Animal assisted intervention: A systematic review of benefits and risks

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Animal Assisted Intervention: a systematic review of benefits and risks

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Conflict of interests:

None

Funding:

None

Abstract

Introduction: The therapeutic use of animals has been debated for decades, and its use explored in a variety of settings and target populations. Research on the benefits of animal assisted intervention and animal assisted activity has been carried out for people with different pathologies but there is no uniformity on naming these interventions. However, evidence based knowledge is essential to implement effective strategies in hospital. This review aimed to focus on the use of animal programs for hospitalized patients, and considered the potential risks.

Methods:. The following databases were searched: PubMed, Scopus, PsychInfo, Ebsco Animals, PROQUEST, Web of Science, CINAHL, and MEDLINE, and PRISMA guidelines were adhered to. All papers considering effectiveness or risks of animal use in hospitals were included.

Results: Out of 432 articles were identified 36 articles suitable for inclusion into the review. Data was heterogeneous in terms of age of patient, health issue, animals used and the length of interactions, which made comparison problematic. Studies on children, psychiatric and elderly patients were the most common. The animal-intervention programs suggested various benefits such as reducing stress, pain and anxiety. Other outcomes considered were changes in vital signs, hemodynamic measures and nutritional intake. Most studies used dogs, but other animals were effectively employed including horses, fishes, cats and caged birds. The major risks outlined were allergies, infections and animal-related accidents. Zoonosis was a possible risk, as well as common infections as Methicillin-resistant Staphylococcus Aureus. The implementation of simple hygiene protocols was effective at minimizing risk. The literature suggested that the benefits outweighed by far the risks.

Conclusion: The human relationship with animals can be useful and relatively safe for inpatients with various psychological, social and behavioural problems. Moreover, the implementation of security precautions and the careful selection of patients should minimize the risks, particularly those infection-related. Many aspects remain unclear, further more controlled studies are required.

Keywords:

Animal-assisted Activity; Animal-assisted Therapy; Animal-assisted Intervention; Pet-therapy; Hospital; Systematic Review, Risks & Benefits, clinical guidelines

Introduction

The Animal Assisted Therapy (AAT) is a health intervention, meant to improve physical, social, emotional or cognitive functioning, with animals as integral part of the treatment(1). The therapeutic use of animals was argued for decades and many associations employ this intervention in order to improve care.

The interest shown by the scientific community is proven not only by the amount of articles published, but also by the specific trainings offered by many universities and in particular by the inception of specific law to regulate this practice.(2)

The "Pet Partners" (an organization dedicated to improve people's health through the interaction with animals) pointed out the differences between AAT and Animal Assisted Activity (AAA), less structured and mainly composed by pet visitation)(3). The AAA, as described above, is slightly structured and it includes, primarily, pet-visitation. These kind of activities are in general spontaneous, grouping several patients, and poorly standardized with regard to duration and type of activities. On the contrary, the AAT sessions are strictly organized considering both the activity type and the duration. Indeed, each AAT session presents individualized goals and is conducted by specifically trained couples (handler and animal).(3) Unfortunately, there is no uniformity on naming these interventions and AAT, AAA and other names are used, often, in a confusing way. To make even harder to compare the studies different animals were used. Although dog is the most common, generally every species can be employed.

Animal interventions have been studied for different pathologies including mental disorders(4) and cancer(5). In particular, some interventions focused on frail patients as elderly(6,7) or children(5,8). Furthermore, AAT and AAA are implemented in different settings like hospitals, nursing homes and schools(4,5). The employment of Animal-Assisted Interventions (AAI) resulted increasingly popular, especially among pediatric patients. About this, Chur-Hansen et al. conducted a critical review regarding AAI for children inpatients. This review focused primarily on the methodology of the retrieved studies. Precisely, the authors concluded that the evidences regarding AAI are scant, and more standardized studies (in particular RCTs) about this topic are required.(9) Another recent review considered only the available RCTs regarding AAT, retrieving overall eleven studies (published from 1990 to 2012). The authors outlined a relatively low quality of the recovered papers. However, the study highlighted some benefits of the AAT, especially in case of psychiatric disorders. The animals employed in these interventions were disparate, from dogs to dolphins or ferrets. The authors identified some areas requiring further insights such as costs, reasons to refuse the intervention and potential adverse effects. Moreover, the authors highlighted how the description of the intervention in terms of length, activities and settings, in the studies included in the review, was not always satisfying.(4)

