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REVIEW ARTICLE

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Animal-assisted interventions in adult hospital rehabilitation settings: A scoping review

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Abstract

Animal-assisted interventions (AAIs) have the potential to enhance people's well-being and function and are increasingly being implemented across a range of settings. This scoping review explored how AAIs have been used in adult hospital rehabilitative care. Using JBI and PRISMA-ScR guidelines, a systematic search of four databases was undertaken. Inclusion criteria involved adults, aged >18 years, who had received AAIs in the hospital rehabilitation setting. Twenty-two articles met the inclusion criteria. Results identified two intervention types: visitation activities ($n = 8$ studies) and structured therapeutic interventions ($n = 14$ studies). Dogs were the most common animal species. Improvements in social and emotional well-being were reported across both types of interventions, with improvements in ambulation, motor skills, and verbal communication reported by those engaged in structured therapeutic interventions. Implementation challenges included a dependency on volunteer dog-handlers; the need for better recording of interventions in medical records to enable evaluation; and cost, safety, infection control, and animal welfare considerations. Strengthening the planning of AAIs is fundamental for the realization of potential outcomes from human–animal interactions in hospital rehabilitative care.

KEYWORDS
animal assisted activity, animal assisted intervention, animal assisted therapy, hospital rehabilitation, pet therapy

Key points

- Used with therapeutic intent, animal-assisted interventions have the potential to benefit individuals and the wider health system.
- In the hospital rehabilitation setting, a planned approach to the implementation of animal-assisted interventions is necessary to maximize the effectiveness and efficiency of the intervention and enhance the well-being of both humans and animals.
- Future research on animal-assisted interventions in hospital rehabilitative care is indicated, including the development of rigorous evaluation approaches and further exploration of the benefits, facilitators, and barriers to implementation.

1 | INTRODUCTION

Animal-assisted interventions (AAIs) as complementary, non-pharmacological therapies are increasingly being employed across healthcare settings including in hospitals (Coakley et al., 2021). Hospitalization requires people to be separated from their usual environment and may inhibit access to social supports, including family, friends, and pets, leading to loneliness and mental health impacts (Coakley & Mahoney, 2009). In adult hospital rehabilitative care this separation may be for extended time periods, heightening the need for an environment that supports social and emotional well-being (Burres et al., 2016). AAIs utilize human–animal teams to implement a range of therapeutic, goal-oriented, and purposeful interventions (International Association of Human-Animal Interaction Organizations [IAHAIO], 2014). As an adjunct to regular care, human–animal interactions in the hospital setting have the potential for biological, psychological, and social benefits, although there is currently limited understanding of AAI use in hospital rehabilitative care (Gee et al., 2021; Lundqvist et al., 2017; Munoz Lasa et al., 2015). To inform this emerging field of practice, a scoping review was undertaken to explore how AAIs have been used in the adult hospital rehabilitation setting.

2 | BACKGROUND

Interest in the use of AAIs to improve human health and well-being has grown over the past decade, with new terminologies and guidelines being developed. Relevant to health settings, two main IAHAIO intervention classifications are animal-assisted therapy (AAT) and animal-assisted activity (AAA). AATs involve goal-oriented, structured, and therapeutic interventions that are planned and delivered by health professionals within their scope of practice. The goal of AAT is to enhance human functioning, including physical, cognitive, behavioral, and social capacity. AAAs, while still planned and goal-oriented, are less formal; these activities are often described as a "meet and greet" animal visitation activities and are commonly conducted for motivational, educational, or recreational purposes. AAAs may be described as AATs if the human–animal team involved in the activity are formally working with a health professional as part of a documented, goal-oriented plan for care (IAHAIO, 2014). Being a newer field of practice, there is some lack of clarity in the current definitions of AAA and AAT (Lundqvist et al., 2017). However, Lundqvist et al. (2017) identify differences in the intervention purpose; specifically, AAA focuses on well-being, while AAT emphasizes health improvement.

Rehabilitative care aims to promote functional capacity to improve an individual's independence in carrying out their activities of daily living. In the hospital rehabilitation setting, care delivery involves a range of health professionals including physiotherapists, occupational therapists, speech therapists, exercise physiologists, and medical and nursing staff (Australian Institute of Health and Welfare, 2018). Therapy focusses on key areas of function including self-care, transfers, locomotion, communication, and social cognition (Ravaud et al., 1999). As an adjunct to regular care, AAIs have been shown to contribute to early and frequent ambulation of hospitalized people (Abate et al., 2011), enhance communication skills (Decina et al., 2022), reduce pain (Harper et al., 2015), and promote social connectivity and psychological well-being (Lundqvist et al., 2017). For the health system, these benefits may influence care outcomes and there is the potential for reduced length of hospital stays and a decreased cost of care (Abate et al., 2011).

A detailed understanding of how AAIs have been implemented in hospital rehabilitative care is needed to develop this promising therapeutic approach. However, existing reviews on AAIs in hospital settings have focussed on healthcare workers (Caton et al., 2021; Maran et al., 2022); high-acuity or psychiatric hospital care (Cooley & Barker, 2018; Malik, 2021; Snipelisky & Burton, 2014); pain (Stensland & McGeary, 2022); oncology and palliative care (Diniz Pinto et al., 2021; Holder et al., 2020); and pediatric populations (Cotoc et al., 2019; Feng et al., 2021; Zhang et al., 2021). A recent systematic review explored dog-assisted interventions (DAIs) in healthcare settings (Lundqvist et al., 2017) and identified one study involving hospital rehabilitative care. This study reported a positive effect on patient pain level and satisfaction with hospital stay and identified the need for additional research in this setting (Harper et al., 2015). Thus, the aim of this scoping review was to explore how AAIs have been used in the adult hospital rehabilitation setting.

