 2000 mg/day, with most individuals exceeding this amount (WHO, 2023). Reducing sodium intake is recommended to help reduce blood pressure and decrease strain on the heart and blood vessels.
- **Potassium intake:** Low potassium intake is considered a risk factor for hypertension as it plays a key role in regulating blood pressure (Buckley, 2019). Higher dietary potassium intake is associated with maintaining lower blood pressure levels, particularly when balanced against sodium intake. Encouraging consumption of potassium-rich foods such as fruits and vegetables can support cardiovascular health and help mitigate the effects of high sodium intake.

Exercise

A balanced exercise program that includes regular physical activity enhances cardiopulmonary function. The National Heart Foundation of Australia recommends at least 150 minutes of moderate-intensity aerobic activity per week to support heart health (National Heart Foundation of Australia, 2016). One of the major benefits of increased physical activity is improved circulation, which enhances oxygenation

and tissue perfusion. This contributes to a lower resting heart rate and blood pressure, as well as reduced cholesterol levels. Regular exercise also supports mental health and assists with weight management.

Stress and Anxiety

Chronic stress and severe anxiety can significantly impact cardiopulmonary function by increasing the body's metabolic rate and oxygen demand. In response to stress, the sympathetic nervous system is activated, leading to an increase in the rate and depth of respiration, pulse rate, and cardiac output. While most healthy individuals can adapt to these physiological changes, those with pre-existing heart disease or acute illness may struggle to meet the heightened oxygen requirements (Ingham-Broomfield 2021).

Smoking, Alcohol/Substance Abuse

Smoking contributes to a number of diseases of the lungs, heart, and vessels. Constant exposure to chemicals in the lungs, mouth, and larynx can cause abnormal cells to divide and cause various cancers. The risk of developing lung cancer is increased by nine times for those who smoke (Hurley et al., 2023). Smoking is the main cause of Chronic Obstructive Pulmonary disease (Winnall et al., 2020). Smoking causes a disruption of the mucociliary clearance, cough and alveolar clearance systems in the lungs, which can lead to increased colonisation of bacteria and cause frequent infections (Winnall et al., 2020). Smoking also damages the lining of blood vessels, promotes the formation of atherosclerotic plaques, and reduces oxygen levels in the blood. It is one of the leading causes of coronary heart disease, stroke, and peripheral vascular disease (Briffa et al., 2021).

Substance abuse, including the use of illicit drugs and excessive alcohol, further compromises cardiopulmonary health. Stimulants such as cocaine and methamphetamine can cause acute cardiac events, arrhythmias, and sudden increases in blood pressure, while long-term use may lead to cardiomyopathy and respiratory depression. Inhaling and smoking of toxic chemicals such as glues and paints causes direct injury to the lungs and leads to permanent damage (Ingham-Broomfield, 2021).

Environmental Influences

Environmental stressors can significantly affect cardiopulmonary function, particularly in urban settings where exposure to pollutants and noise is more concentrated. Living in cities intensifies these stressors, with air pollution being a major concern. Fine particulate matter and gases such as nitrogen dioxide and sulphur dioxide, often released from vehicle exhaust and industrial activity, can penetrate deep into the lungs, causing inflammation, reduced lung function, and increasing the risk of respiratory and cardiovascular diseases (Eckhardt & Wu, 2021).

Noise pollution, especially from traffic, is another urban environmental factor that can elevate stress levels. Chronic exposure to noise activates the sympathetic nervous system, contributing to hypertension, myocardial infarction (MI), and stroke (Münzel et al., 2021).

In occupational settings, environmental exposure is also a concern. Workers in industries such as mining and construction may be exposed to silica dust, increasing the risk of silicosis, while coal miners are at risk for pneumoconiosis ("black lung"). Asbestos exposure, still a concern in older buildings and infrastructure, is linked to mesothelioma, a rare but aggressive form of lung cancer.

Cultural Influences

Cultural and social determinants play a significant role in cardiopulmonary health outcomes across diverse populations in Australia. Aboriginal and Torres Strait Islander (ATSI) peoples experience disproportionately higher rates of hypertension, a key risk factor for cardiovascular disease, compared to non-Indigenous Australians (Buckley, 2019). This disparity is influenced by a complex interplay of factors, including historical disadvantage, limited access to culturally safe healthcare, socioeconomic inequality, and environmental stressors. Additionally, higher rates of smoking, poor nutrition, and chronic stress contribute to increased cardiopulmonary risk. Culturally responsive care that respects community values, supports self-determination, and integrates traditional knowledge is essential to improving health outcomes in ATSI communities.

Life Span Considerations

Infants and Toddlers

Infants' and toddlers' respiratory and cardiovascular systems are still developing, making them particularly vulnerable to oxygenation and perfusion compromise. The airways are smaller and more easily obstructed, and they have fewer alveoli, which limits gas exchange. The diaphragm is the primary muscle of respiration, and fatigue can quickly lead to respiratory distress. Additionally, infants have a higher metabolic rate and oxygen demand, but less efficient oxygen delivery due to immature haemoglobin and limited cardiac reserve. Monitor for signs of hypoxia, such as nasal flaring, grunting, and cyanosis.

Older Adults

Older adults experience structural and functional changes in the cardiopulmonary systems that can reduce efficiency. The heart muscle becomes stiffer, and valves may thicken, leading to reduced cardiac output and increased risk of murmurs and dysrhythmias. Baroreceptor sensitivity declines, contributing to orthostatic hypotension. In the lungs, elastic recoil decreases, and the chest wall becomes more rigid, reducing lung compliance and ventilation efficiency. These changes, combined with a slower immune response and reduced red blood cell production, make older adults more susceptible to hypoxia, anaemia, and respiratory infections.

Assessment of Cardiopulmonary Functioning

Figure 8. Nurse assessing cardiopulmonary functioning

Focused Cardiopulmonary Assessment

A combined cardiac and respiratory-focused assessment is essential for evaluating cardiopulmonary function. The following outlines key assessment criteria; refer to the relevant sections in Health Assessment, part 3: Physical Health Assessment – Systems-Based/Focused Assessment for detailed procedures.

- **Focused cardiac assessment**
  The cardiac assessment should focus on identifying signs of impaired circulation, perfusion, or conduction. Assess the pulse for quality, regularity, and strength. Inspect the limbs for colour and warmth, which may indicate peripheral perfusion status. Auscultate the heart to detect any abnormal heart sounds, such as murmurs. To assess for conduction abnormalities, perform a 12-lead electrocardiogram (ECG).
  Refer to Part 3: Health Assessment – Cardiac
- **Focused respiratory assessment**
  The respiratory assessment should aim to detect signs of reduced ventilation and perfusion. In addition to measuring respiratory rate, observe the depth and regularity of breathing, symmetry of chest movement, and the use of accessory muscles. Note the patient's preferred position, breathing patterns (e.g., pursed lips, gasping, apnoeic pauses), and any signs of anxiety. Auscultate lung fields for adventitious breath sounds, which may indicate fluid accumulation or airway obstruction.
  Refer to Part 3: Health Assessment – Respiratory

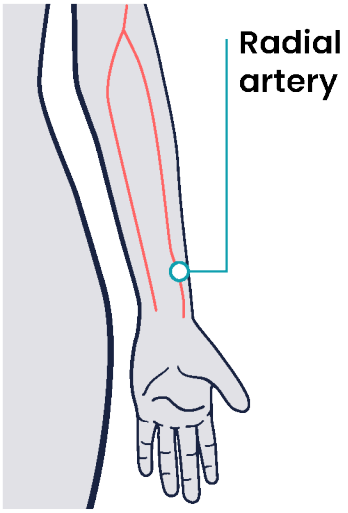
Common Cardiopulmonary Diagnostic Tests

Haemoglobin (Hb)

This test measures the concentration of haemoglobin in a blood sample and is a key indicator of the blood's oxygen-carrying capacity.

Arterial blood gas (ABG)

ABG testing offers important data in relation to acid-base balance. ABGs are considered an invasive procedure and are often reserved for those with severe disturbance. They are collected via puncture from the radial or femoral artery and drawn into a specialised heparinised syringe. If the result is not able to be analysed immediately (at point of care), it must be placed on ice for transport to the pathology laboratory. Refer to the Fluid, Electrolyte and Acid Base chapter for more information on ABGs.



ABG	Normal Range
pH	7.35–7.45
$PaCO_2$	35–45 mmHg
PaO_2	80–100 mmHg
HCO_2	22–26 mmol/L
0_2Sat	95%–100%
Base excess	±2 mmol/L

Figure 9. Arterial blood gas testing

Cultures

To determine if a bacterial infection is contributing to a patient's illness, various cultures may be collected, including blood, sputum, urine, or swabs from a wound or throat. In an unwell patient, it is preferable to collect a culture before commencing antibiotic therapy; however, this should not delay the commencement of therapy (Mondor & Kourouche, 2024). Empirical antibiotic therapy is used until the specific organism and its antibiotic sensitivities can be confirmed.

- **Sputum culture and sensitivity:** Sputum is the mucous secretion from the lungs, bronchi, and trachea, and is not produced in a healthy individual. To gain a sputum sample, the individual must cough deeply to bring up sputum into the mouth and then transfer it into a specimen container. An

attempt should be made to avoid contaminating the specimen with saliva, which may compromise results. Specimen is often collected first thing in the morning, as it tends to accumulate in the lungs when laying down for a period of time.

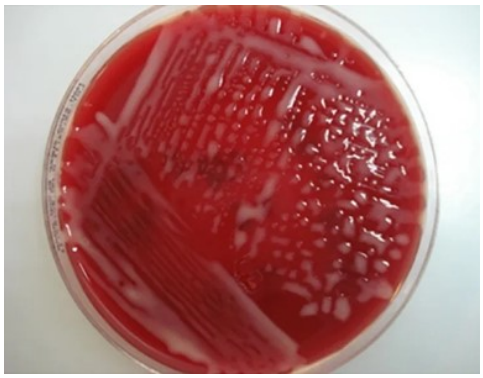


Figure 10. An image of a sputum culture

- **Blood cultures:** Blood cultures are ordered when sepsis is suspected. With some infections, pathogens are only found in the blood intermittently, so a series of three or more blood cultures, as well as blood draws from different veins, may be performed to increase the chance of finding the infection. Blood cultures are incubated for several days before being reported as negative. Some types of bacteria and fungi grow more slowly than others and/or may take longer to detect if initially present in low numbers.

Figure 11. Blood culture bottles are colour-coded to indicate the type of microorganism they are designed to detect. Green cap bottles detect aerobic microorganisms and orange cap bottles detect anaerobic organisms.

Capnography

Capnography involves noninvasive measurement of CO2. Expired gases are sampled from the patient's

airway and measured with an adapter attached to the endotracheal tube, tracheostomy tube or nasal cannula with a side stream cap (Bonaduce et al., 2024).

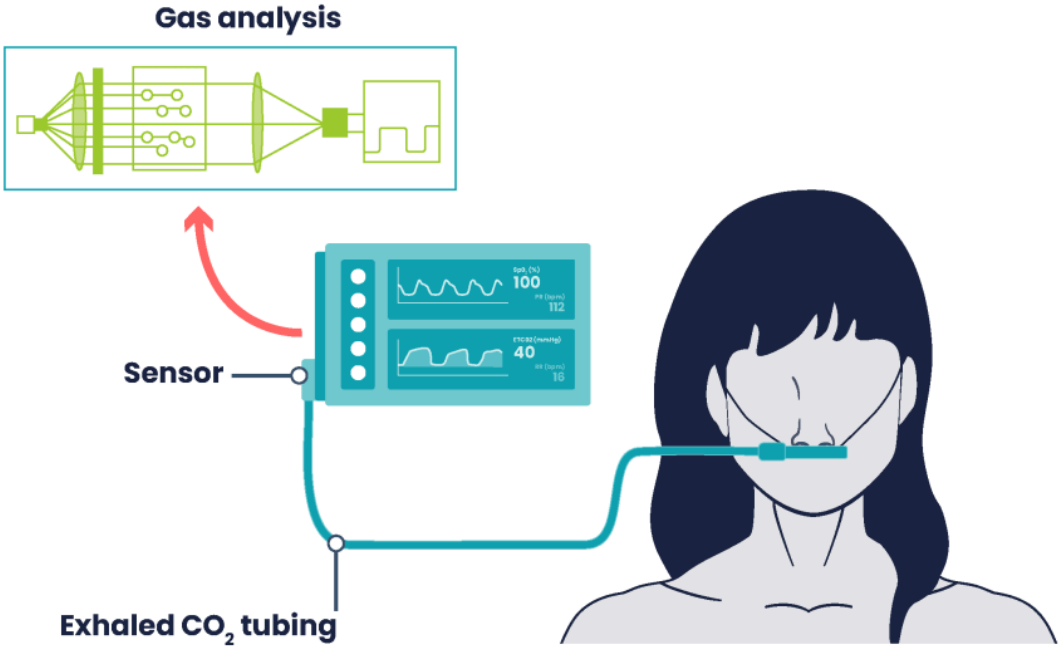


Figure 12. Capnography

Pulse Oximetry

A pulse oximeter is a noninvasive device placed on the finger that is able to read the saturation of haemoglobin using an infrared light. When considering the results, it is important to remember the relationship between haemoglobin and oxygen, recalling that each haemoglobin molecule can carry up to four molecules of O2. A normal saturation level is considered between 94-98% SpO2. Refer to Health Assessment, part 2: Vital signs on the correct usage of a pulse oximeter.

Figure 13. A pulse oximeter

Note: In patients with chronic respiratory disease such as COPD or emphysema, lower levels are tolerated with acceptable parameters, approximately 88%-92% (Barnett et al., 2022). Facility policy may vary, therefore acceptable parameters should be verified before any adjustments are made.

Additional diagnostics may include chest radiographs (x-rays), computed tomography or magnetic resonance imaging, ventilation-perfusion (V/Q) scan, and a variety of pulmonary function tests, depending on the diagnosis being explored.

Electrocardiogram (ECG)

Electrocardiograms (ECGs) use leads with electrodes attached to the patient's body to record the electrical activity of the heart on special graph paper or on a cardiac monitor. These electrodes detect the small electrical changes of cardiac muscle depolarisation followed by repolarisation during each cardiac cycle. The standard electrocardiograph (the instrument that generates an ECG) uses 3, 5, or 12 leads. The greater the number of leads an electrocardiograph uses, the more information the ECG provides.

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Management of Alterations in Cardiopulmonary Functioning

Encourage Breathing Techniques

There are several breathing exercises a nurse can teach a patient to use to enhance ventilation and oxygenation. These techniques include pursed-lip breathing, diaphragmatic breathing, incentive spirometry, and deep breathing and coughing (DB&C).