The outcomes considered, in order to define the AAI benefits, are heterogeneous, incorporating subjective outcomes as the quality of life(10,11), but also objective parameters as vital signs(12), hemodynamic measures(13) and nutritional intake(14). A 2007 review and meta-analysis, firstly, assessed the quantitative effects of AAT. The meta-analysis included 49 studies, and individuated a significant

improvement in the following examined areas: autism-spectrum symptoms, behavioral problems, and emotional well-being. The authors described the AAT as a worthy intervention, necessitating, however, further insights.(15)

Furthermore, the risks of implementing animal therapeutic interventions especially in hospitals are not negligible, and these hazards must be considered(16,17).

An accurate knowledge of the effectiveness and risks of animal use in hospital is essential to implement effective strategies in this setting. Nevertheless, data considering animal interventions are often heterogeneous.. To our knowledge, no previous reviews estimated the evidence on the use of animal-interventions for inpatients. The aim of this review was to focus on Animal Assisted Therapy/Activity for hospitalized patients, to provide a clearer view on the status of the evidence supporting this practice, as well as the potential risks.

Methods

This review followed the Preferred Reporting Items for Systematic Review and Meta-analysis (PRISMA) statements (18).

Multiple search strategies were employed to summarize the existing evidence relating to animal assisted therapy or animal assisted activity for inpatients. Searches for papers reporting data about the effectiveness or the risks of animal use in hospitals were carried out using the following databases: PubMed, Scopus, PsychInfo, Ebsco Animals, PROQUEST, Web of Science, CINAHL and MEDLINE.

Three researchers (EC, GP and GV) independently performed a systematic search using the following strings: “Animal assisted activity” AND hospital, “Animal assisted therapy” AND hospital, “Animal assisted intervention” AND hospital, “Pet therapy” AND hospital, “Animal assisted activity” AND hospitalization, “Animal assisted therapy” AND hospitalization, “Animal assisted intervention” AND hospital, “pet therapy” AND hospitalization.

Studies were considered eligible for inclusion if:

- They were conducted in hospitals or in long-term care facilities
- They were written in English, Spanish or Portuguese
- They considered interventions of “Animal Assisted Therapy”, “Animal Assisted Activity” or “Animal Assisted Intervention”

No restriction was performed based on inpatient age, pathology, or type of animal used. All types of papers were included, since RCTs were few and did not give a complete overview of the topic.

Articles were excluded if:

- They were conducted outside the hospital
- They were published before 2000
- They use robotic animals
- They were case reports or letters to editor

Three investigators (EC, GP and GV) independently conducted a first literature search, sorting sources by title and abstract. Then, the eligible studies for full text review were selected. During the first screening,

the irrelevant or duplicated papers were excluded. The search was completed through a reference list screening. Finally, the researchers independently assessed the articles considering the criteria enunciated above.

Data extraction

The investigators, solving any discrepancies by consensus, independently extracted data from the selected studies, collecting information about the country, the study design, the setting, the sample characteristics, the type of intervention, the outcomes, the results and the potential risks.

Results

The search returned 432 results. After removing the duplicates and irrelevant results, 64 articles for full text review were obtained. The final selection obtained 36 sources (see Figure 1). Eight studies were conducted on children, five referred to psychiatric population, six considered elderly patients, six were performed in the Emergency Department, Orthopedics, Internal Medicine or other wards, and eleven focused primarily on the intervention risks.

Psychiatric Settings

Five studies focused on the AAT for psychiatric inpatients (See Table 1)(10,11,19–21). All studies were published between 2009(20,21) and 2015(11,19). Nearly all the studies considered a dog-AAT (n=4), with the exception of a study comparing four interventions: equine-assisted psychotherapy (EAP), canine-assisted psychotherapy (CAP), enhanced social skills psychotherapy, and regular hospital care(19). Four studies were RCTs(10,11,19,21) and one a controlled crossover study (20). The total sample size ranged from 12(20) to 90(19).