3 | METHODS

A scoping review was conducted using the Joanna Briggs Institute (JBI) methodology for scoping reviews (Peters et al., 2020); with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) used to guide the reporting (Tricco et al., 2018). A scoping review is useful to map the available evidence when the field of interest is emerging (Peters et al., 2020). With AAIs being a developing field of therapeutic practice, a scoping review was deemed to be the preferred method for investigating the extent of evidence in relation to AAIs in the adult hospital rehabilitation setting.

In advance of this review, a protocol was developed that specified the review objectives, criteria for inclusion, and analytical approach (see Appendix S1). As part of this process, the primary review question and four sub-questions were identified (see Table 1). The protocol was not registered in a publicly accessible database as PROSPERO does not accept scoping review protocols for registration.

3.1 | Inclusion criteria

Participants in studies eligible for inclusion were adults, aged >18 years who had received inpatient hospital rehabilitative care. Settings that were not focused on hospital rehabilitative care were

TABLE 1 Research questions used to guide review.

Primary review question	
How have AAIs been used in adult hospital rehabilitation settings?	
Sub-question 1	What types of AAIs have been used in adult hospital rehabilitation settings?
Sub-question 2	What are the health conditions/diagnoses of adults who have received AAIs?
Sub-question 3	What outcomes have been reported following AAI implementation?
Sub-question 4	What factors have influenced the implementation of AAIs?

excluded. These included, but were not limited to, short-stay or emergency department care; high-dependency care, including intensive care; acute mental health; and long-term residential care facilities. In addition, interventions involving animal-like robots or toys were excluded from this review.

3.2 | Types of sources

Articles from peer-reviewed publications that described quantitative, qualitative, or mixed methods studies were included in this review. Case study designs that had been reported using a systematic framework were included, while commentary and opinion pieces were excluded.

The inclusion of gray literature was considered for this exploration of AAIs in hospital rehabilitative care. Early inquiry indicated that gray literature in this field largely consisted of reports on anecdotal experiences of animal visitations to the hospital setting; and lacked a systematic research approach. JBI methodology guidelines assert that researchers may limit their investigations to source types that are useful to the topic (Peters et al., 2020). Thus, the decision was made to not include gray literature as the purpose of this review was to provide evidence-based insights that might potentially inform future practice.

3.3 | Search strategy

Searches were initially undertaken in May 2022 and repeated for timeliness in August 2023. Guided by Cochrane, the repeated search is reported using an integrated approach (Cochrane Handbook for Systematic Reviews of Interventions, 2023). Searches had no date or language restrictions and involved CINHAL, Medline (OVID), Psych Info, and Scopus databases. Search terms used for each database are displayed in Table 2. Duplicates were removed and each of the article abstracts was assessed for inclusion by two or more independent reviewers. The reference lists of review studies were screened for additional studies. Potentially relevant studies were retrieved in full and assessed against the inclusion criteria by two independent reviewers. For potentially relevant studies not published in the English language, an English language version was sourced where possible; if no version was attainable then the study was excluded. *EndNote 20, 2022* (*Clarivate Analytics, PA, USA*) was used for record management. Figure 1 describes the selection process.

TABLE 2 Databases and search terms.

Database	Search terms
CINHAL	(MH "Pet Therapy") OR (MH "Therapy Animals") OR "animal assisted therapies" or "animal assisted therapy" or "animal facilitated therapies" or "animal facilitated therapy" or "facilitated therapy, animal" or "pet assisted therapy" or "pet facilitated therapies" or "pet facilitated therapy" or "pet therapies" or "pet therapy" or "pet-assisted therapies" or "therapy, animal assisted" or "therapy, animal facilitated" or "therapy, pet" or "therapy, pet facilitated" or "therapy, pet-assisted" or "animal assisted intervention" or "therapy animals" AND (MH "Hospitals+") OR (MH "Nursing Units") OR (MH "Hospital Units") OR (MH "Rehabilitation Centers") OR hospital* or ward* or inpatient*
Medline (OVID)	Animal Assisted Therapy/ OR Therapy Animals/ OR (animal assisted therapies or animal assisted therapy or animal facilitated therapies or animal facilitated therapy or facilitated therapy, animal or pet assisted therapy or pet facilitated therapies or pet facilitated therapy or pet therapies or pet therapy or pet-assisted therapies or therapy, animal assisted or therapy, animal facilitated or therapy, pet or therapy, pet facilitated or therapy, pet-assisted or animal assisted intervention or therapy animals).mp. AND exp Hospitals/ OR Hospital Units/ OR hospital*.mp. or ward.mp. or inpatient*.mp.
Psych Info	(MAINSUBJECT.EXACT("Animal Assisted Therapy") OR MAINSUBJECT.EXACT("Service Animals") OR "animal assisted therapies" OR "animal assisted therapy" OR "animal facilitated therapies" OR "animal facilitated therapy" OR "facilitated therapy, animal" OR "pet assisted therapy" OR "pet facilitated therapies" OR "pet facilitated therapy" OR "pet therapies" OR "pet therapy" OR "pet-assisted therapies" OR "therapy, animal assisted" OR "therapy, animal facilitated" OR "therapy, pet" OR "therapy, pet facilitated" OR "therapy, pet-assisted" OR "animal assisted intervention" OR "therapy animals" OR "animal assisted intervention*") AND (MAINSUBJECT.EXACT ("Hospitals") OR hospital* OR ward* OR inpatient* OR "acute care")
Scopus	(animal* OR pet) PRE/1 (therap* OR intervention*) AND hospital* OR ward* OR inpatient* OR "acute care"

