Occupational therapy and/or physiotherapy services following a traumatic hand injury for people who live in rural and remote locations

Thesis submitted by

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STATEMENT OF ACCESS

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STATEMENT OF SOURCES

I declare that this thesis is my own work and has not been submitted in any form for another degree or diploma at any university or other institution of tertiary education. Information derived from the published or unpublished work of others has been acknowledged in the text and a list of references is given.

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Gail Kingston Date

STATEMENT ON THE CONTRIBUTION OF OTHERS

I declare that all persons whom have contributed to the thesis have been included as co-authors for published papers or are acknowledged below:

Intellectual Support:

Research Design:	Professor Marion Gray
	Ms Bronwyn Tanner (patient survey tools and interview questions)
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	Mr Gary Williams (statistical analysis)
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Chapter	Details of publication(s) on which Chapter is based	Nature and extent of contribution
4	Kingston G, Williams G, Judd J, Gray M. The Functional Impact of a traumatic hand injury: a comparison of rural/remote and metropolitan/regional populations. Disabil. Rehabil. (accepted for review)	Gray and Kingston designed the study together. Kingston collected the data, and led the data analysis with Williams. Kingston led the drafting, editing and proofreading with Williams, Judd and Gray.
5	Kingston G, Judd J, Gray M. The experience of living with a traumatic hand injury in a rural and remote location: An interpretive phenomenological study. Rural Remote Health 2014;14: 2764 (Online). Available from http://www.rrh.org.au	Gray and Kingston designed the study together. Kingston collected the data, and led the data analysis with Judd. Kingston led the drafting, editing and proofreading with Judd and Gray

5	Kingston G, Judd J, Gray M. The experience of medical and rehabilitation intervention for traumatic hand injuries in rural and remote North Queensland: a qualitative study. Disabil. Rehabil. 2014; early online: 1-7; doi 10.3109/09638288.2014.923526	Gray and Kingston designed the study together. Kingston collected the data, and led the data analysis with Judd. Kingston led the drafting, editing and proofreading with Judd and Gray
6	Kingston G, Williams G, Judd J, Gray M. Hand therapy services for rural and remote residents: Results of a survey of Australian occupational therapists and physiotherapists. Aust. J. Rural Health (in press)	Gray and Kingston designed the study together. Kingston collected the data, and led the data analysis with Williams. Kingston led the drafting, editing and proofreading with Williams, Judd and Gray.
7	Kingston G, Williams G, Gray M, Judd J. Does a DVD improve compliance with home exercise programs for people who have sustained a traumatic hand injury? Results of a feasibility study. Disabil. Rehabil. Assist. Technol. Early online June 2013: p1-7	Gray and Kingston designed the study together. Kingston collected the data, and led the data analysis with Williams. Kingston led the drafting, editing and proofreading with Williams, Judd and Gray.

STATEMENT OF ETHICS

The research presented and reported in this thesis was conducted in accordance with the National Health and Medical Research Council (NHMRC) National Statement on Ethical Conduct in Human Research, 2007. The proposed research study received human research ethics approval from the JCU Human Research Ethics Committee Approval (H2697) and The Townsville Health Service District Human Research Ethics Committee (14/07).

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Gail Kingston Date

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John Lennon said that ‘Life is something that happens whilst you are busy making other plans’ and this could not be more true of my PhD experience. I began the PhD with little idea of the sheer volume of work involved and with an ambitious plan to finish it as quickly as possible. Life, however, with its ups and downs, played havoc with this plan. Pregnancy and childbirth, fracturing my ankle after falling off the steps of my high set Queenslander home and natural events such as cyclones all added to the roller coaster ride of the PhD.

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ABSTRACT

Despite growing evidence regarding access to health care services in rural and remote areas, there has been limited research on the provision of specialist allied health services for these populations, particularly hand therapy. Therapists (occupational therapists or physiotherapists) who specialise in hand injuries are required to have a thorough knowledge of anatomy, wound healing, biomechanics, and treatment protocols of various traumatic injuries. In metropolitan and regional areas therapists with these specialist skills (gained through further study or experience) provide treatment for a hand injury. However, rural residents, due to distance and the lack of specialist hand therapy services, often receive hand rehabilitation from generalist therapists.

The aim of this research was to explore service provision and propose a model of service delivery for occupational therapists and/or physiotherapists who work in Australian public health care facilities and provide intervention to rural and remote clients who have had a traumatic hand injury. This research used a mixed methods approach with a complementarity purpose where overlapping but separate facets of the rural and remote hand therapy research area were explored.

A secondary data analysis compared rural/remote and metropolitan/regional populations to explore the commonalities and differences in functional recovery and rehabilitation following a traumatic hand injury. Qualitative interviews expanded the understanding about the client's lived experience of a traumatic hand injury. A survey of occupational therapists and physiotherapists in public health care facilities explored issues about patient care and staff professional development needs. A feasibility study was also conducted to determine if DVD technology could enhance compliance with a home exercise program for improvement of rehabilitation outcomes

Findings show that regardless of residential location, a traumatic hand injury can result in stiffness and pain and affect work, leisure and day to day activities. Incorporating activity and occupation in rehabilitation programs as opposed to focusing on strict protocols is an important consideration in the recovery process for rural and remote clients. Rural and remote patients in this research demonstrated resilient, rather than stoic, qualities. They valued the opportunity to return to activity and their paid employment and felt 'useless' when they were unable to do so. Rural and remote patients in this research were able to adapt,

seek help and support, and look towards the future. They reported they were ‘grateful’ for the function they had and appreciated the opportunity to return to work.

The distance and expense in accessing health care services were identified as barriers that can further limit participation in functional activities. The cost of travel on the whole family was significant, with family members often required to take time out of their employment to drive the patients to what was usually only a 30 minute appointment.

Rural health professionals in this current research reported they were expected to undertake a broad range of hand therapy intervention such as splinting and exercises prescription. Of concern is the lack of access to professional development for hand injury treatment for rural health professionals. Rural and remote therapists in this research felt that they benefited from clinical supervision and support from experienced hand therapists to assist with relevant hand therapy interventions. Metropolitan health professionals highlighted the suitability of adopting a shared care approach. In this shared care approach, the metropolitan therapist provided formalised collaboration and support to rural and remote therapists with patient care.

Technology was viewed positively by patients and therapists who felt it would allow for increased communication and clarity of exercises. Many therapists believed it would have been useful to be able to have access to technology if a problem arose. Several patients felt that further complications may have been averted had they been able to contact a specialist. Therapists reported a reticence about replacing face to face contact, particularly with regards to hand assessment.

This research proposes a set of principles that can be adapted into services unique to the needs of individual organisations that provide hand therapy intervention for rural and remote clients. Treatment planning needs to be **flexible** and collaborative, with realistic goal setting utilising the resilient qualities demonstrated by rural participants in this research. The use of **technology** can support **face to face** treatment and can address issues of access, provide improved communication, education and clarity regarding home exercise programs. **Formal** links between rural/remote and metropolitan therapists is recommended to address issues of skills development, professional support and supervision in hand injuries. This research provides evidence for collaborative service delivery with rural and remote clients who have a traumatic hand injury.

Further exploration and research into the use of a shared care approach for hand therapy to rural and remote patients is strongly recommended to determine both the suitability and applicability within the occupational therapy and physiotherapy professions. Research that investigates technologies, other than DVD, that can be used when recommending home exercise programs, or to facilitate communication between therapists, is also recommended.

This research confirms and adds to previous research regarding the contextual factors that impact upon service delivery in rural and remote areas and encourages therapists to review and potentially change their practice for improved outcomes with rural and remote clients. The current research has also recognised gaps in current services, ways to address these gaps and opportunities for further research into, and the development of, occupational therapy and physiotherapy services for rural and remote residents who have had a traumatic hand injury. Given the ongoing changes to health services in Australia and the increasing availability of technologies, it is timely that these recommendations are acknowledged through the development of policies and procedures for the provision of services for rural and remote residents.

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Kingston G, Williams G, Gray M, Judd J. Does a DVD improve compliance with home exercise programs for people who have sustained a traumatic hand injury? Results of a feasibility study. Disabil. Rehabil. Assist. Technol. 2014:9(3); 188-194

CHAPTER ONE: INTRODUCTION

This first chapter introduces and outlines the background and context of this research. This chapter also overviews the research questions, highlights the aims and objectives of the research, and provides a summary of the chapters including the structure of the thesis.

Background – the researcher and the context

This research arose from my own clinical experiences. After working as an occupational therapist for more than ten years in Sydney within three tertiary referral facilities (that were well resourced by public transport and shopping facilities) I moved to Townsville to take a position at The Townsville Hospital in the Occupational Therapy Department, specialising in hand injuries. One of the first patients I treated was a farmer who had lacerated a tendon in his hand whilst tending to farming duties on a large property. After I had fabricated the splint and commenced him on his exercise program, I still recall the look on his face when I told him that he was unable to drive. “How on earth am I supposed to live?” he asked. “I can’t walk to the edge of my property!” Without thinking, I had applied the guidelines and restrictions that had been part of standard recommendations at the metropolitan facility where I had previously worked.

In contrast to Sydney, a large number of patients who attended the Hand Therapy Service at the Occupational Therapy Department resided in rural and remote locations. Patients had to travel on average more than two hours to get to the hospital and, whilst a paid travel scheme was available, it was not uncommon for patients to receive limited or no follow up by the Occupational Therapy Department Hand Therapy Service. Distance, cost and interruption to family and work life were reported to limit outpatient attendance. To address this, patients were referred for follow up to rural allied health professionals if they were available in their local residential area.

Traumatic hand injuries

Traumatic hand injuries are complex and can involve skin, vascular, nerve, tendon, muscle, bone, and the soft tissue around joints [1]. Healing time frames, precautions, and optimal treatment approaches are unique to each of these structures. Occupational therapists and physiotherapists who specialise in hand injuries are required to have a thorough knowledge

of anatomy, wound healing, biomechanics, and treatment protocols of various traumatic injuries. Chan and LaStayo [2] report that therapists who specialise in hand conditions should have a comprehensive understanding of the injuries and types of repairs performed.

The Australian Hand Therapy Association defines hand therapy as:

'The art and science of rehabilitation of the upper limb – shoulder to hand. It involves evaluation and testing to assess the injured limb from which a specific treatment program can be designed. A variety of specialised treatment techniques are used to achieve these goals.' [3]

In metropolitan and regional areas, occupational therapists and physiotherapists with specialist skills gained through further study or experience provide treatment for hand injuries. Due to distance and the lack of specialist allied health services, rural and remote residents with a traumatic hand injury often receive rehabilitation from occupational therapists and physiotherapists as part of their large generalist caseload.

Metropolitan guidelines applied to rural context

There is a growing body of evidence surrounding the limited access to health care services experienced by rural and remote health residents [4–6]. A preoccupation on the limited access to health care, however, fails to address the issues of quality of care, the appropriateness of the service and the needs of the local community [7]. Patient centred, culturally secure and appropriate care that addresses specific needs of people in rural and remote locations is highly valued [8]. Providing this care to rural and remote patients in hand therapy is a challenge. Exercise protocols, services, clinical practices and guidelines that are developed in metropolitan locations often do not 'fit' within a rural and remote environment and also fail to take into account differing values and needs of residents [9]. Rural residents are described as stoic, independent and resourceful. Being productive and able to work is highly valued [10–12]. Finding the time to undertake exercise programs that do not fit within their daily routine and that acknowledge their other responsibilities is difficult. Limited supervision from an occupational therapist or physiotherapist for demonstration of correct exercises and supervision of treatment can also result in reduced compliance and failure to complete exercise regimes [13].

There is a growing interest in reviewing the way health services are provided in rural and remote locations with the acknowledgement that ‘one size does not fit all’ [14]. Despite the ongoing development of innovative health care models in rural and remote areas, more work needs to be done in providing not only accessible services but those that focus on quality and appropriateness [8]. With regards to hand therapy intervention this includes the appropriate application of hand therapy protocols to a rural and remote context, and ensuring that both rural/remote, and metropolitan/regional allied health staff are able to apply these protocols.

Classifying rural and remote

The Townsville Hospital is the major referral hospital for the North Queensland population, providing specialist services west to Mt Isa, north to Torres Strait and south to Mackay [15]. The border for the health service district extends west to Richmond, south to Home Hill and north to Ingham (see Figures 1 and 2). Due to the size of this region there are considerable differences in access to specialist allied health care, particularly hand therapy.

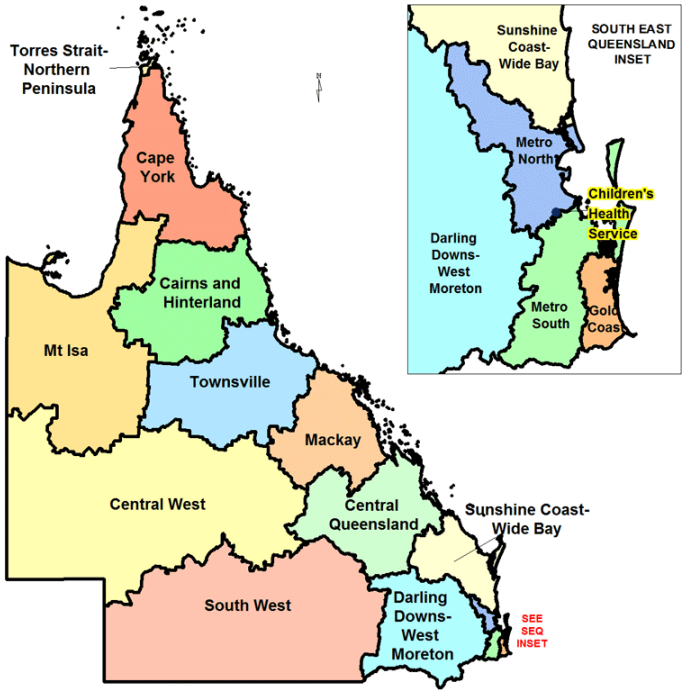

Figure 1: Map of Queensland Health Service Districts

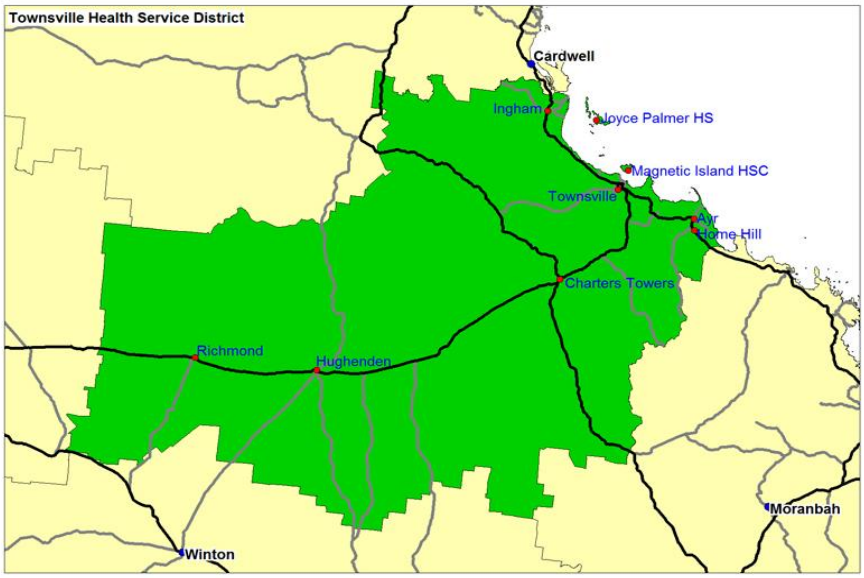

Figure 2: Map of Townsville Health Service District

The Australian Institute of Health and Welfare (AIHW) reports that remoteness is a measure of how far a person must travel to access services in centres of different sizes. The geographical classifications Rural, Remote and Metropolitan Areas (RRMA), Accessibility/Remoteness Index of Australia (ARIA), and Australian Standard Geographical Classification (ASGC) are classifications used to group areas with similar characteristics in Australia [16].

The AIHW currently advocates the use of the ASGC developed in 2002. It is based on ARIA+, which calculates distances from populated localities to service centres based on minimum road distance. This classification uses the categorical areas of ‘major cities’, ‘inner regional’, ‘outer regional’, ‘remote’ and ‘very remote’.

The RRMA was developed in 1994 and uses the classifications of metropolitan (‘capital cities’ or ‘other metropolitan areas’), rural (‘large rural centres’, ‘small rural centres’ and ‘other rural areas’), and remote (‘remote centres’ and ‘other remote areas’). It is still considered a valid classification to use particularly for research, policy and funding purposes [16,17].

The ASGC geographical classification in Queensland considers the areas of Charters Towers, Ingham, Ayr and Townsville as 'outer regional'. RRMA, however, allows for differentiation between these areas within the Townsville Health Service District. Townsville, in this classification, is considered 'other metropolitan' and Ayr, Ingham, and Charters Towers are considered 'other rural areas'. For the purpose of this research, and to acknowledge the differences in accessing specialist allied health services provision, the RRMA remoteness classification will be utilised.

The clinical practice concerns described and issues illustrated in the literature highlighted questions that required further exploration and led to the development of the research aims and objectives of this thesis. These questions included: how do people who live in a rural and remote location continue to work, do activities of daily living (ADL) tasks and engage in social activities following a traumatic hand injury? How do these clients fit rehabilitation into their daily lives? Is there a way of promoting ongoing compliance with specific hand therapy protocols? How do occupational therapists and physiotherapists across Australia in public health care facilities manage the distance and intermittent contact with clients when planning rehabilitation? Is there a better way of providing hand therapy services in rural and remote areas? The next section will overview the aims and objectives of the research.

Aim of this research

The aims of this research were to explore the provision of services and propose a model of practice for occupational therapists and/or physiotherapists who work in public health care facilities and provide intervention to rural and remote clients in Australia who have had a traumatic hand injury. The research seeks to improve the patient journey through the development of key guidelines or recommendations that allied health professionals can apply to their day to day practice when working with patients with a hand injury in a rural and remote area.

The research has the following objectives:

1. To examine the commonalities and differences in the issues associated with functional recovery and rehabilitation in relation to traumatic hand injury identified by rural and remote residents and residents of regional metropolitan areas;

2. To explore the experiences of rural and remote residents in relation to their traumatic hand injury and the issues associated with functional recovery and rehabilitation. Further to investigate the perceptions of this population of the hand therapy services offered;
3. To explore the experience of occupational therapists and physiotherapists in selected Australian health facilities who work with rural and remote patients that may have had a traumatic hand injury and how they have adapted their service to meet the needs of this population; and
4. To explore alternatives of providing therapy, such as DVD technology, to improve exercise compliance and to address issues of distance and reduced contact with therapists.

PhD structure

In order to explore the issues and the development of a model of service delivery this study used a mixed methods approach that allowed for exploration of a wide range of concerns. The strength of using both qualitative and quantitative methods allowed for in-depth exploration of the research problem [18,19]. This study utilised a component design with a complementarity purpose [20]. This allowed for exploration of different facets of the research under investigation and enables an enriched understanding of that phenomenon.

Chapter One is the introductory chapter that provides the background and context of the research. This chapter outlines the research questions, the aim and objectives, and overviews the structure of the thesis.

Chapter Two is an exploration of the literature surrounding the rural and remote context, access to care, staff retention and turnover. This chapter also describes the complexity of traumatic hand injuries, the provision of specialist hand therapy services in rural and remote areas and the use of alternatives for care, such as technology and telerehabilitation.

Chapter Three explores in detail the rationale for the use of mixed methods and a component design with a complementarity purpose. It describes how a complementarity purpose can explore different, yet overlapping, issues relevant to the phenomenon under investigation.

Chapters Four to Seven outline five published or under review publications that highlight and explore different, yet overlapping, issues regarding the development of a model of

practice for occupational therapists and physiotherapists who provide hand therapy services to rural and remote residents that have sustained a traumatic hand injury. Each of these chapters is outlined further below:

Chapter Four explores the commonalities and differences in the issues associated with the functional recovery and rehabilitation of a traumatic hand injury experienced by people in rural/remote and metropolitan/regional areas. This exploration will provide an understanding of the specific needs of rural and remote residents that will contribute to service provision.

Chapter Five utilises an interpretive phenomenological approach to gain an understanding of how rural and remote residents in North Queensland, Australia engaged in work, activities of daily living tasks and social activities following a traumatic hand injury. This chapter also explores the experience of receiving medical and rehabilitation intervention for rural and remote residents who experienced a traumatic hand injury.

Chapter Six explores how therapists provide and/or adapt interventions for rural and remote residents who have received a hand injury. A survey designed specifically for the study investigates perceived barriers to services, use of technology, and professional development and support for therapists in rural and remote areas.

Chapter Seven is a feasibility study that explores whether providing a home exercise program on a DVD, as well as a written brochure, is able to promote compliance with home exercise programs following a traumatic hand injury compared to providing brochures only.

Chapter Eight discusses the results of each research study in relation to the aim of the study. Strengths and limitations of the study are addressed, as are the significance of the research and the contribution to occupational therapy and physiotherapy intervention for traumatic hand injuries in rural and remote areas. Chapter Eight offers recommendations and conclusions for the study.

The research design is depicted in Figure 3.

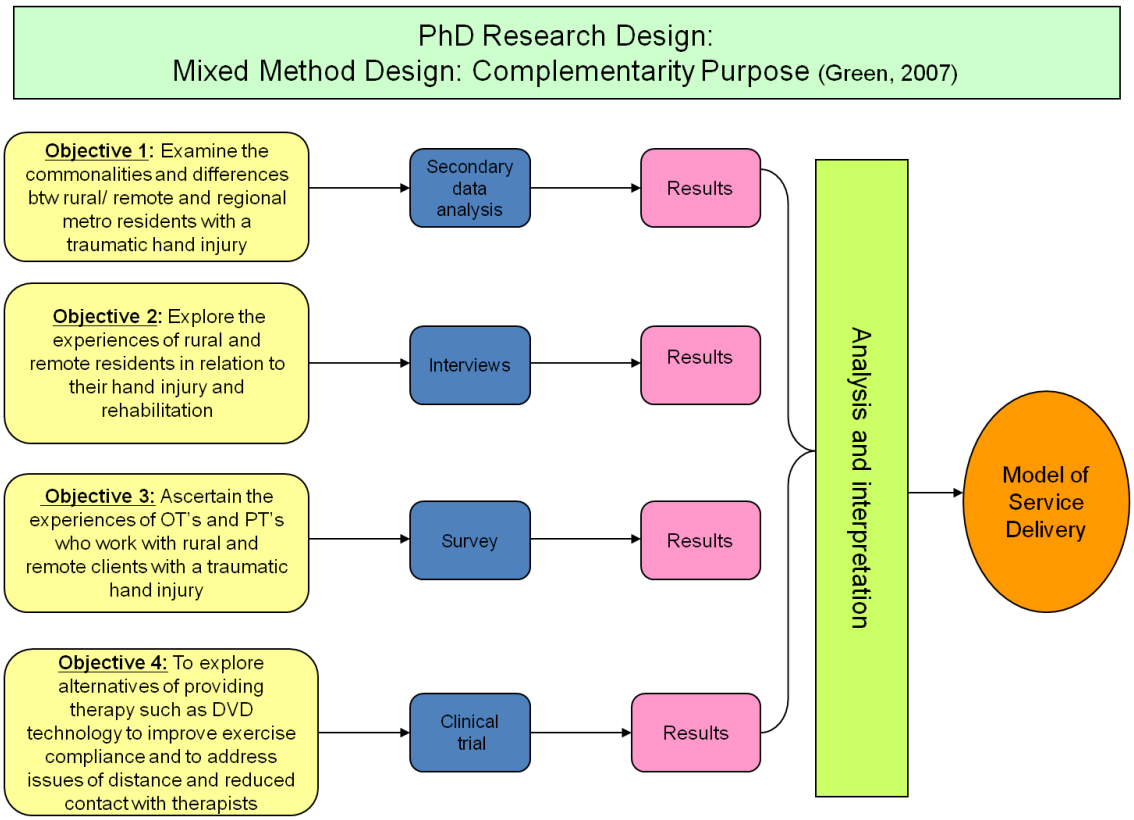

Figure 3: PhD Research Design

Chapter One has outlined the background and context of the research. It has also defined rural and remote, and outlined the research questions, the aim and objectives of the research. The next chapter discusses the literature surrounding the provision of services and models of practice for rural and remote clients in Australia who have had a traumatic hand injury.

CHAPTER TWO: LITERATURE REVIEW

This chapter outlines the current literature regarding services for rural and remote residents who have sustained a traumatic hand injury. The nature of rural living, the impact of a traumatic hand injury and the importance of contextual factors in facilitating or limiting function in daily activities, such as participation in rehabilitation, is highlighted. This chapter will also critically review the literature about rural and remote participants' attitudes to health, access to health care, and the roles and functions of rural and remote allied health professionals. Health service models following a traumatic hand injury and the use of technology in hand injury rehabilitation are also discussed.

'The rural life'

The National Rural Health Alliance states: 'Living and working in the country, especially the most remote parts of Australia, is a health hazard. The air may be cleaner than in the cities, the roads emptier, the noise levels lower, but the living is hazardous' [21]. Rural and remote residents experience higher rates of alcohol abuse and smoking rates; a higher incidence of high blood pressure, diabetes and obesity; a greater prevalence of mental health problems; poorer dental health; and a lower life expectancy [22]. There are also notably higher risks of injury and deaths associated within the agricultural, mining, forestry and fishing industries. Falls from animals, motorcycles and other farm injuries are common [23–26]. Lower levels of income, employment and education, and the need for more long distance travel to access services, such as health, also influences the health of individuals living in rural and remote areas [23]. Poor road conditions, longer travelling times as well as higher speeds, fatigue from longer driving times, and the danger of animals on the road also increase the risk of injury [23,27].

Traumatic hand injuries

Hands provide us with independence in work, leisure, self-care, and social interactions. They are used to communicate and express feelings and are an important part of one's body image [28,29]. The ability to reach out, touch and grasp allows people to explore and develop skills, and interact with the environment around them [30].

An injury to the upper limb is reported as one of the most common injuries sustained to the human body [31,32]. Safe Work Australia indicated that 32% of the total number of accepted workers' compensation claims in 2010/2011 related to the upper limb. Of these upper limb claims, over half were specific to the hand, thumb, wrist and fingers [26]. Traumatic hand injuries involve damage to a number of structures including skin, nerves, tendons, muscle bone and soft tissue, which can result in stiffness, loss of range of motion, pain and sensitivity [29,33].

Participating in any functional task that requires coordination and the ability to grasp is often affected following a hand injury [34,35]. A retrospective survey of rural and remote residents who had sustained a traumatic hand injury confirmed this impact on day to day activities [36]. The majority of respondents in the study experienced ongoing issues such as pain or stiffness for up to four years after their injury, with work and leisure tasks most affected. Both bilateral and single handed injuries had a significant impact on work regardless of hand dominance [36]. Strategies that help to compensate for a loss of hand function include using 'all movable parts' of the body to assist with the execution of day to day activities, undertaking tasks with one hand, asking for help, or total avoidance [35,37].

Loss of function and independence, with disruption to occupational roles are also reported effects of a traumatic hand injury [35,38]. Reliance on friends and family and the need to take time off from their usual occupation have also been attributed to hand trauma [39]. A hand injury can prevent the engagement in career and life roles and can affect financial security and emotional wellbeing [29,38]. Ongoing or chronic injuries that prevent a person from being able to undertake tasks that would normally be taken for granted can impact upon self-esteem and emotional wellbeing, leading to feelings of incompetence and dependency [35,38].

The International Classification of Functioning, Disability and Health (ICF)

Hand therapy outcomes such as function are often measured through the use of tools such as the Disabilities of Arm, Shoulder and Hand (DASH) [40]. An increasing amount of literature analyses how such tools reflect the International Classification of Functioning, Disability and Health (ICF) [41]. Evaluation tools can determine affected body functions and structure as well as the perceived impact on activities and participation. Such tools, however, fail to acknowledge the environmental context that can impact upon function following a traumatic hand injury [40]. Improvements in function can occur by determining

those parts of the social and physical environment that limit participation and performance. The overall assessment and evaluation of the hand injury is important and can assist with the evaluation of health service systems, and contribute to planning and management of services [42].

The ICF defines functioning as a 'dynamic interaction between a person's health condition, environmental factors and personal factors' [41]. Factors in the physical, social and attitudinal environment that can be a facilitator or barrier to function include the natural environment, support and relationships, attitudes, services, systems and policies [41]. When designing and implementing services for rural and remote residents, such factors need to be considered and, where possible, addressed to ensure equitable treatment planning for all patients. The relationship between the health condition and the environmental, and personal, factors is described as complex, dynamic and unpredictable [41]. For people who live in rural and remote locations who have experienced a traumatic hand injury there are a number of environmental factors that can affect functioning. These factors include rural lifestyles and attitudes to health, access to health care services, availability and skills of allied health professionals, health service models in rural and remote areas, rehabilitation services following a traumatic hand injury and the availability and use of technology. These factors are discussed below:

Rural lifestyles and attitudes to health

Attitudes refer to the opinions and beliefs of health professionals about the person or about other matters. Attitudes can also include opinions and beliefs by people of a culture, or society, about other individuals that influence group or individual behaviour and actions [41]. Rural people see themselves as 'different' from people who live in cities. There is a strong belief that hard work and a 'fair go' will help in times of hardship, isolation and when faced with tough geographical conditions [43,44]. People who live in rural and remote locations have been described as self-sufficient, stoic, pragmatic, resilient and independent; particularly in times of adversity [44–46]. Stoicism in rural and remote residents is considered to be the result of the interaction between work and distance related factors, and an emphasis on function rather than personal comfort [46]. Resilience is described as a dynamic process in which people demonstrate positive adaptive behaviours despite being exposed to adversity; similar to a 'rubber ball' which can 'bounce back' [47]. For rural and remote residents, having a connection with the land is considered an important part of being

resilient as well as ‘having a go’; working hard; embracing change; being positive, adaptive and flexible; and seeking help from others [47].