Pursed-Lip Breathing

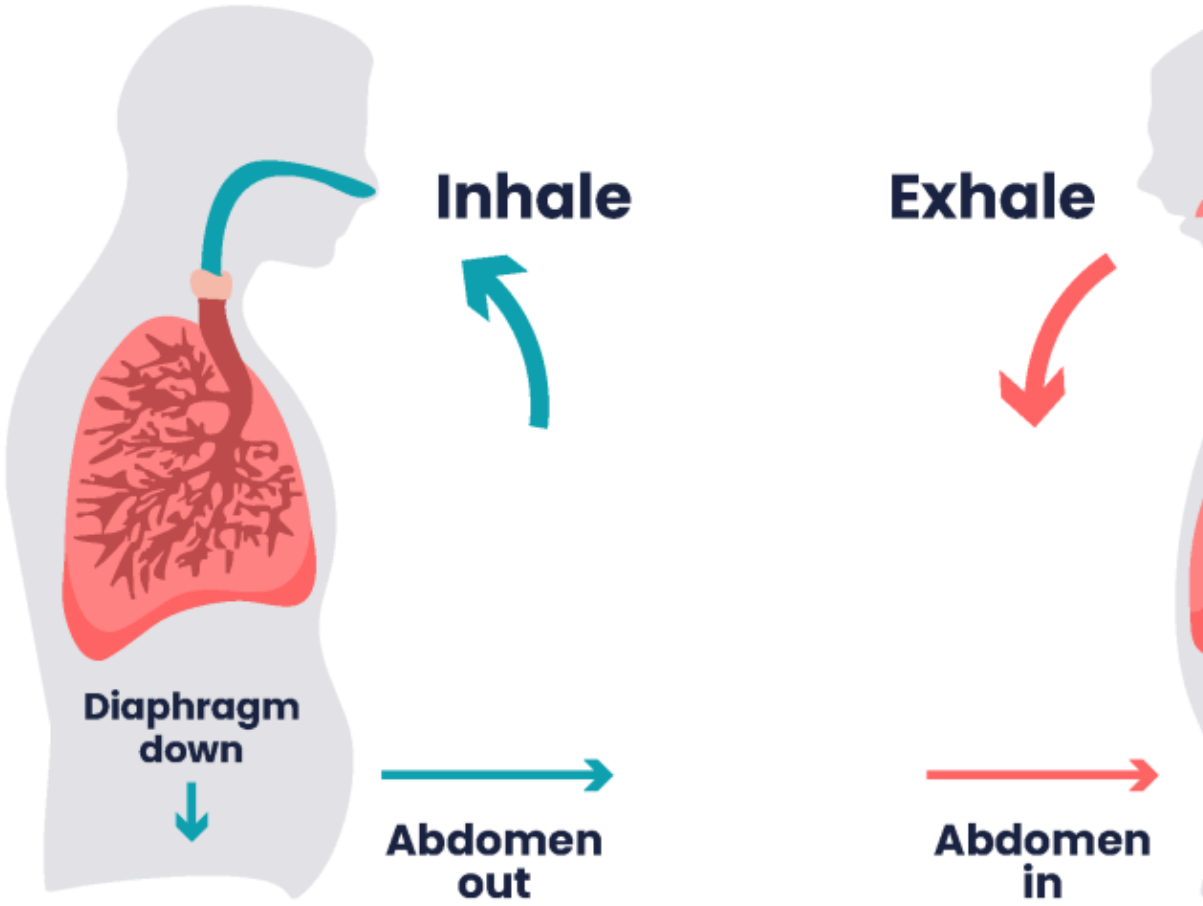
Pursed-lip breathing is a technique that allows people to control their oxygenation and ventilation. The technique requires a person to inspire through the nose and exhale through the mouth at a slow, controlled flow. This type of exhalation gives the person a puckered or pursed appearance. By prolonging the expiratory phase of respiration, a small amount of positive end-expiratory pressure is created in the airways that helps to keep them open so that more air can be exhaled, thus reducing air trapping that occurs in some conditions such as COPD. Pursed-lip breathing often relieves the feeling of shortness of breath, decreases the work of breathing, and improves gas exchange.

Instruction
Sit comfortably and relax the neck and shoulders
Inhale slowly and deeply through the nose.
Purse lips as if going to whistle or blow out a candle.
Exhale slowly and gently through pursed lips for three times longer than inhalation.
Repeat for several breaths, especially during or after exertion.

Diaphragmatic Breathing

Diaphragmatic breathing, also known as abdominal breathing, is a technique that encourages deeper and slower breaths by engaging the diaphragm rather than the chest muscles. It is helpful for patients who are tachypneic due to physiological stress or anxiety. The technique promotes relaxation, improves oxygenation and enhances respiratory efficiency. The nurse teaches the patient how to become aware

of their breathing pattern and intentionally shift from shallow chest breathing to deeper abdominal breathing.



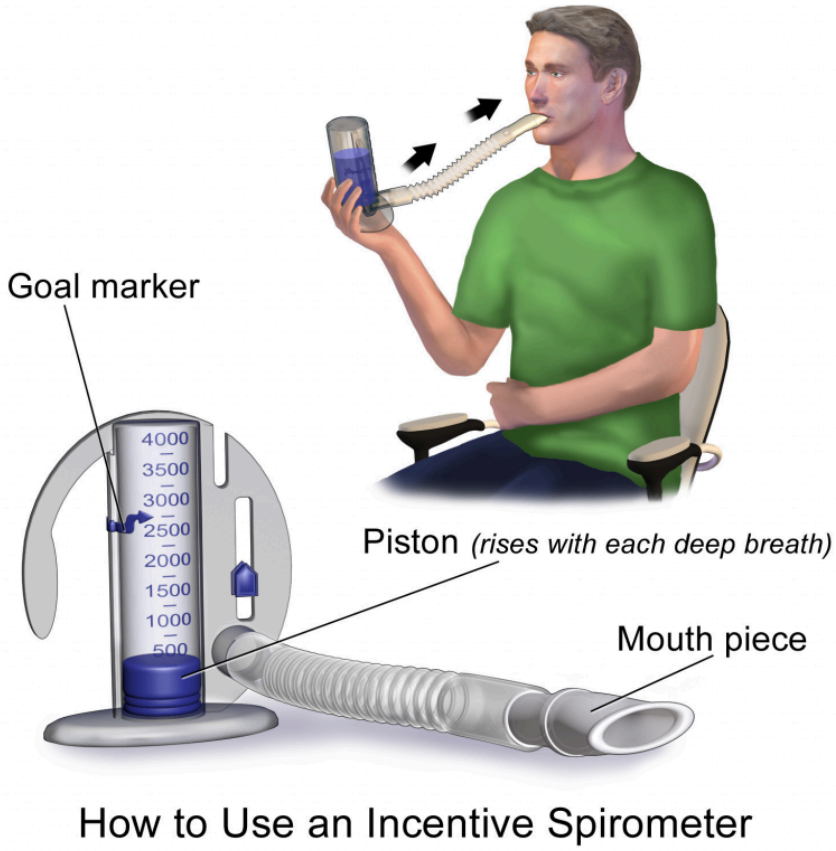
Instruction	Purpose
Sit or lie down in a comfortable position.	Promotes relaxation and r
Place one hand on the chest and one on the abdomen.	Helps the patient identify
Inhale slowly through the nose, aiming to raise the hand on the abdomen while keeping the chest still.	Encourages use of the diap
Exhale slowly through pursed lips, allowing the abdomen to fall.	Promotes controlled exha
Repeat for several minutes, focusing on abdominal movement.	Reinforces the breathing p

Incentive Spirometry

An incentive spirometer is a handheld device commonly prescribed for those with decreased mobility, a respiratory illness or after surgery. It is aimed at preventing complications such as atelectasis, sometimes

referred to as lung collapse, which occurs when alveoli become deflated or filled with fluid, placing the patient at high risk of developing pneumonia. The spirometer provides visual feedback to help patients take slow, deep breaths. While sitting upright, the patient should breathe in slowly and deeply through the tubing with the goal of raising the piston to a specified level. The patient should attempt to hold their breath for five seconds, or as long as tolerated, and then rest for a few seconds. This technique should be repeated by the patient ten times every hour while awake.

Incentive Spirometry Teaching Guide



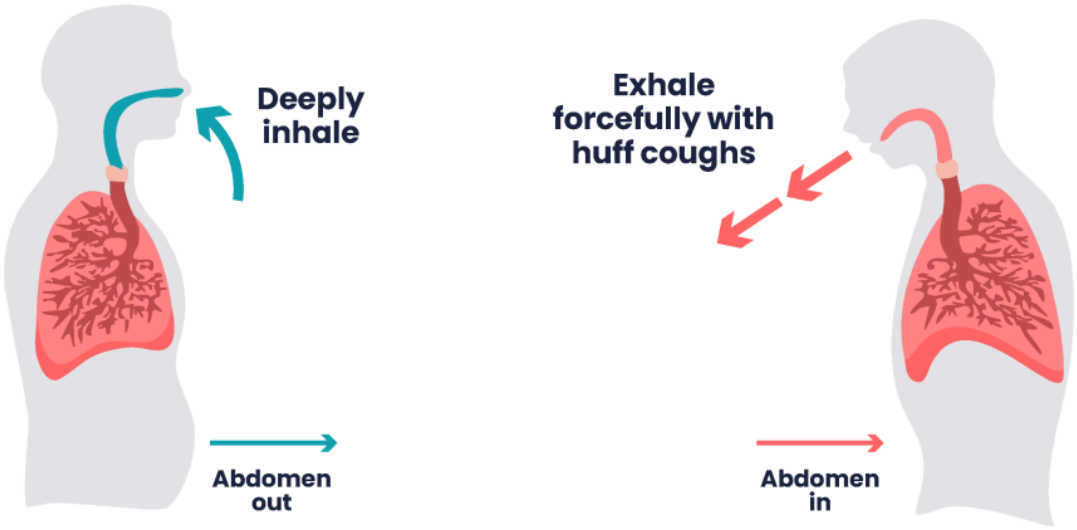
Instruction	Purpose
Sit upright in a comfortable position.	Promotes optimal lung expansion.
Hold the incentive spirometer upright.	Ensures accurate measurement and airflow.
Exhale normally, then place the mouthpiece in your mouth and seal your lips around it.	Prepares for a deep, controlled inhalation.
Inhale slowly and deeply through the mouthpiece to raise the indicator.	Encourages full lung expansion and prevents atelectasis.
Hold your breath for 3–5 seconds, then remove the mouthpiece and exhale slowly.	Improves gas exchange and lung function.
Repeat 10 times every hour while awake, or as directed.	Promotes recovery and prevents postoperative complications.

Deep Breathing and Coughing

Deep breathing and coughing helps open the alveoli, improves oxygenation, and prevents complications such as atelectasis. Coughing assists in mobilising and removing mucus from the lower respiratory tract, promoting airway clearance.

Regular, controlled deep breathing followed by effective coughing can reduce painful, uncontrolled coughing episodes that are often ineffective. One recommended method is the **huff cough**, a controlled technique that helps clear secretions without straining the airways.

Deep Breathing with Huff Cough Teaching Guide



Instruction	Purpose
Sit upright and relax shoulders.	Promotes optimal lung expansion and comfort.
Inhale deeply through nose with mouth closed, expanding lungs fully.	Opens alveoli and prepares for airway clearance
Hold breath for 3-5 seconds, breathe out slowly and fully through the mouth.	Allows air to reach and loosen mucus.
Inhale deeply again and hold breath for 3-5 seconds	Prepares lungs to perform cough
While exhaling with an open mouth, making two to three forceful "huff" or 'ha' sounds from deep in the lungs.	Mobilises mucous without collapsing airways
Repeat process 2–3 times, then rest and breathe normally.	Helps clear secretions and reduce breathlessness
Note: Patient may wish to splint chest by using a small pillow reducing pain caused from cough. Ensure adequate pain relief prior to exercises.	

Positioning

Proper patient positioning plays a vital role in enhancing lung expansion, improving oxygenation, and reducing the work of breathing. Two key positions commonly include High Fowler's position and the Orthopnoeic position (also known as the tripod position).

High Fowler's Position

Raising the head of the bed to a 90-degree angle (High Fowler's) promotes maximum thoracic expansion. This position facilitates deeper inhalation, reduces pressure on the lungs from abdominal organs, and decreases the effort required to breathe. It is especially beneficial for patients experiencing dyspnoea or recovering from abdominal or thoracic surgery. If the high Fowler's position is not tolerated or contraindicated, a semi-Fowler's (45-degree) position may be employed.

Orthopnoeic Position

The orthopnoeic position involves the patient sitting or standing, leaning forward while resting their arms on a bedside table or knees. Pillows are commonly placed over the table for additional support. The posture takes on a tripod effect, allowing gravity to assist in opening the chest cavity, expanding the lungs and reducing accessory muscle work. It is commonly used by patients with chronic obstructive pulmonary disease (COPD) or acute respiratory distress, as it helps ease breathing and enhances oxygen intake.

Oxygen Therapy

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Key Takeaways

In this chapter, we covered:

- Oxygenation and perfusion rely on the coordinated function of the respiratory and cardiovascular systems to deliver oxygen to tissues and remove carbon dioxide.
- Ventilation/perfusion mismatch, hypoxia, and hypoxaemia are critical indicators of impaired gas exchange and require early recognition through clinical assessment and monitoring tools such as SpO^2 and ABGs.
- Lifestyle factors such as poor diet, sedentary behaviour, environmental exposures, stress and anxiety, smoking/substance abuse can significantly impact cardiopulmonary health and contribute to chronic disease.
- Cardiopulmonary investigations such as chest X-rays, ECGs, and ABGs provide essential diagnostic information and guide treatment decisions in patients with respiratory or cardiac compromise.
- Electrocardiogram (ECG) interpretation is a foundational skill for nurses, enabling early detection of arrhythmias and cardiac dysfunction that may affect perfusion.
- Oxygen therapy must be tailored to the patient's clinical condition, with careful consideration of flow rate, FiO^2, humidification, and safety precautions to avoid serious complications.
- Understanding oxygen delivery devices, including nasal cannula, Venturi masks, non-rebreather masks, and high-flow systems, is essential for selecting the appropriate method and ensuring safe, effective care.

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PALLIATIVE AND END-OF-LIFE CARE

Tracey Gooding and Sandra Dash

Learning Outcomes

In this chapter, you will learn how to:

- Define palliative and end-of-life care
- Identify the role of a nurse in palliative and end-of-life care
- Apply Kübler-Ross's five stages of grief model to assess the different stages of grief in patients and families during palliative and end-of-life care
- Identify common symptoms and needs experienced by patients nearing the end of life
- Demonstrate appropriate communication strategies when engaging with patients and families at the end of life
- Develop a holistic care plan to support dying patients and their families
- Analyse the impact of cultural values, beliefs, and practices on patients' and families' experiences of dying and bereavement.

Introduction

As nurses, we are privileged to care for individuals and their families during the most vulnerable and profound moments of life, including the end of life. During this time, clinical expertise must be matched with deep compassion and emotional presence. This role goes beyond the mere alleviation of physical symptoms; it encompasses upholding dignity, the provision of comfort, and the facilitation of psychosocial and spiritual support when curative interventions are no longer viable.

This chapter introduces the foundational principles and evidence-informed practices essential to high-quality end-of-life care. It underscores the importance of holistic, person-centred nursing approaches that are responsive to the individual's values, cultural identity, and expressed wishes. Regardless of their specialty or level of experience, nurses inevitably face situations involving death and dying, whether it be from terminal illnesses, expected outcomes, or unforeseen events. Additionally, nurses frequently play a crucial role in supporting individuals dealing with acute or chronic grief. It is essential for nurses to possess

emotional awareness and emotional intelligence when tending to patients undergoing the dying process, those expecting impending loss, and those going through the grieving process. Nurses must be equipped to navigate intricate discussions, remain composed, and effectively address emotions such as anger, guilt, sadness, and fear. No matter what area of nursing you work in, this chapter will enhance your capacity to identify and address the multifaceted needs of dying individuals, support families, and integrate culturally safe and inclusive care strategies while maintaining personal resilience in clinical practice.

Defining Palliative and End-of-Life Care

According to the World Health Organization (WHO, 2020), palliative care is "an approach that improves the quality of life of patients (adults and children) and their families who are facing problems associated with life-threatening illness. It prevents and relieves suffering through the early identification, correct assessment and treatment of pain and other problems, whether physical, psychosocial or spiritual" (para. 1). Palliative Care Australia (PCA) defines palliative care as "person and family-centred care provided for a person with an active, progressive, advanced disease, who has little or no prospect of cure and who is expected to die, and for whom the primary treatment goal is to optimise the quality of life" (PCA, 2018, p. 6). Palliative care can be conducted in any clinical environment, with some healthcare institutions having a dedicated palliative care unit. This care can be utilised several months to some years before end-of-life is expected.

End-of-life care is a type of palliative care and is defined by the Australian Commission on Safety and Quality in Healthcare as "the period when a person is living with, and impaired by, a fatal condition, even if the trajectory is ambiguous or unknown" (ACSQHC, 2023, p. 27). There is no real consensus on when the period of time known as the end-of-life begins and this is because end-of-life differs depending on the illness that a person is suffering. However, according to ACSQHC (2023, p. 27), people are considered to be "approaching end-of-life" when they are likely to die within the next 12 months. The goal of end-of-life care is the same as palliative care – to deliver care in line with the physical, spiritual and psychosocial needs of the patients, families and carers, but also includes the care of the patient's body after their death (ACSQHC, 2023).