3.4 | Data extraction, analysis, and results compilation

Data was extracted from full-text sources using a charting table constructed in advance by the reviewer team and guided by the review questions (see Table 1). One reviewer completed the initial data

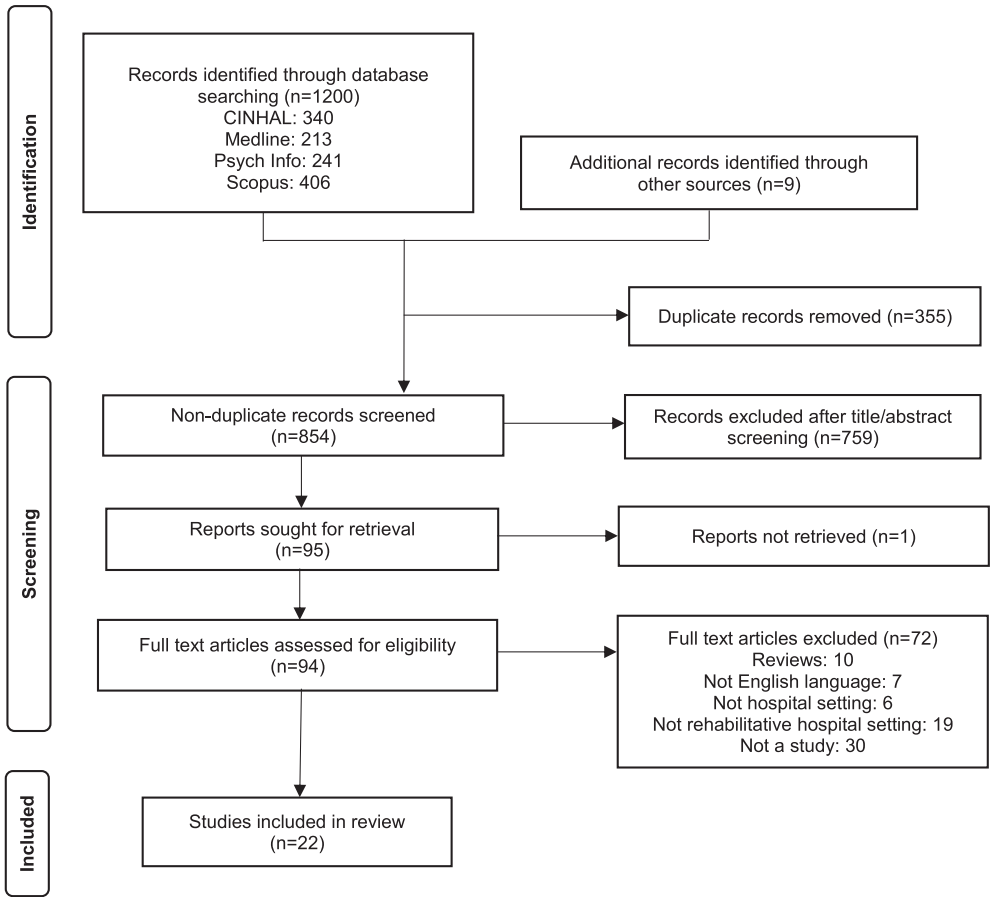

FIGURE 1 PRISMA-ScR flow diagram illustrating the process for study inclusion.

extraction, which was independently reviewed in its entirety by at least one other reviewer. Data extracted included country; study aim and design; participant characteristics; activities descriptions and outcome measures; reported findings; and barriers and facilitators to implementation. Qualitative content analysis (Peters et al., 2020) was undertaken by all members of the reviewer team to compile the results, which are presented using a display (see Tables 3 and 4) and narrative approach.

4 | RESULTS

4.1 | General characteristics of included studies

There were 22 studies identified for inclusion in this review. Studies were published between 2007 and 2022 and undertaken in rehabilitation ($n = 12$), medical/surgical ($n = 7$), and general hospital ($n = 2$) wards; and in a neurorehabilitation clinic ($n = 1$). Eight studies involved animal visitation activities (AAAs) and 14 studies involved structured therapeutic interventions (AATs).

There was inconsistency in the use of AAA and AAT terminology. When compared to the IAHAIO definitions (IAHAIO, 2014), the authors of five of the eight studies classified as AAA in this review reported their activities as AAT or pet therapy (Coakley et al., 2021; Coakley & Mahoney, 2009; Harper et al., 2015; Havey et al., 2014; Phung et al., 2017). These studies involved dog visitation activities to promote well-being and did not form part of a structured, goal-oriented plan to improve functional capacity. Conversely, all studies meeting the IAHAIO definition of AAT were classified by the study authors as AAT.

Characteristics of the AAA and AAT studies are described in Tables 3 and 4. Of the eight articles that described AAAs, seven reported findings from the United States and one from Sweden. Of the 14 articles that discussed AATs, eight were from the United States, two each were from Canada and the Czech Republic, and one each was from Switzerland and Korea. The most common designs were quasi-experimental ($n = 9$), and randomized control trials ($n = 4$).

4.2 | Health conditions of adults receiving AAIs in hospital rehabilitation care

Most AAA participants were engaged in hospital rehabilitation for medical and surgical conditions, including post-joint replacement, fractures, and surgical oncology. Participants who received the more structured AAT interventions typically had experienced stroke, spinal cord injury, brain injury, heart failure, burns, or were diagnosed with mild dementia (see Tables 3 and 4).

TABLE 3 Characteristics, activities, and outcomes of AAA studies.