The social, cultural, economic and spiritual differences that exist between rural/remote residents and people who live in metropolitan areas are significant issues that determine the health behaviours and health outcomes in rural and remote residents [7]. Rural lifestyles and the importance of work can affect the preparedness of rural and remote residents to utilise rehabilitation or health care services. Metropolitan and regional areas tend to view health as the absence of disease or dysfunction whereas people who live in rural and remote locations consider the ability to carry out home and work duties as a significant health indicator [12,48]. This ‘functional’ view of health will often result in rural and remote residents holding back from seeking help until their illness or disability prevents them from doing their usual tasks, which can contribute to poorer health outcomes [5,49].

It is therefore important to design a service that aligns with rural and remote residents’ functional and ‘work focused’ view of health. This is, however, a complex task as services are often developed in metropolitan locations and subsequently clash with rural culture [50]. Lannin and Longland discuss the need for rural therapists to modify urban practices so as to be practical within a rural community [9]. Intervention strategies that are holistic in nature are considered more effective in rural and remote areas [51].

Health services, systems and policies

Access to health care in rural and remote areas

Humphrey’s reported that access to ‘integrated, coordinated and seamless’ health care, and having a local health service presence in rural and remote areas is ‘supremely important’ [5] (p36). A rehabilitation service is both vital and beneficial at the local level as opposed to being centralised in metropolitan areas and results in fewer disruptions to rural and remote patients and their families [52].

Large distances and isolation, a transient and smaller population, the lack of service infrastructure and service options, transport difficulties, and difficulties in recruitment and support of staff, has resulted in service inequity between rural and metropolitan locations [14]. Distances to health care services has been highlighted as an issue, particularly in areas such as cancer care, and has been directly attributed to lower survival rates [53].

Decisions regarding the provision of equitable and accessible care are difficult and challenging in a health care environment that promotes efficiency and cost minimisation.

People living outside major cities are more likely to be admitted to hospital for conditions that could have potentially been prevented through access to non-hospital services and care [22]. Access and equity in service provision between rural/remote and metropolitan areas and the subsequent impact upon health outcomes is an increasingly topical issue [5,54,55]. Rural and remote communities are often too small to provide local health services so residents access care from larger urban centres [56]. Distance from a treating facility coupled with limited transport options can complicate both the acute care and the later stage of rehabilitation of injured people in rural and remote areas [5,57]. Specialist outpatient services are predominantly offered in acute facilities in capital and large regional cities in Australia. Many people have to travel to larger regional centres for care or utilise outreach and visiting services, which can be disruptive and expensive [5,50,52,58].

Health service models in rural and remote areas

Service models and models of care refer to the way health services are structured and operate, including the way care is provided to patients, clinical guidelines and pathways [22]. The complexity of providing a service to rural and remote residents is often overlooked due to a preoccupation on distance and lack of staff. Consideration must be given to cost; the quality of the care; and relevant cultural, political, geographical and social issues [59]. Rural and remote communities are diverse and, as a result, no single model of care can meet the health care needs of this population. Services must be flexible according to the needs of the community, have a multidisciplinary approach and also ensure continuity of care. The key requirements of any service model in rural and remote areas includes: accessibility, equity, appropriateness, timeliness, efficiency and effectiveness. Importantly, any service designed to address the needs of rural and remote communities' needs to be sustainable and accountable [60].

Many 'innovative' services have been designed and implemented in rural and remote areas, however, a shortage of health professionals in rural areas, the lack of an evaluation process, and ongoing funding and coordination problems, results in services that are short term [60,61]. Many of the models of care or services have been driven by motivated individuals but, if the particular person leaves the position, it does not continue due to the lack of clear

procedures, guidelines and a service ‘champion’ [22]. An evaluation framework that measures the performance and quality of the service, and the impact on health outcomes can provide information on what works and why it works, to ensure that the establishment of services is based on sound evidence [62,63]. Models have been implemented in rural and remote areas to address limited services for specialist clinical areas such as rehabilitation and spinal cord injury. Findings from these evaluations highlight the importance of leadership, collaboration, training and development of rural staff, and access to ongoing funding to sustain these services [64,65].

A previous systematic review of primary health care models in rural and remote Australia [14,61] has outlined the types of services provided:

Discrete primary care services are those that are initiated with the aim of maintaining a general practitioner (GP) service in rural and larger remote communities where the recruitment and retention of an adequate GP workforce is difficult. Services in this category help to attract doctors who do not want to be involved with practice management and ownership responsibilities. Funding from universities or the local community ensures service continuity after the doctor leaves.

Integrated models offer a range of primary health care services from sites located in the communities they serve. The scope of services to meet the needs of rural communities is generally broader and more flexible than a GP service [22]. Integrated services provide a single point of access to a range of allied health and specialist services. An example of a model in this category includes shared care. Utilised predominately in mental health, a shared care model requires a team approach; where the skills of both primary and secondary health care practitioners contribute to the overall care of the patient. Shared care encourages the primary health care professional based rurally or remotely to provide more complex care.

Comprehensive services aim to improve health outcomes through improved access to services and by addressing the social determinants of health. Models that fall into this category include primary clinical care, preventive and health promotion activities, as well as education and professional development within workforce training. Models in this category include the Aboriginal Controlled Community Health care services in the Northern Territory that generally have strong community ownership and management accountable to a local health board [14].

Outreach models, such as 'hub and spoke' are characterised by the periodic supply of services from one location that also offers services to other locations that do not have such services. Outreach services are designed to improve access to health services for widely dispersed and isolated populations. The North West Queensland Allied Health Service [66] is such an example. Remote communities are visited every six weeks by an allied health practitioner who spends up to three days providing services. A Cochrane review found that a specialist outreach service can improve access to specialist care, patient health outcomes and efficiency in the use of hospital-based services. The review also noted that outreach can increase interaction between specialists and primary care practitioners particularly when it was part of an overall package that included case conferences, joint consults and education sessions [67].

Virtual Outreach refers to the use of telehealth and telemedicine. These technologies have been increasingly used in Australia over the past decade as a means of overcoming problems of access to health care and to the shortage of health professionals in rural and remote areas. Telehealth is a health delivery system that allows for the provision of health care and related services at a distance between two or more locations using technology-assisted communications. The eHab unit, which uses telerehabilitation technology devised by the University of Queensland, is an example of how rehabilitation services can be provided at a distance [68].

What is clear from the research into the implementation of said models is that flexibility through a range of approaches to delivering health services in rural and remote areas is required. Service delivery should be determined by factors specific to each community with strong consumer input [69–71]. There remains a lack of transparency and clarity around service model effectiveness due to the limited evaluation of these service models. This failure to use an evidence-based approach has prevented the sustainability and transferability of models to other locations. Although trials, pilot studies and demonstration projects to introduce new or enhance existing services have been funded, they are generally ad hoc and not undertaken as part of a broader planning and evaluation strategy [14]. In addressing this issue, the National Rural Health Alliance has called for a coordinated and structured approach to research, monitoring and reporting on health care delivery and outcomes [72]. This monitoring will ensure that the most effective approaches for rural and remote Australia are identified and will become a part of national health policy and program development.

Rural and remote allied health services

Maintaining services in rural and remote areas is difficult due not only to geography and low population numbers but also as a consequence of problems in recruiting and retaining allied health professionals [66]. Allied health professionals working in rural and remote areas are professionally isolated, with a large amount of time taken to travel to outreach sites [73]. There is limited structured supervision with another health professional, high workloads and a lack of time [74].

Poor career planning, structure and opportunity for progression in combination with limited professional supervision and support mean that rural and remote allied health professionals often leave their employment for better career prospects [75–79]. Reduced access to professional development, lack of specialised training, overall expense, isolation and distance limit the ability for ongoing learning and is also regarded as a contributor to the inability to retain allied health staff [80,81].

Technology advancement and an increasing knowledge base surrounding health care treatment have resulted in a trend towards specialisation within health professions, including allied health. This trend, however, makes it difficult to provide the same types of services in rural and remote locations [82]. Mills and Millsteed explored rural occupational therapy workforce retention, and noted that participants had a wider scope of practice than would be provided in metropolitan areas [83]. They reported that they saw ‘everything that came in the door’ and they had to know a ‘little bit about an awful lot of areas of practice’ [83 p174]. The clinical role of rural therapists involved a large amount of diversity and autonomy of workload but higher potential for burnout due to large workloads [73]. Bent believes that rural and remote positions are not appropriate positions for new graduates, however the reality in many areas across Australia is that many new graduates are employed in rural and remote areas [84]. Defined as ‘professional nurseries’, new graduate health professionals generally gain experience in rural and remote areas and move on to larger cities or coastal areas [85].

Therapists working in a rural and remote location identify the importance of contacting metropolitan therapists for advice and support, to discuss assessment results or to validate their proposed treatment regime [83,86]. Improving regular links with metropolitan therapists beyond the scope of patient referral but also for general practice discussion has been suggested as a way of addressing the lack of professional support [75]. The small number of

allied health professionals and the diversity of their roles means that little opportunity for continuing education occurs at the local rural level. Travel to metropolitan centres increases the time and cost of professional development activities. Allied health professionals in Gillham and Ristevski's study valued face to face contact for professional development and mentoring activities over technology-based communication activities such as video and audio conferencing [75]. A member of the study commented that their role was quite hands on and manual so it was important to have face to face professional training [75]. Rural and remote therapists value the input of metropolitan therapists who travel to rural areas to provide professional development [83]. They also also recommend subsidised workshop costs for country therapists who have to travel longer distances to the city [83].

There are programs that support rural allied health professionals to attend metropolitan hospitals and services for specific clinical experiences in specialist areas [15,87]. Such training can provide an opportunity for networking, development of clinical skills, knowledge and confidence. Work experience programs at metropolitan hospitals can also help to improve metropolitan allied health professionals' awareness of rural services and influence the recommendations and expectation for follow up of shared clients [87].

Rural and remote allied health professionals expressed concern that working in rural areas was not appreciated and understood by metropolitan therapists who were unaware of the breadth and volume of work covered by rural therapists [79]. The belief that they may be considered 'second rate practitioners' results in the skills they develop in their employment not being given the same value as the skills acquired in metropolitan areas and may be prohibitive to their career prospects in metropolitan areas [83]. Rural therapists have a broad range of skills that should be considered invaluable in any employment situation. The generalist nature of the work in rural areas, despite the challenges of high caseloads and diversity of caseloads, can provide a valuable career opportunity [88,89]. Allied health professionals who work in rural and remote areas are viewed as 'expert generalists' and have skills in a broad range of areas that in metropolitan practice would be covered by a specialist allied health professional [84,86]. Rural and remote practice is an area where allied health professionals develop unique skills that can be applied to metropolitan settings and used to provide education to metropolitan therapists [9,83].

Rehabilitation and home exercise programs following a traumatic hand injury in rural and remote areas

A major component of rehabilitation following a traumatic hand injury is a home exercise program. These are individually prescribed or generic activities designed to achieve specific outcomes that are completed at home to either replace clinical intervention or reinforce exercises learned during a treatment session [90–92]. The overall goal of a rehabilitation program in hand therapy is to reduce impairments and enhance function by restoring motion [92,93]. Exercise programs maintain and restore mobility, strength and function in the hand following a traumatic hand injury [94–96]. Early motion following injury enhances the healing process by maintaining connective tissue mobility, favourably affecting scar tissue and adhesion formation, and restoring gliding planes of motion [95,97,98].

Home exercise programs ensure continual practice, maintenance of function and encourage patient self-management and responsibility [13,99]. The effectiveness of home exercise programs can be attributed to compliance (also classified as adherence) with home exercise protocols [13,99–102]. Poor compliance with home exercise programs can result in stiffness and ongoing disability [13], development of secondary complications and a general failure of expected treatment outcomes [103]. A key driver in compliance with treatment programs is the belief that undertaking the home exercise program will be beneficial. Supervision, face to face contact, a clear explanation of the exercises and feedback by the therapist also promotes compliance [104,105]. A therapist that can motivate, support and provide encouragement, the involvement of family members and the provision of home exercise diaries can also positively influence compliance [102].

Another important determinant of compliance with home exercise programs includes the ability to include exercises as part of a daily routine and the fit of the routine within day to day life [106]. Therapists treating patients with hand injuries may often follow standard treatment protocols rather than talking with their patients and finding out about their roles, habits and routines. Conversely, discussions need to occur as to the way activities typically performed by the patient can be incorporated into treatment planning. Hand therapy also needs to address the functional priorities of the patients. More emphasis should be placed by the therapist on treatment strategies designed to facilitate those activities and roles that a patient considers important [38]. In hand rehabilitation, occupations and activities should be implemented wherever possible. Not only does it make the treatment regime relevant but it also allows the therapist to observe potential difficulties and to discuss and train them with the client in the safe environment of the therapy setting [35].

Products and Technology

Given that reduced therapist contact can affect compliance, the prescription of therapeutic interventions for rural and remote clients who have had a traumatic hand injury becomes quite a challenge. Due to large travel distances and associated costs, it is more difficult for therapists to keep regular contact with rural and remote clients [4,107–111]. In addition, home exercise programs following traumatic hand injury often comprise of specific splinting and exercise protocols [13]. The length of time between appointments can be several weeks and without therapist supervision or a clear understanding of the exercises, the client's ability to follow specific home exercise protocols may be diminished.

The rapidly changing technological environment means that the location and type of health care intervention can be modified [112]. DVDs can support the provision of therapy and offer improved choice in home exercise program delivery outside of face to face sessions or consultations [113]. Research into the use of DVDs for education and prescription of a home exercise program concluded that these forms of health care practices can be as effective as face to face consultations and written information [114,115]. The universal access to DVDs and computers and the convenience for people who want to be able to review the information at a later time means that such type of interventions continue to grow in popularity [116].

As part of this current research, a critical review of evidence was undertaken on the use of videotapes or DVDs to promote patient compliance with home programs. This review found inconclusive evidence (due to low study quality) as to whether the use of DVD or videotape can improve compliance with home programs [117]. Despite the reported low study quality, it is worthwhile noting that Roddey et al [118] found that DVD technology was as effective in promoting compliance with exercise programs as face to face treatment. This is an important clinical finding when considering the application of a home exercise instruction DVD to a rural and remote population as many rural and remote residents are unable to attend sessions regularly. There were no studies in the critical review that indicated any negative effects from providing a DVD [117]. Two studies in the critical review found that providing a DVD in addition to the standard treatment of brochures and instructions facilitated compliance [119,120].

DVDs for exercise programs can also work alongside the use of telehealth, or more specifically, telerehabilitation. Telerehabilitation is a specific form of telehealth, whereby rehabilitation is provided at a distance using telecommunication technology [68]. For rehabilitation and allied health professionals, telerehabilitation can improve communication between metropolitan and rural/remote therapists, and can allow for objective assessment of physical function and health goals through virtual outreach [121]. Hoffman and Cantoni claim that the use of telerehabilitation can reduce the need for travelling long distances, and overcome the limited availability of allied health professionals in rural areas [122].

Can telerehabilitation replace the need for face to face sessions, particularly for rural and remote patients? Traumatic hand injuries require wound care, ongoing oedema management and splinting with regular modifications [123]. Such interventions cannot be done at a distance, and require 'hands on' care from the therapist. It is acknowledged that certain health assessments and interventions cannot be administered via telerehabilitation due to the lack of hands on contact [124]. Moreover, telerehabilitation is not designed to replace face to face contact with clients and should be used to increase the frequency of contact between health professionals and rural clients. Gregory also reports that the use of 'virtual communication' can be an adjunct to, but not a replacement for, direct interpersonal contact [55].

Summary

The literature review demonstrated the timeliness and relevance of this research topic and the further need to contribute to the body of knowledge surrounding health services in rural and remote areas. For rural and remote residents there is a notable impact on function following a traumatic hand injury, which is magnified by environmental factors such as lifestyle and attitudes.

Providing a rehabilitation program that is both equitable and effective presents a challenge, particularly given the limited ability to monitor and review both progress and outcomes. Technology and telerehabilitation is promoted as a means of reducing inequity and improving outcomes when regular appointments with health professionals are not available, however, their ability to replace face to face contact and some interventions is questioned. Therefore the use of DVDs and videotapes for compliance with, and clarification of, appropriate exercises requires further exploration. Literature indicates that when combined with telerehabilitation for increased patient-therapist contact, DVDs could potentially help

promote equity in health care services for rural and remote residents and may elicit better health outcomes. However, there is negligible information on the use and application of technology and telerehabilitation amongst occupational therapists and physiotherapists in public health facilities in Australia who work with rural and remote residents with a traumatic hand injury. Whilst programs have been established to facilitate professional development for rural allied health professionals at metropolitan hospitals for specific clinical experiences, there is scant literature on how to provide support and training in specialised clinical areas at the 'point of care'.

There are a number of rural and remote health service models that have been discussed and, as Wakerman et al highlight, there is a lack of transparency, planning and evaluation surrounding them [14]. A model of care for providing therapy to people in rural and remote locations who have sustained a traumatic hand injury needs to address the limited access to health services, how the injury impacts upon function and the 'fit' of therapy programs with rural lifestyles. Poor compliance with therapy regimes due to a lack of contact with therapists must also be considered, whilst also addressing skill development and capacity building for rural and remote therapists.

The following chapter will outline the use of a mixed methods approach to explore the development of a model of practice for occupational therapists and/or physiotherapists who provide hand therapy intervention to rural and remote residents with a traumatic hand injury.

CHAPTER THREE: MIXED METHODS DESIGN

This chapter provides a rationale for the use of a mixed methods approach to explore the development of a model of practice for occupational therapists and/or physiotherapists who provide hand therapy intervention to rural and remote residents with a traumatic hand injury. Further, it discusses pragmatism as a 'worldview' and outlines how this paradigm provides justification for the use of mixed methods within this research.

Pragmatism

Pragmatism as a 'worldview' or paradigm proposes that concepts such as truth and reality are relative and purposive [19]. Pragmatism acknowledges the 'complexities and messiness' of a world that has many layers and elements which can be objective or subjective or both [125]. It also challenges the 'positivism' or 'constructivism' division; it is pluralistic, and centred on practical problem solving and oriented toward 'what works' [18,125]. In this paradigm, truth, or an accurate representation of how things are, is not the goal of inquiry [126]. 'The purpose of the inquiry is to achieve agreement amongst human beings about what to do, to bring about consensus on the ends to be achieved and the means used to achieve those ends' [126] (p xxv). A pragmatist believes that the most important question is not what methods were used but whether the methods used have enabled the researcher to find out what they wanted to know [125].

Mixed methods research design

The development of guidelines or the adaption of a health care service is a complex process where the accessibility, quality, safety and the acceptability to the local community must be considered. Service or treatment outcomes and the proposed method of evaluation and monitoring also need to be established [5]. Rehabilitation, in particular, seeks to improve the functional capacity of people through physiological, psychological and social strategies, which is a complex and dynamic process. It is not a linear or simple process and involves the dynamic interaction of biological, social, psychological, cultural and environmental factors [127]. Utilising a single research approach, such as experimental or naturalistic, cannot answer issues that are critical to the research and to the development of a health service model [19]. The emphasis on quantitative data in health care research is considered

a ‘serious mistake’ because the transformation of research into practice cannot be limited by information that is ‘quantifiable, objective and devoid of individualities’ [128]. Quantitative research is inadequate in helping to gain understanding of the context or setting in which people talk and the ‘voices’ of participants are not heard in the process [18]. Qualitative research however, has also been criticised because of the personal interpretations made by the researcher, the resulting bias and the difficulty in generalising results to a large group due to the limited number of participants in the studies; thus utilising a mixed methods approach is a solution [18].

The complexity of health care provides justification, on pragmatic grounds, for researchers to adopt a mixed methods approach. Understanding and addressing health services for specific population groups requires the use of multiple discovery and verification strategies [19]. These strategies can be a combination of a range of methods including interviews, focus groups, surveys and randomised controlled trials [129]. A mixed methods study can verify the experiences of rural and remote residents, as well as revealing new avenues for program improvement and explanation of outcome effectiveness in treatment or intervention [19].

The purpose of a mixed methods study

A mixed methods approach refers to the combining of qualitative and quantitative approaches to gain a better understanding of a research problem than either approach alone could provide [18]. Different components of a mixed methods study are seen as parts of a jigsaw puzzle that can allow more of the full picture to be revealed. Placing more pieces together can lead to a better understanding of an issue and thus the whole ‘becomes greater than the parts’ [129]. When utilising mixed methods the researcher is free to use all methods possible to address a research problem. Selecting and combining designs and methods from both traditions allows one to complement the other to contribute to an understanding of the whole research topic [19].

An important aspect of mixed methods design is the integration between methods. This integration can take place from formulating the research question through to writing up, including at the stages of design, sampling analysis and interpretation [130]. A study with both qualitative and quantitative methods that are not specifically mixed or integrated via merging, embedding or connecting is not an example of mixed methods but rather two separate data gathering methods [18].

The most commonly used mixed methods design is a triangulation design. The purpose of this design is to converge both qualitative and quantitative research methods to establish conclusions about a single phenomenon [18]. In a triangulation design, the researcher collects and analyses quantitative and qualitative data separately on the same phenomenon, which is then converged through comparison and contrasting of results during the interpretation. Both types of data are collected during one phase of the research at roughly the same time and each type of data can be collected and analysed independently (Figure 4).

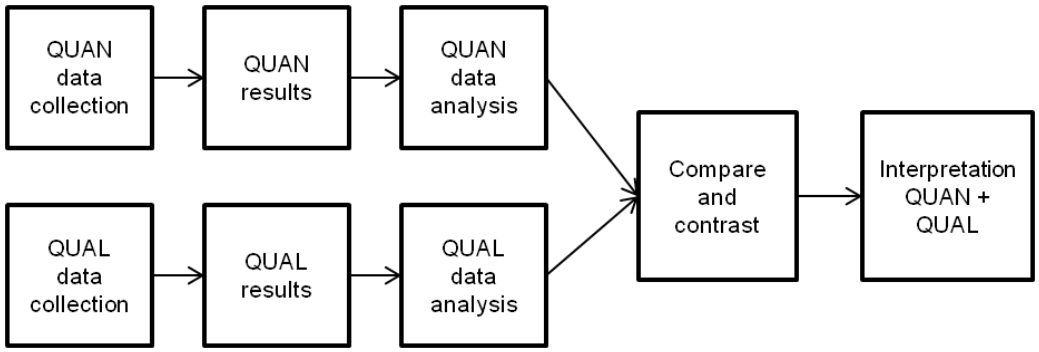

Figure 4: Triangulation Design – convergence model [18]

A limitation of this design, which can be difficult to resolve, is if the qualitative and quantitative data that has been collected do not agree. In a classic triangulation design, studies need to be structured so that the qualitative and quantitative methods address the same concept or phenomenon so that data can be successfully merged. Research in health care and the procedure of recommending a model of practice is a complex process with many different and overlapping elements that need to be explored. These differences raise difficulties in using a triangulation design [20].

A mixed methods design with a complementarity purpose can overcome the difficulty of researching complex health care services. In this case, qualitative and quantitative methods are used to measure overlapping but also different facets of a single phenomenon; the design of a model of practice, which will yield an enriched, elaborated understanding of this phenomenon [20,131]. Using a mixed methods design with a complementarity purpose

acknowledges there is a range to the phenomena under investigation and qualitative and quantitative methods can examine the overlapping aspects to uncover a comprehensive understanding [131]. Green reports that 'most social phenomena are complex and multifaceted' therefore a complementarity purpose fits 'many inquiry contexts' [131] (p101). The use of this design can achieve a comprehensive and elaborated understanding of the complexities surrounding a model of service delivery for rural and remote residents who have sustained a traumatic hand injury.

Applying a mixed methods design with a complementarity purpose to this research

The aim of this research was to explore the provision of hand therapy services and propose a model of practice for occupational therapists, and/or physiotherapists who work in public health care facilities and provide intervention to rural and remote clients in Australia who have had a traumatic hand injury. To achieve this aim, four objectives were identified that acknowledge the complex nature of the 'conceptual phenomena' under investigation, seen in Figure 3 [20]. The four objectives address different, yet overlapping issues [131]. The studies in each of the four objectives were conducted concurrently, as much as time and capacity allowed. The results were analysed together and recommendations made regarding a model of practice.

Objective 1 examined the commonalities and differences identified by rural and remote residents and residents of regional metropolitan areas, in the issues associated with functional recovery and rehabilitation in relation to a traumatic hand injury. Objective 2 explored the experiences of rural and remote residents in relation to their traumatic hand injury and the issues associated with functional recovery and rehabilitation. This objective also investigated the perceptions of the targeted population towards the hand therapy services offered. The third objective ascertained the experiences of occupational therapists and physiotherapists in selected Australian health facilities of working with rural and remote patients who have had a traumatic hand injury and how they have adapted their service to meet the needs of this population. The fourth and final objective explored alternatives for providing therapy, such as DVD technology, to improve exercise compliance and to address issues of distance and reduced contact with therapists. Figure 3 describes the research design using mixed methods with a complementarity purpose.

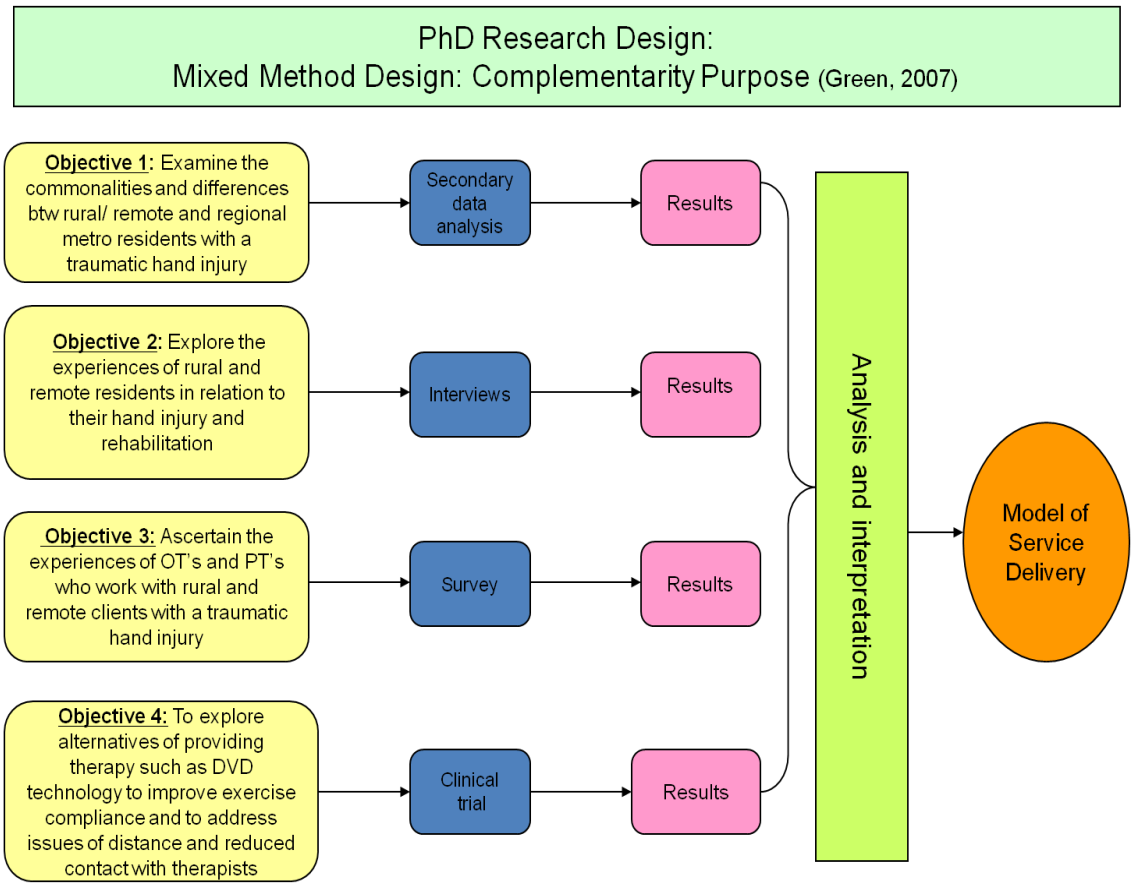

Figure 3: PhD Research Design

Ethics

This research has received ethical approval from Townsville Health Service District Health Research Ethics committee (protocol 14/07) and James Cook University Human Ethics Sub-Committee (H2697). The clinical trial in Objective 4 is also registered with the Australian New Zealand clinical trial register (ANZCTRN 12608000530325).

This chapter has discussed the worldview of pragmatism and its influence on the use of a mixed methods research design with a complementarity purpose. Chapter Three has also outlined different objectives of the research that address differing, yet overlapping issues relevant to the overall research aim. The next chapter addresses the first objective in the

research, which was to examine the commonalities and differences between rural/remote and regional/metropolitan residents with a traumatic hand injury.