In the past, palliative care has typically been seen as something that began only after all curative treatments had ended. Today, it is widely understood that palliative care can be beneficial when provided alongside treatments that aim to slow disease progression and extend life. It is also now recognised that many people with life-limiting conditions are not cured, but instead live with these illnesses for many years (PCA, 2018). According to Palliative Care Australia, palliative care should be everyone's business, and all healthcare professionals involved in supporting people with life-limiting illnesses, as well as their families and carers, should possess core competencies and skills in delivering palliative and end-of-life care (PCA, 2018).

Palliative and End-of-Life Care in Australia

According to the Australian Institute of Health and Welfare (AIHW, 2025), there were 101,000 palliative care-related hospitalisations in 2022-23. The average age at admission was 75 years. Almost 3 in 5 (57%) ended with the patient dying in hospital. Between 2015-16 and 2022-23, there was a 37% increase in the number of palliative care-related hospitalisations, suggesting that the ageing of Australia's population is contributing to the growth in palliative care-related hospitalisations (AIHW, 2025). This does not include palliative or end-of-life care delivered in the home, residential care facilities or as an outpatient.

Each year, many Australians access care through outpatient services provided in non-admitted settings, including hospital outpatient departments, community clinics, and even in their own homes. These services are often connected to a previous emergency visit or hospital admission and are used to deliver diagnostic assessments or follow-up care without the need for the person to be admitted to hospital again. In 2022-23, there were 882,000 palliative care-related service events where the patient was not admitted to hospital (AIHW, 2025). This highlights the substantial role of outpatient and community-based palliative care and reflects a trend toward delivering palliative care in more flexible, patient-centred environments, such as homes and clinics, which may better support quality of life and personal preferences at the end of life. Despite this increase, access to specialist palliative care in the community remains uneven and often inadequate, particularly in rural and regional areas. Palliative Care Australia (PCA) has highlighted that while specialist services are expected to include a broad range of allied health professionals, many community settings lack the infrastructure and workforce to deliver comprehensive care (PCA, 2022). Addressing these gaps is essential to ensure equitable access to quality end-of-life care across Australia.

National Palliative Care Standards

The Australian *National Palliative Care Standards*, developed by Palliative Care Australia, provide a framework for delivering high-quality, person-centred care to individuals with life-limiting illnesses, as well as their families and carers. There are two resources available: National Palliative Care Standards for All Health Professionals and Aged Care Services (PCA, 2022) and National Palliative Care Standards for Specialist Palliative Care Providers (PCA, 2024). Both are guided by the following nine national standards:

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These standards guide healthcare professionals across all settings, from specialist services to aged care,

community and general practice, ensuring that care is respectful, responsive, and aligned with the values and needs of those receiving it. The standards emphasise holistic assessment, collaborative care planning, support for carers, and continuous quality improvement, promoting dignity and comfort at end-of-life. The published standards (linked below) also address diversity within each standard, offering guidance on providing care for people with a wide range of needs. This includes children; Aboriginal and Torres Strait Islander peoples; individuals experiencing mental illness, substance use disorders, dementia, disability, or homelessness; and those in aged care, prison custody, culturally and linguistically diverse communities, or who identify as LGBTQIA+.

Link to Learning

To explore the National Palliative Care Standards further, please follow the link to: National Palliative Care Standards for All Health Professionals and Aged Care Services.

The ACSQHC also provides guidelines for caring for people at the end-of-life. The Comprehensive Care Standard within the National Safety and Quality Health Service Standards (ACSQHC, 2021) has a specific section related to providing comprehensive care at the end-of-life. This section outlines strategies and specific actions for providing comprehensive, holistic, patient-centred, goal-directed, compassionate care to palliative care patients. The actions specific to comprehensive care at the end-of-life include (ACSQHC, 2021):

Action 5.15 – The health service organisation has processes to identify patients who are at the end-of-life that are consistent with the *National Consensus Statement: Essential Elements for Safe and High-Quality End-of-Life Care.*

Action 5.16 – The health service organisation providing end-of-life care has processes to provide clinicians with access to specialist palliative care advice.

Action 5.17 – The health service organisation has processes to ensure that current advance care plans can be received from patients and are documented in the patient's healthcare record.

Action 5.18 – The health service organisation provides access to supervision and support for the workforce providing end-of-life care.

Action 5.19 – The health service organisation has processes for routinely reviewing the safety and quality of end-of-life care that is provided against the planned goals of care.

Action 5.20 – Clinicians support patients, carers and families to make shared decisions about end-of-life

care in accordance with the *National Consensus Statement: Essential Elements for Safe and High-Quality End-of-Life Care.*

The *National Consensus Statement: Essential Elements for Safe and High-Quality End-of-Life Care*, developed by the ACSQHC (2023), outlines the foundational elements required to deliver safe, high-quality, and person-centred care at the end of life. It provides a nationally agreed framework to guide health services, clinicians, and policymakers in improving care experiences for individuals, families, and carers. The statement is a key reference for embedding best practice into clinical and governance systems across Australia. It outlines nine guiding principles and ten essential elements that support person-centred, culturally responsive, and clinically safe care across all settings, including hospitals, hospices, residential aged care, and home environments (ACSQHC, 2023). If you would like to explore these principles in more detail, you can scroll through the full document below.

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When reading the *National Consensus Statement: Essential Elements for Safe and High-Quality End-of-Life Care* (ACSQHC, 2023) and the *National Palliative Care Standards* (PCA, 2022), you may have noticed that both documents share a number of overlapping themes. Both address the principles of care delivery and the structures that support clinical governance in end-of-life care. The following infographics present these two perspectives side by side: one focused on the principles of care delivery, and the other on the governance structures that make such care possible. Together, they offer a comprehensive view of what safe, effective and quality end-of-life care should look like. Click or press on the dots beside each principle to reveal more information and explore its meaning in the context of end-of-life care.

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Palliative and End-of-Life Care Needs for Diverse Populations

Palliative and end-of-life care in Australia encompasses a broad spectrum of individuals, ensuring that palliative care caters for the diverse needs of the population. What does diversity mean in care contexts? Diverse populations include individuals who belong to one or more groups that may have faced exclusion, discrimination, or stigma. Some common types of diversity include (Department of Health, 2017; Palliative Care Australia, 2022):

- Aboriginal and Torres Strait Islander peoples
- People with culturally and linguistically diverse (CALD) backgrounds
- Lesbian, gay, bisexual, trans and gender diverse, and intersex (LGBTI) people
- People who are homeless or at risk of homelessness
- People of different ages, including paediatric and geriatric populations
- People who live in rural or remote areas
- People living with mental illness
- People living with cognitive impairment, including dementia
- People with disability
- People with different religious and spiritual beliefs
- People with socio or economic disadvantage
- People living with addictions or substance abuse disorders
- People who live in prison custody.

While people within these groups may share some common experiences, it is important to recognise that each person has unique preferences and needs. These can relate to their social, cultural, linguistic, religious, spiritual, psychological, medical, and care circumstances. Providing respectful and inclusive care means understanding and responding to these individual differences and not making assumptions based on group identity (Department of Health, 2017).

To ensure safe, high-quality care for people from diverse backgrounds, several national and state guidelines and standards have been developed to help tailor care to the specific needs of different communities. While this chapter cannot cover every diverse population in detail, it is your responsibility as a nurse or future nurse, to actively seek out education and resources relevant to the communities you may serve. The following section offers a starting point to understanding some of the diverse needs in the Australian community and some of the current guidelines for Australian clinicians to deliver care that is respectful, evidence-based, and aligned with the individual preferences and needs of diverse patients and their families.

Palliative and End-of-Life Care for Aboriginal and Torres Strait Islander Peoples

Providing end-of-life care for First Nations people requires a culturally safe, respectful, and person-centred approach that honours the values, beliefs, and traditions of Aboriginal and Torres Strait Islander communities. Health professionals must recognise the significance of kinship systems, which often extend beyond immediate family, and ensure that care decisions involve the appropriate family members as identified by the person receiving care. Communication should be mindful of both verbal and non-verbal styles, avoiding medical jargon and using culturally appropriate language, such as "finishing up" or "passed on", in place of direct references to death (IPEPA Project Team, 2020). Many First Nations individuals may wish to spend their final days on Country, making it essential to support this preference where possible (caring@home, 2022). Respecting Sorry Business practices, which may include traditional ceremonies and extended grieving periods, is vital for supporting families and communities. Building trust through genuine relationships, acknowledging spiritual beliefs, and empowering autonomy in decision-making are all central to delivering compassionate and culturally responsive palliative care (IPEPA Project Team, 2020; Queensland Health, 2015).

Sad News, Sorry Business: Guidelines for Caring for Aboriginal and Torres Strait Islander People Through Death and Dying is a culturally responsive framework developed by Queensland Health to support health professionals in providing respectful and safe end-of-life care. These guidelines recognise the sacred and sensitive nature of death and bereavement within Aboriginal and Torres Strait Islander communities, where Sorry Business encompasses mourning practices, ceremonies, and collective grieving. The document emphasises cultural capability, respectful communication, relationship-building, and trauma-informed care, particularly in cases of sudden or unexpected death. It provides practical guidance for nurses and other healthcare workers to honour cultural protocols, support families, and uphold dignity during the final stages of life and after death (Queensland Health, 2015). To deepen your understanding of culturally safe and respectful end-of-life care for First Nations peoples, you can access the full document below. It offers valuable insights into traditions, beliefs, and practices that shape how death and dying are experienced within Aboriginal and Torres Strait Islander communities. Read through the document below to gain a better understanding of supporting Aboriginal and Torres Strait Islander Peoples through the death and dying process.

An interactive H5P element has been excluded from this version of the text. You can view it online here:
https://jcu.pressbooks.pub/nursing-skills-foundations/?p=3829#h5p-212

Cultural Considerations: Providing End-of-Life Care for Aboriginal and Torres Strait Islander Peoples is another resource developed by the IPEPA Project Team (2020), which offers culturally grounded guidance for health professionals delivering palliative care to Aboriginal and Torres Strait Islander peoples. Informed by extensive community consultation across urban, rural, and remote regions, the guide supports culturally safe, person- and family-centred care. It highlights the importance of Indigenous knowledges, kinship structures, and holistic practices, and aims to build the capacity of both Indigenous and non-Indigenous healthcare workers to provide respectful, responsive care at the end-of-life (IPEPA Project Team, 2020).

Link to Learning

Cultural considerations: Providing end-of-life care for Aboriginal peoples and Torres Strait Islander peoples

In many First Nations communities, the end-of-life is not only a personal journey but a deeply cultural one. The following document offers practical guidance for First Nations health professionals supporting families through palliative care at home. It acknowledges the importance of place, kinship, and cultural practices in shaping how care is delivered and received when someone chooses to spend their final days on Country (caring@home, 2022).

Link to Learning

Managing palliative care symptoms: guide for health professionals (for First Nations health workers)

Paediatric Palliative and End-of-Life Care

The *National Consensus Statement: Essential Elements for Safe and High-Quality Paediatric End-of-Life Care* outlines the core principles and practices required to deliver compassionate, developmentally appropriate care to children nearing the end of life. Developed by the ACSQHC, this statement builds upon the adult framework but recognises the unique clinical, emotional, and ethical considerations

involved in paediatric care. It emphasises the importance of family-centred approaches, clear communication, and multidisciplinary collaboration to support both the child and their caregivers. The statement serves as a foundational guide for nurses and other health professionals working in acute, community, and hospice settings to ensure that paediatric patients receive care that is safe, respectful, and aligned with their needs and values (ACSQHC, 2016).

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Perinatal Palliative and End-of-Life Care

Perinatal palliative care is a model of care that is holistic and multidisciplinary and aims to provide end-of-life care and optimal symptom control for a baby, along with specialised support for families from diagnosis through to bereavement (Palliative Care Australia, Pediatric Palliative Care Australia, and New Zealand, 2022). The national *Care Around Stillbirth and Neonatal Death (CASaND) Clinical Practice Guideline* (Stillbirth Centre of Research Excellence, 2024) acknowledges that perinatal palliative care is a right for all babies who have a life-limiting or life-threatening condition. Care should be initiated from diagnosis, whether that be during pregnancy or after birth, as recognised in the national *Stillbirth Clinical Care Standard* (ACSQHC, 2022).

Perinatal mortality can occur after birth-related trauma or in relation to congenital anomalies. Congenital anomalies are a major cause of perinatal death in Australia (Australian Institute of Health and Welfare, 2024). A congenital anomaly is a difference in the genetics, development or health of a baby, present at birth. Some anomalies are associated with fetal, newborn or childhood death and are considered life-limiting, such as trisomy 18 or trisomy 13. Some anomalies may be treated with life-sustaining surgery and are considered life-threatening, such as congenital heart anomalies. Although perinatal palliative care is acknowledged as vital for babies and families with a life-limiting or life-threatening condition, there is also a call to integrate perinatal palliative care into care for all babies with an uncertain prognosis (Wilkinson et al., 2025).

As antenatal screening technologies continue to advance, more fetal anomalies are being identified during pregnancy. However, access to perinatal palliative care during the antenatal period remains limited, and parents in Australia who continued pregnancy after a life-limiting fetal diagnosis described their care as ‘ad hoc’ (Weeks, 2020). End-of-life care during the neonatal period, particularly within neonatal intensive care units (NICUs) and special care nurseries, is more widely recognised, and health services and clinical

excellence agencies have dedicated clinical guidance to support best practice, such as the Palliative (end of life) neonatal care best practice guidance by Safer Care Victoria.

Perinatal palliative care teams work within state-based paediatric palliative care teams around Australia, which can be located through *Palliative Care Australia's National Service Directory*. Such teams can provide care coordination, outreach or secondary consultation. However, all health professionals can provide care that builds upon the key elements of perinatal palliative care.

Wilkinson et al. (2025) described five elements of perinatal palliative care:

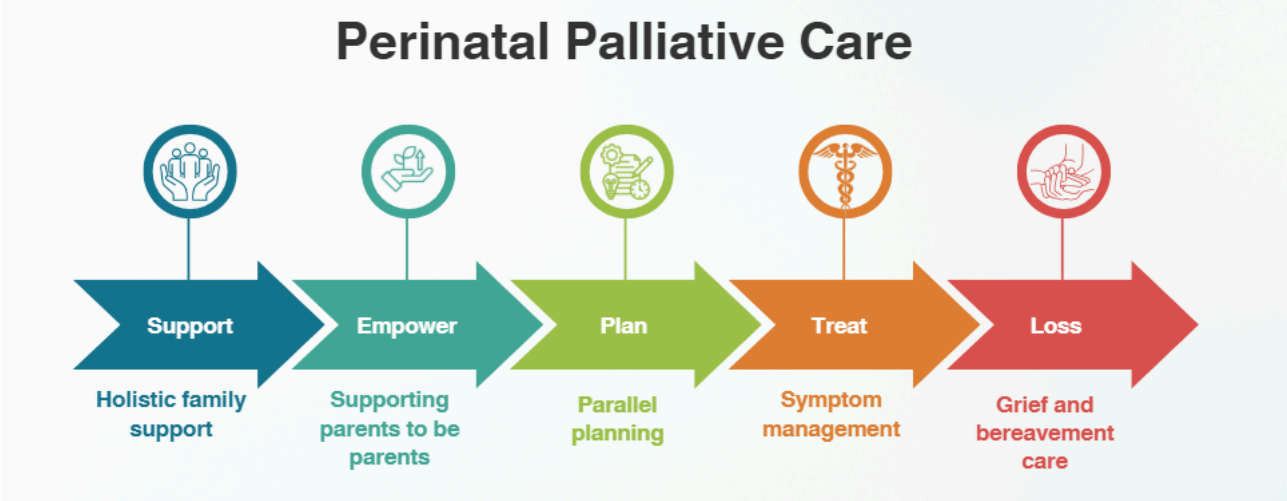

Figure 1. The five elements of perinatal palliative care

Palliative and End-of-Life Care for the LGBTQIA+ Community

Palliative and end-of-life care for LGBTQIA+ individuals must be inclusive, affirming, and free from discrimination. Many LGBTQIA+ people have experienced lifelong stigma, marginalisation, and trauma, which can shape how they engage with healthcare services—particularly at vulnerable times such as the end of life. Inclusive care involves recognising diverse identities, respecting chosen families, and avoiding assumptions about gender, sexuality, or relationships. Health professionals should create welcoming environments by using inclusive language, acknowledging pronouns, and ensuring that care plans reflect the individual's values and support networks.