Author (year) Country	Intervention	Study aim/rationale	Study design	Participants N; Gender[a]; mean age (years) Patient population	Activity/ duration/team	Outcome
Coakley et al. (2021) USA	Dog visitation	Explore the effect of single-dog visits on patient anxiety, comfort, and well-being.	Quasi-experimental, pre/post-test, single group	59; F = 22, M = 27; 55.7 Surgical, surgical oncology	Pet dog, talk with dog, and handler. 1 session × 15 min. Multiple volunteer dog-handler teams.	Decreased anxiety levels, heart and respiratory rate. Improvement in comfort and well-being.
Coakley and Mahoney (2009) USA	Dog visitation	Explore the effect of pet therapy on patient physiology, pain, energy, and mood.	Quasi-experimental, pre/post-test, single group, with mixed methods	59; F = 24, M = 29[b]; 59.6 Medical, surgical	Pet dog, talk with dog, and handler. 1 session × 10 min. Multiple volunteer dog-handler teams.	Decreased stress, pain, and fatigue; improved mood.
Falk and Wijk (2008) Sweden	Animal visitation (bird)	Describe spontaneous interaction between caged birds and older people in the hospital ward.	Observational	35; F = 21, M = 14; 78 Rehabilitation	Birdcage in ward lounge. Spontaneous patient–bird interactions.	Positive effect on activity, attention, interaction, and socialization.
Harper et al. (2015) USA	Dog visitation	Evaluate the role of therapy dog visits in patient recovery.	Randomized control trial	Intervention: 36; F = 20, M = 16; 67 Control: 36; F = 22, M = 14; 66 Post joint replacement	Pet dog, talk with dog and handler. 3 sessions × 15 min. Orthopedic surgical resident and therapy dog.	Decreased pain. Increased satisfaction with hospital stay.
Havey et al. (2014) USA	Dog visitation	Explore the effect of dog visits on patient pain medication usage.	Retrospective, matched cohort	Intervention: 46; Comparative: 46; F = 76, M = 16; 66 Post joint replacement	Pet dog, talk with dog, and handler. 1–7 sessions × 5–15 min. Multiple volunteer dog-handler teams.	Decreased oral pain medication use.
Kowalski et al. (2021) USA	Dog visitation	Determine if dog visit reduces anxiety for hospitalized older adults.	Quasi-experimental, pre/post-test, multicenter	141; F = 71, M = 69[b]; >75 Medical, surgical, including orthopedic and cardiac	Pet dog, talk with dog, and handler. 1 session × 15 min. Multiple volunteer dog-handler teams.	Decreased anxiety.
Phung et al. (2017) USA	Dog visitation	Explore effect of dog visits on patient pain, anxiety, and fatigue.	Quasi-experimental, pre/post-test, single group	123;[b] Medical, surgical	Pet dog, talk with dog, and handler. 1 session × 10–15 min. Two volunteer dog-handler teams.	Decreased pain, anxiety, and fatigue.
Smith et al. (2020) USA	Dog visitation	Explore the effect of dog visits on the anxiety of older-aged patients.	Quasi-experimental, pre/post-test, single group	60; F = 34, M = 26; 79 Medical, surgical, medical oncology	Pet dog, talk with dog, and handler. 1 session × 12–20 min. Multiple volunteer dog handler teams.	Decreased anxiety.

[a]F, Female; M, Male.
[b]Missing data not shown.

4.3 | Types of AAIs used in adult hospital rehabilitation settings

4.3.1 | Animal-assisted activities

AAAs in hospital rehabilitative care predominantly involved dogs. Seven studies involved volunteer dog-handler teams, visiting people at the beside for between 5 and 20 min, with the activity focussed on patient well-being (Coakley et al., 2021; Coakley & Mahoney, 2009; Harper et al., 2015; Havey et al., 2014; Kowalski et al., 2021; Phung et al., 2017; Smith et al., 2020). During these visits, patients talked with the dog and handler; petted/stroked the dog; and talked about their own pets. Hospital staff supervised the activities but were not directly involved in the patient–dog interaction or required to

TABLE 4 Characteristics, activities, and outcomes of AAT studies.