Chu and Villalta specifically focused on canine-assisted therapy for chronic schizophrenic inpatients (>10 years since onset)(10,21). Both studies underlined some positive effects of these interventions. In particular, the study of Chu, highlighted an increase in self-esteem, self-determination, and a decrease in positive psychiatric symptoms and emotional symptoms after 8 weeks of AAA ($p<0.05$) (10). The study of Villalta showed a significant improvement from baseline after a dog-program in social contact score, in positive and negative symptom dimensions and in quality of life(21). However, no significant difference was assessed between the group experiencing AAT and the control group(21). Nurenberg et al. considered the effectiveness of the AAT in reducing aggressiveness in chronic psychiatric inpatients, including various psychiatric diagnosis (76% presented schizophrenia or schizoaffective disorder). The authors compared two different AAT, the first using dogs and the second horses. Certified pet therapists, following the "Pet-Partners guidelines", conducted both these interventions. The reduction of violent incidents was significantly greater in the EAP group ($p<0.035$), while other generic benefits were assessed for both the AAT interventions. These positive effects were maintained for several months(19).

The effects of AAT were studied also in other psychiatric diseases as major depression (inpatients with suicidality tendencies). In this study, a dog-assisted intervention (two sessions of dog-AAA) effectively reduced anxiety ($p=0.016$), as measured employing the State-Trait Anxiety Inventory (STAI). This improvement was independent from age, gender or pet possession(20).

Finally, an Italian study considered children experiencing acute psychiatric disorders. The main diagnosis were eating disorders (64.7%) and mood disorders (20.6%). In this population, the implementation of a dog-AAT program once a week resulted, compared to the control group, in an improvement of clinical severity ($p=0.02$), ordinary school attendance ($p<0.03$), and global functioning ($p<0.0001$). In particular, the intervention group showed an improvement in socialized behaviors with adults and peers ($p<0.04$). The authors adhered, for the protocol implementation, to the "Pet Partners guidelines", and all the animals employed in the study followed strictly veterinarian sanitary protocols (11).

Children Hospitals

Eight papers referred to pet therapy in pediatric hospitals (See Table 2)(8,22–28). The articles were published between 2002(22,28) and 2015(23). Two were descriptive studies(24,25) and six trials(8,22,23,26–28). Two studies had a special focus on oncological patients(24,25), while the others referred to general pediatric inpatients. In particular, two interested children with acute diseases(23,26). All papers used dogs, ranging from simple pet visitation(22,28) to structured AAT(23,26,27). The number of children involved ranged from 15(27) to almost 150(8).

Four studies evaluated the satisfaction after the intervention and the effects on psychosocial behaviors(8,22,24,25), instead four considered also physiological phenomena(23,26–28). Two studies were conducted through a survey among parents and caregivers(22,24), while in two these data were integrated with children self-reports(8,25). Many different physiological parameters like pain(23,26) or cardiovascular response(27,28) were evaluated.

The studies involving oncological patients showed physiological benefits, like pain reduction(26), and psychological benefits like decreased loneliness, increased relaxation, socialization and self-esteem(8). These benefits were perceived also by parents and caregivers(24,28). These findings are consistent with a study conducted in acute pediatric care(22).

Barker et al., in a RCT on generic pediatric inpatients, showed the consistency of these results in different diseases(23). This study evaluated the AAI impact on anxiety and pain in acute care. A significant difference was found for anxiety, with the AAI-group experiencing lower anxiety score(23). However, no significant differences within- or between-groups or pre-post intervention were assessed in nor pain or anxiety(23). For the implementation of this protocol, all the hospital policies were followed, including those regarding safeguard for the dogs.

On the other hand, no differences in anxiety and medical fear were noticed in a study involving 15 hospitalized children(27). In this study, a reduction in the systolic blood pressure ($p=0.008$) was recorded and this reduction continued even after the intervention was over.

Elderly patients

Six articles evaluated the impact of the AAT in elderly inpatients (See Table 3)(6,7,13,14,29,30). These articles were published between 2002(14) and 2012(30). Five studies were performed in hospitals(7,13,14,29,30), while one was conducted in a nursing home(6). The samples ranged from 20 (30) to 76(13) subjects.

Patients were hospitalized for different diseases including cancer(30), chronic heart failure(13,29), Alzheimer disease(14) or chronic age-related disease(6,7). The animals used were dogs(13,29,30), cats (6,30), rabbits(30), cage birds(7) and fishes(14).