Resources like the *LGBTIQ+ Inclusive Palliative Care Toolkit* (Palliative Care ACT, 2022) and ELDAC's inclusive end-of-life care guide for aged care providers (ELDAC, 2022) offer practical strategies for embedding inclusivity into clinical practice, including how to navigate advance care planning, spiritual care, and bereavement support at end of life. You can access these helpful resources below for more information.

Links to Learning

LGBTIQ+ Inclusive Palliative Care: A toolkit for carers & healthcare professionals

Supporting Inclusive End of Life Care: Lesbian, Gay, Bisexual, Trans and Gender Diverse, and Intersex Elders

Palliative and End-of-Life Care for People from CALD Backgrounds

People from culturally and linguistically diverse (CALD) backgrounds often face distinct challenges when accessing palliative care services. A recent review to identify cultural considerations for people from CALD backgrounds at the end-of-life in Australia identified four themes: communication and health literacy; access to end-of-life care services; cultural norms, traditions and rituals; and the cultural competence of healthcare workers (Lambert et al., 2023). Language barriers can make it difficult to communicate symptoms, understand care options, or participate in advance care planning. Access to translation services is integral in these circumstances. Additionally, cultural beliefs and values around caregiving, gender roles, privacy, and authority may shape how care is received and lead to hesitation in accessing services. Having an understanding of different cultures and the barriers and enablers for this population to palliative care services can help nurses respond appropriately to cultural diversity and improve the quality of palliative and end-of-life care. To learn more about the CALD population in Australia and how palliative care standards can be improved, access the links below.

Links to Learning

Palliative Care and Culturally and Linguistically Diverse Communities: Position Statement (Palliative Care Australia, n.d.)

Australia's ageing Culturally and Linguistically Diverse population (ELDAC, n.d.)

Exploratory Analysis of Barriers to Palliative Care – Issues report on people from culturally and linguistically diverse backgrounds (Department of Health, 2020)

The Role of the Nurse in Palliative and End-of-Life Care

All nurses, regardless of their clinical specialty or setting, may be called upon to care for individuals with life-limiting illnesses or those approaching the end of life. In these moments, nurses play a vital role in ensuring that care is not only clinically appropriate but also compassionate, respectful, and aligned with the patient's values and goals. Palliative care requires a specific skill set to provide effective care to people living with a life-limiting illness, their families and carers. These skills include, but are not limited to:

- Communication skills, especially when conveying potentially distressing information regarding prognosis and care options for people close to death
- Effective management of symptoms, including pain
- Critical appraisal skills, including the ability to assess a person's palliative care requirements, whether medical, functional, psychological, financial, emotional or spiritual
- Skills in providing advice and assisting with advance care planning
- Ethical decision making
- Life closure skills related to care provided when people are close to death that aim to preserve the dignity of the person and their family. (PCA, 2018, p. 29)

This section explores how nurses can support patients and their families during this time, guided by the first six National Palliative Care Standards (PCA, 2022), which describe the systems, processes and enablers necessary to deliver high-quality palliative care. These 6 standards focus on comprehensive assessment of needs, developing the comprehensive care plan, caring for carers, providing care, transitions within and between services and grief support (PCA, 2022).

Comprehensive Assessment of Needs

Comprehensive assessment of needs refers to the initial and ongoing assessment that incorporates the person's physical, psychological, cultural, social, and spiritual experiences and needs (PCA, 2022, p. 18). Recognising when a person is approaching end-of-life is the first step in ensuring comprehensive assessment of needs. Ask yourself, "Would you be surprised if this person died within the next 12 months"? If the answer is yes, this may be a trigger to initiate and provide quality end-of-life care (ACSQHC, 2023). There are many assessment tools used to help identify persons with palliative care needs and enable improved assessment, symptom management and support. For example, the AMBER Care Bundle, Supportive and Palliative Care Indicators Tool (SPICT), and the Palliative Care Outcomes Collaboration (PCOC) assessment form.

The AMBER Care Bundle is designed for patients who are clinically unstable and whose recovery is uncertain. It supports multidisciplinary teams in identifying such patients early and initiating timely

conversations about care preferences, escalation plans, and goals of care. The bundle includes structured interventions and timelines to ensure that critical decisions—such as resuscitation status and escalation to intensive care—are addressed proactively. It also emphasises the importance of sensitive communication with patients and families, tailored to their pace and capacity for understanding. To learn more about the AMBER care bundle, you can access the website below.

Link to Learning

Follow the link to access more information about the AMBER Care Bundle from the Clinical Excellence Commission.

The SPICT tool helps clinicians identify people at risk of deteriorating and dying due to one or more advanced conditions. It uses clinical indicators and prompts to support early recognition and referral to appropriate services. SPICT is particularly useful in generalist settings where specialist palliative care may not be immediately available. The SPICT-4ALL tool is a plain language version of the SPICT, making it easier for everyone to talk about deteriorating health and ask about more help and support. To learn more about the SPICT tool, you can access the website below.

Link to Learning

Follow the link to access The SPICT tool.

Follow the link to access the SPICT-4ALL tool.

The PCOC is funded by the Australian Government and provides assessment tools to facilitate routine palliative assessment and clinical response. The form assesses levels of delirium, pain and other common symptoms in palliative patients and their ability to complete activities of daily living (ADLs). To learn more about the PCOC, you can access the website below.

Link to Learning

Follow the link to access the Palliative Care Outcomes Collaboration (PCOC).

This comprehensive assessment provides the foundation for developing the comprehensive care plan.

Developing the Comprehensive Care Plan

At this stage, the patient, their family and carers, and substitute decision-maker(s) work in partnership with multidisciplinary teams to communicate, plan, set goals of care and support informed decisions about the care plan. All too often, patients and families leave decision-making too late, which can see the family solely being responsible for decisions that they are not sure about. In turn, not having decisions made early causes a loss of valuable time for both the patient and their family (Welsch & Gottschling, 2021).

Ensuring Inclusivity and Responsiveness in Care Planning

A comprehensive care plan is essential for delivering safe, person-centred palliative care that respects the individual's values, goals, and preferences. Individuals should be actively involved in planning their care, and, where consistent with their wishes, family members and carers should also be included in the process (ACSQHC, 2023; PCA, 2022). In cases where the person is unable to participate due to age, cognitive impairment, or incapacity, a legally appointed substitute decision-maker or guardian should be identified in accordance with relevant legislation and the person's known preferences (PCA, 2022). Recognising the uniqueness of each person and the potential for care goals to evolve over time is vital to ensuring the care plan is flexible and inclusive, taking into account cultural identity, gender, sexuality, and other aspects of diversity. Additional support may be required for vulnerable populations, such as Aboriginal and Torres Strait Islander peoples, including referrals to social work or guardianship services (ACSQHC, 2023; PCA, 2022). Development and communication of the plan may also require the use of interpreters for people from culturally and linguistically diverse backgrounds, and assistive communication tools for those with sensory or cognitive impairments (ACSQHC, 2023). This care plan should be updated with each reassessment of the patient to ensure it remains responsive to their evolving needs, and clearly documented in the clinical record, including any decisions made and any unresolved issues requiring follow-up.

Advance Care Planning

Advance Care Planning (ACP) is a dynamic and person-centred process that involves both discussion and documentation of an individual's values, beliefs, and preferences for future health and personal care. It typically includes conversations about the person's understanding of their illness, concerns about their health and care, goals and priorities, preferred place of care, and the identification of substitute decision-makers. Terminology and legal recognition of ACP documents may vary across states, but commonly used components include the following: (Flip the cards to understand the terminology used in advanced care planning discussions)

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Individuals should be supported to document their future care preferences through advance care directives or Goals of Care documents, which should be accessible to all healthcare providers (ACSQHC, 2023; PCA, 2022). Advance care planning should be introduced early, with clear information provided about its purpose and process. Individuals should be offered the opportunity to initiate or revise an advance care directive, and, where appropriate, family members, carers, and substitute decision-makers should be involved in these discussions. Legally binding directives should be promoted where possible, and individuals should be encouraged to upload these documents to My Health Record to ensure they are readily available across care settings (PCA, 2022).

Research has shown that there needs to be much improvement in ACP invitation and completion rates in Australia, particularly in the area of patients with advanced cancer (Veltre et al., 2023). ACP is supported by national standards across aged care, general practice, and healthcare services, and can be facilitated by both registered and non-registered health practitioners. Importantly, individuals may also choose to engage in ACP with family members or trusted others, outside of formal healthcare settings. These discussions can be started early and should be integrated into the assessment and development of a comprehensive care plan to ensure ACP is meaningful and actionable.

Adapting the Care Plan for End-of-Life Transitions

Timely recognition of a person's transition to the terminal phase of life is critical to ensuring timely adaptation of the care plan and that the patient's wishes at end-of-life are carried out. When this occurs, it is important to communicate this change in plan to the patient, their substitute decision-maker, family,

carers, and other healthcare providers involved in their care. The care plan should be revised to reflect the unique needs of all involved during this phase, including confirming the preferred place of care and ensuring appropriate supports, such as pastoral care and home care needs, are in place (ACSQHC, 2023; PCA, 2022).

Caring for the Carers

According to the most recent Australian Bureau of Statistics (ABS) Survey of Disability, Ageing and Carers, approximately 3 million Australians, or 11.9% of the population, were providing informal care in 2022 (ABS, 2022). An evaluation of the needs and preferences of an individual's family members, carers, and substitute decision-makers is essential to ensure they receive tailored support and clear, practical guidance. This process plays a critical role in shaping how their contributions are understood, acknowledged, and supported within the care framework (PCA, 2022, p. 22). Families and carers often assume substantial responsibilities when supporting individuals with life-limiting illnesses. This informal or unpaid care can encompass a broad spectrum of tasks, including personal care (such as assistance with showering), nursing duties (like symptom management and medication administration), household chores (e.g., cooking and cleaning), financial support (particularly when income is impacted), practical assistance (such as transportation), emotional support, and active involvement in planning and coordinating care and services (PCA, 2018).

Assessing the Needs of Carers

Clinicians should work collaboratively with carers and families to understand their desired level of involvement and discuss the potential benefits and risks of assisting with care. Ongoing assessment of carers' willingness and ability to participate is essential, as is providing up-to-date information and resources tailored to their needs, including education about how to safely assist with care, such as medication management, risk reduction, manual handling, and activities of daily living, and education and resources for emotional support (PCA, 2022). Additionally, carers should receive information about the signs and symptoms of approaching death and guidance on what steps to take following death, delivered in a manner appropriate to their age, culture, religion, and social situation (ACSQHC, 2023; PCA, 2022). It is important to recognise that family situations may be complex, and not all carers will be family members; some may be friends or members of the community (PCA, 2022).

Recognising Diversity

It is essential to acknowledge the diversity among carers. Young carers, LGBTIQ+ partners, and carers from culturally and linguistically diverse backgrounds may face unique challenges and burdens. In Aboriginal and Torres Strait Islander contexts, family and kinship structures may require the involvement of multiple

decision-makers, and additional support may be needed to address fragmented family connections due to colonisation (PCA, 2022).

Supporting the Wellbeing of Carers

Supporting the wellbeing of carers is a fundamental aspect of high-quality palliative care. This includes providing emotional support, opportunities for peer connection, and access to professional counselling or debriefing when needed. Healthcare providers should ensure carers are aware of available supports and encourage them to seek help for feelings of distress or burnout (ACSQHC, 2023; PCA, 2022). Support for carers can also include access to respite care, community resources, therapy to develop coping mechanisms for processing caregiver burnout and grief support services before and after the death of their loved one. In the context of palliative care, respite care is an important factor to consider when caring for the carers as it offers short-term or occasional relief, allowing them temporary breaks from their ongoing responsibilities. This support is vital for maintaining the carer's wellbeing and sustaining their ability to continue in their role effectively (PCA, 2018). Caregiver burnout and compassion fatigue are similar concepts that explain the emotional toll experienced by individuals caring for others. Both caregiver burnout and compassion fatigue may result in emotional and physical symptoms, signalling a state of stress and extreme exhaustion. Nurses can anticipate possible caregiver fatigue and proactively prepare the caregiver and encourage the use of available respite services before burnout occurs.

Providing Care

Care is guided by a thorough assessment of the individual's needs, is grounded in evidence-based practice, and aligns with the person's documented values, goals, and preferences as outlined in their care plan (PCA, 2022). This approach ensures timely responses to needs, ongoing evaluation of treatment effectiveness, and continuous access to palliative care for the individual, their family, carers, and substitute decision-makers. Additionally, any distress, whether physical, psychosocial, cultural, spiritual, or related to social determinants of health, is proactively anticipated and addressed promptly and effectively when it arises (PCA, 2022, p. 25).

Comfort Care Measures

The nurse's role includes the knowledge and skills to maximise the patient's comfort level to their desired outcome. The nurse must think about comfort holistically to include not only physical and psychological comfort, but spiritual and social comfort as well.

Figure 2. End-of-life care and advocacy for the patient

The only way to ensure adequate comfort in all these areas is to talk with the patient. The nurse must get to know the patient and establish a good nurse-patient relationship. A nurse can learn a lot about what is important to their patient by simply asking them. Comfort care measures provide pain control, relief from anxiety and agitation, support from spiritual leaders, and assistance with bodily functions and activities of daily living. Table 1 lists comfort care interventions for common end-of-life situations (National Institute on Aging, 2022).

Table 1. Comfort care interventions

End-of-Life Situation	Nursing Interventions
Pain	• Administer pain medication as directed • Monitor for nonverbal cues of pain • Administer preventive pain therapies as ordered • Maintain comfortable positioning.
Breathing problems	• Raise the head of the bed if tolerated • Use medications to relieve breathlessness as directed • Educate the family on expected changes in breathing patterns • Administer medications to lessen secretions as directed.
Skin irritation	• Keep skin clean and dry • Create a turning schedule to prevent pressure damage to the skin • Apply lotions to relieve itching • Keep lips moist with ointments • Moisten the mouth with ice chips or swabs.
Digestive problems	• Offer small amounts of food if swallowing is not an issue • Administer medications for nausea if indicated • Allow eating and drinking to the patient's comfort • Educate the family on the nutritional needs of the patient.
Temperature sensitivity	• Monitor for signs of heat or cold intolerance • Provide warm blankets • Use a fan if desired.
Fatigue	• Create resting spaces for people who are still ambulatory • Create a restful atmosphere • Have a commode near the bed.
Emotional disturbance	• Provide physical contact if the patient desires • Play quiet music • Use soft lights • Communicate with the dying person • Involve a spiritual leader if the patient desires.

Management of Pain

Pain is one of the most common symptoms in palliative care and perhaps one of the greatest concerns of patients who are nearing the end of life. In Australia, pain relief medications accounted for 8 in 10 (79%) of palliative care-related prescriptions in the period 2023-24, highlighting the central role of pain management for palliative care patients (AIHW, 2025). Although pain is one of the most frequently encountered symptoms in palliative care, it remains inadequately managed in many cases. Any pain management in palliative care should start with a thorough pain assessment followed by the formation of a pain management plan and continuous re-assessment to ensure that the method of pain relief is effective and to minimise and address any side-effects (Franklin & Lovell, 2024). Pain is a symptom that requires continual assessment and evaluation of the current interventions used for its management. As those who work with patients in pain know, the longer pain is left unmanaged, the more difficult it may be to treat. Effective management requires routine screening, thorough assessment when pain is identified, and the implementation of appropriate interventions. These may include localised and systemic treatments, as well as both pharmacological and non-pharmacological interventions (Franklin & Lovell, 2024).

Pharmacological Interventions

The World Health Organization (WHO, 2018) recognises that pain in terminal illness cannot always be completely eliminated. The goal of pain management, therefore, is to alleviate discomfort to a degree that enables the patient to maintain a level of quality of life that they personally find acceptable. The World Health Organization developed a three-step ladder for cancer pain in adults and adolescents, which can be used as a general guide to pain management and could be transferable to any pain during terminal illness. The World Health Organization's approach to pain management in cancer pain is guided by four key principles: By the clock, by the mouth and by the ladder.