Author (year) Country	Intervention	Study aim (population)	Study design	Participants N; Gender[a]; Mean age (years) Patient population	Therapy/duration/team	Outcome
Abate et al. (2011) USA	Walk with dog	Determine the impact of dog-assisted ambulation to encourage patient ambulation.	Experimental, historical comparative group	Intervention: 64; F = 31, M = 33; 69.5 Comparative: 64; F = 33, M = 31; 72.2 Heart failure	Walk with the therapy dog, controlled by the handler. 1 session/day × 9 days. 1 dog-handler team, nursing assistant, and physical therapy aid.	Reduced ambulation refusal rate. Increased length of ambulation.
Baek et al. (2020) Korea	Walk, pet, talk, engage in activities with dog	Investigate the effects of dog-assisted therapy on older patients cognitive function, emotional status, problematic behaviors, and activities of daily living.	Quasi-experimental, pre/post-test, with non-equivalent comparative group	Intervention: 14; F = 4, M = 10; 82.3 Comparative: 14; F = 2, M = 12; 82.1 Moderate dementia	Initial session: build a relationship with the dog. Middle sessions: interact with dog—groom, walk, and talk with dog. Final session: farewell to dog. 2 sessions/week × 8 weeks × 60 min. Multiple dog-handler teams, investigators, psychologists, social workers, administrators, and research assistants.	Improved cognitive function, emotional state, and activities of daily living.
Bode et al. (2007) USA	Walk with dog	Evaluate the effect of dog-assisted therapy on patient ambulation.	Quasi-experimental, single group	22; F = 9, M = 13; 52.5 Post-stroke	Walk with and without a therapy dog. Double lead: handler and patient. 2 sessions × 30 min. Multiple volunteer dog-handler teams. Therapist.	Improved walk distance, time, and speed with dog. All participants, both patients and volunteers, reported satisfaction with AAT and would participate again.
Burres et al. (2016) USA	Walk, talk, engage in activities with the dog	Describe the use of dog-assisted therapy in acute inpatient rehabilitation setting.	Case study	1; F = 1; 85 Aphasia post stroke	Activities to meet set therapy goals e.g., walk with dog on a leash, play catch, give dog commands. 2–3 sessions/week Therapy dog, therapists: speech pathologist, physio, or occupational therapist.	Pre-established rehabilitation therapy goals are reached faster by incorporating dogs in therapy sessions.
Denzer-Weiler and Hreha (2018) USA	Walk, pet engage in activities with the dog	Describe the use of dog-assisted therapy in combination with physical therapy in inpatient rehabilitation.	Case study	1; F = 1; 34 Post spinal surgery	Walk with dog; negotiate stairs and obstacles to reach dog; and pet and groom dog. 8 sessions over 18 days × 90 min. Therapist and their trained therapy dog.	Improved progress toward therapy goals where progress had been stalled. Improved walking distance, sitting tolerance, and functional independence score.
Hediger, Thommen, et al. (2019) Switzerland	Engage in activities of daily living with a range of animal types	Investigate the effects of animal-assisted therapy on social competence in neurorehabilitation.	Randomized controlled trial	19; F = 6, M = 13; 50.8 Acquired brain injury	Therapists and patients chose animals for each session. AAT with horse, donkey, sheep, goat, cat, chicken, rabbit, or guinea pig. Examples: cut vegetables to feed guinea pigs, build and walk course with minipig, clean rabbit cage, walk with sheep, read questions about animal, and fill in answers with the animal present. 2 sessions/week × 6 weeks × 30 min.	Increased verbal and non-verbal communication, positive emotions, motivation, and satisfaction.

TABLE 4 (Continued)

Author (year) Country	Intervention	Study aim (population)	Study design	Participants N; Gender[a]; Mean age (years) Patient population	Therapy/duration/team	Outcome
					Variety of animals, multiple therapists: speech pathologist, physio, or occupational therapist, AAT specialist.	
LaFrance et al. (2007) Canada	Walk, talk with dog	Explores the effects of a therapy dog on the communication skills of a patient with aphasia receiving intensive speech and language therapy.	Case study	1; M = 1; 61 Post-stroke	Walk back to the ward without dog or handler, with dog and/or handler 11 sessions × 3–5 min. Speech pathologist and their trained therapy dog.	Improvement in verbal and non-verbal communication when the dog is in attendance for walk.
Machova, Prochazkova, Riha, and Svobodova (2019) Czech Republic	Walk, pet, talk, engage in activities with dog	Determine if supplementing standard therapy with dog-assisted therapy was beneficial to patients.	Quasi-experimental, pre/post-test, comparative group	Intervention: 6; F = 4, M = 2; 66.7 Comparative: 9; F = 6, M = 3; 65 Post-stroke	Dog involved in memory, speech, and fine and gross motor skill exercises. 2 sessions/week × 6 weeks × 20 min. Single dog-handler team, therapist; consulted with a physician, physio, or occupational therapist.	Improvement in activities of daily living in the intervention group. Improvement in mood in both intervention and control groups.
Machova, Prochazkova, Eretova, et al. (2019) Czech Republic	Walk, talk, engage in activities with the dog	Determine the effect of dog-assisted therapy on patients in long-term hospital care.	Quasi-experimental, pre/post-test, comparative group	Intervention: 33; F = 25, M = 8; 84.5 Comparative: 39; F = 28, M = 11; 87 Post-stroke, mild dementia, mild cognitive disease, cancer.	Outdoor walk with the dog, play fetch with the dog, and short obedience exercises with the dog. 1 session/week x 12 weeks × 20 min. Single dog-hander team, therapist; consulted with a physician, physio, or occupational therapist, or nurse.	Improvement in mood in the intervention group. No statistically significant variance between the intervention and control group for heart rate, blood pressure, or activities of daily living.
Markovich (2011) USA	Walk, pet, talk with dog	Evaluate the impact of dog-assisted therapy on patients' mental health and functional therapy goals.	Multi-methods, qualitative survey analysis, comparative activity measurement log	Survey: 42; F = 24, M = 18; 68.9 Log: 41; F = 18, M = 23; 67.1 Post-stroke, brain or spinal cord injury, multiple sclerosis, post-surgical.	Walk with the dog on leash, attach leash, brush, pat, talk with the dog, and give verbal commands. 4 sessions/week: 2 with dog, 2 without dog. Multiple volunteer dog-handler teams. Recreation or occupational therapist.	Improved progress toward therapy goals. Improved standing tolerance and walking distance in AAT sessions. Reported AAT enjoyable and assisted with therapy goals.
Pruskowski et al. (2020) USA	Walk, pet, engage in activities with the dog	Describe implementation and satisfaction with dog assisted therapy program in a Burns Center.	Post-intervention study	14;[b] Burns	Walk, brush, pet, feed, throw toy, or dress dog. Sessions varied depending on patient needs. Multiple volunteer dog-handler teams. Occupational or physical therapist; and/or therapy assistant.	Decreased pain and anxiety after AAT. Demonstrated feasibility, acceptability, and patient and staff satisfaction with AAT.