CHAPTER FOUR: THE FUNCTIONAL IMPACT OF A TRAUMATIC HAND INJURY – A COMPARISON OF RURAL/REMOTE AND METROPOLITAN/REGIONAL POPULATIONS

This chapter addresses the first research objective:

To explore the commonalities and differences in the issues associated with functional recovery and rehabilitation in relation to traumatic hand injury identified by rural and remote residents and residents of regional metropolitan areas.

Figure 5 shows an overview of the research design and highlights (in red) Objective 1.

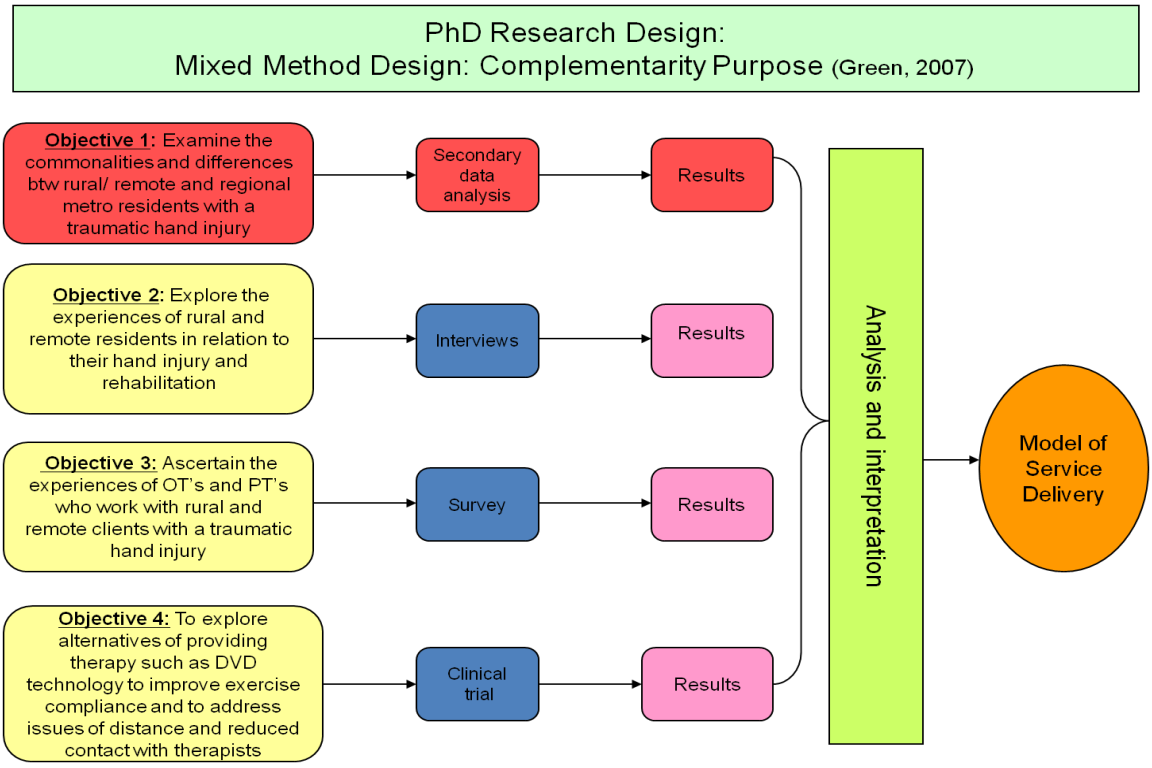

Figure 5: Objective 1 – Secondary Data Analysis

The ICF lists the environment as a contextual factor that can both limit or facilitate participation in activities [41]. Environmental factors include the natural environment, support and relationships, attitudes, services, systems and policies. The environment is often listed

as an important issue in rural and remote health service delivery. There is a lack of public transport and a requirement to travel long distances, often over unsealed roads to access health care, which can be costly [27,49,132,133]. There are also less health care professionals in rural and remote areas when compared to metropolitan/regional Australia, which is due to difficulty recruiting and retaining staff [9,51,83,134]. Services and interventions, such as hand therapy exercise protocols, services, clinical practices and guidelines, which are developed in metropolitan locations often do not 'fit' within a rural and remote context [9,14]. Models of care in rural and remote areas must differ from metropolitan locations to address specific issues such as isolation [9,14]. Identifying the differences between the two populations and the specific needs of the rural and remote population will assist in designing a service that is appropriate, accessible and safe [5,135].

Two retrospective surveys on a rural/remote population and a metropolitan/regional population revealed a notable functional impact following a traumatic hand injury, particularly in the areas of work and leisure [36,136]. Concerns were also highlighted regarding the equitable provision of health care services between rural/remote and metropolitan/regional areas [36]. The research paper in this chapter addressed Objective 1 and compared and explored the data from the two retrospective surveys. The aim was to determine differences and commonalities between the two population groups regarding the impact on function and the provision of rehabilitation.

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The functional impact of a traumatic hand injury: a comparison of rural/remote and metropolitan/regional populations

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Implications for Rehabilitation

1. A traumatic hand injury can have a moderate to severe impact on work and leisure regardless of a person's residential location
2. Contextual factors such as distance and expense can be barriers to participation in rehabilitation for rural and remote residents
3. The further development and implementation of telerehabilitation technology is important to facilitate more equitable health care service delivery between rural/remote and metropolitan/regional populations

Abstract

Purpose: The aim of this research was to explore the commonalities and differences in the issues associated with the functional recovery and rehabilitation of a traumatic hand injury experienced by people in rural/remote and metropolitan/regional areas.
Methods: Responses to a previously mailed survey exploring the functional impact on a rural and remote population and a metropolitan/regional population were used for analysis and comparison.
Results: Both populations reported a loss of movement, pain and stiffness and a significantly greater percentage of metropolitan/regional respondents reported a loss of strength. Leisure and work tasks were affected for both groups as a result of their impairment. Rural and remote respondents would have liked more appointments but found that it was expensive to get to them. There was a significant reduction post hand injury for both populations of respondents reporting their occupation as labourers. There was also a significant increase in those who reported undertaking home duties, were pensioners or unemployed.
Conclusion: A traumatic hand injury can have a moderate to extreme impact on work and leisure regardless of residential location. Contextual factors related to living in rural and remote areas can be both a barrier and a facilitator to participation in functional activities. A review of service provision in rural/remote areas to address concerns regarding the expense of attending appointments and the minimal number of appointments required for rural and remote residents following a traumatic hand injury is recommended. Distance technology such as telerehabilitation can increase flexibility of treatment and reduce the requirement to travel. The further development and implementation of such technology is important to facilitate more equitable health care service delivery between rural/remote and metropolitan/regional populations.

Keywords: Hand Injuries, functional outcome, rurality

Introduction

A traumatic injury to the hand can result in limited range of motion, loss of strength, pain and altered sensation [1-3]. These impairments can affect participation in day to day activities, in particular work and leisure [4-7]. There are no studies to determine if there is a difference between a rural/remote and a metropolitan/regional population on the impact of hand trauma on function, attitudes and in rehabilitation services provided.

The World Health Organisation notes that the environment is an important contextual factor that can limit or facilitate participation in daily activities. Environmental factors 'make up the physical, social and attitudinal environment in which people live and conduct their lives'[8]. Different environments may have different impacts on the same individual with a given health condition [9]. Factors that can facilitate or inhibit participation in daily activities include the natural environment, support and relationships, attitudes, services, systems and policies.

Environmental contextual factors have been discussed in studies exploring rural and remote health service delivery. The rural climate is described as harsh with drought and bushfires posing a threat to livelihood and health [10]. Barriers to access of health services include the lack of public transport and the need to travel long distances, often over unsealed roads, access to health care, and the subsequent costs involved [11-14]. There are fewer local specialist services with a disparity in the number of health care professionals between metropolitan/regional and rural/remote areas of Australia that is often due to the difficulty of recruiting and retaining staff [15-19]. Rural and Remote residents are described as stoic, pragmatic and resilient [20,21]. The ability to work is seen as a strong predictor of good health [22,23]. The nature of work in rural/remote areas is predominantly manual in nature with occupations focused within the primary production and mining industries [24].

It is unclear to what effect contextual factors influence functioning and participation of people who live in a metropolitan or regional location when compared to a rural and remote location. The aim of this research was to explore the commonalities and differences in the issues associated with the functional recovery and rehabilitation of a

traumatic hand injury experienced by people in rural/remote and metropolitan/regional areas.

Methodology

Responses to a mailed survey exploring the functional impact on a rural and remote population and a metropolitan/regional population were used for analysis and comparison [4,25]. These respondents had received treatment for a traumatic hand injury at the occupational therapy unit of a tertiary referral public hospital in North Queensland. The catchment area for this hospital extends 550 km to the south, 1200 km to the northern tip of Australia and 1100 km west to the Northern Territory.

Classification of remoteness

The Rural, Remote, Metropolitan Areas (RRMA) classification is considered a valid classification to use for research, policy and funding purposes [19,26]. Therefore this classification was applied to data analysis and in presentation of results. Respondents who resided RRMA areas: M1, M2 and R1 were classified as metropolitan and regional. RRMA areas: R2, R3, Rem1 and Rem2 were classified as rural and remote.

Survey Tool

Survey questions explored injury type, hand dominance, length of time since injury and impairment. Using a five-point Likert scale, respondents were asked to rate the perceived impact of the injury on their day-to-day life, self-care, work and leisure, interpersonal relationships and their satisfaction with life. In addition, the Upper Extremity Functional Index (UEFI) [27] provided more specific questions related to functional activities, such as dressing, driving, opening jars, and lifting items.
The survey tool also explored their experience the provision of hand rehabilitation, including the barriers to compliance, such as the availability of and access to appointments, understanding prescribed exercises and accessing hand therapy rehabilitation.

Data analysis

The data were analysed using the Statistical Package for Social Sciences Version 21. Descriptive statistics using means and valid percentages of the sample were applied to explore variables.
Chi-Squared analysis was used for all unpaired categorical data. The McNemar test for paired categorical data analysed occupational data before (pre) and after injury (post).

Open ended comments were analysed within rural and remote and metropolitan/regional data to elaborate upon the quantitative findings. The analysis used content analysis by coding common words and phrases from both metropolitan/regional and rural/remote populations and by undertaking frequency counts of the codes [28]. This technique has been used in other mixed method studies to support interpretation of quantitative data [29,30].

Occupation Classification

Major group categories in The Australian and New Zealand Standard Classification of Occupations (ANZSCO) [31] were: Managers (including farmers and farm managers); Professionals; Technicians and Trades Workers; Community and Personal Service Workers, Clerical and Administrative Workers, Sales workers, Machinery Operators and Drivers, and Labourers. An extra category, not related to ANZSCO, was assigned for respondents who reported that their main occupation was home duties or being a pensioner, a student, or unemployed.

Ethics Approval

Ethical approval for the study was provided by The Townsville Health Service District Health and Research Ethics Committee (14/07) and James Cook University Ethics Committee (H2697).

Results

Sample Characteristics

Table 1 provides a description of the sample. Data was analysed for a total of 159 respondents: rural and remote (n=77), and metropolitan/ regional (n=82). Females accounted for 54.7% of the sample, with 46% residing in rural and remote areas. Of the male respondents, 51.4% resided in rural and remote areas. The mean age of the total sample was 49.84 years with an age range of 18-84 years.

With regards to level of education, 59% of respondents completed high school level. Of the 30.6% of respondents who had completed tertiary education, 60.4% resided in metropolitan and regional areas.

The majority of survey respondents (71.7%) had received their injury in the 3 years prior to completing the survey. Injuries to one hand accounted for 90% of the injuries. Over half of all respondents reported an injury to their dominant hand of which 50% were rural and remote residents.

Injury type:

The most common injuries reported were fractures (47.2%), and tendon injuries (40.9%). A significantly higher percentage of metropolitan residents reported fracture as their injury than the rural and remote residents (p= 0.026).

Impairments

The greatest impairments reported by respondents were pain (49.1%), stiffness (59.7%), loss of strength (49.1%) and loss of movement (66%). A greater percentage of rural and remote respondents (63%) reported a loss of sensation from their injury; which was statistically significant (p=0.023). A significantly higher percentage of metropolitan/regional respondents reported a loss of strength as a result of their injury (p=0.012).

Insert Table 1 about here

Occupation

Technicians and trade workers accounted for 17.1% of occupations prior to injury and labourers accounted for 13.3%. The largest category of respondents related to home duties, pensioners and students; 25.3%. Within the management category 68.8% were rural and remote residents, of which 72% were farmers and farm managers (Table 2)

The number of respondents who reported their occupation as home duties, pensioner, disability pensioner, or unemployment following their traumatic hand injury rose to 40.5% of the total sample. The increase in this category for both remoteness classifications between pre-injury occupation and post injury occupation was significant ($p< 0.001$). Technicians/trades and labourers fell to 13.3% and 5.1% respectively. The reduction from pre-injury to post-injury in the labourers category for both remoteness classifications was significant ($p< 0.001$).

Respondents in metropolitan and regional locations accounted for 82.4% of professionals prior to their traumatic hand injury which was significant when compared to the rural population ($p=0.009$). This percentage dropped to 73% following post injury and was not significant

Insert table 2 about here

Level of impact on day to day activities

There were no significant differences between metropolitan/regional and rural/remote categories regarding the functional impact of the traumatic hand injury. Almost half of all respondents reported they experienced a moderate to extreme impact on their day to day activities (46.2%) and work activities (46.5%) whilst 42.7% reported a moderate to extreme impact on leisure activities.

Upper Extremity Functional Index (UEFI)

Results from the UEFI also found that 42.9% of respondents reported that performance of leisure activities was either moderately to extremely difficult or that they were unable to participate in these activities. Specific areas of difficulty in day

to day activities included lifting a bag of groceries to waist (38.9%); above their head (44.5%); pushing up on hands (37.2%); or using tools or appliances (32.5%). Only 11.9% of respondents reported that driving was extremely difficult or that they were unable to drive at all.

Home program

Table 3 provides a summary of responses regarding the home program. The majority of respondents (75.5%) agreed that they saw a hand therapist enough after their injury and 62.9% found the home exercise program moderately to extremely useful.
With regards to the home exercise programs 41.4% of rural/remote respondents and 45.4% of metropolitan/regional respondents agreed that after seeing the hand therapist they understood exactly what they needed to do. There were no significant differences between the rural/remote and metropolitan/ regional groups with regards to their understanding of the home program and remembering the exercises.
Over half of the respondents (66.4%) disagreed or strongly disagreed that they did not have enough time to do their exercises. With regards to appointments, 37.5% of rural and remote respondents agreed or strongly agreed that it was expensive to get to appointments which was significantly greater than metropolitan respondents ($p<0.001$).
A significantly greater percentage of rural and remote respondents agreed that they would have liked more follow up appointment than did metropolitan/regional respondents ($p=0.009$).

Insert table 3 about here

Open ended comments

Table 4 outlines the frequency of codes for both metropolitan/regional and rural/remote categories.

Rural and remote residents noted the time it took to travel to appointments and the expense involved.

'It was expensive going for appointments; fuel each week and a 2.5 hour trip'

The need to adapt tasks was also mentioned by rural and remote respondents:

'Being self-employed it was just a case of getting on with work after the accident. Some aspects of the job are harder now but I have been able to adjust my technique in most cases'

The inexperience of local therapists and the delay in treatment was an important issue for rural/remote residents:

'Rehabilitation support at (local hospital) very inadequate due to inexperience and/or understaffing'

Both remoteness classifications reported on impairments following their hand injury and the impact of this on functional tasks:

'I now have ... stiffness and reduced mobility in the end joint causing the finger to get caught in clothing and a slight reduction in grip strength'

Metropolitan/regional and rural/remote residents also commented on their positive experience of medical and rehabilitation treatment

'My (hand) therapist gave me the most encouragement and advice. I trusted her more than any other professional person that I dealt with. I had complete faith in her ability to help me"

Insert table 4 about here

Discussion

The aim of this research was to explore the commonalities and differences in the issues associated with functional recovery and rehabilitation in relation to a traumatic hand injury experienced by rural/remote and metropolitan/regional respondents.

Analysis of results has demonstrated both commonalities and differences between rural/remote and metropolitan respondents of this retrospective survey. These results are discussed below.

Injury type and impairments

Both metropolitan/regional and rural/remote participants reported a loss of movement, pain and stiffness which is reflective of research exploring impairment following a traumatic hand injury. [1,32] In this study, a significantly greater percentage of metropolitan/regional respondents reported a loss of strength. Stoicism, a quality attributed to rural and remote residents, may be the reason for rural/remote respondents not acknowledging that they had a loss of strength [33]. Furthermore a higher proportion of the metropolitan/regional groups were employed in professional and clerical and administrative occupations prior to injury. This proportion is in contrast to rural/ remote respondents who were focused in occupations such as technicians and trades, managers (farmers and farm management), labourers and community and personal service that require greater physical strength due to the manual nature of tasks involved [31]. It is likely that rural/remote respondents returned to physically demanding occupations, particularly farming, which would have resulted in an improvement in strength due to the physical nature of the tasks.

Level of impact on day to day activities

This analysis established that for both rural/remote and metropolitan/regional respondents' leisure and work tasks were affected as a result of their injury. Just under half reported a moderate to extreme impact on day to day activities, in particular work and leisure. This demonstrates that work and leisure are common and important issues regardless of residential location.

Rehabilitation and home exercise program

An important and statistically significant finding of this research showed that rural and remote respondents would have liked more appointments but found that it was expensive and difficult to get to them. This finding supports previous research that

highlights that the expense of travel is likely to be a barrier in attending appointments for the rural and remote populations [11,13,18]. This result also confirms that contextual factors related to living in a rural and remote location likely play an important role in facilitating or limiting participation in functional activities to a larger extent than for the metropolitan/regional groups [8]. Australian state/territory governments have acknowledged the expenses incurred from attending medical appointments and updated patient travel subsidy schemes to reimburse patients [34]. These schemes, however, are unable to provide adequate compensation to family members who often have to take time off work to drive family members to appointments [35]. Telerehabilitation, telehealth and internet technology have been viewed as a means of providing contact between scheduled appointments [36]. This distance technology can increase flexibility of treatment and reduce the requirement to travel long distances that incur additional expenses.

Occupation

The occupation data for this survey is reflective of local government area regional profiles available through the Australian Bureau of Statistics [37]. Within the metropolitan/regional population of this study technicians and trade workers, professionals, clerical and administrative workers were the most common occupational groups. Occupations in rural and remote category focused on the more physically demanding occupations of managers (farmers and farm managers) technicians and trades workers and community and personal service workers comprised the largest category for rural/remote respondents.

There was a significant reduction post hand injury for both remoteness classifications of respondents reporting occupations in the labourers' category. There was also a significant increase in those who reported undertaking home duties/pensioners/unemployed and students. This point confirms that a traumatic hand injury can have a moderate to extreme impact on the ability to perform work, resulting in a need to change, or leave, employment. Labouring occupations involve routine and repetitive physical tasks using hand and power tools and machines [31]. The physical demands of being employed casually or seasonally in roles within the agricultural, forestry and fishing, mining and manufacturing industries, would be compromised by a traumatic hand injury.

Limitations

The main limitation of this study is the low response rates (18% and 32.8%) and probable volunteer bias already addressed in the preliminary studies [4,25]. Ethics requirements for both studies allowed only one mail out and one follow up phone call. As a result, those individuals who had most concerns about their injury and treatment were most likely to have responded. The number of difficulties reported in the survey and comments about the home exercise and rehabilitation program would also have been influenced by volunteer bias. These respondents were also more likely to adhere with the requirements of home program [38,39]. Despite the limitations identified from the previous surveys, this research provided a unique opportunity to compare between rural/remote and metropolitan/regional population groups and offers further insight into the most important contextual factors for consideration in hand rehabilitation.

Conclusion

This study has demonstrated that contextual factors related to living in rural and remote areas can be both a barrier and a facilitator to participation in functional activities. The similarities and differences of issues with functional recovery and rehabilitation in relation to a traumatic hand injury for both rural/remote and metropolitan/regional populations have also been highlighted. Both metropolitan/regional and rural/remote populations experienced a notable impact on work, leisure and day to day activities. A number of respondents changed occupations, in particular labourers', who after their injury, reported that they engaged in home duties, were pensioners or were unemployed. Significantly, less rural and remote respondents reported a loss of strength following their injury which reflected the more physical nature of work in rural and remote areas. A review of service provision in rural/remote areas to address concerns regarding the expense of attending appointments and the minimal number of appointments required for rural and remote residents following a traumatic hand injury is recommended. Distance technology such as telerehabilitation can increase flexibility of treatment and reduce the requirement to travel. The further development and implementation of such

technology is important to facilitate more equitable health care service delivery between rural/remote and metropolitan/regional populations.

Declaration of interest

The authors report no declaration of interest

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Table 1: Characteristics of Sample

Variable Characteristic	Summary Statistics Measure of Dispersion		
% Rural and Remote or Metropolitan/Regional		Rural/Remote 48.4%	Metro/Regional 51.6%
%Gender	Total	Rural/Remote	Metro/Regional
Female	54.7%	46%	54%
Male	45.3%	51.4%	48.6%
%Education	Total	Rural/Remote	Metro/Regional
Primary	9.6%	60%	40%
High School	59.9%	51.1%	48.9%
Tertiary	30.6%	48.9%	60.4%
% Injury	Total	Rural/Remote	Metro/Regional
Fracture	47.2%	38.7%	61.3%
Crush	13.2%	66.7%	33.3%
Nerve	25.8%	51.2%	48.8%
Tendon	40.9%	52.3%	47.7%
Amputation	6.9%	72.7%	27.3%
Burns	2.5%	75%	25%
Other	6.9%	45.5%	54.5%
%Injury to dominant hand	Total	Rural/Remote	Metro/Regional
	51.6%	50%	50%
% Time since Injury	Total	Rural/Remote	Metro/Regional
Less than 1 year	13.2%	33.3%	66.7%
1 to 2 years	34%	46.3%	53.7%
2-3 years	24.5%	51.3%	48.7%
3-4 years	13.8%	59.1%	40.9%
More than 4 years	14..5%	52.2%	47.8%
%Impairments	Total	Rural/Remote	Metro/Regional
Pain	49.1%	50%	50%
Stiffness	59.7%	50.5%	49.5%
Swelling	24.5%	51.3%	48.7%
Sensitivity	31.4%	48%	52%
Loss of sensation	28.9%	63%	37%
Loss of movement	49.1%	47.4%	52.6%
Loss of strength	66%	41%	59%
No effect	9.4%	60%	40%

N=159

Table 2: Occupation classifications

Classification (Based on ANZSCO)	Pre-Injury			Post-Injury		
	Total (n=159)	**Rural (n=77)**	**Metro (n=82)**	**Total (n=159)**	**Rural (n=77)**	**Metro (n=82)**
Group 1 :Managers	**10.1%**	14.3%	6.2%	**8.2%**	10.4%	6.2%
Group 2: Professionals	**10.8%**	3.9%	17.3%	**10.1%**	6.5%	13.6%
Group 3: Technicians and Trades workers	**17.1%**	14.3%	19.8%	**13.3%**	10.4%	16%
Group 4: Community and Personal Service Workers	**10.8%**	14.3%	7.4%	**8.9%**	9.1%	8.6%
Group 5: Clerical and Administrative workers	**7.6%**	3.9%	11.1%	**5.7%**	2.6%	8.6%
Group 6: Sales Workers	**2.5%**	2.6%	2.5%	**3.8%**	5.2%	2.5%
Group 7 Machinery operators and drivers	**2.5%**	5.2%	0%	**4.4%**	7.8%	1.2%
Group 8:Labourers	**13.3%**	16.9%	9.9%	**5.1%**	6.5%	3.7%
Group 9: Other (not included in ANZSCO)	**25.3%**	24.7%	25.9%	**40.5%**	41.6%	39.5%

Table 3: Hand therapy Program

	Disagree/ Strongly disagree		Neither agree nor disagree		Agree/Strongly agree	
	Rural	Metro	Rural	Metro	Rural	Metro
After seeing the hand therapist I understood exactly what I needed to do to help my recovery from my hand injury.	2.6% (4)	5.3% (8)	3.3% (5)	2% (3)	41.4% (63)	45.4 (69)
I never had enough time to do my exercises.	31.65 (48)	34.9% (53)	7.9% (12)	11.2% (17)	7.2% (11)	7.2% (11)
The exercises hurt too much to do	29.1% (44)	28.5% (43)	11.3% (17)	16.6% (25)	6.6% (10)	7.9% (12)
I understood why I had to do the exercises.	1.3% (2)	2.6% (4)	3.3% (5)	2.6% (4)	43.1% (64)	48% (73)
I found it hard to remember the exercises I was supposed to be doing.	43% (65)	41.7% (63)	3.3% (5)	7.3% (11)	0.7% (1)	4% (6)
It was too difficult to get to follow up appointments.	32.7% (49)	42.7% (64)	4.7% (7)	4% (6)	10% (15)	6% (9)
It was expensive getting to appointments.	22.4% (34)	41.4% (63)	7.2% (11)	7.2% (11)	17.8% (27)	3.3% (6)
I would have liked more follow up appointments	22% (33)	31.3% (47)	9.3% (14)	12.7% (19)	15.3% (23)	9.3% (14)

Table 4: Open ended comments (codes)

	Rural and remote	Metro and regional
Functional Tasks		
Unable to do leisure tasks	1	1
Drop items e.g coins	2	2
Hand writing difficulties	1	2
Unable to carry heavy items, open jars	3	
Adapt and change tasks	4	1
Impairments		
No effect from hand injury/successful healing	5	2
Reduced range of motion and finger dexterity	8	3
Pain	4	8
Reduced strength	6	6
Reduced sensation	3	1
Rehabilitation and medical appointments		
Length of time to travel to appointments and expense	7	1
Local Occupational Therapist and Physiotherapist: long waiting times and inexperience	4	
Positive experience of medical and rehabilitation treatment	12	13
Negative experience of medical and rehabilitation treatment: no information , poor communication, delayed surgery	4	5

Key Points

- Both metropolitan/regional and rural/remote participants reported a loss of movement, pain and stiffness in their hand. A statistically significant greater percentage of metropolitan/regional respondents reported a loss of strength ($p=0.012$), which reflected the more physical nature of work in rural and remote areas. A statistically significant higher percentage of rural and remote residents reported a loss of sensation ($p=0.023$).
- Leisure and work tasks were affected for both rural/remote and metropolitan/regional respondents' as a result of their injury, demonstrating that work and leisure are common and important issues regardless of residential location.
- A statistically significant greater percentage of rural and remote respondents would have liked more appointments than metropolitan respondents ($p=0.009$). The difficulty and expense faced by rural and remote respondents in terms of getting to appointments was statistically significant greater than metropolitan respondents ($p<0.001$)
- Technicians and trade workers, professionals, clerical and administrative workers were the most common occupational groups in the metropolitan/regional population. Occupations in the rural and remote category focused on the more physically demanding occupations of farmers and farm managers, technicians and trades workers, and community and personal service workers.
- A traumatic hand injury can have a moderate to extreme impact on the ability to perform work, resulting in a need to change, or leave, employment. This study revealed that there was a significant reduction of respondents in both groups reporting their occupation as a labourer post hand injury ($p<0.001$). There was also a significant increase in those who reported undertaking home duties/pensioners/unemployed and students ($p<0.001$)

Conclusion

Chapter Four has explored the commonalities and differences in the issues associated with functional recovery and rehabilitation in relation to traumatic hand injury identified by rural and remote residents and residents of regional metropolitan areas. Results demonstrated

that a traumatic hand injury can have a moderate to extreme impact on work and leisure regardless of the participants/clients residential location. Contextual factors related to living in rural and remote areas can be both a barrier and a facilitator to participation in functional activities. Services need to address concerns regarding the expense of attending appointments. The further development and implementation of distance technology is important to facilitate more equitable health care service delivery between rural/remote and metropolitan/regional populations.

The following chapter will address Objective 2 of the research and presents two publications that explore the experience of living with a traumatic hand injury and the experience of receiving medical and rehabilitation intervention following a traumatic hand injury in a rural and remote location.

CHAPTER 5: THE EXPERIENCE OF LIVING WITH A TRAUMATIC HAND INJURY AND THE EXPERIENCE OF MEDICAL AND REHABILITATION INTERVENTION FOR TRAUMATIC HAND INJURIES IN RURAL AND REMOTE NORTH QUEENSLAND

This chapter addresses the second research objective:

To explore the experiences of rural and remote residents in relation to their traumatic hand injury and the issues associated with functional recovery and rehabilitation. Further, to investigate the perceptions of this population of the hand therapy services offered.

Figure 6 overviews the research design and highlights (in red) Objective 2.