By the Clock

To effectively manage pain, medications should be administered at consistent intervals rather than only when symptoms arise. This scheduled dosing helps maintain continuous relief and is tailored to the type of medication, whether it's short-acting or long-acting. The dose should be increased until the patient is comfortable and the next dose given before the effect of the previous dose has worn off (WHO, 2018).

By Mouth

Oral administration is generally favoured due to its simplicity and suitability across various care environments. However, when oral intake is not possible, such as in cases of unconsciousness or swallowing difficulties, alternative routes should be considered. Less invasive methods like sublingual or subcutaneous delivery are preferred over intravenous options, and intramuscular injections are discouraged due to discomfort and variability in absorption (WHO, 2018).

With Attention to Detail

The first and last doses of the day should be linked to the patient's waking time and bedtime. Ideally, the patient's analgesic medicine regimen should be written out in full for patients and their families to work from and should include the names of the medicines, reasons for use, dosage and dosing intervals. Patients should be warned about the possible adverse effects of each of the medicines they are being given.

For the Individual

Management of an individual patient's pain requires careful assessment, plus differential diagnosis of the type of pain, the site of origin of the pain and a decision about optimum treatment. The correct dose is the dose that relieves the patient's pain to a level acceptable to the patient. While pain assessment tools like the three-step ladder below (Figure 3) can offer valuable insights into managing pain and can be useful as a teaching tool, they are not universally applicable to every patient. Pain management should always be individualised and informed by a comprehensive clinical evaluation. This includes considering the patient's overall health status, existing medical conditions, cardiovascular stability, potential side effects of treatment, the urgency of their condition, and both past and current therapeutic interventions (WHO, 2018).

Pain relief should follow a structured progression based on severity. However, note that in cases of severe pain, it may be appropriate to start directly with a strong opioid. The first step of the ladder includes non-opioid medications (e.g. Paracetamol or non-steroidal anti-inflammatory drugs [NSAIDs]), plus an adjuvant medication if appropriate. If pain persists, the next step on the ladder for increasing mild to moderate pain is mild opioid medications (e.g. codeine), plus a non-opioid and/or adjuvant medication if applicable. If pain persists, the third and final step on the WHO ladder is the use of strong opioid medications (e.g., morphine or hydromorphone), also with or without the non-opioid and/or adjuvant medication if applicable. Once effective pain control is achieved, the patient should remain on the dose that works, unless the underlying cause of pain resolves (WHO, 2018). See Figure 3 for a visual representation of the 3-step analgesic ladder.

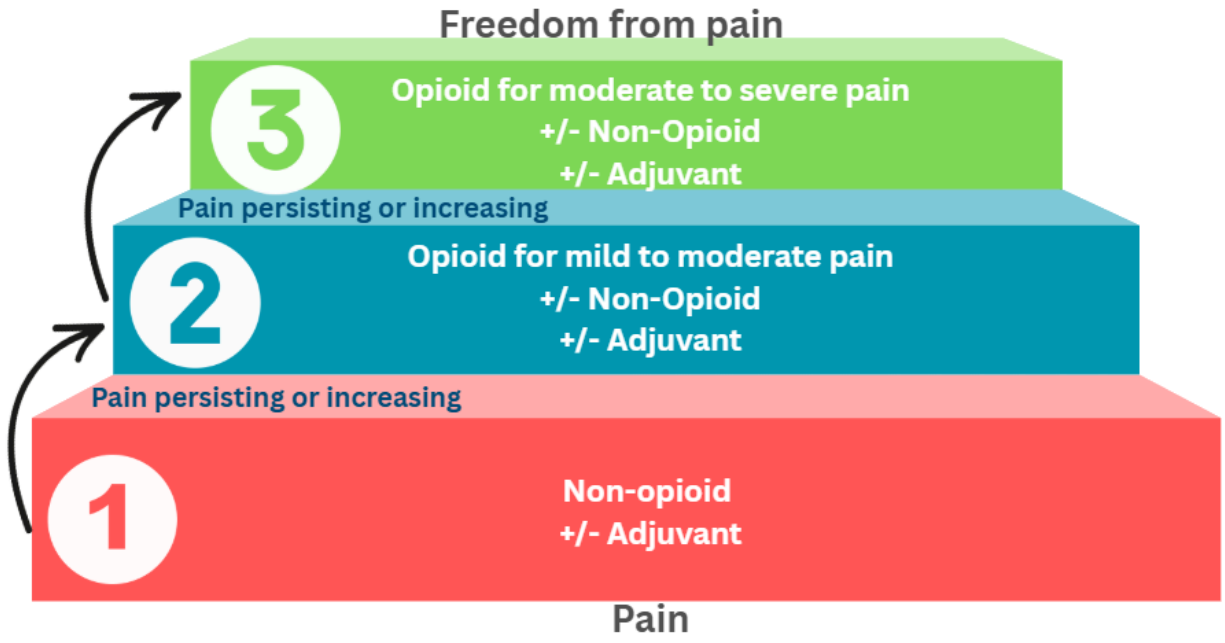

Figure 3. The three-step analgesic ladder

A wide range of pharmacological options are available to support effective pain relief in palliative care. These interventions are selected based on the nature and severity of the pain, the patient's overall condition, and their response to previous treatments. Understanding the different classes of medications and their roles is essential for tailoring pain management to individual needs in palliative care. Table 2 outlines the common medicines used in palliative care.

Table 2. Groups and classes of medicines for cancer pain management and specific examples (WHO, 2018)

Medicine Group	Medicine Class	Example Medicines
Non-opioids	Paracetamol	Paracetamol oral tablets and liquid. Rectal suppositories, injectable
	NSAIDs	Ibuprofen oral tablets and liquid
		Ketoralac oral tablets and injectable
		Acetylsalicylic acid oral tablets and rectal suppositories
Opioids	Weak opioids	Codeine oral tablets and liquid and injectable
	Strong opioids	Morphine oral tablet and liquid and injectable
		Hydromorphone oral tablets and liquid and injectable
		Oxycodone oral tablets and liquid
		Fentanyl injectable, transdermal patch, transmucosal lozenge
		Methadone oral tablet, liquid, injectable
Adjuvants	Steroids	Dexamethasone oral tablet and injectable
		Methylprednisolone oral tablets and injectable
		Prednisolone oral tablets
	Antidepressants	Amitriptyline oral tablets
		Venlafaxine oral tablets
	Anticonvulsants	Carbamazepine oral tablets and injectable
	Bisphosphonates	Zoledronate injectable

Non-Pharmacological Interventions

Non-pharmacological interventions can be useful in managing pain in palliative care by meeting patients' psychological, social and spiritual needs in conjunction with analgesic medication (Franklin & Lovell, 2024). Recent reviews have highlighted a range of non-pharmacological interventions for palliative pain management. Ruano et al. (2022) found that mindfulness-based cognitive therapy, guided imagery, progressive muscle relaxation, and emotional and symptom-focused engagement (EASE) were the most effective psychological strategies for reducing cancer pain. Music therapy and brief cognitive behavioural

strategies (CBS) showed potential but require further research, while coping skills training and yoga did not demonstrate significant benefits.

Complementing these findings, van Veen et al. (2024) found that massage therapy and virtual reality had the strongest evidence for pain relief. Other promising interventions included hypnosis, progressive muscle-relaxation-interactive-guided imagery, cognitive-behavioural audiotapes, wrapped warm footbaths, reflexology, and music therapy. However, mindful breathing, mindfulness-based stress reduction, aromatherapy, and aroma-massage therapy did not show significant effects. These findings underscore the importance of integrating evidence-based, non-pharmacological strategies into palliative care pain management.

Management of Physical Symptoms

In addition to pain, patients nearing the end-of-life often have other types of negative symptoms, including dyspnoea, cough, nausea and vomiting, constipation, anorexia and cachexia, dysphagia, fatigue, seizures, lymphoedema, depression, anxiety and terminal restlessness or delirium. Click or tap on the tabs below to learn more about these symptoms at the end of life.

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At the time of impending death, nurses play a vital role in creating a peaceful and supportive atmosphere where families feel safe to express their cultural responses to death. This involves more than clinical care; it requires emotional presence, cultural sensitivity, and thoughtful communication. Nurses can dim harsh lighting, reduce noise, and arrange the space to feel more private and comforting. They can also facilitate rituals or practices important to the family's beliefs, such as prayer, music, or the presence of spiritual leaders. By acknowledging and respecting diverse cultural expressions of grief, nurses help families feel seen and supported during one of life's most vulnerable moments.

Caring for Spiritual Needs

Caring for the spiritual needs of palliative care patients is an essential component of comprehensive care. Spiritual needs are highly prevalent among palliative care patients, however, this is a part of care that is often overlooked or suboptimal (Büssing, 2024; Vivat, 2024). But what does spirituality really mean? The world consensus definition describes spirituality as: "a dynamic and intrinsic aspect of humanity

through which persons seek ultimate meaning, purpose, and transcendence, and experience relationship to self, family, others, community, society, nature, and the significant or sacred. Spirituality is expressed through beliefs, values, traditions, and practices." (Puchalski et al., 2014, p. 646). Spiritual care is deeply personal and will vary greatly from one individual to another. For this reason, assessing spiritual needs and spiritual wellbeing and engaging in meaningful conversations about what that looks like for each patient is essential (Büssing, 2024). Spiritual needs can be explored using assessment tools such as the Spiritual Needs Questionnaire (SpNQ-20) developed by Büssing (2010), which helps identify individual concerns, values, and sources of strength and meaning at the end of life. This assessment identifies four key dimensions of spiritual need: religious needs, needs for inner peace, existential needs, and the need to give to others (Büssing, 2010). Other structured conversation tools, such as HOPE (Sources of Hope, Organised religion, Personal practices, Effects on medical care) or FICA (Faith, Importance, Community, Interventions), remind clinicians of key areas to address (Leget, 2024; Vivat, 2024). Even just facilitating a discussion about spiritual needs can aid in addressing spiritual needs as they can remind patients of their spiritual strengths like meaning, connection, agency, hope and faith (Haufe et al., 2024). A somewhat structured way of getting into conversation can be making use of the two questions that were developed by Caresearch (2023a):

1. Are you at peace?
2. Where do you find strength in difficult times?

However you assess spiritual needs, spiritual care involves skills in communication, such as asking open-ended questions, being receptive and listening carefully in a nonjudgmental way, rather than speaking (Leget, 2024). Simply responding to a patient's spiritual assessment, especially when it reveals distress or unmet needs, is a vital starting point for providing meaningful spiritual support (Vivat, 2024). It's important to ensure a multi-disciplinary approach is implemented, integrating the patient's spiritual needs into the comprehensive care plan, and making appropriate referrals to specialists like chaplains, ministers or other spiritual guides when needed (Büssing, 2024; Leget, 2024; Vivat, 2024).

Transitions Within and Between Services

Transitions in and between care settings are critical moments in the palliative and end-of-life care journey. Effective management of these transitions is essential to ensure continuity, safety, and person-centred care for people with life-limiting conditions and their families (ACSQHC, 2023; PCA, 2022). Click or tap on the tabs below for the principles for ensuring effective transitions of care.

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Key actions for safe transitions include thorough preparation and anticipatory planning to ensure that patients, their families, and carers have continuous access to appropriate care, medications, and support, including after-hours assistance (PCA, 2022). Any significant changes, such as a transfer between wards, discharge home, or the death of a patient, should be communicated promptly within and between services to prevent distressing errors, such as inadvertently recalling a deceased person for appointments (PCA, 2022). Additionally, every transition of care should trigger a reassessment of the patient's needs and preferences, ensuring that care remains aligned with their goals and current circumstances (PCA, 2022).

Grief Support

In palliative and end-of-life care, supporting families and carers through grief is a core responsibility of all health professionals, extending before, during, and after the death of a person with a life-limiting condition. Grief is a natural response to loss, and its course and consequences vary for each individual, shaped by personal, social, and cultural circumstances. Each person will react differently to anticipated and actual death. To understand how to support a person in their time of grief, you must first understand the different stages of grief that person might be in.

Navigating the Different Stages of Grief

In 1969, Dr Elisabeth Kübler-Ross wrote a book entitled *On Death and Dying* in which she outlined a conceptual framework for how individuals cope with the knowledge that they are dying (Kübler-Ross, 1997). She proposed five stages of this process that included denial, anger, bargaining, depression, and acceptance. Not all people will go through each stage in sequence, and some may skip some stages altogether. It is important for nurses who care for patients who are dying to have an understanding of these stages to be able to properly care for and support themselves and their families.

Patients and families may experience these stages along a continuum, move randomly and repeatedly from stage to stage, or skip stages altogether. As the figure below illustrates, there is no correct way to grieve, and an individual's needs and feelings must remain central to care planning.

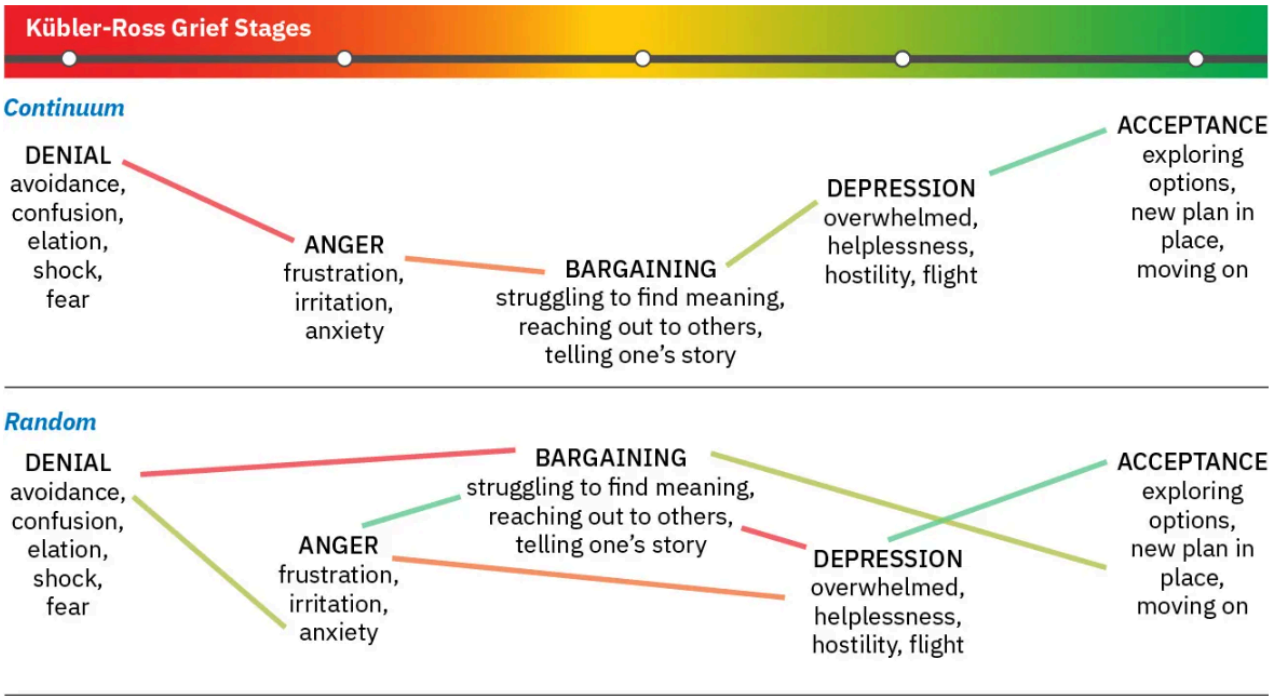

Figure 4. The Kübler-Ross grief cycle explains the normal grief process; however, it is common to fluctuate and move randomly through the stages, particularly in cases of complicated grief

Denial

Denial is the first stage because many individuals will initially react to being told that they may die by denying what they heard. People in this first stage will be in disbelief and think that their doctor has made some kind of mistake. Often, patients will go to another doctor for a second opinion during this stage. Denial can be important for two reasons: it will initially be somewhat of a shock absorber, enabling the person to seek clarification about the truth in what they were told. It can also provide patients with the needed time to become acquainted with the possibility that the information they heard is true, which can enable them to internalise and begin to process that information.

Anger

Anger is the second stage and can be the most difficult for clinicians and caregivers to witness. In this stage, individuals have accepted that the news of impending death is true, and they are naturally angry about it. They do not understand why they have to die, and they make this known to those around them. They may lash out at clinicians and loved ones alike because they are angry about their situation. Often, nothing that clinicians or family members do for them is right, and they have negative things to say about other aspects of their lives as well. Patients in this stage realise that they have lots of things in their life that they wanted to accomplish, but now they will not have the time.