Stasi used a cat-therapy (3 sessions per week) for 28 elderly patients in a long-term facility(6). A significant reduction in depressive symptoms and systolic blood pressure ($p=0.01$) was measured in the intervention group(6). Similarly, a dog therapy was compared to volunteer visit and usual care in 76 patients suffering acute heart failure(13). Compared with controls, the volunteer-dog group experienced a significant decrease in systolic pulmonary artery pressure and in pulmonary capillary wedge pressure(13). Compared with the volunteer-only group, the volunteer-dog group presented a greater decrease in epinephrine and in norepinephrine levels during and after the intervention. Finally, the dog-group showed a greater decrease in the state anxiety score compared to both volunteer-only ($p=0.02$) and control group ($p<0.001$) (13).

Differently, another study analyzed the impact of dog-therapy on patients with chronic heart failure to determine the impact of Canine Assisted Ambulation (CAA) in encouraging ambulation(29). Additionally, patient satisfaction was assessed. The experimental group receiving CAA walked significantly more steps ($p<0.0001$) than the historical control group, and all patients responded positively to this experience(29).

The benefits of AAA were investigated in a palliative care unit of a Japanese hospital, considering twenty elderly users. The considered program included a 30-minute session once a month using dogs, cats or rabbits, all previously tested for health and suitability. The authors considered the effects of this intervention upon the Quality of Life of the selected inpatients, employing a validated scale (Lorish Face Scale) to assess mood changes. The study outlined the beneficial effect of similar interventions in the mood state before and after each session ($p<0.01$). In particular, the positive results were higher for those who claimed to like animals or that owned a pet (especially dogs).(30)

Furthermore, we found studies using uncommon animals like fishes(14) and cage birds(7). A first study assessed the nutritional intake in individuals with Alzheimer after the introduction of an aquarium in the ward(14). The nutritional outcomes were recorded at baseline, and, then, after 10 weeks following the aquariums introduction. The nutritional intake increased significantly ($p<0.001$) after this intervention and continued increasing during follow-up. Moreover, also the weight increased significantly ($p<0.001$)(14). A second study assessed the interaction between cage-birds and older people in hospital(7). This qualitative study investigated the patient's reactions succeeding the introduction of cage birds in a Swedish geriatric ward. Patients manifested attention and curiosity regarding the birds and expressed desire to take care of them(7).

Emergency Department, Orthopedics, Internal Medicine and other wards,

Six studies evaluated the impact of pet therapy on adult inpatients with different pathologies (See Table 4)(31–36). Two studies investigated the dog-AAT effectiveness for orthopedic inpatients after a total joint arthroplasty intervention(31,32). Both studies considered the impact of this intervention on pain(31,32). Harper et al. inquired the subjective level of pain, using the Visual Analogue Scale (VAS)(31), while

Havey et al. assessed the use of oral pain medications(32). Harper et al. considered a dog-visitation session prior each physical session, and outlined lower VAS score in the intervention group ($p<0.001$)(31). Furthermore, the use of pain medications appeared significantly lower among the AAT group ($p=0.007$)(32). Harper investigated also the patient satisfaction regarding the hospital stay(31). The treatment group reported a higher level of appreciation compared to the control group ($p<0.05$). Moreover, the groups did not differ nor in the cleanliness items nor in quietness of hospital environment(31).

Lynch et al. studied the implementation of a dog-AAI in antepartum wards for women with complicated pregnancies(33). The program consisted of non-structured dog-contact sessions. The authors assessed depression and anxiety symptoms prior and after each session(33). The women recruited presented heterogeneous complications, including pre-term labor, pre-eclampsia and diabetes. Despite the lack of a control group, the results indicated that both depression and anxiety improved after the intervention ($p<0.01$)(33).

Two studies considered the implementation of a dog-AAT in hospital wards(34,35). Nahm considered the development of similar programs in an Emergency Department, considering the opinion of patients, staff and visitors(34). The intervention was successful among both patients and visitors (<5% of the patients expressed negative opinions). Furthermore, the staff appreciated the intervention (over 90% did not considered dogs as an obstacle to routine activities)(34). Coakley et al., instead, focused on the implementation of a dog-visitation program in twelve different departments, collecting patients' opinions(35). The authors considered the effects on vital signs, pain perception (VAS-scale), and mood-state (exploring anxiety, depression, hostility, vigor, fatigue and confusion). The subjects participating presented a wide range of diseases. After the intervention the participants experienced a slightly, but significant, decrease in respiratory rate ($p<0.001$) and in pain score ($p=0.001$). The mood scale outlined a significant improvement in nearly all the items ($p<0.001$), except vigor and confusion(35).