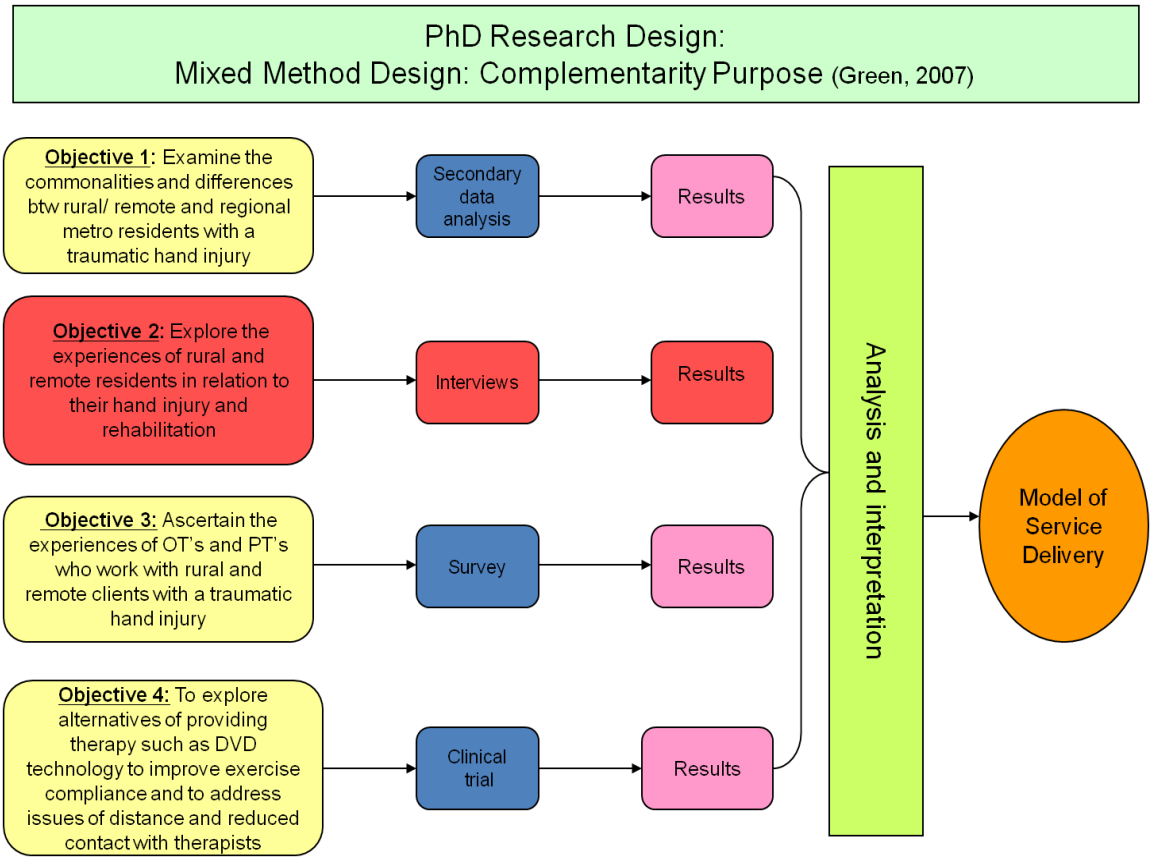

Figure 6: Objective 2 - Interviews

A preliminary survey exploring the functional impact of a traumatic hand injury on people who live in rural and remote locations found that work and leisure tasks were most affected following a traumatic hand injury [36]. Survey respondents also highlighted concerns regarding the long distance travel for follow up appointments and the expense involved. The study recommended further research using a qualitative research design to explore in more depth the functional impact of a traumatic hand injury [36]. This chapter ensures that the 'voices' of rural and remote respondents make an important contribution to the research aim [18]. This study sought to understand rural and remote people's experience of engaging in occupations, which can include work, activities of daily living and social activities [137]. Exploring the lived experience and the meanings attributed to these experiences can assist in the development of services and models of care, particularly following a traumatic hand injury [138]. This process provides an opportunity to gain a perspective on health services specifically 'for rural by rural', which can contribute to service improvement [22].

The first paper is the PDF version of the following article that has been accepted for publication:

Kingston G, Judd J, Gray M. (2014). The experience of living with a traumatic hand injury in a rural and remote location: an interpretive phenomenological study. Rural and Remote Health 2014; 14:2764 (Online). Available at http://www.rrh.org.au

The article is formatted according to the requirements listed under 'Instructions for Authors'. This journal has an impact factor of 0.820 and a Scopus Journal Rank of 0.529. It was selected for its focus on rural health practice, policy and research.

The second paper is the PDF version of the following article that has been accepted for publication:

Kingston G, Judd J, Gray M. The experience of medical and rehabilitation intervention for traumatic hand injuries in rural and remote North Queensland: a qualitative study. Disabil. Rehabil. 2014; early online:1-7; doi 10.3109/09638288.2014.923526

The article is formatted according to the requirements listed under 'Instructions for Authors'. This journal has an impact factor of 1.541 and a Scopus Journal Rank of 0.662. It was selected due to its international and multidisciplinary focus on rehabilitation. This journal

publishes both qualitative and quantitative research regarding the practice and policy aspects of disability and rehabilitation.

The two articles in this chapter provide a rich and comprehensive understanding of how rural and remote residents with a traumatic hand injury engage in day to day activities and their experience of medical and rehabilitation intervention follow a traumatic hand injury. These articles give ‘voices’ to the patients in this mixed methods research and contribute to the development of services in rural and remote areas.

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ORIGINAL RESEARCH

The experience of living with a traumatic hand injury in a rural and remote location: an interpretive phenomenological study

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The experience of living with a traumatic hand injury in a rural and remote location: an interpretive phenomenological study

Rural and Remote Health **14: 2764. (Online) 2014**

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ABSTRACT

Introduction: The aim of this research study was to gain an understanding of how rural and remote residents in North Queensland, Australia, engaged in work, activities of daily living tasks and social activities following a traumatic hand injury. Findings from a previous retrospective survey with these participants revealed that patients experienced difficulties such as pain for many years after their injury; however, because of the survey methodology, the voices of participants were not heard. This study contributes to a larger project that seeks to propose a model of service delivery to rural and remote residents who have sustained a traumatic injury.

Methods: Utilising an interpretive phenomenological research design, data were gathered through in-depth, semistructured interviews. Fifteen participants were recruited into this study and questions were designed to explore the experience of having a traumatic hand injury in rural and remote areas of North Queensland.

Results: The thematic analysis indicated five major themes: injury and impairment, pain, occupation and activity, and resilience. Participants reported that having a hand injury often caused further injury due to the impairment. The pain experienced could be 'all consuming' yet participants reported 'pushing through' this pain to complete daily tasks. Participants reported that they would 'go mad' if they did not work and highlighted the importance of activity in their recovery. Participants felt grateful at having their hand and thought towards the future. Being self-reliant was important but they were willing to accept support from others when needed.

Conclusions: Incorporating activity and occupation in rehabilitation programs as opposed to focusing on strict protocols is an important consideration in the recovery process of rural and remote residents. In particular, engaging in activity and occupation was

an important part of managing the pain associated with the hand trauma. This research also found that participants demonstrated resilient qualities while recovering from a traumatic hand injury. Health professionals who work with people from a rural and remote location with a traumatic hand injury should consider a treatment model that encourages active patient participation, identifying collaborative treatment goals that align with the values of people living in rural and remote locations. Education regarding the high risk of further injury due to the nature of, and exposure to, the type of work and activity in rural and remote locations is also recommended.

Key words: activities of daily living, hand injuries, pain, resilience, work.

Introduction

Findings from a previous retrospective survey that explored the impact of a traumatic hand injury for people who live in rural and remote locations in North Queensland, Australia, revealed that participants experienced ongoing difficulties such as pain or stiffness for many years after their initial injury[1]. These difficulties resulted in a moderate to extreme impact on their day-to-day lives, with work and leisure activities often the most affected. Work tasks were predominantly manual in nature and considered especially important in rural and remote locations[1]. This previous survey, while highlighting important points surrounding the impact of traumatic hand injuries in rural and remote locations did not explore in detail the issues raised by the respondents. Voices and stories of patients can contribute positively to service delivery improvements for traumatic hand injury in rural and remote locations[2].

The literature highlights the importance of working in partnership with, and being responsive to, the cultural and specific needs of people who utilise the service when designing rehabilitation programs[3]. There are also concerns that clinical practices and guidelines, which have been developed in metropolitan locations, are unlikely to fit in rural and remote locations as they may not take into account the differing values and needs of residents[4,5]. This issue is particularly relevant for hand therapy rehabilitation programs, which require strict adherence to protocols through the prescription of systematic movements with specific numbers of repetitions[6].

The aim of this study was to gain an understanding of the lived experience of rural and remote residents who have a traumatic hand injury. It seeks to understand their experience of engaging in occupation or 'things which people do in their everyday life', which can include work, activities of daily living and social activities[7]. Exploring the lived experience and the meanings attributed to these experiences can assist in the development and evaluation of services and supports required following a traumatic hand injury[8]. This current study contributes to a larger project that seeks to propose a model of service delivery to rural and remote residents who have sustained a traumatic injury.

Methods

Interpretive phenomenology

This qualitative study used an interpretive phenomenological research design, where the goal was to increase the understanding and meaning of human experiences and practices[9]. It also explored 'the essence of lived experience' by interviewing people living with a traumatic hand injury in a rural and remote setting[10]. The researcher, using an interpretive phenomenological approach, sought to hear and understand the voice and 'lifeworld' of the participant[11]. In interpretive phenomenology, the researcher's own background and practical knowledge is considered part of the

perceptual lens[11]. Indeed, it is the researcher's knowledge base that leads to specific ideas about how the inquiry needs to proceed to produce useful knowledge[12].

Recruitment strategy

Participants in this study had previously attended the hand therapy service at The Townsville Hospital Occupational Therapy Department and had responded to a retrospective survey[1]. Fifteen participants were purposefully selected according to gender, age group, residential location and injury type from demographic information provided in the surveys[13]. This process ensured a broad representation of rural and remote residents who sustain a traumatic hand injury and receive treatment in a public hospital facility. The number of interviews was chosen to allow for generation of rich and meaningful information[13]. Clients resided in the rural and remote zone according to the Rural, Remote and Metropolitan Areas (RRMA) remoteness classification[14]. Participants were contacted by mail with a follow-up phone call to confirm participation.

Interviews

Data were gathered through in-depth, semistructured interviews that explored the experience of having a traumatic hand injury in rural and remote areas of North Queensland, Australia. Each interview ran for an average of 60 minutes, which allowed for in-depth exploration of issues[13]. Questions were based upon issues raised in the retrospective survey and the researcher's own experiences of working with rural and remote residents with a traumatic hand injury[1].

Participants were asked to describe some of the difficulties they experienced because of their hand injury; the activities they no longer did because of the hand injury; the effect of the hand injury on their work life; how having had a hand injury made them feel about their day-to-day life; and its effect on their future.

Interviews were conducted either at the participant's residence or at a location agreed to by participants and researcher. Interviews were taped with permission and transcribed verbatim from audio files. Pseudonyms have been given to ensure confidentiality.

Data analysis

Following transcription, the first and second authors individually coded the transcripts, making notes against the transcript. Van Manen's method of isolating thematic statements using the selective highlighting process was utilised[10]. These statements were grouped into themes and subthemes. Meetings were held to ensure consensus with the analysis. During the writing process, the first author reflected on the themes that had emerged, moving between the parts and the whole of the text[10].

Interviews were sent to participants for member checking to ensure validity of the data[15]. In addition, Leximancer (http://info.leximancer.com) was utilised, which supported the thematic analysis undertaken by the researchers. The use of Leximancer can reveal relationships not previously uncovered by the researcher and can increase reliability in analysis[16].

Ethics approval

The Townsville Health Service District Health and Research Ethics Committee (14/07) and James Cook University Ethics Committee (H2697) provided ethical approval to conduct the study.

Results

The thematic analysis indicated four overarching themes: injury and impairment, pain, occupation and activity, and resilience. These themes and subthemes do not exist as separate entities; they are interrelated and connected in their description of the phenomena under investigation[17].

Experience of the injury and impairment

'A freak event': Participants discussed that the injury occurred while they were doing routine work or leisure tasks

that they had been doing for many years. The event that resulted in the injury (eg a bullock getting out of control while being tailed and tagged, a winch on a boat breaking, or a fire occurring) was described as an 'out of the ordinary' or freak event. Two examples are highlighted below.

Kerry reported that she had been:

> *… putting cattle through the race to tail and tag them before they went on the truck to the sale gate. It was really a freak accident because the gate had been shut and it slid open and I grabbed it and my hand must have been out … and the bullock hit the gate … so yeah … that's a lot of weight behind it, 900 kg bullock hitting it and it just smashed to the bone.*

For Mark, who lives on a large cattle property, fencing was one of the many tasks required for maintaining the property and was done on as regular basis:

> *I was fencing and I had a cut-off saw on the back of the car … I deliberately work on the back of the car and I had cleared an area and just a freak … somehow a spark got flipped over the back, got the grass going and because I run a generator to run the saw with the noise and the fumes of the generator, I didn't smell the smoke … by the time I'd realised that it was going, I had a shovel and I nearly got it out … just then a freak of wind came out, so then I thought 'Well, OK, I'll jump on the tractor. I'll use the bucket of the tractor to scrape a fire break' which was very slow and … I nearly beat it … all the time the flames were just there and basically what I was doing was steering with … my right hand but shielding my face with my left hand and that's why … my hand … and my face and my two elbows … that's what got burnt.*

Impairment: As a result of their injury, issues such as loss of strength and movement in the hand were noted. For the participants, this was significant due to the implications the impairment had on their day-to-day tasks. Some examples of the impact of their injuries follow.

> *I used to get bottle tops and crush them … instantly, and I can't do that anymore, no way in the world, I've been trying and trying.* (Adam)

> *You pick up a piece of timber without thinking … you think you've got it and it goes plunk … it sounds stupid but you feel like an idiot. The strength is in the wrong place when you grip.* (Harry)

> *I can't vacuum because the vibration would send me off my head and I have not got the strength to pull the mop back and forwards.* (Leanne)

> *If I am looking at handling someone … usually people won't lash out at you but they will just struggle to be arrested, resist or whatever so … you know if you're holding them and having to put a cuff on or whatever you just haven't got that strength in there.* (Dean)

> *It's still really sensitive like, especially where the finger's gone … it's still really sensitive to touch.* (Nancy)

Further trauma: As a result of the initial injury and the impairment, there were often subsequent accidents. Many returned to work with less strength or movement in their hand and caused further difficulties. The nature of their work also meant that they were placed at greater risk of further injury. The following examples highlight this issue.

> *If I could've hung onto that rope like I should've been able to … once a horse would drag me from here to Timbuctoo before I'd let go but … I could not hold it and … because I tried, it just smashed it straight into it.* (Iris)

> *I fell over out here one day, I tripped … and I was in so much agony and I was screaming out to [husband] and he come out and he knows I can't get up because I can't push down on my wrist … I've just got to stay there.* (Edna)

Pain

Not only did participants discuss the issue of pain in the interviews, some were in visible discomfort and admitted that they were in pain. The presence of pain was closely linked with reduced strength and range of motion, which limited engagement in occupation and activities. Descriptions from participants are highlighted below.

All-consuming pain: Participants discussed how the pain was constant and would occur from the smallest knock, when doing a task, either work or personal care, or even while they were not doing anything.

Leanne injured her arm following a fall from a ladder while working as a shop assistant in a rural town. For her, the effect of the ongoing pain was 'just like your whole system just shuts down … it's almost like when the pain is too much'. Leanne was also unable to breastfeed following the birth of her second child as she could not hold her son.

> *He breastfed really well except that at night if my arm was sore I would tense up and he couldn't feed so he was pretty distressed through the night. I would have loved to have breastfed him … it [the pain] has robbed me of that.* (Leanne)

Changing nappies also caused pain.

> *I had him on the change table and he brought his legs up and brought them down and he must have hit me where that screw is … I just flaked it on the floor … I kind of, just slid myself over and then just got him by the feet as he was sitting up by that stage and I kind of just pulled him down on the floor to me.* (Leanne)

Managing the pain: Participants discussed inventive ways in which they managed the pain, or when they did not want to take medication.

> *I've even tried rubbing chillies on it to ease the pain.* (Chris)

> *It's like somebody's driving needles … knives in your hand there … honestly I just feel like getting it out on the anvil with a hammer and just banging or cutting it off.* (Chris)

Avoidance and protection: Participants described being protective or conscious of their hand injury and avoiding situations that could potentially cause pain and further injury.

> *If people come up to shake hands I stick out my other hand … because I am very protective of it.* (Fiona)

> *Once you got comfortable you didn't move, not even to go to the toilet … you'd hold on as long as you could because you knew it would take you another 3 hours to get it so that it did not hurt.* (Leanne)

Pushing through the pain: Participants talked about having to put up with the pain or push through in order to get tasks done. For many, the importance of completing tasks or work was important, so not allowing the pain to overtake their day was vital.

> *Yeah it hurts whether it's holding something heavier and just doing the sweeping. I just flex one hand while I've got it in the other hand and just sort of push through it.* (Iris)

> *I look at pain like this … if it's not going to kill you, then you should be able to do it.* (Iris)

> *I used to think about it because it hurt if it got bumped but then you just get used to it … now I don't worry.* (Kerrie)

Occupation and activity

Loss of roles/loss of independence: The importance of independence and returning to prior roles were highlighted, particularly when participants discussed their distress at not being able to do the things they used to do. From the participants themselves:

> *I've lost my independence; that's the main thing … and everything I did is just memories.* (Edna)

I couldn't go back to work because … trying to look after this, trying to do exercises, doing everything … it's impossible so they put me on the disability pension. I loved my work. I miss it. I do. I still feel like I see myself out there … it's part of your life that you've no longer got. (Fiona)

I don't have a bath unless someone's home and I always say it's like a little kid 'Oh I'm going to the bath now; I'm going to the bathroom, to the toilet now.' (Leanne)

Feeling useless and frustrated: For participants who could not do what they wanted, it became a frustrating and unsettling experience.

Working makes me feel as though I am doing something and now I feel like I am just hopeless. (Edna)

When you are brought up in the bush, you can turn your hand to anything and everything … if you can't, well … you get left behind and … we were taught right from little fellas cos the old man he could do anything, do all your own mechanics and your own welding and everything you know and now you're back to sort of one and a half hands … oh my oath I feel frustrated not being able to do that work. (Chris)

'I'd go mad if I wasn't working': The ability to work or be productive was vital to people. Work gave purpose and meaning to their lives and provided an important distraction from their injury. These sentiments are highlighted by the following quotes.

Yeah (I went to) hospital and had an X-ray but … I still continued to work with just one hand. (Iris)

My whole life has changed and if I didn't have a garden … to keep me busy it would be a lot harder to manage. (Fiona)

I was worried that I'd be stuck in an office or … have to have an inside job. I put it off for a while to recover and then I got back into riding horses because you lose your confidence so quickly. (Kerrie)

Work helps me not think about stuff. It keeps my mind busy and when I come home I've got stuff to do so I'm not sitting around thinking about it. (Gertrude)

Role of activity in recovery: Participants felt that being involved in meaningful activity helped with the return of movement and strength in their injured hand. Importantly, feeling as though they were doing something and being 'occupied' was vital to their emotional wellbeing.

I probably wouldn't have gotten this far without doing the fishing and stuff in the first place. If I stayed at home and wasn't a keen fisherman … and let it go I wouldn't end up with the flexibility I have today. (Adam)

If I had sat at home and not gone back to work, it would have hurt more. I would have had more pain. I always say if you sit around and you've got an injury, you feel the pain a lot more than if you can get out. (Iris)

It is fantastic … I suppose you could call it my own career my own business that I do… that keeps me happy as well as going out and riding horses … it gives me something to do. (Kerrie)

Having something to do all the time … like as we are travelling I can thankfully hand-sew, which is good … keeps my mind occupied. (Nancy)

Resilience

The major theme of resilience was identified after analysis of subthemes. Resilience is defined in the literature as a person's ability to adapt and grow despite being exposed to significant stressors[18]. Possessing a positive outlook, being determined, having supportive families, getting on with life and adaptation are considered to be important qualities that contribute to resilience[18,19].

Getting support: Participants reported that being able to accept help to get tasks achieved was an important part of living with a hand injury in a rural and remote location. Many

noted that the isolation and lack of services meant that it was important to ask for help, particularly with domestic chores. Participants provide examples of this phenomenon.

> *When I first got out of hospital I had strangers coming up to me 'Are you all right love … let me open the door for you … here I'll help you with that'. There were total strangers helping me and I mean that was good.* (Fiona)

> *He [husband] sees me and he'll grab it off me and do it and … I just go 'Yeah I know my stinking hand' … no I don't mind being helped at all.* (Iris)

> *If the kids are there, I'll call the kids out to come and help me … the kids help me a lot with things.* (Julie)

> *My parents came out and just looked after our domestic animals and Dad's pretty good. They come in the holidays quite a bit so he checked the waters and then my two neighbours … a neighbour in the east and a neighbour to the west and whenever dad did find a couple of things that were wrong he rang them and they'd come up straight away so you rely a lot on your neighbours out here.* (Mark)

'I am grateful': Despite pain, physical impairment and, for some, a loss of independence, participants were able to think positively and be glad for what they had and not focus on what they had lost.

> *I guess I'm pretty lucky in how it ended up. I've got movement.* (Dean)

> *It's disappointing I can't work anymore; it's something you've got to live with. It's not a death in the family. I mean I've always got my hand and I am grateful, extremely lucky that I am alive but it's something that I have to learn to live with.* (Fiona)

> *I've still got my arm and I've still got at least three fingers that can do something.* (Leanne)

> *I am alive and as I say to doctor and everybody 'there's more meat on a brisket bone than there is on my hand' … I'm lucky I'm alive. I've got my hand; that's a big bonus.* (Fiona)

Adaptation: Participants reported how they and their family had adapted to their injury to maintain independence and remain productive. Some specific examples to demonstrate this process follow.

> *No one in this house should ever eat pumpkin cos it's travelled a kilometre and a half before it goes in the pot. I've got a cleaver and I just hit it like that and you go and get that bit and then you cut it again and it flies off and it's the most travelled pumpkin in Queensland … they don't kind of watch too closely what I do luckily.* (Leanne)

> *One of my boy's mates put motorbike handles on the end of the broom and the mop and it actually helped.* (Julie)

> *I can mow the yard, I've learned … I push the mower up against the post or a rock or something out there where it won't go anywhere and I put my left foot on it and I start it with my left hand and I just pull … sometimes I swear at it.* (Fiona)

> *Instead of the ordinary rope reins … about as thick as your little finger … ones I've got now probably about as thick as your thumb. I've gone double so I've got double the thickness to hang onto when you ride.* (Chris)

> *My son is 11 months but from about 4–5 months he would grab his feet and pull his bottom up cos I couldn't … change the nappy … I had no chance of holding his legs up with that hand so I just say 'help mummy' and he lifts his legs up.* (Leanne)

Self-reliance and management: A strong sense of 'being able to do it themselves' was evident in the interviews. Participants reported that although they were happy to accept help initially, it was important for them to be able help themselves.

You've got to ride with the punches, otherwise you'll go down. If I can't do something I will sit and mull over it, I don't just turn around and say I can't … I'll get someone else to do that. I'll work something out that I can do it. (Harry)

I'm a very determined person and nothing will stop me … I've been like it all my life and nothing will pull me up from something I've got to do or I want to do. (Iris)

Chris, a contract musterer, lives alone in a town of 100 people in remote North Queensland. His story really highlights this issue:

I don't want to rely on anyone. If you do that in the bush, you'll go down, you'll just disappear … when I come home people said 'oh yeah we'll come and help you'. If I can't do it, nobody else is going to do it and you work out ways of getting around it … City folks, if you tell them they can't do something well then they say 'I have been told I can't do that' and give up. They've got no ticker. You live out in the bush. You learn to improvise.

A report written about Chris's future work capacity stated he would never ride again, which infuriated him:

She said I would never ride horses again and that's the worst thing you can ever tell me that you can't or never will be able to do anything, cos I'll just prove them wrong.

He was keen for all the treatment and reports to conclude:

Once you know everything's up to me, then it's up to me … to make the decisions whether I sink or swim. I want to be in charge of me … be home in me own space … If I want to do something I can do it.

The future: Thinking of the future and making changes for the future was an important part of the recovery process. For some, the injury was a life-changing event that forced them to reassess their priorities.

All I want to do, I don't care if it's the last thing I do … to do calf roping and team roping at the rodeos. (Chris)

I have to get off the tools sooner. I think it's going to get worse when I get older, you know, and I can see that now … well, I am financially moving into other options where there is a lot less movement and physical strength used in those sorts of areas. (Adam)

Rural and remote context

Participants talked of occupations traditionally associated with rural and remote locations: tomato shed graders, graziers, musterers, cattle station managers and tannery workers. They mentioned the difficulty faced when trying to perform important tasks, such as riding horses, when living in a rural and remote location.

Leanne discussed the limited takeaway food options in her town when she felt unable to cook for her family.

… don't worry about it … why don't you buy tea? Well, for a start … you could have pizza one night, a Chinese another night, you've got McDonalds and a Subway … what else are you going to do?

Having to drive long distances to get to appointments caused pain for Chris.

Well, you just imagine driving from here to Georgetown in that old rig of mine … It's made of the good stuff that old girl … and it's just torture driving from here to Georgetown.

Despite the difficulties of living in an isolated area with a traumatic hand injury, participants still preferred living in a rural location and often accepted these limitations in return for the benefits.

I don't worry about it much because I suppose this is our lifestyle and we've chosen this … this is our choice and … I've grown up with it, we're used to it … you don't know much different. (Kerrie)

In the bush … clean air and there's no phones. Here you're at ease. (Chris)

Discussion

The aim of this study was to gain an understanding, through the exploration of lived experience, of how rural and remote residents who have a traumatic hand injury engage in work, activities of daily living tasks and social activities.

The themes that emerged from this current study were the experience of the injury and impairment, pain, occupation and activity, resilience and rural and remote context.

Participants believed that *injury* was a 'freak' or out-of-the-ordinary event that occurred while engaging in routine tasks. *Rural and remote* residents, however, are exposed to higher risk of injury from large animals, equipment or poor occupational health and safety practices[20,21]. Participants reported that *impairments* previously noted in the retrospective survey had not resolved, which reflects research outlining that people in remote areas are more likely to report a long-term condition due to injury[1,22]. Education surrounding risk exposure and likelihood of further injury due to the nature of work and ongoing impairment is recommended.

Being productive by being able to return to work or a chosen activity was considered a significant part of recovery and should be an important consideration for health professionals when planning rehabilitation programs for people in rural and remote areas who have had a traumatic hand injury. This finding concurs with research that highlights the particular importance of productivity for people who live in rural and remote locations[4,23]. The emphasis on strict guidelines and protocols associated with hand therapy rehabilitation may need to be re-evaluated when considering the importance of productivity and the difficulties with being able to adhere to these protocols when faced with the needs of rural life. Hand therapy research shows that factors such as the physical environment, societal attitudes, patient lifestyle, coping styles, education and life experience need to be considered when prescribing exercises[24]. Not being able to drive, often a precaution outlined following hand surgery, may result in a person not attending appointments or affect their ability to be self-sufficient in this environment where alternative forms of transport are limited or non-existent[25].

Designing a treatment program that incorporates and acknowledges engagement in *occupation and activity* as well as prescriptive exercise protocols can also address the pain associated with a traumatic hand injury. Participants in this study described moments when the pain was all consuming and interfered in their daily functioning. Frequently, activities that had the potential to cause pain were avoided. Engaging in activity and occupation, however, was important in dealing with the ongoing, sometimes all-consuming *pain* that occurred as a result of these injuries. These themes reflect research exploring rural and remote residents' experience of living with chronic pain and the impact of occupation on chronic pain[26,27]. In these studies, participants kept active to help focus on issues other than pain[26,27].

Rural and remote residents have been described as stoic when dealing with adverse events or issues, such as pain[4,28,29]. Stoicism refers to the quiet endurance of adversity and setbacks with courage and grace, without the display of feelings or complaint[28]. Not wanting to burden family, not wanting people to feel sorry for them and keeping silent about the pain are indicators of stoicism[28]. While there were stories from participants that reflected stoicism in this study, such as not wanting to burden family, we found that participants also discussed coping mechanisms that reflected a sense of positivity and hope.

Resilience refers to effective coping and adaption in the face of adversity[18,30]. The subthemes identified in this research of getting support, thinking of the future, feeling grateful and adaptation have been discussed in the literature as being the qualities of a resilient person[18,19,30]. Participants in this study also reported that they were frustrated at losing their independence – a quality often associated with rural and remote residents[31]. Despite this desire for independence,

they were willing to accept support from their family and adapt to the change in their circumstances. This flexibility and ability to change to circumstances can provide a greater sense of control[26]. For health professionals working with rural and remote clients with a traumatic hand injury, this willingness to adapt, think of the future and accept support when required can be vital in facilitating collaborative treatment planning and realistic goal setting.

Study limitations

A possible limitation of this study was that the first author had previously been involved as the treating clinician with a number of the participants – it may be argued that this influenced questions and subsequent responses. Interpretive phenomenology, however, requires the researcher to engage with the phenomenon and bring to the research inquiry past experiences, prior knowledge and opinions[32]. The knowledge base of the researcher guides and directs the questioning to produce useful information about the lived experience of a traumatic hand injury[33]. It is felt that these interviews benefited from this previous relationship as it led to richer responses and enhanced opportunity for the participants to have a voice. The use of memos and member checking clarified and validated the interview data. The reliability of the thematic data analysis occurred through intercoder agreement with the first and second authors and the use of computer-based data analysis (Leximancer) verified the thematic analysis[34].

Conclusions

This current study explored the lived experience of a traumatic hand injury for people in a rural and remote location in North Queensland, Australia. The interpretive phenomenological methodology used in this research has allowed the voices of patients to be heard and will contribute to the enhancement of service delivery for traumatic hand injury in rural and remote locations. The themes that emerged from this current study were the experience of the injury and impairment, pain, occupation and activity, resilience and rural and remote context.