(Continues)

TABLE 4 (Continued)

Author (year) Country	Intervention	Study aim (population)	Study design	Participants N; Gender[a]; Mean age (years) Patient population	Therapy/duration/team	Outcome
Rondeau et al. (2010) Canada	Walk and mobilize with dog	Document the effectiveness of rehabilitation dogs to foster the walking of patients with hemiparesis, both as a therapeutic method and as a walking aid.	Multiple case study	4; F = 1, M = 3; 58 Post-stroke	Gait retraining: walk with dog, navigate the obstacle course. The dog involved in activities to practice transfers to sitting and standing. 4 sessions/week × 60 min. Single dog-handler team. Therapists.	Increased walking speed and improvements in gait. Involvement of the dog created a rehabilitation context that is more flexible, allowing for changes in direction. Therapeutic environment is more realistic: location and environment interactions.
Sherrill and Hengst (2022) USA	Walk, pet, talk, engage in activities with dog	Explore how dog-assisted therapy during speech-language pathology sessions might impact patient communication environments.	Interpretative design, including participation action research	10;[b]; 18–84 Acquired cognitive-communication disorders	Conversational exchanges as groom, pet, and play with dog, for example, name and follow directions, tell personal stories, respond to actions of the dog. 1 session × 30 min. Multiple volunteer dog-hander teams. Speech pathologist, administrator.	AAT sessions were useful for creating rich, complex therapeutic communication environments.
Thompkins et al. (2019) USA	Walk, pet, talk, engage in activities with dog	Investigate the effects of dog-assisted therapy on patient affect, pain, and stress.	Randomized controlled trial	Intervention: 16; F = 6, M = 10; 35.4 Control: 15; F = 3, M = 12; 41.8 Spinal cord injury	Pet, walk, feed, pour water for and dress dog. 4 sessions × 30 min. Multiple dog-handler teams. Occupational therapists.	AAT had a modest impact on reducing patients' negative affect during rehabilitation; mixed effect on physiological stress response and modest reduction (not statistically significant) in pain ratings.

[a]F, Female; M, Male.
[b]Missing data not shown.

document any therapeutic outcomes (see Table 3). One study involved a birdcage being situated in the ward lounge with patients visiting the birds as frequently as wanted to promote activity and socialization (Falk & Wijk, 2008).

4.3.2 | Animal-assisted therapies

Consistent with the AAA sessions, AATs delivered in hospital rehabilitative care mostly involved dogs. AAT delivery was goal-oriented and structured, with a range of health professionals involved in the planning and delivery, including occupational, physical, and recreational therapists; speech pathologists; social workers; and psychologists and trained therapy assistants (see Table 4).

AAT sessions were mostly longer than AAA sessions. The majority ranged from 20 to 60 min in length, with one being 5 min and another 90 min. AAT sessions were usually undertaken away from the bedside, in a range of locations including conference/therapy rooms, corridors, and gyms. Activities undertaken during the sessions were varied, depending on the therapy goals. When the goal was to improve ambulation or gait, sessions typically involved walking with the therapy dog. For the goal of improving activities of daily living, sessions involved feeding, grooming, petting, and playing games with the dog. Studies that used AAT to improve communication skills involved activities such as naming and following directions, giving commands, and conversational exchanges around the dog and their care (see Table 4).

Dogs used to deliver AATs were trained as therapy dogs; some belonged to hospital staff involved in the AAT delivery (Burres et al., 2016; Denzer-Weiler & Hreha, 2018; LaFrance et al., 2007), while others were sourced from volunteer dog-handler teams (Bode et al., 2007; Markovich, 2011; Pruskowski et al., 2020; Sherrill & Hengst, 2022; Thompkins et al., 2019).

One study described the involvement of a range of animals including horse, donkey, sheep, goat, cat, chicken, rabbit and guinea pig (Hediger, Meisser, & Zinsstag, 2019). In this study, the therapist

and participant chose an animal type and activity for each AAT session to support the social behavior of people who had experienced an acquired brain injury.

4.4 | Outcomes from receiving AAIs in adult hospital rehabilitative care

4.4.1 | Animal-assisted activities

Measurement of AAA outcomes included vital signs (Coakley et al., 2021; Coakley & Mahoney, 2009); cortisol level (Coakley et al., 2021); validated (Coakley & Mahoney, 2009; Harper et al., 2015; Kowalski et al., 2021; Smith et al., 2020) and non-validated (Phung et al., 2017) patient surveys; and chart audit (Havey et al., 2014).

Reported outcomes from AAA visits included a decrease in anxiety, fatigue, and/or pain (Coakley et al., 2021; Coakley & Mahoney, 2009; Kowalski et al., 2021; Phung et al., 2017; Smith et al., 2020); and the decreased use of pain medication (Havey et al., 2014). The study involving spontaneous patient–bird interactions reported a positive effect on activity, attention, and enhanced social behavior in older people (Falk & Wijk, 2008).

4.4.2 | Animal-assisted therapies

Outcome measures for AATs involved objective tools such as walking speed, length, and gait measures (Abate et al., 2011; Bode et al., 2007; Rondeau et al., 2010) and vital signs (Machova, Prochazkova, Eretova, et al., 2019; Machova, Prochazkova, Riha, & Svobodova, 2019). Non-validated (Abate et al., 2011; Pruskowski et al., 2020) and validated (Baek et al., 2020; Thompkins et al., 2019) survey instruments were used, including measures of functional independence (Denzer-Weiler & Hreha, 2018; Hediger, Meisser, & Zinsstag, 2019). The qualitative data collection included the analysis of video and audio recordings from treatment sessions (Sherrill & Hengst, 2022).