Finally, Hastings et al. investigated the use of a bi-weekly dog-visitation in a Burn Intensive Care Unit and a Burn Acute Care Unit(36). In order to guarantee the security of these patients, all the Protection Equipment guidelines were respected. The authors collected patients, staff and visitor opinions. Nearly all comments were positive and only three patients (0.5%) refused the proposed sessions, reporting fear. The number of dog-visits significantly increased during the observation, and no infection nor issues animal-related were reported(36).

Risks and Threats of Animal-Intervention in healthcare settings

Eleven articles focused explicitly on the risks of animal use in hospitals(16,17,37–45). These papers ranged from 2000(37) to 2013(38), and included guidelines, recommendations, clinical trials, cross-sectional surveys and reviews. Two studies investigated the prevalence of infective agents in pet-visitation animals in hospitals or in long-term care facilities(17,44). The first investigation is a broader survey that considered all the hospitals located in the Ontario region with a pet visitation program. In particular, this investigation analyzed aural, nasal, oral, pharyngeal and rectal swabs of over 100 visitation dogs, identifying Clostridium Difficile as the most common isolated organism(17). Moreover, 17% of

these isolates were indistinguishable from the toxigenic microorganisms responsible of the human disease. In the feces samples, the authors retrieved also Salmonella and Escherichia Coli (partly in antibiotic-resistant forms). Furthermore, some samples were positive to parasitology and mycology analysis. These microorganisms were carried asymptomatically by dogs, but can be dangerous especially for immunocompromised patients(17). Coughlan et al. focused on Methicillin-resistant Staphylococcus Aureus (MRSA) colonization among residents animals (one dog and eleven cats) in a long-term care facility(44). The authors considered a large long-term care facility with over 100 beds, characterized by the presence of resident animals. The researchers collected nasal swabs from the animals for overall eight weeks. Two cats presented MRSA positive swabs and the test positivity was confirmed in subsequent tests. In the meantime, human MRSA infections occurred in the facility(44).

Lefebvre et al. (2006) conducted a cross-sectional survey in the Ontario hospitals in order to assess the presence and characteristics of Canine Visitation Programs for inpatients. Moreover, the authors interviewed the dog handlers regarding the health protocols for AAA. Nearly all the hospitals surveyed (90%) consented the access to dogs in their facilities. Two of the selected hospitals interrupted the AAA program, during 2003, due to the onset of severe acute respiratory syndrome. The screening protocols resulted extremely variable, and eighteen dog-owners (20%) declared that they did not follow any infection control. Furthermore, over 70% of the interviewed handlers allowed the dog both to climb on patient's bed and to lick patients. Finally, the dog owners were not aware of the potential zoonosis risks. (45)

Two reviews(37,39) considered the potential risks of animal use in healthcare settings, considering infections, allergies and bites. Precisely, Khan et al. considered the AAA or AAT implementation in healthcare settings, especially in hospitals.(37) The second review focused specifically on the healthcare environment of Europe and North America.(39) The zoonosis can be a risk especially for very young, old or immunosuppressed patients(37,39). All the animals mostly used in AAI can act as a source of infections. Not only zoonosis could be a risk, but also other common infections as MRSA. However, the application of hygiene protocols consented an effective risk minimization(39). Moreover, the repeated health screenings for the animals and the careful selection of patients, using special precautions in case of open wounds and immunosuppression can help to control the risks(37). Another risk is allergy; anyhow, the reasoned selection of patients and animals can effectively reduce this risk. Finally, animal-related accidents can be practically canceled following appropriate guidelines(39). Therefore, the reviews concluded that the benefits overhang risks. In particular, Khan et al. recommended a careful selection of the patients, excluding patients with splenectomy, dog allergy, positive to Mycobacterium Tuberculosis, with pyrexia of unknown origin or infected with MRSA.(37)