Findings highlight that incorporating activity and occupation in rehabilitation programs, as opposed to focusing on strict protocols, is an important consideration in the recovery process of rural and remote residents. In particular, engaging in activity and occupation was an important part of managing the pain associated with the hand trauma. This research also found that participants demonstrated far greater resilient, as opposed to stoic, qualities while recovering from a traumatic hand injury in that they had a willingness to adapt, think of the future and accept support. Health professionals who work with people with a traumatic hand injury from a rural and remote location should consider a treatment model that harnesses this adaptability and active participation, identifying collaborative treatment goals that align with the values of people living in a rural and remote location. Education regarding the high risk of further injury due to the nature of, and exposure to, the type of work and activity in rural and remote locations is also recommended.

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RESEARCH PAPER

The experience of medical and rehabilitation intervention for traumatic hand injuries in rural and remote North Queensland: a qualitative study

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Abstract

Introduction: This research explored the experience of receiving medical and rehabilitation intervention for rural and remote residents in North Queensland, Australia who had experienced a traumatic hand injury. This study contributes to larger project that seeks to propose a model of service delivery to rural and remote residents who have sustained a traumatic injury. *Methods*: Utilising an interpretive phenomenological research design, data was gathered through in-depth, semi-structured interviews. Fifteen participants were recruited into this study and questions were designed to explore the experience of receiving medical and rehabilitation intervention following a traumatic hand injury for residents in rural and remote areas of North Queensland. *Results*: The major themes that emerged were experience of medical intervention, experience of rehabilitation, travel, and technology. Participants felt that medical practitioners had a lack of local knowledge and were concerned that delays in medical intervention resulted in ongoing impairment. They reported following the exercise program they were given, often modifying it to fit with their daily routine. Metropolitan therapists appeared to have limited understanding of issues relevant to rural and remote lifestyles. There was, quite often, no occupational therapist or physiotherapist at their local facility due to staff turnover, and, when available, they had limited experience in hand injuries. The distance and cost of travel to appointments were of significant concern. The use of telehealth or telerehabilitation received a mixed response. *Conclusion*: Findings highlight the concerns regarding the provision of healthcare to rural and remote residents following a traumatic hand injury. These results provide the basis for recommendations surrounding the development of programs and service delivery models to address diverse needs in rural and remote areas.

➤ Implications for Rehabilitation

- Timely medical and rehabilitation interventions for rural and remote residents with a hand injury will reduce the impact of a traumatic hand injury on function and livelihood.
- Rural and remote therapists with limited skills in hand injuries should identify a mentor or specialist in hand injuries to ensure clinical practice concerns can be addressed.
- Developing an appreciation of rural issues is vital to ensure effective communication and collaboration with rural and remote residents.
- Alternate models of care such as telehealth, shared care and "hub and spoke" or outreach services should be adapted to the skills of the local therapists and the needs and preferences of the patient.

Keywords

Australia, hand injuries, rural and remote

History

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Key Points

- Participants reported that the injury was a ‘freak’ or out of the ordinary event that occurred whilst engaging in routine tasks. The impairments sustained from the injury were ongoing for many years after the event.
- Returning to activity or work was considered an important part of recovery. Engaging in activity and occupation was important in dealing with the ‘all consuming’ pain that occurred as a result of the hand injury.
- Participants highlighted resilient, as opposed to stoic, qualities that helped them to get on with daily life following a traumatic hand injury. This included getting support, thinking of the future, feeling grateful and adapting to the new circumstances.
- Participants were concerned about the time it took to receive treatment for their injury. Given the physical nature of work in rural and remote areas and the need for full hand function, any delay can potentially impact on timely access to rehabilitation and subsequent ability to participate in work and leisure tasks.
- Participants were committed to their home exercise program and they believed it to be an important part of their recovery. Participants adapted the exercise program to avoid causing too much pain, which would prevent them from going about their daily routine. The high turnover of physiotherapists or occupational therapists was disruptive to the rehabilitation program.
- Participants’ families often had to accompany them to appointments, which required time off from their work and potential loss of income. The energy and time required to travel for what often was a ten to thirty minute appointment led many participants to ask if an outreach service may be more feasible.
- Telehealth was seen by clients as a way of being able to keep in touch between face to face appointments as well as a possible avenue of communication if something went wrong. The importance of being able to see the hand injury and touch the hand was highlighted and it appeared that participants were hesitant to totally replace face to face contact with technology.

Conclusion

This chapter explored the experiences of rural and remote residents in relation to their traumatic hand injury and the issues associated with functional recovery and rehabilitation, and also investigated the perceptions of the hand therapy services offered to this population. Incorporating activity and occupation into rehabilitation programs, as opposed to focusing on strict protocols, is an important consideration in the recovery process of rural and remote residents and can assist with the management of pain associated with hand trauma. Participants in this study were committed to engaging in rehabilitation and adapted the home program to fit their daily routine. Health professionals who work with people from a rural and remote location with a traumatic hand injury should consider a treatment model that harnesses the resilient qualities demonstrated by these rural and remote participants. These qualities include adaptability and active participation and identifying collaborative treatment goals that align with the values of people living in a rural and remote location. Consideration also needs to be given to ensure access to timely medical and rehabilitation interventions; as this will directly affect restoration of movement and function. Alternate models of care such as telehealth, shared care and/or outreach services can be adapted to the skills of the local therapists and the needs and preferences of the patient.

Chapter Six presents the results of a survey of Australian occupational therapists and physiotherapists who provided hand therapy services to rural and remote residents and addresses Objective 3 of the research.

CHAPTER SIX: HAND THERAPY SERVICES FOR RURAL AND REMOTE RESIDENTS – RESULTS OF A SURVEY OF AUSTRALIAN OCCUPATIONAL THERAPISTS AND PHYSIOTHERAPISTS

This chapter addresses the third research objective:

> *To explore the experience of occupational therapists and physiotherapists in selected Australian health facilities who work with rural and remote patients that have had a traumatic hand injury and how they have adapted their service to meet the needs of this population.*

Figure 7 overviews the research design and highlights (in red) Objective 3.

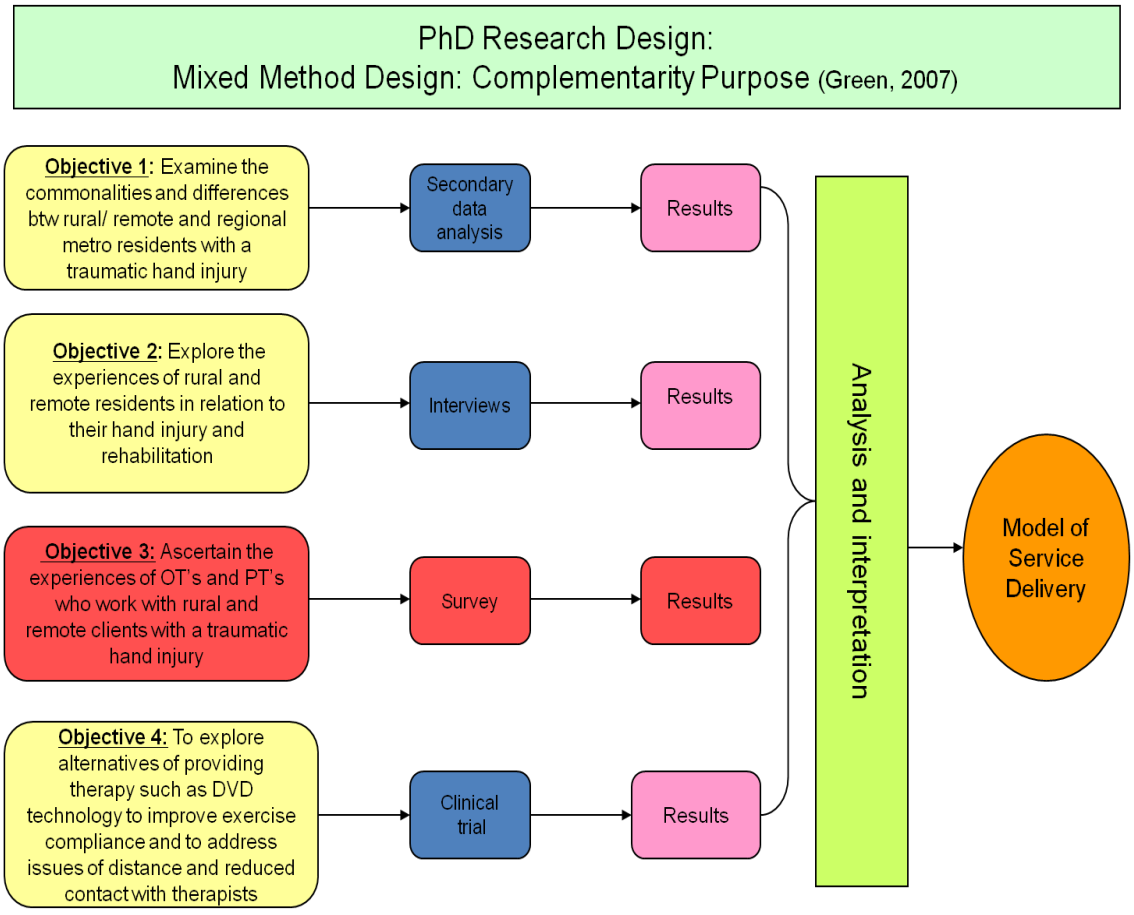

Figure 7: Objective 3 – Survey

The provision of hand therapy services in metropolitan/regional areas is provided by occupational therapists and physiotherapists with specialist skills gained through further study and/or experience. In rural and remote areas residents with a traumatic hand injury generally receive rehabilitation from occupational therapists and physiotherapists as part of a larger caseload with a variety of diagnoses. Wakerman et al note that a range of approaches to health care service delivery in rural and remote areas have been implemented but there is still limited information on 'what works and why' [14]. It is important to gather and disseminate information about providing hand therapy services to rural and remote residents and to also determine how it can be applied in other locations [14].

This is the text version of the following article that has been submitted for publication:

Kingston G, Williams G, Judd J, Gray M. Hand therapy services for rural and remote residents – results of a survey of Australian occupational therapists and physiotherapists. Australian Journal of Rural Health (in press).

This article explored metropolitan/regional and rural/remote therapists perceptions about barriers to services for rural and remote residents with a traumatic hand injury; the coordination of services between metropolitan/regional and rural/remote locations; the use of technology for patient contact and professional development; and the support provided to therapists in metropolitan/regional and rural/remote areas.

The article is formatted according to the requirements listed under 'Instructions for Authors'. This journal has an impact factor of 1.545 and a Scopus Journal Rank of 0.616. It is an official journal of the National Rural Health Alliance and aims to build and advance rural practice for all health professionals. This journal was selected as it publishes research with a direct impact on rural and remote practice in Australia.

Hand therapy services for rural and remote residents – results of a survey of Australian occupational therapists and physiotherapists

Objective: The aim of this study was to explore how interventions were provided to meet the needs of rural/remote residents who have had a traumatic hand injury; including the coordination of services between rural/remote and metro/regional therapists. Barriers to providing services, use of technology, and professional support provided to therapists in rural/ remote areas were also explored.

Design: Cross-sectional survey

Setting: Metropolitan/regional and rural/remote public health facilities in Australia

Participants: Occupational therapists and physiotherapists that provide a hand therapy service to rural/ remote patients.

Results: There were 64 respondents, out of a possible 185. Over half of rural/ remote respondents provided initial splinting and exercise prescriptions and over 85% reported that they continued with exercise protocols. Videoconferencing technology for patient intervention and clinical review was used by 39.1% respondents. Barriers to providing services in rural/remote locations included transport, travelling time, limited staff, and lack of expert knowledge in hand injuries or rural/remote health care. Four major themes emerged from the open ended questions: working relationships, patient-centred care, staff development and education, and rural and remote practice.

Conclusion: The use of technology across Australia to support rural/remote patient intervention requires attention to achieve equity and ease of use. Flexible and realistic goals and interventions should be considered when working with rural/remote patients. A shared-care approach between metropolitan/regional and rural/remote therapists, may improve understanding of rural/remote issues, and provide support to therapists. Further research is recommended to determine the suitability of this approach when providing hand therapy to rural/remote residents.

What is already known on this subject?

Hand therapy is provided by occupational therapists and physiotherapists in metropolitan and regional areas who have specialist skills gained through further training and/or experience.

In rural and remote areas, hand therapy is predominantly provided by generalist occupational therapists and physiotherapists

Allied Health staff in rural/remote areas report large caseloads with a wide variety of diagnoses, limited supervision, and a lack of locally available continuing professional development opportunities.

What does this paper add?

The use of technology across Australia to support rural/remote patient intervention requires attention to achieve equity, ease of use and accessibility.

Flexible and realistic therapeutic goals and intervention are required for rural/remote patients as opposed to a focus on prescriptive and passive splint and exercise regimes.

A shared care approach may establish formal links between metropolitan/ regional and rural/ remote therapists.

Introduction

For rural/remote residents who experience a traumatic hand injury, the impact on function can be significant, particularly when engaging in work and leisure activities. [1] Given that employment in rural and remote areas is predominantly in occupations which involve heavy manual work, hand therapy rehabilitation is crucial to prevent a loss of function and subsequent risks of re-injury. [2, 3]

Hand therapy refers to the rehabilitation of the upper limb from shoulder to hand involving a variety of specialised treatment techniques. [4] Exercise protocols recommended by either the surgeon or therapist can focus on early active or passive motion. [5] This decision depends on the injury, the surgical repair, and the ability of the patient to follow complex instructions. [6] Hand surgery can be complex, and often occurs in metropolitan and regional centres. [7,8] Outpatient rehabilitation for rural/remote patients can be a combination of local rural/remote appointments with follow up reviews at metropolitan/regional facilities. [9, 10]

The provision of hand therapy services in metropolitan and larger regional areas is provided by occupational therapists and physiotherapists with specialist skills gained through further study and/or experience. The lack of specialist allied health services in rural and remote areas results in residents with a traumatic hand injury receiving rehabilitation in rural areas from occupational therapists and physiotherapists as part of a larger general caseload. [11] Rural/remote allied health professionals have been described as 'expert generalists' with skills in a broad range of practice areas. [11-13] There are few continuing professional development opportunities focusing on hand therapy available in these local areas. [14,15] Structured supervision with another health professional, if at all available, may be limited, due to large workloads, high workforce turnover and a lack of time. [16] Many rural/remote therapists identify the importance of contacting metropolitan therapists for professional support. [13, 17]

Technologies such as videoconferencing, email and internet can provide access to specialist clinical advice and outpatient intervention at a distance, and also support staff professional development and collaboration amongst clinicians. [7,10] Videconferencing is currently used in rural/remote areas for the treatment and managment of paediatric burns and pulmonary

rehabilitation exercise and education programs. [18,19] DVD technology can record exercises as part of a home exercise program to improve compliance and understanding of home exercise programs for rural/remote residents who have had a traumatic hand injury. [20] The internet can also provide specialist information regarding hand anatomy and clinical conditions. [21] The extent to which therapists utilise these technologies for their professional development and to support service provision to rural/remote residents with a traumatic hand injury is uncertain.

The aim of this study was to explore how interventions were provided to meet the needs of rural and remote residents who have had a traumatic hand injury; including the coordination of services between rural/remote and metro/regional therapists. Barriers to providing services for these residents, the use of technology, professional development and support provided to therapists in rural/remote areas were also explored. This research forms part of a PhD study that seeks to develop a model for occupational therapy and/or physiotherapy services in public health care facilities to rural/remote residents who have had a traumatic hand injury.

Method

In 2009 public healthcare service websites from each state in Australia were reviewed and maps outlining regions and facilities were used to determine eligible facilities to contact. An initial phone call was made to each facility to determine if a hand therapy service was provided and to obtain contact email addresses for the relevant occupational therapist or physiotherapist. An email was then sent to the health professional seeking their input to request their participation in this national descriptive cross sectional survey. If the participant agreed, a survey was emailed.

In June 2013 a follow up email was sent to 25 therapists, who were purposively chosen from the original survey respondents to ensure representation of profession, state and metropolitan/regional or rural/ remote. [22] The aim of this email was to clarify any changes or updates to the provision and coordination of services and barriers they had outlined in the original survey; with particular interest in the use of technology for patient-therapist contact.

Instrument Development

The survey consisted of closed and open questions. Closed questions explored the type of hand injuries treated, processes for rehabilitation, interventions provided, and perceived barriers to the

provision of hand therapy services to rural/remote residents. Questions were based on key findings highlighted in previous studies. [1, 10, 14, 20,23-25] Open questions explored therapists' experiences of the support they provided or received in relation to the treatment of rural/remote residents with a traumatic hand injury; how they had adapted or changed their service and recommendations to improve services. The survey tool was piloted with occupational therapists from the local area that were not employed in the health service district.

Data Analysis

Within the health service district in which the North Queensland facility operates there are considerable differences in accessing specialist hand therapy services. The Rural, Remote, Metropolitan Areas (RRMA) classification differentiates areas within the health service district and was utilised in data analysis and presentation of results. [26]

RRMA areas of M1, M2 and R1 were classified in this study as metropolitan/regional. Therapists in these areas who responded worked in larger facilities with dedicated hand therapy positions. RRMA areas of R2, R3, Rem1 and Rem2 were classified as rural/remote. Hand therapy services in these facilities were part of a larger caseload.

IBM Statistical Package for Social Sciences (SPSS) Version 21 was used in data analysis. Descriptive statistics were used to aggregate and summarise the characteristics of the sample such as the professional background, state or territory as well as the responses to closed question items such as hand conditions, intervention techniques, and technology used.

All respondents provided comprehensive responses to the open ended questions that, at times, extended to issues beyond the original scope of the question. These responses were compiled and, given the depth of answers provided, qualitative content analysis was used for interpretation. We used an inductive approach, through a process of open coding, creating categories and then grouping together similar statements. [27,28] Data from the follow up email was analysed to determine if there were any additions to the original survey responses.

Results

Occupational therapists and physiotherapists (185) who worked in public healthcare facilities across Australia were contacted. Of these, 100 surveys (100) were sent two weeks after initial contact, and 64 responded (34.6%).

Characteristics of the sample

Table 1 outlines the characteristics of the sample. Of the 64 respondents, 17.2% were physiotherapists and 82.8% were occupational therapists. The largest number of total respondents (28.1%) and rural/remote respondents (39%) were from Western Australia.

Insert table 1 here

Common Hand Conditions

The most commonly treated hand conditions were tendon injuries (82%) and fractures (73%). Metropolitan therapists reported that crush injuries and trauma were commonly treated (60.9%) compared to 30.6% of rural/remote respondents.

Insert Table 2 here

Therapy Processes

Weekly (46.9%) and monthly (21.9%) appointments were the most common for all therapists. 30.4% of metropolitan/regional therapists reported they saw rural/remote patients on a weekly basis compared to 56.1% of rural/remote therapists. Over half of rural/remote respondents reported they provided initial splinting and exercise prescriptions and over 85% reported they continued exercise protocols prescribed by metropolitan /regional therapists, modified and adapted splints, and undertook scar or oedema management. Over 90% of rural/remote therapists reported that their hand injury caseload was referred from a metropolitan/ regional area. Metropolitan/regional therapists reported that they referred patients to local therapists after providing an inpatient service (39.1%) whilst 56.5% continued to see rural and remote patients as an outpatient.

Insert Table 3 here

Technology

Videoconferencing (VC) technology was used by 39.1% of therapists for patient intervention and contact and the same percentage reported using internet technology to assist with providing exercise programs and therapy. Of the respondents who reported using these two forms of technology 68% (VC) and 52% (internet) were from Western Australia. Only 2 therapists reported using video or DVD for exercise regimes.

Insert Table 4 here

Perceived Barriers or Gaps

Therapists from both regional/metropolitan and rural/remote areas felt that the largest gaps to service delivery were transport (58.7%), distance and travelling time (73%), lack of staffing and time (58.7%), and lack of expert knowledge in hand injuries in local area (74.6%). In particular, 87% of metropolitan respondents believed that a lack of expert knowledge of hand injuries in the local area was a barrier to service. Over half (52.5%) of the rural/remote respondents felt that metropolitan or regional therapists had a poor understanding of rural/remote issues.

Insert Table 5 here

Open Question Responses

The responses to the open ended questions provided further clarification of the quantitative data. Four major themes emerged from the therapists' comments: working relationships, patient centred care, staff development and education, and rural/remote issues. These results, including an example, have been outlined in Table 6.

Insert Table 6 here

Working relationships between metropolitan and rural/remote therapists

Comprehensive handovers, treatment protocols and guidelines, ongoing support, supervision and email or phone contact were important for rural and remote therapists who often had limited

experience in hand injuries. Metropolitan/regional therapists highlighted the importance of ongoing collaboration with local therapists. An example of a comment that discussed working relationships follows:

> '*We often adopt a shared care model of service to allow the experienced hand therapist in the hand unit clinics to guide treatment....' (M1, NSW)*

Patient Centred Care

Providing the necessary information, setting realistic goals, being responsive to patient circumstances and rural/remote lifestyles were identified as important considerations when providing hand therapy rehabilitation. Metropolitan/regional therapists acknowledged that it was a challenge to reconcile the differences between their view of a good therapeutic outcome (which places a strong emphasis on achieving a full range of motion and strength), and the view of the rural/remote patient (who places great importance on function). When follow up by a rural/ remote therapist was not available or the skills of the rural therapist did not extend to hand therapy, metropolitan/regional therapists often prescribed passive movement as opposed to protocols that promote early active movement. This is highlighted below:

> *" For zone 2 extensor tendon injury we usually do active protocol however these are statically splinted and followed up at four weeks"* (R1, NSW)

Technology was viewed as a way to improve the quality of patient care, allowing the patient to link with specialists in metropolitan locations without having to travel long distances. Patients could attend their local service and a joint videoconferencing session could be arranged between the patient, the local therapist and also the hand therapist in the metropolitan location:

"Sometimes the clients can complete the teleconference with the metro therapist at their local hospital and the rural therapist can link in from the base town" (R3, WA)

Staff development and education

Professional development opportunities in hand therapy are often located in metropolitan locations and are not easy to access:

'Professional dev[elopment]…at least a one day, preferably two day workshop because we cannot justify a flight to Adelaide for a 3-4 workshop' (R2 SA)

Rural/remote respondents highlighted the need to improve the therapists' in metropolitan/regional areas understanding of the barriers experienced in rural/remote areas (particularly regarding travel, caseload and cultural issues):

'Greater understanding is required by metropolitan therapists of issues and barriers experienced by country patients' (R2 SA).

Rural and Remote Practice

Rural/ remote therapists discussed a lack of resources, such as splints, to provide the specialist treatment required. Large travelling distances were part of normal routine for rural/remote therapists. Utilising available health care employees, regardless of professional background, also ensured important health interventions were provided. For example, when no therapist was available, rural/remote area nursing staff and Aboriginal liaison officers were requested for monitoring and check-up services regarding splint and exercise adherence:

"*Protocols have been sent to practice nurses on the islands to follow up with clients who can't make a mainland appointment"* (R3 QLD

Responses to follow up email to respondents

In a follow up email in June 2013, therapists from metropolitan/regional and rural/remote areas highlighted ongoing concerns regarding gaps in service delivery. An example of this is reported below:

'Currently there is a huge gap in service……. I try to convince remote patients to stay in town for at least four weeks if they have a serious injury e.g. tendons..... however our remote patients are generally Aboriginal and/or unemployed so they are staying in an unfamiliar place and they do not have the means to pay to come in……' (M1, NT)

All therapists confirmed the availability of videoconferencing in their facility, yet most, except therapists in Western Australia, reported they were often unable to access it due to the high demand for use by other health professionals. In addition, the time invested to set up the operating systems was viewed negatively, particularly by rural and remote staff. One therapist reported a preference for 'video emailing' rather than videoconferencing, whereby a video could be watched at any time and replayed as needed.

Discussion

The aim of this study was to explore how interventions were provided to meet the needs of rural and remote residents who have had a traumatic hand injury; and included the coordination of services between rural/remote and metro/regional therapists. Barriers to providing services for these residents, the use of technology to increase patient-therapist contact, professional development and support provided to therapists in rural/remote areas were also explored.

A larger proportion of metropolitan/regional therapists reported treating crush and multiple trauma injuries. This specific caseload is not surprising in metropolitan/regional areas as these injuries are complex and involve many structures. [29] Specialist surgery and rehabilitation required for the management of these injuries is generally available only in metropolitan/regional locations and patients are discharged to their rural/remote regions after receiving initial rehabilitation. [30] Support mechanisms need to be in place for local therapists given the complexity and ongoing need for longer term rehabilitation of these injuries.

The highest proportion of barriers or gaps reported related to therapist (e.g. therapist skills), and geographical (e.g. distance) factors, such as distance and therapist skills. A lower percentage of

respondents felt that the barriers for providing a service to rural/remote patients related to patient variables such as poor understanding of, and adherence with, exercise regimes. This finding appears to reflect that therapists are aware that adherence to therapy programs is multidimensional and often related to factors beyond the patient's control. [20, 31, 32]

Therapists from all metropolitan/regional and rural/remote areas reported that they provided a full range of therapeutic interventions including splinting, initial exercise prescription and splint modification and adaption. The most commonly reported barrier for providing these services was the lack of expert knowledge in hand injuries in the local region. Limited local and affordable training opportunities for rural/remote therapists meant they were often required to travel to metropolitan locations for training. Therapists that had access to, and regularly used technology, such as videoconferencing, believed it provided a perfect opportunity for skill development. Technology also allowed for therapists to obtain feedback on patient's progress. Despite evidence indicating positive results of technology as an adjunct to face to face treatment and as a means of increasing patient therapist contact, [20, 33,34] there was limited use of alternate means of providing patient intervention. Therapists reported it took a large amount of time to set up a video connection, and the technology was not always available at the times it was required; only Western Australia reported using videoconferencing routinely.

Respondents indicated the establishment of informal professional links, often driven by motivated individuals, between rural/remote and metropolitan/regional therapists to support patient care and professional development. Suggestions from therapists (and within the literature) to formalise these relationships include the implementation of a 'shared care' model. [35, 36] Shared care refers to the collaboration between therapists with different specialist skills to enable planned delivery and joint responsibility of patient care, [36,37] In a shared care approach, the different areas of therapist expertise in hand injuries and rural and remote health can be combined to achieve patient care goals and objectives. [36, 37, 38]

Metropolitan/regional respondents used passive and conservative protocols that limit hand movement when adapting their practice for rural and remote patients. Ongoing advances in surgical techniques call for therapists to consider the forces required in functional activities when making decisions about active participation or restricted and passive movement. [39] Rural/remote

therapists highlighted the need for realistic goal setting and flexibility, as many patients need to return to physically demanding employment, such as farming. [1, 9] A metropolitan/regional respondent noted they had to 'lower' their expectations with regards to rural/remote patient outcomes; away from the full resolution of impairments (such as reduced range of motion and strength) and onto functional use of the affected hand. For rural/remote populations hand therapy intervention should not only focus on biomechanical issues, such as the preservation of surgical repairs or the restoration of body structures and functions. [41, 42] Hand therapy intervention should, more importantly, involve advice on how to simplify or adapt daily occupations and returning to employment. [43]

Limitations

The response rate of 34.6% indicated a possible selection bias as the research may include views of those more positive about developing services and skills. Regardless, this information is representative of therapists working across metropolitan/regional and rural/remote locations, states, and professions. Results can help inform therapists about possible options to address barriers to service provision for rural and remote clients with traumatic hand injury which are currently likely to compromise recovery. Issues raised by therapists in this study also reflect results of a study that explore the perspective of rural/remote residents who received medical and rehabilitation following a traumatic hand injury. [9]

Conclusion

This study explored a range of interventions for rural and remote residents who have a traumatic hand injury. Barriers to services, the use of technology, professional development and support for therapists in rural and remote areas were examined. The use of technology across Australia to support rural and remote patient intervention requires attention to achieve equity, ease of use and accessibility. A shared care approach could facilitate formal links between metropolitan/regional and rural/ remote therapists. Further research into the implementation of such a model is recommended. A critical element would be to develop and address flexible, realistic and functionally based therapeutic goals and provide intervention likely to address the needs of people with hand injuries in rural/remote locations, particularly when returning to work. Any service model designed to address the issues identified in this paper would include opportunities

for professional development and support for therapists working in rural/remote areas and a range of frequent, flexible, accessible and reliable communication strategies related to patient care for all therapists, regardless of geographic location.