AATs enabled therapeutic activities to involve interactions with the environment that was closer to reality (Rondeau et al., 2010; Sherrill & Hengst, 2022). Therapeutic benefits of dog walking were described such as creating purpose and changing direction. Further, AATs were able to be undertaken in a range of locations, thereby being more accessible than training with a treadmill (Rondeau et al., 2010). Improvements were observed in walking distance, speed, and/or gait (Abate et al., 2011; Bode et al., 2007; Denzer-Weiler & Hreha, 2018; Markovich, 2011; Rondeau et al., 2010); a reduced refusal rate for ambulation (Abate et al., 2011); transfers, sitting, and standing tolerance (Denzer-Weiler & Hreha, 2018); functional independence and self-sufficiency in activities of daily living (Baek et al., 2020; Machova, Prochazkova, Riha, & Svobodova, 2019); communication skills, both verbal and non-verbal (Burres et al., 2016; Hediger, Meisser, & Zinsstag, 2019; LaFrance et al., 2007); motivation, social behaviors, and mood (Hediger, Meisser, & Zinsstag, 2019; Machova, Prochazkova, Eretova, et al., 2019); and a decrease in pain and/or anxiety (Pruskowski et al., 2020).

The potential for the volunteer dog handlers to confound the effect of the intervention was noted. That is, having an opportunity to engage with the dog handler, rather than the dog, may influence or even be the cause of the therapeutic effect (Bode et al., 2007). In addition, there was concern that interactions with the dog may be a distraction and inhibit the precise execution of rehabilitative techniques (Burres et al., 2016; Markovich, 2011).

4.5 | Factors that influence the implementation of AAIs in the hospital rehabilitation setting

Discussion of factors influencing AAI implementation in the hospital rehabilitation setting was limited, with many of the study sites already having AAI in place for a number of years (Coakley et al., 2021; Kowalski et al., 2021; Pruskowski et al., 2020; Sherrill & Hengst, 2022; Smith et al., 2020). However, a range of factors was identified and have been summarized under four categories: *participants*, *dog/handler teams*, *hospital setting*, and *intervention*.

4.5.1 | Participants

Individual characteristics that facilitated AAI participation included liking dogs, current or previous dog or animal ownership, and a desire to take part in the intervention (Burres et al., 2016; LaFrance et al., 2007; Machova, Prochazkova, Eretova, et al., 2019); while fear of, or allergies to dogs presented barriers (Abate et al., 2011; Baek et al., 2020; Coakley et al., 2021; Kowalski et al., 2021; LaFrance et al., 2007; Rondeau et al., 2010; Smith et al., 2020).

As a requisite for AAI, participants need to be medically stable (Coakley & Mahoney, 2009; Pruskowski et al., 2020). Some medical conditions excluded AAI participation. These included having an open wound (Kowalski et al., 2021; Phung et al., 2017; Pruskowski et al., 2020); being immunocompromised (Burres et al., 2016; Coakley et al., 2021); having an active infection (Harper et al., 2015; Kowalski et al., 2021); and having a condition requiring isolation (Kowalski et al., 2021; Smith et al., 2020).

4.5.2 | Dog/handler teams

Assessment and certification of dog/handler teams by external organizations were noted in most studies. Registration with an AAI training organization provided insurance cover for the dog/handler team in some jurisdictions (LaFrance et al., 2007; Pruskowski et al., 2020). In one study, where a handler was a staff member, the dog was also registered as a volunteer at the hospital for insurance purposes (LaFrance et al., 2007).

There can be challenges in recruiting adequate numbers of appropriately trained teams to meet demand (Coakley et al., 2021; Coakley & Mahoney, 2009; Sherrill & Hengst, 2022). Study settings with single dog/handler teams tended to have staff members as handlers (Burres et al., 2016; Denzer-Weiler & Hreha, 2018; Harper

et al., 2015; LaFrance et al., 2007); however, most teams were comprised of volunteers from community-based organizations.

Dog welfare was considered by placing limitations on daily working hours (Pruskowski et al., 2020; Thompkins et al., 2019) and handler awareness of dog stress behaviors (Kowalski et al., 2021; Thompkins et al., 2019). Additional animal welfare considerations were noted to include adequate time for rest, a mix of indoor and outdoor activities, access to water, and avoidance of overfeeding (Machova, Prochazkova, Eretova, et al., 2019).

4.5.3 | Hospital setting

The risk of zoonotic transmission and other infection control concerns were addressed by a variety of measures including facility AAI guidelines (Burres et al., 2016; Coakley et al., 2021; Coakley & Mahoney, 2009; Pruskowski et al., 2020; Smith et al., 2020), handler training (Burres et al., 2016), hand hygiene protocols (Burres et al., 2016; Harper et al., 2015), dog bathing requirements (Baek et al., 2020; Pruskowski et al., 2020), and dog vaccination (Baek et al., 2020; Denzer-Weiler & Hreha, 2018; LaFrance et al., 2007; Pruskowski et al., 2020).

The need for access to adequate space for an AAI within a hospital setting was documented (Baek et al., 2020; Sherrill & Hengst, 2022). Provision for other staff, patients, and/or visitors who dislike, fear, or have an allergy to dogs, was essential (Coakley et al., 2021; Phung et al., 2017; Pruskowski et al., 2020).

4.5.4 | Intervention

AAIs using volunteers were perceived as being low cost (Abate et al., 2011; Smith et al., 2020). However, the time, money, and energy required to train and support a facility dog were recognized (Denzer-Weiler & Hreha, 2018), with one facility reporting the need to fundraise to support their facility dog's ongoing care and training expenses (Burres et al., 2016). Further, the therapist's time to plan and adapt activities to incorporate AAI, alongside the potential for longer sessions with patients having difficulties disengaging from the dog, were seen as additional, potential, and indirect costs (Sherrill & Hengst, 2022).

Practicalities of timing AAIs to avoid times when patients are engaged in other activities away from the unit, such as therapy or diagnostic studies, were discussed (Phung et al., 2017). Concurrently, there was recognition of the importance of timing analgesia administration to enhance patient readiness for AAI (Harper et al., 2015).