Bargaining

The third stage is called bargaining, and it is a stage that is rarely visible to onlookers, as it happens internally

within the person who is dying. In this stage, individuals realise that they are past denying that they are dying and that they have been angry about it, with neither of the two causing any change in the outcome. Patients at this stage may bargain with a higher power to change their outcome and give them more time. Sometimes patients might bargain with their doctor to try to find any other option that might give them more time, but this bargaining is often accomplished internally between the dying patient and their higher power or God.

Depression

Depression is the fourth stage and is a natural part of learning that impending death is near. Patients might be saddened because they had things they wanted to accomplish, places they wanted to go, or people they wanted to see, and those things will now be cut short. In addition, patients may be experiencing a decline in physical abilities, loss of function, and increased symptoms such as pain. Those are factors that can lead to depression even in people who are not dying, and are even more magnified in those who are dying. It is not uncommon for individuals in the depression stage of grief to experience irritability, sleeplessness, significant fatigue, and loss of focus or energy. Simple tasks such as getting out of bed, showering, or preparing a meal can feel so overwhelming that individuals withdraw from activity. They may struggle to find meaning in their life or to identify their sense of personal worth or the value of their contributions. Depression can be associated with ineffective coping behaviours, and nurses should watch for signs of self-medicating with alcohol or drugs to mask or numb depressive feelings.

Acceptance

The final stage is acceptance. This stage does not mean that the person is happy about their impending death, but rather that they have come to accept it and have found a sense of peace with it. The first four stages involved mostly negative emotions, which have taken a toll on the patient. Time has progressed, and patients can begin to move past the negative emotions and focus on the time they have left. During this stage, their hope for a cure is replaced by a hope that their final days will be peaceful and their death will be what they want it to be.

There are some important actions that nurses and clinicians can take during each of these stages to support the patient and their family. Click or press on each stage below to explore the nursing interventions that can assist with each stage.

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Bereavement Support

Grief support should be tailored to the unique needs, values, and cultural backgrounds of families and carers. This includes recognising diverse definitions of family, such as chosen family, kinship networks, and friends (PCA, 2022). Support for grief and bereavement begins before death, with anticipatory guidance and preparation, and continues after death to help families adjust and cope (ACSQHC, 2023). In a recent scoping review, Coelho et al. (2025) outlined six stages of interventions for bereavement support in palliative care, ranging from initial patient admission through post-death bereavement, emphasising individualised assessment and tailored support to address the varying needs of grieving individuals. Press or click on the plus signs in the infographic below to understand each stage of bereavement support (Coelho et al., 2025).

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Communication

Discussing end-of-life care can be challenging. These conversations often involve navigating complex emotions, uncertainty, and deeply personal values. Despite the difficulty, open and honest communication is vital to ensure that a person's wishes are understood and respected. Initiating these discussions early offers significant benefits for both patients and their families. Research shows that early end-of-life conversations are linked to improved patient and healthcare outcomes, as well as a higher likelihood of receiving care aligned with personal preferences (Deckx, 2020; Nakazawa et al., 2025). Such conversations can reduce the use of aggressive medical interventions, often associated with diminished quality of life, and instead promote care that enhances comfort, mood, and overall satisfaction (Crawford et al., 2021; Nakazawa et al., 2025; Thomas et al., 2020). By documenting their values and preferences, patients can safeguard their autonomy and ensure that future healthcare decisions reflect their wishes, even if they lose the capacity to communicate (Crawford et al., 2021). In contrast, the absence of these discussions may lead to emotional isolation, heightened anxiety, and poorly managed pain (Sansom-Daly, 2022).

Families also benefit greatly from early end-of-life conversations. These discussions help prepare loved ones for the patient's death, offering clarity and guidance during a difficult time (Thomas et al., 2020). When patients' preferences, particularly for home-based care, are honoured, families report higher "good death" scores, including positive experiences such as dying in a favourite place, enjoying daily life, and spending meaningful time together (Nakazawa et al., 2025).

For healthcare providers and the broader system, early conversations help clarify patient goals, reduce unnecessary interventions, and strengthen the therapeutic relationship. They enable clinicians to better understand what matters most to patients, leading to more personalised and patient-centred care (Nakazawa et al., 2025; Thomas et al., 2020). Recognising the importance of early end-of-life conversations is only the first step. The next challenge lies in knowing how and when to initiate these discussions in a way that feels respectful, timely, and supportive. While there is no one-size-fits-all approach, understanding the principles of compassionate communication during end-of-life discussions can help clinicians and caregivers navigate these moments with confidence and care.

Initiating End-of-Life Discussions

Initiating an end-of-life discussion requires a thoughtful and well-prepared approach to ensure it is both patient-centred and effective. Preparation begins with assessing the patient's readiness to engage in such conversations. This can be achieved by observing their emotional and psychological state, and by using open-ended questions to explore their feelings, concerns, and both verbal and non-verbal cues (Deckx et al., 2020). Non-verbal cues can include a patient's overall demeanour and psychological presentation compared to their baseline. For example, observing signs of fear or denial in a patient's body language or facial expressions can indicate their openness (or reluctance) to engage in such conversations. While clinicians may not always accurately predict readiness based on non-verbal cues alone, paying attention to these signals is part of a sensitive approach to understanding a patient's comfort level and helping to pick the right time for these discussions (Deckx et al., 2020; Thomas et al., 2020).

Being able to gauge the readiness of a conversation about end-of-life preferences is important. Starting with open-ended questions can help create a safe and supportive space for patients to express their thoughts, values, and concerns. These questions not only guide the conversation gently but also allow clinicians to assess emotional readiness and tailor discussions to individual needs.

Below is a table of open-ended questions that can be used to initiate and navigate these sensitive conversations:

Table 3. Open-ended questions for initiating end-of-life discussions

Theme	Example Questions
Readiness and information preferences	"How much would you like to know about your condition?" "Would you like to talk about what might happen if your health changes?"
Support and emotional needs	"When you're not feeling well, who do you like to have around for support?" "Some people say they feel alone even in a room full of people. Have you ever felt that way?"
Comfort and environment	"What brings you comfort when you're feeling unwell?" "Do you prefer a quiet space, music, or something else when you're resting?"
Decision-making preferences	"How are decisions about your care usually made?" "Have you thought about who you'd trust to make decisions if you couldn't?"
Treatment preferences	"Are there any tests or treatments you've found especially difficult or would prefer to avoid?" "Have you ever thought about whether you'd want life-support treatments like a breathing machine?"
Family and relationships	"Do you ever worry more about your family than yourself?" "What would help your family feel supported if your health worsened?"
Spiritual beliefs	"Do you find comfort in any spiritual or religious beliefs or traditions?"
Cultural sensitivity	"Are there any cultural or family traditions that are important to you when thinking about your care?" "Would you prefer to have these conversations with your family present?"
Remembrance and legacy	"What would be most important to you if you were no longer here?" "Would you want a service? What kind? Who would you want to be there?" "If you wanted to leave a message or letter, who would it be for?"

Clinicians should also be mindful of time management. While these discussions can be time-consuming, initiating them early often leads to more efficient care planning and can ultimately save time (Deckx et al., 2020; Thomas et al., 2020). Deckx et al. (2020) outline several entry points for introducing the topic, including responding to patient cues, incorporating discussions into routine care (such as during assessments or care planning), or addressing prognosis and potential deterioration directly. It is important to recognise that end-of-life conversations are rarely a one-off event. They typically unfold over multiple consultations, allowing for gradual exploration of sensitive topics and reducing the risk of overwhelming the patient (Deckx et al., 2020).

Cultural sensitivity is also essential. For diverse populations, such as older first-generation migrants or First Nations People, clinicians must be aware of cultural attitudes toward death, preferences for family-based decision-making, and the need for interpreters or translated materials to overcome communication and health literacy barriers (Gerber et al., 2020). Communication should be tailored to each individual, balancing gentleness with honesty, using clear and straightforward language, and avoiding assumptions based on age or cultural background (Deckx et al., 2020; Gerber et al., 2020).

Family involvement is another key component. Patients should be given the opportunity to include family members or nominated substitute decision-makers in these discussions. This not only supports shared

understanding but also ensures that family perspectives are incorporated in a timely and structured way (Crawford et al., 2021; Deckx et al., 2020). Whatever the circumstances, end-of-life conversations should be person-centred, adapted to the individual's level of health literacy, and revisited regularly to reflect changing needs and preferences (ACSQHC, 2023).

Supporting End-Of-Life Conversations with the PREPARED Framework

Initiating and navigating end-of-life discussions can be emotionally complex and clinically challenging. These conversations require sensitivity, empathy, and a structured approach to ensure that patients feel heard, respected, and empowered. The PREPARED framework and SPIKES framework offer clinicians a practical guide to approaching these discussions with confidence and compassion. These frameworks provide a step-by-step method for preparing, engaging, and responding to patients and families during these critical moments, helping to align care with individual values and preferences. You can access these frameworks via the links below.

Links to Learning

PREPARED model: A guide for clinicians for conversations about the last days of life

SPIKES: A communication framework for serious illness conversations

Documentation

Documentation in end-of-life (EOL) care is essential, as it supports patient autonomy and ensures that future healthcare decisions reflect the individual's values and preferences, particularly if they lose the capacity to make decisions. As discussed earlier, end-of-life conversations are not just a one-time conversation. These conversations need to be happening and documented on a regular basis to ensure documentation reflects preferences and needs in the evolving situation (ACSQHC, 2023). Research shows that clear documentation is associated with a higher likelihood of patients receiving their preferred care, reduced use of aggressive or non-beneficial interventions, and improved quality of life and satisfaction (Crawford et al., 2021).

One key form of documentation is the Advance Care Directive (ACD), a legally binding document that allows individuals to express their healthcare preferences, appoint a substitute decision-maker, and formally

refuse specific treatments. Despite its importance, ACD completion rates remain low in Australia, and integration within hospital systems is often poor (Crawford et al., 2021; Veltre et al., 2023). This can result in difficulties accessing the directive when it is most needed, and in some cases, the document may not adequately reflect the progression of illness or evolving health status.

To be effective, documentation must be clear, accessible, and embedded within clinical systems, while also remaining responsive to the patient's changing condition and enduring values. Regular review and updates to care plans and directives are recommended to ensure they remain relevant and actionable throughout the patient's healthcare journey (Crawford et al., 2021). Ensuring that documentation is clear, accessible, and integrated into the system, while remaining responsive to a patient's health trajectory and enduring values. There are more and more tools out there to help us initiate and document these processes. Pathways such as the 7-Step Pathway developed by South Australia Health specifically for patients nearing the end of their lives, can help to guide clinicians through the appropriate clinical, legal and ethical steps in the correct order, and allows decisions to be documented, standardised and recognised (SA Health, 2024). Press or click on the tabs below for a summary of the 7-step pathway for a resuscitation plan.

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Ethical Considerations at End-of-Life

Ethics in death and dying is a recurring topic in the medical community. It is also routinely addressed in legislation where national and state laws are set and often challenged based on varying ethical standards. As with any ethical conflict, considerations include autonomy (the right of independence), beneficence (to do good), nonmaleficence (to do no harm), and justice (fairness). Many of the preceding advance directives seek to ensure an ethical death in that quality of life is maximised and the decision made by others on behalf of a dying individual aligns with their values, beliefs, and cultural conditions. While nurses may be ethically challenged when caring for a dying patient, they must be informed and comfortable supporting patients and families in end-of-life situations.

Terminal Weaning

Removing or discontinuing life-sustaining treatments and procedures is referred to as terminal weaning, also known as terminal extubation. This process can present a significant ethical dilemma for the patient's

family, carers, and healthcare decision-makers, as it often involves complex considerations around the patient's wishes, quality of life, prognosis, and cultural or religious beliefs. Navigating these decisions requires sensitive communication, ethical guidance, and a multidisciplinary approach to ensure that care remains compassionate and aligned with the patient's values and best interests. It is important to note that terminal weaning is not the same as euthanasia; rather, it involves allowing the natural progression of a terminal condition without artificially prolonging life. Most terminal weaning takes place in an intensive care unit (ICU) setting with the removal of ventilator tubes or other life-sustaining equipment. Terminal weaning occurs after a determination is made by providers that continued treatment will not improve or reverse the condition of the individual, and the intubation is only prolonging the dying process (Thellier et al., 2017). The patient's family ultimately makes the decision based on the provider's recommendations and facts about the prognosis for ongoing life. The time between terminal weaning and death is typically very short. Terminal weaning occurs in the presence of providers and nurses to ensure the patient's comfort level is maximised, usually using palliative sedation and pain medication, and the family has adequate support.

Palliative Sedation

The administration of pharmaceutical agents to reduce consciousness with the aim of reducing discomfort and distress at end-of-life is known as palliative sedation (Cherny, 2024). These medications may be administered intravenously, subcutaneously, orally, or rectally. Palliative sedation is appropriate in the case of severe and intractable pain at the end of life, and it can be used in the ICU, inpatient hospice, inpatient general units, and at home, depending on the circumstances of each individual. Palliative sedation allows restfulness for the individual and reduces stress levels for the family (Cherny, 2024). Discomfort and pain in palliative care may result from the disease process itself or as a result of palliative treatments, procedures, or surgical interventions. However, palliative sedation is more than just administering pain relievers. Palliative sedation may also relieve emotional suffering, such as anxiety, and reduce physical discomfort, such as breathlessness or dyspnea. It can also alleviate symptoms of delirium and fatigue.

While both euthanasia and palliative sedation may use similar modalities, the distinction lies in the intention and the outcome. Palliative sedation intends to provide comfort and focuses on the ethical standards of beneficence and nonmaleficence. The outcome of palliative sedation is improved quality of life during the end-of-life period rather than inducing or hastening the process of death. Nurses need to assess their comfort level in providing this care during this challenging time, as there is a shift from delivering curative treatment to maintaining and providing dignity and comfort at the end of life.

Voluntary Assisted Dying

Voluntary assisted dying (VAD) is now legally available in all six Australian states: Victoria, Western Australia, Tasmania, South Australia, Queensland, and New South Wales. Each state has its own legislation

outlining eligibility criteria and procedural safeguards. In these jurisdictions, VAD allows a competent adult with a terminal illness to request and receive medication to end their life, either through self-administration or practitioner administration (by a doctor, or in some States, a nurse practitioner or registered nurse). The Australian Capital Territory (ACT) passed its VAD legislation on 5 June 2024, with the law set to commence on 3 November 2025. In contrast, VAD remains illegal in the Northern Territory, where assisting another person to die may result in serious criminal charges (Queensland University of Technology, 2025)

Each state and territory has different legislation related to VAD, therefore, as a nurse, it is important to understand the legal boundaries of the role in VAD processes. For example, in Queensland, registered nurses may:

- Provide information about VAD only when requested
- Participate in VAD processes if trained and authorised
- Continue to provide holistic care to patients accessing VAD, including palliative and psychosocial support. (Queensland Health, 2021)

The Australian College of Nursing (ACN) recognises the ethical complexity of VAD and encourages nurses to:

- Respect patient autonomy, dignity, and informed choice
- Provide compassionate, person-centred care regardless of personal beliefs
- Exercise conscientious objection if participation conflicts with personal, cultural or religious values, while ensuring continuity of care. (ACN, 2021)

Clinical and Legal Responsibilities at End-of-Life

Verification of Death

Verification of death is the clinical process of confirming that a person has died. In Australia, this can be performed by a medical practitioner (doctor), registered nurse, registered midwife, or qualified paramedic, particularly in palliative care settings where death is expected. The process involves a clinical assessment to confirm the irreversible cessation of cardiorespiratory function, which includes checking for the absence of a pulse, heart sounds, breath sounds, pupillary response to light, and response to painful stimuli. A minimum observation period (often five minutes) is required to ensure that these signs are absent before death is verified. The time of death is then recorded, and a Verification of Death form must be completed according to state or territory policy (Caresearch, 2023b).