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Table 1: Characteristics of Sample

Characteristic	% Total Participants (n=64)	% Rural and Remote (n= 41)	% Metropolitan and regional (n=23)
Profession			
Occupational Therapy	82.8%	85.4%	78.3%
Physiotherapy	17.2%	14.6%	21.7%
State			
QLD	14.1%	9.8%	21.7%
NSW	21.9%	14.6%	34.8%
ACT	1.6%	0%	4.3%
VIC	20.9%	24.4%	13%
TAS	6.3%	2.4%	13%
WA	28.1%	39%	8.7%
NT*	1.6%	0%	100%
SA	6.3%	9.8%	0%

Table 2: Common Hand Conditions

Hand Condition	% Total Participants (n=64)	% Rural and Remote (n= 41)	% Metropolitan and regional (n=23)
Tendon Injury	82%	75.6%	95.7%
Fractures	73.4%	63.4%	91.3%
Crush/Trauma	45.3%	36.6%	60.9%
Amputation	29.7%	14.6%	56.5%
Nerve Injury	42.2%	34.1%	56.5%
Burns	20.3%	22%	17.4%

Table 3: Therapy Processes

Therapy Processes	Total (n=64)	% Rural and Remote (n=41)	% Metropolitan and Regional (n=23)
Process for hand therapy			
Seen as inpatient then as outpatient	35.9%	24.4%	56.5%
Seen as inpatient then referred to local service	15.6%	2.4%	39.1%
Referred from metropolitan or regional facility	62.5%	90.2%	13%
Regularity of patient appointments			
One off appointment	9.4%	4.9%	17.4%
Weekly	46.9%	56.1%	30.4%
Twice weekly	10.9%	9.8%	13%
Monthly	21.9%	22.0%	21.7%
Other	10.9%	7.3%	17.4%
Therapy Provided			
Initial Splinting	70.3%	56.1%	95.7%
Initial Exercise Prescription	67.2%	56.1%	87.0%
Continuation of prescribed exercises and protocols	85.9%	90.2%	78.3%
Splint modification/adaptation	82.8%	85.4%	78.3%
Scar Management	85.9%	87.8%	82.6%
Oedema Management	85.9%	82.9%	91.3%

Table 4: Technology use by state

Technology Used with rural and remote clients	QLD	NSW	WA	SA	ACT	TAS	NT	VIC
Videoconferencing (n=25)	12%	4%	68%	0%	0%	4%	0%	12%
Internet (n=25)	8%	16%	52%	4%	0%	4%	0%	20%
Email (n=42)	21.4%	21.4%	31%	4.8%	0%	0%	2.4%	19%
Telephone (n=56)	14.5%	21.4%	28.6%	5.4%	0%	5.4%	1.8%	23.2%
Fax (n=26)	23.1%	15.4%	30.8%	7.7%	0%	0%	3.8%	19.2%
Video or DVD of exercises (n=2)	50%	0%	0%	0%	0%	0%	0%	50%

Table 5: Perceived Barriers or Gaps to Service

Barrier or Gap	Total Respondents (n=64)	Rural/Remote (n=41)	Metropolitan/ regional (n=23)
Transport	58.7%	57.5%	60.9%
Distance and travelling time	73%	70%	78.3%
Lack of follow up once discharged	30.2%	25%	39.1%
Pt compliance with home exercise program	25.4%	30%	17.4%
Lack of expert knowledge in hand injuries in local area	74.6%	67.5%	87%
Poor communication between facilities	31.7%	37.5%	21.7%
Poor understanding/comprehension by patient	22.2%	27.5%	13.0%
Poor understanding/comprehension by local therapist	25.4%	25.0%	26.1%
Poor understanding of rural and remote issues by metropolitan based therapist	44.4%	52.5%	30.4%
Pt compliance with precautions against re-injury	33.3%	40.0%	21.7%
Lack of staffing and time	58.7%	60%	56.5%
Greater importance on returning to work or home duties than exercise protocols and rehabilitation program	15.9%	22.5%	4.3%

Table 6: Summary of Themes

Theme	Subtheme	Quote
Working relationships	Supervision and support	I have very little to no supervision or mentoring, so I make a point of establishing a relationship with Metropolitan therapists.....for advice, expertise or sharing of resources (R2 VIC)
	Treatment protocols and guidelines	The hospital's current protocols for the referred patient e.g. flexor tendon repairs. It is always helpful to receive a written referral and phone call regarding what treatment is to be provided. (Rem 2 WA)
	Communication/ clarity of expectations	Clear communication to clarify the services the rural therapist can provide (physical resources and staffing) and good networks to ensure the free flow of information and ability to request assistance/guidance is the key! (R3)QLD
	Shared care/specialist outreach	We often adopt a 'Shared Care' model of service allowing the experienced Hand Therapist in the Hand Unit Clinics to guide treatment..... the patients appreciate the team approach and the experienced therapist can provide a form of supervised clinical practice for the rural/remote therapist (M1 NSW)
Patient centred care	The patient is in control	Provide written instructions and consumables to allow (pt) to progress their own treatment...with phone consultation (for)... questions or concerns to enable less-frequent therapy visits (M1 QLD)
	Realistic goal setting	The main issue for me is understanding patients' goals and reconciling the differences between their priorities and mine. Often I feel that a better long-term outcome could be achieved with greater sacrifices made in the short term, but the patient is unable... e.g. take sufficient time off work to facilitate what I would call an excellent result. I think that this is more common for rural/remote residents, especially where they are self-employed farmers with no-one available to cover their time off work. I should note that patients are typically very happy with their outcomes when they achieve a good functional result, even when I feel that a better long-term result could have been possible (R1 TAS)
		Remote clients will be motivated to follow a program that is convenient, accessible, and responsive to rural geographical and lifestyle considerations. (R3 VIC)
		Lower expected outcomes (most patients are happy with some function rather than full function) R1 NSW
	Patient Education	Time is spent educating patients about specific examples of what could happen if they do not adhere to precautions, or complete their exercises.....demonstrating exercises and teaching family members about the program as well (Rem1 WA)
	Align appointments	Clients travel to our service from an hour away, we arrange appointments where possible to suit when they are coming to town and when they have other appointments. (R3 VIC)

	Changing treatment protocol	Zone 2 extensor tendon injury; usually do active protocol however these are statically splinted and followed up usually at four weeks. Any protocol that requires splint modifications cannot be done if patient is not returning as the rural areas have no therapist able to do this (R1 NSW)
	Technology	Sometimes the client can complete the teleconference with the metro therapist at their local hospital and the rural therapist can link in from the base town, this also reduces time taken to come for an appointment. (R3 WA)
Staff Development and Education	Rural and Remote Therapist Skills	Therapists in rural areas are not as experienced as metropolitan therapists as we don't have the opportunity to see as many clients or diversity of clients, as a result we are not always as skilled with treatment protocols (R3) Vic Professional dev opportunities..….at least a one day, preferably two day workshop because we cannot justify a flight to Adelaide for a 3-4 workshop R2 SA
	Metropolitan Therapists skills	More understanding from metro facilities that services and resources are limited in these remote areas (R2) NSW Greater understanding is required by metropolitan therapists of issues and barriers experienced by country patients (R2 SA)
Rural and remote issues	Resources	We...operate on fairly meagre shared allied health budgets therefore don't have the physical resources, (..off-the-shelf splints and garments) that (metropolitan therapists) might be used to. Some therapists have offered to provide these things to the clients from their base rather than waiting until they are discharged back to the rural area. (R3 QLD)
	Distance	There appears to be a lack of awareness of the area covered by (rural) therapists. For example a tertiary centre sent a patient back to an area 400kms away where we only visit once a month but the patient required weekly alterations to their splint.(Rem 2 WA)
	No Allied health staff	Protocols (have been) sent to practice nurses on 'the islands' to follow up with clients who can't make mainland appointment. (R3 QLD) We have to use the services of the ALO and also Aboriginal Medical Services to assist us with follow up treatment. We often liaise with Remote Area nurses at clinics in regards to an exercise program and progress of a patient (Rem2 WA

Key Points

- The highest proportion of perceived barriers or gaps reported by all respondents related to the therapist (skills), and geographical factors, such as distance. Whilst distance; travel; transport; lack of staffing; and time were noted to be barriers, there was limited use of alternate means of providing patient intervention such as videoconferencing. Videoconferencing took time to set up the video connection, and there is limited availability of the technology.
- Therapists from all remoteness classifications reported that they provided a full range of therapeutic interventions including splinting, initial exercise prescription, and splint modification and adaption. Rural and remote residents noted their lack of expert knowledge in hand injuries but there was little availability of local and affordable training opportunities to address this.
- Responses from therapists indicated the establishment of informal professional links, such as the implementation of a 'shared care' arrangement, between rural/remote and metropolitan/regional therapists. This was often driven by motivated individuals to support patient care and professional development rather than a system implemented process.
- Metropolitan and regional therapists described their reliance upon prescriptive and conservative protocols when adapting their practice for rural and remote patients.
- A higher percentage of rural and remote therapists felt that a barrier or gap to providing hand services to rural and remote residents was patient compliance with the precautions after injury and the poor understanding or comprehension by patients regarding the hand therapy guidelines. This finding reflects the importance of flexibility in treatment planning and adapting healthcare interventions that are often based on patient regimes that are designed in metropolitan areas.
- Moreover, a greater percentage of rural and remote therapists acknowledged that patients placed greater importance on returning to work or home duties than exercise protocols and rehabilitation programs. They believed this was a barrier to providing a health care service. Rural and remote therapists highlighted the need for realistic goal setting and flexibility, as many patients need to return to physically demanding employment, such as farming.

Conclusion

This chapter explored how hand therapy rehabilitation is provided and adapted to meet the needs of rural and remote residents who have had a traumatic hand injury. Perceived barriers to providing services, the use of technology and professional development and support provided to therapists in rural and remote areas were also investigated.

Further exploration is recommended regarding equity of access and ease of use of technology that can help to support rural and remote patient intervention across Australia. A shared care model could possibly establish formal links between metropolitan/regional and rural/remote therapists. Further research into the implementation of this model is recommended

Flexible and realistic therapeutic goals and intervention are required for rural and remote patients. Restoration of range of motion and strength may be an important aim of treatment; however treatment needs to align with rural and remote patient goals, the importance of function and ability for them to return to work.

The following chapter addresses Objective 4 of the research by presenting the results of a feasibility study that explores whether DVD technology improves compliance with home exercise programs for people who have sustained a traumatic hand injury.

CHAPTER SEVEN: DOES A DVD IMPROVE COMPLIANCE WITH HOME EXERCISE PROGRAMS FOR PEOPLE WHO HAVE SUSTAINED A TRAUMATIC HAND INJURY? RESULTS OF A FEASIBILITY STUDY

This chapter addresses the fourth research objective:

To explore alternatives of providing therapy, such as DVD technology, to improve exercise compliance and to address issues of distance and reduced contact with therapists.

Figure 8 overviews the research design and highlights (in red) Objective 4.

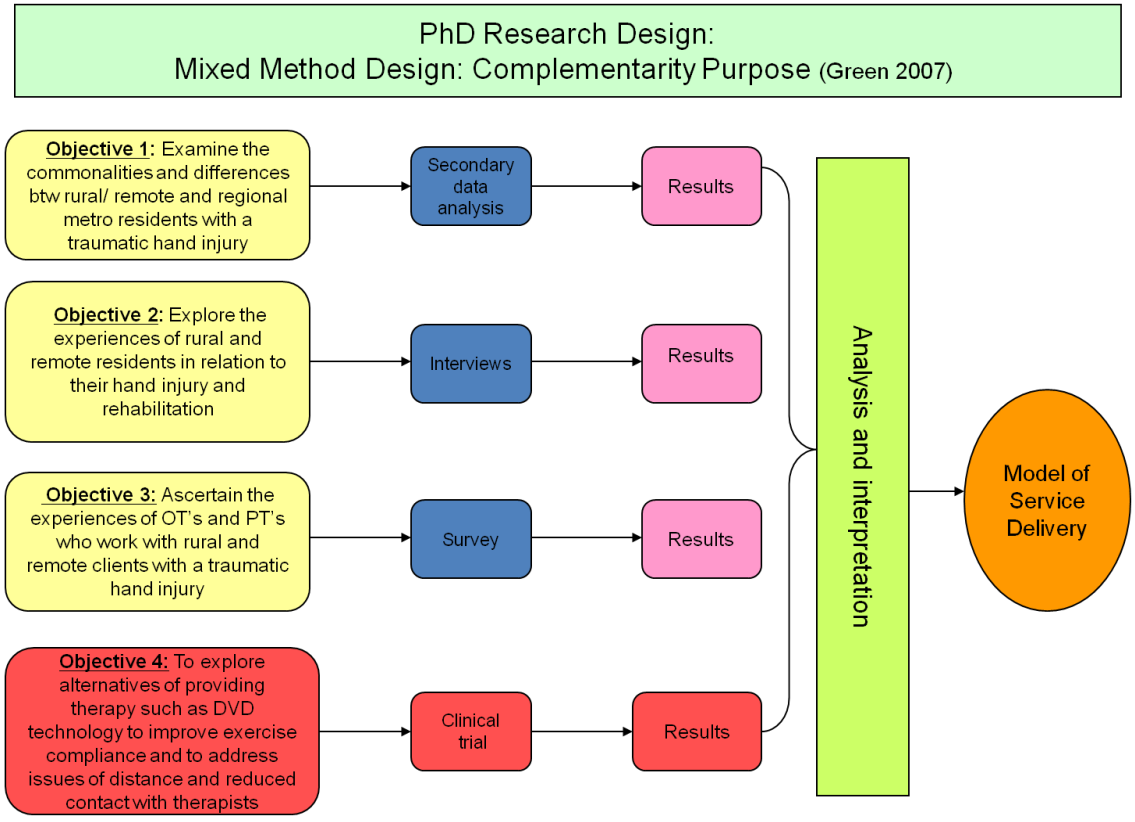

Figure 8: Objective 4 – Clinical Trial

The distance to health care facilities for follow up after a traumatic hand injury makes regular face to face contact with rural and remote clients difficult and often results in lengthy times between appointments [107]. The concern with this delay is the potential for loss of motivation to do exercises, or forgetting the prescribed exercise regime without the supervision of a therapist [139].

Technology, such as DVDs, has been promoted as a way to maintain motivation and ensure exercises are completed correctly between appointments [140]. Due to distance from the treating facility technologies, such as DVDs have also been reported as a possible medium for patients who cannot attend weekly therapy appointments [141]. A pilot study was conducted and published evaluating a home exercise DVD for patients who reside in a rural and remote location. The results demonstrated that patients are accepting of technology and perceive that it improves their understanding and knowledge [142]. I have also published a critical review on the evidence of the use of videotapes or DVDs to promote patient compliance with home programs [117]. Results showed mainly positive effects on compliance; however, methodological issues limited the clinical applicability of using DVDs for hand therapy home exercise programs. My critical review recommended the need for further randomised controlled trials to provide clearer evidence for the effectiveness of DVD or videotape technology in improving compliance, particularly for rural and remote participants.

This is the PDF version of the following article that has been published:

Kingston G, Williams G, Gray M, Judd J (2013) Does a DVD improve compliance with home exercise programs for people who have sustained a traumatic hand injury? Results of a feasibility study. Disability and Rehabilitation Assistive Technology, 2014; 9(3): 188-194

The article is formatted according to the requirements listed under ‘Instructions for Authors’. This journal was chosen as it is an international multidisciplinary journal that publishes research on technology that supports the rehabilitation process and outcomes.

This article investigated if compliance and understanding of a home exercise program following a traumatic hand injury is improved when patients are provided with a DVD and a brochure when compared to using brochures only.

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ORIGINAL RESEARCH

Does a DVD improve compliance with home exercise programs for people who have sustained a traumatic hand injury? Results of a feasibility study

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Abstract

Purpose: This feasibility study sought to determine if compliance and understanding of a home exercise program following a traumatic hand injury is improved when patients are provided with a DVD and a brochure when compared to using brochures only. *Method*: Patients who presented with a traumatic hand injury and commenced on a hand therapy protocol were randomly assigned into two groups. The control group received brochures while the experimental group were provided with exercise instructions on DVD as well as brochures. Compliance was measured through the use of exercise diaries, clinic attendance, a checklist to measure correctness and understanding of exercises and a follow-up survey. *Results*: No significant improvement was found in the mean exercise compliance score ($p = 0.344$) between the intervention and control groups. From the survey results almost half of all participants reported that pain interfered in their ability to perform their home exercises and a third acknowledged that time limited their ability to perform their exercises. *Conclusion*: Findings demonstrate the multidimensional nature of compliance. The provision of DVD technology, while not shown to cause a statistically significant change in overall compliance, did help improve understanding of exercises; as such DVDs could be utilised as part of a program that facilitates the patient–therapist relationship.

➤ Implications for Rehabilitation

- Limited time and level of pain are highlighted as reasons for non compliance with exercise and treatment programs.
- The use of DVDs can improve understanding and execution of exercises and can be part of a treatment program that facilitates increased patient therapist contact for rural and remote clients.

Keywords

Compliance, DVD, home exercise program, traumatic hand injury

History

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Key Points

- No statistically significant difference in overall exercise compliance was found between the treatment and control groups.
- Results highlighted important clinical implications around compliance:
    - Almost a third of all participants stated that they often or sometimes forgot to do their exercises.
    - Participants reported that pain interfered in their ability to perform their home exercises.
    - A third of all participants acknowledged that time limited their ability to perform their exercises.
- The DVD was viewed positively in terms of enhancing understanding of the correct way to undertake what can often be complex hand therapy protocols and exercises.
- All respondents felt that their appointment with their hand therapist was moderately to extremely important and 90.6% felt their appointment was moderate to extremely important in motivating them to do their exercises.

Conclusion

This chapter explored alternatives of providing therapy, such as DVD technology, to improve exercise compliance and to address issues of distance and reduced contact with therapists. Findings demonstrated the multidimensional nature of compliance with exercise programs. Issues such as limited availability of time and level of pain were highlighted as reasons for noncompliance, indicating that no one strategy, including DVD technology can combat all of these factors to ensure compliance with home exercise programs. The survey results demonstrated the importance of the patient-therapist relationship in motivating patients to undertake exercises and ensure compliance.

The provision of DVD technology, whilst not shown to bring about statistically significant changes in overall compliance, did help to improve understanding of exercises. Therefore DVDs could be an important component of a program to facilitate the patient-therapist relationship e.g. telerehabilitation. Rural and remote residents, who often do not have quick access to therapists, can use technologies such as DVD's to provide a visual clarification of complex and specific hand therapy protocols. Further research to confirm the acceptance

within a rural population of using technology such as DVDs to record home exercise programs is recommended.

The next chapter integrates and discusses the results of Chapters' Four to Seven and provides recommendations for a model of practice for occupational therapists, and/or physiotherapists who work in public health care facilities and provide intervention to rural and remote clients in Australia who have had a traumatic hand injury.

CHAPTER EIGHT: DISCUSSION AND RECOMMENDATIONS

This research arose from my concerns about services for residents living in rural and remote areas of North Queensland who had sustained a traumatic hand injury. The limited access to occupational therapists and physiotherapists in rural and remote areas resulted in patients taking long trips into the tertiary referral facility to receive rehabilitation. Appointments were irregular, and attendance was often dependent on weather and road conditions. Moreover, hand therapy rehabilitation, with its emphasis on strict guidelines to protect surgical repairs, often conflicted with the day to day realities of living in a rural area, such as the need to ride horses, drive tractors and use tools. The aim of this research was to explore service provision and propose a model of practice for occupational therapists, and/or physiotherapists who work in public health care facilities and provide intervention to rural and remote clients in Australia who have had a traumatic hand injury. The research had the following objectives:

- To examine the commonalities and differences in the issues associated with functional recovery and rehabilitation in relation to traumatic hand injury identified by rural and remote residents and residents of regional metropolitan areas;
- To explore the experiences of rural and remote residents in relation to their traumatic hand injury and the issues associated with functional recovery and rehabilitation. Further to investigate the perceptions of this population of the hand therapy services offered;
- To explore the experience of occupational therapists and physiotherapists in selected Australian health facilities who work with rural and remote patients that may have had a traumatic hand injury and how have they adapted their service to meet the needs of this population; and
- To explore alternatives of providing therapy, such as DVD technology, to improve exercise compliance and to address issues of distance and reduced contact with therapists.

This research used a mixed methods research design with a complementarity purpose (see Figure 9). Qualitative and quantitative methods were used to measure overlapping but also

different aspects to obtain a comprehensive understanding of the complexities surrounding a model of service delivery for rural and remote residents who have sustained a traumatic hand injury.

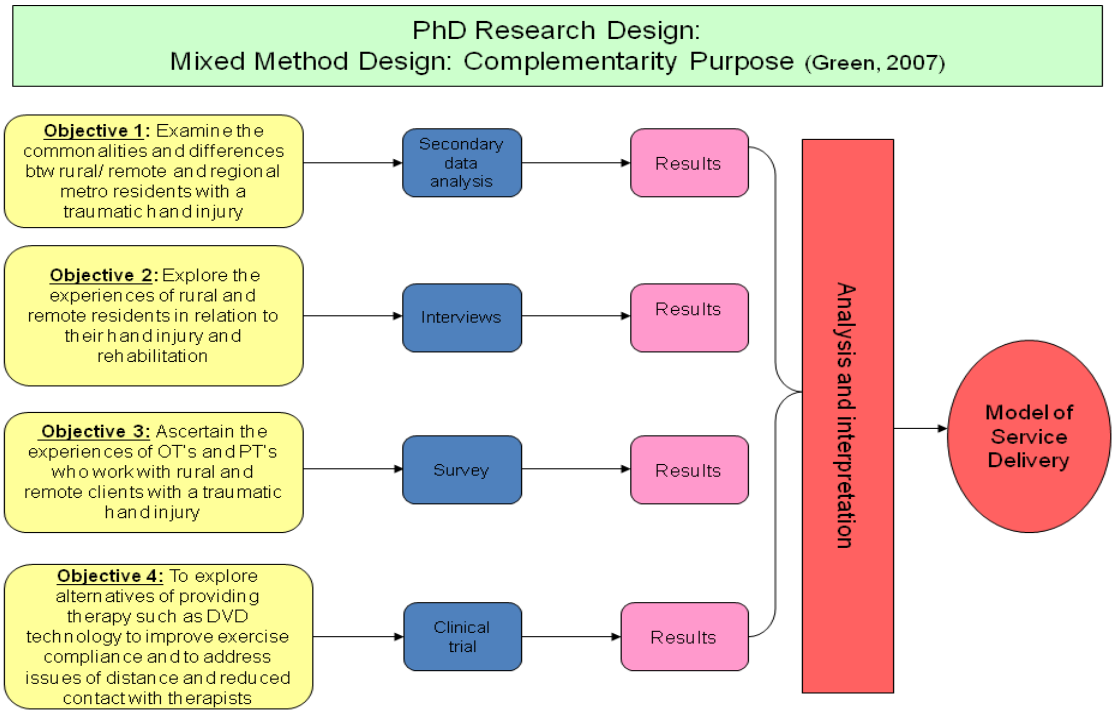

Figure 9: Analysis and Interpretation/Model of Service Delivery

It was anticipated that this research would lead to the development of a set of guidelines or a pathway for the patient journey. This research has been undertaken as a set of related studies, undertaken concurrently, that have been published, or in review, and fit together to form the entire study. The results from each objective have been combined for analysis and interpretation. The main findings of the research are discussed below:

Main Findings

Impairments following a traumatic hand injury

Living and working in a rural and remote location places residents at higher risk of injury from incidents such as road traffic accidents [143]. There is also a higher risk of injury in agriculture, forestry and fishing. These predominantly rural and remote industries reported the largest number of fatalities in 2010–2011 and included incidents involving farming vehicles such as tractors and quad bikes [24,134]. An interesting finding from my current research was that rural and remote patients felt their injury occurred as a result of a 'freak' event. Many were undertaking routine tasks with livestock or equipment that was a part of normal daily routines. Given the higher risk, it seems that the injuries may not have been from a freak event but perhaps the tasks were undertaken in a manner that compromised their safety. Patients reported that their injury resulted in reduced movement or loss of strength and, for many, caused further injury. An important component of intervention for rural and remote clients should involve education regarding safe working procedures to prevent further injury.

In this research, loss of range of motion and hand stiffness is a common result following a traumatic hand injury and was reported by patients in both rural/remote and metropolitan/regional locations. These impairments are compounded if the hand is immobilised to protect surgical repair or injured structures [36,144,145]. An important priority in treating hand injuries is to restore movement and encourage return to functional activity. There is some debate regarding the intensity and frequency of exercises and whether home programs or face to face treatment with the therapist is more effective [93]. Management after injury is a significant contributor to the development of loss of movement and joint stiffness [145]. The difficulty rural and remote patients faced in my research was the lack of intervention in the acute phase, and the limited ongoing support and intervention to address the impairments that resulted from the injury.

Therapists need to consider the many factors that may affect a patient's ability to participate in rehabilitation, particularly ongoing impairments such as pain. Pain following a traumatic hand injury can be one of the most limiting and overwhelming features. A person's ability to manage pain following an injury is considered a predictor of overall treatment outcomes [144]. Pain is a significant determinant affecting delays with returning to work, and reduced

involvement in leisure and day to day activities [146,147]. Patients in my research reported that pain was an important reason for not completing the home exercise program, as opposed to not understanding the exercises, which supports findings from O'Brien and Presnell [148]. These findings highlight that adherence to home programs is complex and involves many factors, both physiological and psychological [13,149]. Flexible rehabilitation programs with an emphasis on functional activity can facilitate adherence; reduce the perception of pain; help to prevent depression and functional limitations [144,150].

Activity and occupation

Regardless of their residential location the impairments of pain, loss of strength, loss of range of motion and stiffness affected patients' ability to engage in work, leisure and day to day activities. This finding supports previous research exploring both the acute and long term functional impact of a traumatic hand injury on residents from metropolitan, regional, rural and remote locations [36,136,151,152]. Patients noted a change in their paid employment following their traumatic hand injury, with an increase in people undertaking home duties, being pensioners, becoming unemployed or undertaking studies. There was also a reduced number of patients who worked as labourers and this finding demonstrates that a traumatic hand injury can result in the need to change employment [36,136].

The involvement in meaningful activities and occupations helped to manage the pain and assisted in recovery for patients. Most believed that they would not have the strength and functional ability that they had achieved had they not returned to work. Fisher reports that the more meaningful and enjoyable the task, the greater the success in diverting focus from pain [150]. When engaged in an activity that had meaning and purpose, participants in Fisher's study were able to 'lose themselves in the work' (p105). Fisher concluded that engagement in work, leisure and activities of daily living and the perception of pain were closely linked [150]. In rural areas, engaging in an activity such as going shopping for groceries, not only helps to manage the pain but can become a social activity and a link to the local community [10].

The loss of independence and occupational roles can result in feelings of uselessness and frustration. A patient in my research noted that they would 'go mad if they were not working' and highlighted the importance of participation in activity following hand injury. People can demonstrate their contribution to society and can encourage personal growth and development by engaging in occupation [153]. Less rural patients in this current research

reported a loss of strength, which would suggest they had returned to activities and occupations that may have required physical strength to complete. Rural patients were employed as technicians and tradespeople, farmers, labourers and community and personal service workers, which is reflective of employment in rural areas in Australia [154]. Being rural is an identity and rural residents' wellbeing is influenced by their active involvement in daily activities [155]. Farming, for example, is a highly physical role that requires strength and stamina to undertake tasks such as tagging (for identification) or mustering cattle or using special tools and equipment. Adapting and modifying behaviour and tasks following injury allows people to continue farming and to complete activities necessary in the day to day management of their property and should be considered as part of a therapist's role [156].

Hand therapy protocols and splinting regimes can limit participation in day to day activity. For rural and remote residents, such limitations can affect their livelihood, particularly regarding employment. Disruption to occupational roles and tasks can extend beyond the acute and rehabilitation phase of the injury. Despite changing and adapting occupational tasks, it can still be a source of frustration for injured people who may not be able to do all the tasks they once could do [37,146]. It has been found, however, that hand therapists do not routinely provide advice or recommendations about participation in daily activities and prefer to focus on the preservation of surgical repairs or the restoration of body structures and functions [152].

Kaskutas and Powell reported that participants in their study had difficulty undertaking day to day tasks one handed, particularly self-care and household chores [152]. As a result over half of the participants flexed their injured hand against resistance to complete important activities despite being cautioned against this. A previous study exploring a specific splinting technique to resolve impairments reported that patients found daily tasks difficult whilst wearing the splint and that they had to adapt how they completed the task or engage the help of family and friends [139]. An important part of intervention, therefore, particularly for rural and remote residents, should focus on advising patients how to simplify or adapt daily occupations following a major hand injury [37].

Importantly, the type of activities that are allowed or encouraged following a traumatic hand injury should be reviewed. Hand therapy protocols are based on previous studies that examine forces following surgical repairs. Advances in surgical techniques, however, require

an evaluation of the forces needed to complete functional activities and whether participation in activities should be strictly limited [157]. Sandford et al explored adherence to a splinting regime following hand surgery and found that 67% of patients reported removing their splint to wash their hand, get dressed, have a bath or shower or because of discomfort [158]. Despite removal of the splint, the tendon rupture rate was within the average range of all ruptures. A number of participants in Sandford et al's study also drove a car, with this author noting that in rural areas this would be higher due to lack of public transport [158].

Therapists need to take time to discuss daily activity participation and any problems a patient may encounter with certain tasks [152,158]. Powell and von der Hyde noted that rehabilitation of injuries generally focuses on biomechanical issues and not on the performance of activities [159]. Their survey of hand therapists revealed that therapists believed a focus on formal activity of daily living retraining was unnecessary in the acute phase following tendon repair due to the temporary nature of the injury and that many patients could find their own adaptive solutions. Therapists reported a lack of time during appointments and felt the most important aspect was ensuring adherence to surgical precautions, prescription of home exercise programs, scar and oedema management [159].

Home exercises programs in hand therapy can be rigid and require specific exercises and this can intrude into day to day life. Patients in studies conducted by Kirwan et al and Miller et al reported that they either do not have the time or simply forget to do the required exercises [13,140]. In my research, patients reported not having time to do exercises due to its intrusion into their everyday life in which daily activities and occupations took precedence. The emphasis patients placed on returning to activity and occupation highlights the importance of therapists being flexible with rehabilitation programs. Exploring strategies to fit the exercise regime into a rural and remote patient's busy daily routine or incorporating daily activities as part of a patient's exercise program can promote adherence to rehabilitation programs. Improving the relevance of rehabilitation programs for rural and remote patients can therefore contribute to accessible and appropriate health care [5].