5 | DISCUSSION

This scoping review explored how AAIs have been used in the adult hospital rehabilitation setting and found a range of AAAs and AATs had been used to promote health and well-being. Several differences were identified between the two categories of interventions. While both may have an impact on psychological outcomes such as mood, anxiety, fatigue, and pain; goal-oriented AATs that formed part of a planned treatment approach, demonstrated the potential to support people in meeting their physical and communication rehabilitation goals, including improvements in ambulation, fine motor skills, and verbal communication. Promoting functional independence through AAI may benefit participants and the wider healthcare system, potentially enabling a shorter time to achieve therapeutic goals and promoting early discharge home.

Practitioners considering the use of AAIs should clarify the purpose of their intervention. If the purpose is to support participant's social–emotional well-being, then lower-cost AAAs that involve less time and training of both staff and animal handler team should be considered. Importantly, co-designing approaches to AAI delivery with consumers and the wider rehabilitation team is critical, to ensure that the proposed intervention is acceptable to the targeted group (Slattery et al., 2020).

Most AAIs used in hospital rehabilitative care have involved dogs. However, the use of other animal types, including birds or fish, may promote socialization, communication, and patient well-being. The current evidence on these animal types is limited, with further investigation warranted to explore the potential benefits of these potentially lower-cost AAIs.

The review also highlighted factors to be considered as part of introducing AAIs in the hospital rehabilitation setting. There is a need to improve the documentation of AAIs in hospital medical records. This includes detailing the specific, measurable, therapeutic goals of AATs. Establishing reporting standards for AAIs in hospital medical records will enable better evaluation of formal and informal, goal-oriented interventions; and provide direction for further development.

Support from hospital management and a consideration of the views of all staff, patients, and visitors toward animals in the hospital setting is vital. Opportunities to integrate AAIs into existing hospital systems need to be explored and addressed. This includes the development of policies and procedures for animal and handler training, and safety and infection control. To guide implementation, a companion-animal, multi-species risk management framework may be useful. The SAFE tool, developed for communal aged care settings in Australia, provides guidance for human health services exploring the use of AAIs (UniSA, 2022).

A reliance on volunteer dog handler teams and/or individual practitioner's own animals for AAI delivery was identified in this review. As an ongoing, treatment modality, hospital services need to consider the establishment and ongoing costs of therapy provision. Animal certification; training of animals and pet-therapy teams, including hospital staff and volunteers; daily animal care; and veterinarian care are all potential costs related to AAIs.

Any proposed intervention should consider the impact on the animal itself. Overall, animal welfare was poorly documented in the studies included in this review and the absence of consideration and/or reporting has been detailed by others (Glenk & Foltin, 2021). Hediger, Meisser, and Zinsstag (2019) have proposed the use of a One Health framework for AAIs, in which the benefits and risks for human participants and animals are integrated and assessed. Additionally, Winkle

et al. (2020) noted variety in the experience of individual animals within each AAI approach, and further variability in each human–animal interaction. They advocate for overarching guidelines and standards embedding general principles for animal welfare, as well as an individualized animal–human plan for each planned AAI.

5.1 | Recommendations for future research

Areas that could benefit from further research have been highlighted in this review. The impact of handler interaction with the AAI participant was unclear and has the potential to be a confounder of any observed effect. There was a limited acknowledgment of animal welfare issues or consumer preferences for AAI, with further investigation warranted to ensure healthy outcomes for all species involved in AAI delivery. Further, a lack of clarity in the use of the definitions of AAA and AAT was identified. Understanding would be better informed if future studies aligned AAI classification with the IAHAIO definitions.

5.2 | Limitations

While a thorough search strategy was used, by excluding gray literature in an emerging field of inquiry this may have omitted the identification of potentially relevant materials. Furthermore, there was high variability in the design and quality of the included studies, making it difficult to draw conclusions from the reported findings. This highlights the need for further well-designed studies to be conducted to assess the impact of AAIs.

6 | CONCLUSION

This review identified a range of potential benefits that result from the implementation of AAIs as part of overall treatment in hospital rehabilitative care. While both AAAs and AATs may impact positively psychological outcomes such as mood, anxiety, fatigue, and pain, more intensive AATs which are integrated into a planned treatment approach, could have wider benefits including improvements in ambulation, motor skills, verbal communication, and overall functional independence. This not only benefits the individual patient but may reduce pressure on the health system by minimizing the length of hospital stay and enabling earlier discharge. However, the implementation of both AAAs and AATs is not without their challenges. Further research, including rigorously designed evaluations of AAI interventions, is required to allow a deeper understanding of the benefits, facilitators, and barriers to undertaking AAIs at an individual client and health system level.

AUTHOR CONTRIBUTIONS

Mary O'Loughlin: Conceptualization; investigation; writing – original draft; methodology; writing – review and editing; supervision; validation; visualization; project administration; funding acquisition. **Rachael Edwards:** Writing – original draft; writing – review and editing; project administration; investigation; validation; data curation; visualization. **Em Bould:** Conceptualization; investigation; writing – original draft; writing – review and editing; validation. **Sue Devine:** Conceptualization; investigation; writing – original draft; writing – review and editing; funding acquisition; validation. **Sandra Downing:** Conceptualization; investigation; funding acquisition; writing – original draft; writing – review and editing; project administration; validation.

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CONFLICT OF INTEREST STATEMENT

The authors declare they have no conflicts of interest.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

ETHICS STATEMENT

Research undertaken in this review has been approved by the Far North Queensland Human Research Ethics Committee: HREC/2022/QCH/89785 (Dec Ver 3)—1646.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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