Medical Certificate of Cause of Death

Certification of death is a separate legal process that involves formally diagnosing the cause of death and completing the Medical Certificate of Cause of Death (MCCD). Only a medical practitioner who knows the patient's medical history and is prepared to certify the cause and circumstances of death can complete the MCCD. This certificate is a legal requirement under the Births, Deaths and Marriages Registration Act and is necessary for registering the death with the relevant state or territory authority (ABS, 2024; Caresearch, 2023b).

Coroners Cases

If the death is a Coroner's case, additional legal steps must be followed. If the death is reportable to the Coroner (for example, if it is unexpected, unexplained, or due to certain circumstances), a Coronial Checklist or additional documentation must also be completed, and the case referred to the Coroner (ABS, 2024). In cases where a death is reportable to the Coroner, nurses may be required to assist in gathering information for the Coronial Checklist and ensure that the body is not disturbed until the Coroner or their representative provides further instructions.

Organ Donation

According to the latest Australian statistics from 2024, there were 527 deceased organ donors, 1,694 deceased eye donors, and 311 deceased tissue donors. These generous donations enabled 1,328 individuals to receive life-saving organ transplants (Organ and Tissue Authority, 2024). Only 2% of Australians die in a way that makes it possible for them to donate their organs. In Australia, individuals who become deceased organ donors are typically patients in an Intensive Care Unit (ICU) or Emergency Department (ED), and are usually supported by a ventilator at the time of death. For this type of donation, the individual must undergo a series of neurological assessments and be formally declared brain dead. Despite the absence of brain activity, the person remains on life support to maintain organ function, which is essential for successful organ retrieval and transplantation. Eye and tissue donation, however, can occur up to 24 hours after death. Donation after Circulatory Determination of Death (DCDD) is different again and refers to organ donation that occurs after death is confirmed using circulatory criteria, rather than neurological criteria. This process typically takes place in a controlled hospital setting, such as an Intensive Care Unit (ICU) or Emergency Department (ED), although it may also occur in other areas of the hospital. DCDD usually follows the planned withdrawal of cardio-respiratory support (WCRS) in patients with no chance of recovery, such as those with irreversible brain injury, severe organ failure, or advanced neuromuscular disease. For DCDD to proceed, death must occur within a specific timeframe, generally within 90 minutes of WCRS, for organs to remain viable for transplantation. The process is carefully managed to ensure patient comfort and dignity, and includes clear communication with families, ethical oversight, and adherence to jurisdictional legislation. In Australia, DCDD accounts for approximately 30%

of all deceased organ donations and most commonly occurs when cardiac arrest is expected following treatment withdrawal in a controlled environment such as an ICU or operating theatre (Organ and Tissue Authority, 2021a).

For all types of organ donation, for organs to be viable for donation, they must be functioning well prior to retrieval. Importantly, even if a person has registered their wish to donate, their family must still provide consent for donation to proceed. Currently, the national family consent rate stands at 53% (Organ and Tissue Authority, 2021a). It is important to note that organ and tissue donation should only be discussed with the family once they have a clear understanding of their loved one's poor prognosis and the likelihood of death. Ideally, a donor specialist or someone trained in having these conversations should be present. It's important that this conversation is approached with sensitivity and not rushed. Ideally, the topic of donation is introduced separately from the initial end-of-life discussion, allowing families time to process the situation before considering the possibility of donation (Organ and Tissue Authority, 2021a).

Once a person has consented to organ donation, there are specific clinical and procedural guidelines that must be followed to ensure the donation process is safe, respectful, and effective. Donation specialist nurses and doctors play a central role in coordinating this process. They provide clear guidance to the healthcare team, manage communication with the donor's family, and ensure all legal, ethical, and medical requirements are met. These specialists will inform staff of the necessary steps, including maintaining organ viability, preparing for retrieval, and supporting the family through the process. Their involvement helps ensure that the donor's wishes are honoured with dignity and that the donation proceeds smoothly within the framework of national standards (Organ and Tissue Authority, 2021b).

Pathophysiological Changes at End-Of-Life

The pathophysiology of death explains the outwardly visible physical changes to the individual and the internal organ functions that deteriorate during the dying process. These changes may progress quickly or slowly. Many of these changes can be predicted and expected; however, not every individual experiences every symptom of dying. This is particularly true if the death is sudden rather than prolonged. The active dying process has three stages: early, middle, and late. Each stage has specific changes in behaviour and physical changes in the body that influence the individual's appearance (Traditions Health, 2021). Click or press on the tabs below to see the pathophysiological and physical changes associated with each stage of death.

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Early Stage

During the early stage of dying, there may be few visible changes, depending on the underlying disease process. The human body begins to conserve energy in this early stage, resulting in a reduced appetite and a lack of interest in food. Patients may experience trouble swallowing, feeling full after consuming a small amount of food, and decreased pleasure sensation from food. For some individuals, chewing, swallowing, and digestion may become painful due to dry mouth, oral sores, dry throat, and bloating. This is the body's sign that fewer nutrients are needed. This stage is often difficult for family members and caregivers, since providing nourishment is essential to caregiving.

Middle Stage

The middle stage of the dying process can last anywhere from a few hours to days. Nurses will notice predictable and expected physical changes that suggest a slowing of bodily functions. The physical changes noted during the middle stage of dying result from physiological changes, such as a reduction in peripheral circulation as blood flow is reserved for the functioning of primary internal organs. Changes to internal blood circulation result in findings such as low blood pressure, irregular breathing patterns, and bradycardia (slow heart rate). Visible changes include cool hands and feet, a sensation of being cold, and paling or darkening of the skin. Decreased circulation in the skin may result in pallor, an extremely pale hue of the skin, or mottling, a bluish-red, lace-like (reticular) colouration of the skin. Many of these circulatory effects also result in weakness and fatigue. Less blood to the brain may also affect cognition and verbal response, leaving some individuals unable to speak. The inability to communicate effectively often leads to social withdrawal. However, individuals can still experience touch, hearing, and emotions.

Late Stage

Depending on the cognitive and physical state before the initiation of the dying process, individuals may experience progressive failure of body organ systems. Because circulation is reduced to major organs, breathing muscles may be less effective and unable to clear secretions. This results in sporadic, shallow, or noisy breathing. Individuals may show respiratory changes such as laboured breathing and periods of apnea, temporary pauses in breathing. Also, bowel or bladder incontinence may result due to a lack of muscle tone in the bowel or bladder. Patients may have little or no urine or stool output due to reduced metabolism and processing of nutrients. Skin changes progress to include widespread mottling. Continued

circulatory changes include pronounced bradycardia and hypotension (low blood pressure). During this later stage, patients may become extremely restless, especially if the work of breathing is significantly impaired. Patients lose interest in food and may develop abdominal ascites as the liver is less effective in processing waste products.

Physical Signs of Impending Death

Physical signs that signal impending death typically occur during the last hours before death. Sometimes, these are continuations of previous symptoms and may be more pronounced during this stage. Signs of impending death may include terminal restlessness or terminal agitation. Individuals often have a fading of consciousness or even periods of unconsciousness. Sensory changes, including illusions, delusions, hallucinations, and death awareness, may occur (Clifton & Fletcher, 2024). Additional changes to breathing patterns are often a sign of impending death. Cheyne-Stokes breathing is a pattern of abnormal breathing characterised by progressively deeper and sometimes faster breathing, followed by a gradual decrease that results in a temporary stop in breathing (apnoea), while agonal breathing refers to gasping or laboured breaths that may be followed by periods of apnoea lasting many seconds.

Care After Death

Care for a patient does not end at the moment of death. The period immediately following death is a critical phase in the continuum of care, requiring sensitivity, professionalism, and adherence to ethical and legal standards. This phase includes physical care of the deceased, ongoing support for the family, and coordination with relevant authorities.

Postmortem Care

The care provided for an individual immediately after death is called postmortem care. At this time, the body will experience expected changes, including a drop in temperature, colour changes to the skin, and rigor mortis, the stiffening of the muscles in the body. The skin will develop passive euthanasia, a pale to greyish colour of the skin that occurs shortly after death, with some areas turning purplish due to blood pooling in lower body parts due to gravity.

The task of postmortem care falls to the nurse in a hospital setting and possibly in a long-term care facility or home setting. Nurses must provide gentle care to the body to prevent tissue damage and preserve dignity; modesty and privacy are also important. Nurses should remove all IV lines that fall under their scope of practice (e.g., some facilities will allow peripheral IVs to be removed but not tunnelled or large-bore lines) and remove indwelling tubes, such as nasogastric or urinary catheters. It is important to note that if an autopsy is planned, no lines or tubes should be removed. Nurses should also remove or replace any soiled linens and clothing, close the eyes, and gently cleanse any soiled parts of the body before the family viewing.

Documenting a postmortem assessment is essential, particularly in inpatient settings and for individuals who will have an autopsy performed. The facility will dictate the type and extent of the exam.

Postmortem care should also provide time for the family to view the body and say goodbyes; a private space for this is ideal. Nurses have an important duty in creating a peaceful space for the family to view the body. By removing IV lines, tubing, ventilators, pumps, and other machines, nurses can help the family focus on emotional needs. Cleaning the room of visible stains and body fluids and applying clean linens will go far in creating a space for families to begin their healing. As much as possible, the patients and their families' cultural beliefs and wishes should guide postmortem care.

While this chapter concludes with a step-by-step procedure for caring for a body after death, it is essential to acknowledge that postmortem care practices vary widely depending on the care setting. In large hospitals, procedures may follow detailed protocols involving mortuary services and specialised staff. In contrast, smaller or rural facilities may operate with limited infrastructure and resources, requiring more flexible approaches. In community-based environments, such as home care or aged care, postmortem care often involves family members and local support services, who coordinate arrangements for the body's transfer and next steps. Healthcare professionals must be prepared to adapt postmortem care to suit the physical environment, available resources, cultural considerations, and the needs of the bereaved. Sensitivity, respect, and clear communication are key, regardless of the setting. The following procedure outlines a general hospital-based approach and should be modified as appropriate to reflect the specific context in which care is provided.

Click through each stage of postmortem care below to understand how to care for the body after death.

An interactive H5P element has been excluded from this version of the text. You can view it online here:
https://jcu.pressbooks.pub/nursing-skills-foundations/?p=3829#h5p-224

Key Takeaways

In this chapter, we covered:

- Foundational principles of end-of-life care
- The definition of palliative and end-of-life care linking to Australian standards and end-of-life organisations
- The role of the nurse in palliative and end-of-life care, understanding that while ethical challenges may occur, it is important to inform the patient and family of treatment and complications, ensuring autonomy in decision-making
- Caring for families and/or carers with the understanding that end-of-life care is not just about the patient. It is a holistic approach involving the family and even the community, depending on the patients' culture and role in society
- Pharmacological and non-pharmacological management of pain, understanding that not all pain can be treated
- The stages of grief that both the patient and family will go through
- Communication and its importance in maintaining a trusting relationship between the patient and their family
- Care after death, observing cultural and religious aspects.

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GLOSSARY

Abscess

Localised collection of pus

Acne

A skin disturbance that typically occurs on areas of the skin that are rich in sebaceous glands, such as the face and back

Active immunity

Immunity that results from the production of antibodies to help protect the body from a pathogen that has entered the body

Active listening

Listening with the intent of understanding and discerning

adhesions

Fibrous bands of tissue that can form after surgery, potentially constricting the intestines

Adipose tissue

Connective tissue in which fat is stored

advanced life support

A set of medical interventions used to manage life-threatening emergencies, particularly cardiac arrest, severe respiratory distress, and shock. ALS builds upon Basic Life Support (BLS) by incorporating advanced airway management, drug administration, and cardiac monitoring.

Airborne precaution

A practice indicated for patients known or suspected to be infected with pathogens that are transmitted through droplet nuclei

Airborne transmission

The spread of pathogens that are carried by dust or the nuclei of an evaporated droplet and remain suspended in the air

algorithm

A step-by-step procedure designed to guide healthcare providers through clinical decision-making processes for certain conditions or diagnoses

Angiogenesis

The development of capillaries in new tissue growth

Antibody

A protein created in the body in response to an antigen in order to fight the identified substance or toxin

Antigen

Anything the immune system recognises as a foreign object or substance and subsequently initiates formation of antibodies

arterial blood gas

A blood test taken from an artery that primarily measures the levels of oxygen and carbon dioxide and pH balance (acidity and alkalinity) and lactate in your blood

Arterial ulcer

A medical condition that causes decreased sensation of pain and pressure, typically in the lower extremities

Asepsis

The state of being free from disease-causing contaminants

Aseptic technique

The purposeful reduction of pathogens to prevent the transfer of microorganisms from one person or object to another during a medical procedure

Assistive device

An object or piece of equipment designed to help a patient with activities of daily living, such as a walker, cane, walk belt, or mechanical lift

Atelectasis

Partial or whole lung collapse because of alveoli deflation secondary to surgery, smoking or blockage of bronchioles

Atherosclerosis

A build-up of plaque that can cause reduced blood flow

Blanching

To make white or pale by applying pressure

Bowel incontinence

The accidental loss of bowel control causing the unexpected passage of stool

Bowel retraining

Teaching the body to have a bowel movement at a certain time of the day

cardiac arrest

The complete loss of heart function, leading to an absence of blood circulation and oxygen delivery to vital organs

Chain of infection

Cyclic process required for the transmission of an infectious agent to occur from one place or person to another

Clinical judgement

The result of critical thinking and clinical reasoning using inductive and deductive reasoning

clinical pathway

A management tool used in healthcare to standardise and optimise patient care processes specific to certain conditions

Clinical reasoning

A complex cognitive process that uses formal and informal thinking strategies to gather and analyse patient information, evaluate the significance of this information, and weigh alternative actions

Colostomy

The colon is attached to a stoma to bypass the rectum and the anus

Constipation

Defined as less than three stools per week, caused by decreased peristalsis due to limited physical activity, dehydration, dietary changes, medications or surgical procedures

Contact precaution

A practice implemented for patients who have known or suspected infections that can be transmitted through direct skin-to-skin contact or indirect contact with environmental surfaces or equipment

Contractures

Lack of full passive range of motion due to joint, muscle, or soft tissue limitations

Convalescent period

The time when recovery and healing begin

Critical thinking

An intellectual process used to analyse and interpret situations, enabling problem-solving and sound decision-making

Crust

Dried fluids from a lesion on the surface of the skin

Cues

Subjective or objective data that gives the nurse a hint or indication of a potential problem, process, or disorder

Cultural awareness

A person's understanding of their own culture and its impact on themselves

Cultural safety

Framework utilised by healthcare systems to ensure cultural safe care is provided to all health recipients

Cultural sensitivity

Responsive action where one adjust/adapts care requirements ensuring cultural values and beliefs are respected

Culture

A set of beliefs, attitudes, and practices shared by a group of people or community which is accepted, followed, and passed down to other members of the group

Cyanosis

A bluish discoloration caused by lack of oxygenation of the tissue

Debridement

The removal of non-viable tissue in a wound

Deductive reasoning

Making a specific observation from the obvious

Deep vein thrombosis

A thrombus formation within a deep vein (commonly the legs) that may be asymptomatic or be accompanied by swelling and pain. They are potentially life threatening if dislodgment occurs

Dehiscence

The separation of a surgical incision

Dependent interventions

Activities carried out in relation to medical orders that cannot be initiated independently by the nurse

Dermis

The inner layer of skin with connective tissue, blood vessels, sweat glands, nerves, hair follicles, and other structures

deteriorating patient

A patient whose clinical condition is worsening, increasing their risk of serious adverse outcomes such as cardiac arrest, organ failure, or death

Diaphoretic

Excessive, abnormal sweating

Direct transmission

The spread of a pathogen that is transmitted directly from an infected person

Disease

An alteration in body functioning resulting in the reduced capacity or shortening of lifespan

diverticulitis

Inflammation or infection of the small pouches in the colon

Droplet precaution

A practice implemented when patients are known or suspected to be infected with pathogens transmitted by respiratory droplets from coughing, sneezing, and talking

Droplet transmission

The spread of a pathogen that travels through a spray of water droplets that are released when an infected person coughs, sneezes, or talks

DRsABCD

An algorithm used in Basic Life Support (BLS) representing the steps of BLS: Danger, Response, send for help, Airway, Breathing, Cardiopulmonary Resuscitation (CPR) and Defibrillation.