Access to health care services for rural and remote residents with a traumatic hand injury

Recognition of the role of environmental factors in facilitating or limiting function has changed the focus from the individual to the environment in which they live [160]. Veitch, Tham et al and Bourke et al describe rural and remote environmental determinants that include geographical isolation, the distance from both health care and support networks,

long distance travel, and the recruitment and retention of health care staff, as having both a physical and a psychological impact upon people living in rural and remote locations [7,49,62].

Rural patients and therapists in my current research reported that the distance and expense of getting to hand therapy appointments was a barrier to attendance at rehabilitation appointments. The cost of travel on the whole family was significant, with family members often required to take time out of their employment to drive the patients to appointments. This finding is consistent with previous research that noted the influences of distance and cost on access to health care services [5,161].

Complex hand injuries are treated in metropolitan and larger regional facilities, and people from rural and remote areas are generally referred back to their local community to be treated by the local therapist following the acute surgical phase. The large caseloads managed by rural therapists and lack of resources to provide a hand therapy service often means that patients have to travel back to the metropolitan or regional facility for therapy and surgical reviews. Follow up appointments that are organised at the metropolitan or regional facility are often poorly coordinated, delayed or cancelled.

People have to travel long distances for what is usually only a 30 minute appointment [134]. Services that are designed in urban or metropolitan locations generally do not suit rural contexts and subsequently rural and remote health services have adapted to meet the needs of their rural population. To address this issue, a range of flexible and innovative strategies regarding appointment scheduling that does not rely on the need for patients to travel to appointments all the time is needed [134]. These adaptations, which are relevant to hand therapy intervention, include technology for assessment; intervention and increased networking and communication; and outreach specialist services [8,134,162]. Therapists need to consider these strategies when designing rehabilitation programs for rural and remote residents with a traumatic hand injury.

It should be noted that face to face contact with a treating health professional still remains important, particularly in hand injuries, to provide motivation, encouragement and support and so that a therapist can actually see and feel the hand injury. The patient-therapist relationship is considered an important component of adherence [106,163,164]. Having access to a physiotherapist or occupational therapist with expertise in hand therapy is highly valued to address concerns quickly and easily. The limited specialised knowledge and

equipment to address complications that may arise has previously been identified as a barrier in rural areas when dealing with specialist clinical areas such as spinal cord injury [162].

A shared care approach

Despite the limited opportunity for specialised clinical positions in rural areas [77], rural health professionals in this current research reported they were expected to undertake a broad range of hand therapy intervention such as splinting and exercises prescription. The large scope of practice and caseload can be quite overwhelming for rural health professionals [83]. Of concern is the lack of access to professional development for hand injury treatment, poor professional support and professional supervision for rural health professionals. The need to manage a large caseload in an isolated area with little access to professional development and support is cited as a reason for the low retention of therapists in rural and remote areas [77]. Strategies to address skills and retention of allied health staff include the introduction of outreach models such as 'hub and spoke', which involves the periodic supply of services from one location that offers a service to those locations which do not [66,162], interprofessional teamwork, allied health assistants, telehealth, and ongoing professional development and clinical mentoring on a needs based approach [66,81].

Rural and remote therapists in my research felt that they benefited from clinical supervision and support from experienced hand therapists to assist with relevant hand therapy interventions. The importance of clinical support to address allied health retention is highlighted in the literature [80]. Metropolitan health professionals in this research study highlighted the suitability of adopting a shared care approach. In this shared care approach, the metropolitan therapist provided formalised collaboration and support to rural and remote therapists with patient care. A shared care approach has been used in rural palliative care whereby general practitioners are able to deliver a palliative care service to rural and remote residents who may not be able to access specialist input through palliative care specialists [165].

Queensland Health's advanced clinical practice and expanded scope of practice framework recognises the potential for specialisation of occupational therapists and physiotherapists in clinical areas such as hand therapy [166]. Shared care involves an integrated and planned delivery with joint responsibility of patient care between generalist health professionals and specialists. This model of care also requires collaboration, clarity of objectives, frequent

communication, coordination and planning and a clear understanding of roles and skills amongst the professionals with different skills and knowledge [164,167–169]. In a shared care approach, the different areas of expertise can be utilised so that there is a combined knowledge base working towards common goals and objectives regarding patient care [168,169]. Thus, the clinical expertise of the metropolitan therapist combined with the rural expertise of the rural and remote therapist can provide a comprehensive intervention plan for a patient with a traumatic hand injury.

This current research found that the shared care model is dependent on the motivation and commitment of the rural/remote therapist and the hand therapy specialist in the metropolitan/regional location as opposed to a planned and coordinated approach. Recommendations from projects have not been implemented and evaluated, due to a lack of support for ongoing planning and research [170]. Developing collaborative goals, clear guidelines and expectations formalises this relationship and promotes an ongoing relationship between therapist and patient.

Understanding of rural health issues

Rural therapists in this research reported a lack of understanding by metropolitan therapists regarding the breadth of the work they did, the distances travelled and the high caseloads. This is similar to findings by Mills and Millsteed who found that rural practitioners often felt undervalued by metropolitan therapists due to a lack of understanding and appreciation of rural issues [83]. Programs designed for rural and remote allied health clinicians attending metropolitan hospitals for specific clinical work experiences or developing skills in spinal injuries have been established to support professional development of the rural and remote allied health professionals. These programs have had a positive influence on metropolitan staff members' knowledge of rural service delivery with subsequent improved referrals to rural therapists [87,161].

The mistrust of 'foreign trained' or practitioners who are 'not local' was highlighted as an issue for patients in the current research and resulted from health professionals lacking 'local knowledge' or having an understanding of the issues and concerns relevant to rural and remote living and the communities they service. Rural residents are described as having a mistrust of anyone new to the area and Hays notes that this is partly due to health

professionals who do not stay for long and who do not try to understand the specific needs in rural and remote areas [171].

Many newly graduated professionals take up positions in rural and remote locations, develop skills and experience, and then move to a city or coastal area, giving rise to the description of rural and remote areas as 'professional nurseries' [85]. Therapists who are unfamiliar to the rural area should therefore develop links with familiar and trusted services and staff, such as community health nurses or the Royal Flying Doctor Service, to help overcome any scepticism from patients regarding a new staff member or service. These links can help build trust and encourage collaboration with other rural health services [172].

Resilience

Stoicism is a term often used to describe rural and remote residents and is defined as the 'endurance of pain or hardship without the display of feelings and without complaint' [173]. Stoic responses by rural residents to health care issues include the delay in seeking help for a medical condition and seeking help only when symptoms disrupt day to day activities such as employment [11,174]. Being stoic is often seen as a core feature of living in rural location [174]. However, patients in this research who had sustained a traumatic hand injury appeared to demonstrate resilient, rather than stoic, qualities.

Resilience refers to the ability to thrive or adapt despite adversity, through anticipating and welcoming change [47]. The notion of hope, positivity and determination are important components of resilience [175–177]. Resilience may be a quality inherent within each patient and not necessarily a reflection of being rural and/or a response to environmental influences. Nevertheless, patients in this current research demonstrated resilient qualities when they discussed how they adapted their treatment program to fit with their lifestyles and how they talked about the importance of support to get tasks done, particularly due to the isolation of rural and remote areas. These patients focused on what they had, not what they had lost and whilst acknowledging the need to get help, they were also aware of the need to do tasks themselves so they could manage in the future [47,178].

Rural and remote patients in my research discussed metropolitan therapists' limited understanding of the difficulty in attending appointments. One patient noted that therapists in metropolitan areas [170] 'did not know what it took to get there' and that when they returned home, they had family to care for. Undertaking the prescribed exercises was not possible

due to their work and family responsibilities. Overcoming this barrier is vital to ensure collaborative treatment and communication. Rural and remote patients valued the opportunity to return to activity and their paid employment and felt 'useless' when they were unable to do so. They reported they were 'grateful' for the function they had and appreciated the opportunity to return to work [178]. Being occupied and busy has been highlighted as important for rural and remote residents' wellbeing [179], and reinforces the importance of incorporating daily activities as part of a patient's exercise program and designing a rehabilitation program that fits within a patient's busy day to day routine.

Goals of hand therapy for rural and remote residents.

The 'functional' view of health highlighted by rural and remote residents in this research appears to clash with comments made by metropolitan therapists [9,48]. One therapist who responded to my survey mentioned they had to lower their expectations with regards to outcomes for rural patients. The therapist noted that their rural patients were happy to return to work whereas they (the therapist) felt they could achieve more. Hand therapy is focused on healing of the hand and maintaining the function of this structure.

The measurement of outcomes in hand therapy often focuses on physical measures [38,151]. Instruments such as goniometers and dynamometers are regularly used in hand therapy to provide objective measures of body functions and structures [180]. However, there is an increasing amount of research promoting the use of patient report outcome measures such as the DASH and the Patient-Rated Wrist and Hand Evaluation (PRWHE). These outcome measures address perceptions of hand function, satisfaction and quality of life [180-183]. Regardless, hand therapists often still believe small improvements in active range of motion will benefit patients, yet these improvements may actually not be relevant to overall function [184]. These differing attitudes towards health and outcomes of therapy prevent a truly collaborative approach between patients and therapists.

Another therapist in my research reported that they recommended patients use passive and restrictive protocols. This decision by the metropolitan therapist appears to not have been based upon the quality of the surgical repair or on the activities that the patient had to do but on their rural and remote residence and whether the metropolitan or a local therapist were able to see the patient for follow up. The willingness to adapt, seek help and support and look towards the future for the rural participants in this research are important attributes to 'tap into' when planning a treatment program. Therapists need to consider the roles and day

to day responsibilities of the rural patients and their goals for therapy to promote adherence to therapy and home programs and ensure a collaborative approach to therapy [139]. Moreover, rural and remote patients should be afforded the same opportunity as metropolitan/regional patients to follow active hand therapy protocols that can promote improved outcomes [185].

Technology

Telehealth and telerehabilitation are believed to be effective ways of complementing health care services by reducing the need to travel, by providing services in partnership with local providers in remote communities, and by giving timely access to specialists and medical services. The use of telehealth can also support training and education of rural and remote health workers [51,186]. Telehealth and telerehabilitation continue to receive increasing publicity as a solution to the lack of services in rural and remote areas by allowing health consults and assessments to be conducted remotely [187]. Telehealth can also allow a rural and remote allied health professional to provide treatment and management to a patient at a distance [188]. The limited capability of internet technology regarding bandwidth can limit the applicability of the use of the internet, however it is anticipated that accessibility to this technology will increase with the updates to Australian's National Broadband Network [189], improved computer power and reduced cost of technology [190,191]. Technology in rural and remote areas can be used for speech and swallowing assessment and treatment, counselling, occupational therapist home assessments, exercise program assessment, and review [121,188,191–194].

Health professionals can utilise technology such as telehealth or videoconferencing for team meetings, to discuss clinical cases with other professionals, and for training and development. Technology can also allow access to specialist clinical assessment and intervention, to clinics in metropolitan areas and to assist with professional development and clinical supervision of rural and remote therapists involved in direct patient care [188,194]. This contact can help to reduce professional isolation and increase the skills and confidence of rural and remote health professionals [194].

In this current research, technology was, on the whole, viewed positively by patients and therapists who felt it would allow for increased communication and clarity of exercises. Many therapists believed it would have been useful to be able to have access to technology if a

problem arose, and several patients felt that further complications may have been averted had they been able to contact a specialist. Therapists reported a reticence about replacing face to face contact, particularly with regards to hand assessment. This finding has been supported in a previous study exploring the diagnostic accuracy of telerehabilitation with lower limb injuries [195]. Their participants reported a preference for face to face contact and felt that they disclosed more information during the face to face session that assisted the therapist with clinical decision making [196]. There were several patients in this research that were not accepting of technology, one reported that telehealth would not have worked because she needed splints specially moulded for her and another stating that face to face is more important. However, others reported it would be a useful way of being able to clarify concerns and maintain contact. The preference of patients when designing a rehabilitation program is an important point to consider when looking at the use of telerehabilitation in the treatment of hand injuries.

The majority of intervention requires the therapist to be able to physically touch the patient and assess limitations in range of motion, scar adhesion, and oedema. Adaption of conventional intervention may be possible, with studies demonstrating that the range of motion for the shoulder, wrist, elbow and forearm can be tested through the use of an internet based goniometer [122]. Grip and pinch strength testing and finger dexterity can also be administered via telerehabilitation [192]. Concerns related to pixilated video image and video quality may affect clarity of assessment and treatment in hand injuries, although this is likely to be addressed with ongoing improvement to internet and broadband access in Australia [189,191]. Telehealth in Australia has been designed to expand upon, and not replace, existing services including face to face contact, which is still considered the preferred method of service delivery [124,194]. This technology can be used in conjunction with face to face treatment and address the issues of distance and expense [121].

This current research used DVD technology for the home exercise program because of the universal access to DVD recorders and the lack of equitable internet and mobile phone access in rural and remote areas at the time the research was conducted. The continued advancement in internet technology through the introduction of the National Broadband Network [189] should ensure comprehensive access to phone and internet technology in rural and remote areas.

The growing use of mobile phones to watch video, play games or record video provides an alternate and more transportable method of ensuring a visual reminder of exercises and would prove a valuable focus for future research. For example, a health professional can video the exercises and download them to a patient's mobile phone or photograph the instructions on the mobile phone. This technique has been used successfully with university students and with patient discharge instructions [196,197].

The correct execution of exercises is considered an important component of ensuring positive outcomes [198,199] and the use of DVD technology for home exercise programs was viewed favourably in this research. Having the exercises recorded and the ability to play back when required enhanced understanding and clarity. DVD technology was used as an intervention to address the issue of large travelling distances and subsequent difficulty with ensuring regular face to face contact with rural and remote patients [200]. Given its acceptance and pervasiveness in our daily lives, using technology to demonstrate home exercise programs for patients, regardless of residential location, can ensure clarity and understanding of home exercise programs.

Recommendations

The integrated results of this research highlight the differing needs, values and opinions of both therapists and patients regarding services and care for rural and remote patients who have sustained a traumatic hand injury. My research has given voices to, and rich information about, therapists and patients to improve health care services and outcomes for rural and remote clients.

The aim of my research was to recommend a model of service or practice. The results, however, confirm that a model of service delivery or model of care must be individualised and adapted to the needs of patients in rural and remote areas due to the large geographical, social, cultural and economic contexts that exist within the rural and remote communities in Australia [50,60]. Outlining a specific model of practice, therefore, may prove too restrictive when planning rehabilitation programs for rural and residents in Australia who have had a traumatic hand injury.

Dew et al. outline a framework when planning services for people with a disability in rural areas that builds upon existing rural services, rather than seeking to create a new service [132]. This person-centred and place-based approach asks the questions: 'what does this

person want' and 'what would make a good life for this person'. This approach then explores the supports that are locally available, the supports that will need to be brought in, and the supports the person will need to travel to access the service. The final question in this approach asks what supports could be accessed via technology [132]. This approach does not try to create a specific model of practice but rather a flexible and innovative strategy designed to enhance and build on existing services. This approach also supports Humphrey's following statement:

> '*Because no one size fits all, our focus in rural and remote areas should be on developing strategies to ensure that key service requirements and community needs are met rather than concentrating too much on the actual model configuration*' [5](p37).

The main findings from my research have highlighted key principles that should be explored and addressed when providing a service to rural and remote residents that have had a traumatic hand injury. It is recommended that therapists take these principles into consideration when planning intervention to ensure that they will be able to provide care that meets the needs of each individual patient. These principles aim to address the patient journey from the acute phase of the traumatic hand injury to the rehabilitative phase.

KEY PRINCIPLES for providing a service to rural and remote patients who have had a traumatic hand injury:

Flexibility with patient intervention, goal setting and exercises.

There has been a tendency to focus on restrictive protocols and guidelines in hand therapy with limited consideration regarding their fit within the day to day lives of the patient. This research recommends strong emphasis on collaboration and flexibility when designing a treatment program to meet the individual needs of the consumer. Clear discussion must occur regarding what functional activities the patients need to undertake and an exploration of the environmental barriers and facilitators that impact upon a patient's ability to participate, not only in rehabilitation but in daily activities. This current research has also confirmed that rural patients are resilient and willing to adapt to their circumstances. Discussions between the patient and therapist at the initial appointment regarding the important tasks that the patient must undertake each day can lead to strategies about how

tasks can be adapted and how the patient can continue to engage in day to day occupations as opposed to a focus on strict protocols and guidelines.

Formal links between rural and metropolitan therapists

Links between rural/remote therapists and metropolitan/regional specialists tend to be driven by individuals who are committed to providing equitable care to rural and remote patients and ongoing professional development to rural and remote therapists. However, these links do not appear to have clear expectations and outcomes specified. As a result should the therapist/s leave their respective position there is a lack of continuity of care. The shared care approach highlighted by therapists in this current research and supported by the published literature can be a suitable option to consider. This shared care approach incorporates a more collaborative and formal link between professionals, where clear expectations of each professional's role in the patient care can be established. Shared care also provides an opportunity for metropolitan and regional therapists to understand the difficulties faced by rural and remote therapists and can enhance their own learning. These formal links can become embedded within a service with potential for sustainability and longevity regardless of staff turnover.

Importance of **face to face** contact

Face to face contact is highly valued by rural and remote residents with a hand injury, who felt that having an occupational therapist or physiotherapist being able to touch their hand helped in their care. Face to face contact in hand injuries is an important part of rehabilitation. Being able to identify problems regarding range of motion, pain, scar formation and also concerns such as tendon rupture can often only be undertaken by a physical examination. The face to face contact can occur with either the rural and remote therapist or the metropolitan and regional specialist, or a combination of both. Adequate training in the assessment of hands and being able to clearly articulate such concerns is important for the rural therapist. When, how and with whom the face to face contact should occur should be a collaborative decision and should be based upon the patient's injury, their ability and willingness to travel and the skills of the therapists.

Technology to enhance face to face treatment

Technology is a useful adjunct to treatment and in collaboration with the patient can be included as part of a treatment plan. The use of telehealth or telerehabilitation has an important role in the delivery of patient care in rural and remote areas by providing additional treatment sessions in conjunction with face to face intervention. Technology can assist in addressing the limited access to specialist health professionals for the patients and also the lack of professional development opportunities for rural and remote therapists.

These recommendations are depicted in Figure 10:

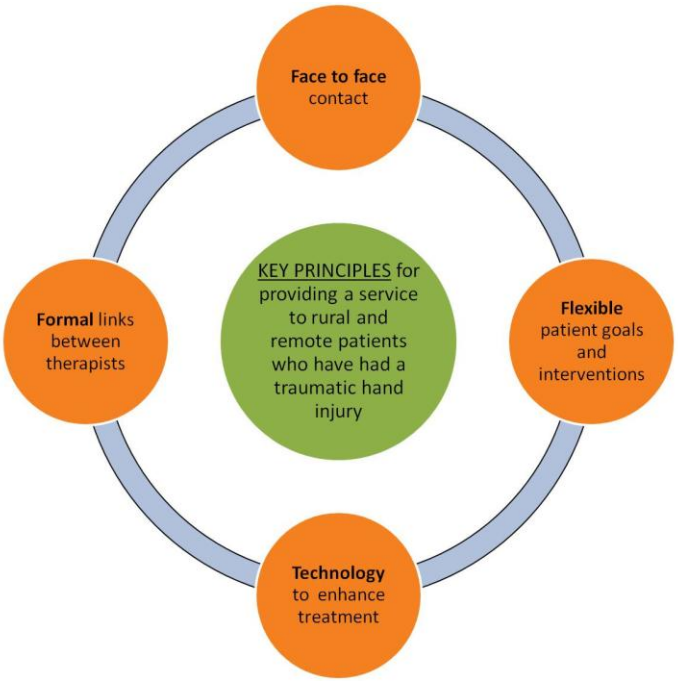

Figure 10: Key principles for providing a service to rural and remote patients who have had a traumatic hand injury

Future research

Further exploration and research into the use of a shared care approach for hand therapy to rural and remote patients is strongly recommended to determine both the suitability and

applicability within the occupational therapy and physiotherapy professions. Outcomes to be measured in any research into a shared care approach for occupational therapists and physiotherapists in public health care facilities must include the achievement of rural/remote patient goals and rural/remote patient perceptions of the service. Evaluation of the change or improvement in communication and collaboration between the specialist hand therapist and the generalist therapist as well as the impact upon all therapists' professional development and knowledge should also be considered. The implementation of a shared care approach would benefit from both Commonwealth and State endorsement to formalise and legitimise its application to occupational therapy and physiotherapy. Commonwealth guidelines such as *The National Strategic Framework for Rural Health* provide key priority areas for rural and remote health service delivery for services, which support the implementation of a shared care approach in rural and remote areas [134]. Relevant allied health management units at a state health department level could develop guidelines clarifying the intent and potential implementation of a shared care approach.

Research that investigates technologies, other than DVDs, that can be used when recommending home exercise programs, or to facilitate communication between therapists is also recommended. Research into the use of technologies should explore the ease of use for both patients and therapists and the clarity of instructions provided to the patient through the relevant technology. There is also a need to update the evidence into the forces required to execute functional activities and how these forces relate to surgical repairs and precautions following surgery. Accurate and current information will provide clarity when deciding to implement active or passive and restrictive hand therapy protocols for rural and remote residents.

Limitations

The limitations of each study has been outlined in Chapters' Four through to Seven, however a few points need highlighting. The survey of occupational therapists and physiotherapists and the preliminary studies exploring the functional impact of a traumatic hand injury had relatively low response rates that ranged from 18% to 34% [36,136,199]. As a result there is a possibility of selection bias as the research is likely to include views of those therapists who are more positive or concerned about developing services and skills or those patients who had concerns about their injury and the treatment they received. Nevertheless, the therapists and the patients who responded worked or resided across

metropolitan/regional and rural/remote locations, and therapists worked across all states of Australia. Results therefore do provide representation of the intended population and give insight into the contextual factors that impact upon hand rehabilitation and the barriers to service provision for rural and remote clients with traumatic hand injury.

I had also previously been involved as a treating clinician with several of the 15 patients that were interviewed which may appear to raise the issue of bias. Given the potential mistrust of newcomers and people who are 'not local' to the rural and remote area I believe my prior relationship with these patients led to honest and comprehensive responses. Moreover, the interviews reflect issues that are outlined in other research studies regarding health care services for rural and remote residents.

Only metropolitan/regional based patients were involved in the feasibility study due to the requirement of attending weekly therapy sessions. I believe it is likely the use of DVD technology would be equally as useful to rural and remote clients and future studies exploring the use of technology should focus on a rural/remote sample.

There were no Indigenous respondents to the survey or Indigenous participants in the feasibility study. This limitation was partly due to the requirement of the health service district health and research ethics committee that only one survey and one follow up phone call was allowed in the preliminary studies, thus encouragement to participate was restricted. In addition, Indigenous patients who attended the occupational therapy hand rehabilitation clinic were unable to attend weekly sessions due to geographical barriers, which excluded them from participating in the feasibility study. Therefore I could not capture this important population group's thoughts and opinions regarding health care in rural and remote areas. Rural and remote therapists, however, were able to raise points regarding Indigenous patients and my research has identified issues surrounding service provision that are relevant to an Indigenous population. Ensuring that Indigenous patients are included is an important consideration for future research exploring service provision for rural and remote patients with a traumatic hand injury.

Conclusion and significance of this research

The aim of my research was to explore service provision and propose a model of practice for occupational therapists, and/or physiotherapists who work in public health care facilities and to provide intervention to rural and remote clients in Australia who have had a traumatic

hand injury. As a result, this research builds and offers principles for an improved service delivery of treatment and rehabilitation for traumatic hand injuries in rural and remote areas.

This current research has highlighted and confirmed the contextual factors that impact upon service delivery for rural and remote patients. Therapists need to be collaborative when identifying a patient's treatment goals and acknowledge the importance of activity and participation by fitting relevant hand therapy exercises and protocols into the daily lives of rural and remote patients. Significantly the research has synthesised evidence about possible new technologies and explored the expressed needs and opinions of a group of rural and remote residents who have sustained a hand injury. My research has explored both service provision and the skills needed from occupational therapists and physiotherapists in public hospitals and community health centres in rural and remote areas that provide a generalist service to a large variety of clinical conditions, including hand injuries. Importantly, my research has also explored the support provided to rural and remote therapists from therapists based in public health facilities in metropolitan and regional locations who provide a specialist service in hand injuries.

The current research has also recognised gaps in current services, ways to address these gaps and opportunities for further research into, and the development of, occupational therapy and physiotherapy services for rural and remote residents who have had a traumatic hand injury. Given the ongoing changes to health services in Australia and the increasing availability of technologies, it is timely that these recommendations are acknowledged through the development of policies and procedures for the provision of services for rural and remote residents.

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A PILOT STUDY EVALUATING A HOME EXERCISE DVD FOR PATIENTS WHO RESIDE IN A RURAL AND REMOTE LOCATION

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ABSTRACT

Objectives: Home exercise programs are an important component of a hand therapy rehabilitation program. Compliance with the recommended home exercise regime is generally considered essential for good treatment outcomes. The aim of this pilot was to determine the clarity of an innovative hand therapy DVD. This DVD will be utilised in a randomised controlled trial (RCT) examining the usefulness of DVD technology for enhancing treatment compliance for rural and remote hand therapy patients. **Methods:** A series of seven DVDs of previously utilised home exercise protocols were taped and edited by the researchers. The pilot used a convenience sample of nine consecutive consenting patients who attended the Hand Therapy Service at a regional hospital in North Queensland. Subjects viewed a DVD that related to their clinical diagnosis and then completed a questionnaire on the suitability of the research instrument. **Results:** There were unanimously positive responses to the DVD from all subjects, with 100% indicating yes to the prompt questions. No negative comments were received. **Discussion:** The DVDs produced were found to be clear and useful for a group of hand therapy patients characteristically similar to those who will be recruited into the RCT. Resulting compliance with these home exercises will be presented in a subsequent paper resulting from the RCT. Given the poor health outcomes generally associated with patients from rural and remote areas, this endeavour contributes to the ongoing effort to improve service delivery to better address the health needs of rural and remote patients.

KEYWORDS: Hand Therapy; Compliance; Home Exercise Programs; DVD

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INTRODUCTION

Traumatic hand injuries are generally complex and may result in a loss of sensory and motor dysfunction (Gustafsson and Ahlstrom, 2004). Enabling the client to regain functional use of their hand or arm and return to pre injury occupations is a primary focus following such injuries. The provision of hand rehabilitation involves therapy for physiological impairments, difficulties with activities and limitations in occupational roles (Case-Smith, 2003). Home exercise programs are considered to be an important component of a hand therapy rehabilitation program. Hand therapy rehabilitation is usually completed following an acute rehabilitative phase; these programs prevent ongoing stiffness and disability (Kirwan et al., 2002; Weeks et al., 2002). Compliance with the recommended home exercise regime encourages patient self management and is generally considered essential for good treatment outcomes (Chen et al., 1999). 2009 Compliance with hand rehabilitation is defined as the extent to which a patient or clients actively follows therapist advice and instruction (Chen et al, 1999). Behaviours that demonstrate compliance include attending appointments, active participation in rehabilitation activities at the clinic and home and the wearing of protective or therapeutic devices (Kolt et al, 2006). Factors that may influence compliance include: the duration of treatment; presence of stable family network; financial situation; accessibility of treatment setting; transportation; literacy; positive or negative feedback from therapists; fit with daily routines and pain caused by exercises (Chen et al., 1999, Groth and Wulf, 1995; Kirwan et al 2002). Patients who believe that little can be done by exercising or are unable to see the results of exercises are less likely to be compliant (Henry et al., 1999). Kirwan et al. (2002) highlights that often therapists and patients have different perceptions regarding levels of compliance to home exercise programs. For example, hand therapists believed their patients were less motivated and committed than the patients viewed themselves. Patients ranked pain and discomfort caused by exercises higher than therapists for reasons for non compliance.

Compliance is the most unpredictable and least controllable variable in medical intervention (Groth and Wulf, 1995). Although there are other factors involved in achieving successful outcomes, compliance is generally recognised to be an important factor in rehabilitation (Henry et al., 1999, Jan et al., 2004, Lyngcoln et al., 2005, Shaw et al., 2005). In a study exploring outcomes after distal radius fracture, compliance to home exercises were believed to be important aspects in determining short term outcome (Lyngcoln, et al., 2005). Poor compliance affects the recovery and functional abilities of a patient and can result in ongoing disability (Kirwan et al., 2002). The long term cost of treatment, morbidity and side effects may be alleviated by undertaking what is considered to be relatively inexpensive exercise programs, as prescribed by a hand therapist (Schneiders et al., 1998). Measuring compliance is a difficult and often subjective process. Patient or client reports, which are a commonly used measure, result in varying degrees of accuracy and reliability (Bassett, 2003; Schneiders et al., 1998; Sluijs et al., 1993). Attendance at therapy sessions, the reported time spent exercising and the intensity of observed exercise have also been utilised to measure compliance with exercise programs (Shaw et al, 2005). A study by Brewer et al. (2004) provided home exercise

programs on videocassettes containing a hidden counter that recorded each time the video was played. Brewer et al. (2004) found that the total number of self reported completions of the home exercise routine was significantly higher than the number of times the videotape was played. However, as the research does not report whether ethical approval was granted to undertake this covert monitoring, this is not a study methodology that would be advocated for future research into compliance.

The observation of proficient exercise performance is highlighted in the literature as being positively correlated with patients' self reporting higher levels of compliance (Codori et al., 1992; Henry et al., 1999). The same studies acknowledge that the amount of training a patient receives and the tendency of patients to overestimate their compliance does impact upon the exercise performance proficiency and compliance relationship (Codori et al., 1992; Henry et al., 1999). Email and on-line registration or reporting has also been suggested in order to enhance patient compliance (Shaw et al., 2005).