Dysuria

Painful or difficult urination

Early Warning Score

A clinical tool used in healthcare to identify patients at risk of deterioration

Ecchymosis

Bruising

ECG

(Electrocardiogram): a medical test that records the electrical activity of the heart

Eczema

An allergic reaction to the skin, causing a dry and itchy rash

end-of-life care

The period when a person is living with, and impaired by, a fatal condition, even if the trajectory is ambiguous or unknown

Epidermis

The thin, uppermost layer of skin

Epithelialisation

The growth of new epidermis and granulation tissue

Erythema

A red colour of the skin

escalation protocol

A predefined set of procedures used to manage and respond to situations where a patient's condition is deteriorating

Eschar

A collection of dry, dead tissue (necrotic tissue) within the wound that appears as black, firm matter

Excoriation

Redness and removal of the surface of the topmost layer of skin, often due to maceration or itching

Exudate

Fluid that oozes from a wound

Faecal impaction

Hardened faecal matter is unable to be evacuated with regular peristalsis activity and is retained in the rectum

Fever

A rise in core body temperature

Frequency

The need to urinate several times during the day or at night (nocturia) in normal or less-than-normal volumes. It may be accompanied by a feeling of urgency

Friction

The rubbing of skin against a hard object, such as the bed or the arm of a wheelchair. This rubbing causes heat that can remove the top layer of skin and often results in skin damage

Generalisations

A judgement formed from a set of facts, cues, and observations

Goals

Broad statements of purpose that describe the aim of nursing care

Granulation tissue

New connective tissue in a healing wound with new, fragile, thin-walled capillaries

Haematoma

An area of blood that collects outside of the larger blood vessels

Haemostasis phase

The first stage of wound healing that typically lasts up to 60 minutes. The body attempts to limit or stop blood loss

Healthcare-associated infections

An infection that is acquired while receiving medical treatment in a healthcare facility

Hematuria

Blood in the urine, either visualized or found during microscopic analysis

Hemostasis phase of wound healing

The first stage of wound healing when clotting factors are released to form clots to stop the bleeding

hernias

Occur when a part of the intestine bulges through a weak area in the abdominal wall, potentially getting pinched and causing a blockage

Hypodermis

The layer of skin beneath the dermis composed of connective tissue and used for fat storage

Hypostatic pneumonia

Inflammation of the lungs from stasis or pooling secretions

Hypotheses

Predictions of a relationship between variables

hypovolemia

Intravascular fluid loss. Used interchangeably with “deficient fluid volume” and “dehydration.”

Ileostomy

The lower end of the small intestine (ileum) is attached to a stoma to bypass the colon, rectum, and anus

Ileus

Slowing of gastrointestinal motility not associated with mechanical obstruction

Illness period

The third stage of infection, which starts when a person experiences the specific signs and symptoms of a disease

Impaired tissue integrity

Damage to deeper layers of the skin or to other integumentary structures

Incubation period

The initial stage of infection when a pathogen successfully enters into a new host

Independent nursing interventions

Any intervention the nurse can provide without obtaining a prescription or consulting anyone else

Indirect transmission

The spread of a pathogen to a new host through an intermediary, such as the air, food, water, animals, or objects

Inductive reasoning

Making generalisations from specific data

Induration

A thickening or hardening of the soft tissue in the skin

Infection

The disease produced by micro-organisms

Infection control

The discipline of stopping or preventing the spread of infectious agents

Inference

Interpretations or conclusions based on cues, personal experiences, preferences, or generalisations

Inflammatory phase

The second stage of wound healing. White blood cells in the bloodstream to the wound and start cleaning the wound bed

Inflammatory phase of the wound healing

The second stage of healing when vasodilation occurs to move white blood cells into the wound to start cleaning the wound bed

Inflammatory response

One of the first responses when a pathogen breaches the nonspecific innate immune system; it aids in the recruitment of cellular defences to remove pathogens

Intersectionality

The way in which a person's culture is intertwined to create their cultural identity

Interstitial fluid

Fluids found between the cells and outside of the vascular system.

Intravascular fluid

Fluids found in the vascular system consisting of the body's arteries, veins, and capillary networks.

intussusception

A section of the intestine telescopes into the adjacent section, causing a blockage

Ischemia

A reduction or restriction in blood flow to a part of the body

Jaundice

A yellowing of the skin or sclera caused by underlying medical conditions

Key part

Any sterile part of equipment used during an aseptic procedure

Key site

A key site is the site contacted during an aseptic procedure, such as non-intact skin, a potential insertion site, or an access site used for medical devices connected to the patients

Lesion

An area of abnormal tissue

log-rolling

A technique used to move a patient while maintaining the alignment of their spine

Lymphedema

A type of swelling that occurs when lymph fluid builds up in the body's soft tissues due to damage to the lymph system

Maceration

A condition that occurs when skin has been exposed to moisture for too long causing it to appear soggy, wrinkled, or whiter than usual

Maturation phase

The fourth and final stage of wound healing. Collagen continues to be created to strengthen the wound and prevent it from reopening

Maturation phase of wound healing

The final stage of wound healing when collagen continues to be created to strengthen the wound and prevent it from reopening

Medical diagnosis

A specific illness, injury, or disease process diagnosed by a medical practitioner

Medical Emergency Teams

A specialised group of healthcare professionals, with advanced life support skills, trained to respond rapidly to deteriorating patients in a hospital setting

Melanin

Skin pigment produced by melanocytes scattered throughout the epidermis

metabolism

Aggregate of all biochemical reactions in every body cell

Microorganisms

A single-celled organism that is microscopic in size and too small to be seen by the naked eye

Multidisciplinary

A group of professionals that work collaborative within healthcare to support patient and families in care requirements

Multidrug-resistant organisms

A bacterium that has become resistant to certain antibiotics

Necrosis

Tissue death

Necrotic

Dead tissue that is black

Nocturia

The need to get up at night on a regular basis to urinate. Nocturia often causes sleep deprivation that affects a person's quality of life

Nursing interventions

Evidence-based actions that the nurse performs to achieve patient outcomes

Nursing problem

A human response to a condition that is causing an impact on the patient

Objective data

Signs that are observable by an observer or can be measured or tested against an acceptable standard

Oedema

Swelling

oncotic pressure

Fluid movement occurs inside the body due to osmotic pressure, hydrostatic pressure, and osmosis. Proper fluid movement depends on intact and properly functioning vascular tissue lining, normal levels of protein content within the blood, and adequate hydrostatic pressures inside the blood vessels. Intact vascular tissue lining prevents fluid from leaking out of the blood vessels. Protein content of the blood (in the form of albumin) causes oncotic pressure that holds water inside the vascular compartment. For example, patients with decreased protein levels (i.e., low serum albumin) experience oedema due to the leakage of intravascular fluid into interstitial areas because of decreased oncotic pressure.

Orthostatic hypotension

Defined as a drop in systolic blood pressure of 20 mm Hg or more or a drop of diastolic blood pressure of 10 mm Hg or more that occurs when a patient changes position from lying to sitting or sitting to standing resulting in the patient feeling dizzy, faint, or light-headed

Osteoporosis

A chronic, progressive metabolic bone disease in which bone becomes porous and weak making it easy to break and slow to heal

Ostomy

A surgical procedure that creates an opening (stoma) from an area inside the body to the outside of the body

Outcome

A measurable behaviour demonstrated by the patient's response to nursing interventions

Pallor

A reduced amount of oxyhemoglobin the skin or mucous membranes. Skin and mucous membranes present with a pale skin colour

Passive immunity

The result of antibodies being passed from one person to another

Pathogen

Any type of microorganism that causes disease to its host

Pathogenicity

The ability of a microorganism to cause disease

Peripheral neuropathy

A medical condition that causes decreased sensation of pain and pressure, typically in the lower extremities

Peristalsis

Progressive wavelike contractions of the bowel that assist the movement of food through the gastrointestinal system

Person-centred care

A fundamental concept in nursing that places the patient at the forefront of healthcare delivery

Petechiae

Tiny red dots caused by bleeding under the skin

Polyuria

Greater than 2.5 liters of urine output over 24 hours, also referred to as diuresis. Urine is typically clear with no colour. New polyuria should be reported to the health care provider because it can be a sign of many medical conditions

Portal of entry

The site at which a pathogen enters the susceptible host

Portal of exit

The path by which the pathogen leaves the reservoir

Pressure injury

Skin breakdown caused when a patient's skin and soft tissue press against a hard surface for a prolonged period of time, causing reduced blood supply and resulting in damaged tissue

Primary infection

Initial infection caused by a pathogen

Primary intention

A type of wound that is sutured, stapled, glued, or otherwise closed so the wound heals beneath the closure

Prioritisation

The skillful process of deciding which actions to complete first for patient safety and optimal patient outcomes

Prodromal period

The second stage of infection, which begins at the initial appearance of mild or vague symptoms

Proliferative phase

The third stage of wound healing that typically starts 2-3 days after the injury. New cells begin to grow, and the wound edges start to contract

Proliferative phase of wound healing

The third stage of wound healing that begins a few days after injury and includes four processes: epithelialization, angiogenesis, collagen formation, and contraction

Proprioception

Ones perception and awareness of posture, movement, and changes in equilibrium of the body

Pulmonary oedema

Build-up of fluid into alveoli and tissue of the lungs

Purulent

Drainage that is thick; opaque; tan, yellow, green, or brown in colour. New purulent drainage should always be reported to the health care provider

Range of motion

The extent to which a part of the body can be moved around a joint or a fixed point

Rapid Response Systems

A healthcare system designed to quickly identify and respond to patients whose condition is deteriorating rapidly, aiming to intervene early and prevent further complications or critical situations by activating a dedicated team of healthcare professionals when specific clinical criteria are met

Rapid Response Teams

A dedicated team of healthcare professionals often consisting of both Doctors and Nurses with advanced life support skills who respond to patient deterioration when escalated

Reservoir

The habitat or source of the pathogen that provides a place for survival and growth

respiratory rate

Number of breaths per minute (bpm). Normal is 12-20 bpm

Rhonchi

Continuous low-pitched musical sound heard on auscultation near the trachea or bronchi. Often can be cleared by coughing

SAMPLE

A mnemonic utilised during a secondary survey to guide a thorough patient assessment and stands for Symptoms, Allergies, Medications, Past medical history, Last meal, and Events leading up to illness or injury

Sanguineous

Drainage from a wound that is fresh bleeding

Scabies

A parasitic skin infection caused by mites, that is highly contagious

Secondary infection

An infection that occurs during or after treatment for a different pathogen. It may be caused by the treatment for the first infection or a result of a diminished immune system or the elimination of normal flora

Secondary intention

A type of healing that occurs when the edges of a wound cannot be brought together, so the wound fills in from the bottom up by the production of granulation tissue. An example of a wound healing by secondary intention is a pressure ulcer

Serosanguineous

Serous drainage with small amounts of blood present

Serous

Drainage from a wound that is clear, thin, watery plasma. It's normal during the inflammatory stage of wound healing, and small amounts are considered normal wound drainage

Shear

Occurs when tissue layers move over the top of each other. This opposing movement of the outer layer of skin and the underlying tissues causes the capillaries to stretch and tear, which then impacts the blood flow and oxygenation of the surrounding tissues

Skin cancer

This is awful business

Skin tear

Wounds caused by mechanical forces such as shear, friction or blunt force

Skin turgor

The skin's elasticity and its ability to change shape and return to normal when gently grasped between two fingers

Slough

Inflammatory exudate in wounds that is usually light yellow, soft, and moist

Social determinants of health

Socioeconomic factor such as poverty, employment, and education that may impact on health outcomes, mobility, education, and environmental conditions. Individuals with health-related social needs may lack affordable housing, access to healthy foods, connections with social services, or adequate transportation

Stage 1 pressure injuries

Intact skin with a localised area of nonblanchable erythema where prolonged pressure has occurred

Stage 2 pressure injuries

Partial-thickness loss of skin with exposed dermis. The wound bed is viable and may appear like an intact or ruptured blister

Stage 3 pressure injuries

Full-thickness tissue loss in which fat is visible, but cartilage, tendon, ligament, muscle, and bone are not exposed. The depth of tissue damage varies by anatomical location. Undermining and tunnelling may be present. If slough or eschar obscures the wound so that tissue loss cannot be assessed, the pressure injury is referred to as unstageable.

Stage 4 pressure injuries

Full-thickness tissue loss like Stage 3 pressure injuries but also have exposed cartilage, tendon, ligament, muscle, or bone

Standard precaution

The first tier of precautions to protect healthcare staff and patients

Sterile

As an area or item free from all microorganisms

Sterile technique

Practices and procedures that inhibit microorganisms in a specific environment and prevent contamination

Subculture

Smaller groups formed within a culture

Subjective data

Symptoms that are only apparent to the person that is affected and can only be verified only by that person

Susceptible host

An organism that is susceptible to or at risk for infection

Tertiary intention

The healing of a wound that has had to remain open or has been reopened, often due to severe infection or swelling

Therapeutic relationship

Relationship established between healthcare provider and recipient that is built on trust and respect, allowing high quality, effective healthcare to be provided

transcellular fluid

Fluid in areas such as cerebrospinal, synovial, intrapleural, and gastrointestinal system.

Transmission

The method that a pathogen uses to spread from one host to another

tumours

Growths, both benign and cancerous, can obstruct the intestines either from within or by pressing on them from outside

Tunnelling

Passageways underneath the surface of the skin that extend from a wound and can take twists and turns

Ulcer

Break in the skin or open sore such as a venous ulcer

Unstageable pressure injuries

Full-thickness skin and tissue loss in which the extent of tissue damage within the ulcer cannot be confirmed because it is obscured by slough or eschar

Urgency

A sensation of an urgent need to void. Urgency can cause urge incontinence if the client is not able to reach the bathroom quickly

Urinary incontinence

The involuntary loss of urine

Urinary retention

A condition when the client cannot empty all of the urine from their bladder

Urinary tract infection

A urinary tract infection (UTI) is a common infection that occurs when bacteria, typically from the rectum, enter the urethra and infect the urinary tract

Urostomy

The ureters (tubes that carry urine from the kidney to the bladder) are attached to a stoma to bypass the bladder

Venous insufficiency

A medical condition where the veins do not circulate blood back to the heart effectively, resulting in a pooling of fluid in the lower extremities

Venous stasis

A decrease in venous return to the heart

Venous ulcer

A wound caused by the pooling of fluid in the lower extremities as a result of insufficient circulation

volvulus

A twisting of the intestine around its blood supply, leading to a blockage

Walk belts

A belt, with or without handles, that is fastened around a patient's waist used to ensure stability when assisting patients to stand, ambulate, or to transfer from bed to chair

VERSION HISTORY

This page provides a record of changes made to this guide after publication. Each set of edits is acknowledged with a 0.1 increase in the version number.

Version	Date	Details
1.0	12 February 2025	Six chapters published via JCU Open eBooks: • Introduction to Nursing Practice: Providing Safe and Effect • Infection Prevention and Control • Health Assessment, Part One: Health History Assessment • Health Assessment, Part Two: Physical Health Assessment - Vital Signs • Health Assessment, Part Three: Physical Health Assessment • Pain Assessment and Management.
1.1	19 February 2025	Two additional chapters published: • Developing Person-Centred Care Plans through Clinical Re • Recognising and Responding to the Deteriorating Patient.
1.2	26 February 2025	Two additional chapters published: • Assessment of the Integumentary System • Introduction to Wound Care Principles.
1.3	5 March 2025	Two additional chapters published: • Pressure Injury Prevention and Management • Assessing and Supporting Mobility.
1.4	12 March 2025	One additional chapter published: • Assessing and Supporting Hygiene
1.5	25 March 2025	Three additional chapters published: • Assessing and Supporting Nutrition • Assessing and Supporting Elimination • Promoting Sleep
1.6	20 June 2025	Two additional chapters published: • Foundations of Medication Safety • Non-Parenteral Medication Administration
1.7	2 July 2025	One additional chapter published: • Fluid, Electrolyte and Acid Base

1.8	9 July 2025	One additional chapter published: • Parenteral Medication Administration
1.9	6 August 2025	One additional chapter published: • Managing Oxygenation and Perfusion
1.10	20 October 2025	One additional chapter published: • Palliative and End-of-Life Care