Few of these compliance measures have been tested for reliability or validity. The Sports Injury Rehabilitation Adherence Scale (Brewer et al., 2002) uses three items to measure compliance. A five point scale is used to assess the intensity with which exercises are performed, the extent to which patients follow the therapist's advice and the patient's receptiveness to change. The use of multiple measures of compliance is recommended, including attendance at therapy sessions, exercise diaries and logbooks, therapist rating of compliance, as well as patient self report (Shaw et al., 2005).

There is increasing acknowledgement that people in rural and remote locations are not doing as well in health status as those in the cities (Gregory et al., 2006). This discrepancy is reported to be the result of lower income, level of education and employment types, exposure to harsher environments, sparser infrastructure and poorer access to health services (AIHW, 1998). Rural and remote populations have a disproportionate share of the burden of traumatic injury (AIHW, 2006). People living in rural and remote locations and engaged in occupations such as farming, mining, forestry and fishing are at higher risk of traumatic injuries due to the physical risk involved in these occupations (AIHW, 2006). In addition, for rural people, the need to travel over long distances on country roads can also hold dangers due to factors such as higher speeds, fatigue from longer driving times and animals on the road (AIHW, 2006).

The recovery from such traumatic injuries can be exacerbated by the issue of compliance with treatment regimes, which can be of particular concern for people who reside some distance from a treatment centre. The cost of travel to attend specialist treatment is commonly highlighted in literature discussing rural and remote issues (Bolch et al., 2005; Eckert et al., 2004; Humphreys, 2000; Jones et al., 2006; National Rural Health Alliance, 2002; Simmons, 2000). Travel and accommodation costs and the time taken seeking services in metropolitan centres often limit the duration and follow up of treatment.

Furthermore, there is an attitudinal difference between populations. People who live in metropolitan and regional areas tend to view health as the absence of disease or dysfunction, but for people who live in rural and remote locations health is seen as the ability to carry out activities of daily living at home and work tasks (Elliott-Schmidt and Strong, 1997). People who live in rural and remote locations are described as stoic, hard working, self sufficient and independent in times of adversity (Edwards et al., 2007; Kelly and Smith, 2007; Rolley and Humphreys, 1993). These attitudinal differences between populations may influence the level of compliance that a patient has to a treatment regime and subsequently outcomes.

Health professionals working with rural and remote patients have to address relevant health issues, whilst also dealing with the highlighted factors surrounding distance, isolation and a dispersed population (National Rural Health Alliance, 2002). One solution is a home based therapy program that can be monitored and adapted when the patient does visit (Elliott-Smith and Strong, 1997).

Home exercise programs, particularly for hand injuries such as tendon repairs or crush injuries, rely on the execution of protocols that align the need for protection with early movement. When the need to regain function for work and home tasks becomes a focus, therapists must promote compliance through balancing a recommended home exercise program within the daily life of their patients.

The provision of a DVD or videotape may ensure performance proficiency and compliance, and hence, improve health outcomes. Research has investigated the use of videotape education to improve medication adherence (Brook et al., 2005, Wong et al., 2006), frequency of breast examination (Janda et al., 2002), and awareness of medical conditions such as colitis and heart failure (Eaden et al., 2002; Smith et al., 2005). Wong et al. (2006) noted that the use of a video is useful for people with lower levels of education and limited understanding of the importance of their therapy. Weeks et al. (2002) argued that dynamic modelling, through the use of a video tape, was more effective than static illustrations. Moreover, Lin et al. (1997) found that the group who received a videotape performed the exercise more regularly and correctly than those who received a booklet only.

Schoo and Morris (2003) conducted a systematic review on the effectiveness of face to face instructions, illustrated brochures, audiotapes and videotapes on the correctness of home exercise performance and compliance. They concluded that there was moderately strong evidence for face to face verbal instructions combined with handouts, with modest support for the provision of additional videotape instructions to further improve correctness and compliance. Further to this Schoo et al. (2005) conducted a RCT and reported that there was no evidence to support that providing videotape, in addition to brochures, would improve compliance and correctness of exercise performance. Compliance in Schoo et al.'s study was measured through patient self report which is considered an unreliable measure, when used on its own (Bassett, 2003; Shaw et al., 2005). Utilising other outcome measures, in addition to patient self report, may have provided more comprehensive data for the above study and therefore more positive results for the use of videotape.

For rural and remote patients, face to face contact and the provision of handouts cannot always occur on a regular basis. Attendance at therapy sessions may need to coincide with appointments with surgeons, and this often occurs infrequently.

Schoo et al. (2005) did note that videotapes may benefit those patients who are unable to attend face to face appointments due to lack of transport or distance. The obvious benefit in this case being, that when instruction in the home exercise program is video based, the patient can take the video home and replay it.

This pilot study was conducted to examine instructions outlined in DVD home exercise program, which was developed for patients of a regional hospital hand therapy service. This DVD will be further utilised in a study that explores whether providing a DVD in conjunction with brochures improves compliance with prescribed exercises, when compared to providing brochures alone. It is important to ensure a research instrument is clear when used in the major study (van Teijlingen and Hundley, 2002). Specifically, the aim of this pilot was to determine the clarity of an innovative hand therapy DVD.

METHODS

Approval was received for the study from The Townsville Health Service District Human Research Ethics Committee (protocol #14/07) and the James Cook University Human Research Ethics Committee (approval # H2697).

The authors published an announcement in the newsletter of the Australian Hand Therapy Association, requesting information from any hand therapists in Australia as to the existence of exercise protocols on videotape or DVD. No responses were received to indicate that media other than brochures or handouts were utilised. Telephone contact was made with hand therapists employed in teaching hospitals in Brisbane, Sydney and Perth who also confirmed that home exercise protocols were not provided on either DVD or videotape.

A series of seven DVDs of previously utilised home exercise protocols were taped and edited by the Audiovisual Department and Occupational Therapy Department at the regional hospital (see Table 1). Occupational Therapy Department staff members were filmed demonstrating correct execution of the exercises. Audio instruction was also provided by an Occupational Therapy Department staff member. The DVDs followed the protocols provided on handouts currently in use within the Occupational Therapy Department. These protocols have been reviewed by specialist hand and upper limb therapists and surgeons. They have been published by EKCO Occupational Services Hand and Upper Limb Rehabilitation Unit (Anderson et al., 2006).

Table 1: Hand Therapy DVD Protocols

DVD	Hand Therapy Regime/Protocol
1	Flexor tendon repair: early active motion protocol
2	Flexor tendon repair: passive protocol
3	Flexor Pollicis Longus (FPL) repair: early active motion protocol
4	Flexor Pollicis Longus (FPL) repair: passive protocol
5	Short arc early active range of motion repair for zones 2 to 3
6	Controlled early active motion for zones four to seven extensor tendon repair
7	Trimmed fixation following distal radius fracture

SUBJECTS

The pilot used a convenience sample of nine patients who attended the Occupational Therapy Department Hand Therapy Service at a regional hospital in North Queensland. The pilot target group were all patients who presented to the hand therapy service over a period of one month between May and June 2007. After nine patients volunteered to take part, recruitment was ceased. A sample size of 10% or over of the major study size is commonly deemed adequate for a pilot study (Lackey and Wingate, 1998). The subsequent RCT will recruit prospectively 52 patients from this regional hospital patient base, thus this current study is larger than the required sample size (15%). In addition, Hertzog (2008) notes that a sample of ten or fewer subjects is acceptable in a pilot study aimed at assessing clarity of instruction, wording, formatting or ease of administration. Ethics approval for the subsequent RCT necessitated subjects to be over the age of eighteen.

Criteria for participating in the pilot study were that subjects had to be receiving a therapy program that related to one of the seven DVDs, be able to speak English, have no visual impairments and no diagnosed cognitive disability.

The pilot subjects demographics were compared to previous participants of a hand therapy study from the same regional hospital patient base (see Table 3), in order to predict their similarities with the subsequent RCT target group (which will be derived from the same regional hospital hand therapy patient base).

PROCEDURE

A standard script was devised for the treating therapist to invite patients to participate in the pilot study. This script was read out during their regular treatment session. Patients who agreed to participate were then taken to a separate room with a research assistant for 15 minutes after their scheduled appointment. This step ensured limited interruption to normal treatment sessions and enabled subjects to view a DVD that related to their clinical diagnosis and rehabilitation program. The option was also provided for the subject to take the DVD home and to discuss it at their next treatment session.

After viewing the DVD subjects were provided with a questionnaire. The questionnaire was designed specifically for this pilot study and was based on issues that determine the

suitability of the research instrument in terms of clarity and potential usefulness (Table 2). The questionnaire addressed the ease of use, understanding and of the DVDs. Reponses were yes/no with ability to comment.

Table 2: Pilot Questions

Number	Question
1	Is it easy to navigate around the DVD?
2	Is the audio clear and easy to understand?
3	Is the picture clear?
4	Are instructions for the exercises clear?
5	Is it easy to understand the correct positioning of the hand and fingers for the exercises?
6	Is the DVD too long, too short or the right length?

RESULTS

With 55.6% males and 44.4% female, mean high school education level and an age range of 21-70 years, subjects were characteristically similar to those recruited in a previous study on the same patient base as the target group for the subsequent RCT (see Table 3). Thus this pilot sample is likely to be representative of the target RCT group. The results from the questionnaire have been provided in table format outlined below (Table 4).

Open ended comments provided further information as to the how the subjects felt about the use of a DVD in providing home exercise instructions. There was a unanimously positive response to the DVD from all subjects, with 100% indicating yes to the questions (see Table 4). No negative responses were received from any subject regarding the use of the DVD. For example:

- *Clear instructions about what you have to do;*
- *Wished I had it. Would have been great for me as I got confused with the hand exercises;*
- *Useful and helpful;*
- *It's a really good idea to be able to refer to DVD as sometimes you forget what you have been shown. Good for family members as well;*
- *DVD showed a bit more. Makes it clear in your mind what to do.*

Table 3: Subjects Characteristics

	Current Study Subjects (n = 9)	Previous Hand Therapy Study Subjects (2003-2007) (n = 65)
Male	5 (55.6%)	33 (50.7%)
Female	4 (44.4%)	32 (49.3%)
Age Range	21- 70 years	21 – 82 years
Mean Education Level	High School	High School

Table 4: Results of DVD pilot questionnaire

Question	Yes (n=9)	Comments
Is it easy to navigate around the DVD?	100%	Able to click on each week.
Is the audio clear and easy to understand?		
Is the picture clear?	100%	
Are the instructions for the exercises clear?	100%	Need to clarify how many times the exercises have to be.
Is it easy to understand the correct positioning of the hand and fingers for the exercise?	100%	Easier than on paper. Explained well.
Question	**Just right**	**Comments**
Is the length of time for the DVD too long, too short or just right?	100%	Would have liked more info, not less.

DISCUSSION

The results from the pilot show that patients are accepting of technology and perceive that it improves their understanding and knowledge. Responses to the clarity of the DVD picture, audio, instructions provided and the length were clearly positive.

In addition to the feedback regarding these surveyed aspects, subjects also reported that the DVD provided clarification regarding the number of exercises and their execution. Positives for home exercise programs include improved efficiency and enhanced patient, family and caregiver understanding of the exercises (Barber, 1999). Lysack et al. (2005) notes that the potential benefit of technology is that it can result in better understanding, knowledge retention and positive behavioural change in patients. This benefit is due to the ability to replay the DVD or technology thus reinforcing the exercises. Thus home exercise programs utilising technology can enhance compliance.

The results reflect the growing trend and acceptance of video technology in the health workplace (Gysels and Higginson, 2006; Lewis et al., 2002). Moreover, as a means of instruction, DVDs are used widely with cooking, gardening and 'do-it-yourself' activities (Miller et al., 2004). Therefore, this technology should be familiar for people to use in their homes.

Research investigating the use of videotape or DVD technology in the prescription of home exercise program has sought to determine whether it results in improved correctness of exercise performance and compliance (Schoo et al., 2005), quality of exercise performance and motivation (Weeks et al., 2002), clinical progress and compliance (Miller et al., 2004), change in wellbeing, patient satisfaction and patient's skills (Roddey et al., 2002), patient satisfaction and compliance (Lysack et al., 2005) and performance accuracy (Reo and Mercer, 2004). Studies have also examined videotape technology in improving education and knowledge (Consoli et al., 1995; Dunn et al., 2004; Gates et al., 2005; Miller et al., 2005; Partin et al., 2004). This pilot study is the initial phase in a RCT that will be undertaken to answer the research question: Following a traumatic hand injury, does providing a DVD in conjunction with brochures outlining a home based exercise program improve patient compliance, when compared to providing handouts alone? Testing the DVD on a sample of patients has been successful in confirming the clarity, understanding and ease of use of a series of DVDs that outline various home exercise protocols. The positive results gained for the DVDs developed indicate, even at this preliminary stage, that the level of clarity of the DVD should enhance the understanding of the exercises required to undertake a successful home program. Whether enhancing such understanding, results in increased patient compliance with these exercises at home, will be presented in a subsequent paper resulting from the RCT. Regardless, this pilot project has highlighted the value patients place on therapist's efforts to develop appropriate medium to enhance communication with them. Given the poor health outcomes generally associated with patients from rural and remote areas, this endeavour contributes to the ongoing effort to improve service delivery to better address the health needs of rural and remote patients.

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REVIEW

A critical review of the evidence on the use of videotapes or DVD to promote patient compliance with home programmes

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Accepted January 2010

Abstract

Purpose. The purpose of this paper is to critically review published research in order to evaluate the evidence surrounding the provision of video or DVD technology to promote patient compliance with home exercise or health programmes.

Method. A literature search of the MEDLINE, CINAHL and Cochrane databases was undertaken. Critical appraisal of selected studies was undertaken using a previously validated tool. Inclusion criteria were: research related to DVD or videotape technology to improve compliance; published in peer-reviewed journals and full-text English language articles. Compliance was the main outcome measure.

Results. Eleven eligible studies were reviewed. All but one, which used a before–after design, were randomised controlled trials. Study quality tended medium to high in the critical appraisal scoring system, but an overall low quality on the Jadad score for randomisation; with only one study from 11 scoring well on both these measures. Research into the use of video or DVD showed mainly positive effects on compliance; however, methodological issues limit clinical applicability.

Conclusions. Future well-designed randomised controlled trials with adequate sample sizes and reliable outcome measures will provide clearer evidence into the effectiveness of this technology in improving home exercise or health programme compliance, particularly for rural and remote populations.

Keywords: *DVD or videotape, patient compliance, exercise programmes*

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RESEARCH PAPER

The functional impact of a traumatic hand injury on people who live in rural and remote locations

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Accepted June 2009

Abstract

Purpose. This study aimed to gain an understanding of the functional impact of a traumatic hand injury on a rural and remote Australian population.

Method. A retrospective, exploratory design was used. Patients who had experienced a traumatic hand injury were samples and were treated at the occupational therapy department at a major regional Australian hospital between January 2003 and February 2007 ($n = 198$). A mail-out survey was utilized, with 65 respondents included in the study. Questions focused on the impact on specific areas of occupational performance and on compliance to home exercises. The upper extremity functional index was also incorporated in the survey.

Results. The results revealed that almost 90% of survey respondents had residual difficulties as a result of the traumatic hand injury. The overall impact these difficulties have on 'day-to-day' life was moderate to extreme for over half of the respondents. In the areas of occupational performance, the most affected were work and leisure with less impact reported in self-care and rest. Comments were at times contrary with closed question data, with many respondents expressing relative satisfaction with their outcome despite highlighting the functional difficulties.

Conclusion. A significant impact on occupational performance has been highlighted, which reflects common issues within this rural and remote population. Confirmation of the extent of these identified issues within the larger rural and remote Australian population will contribute to the formulation of policy and consequent improvements in health for this traditionally underserved population.

Keywords: *Hand injury, rurality, Australia*

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Name: _____

TRAUMATIC HAND INJURY SURVEY

This survey asks questions about your hand injury and how having a hand injury has affected your life.

1. What type of hand injury did you have? (Please tick **one or more** boxes below).
   - ☐ Fracture to bones of the hand or wrist
   - ☐ Crush injury involving both bones, tendons, arteries and nerve of the hand.
   - ☐ Nerve injury
   - ☐ Tendon injury
   - ☐ Amputation of part of the hand
   - ☐ Burns to hand

2. Which hand was injured? (Please tick **one** box below).
   - ☐ Right
   - ☐ Left
   - ☐ Both

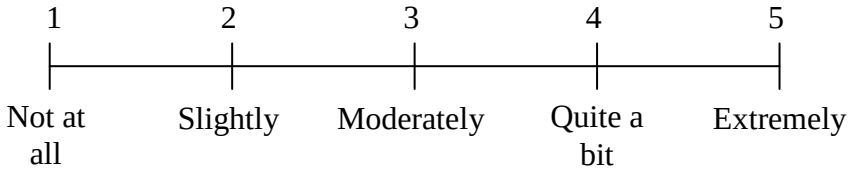
3. Before your injury were you right or left handed? (Please tick **one** box below)
   - ☐ Right
   - ☐ Left
   - ☐ I could use both right and left hands with the same degree of skill.

4. How long ago did your injury happen? (Please tick **one** box below)
   - ☐ Less than 1 year ago
   - ☐ 1 to 2 years ago.
   - ☐ 2 to 3 years ago.
   - ☐ 3 to 4 years ago.
   - ☐ More than 4 years.

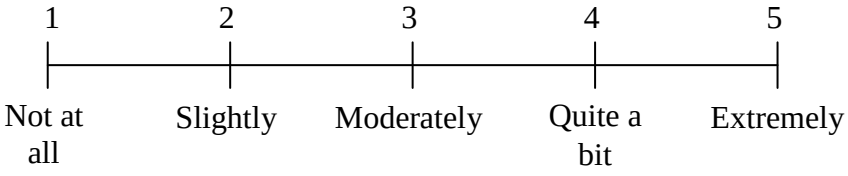
5. What difficulties do you still have as a result of your hand injury? (Please tick **one or more** boxes below).

   - ☐ Pain
   - ☐ Stiffness
   - ☐ Swelling
   - ☐ Increased sensitivity
   - ☐ Loss of sensation
   - ☐ Loss of movement in injured hand
   - ☐ Loss of strength in injured hand
   - ☐ I have no after effects of the injury.

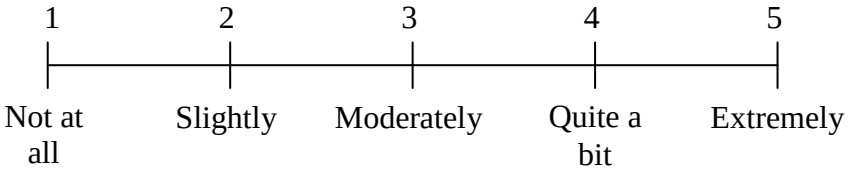
6. On a daily basis, how much do these difficulties affect your day to day activities? (Please circle the number that best describes your response).



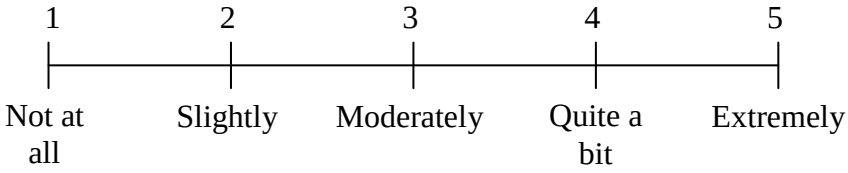
7. How much has having a hand injury interfered with your daily self care activities (bathing, dressing, grooming, and eating)? (Please **circle the number** that best describes your response).



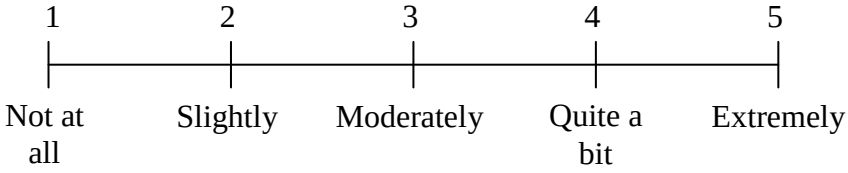
8. How much has having a hand injury interfered with your work (paid or unpaid)? (Please **circle the number** that best describes your response).



9. How much has having a hand injury interfered with your leisure activities? (Please **circle the number** that best describes your response).



10. How much has having a hand injury interfered with your rest and sleep? (Please **circle the number** that best describes your response).



11. We are interested in knowing whether you are having any difficulty at all with the activities listed below because of your hand or upper limb problem. Unless stated, it doesn't matter which hand or arm you use to perform the activity, please answer based on your ability regardless of how you perform the task. Today, do you or would you have any difficulty at all with: (Please tick **one** box for each activity.)

Activities	**Extreme difficulty or Unable to perform activity**	**Quite a bit of difficulty**	**Moderate difficulty**	**A little bit of difficulty**	**No difficulty**
Any of your usual work, household or school activities					
Your usual hobbies, recreational or sporting activities					
Lifting a bag of groceries to waist level					
Lifting a bag of groceries above your head					
Grooming your hair					
Pushing up on your hands (eg from bathtub or chair)					
Preparing food (eg peeling or cutting)					
Driving					
Vacuuming, sweeping or raking					
Dressing					
Doing up buttons					
Using tools or appliances					
Opening doors					
Cleaning					
Tying or lacing shoes					
Sleeping					
Laundering clothes (eg washing, ironing, folding)					
Opening a jar					
Throwing a ball					
Carrying a small suitcase with your affected limb.					
Sexual activities					

12. To what extent do you agree or disagree with the following statements? (Please tick **one** box for each statement)

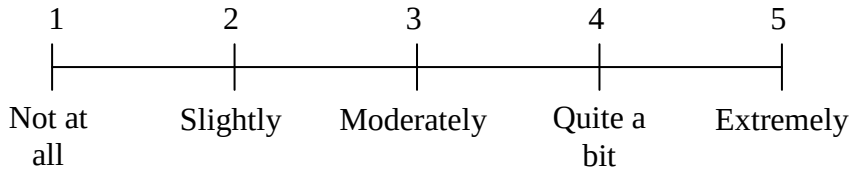
	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
It takes a lot longer for me to do things since I had a hand injury.					
There are things I would like to do but can't because of my hand injury.					
My social life is the same as it was before my hand injury.					
My family life has suffered because of my hand injury.					
Overall I am less satisfied with my life since my hand injury.					

The following questions ask about the rehabilitation you received following your hand injury.

13. Did you see the hand therapist enough after your injury?

☐ Yes
☐ No
☐ Not sure

14. How useful was the home exercise program to your recovery from your injury? (Please mark your response on the line below)



15. To what extent do you agree or disagree with the following statements. (Please tick **one** box for each statement)

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
After seeing the hand therapist I understood exactly what I needed to do to help my recovery from my hand injury.					
I never had enough time to do my exercises.					
The exercises hurt too much to do					
I understood why I had to do the exercises.					

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
I found it hard to remember the exercises I was supposed to be doing.					
It was too difficult to get to follow up appointments.					
It was expensive getting to appointments.					
I would have liked more follow up appointments					

The following questions ask about some aspects of your life.

16. What was your main occupation before you injured your hand?

_____

17. What is your main occupation today?

_____

18. What is your highest level of education? (Please tick **one** box below).

☐ Primary School
☐ High School
☐ Teritary Education

Other comments?

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

THANK YOU FOR YOUR TIME IN COMPLETING THIS SURVEY. PLEASE RETURN THIS SURVEY AND THE SIGNED CONSENT FORM IN THE REPLY PAID ENVELOPE PROVIDED.

Gail Kingston
PhD candidate
School of Public Health, Tropical Medicine
and Rehabilitation Sciences
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Dear Colleague,

This survey is part of a PhD study which seeks to develop service delivery options for public health occupational therapists and physiotherapists working with people who live in rural and remote locations who have had a traumatic hand injury. The survey specifically seeks to explore the differences and commonalities in service provision and how occupational therapists and physiotherapists in public health facilities across Australia have adapted or changed their practice to meet the needs of rural and remote residents.

It is anticipated it should not take longer than 20 minutes to complete. Ethical approval has been granted by both James Cook University and The Townsville Health Service District Health and Research Ethics Committees. Please do not hesitate to contact me regarding any concerns and questions. Participation in the survey is voluntary and you are free to withdraw at any time. Once completed, please save as a separate document and attach to a reply email.

Many thanks,

Gail Kingston

Occupational Therapist, The Townsville Hospital
PhD Candidate, James Cook University

Provision of hand therapy services to rural and remote residents

Profession

1. **Please tick your profession**

    □ Occupational Therapy
    □ Physiotherapy

Facility questions

2. **What type of facility do you work in**
    □ Metropolitan tertiary referral facility.
    □ Metropolitan district facility
    □ Regional tertiary referral facility
    □ Regional hospital
    □ Rural/remote facility

3. **What number (FTE equivalent) of OT's (or PT's) provide services to patients with a hand injury?**

    _____

Nature of Caseload

4. **On average, how many patients with a traumatic hand injury would you see per month?**

5. **What are the most common traumatic injuries you treat?**

    □ Tendon injuries □ Fracture □ Crush/multiple trauma
    □ Amputation □ Nerve injuries □burns
    □ Other (please specify):_____

6. **What percentage of your hand injury caseload reside in rural and remote areas?**

   □ Less than 10% □ between 10-30% □ between 30-50%

   □ Between 50-70% □ between 70-90% □ greater than 90%

Nature of Service provided

7. **What is the usual process regarding surgery and surgical review at your facility for a person with a traumatic hand injury from a rural and remote area?**

   □ Initial surgery undertaken and then regular follow appointments scheduled at the same facility

   □ Initial surgery undertaken and then patient discharged to client's local facility for ongoing surgical/medical review

   □ No surgery. Patient referred for medical/surgical review and follow up

   □ No medical or surgical follow up/ review provided

   □ Other (please specify the process)

8. **What is the usual process followed by your facility in terms of provision of hand therapy for a person with a traumatic hand injury who resides in a rural and remote location?**

   □ Patient initially seen as an inpatient following surgery and then as an outpatient for ongoing therapy.

   □ Seen as inpatient following surgery then referred to local service

   □ Referred from metropolitan or regional facility and seen as outpatient

   □ Other (please specify the process)

9. What services do you provide to the majority of people with a traumatic hand injury from a rural and remote location (Please tick all that apply)

- ☐ Initial splinting
- ☐ Initial exercise prescription
- ☐ Continuation of prescribed exercises and protocols
- ☐ Modification/adaptation of splints
- ☐ Scar management
- ☐ Oedema management
- ☐ Other (please specify)

10. On average, how regularly did you see your last ten patients with a traumatic hand injury from a rural and remote area?

- ☐ One off appointment (either inpatient or outpatient)
- ☐ Daily
- ☐ Weekly
- ☐ Twice weekly
- ☐ Monthly
- ☐ Other (please specify)

Are Workcover funded patients included in this number?

11. **Do you utilise any of the following technologies to assist with providing exercise programs and therapy to residents of rural and remote areas?**

- ☐ Videoconferencing/telehealth
- ☐ Internet
- ☐ Email
- ☐ Telephone
- ☐ Fax
- ☐ DVD/video of exercise program
- ☐ Other (please specify)

Support for Occupational Therapists and Physiotherapists who work in a rural and remote location

12. **Rural and remote clinicians only: Please give examples of the support you do, or would like to, receive from metropolitan or regional clinicians when they refer a patient with a hand injury from their facility:**
    Response:

13. **Metropolitan and regional clinicians only: Please outline the initial and ongoing support you provide when referring a patient with a hand injury to clinicians based in a rural and remote location.**
    Response:

Perception of service to rural and remote residents who have sustained a traumatic hand injury

14. **What do you think are the major barriers/gaps providing a service to rural and remote patients?**

- Transport to outpatient service
- Distance and travelling time to follow up facility
- Lack of follow up once discharged
- Patient compliance with home exercise program
- Lack of expert knowledge in hand injuries in local area

- Poor communication between facilities post discharge
- Poor understanding/ comprehension of therapy programs by patient
- Poor understanding/comprehension of therapy program and protocols by local therapist
- Poor understanding of rural and remote issues by metropolitan based therapist
- Patient compliance with precautions against re-injury once discharged
- Lack of staffing and time
- Greater importance placed on returning to work duties or home duties rather than exercise protocols and rehab programme

15. Please provide examples (where relevant) where you have adapted or changed your usual service for rural and remote residents with a traumatic hand injury to address the issues highlighted above

Response:

16. What changes do you think are needed to improve services to rural and remote clients with a traumatic hand injury

Response:

Matrix of Question Options: Qualitative Interviews.

TYPE	PAST	PRESENT	FUTURE
BEHAVIOUR/ EXPERIENCE	How did your hand injury occur? What was your experience of getting treatment for your injury? What was your experience of the rehabilitation program?	Describe some of the difficulties you experience today because of your hand injury. What activities do you no longer do because of your hand injury?	
OPINION/ VALUE	Do you think there are any ways that you could have improved your recovery from your hand injury? In what ways did the rehabilitation program help in your recovery? What ways could the rehabilitation program have been better for you?	How has injuring your hand affected your work life? How has injuring your hand affected your home life? How has injuring your hand affected your social life?	When Queensland health designs future services what changes would you like to see?
FEELING	How did you feel about the amount of information you were given by the rehabilitation team?	How does having a hand injury make you feel about your day to day life?	How do you feel that having a hand injury has affected your future?