The guidelines about AAI and pet-visitation agreed over the main key points, suggesting hand hygiene after all animal contacts and avoiding as possible contacts with animal bodily fluids(16,38–41). All animals used for AAT must be selected carefully, avoiding the most dangerous species as reptiles and primates(16). Moreover, animals must follow strictly veterinary health screenings, vaccine programs, and be specifically trained for these activities. To minimize the allergic risk, bathing and grooming animals

prior each session could be useful. After each session, routine cleaning protocols should be implemented. Finally, inclusion of patients with severe immunosuppression, known allergy or animal phobia should be carefully considered, assessing benefits and risks(16,38–41). In particular, Sehulster et al. reported the CDC guidelines for environmental infection control in health-care facilities, including a section regarding the safety of AAA and resident animals programs in healthcare settings. On the contrary, in their guidelines,(16) Sehr et al. considered exclusively a program of private pet-visitation in hospital. In this case, the authors excluded immunocompromised patients, newborns and patients in post-anesthesia care units. Moreover, the authors registered overall positive evaluations of the nurses regarding the guidelines implementation.(38) The work of Jofrè et al. consisted in a review of guidelines, in order to achieve a consensus regarding animal use in healthcare settings. As well as underlining the importance of regular veterinary checks and strict sanitary protocols, the authors recommended to avoid the use of puppies in order to minimize the infection risk.(41) Similar guidelines are adopted also in hospital implementation protocols(42,43). In particular, these programs excluded all patients in post-operative period, with recent splenectomy or severe immunosuppression(42). Silveira et al. reported the implementation protocol of an AAA program in a Brazilian University hospital. This protocol included a wide range of potential employed animals, including dogs, cats, fishes, rabbits, reptiles and other rodents.(42) Similarly, Kobayashi et al. reported the Board of Nursery experience concerning the implementation of an AAT project in a University hospital. In particular, the authors adapted the CDC guidelines to their specific setting.(43)

Discussion

Our review investigated the effectiveness and risks of animal assisted therapies in hospitals. Our search revealed extremely heterogeneous results, in terms of settings, target population, type of intervention and considered outcomes. However, most studies focused on particularly frail population groups as children(8,22–28), psychiatric inpatients(10,11,19–21) and elderly patients(6,7,13,14,29). The relationship with the animals can be extremely useful for these patients especially focusing on communication and social behaviours(7,11,28). In particular, considering psychiatric diseases, schizophrenic inpatients would benefit from animal contact considering schizophrenic symptoms, social relationships and aggressiveness(10,19,21). The reduction in aggressive behaviors was outlined, not only in psychiatric inpatients, but also considering general inpatients(35). The studies regarding adults were rare, but they considered different diseases including orthopaedic surgery and high-risk pregnancies(31–36).

Even if dogs are the most studied animals(8,10,11,20–28,31–36), also other species are considered as cats(6,44), fishes(14), cage birds(7) and horses(19). The prevalent use of dogs is explained by the easier training for therapy; however, also other species can be potentially beneficial. Interestingly, the papers retrieved highlighted how “pet therapy” programs can be effectively implemented in a wide range of settings including Emergency Departments(34), long-term care facilities(6) and hospital wards(35). Although all the interventions retrieved took place in hospitals or in long-term care facilities, the specific

location of the interventions differed. Indeed, some interventions took place in the hospital garden(19) or in activity rooms specifically equipped(11), while others occurred directly in the ward(33,34), or at bedside(25,27). Also considering the interventions' characteristics, the results appeared variegated. Inasmuch, the length of the sessions ranged from 5-10 minutes(32,35) to different hours(24). Moreover, some programs required multiple sessions(6,8,11,21), while others included only a single session.(13,34) These important organizational differences make extremely difficult to compare the retrieved intervention, and to draw clear conclusions. Furthermore, not all the studies exactly described the specific train and formation of the couple animal-therapist or handler. About this, some studies declared to adhere and follow the "Pet Partners Guidelines".(8,19) The AAT interventions resulted, in accordance to their definition, more structured, organized in limited groups and conducted by certified therapists. On the contrary, the described AAA ranged from simple pet-visitation to spontaneous activities. In this case, the specific formation of the couple dog-handler is less described, and in one case, the dogs are accompanied only by the investigators, and not by the handler.(10)

Despite the wide range of outcomes considered, the studies retrieved outlined general benefits of AAT or AAA in terms of psychological and physical effects. In particular, one common outcome explored was anxiety. Positive effects on anxiety, measured using the STAI scale or the Profile of Mood States survey, were detected for various pathologies as major depression(20), hospitalized children(23), elderly patients with acute heart failure(13) , high-risk pregnancies(33) and adult inpatients in different hospital departments(35). The favorable effect of AAT upon anxiety symptoms on children was confirmed by parents and staff(8). In conclusion, the favorable impact on inpatient anxiety seemed assessed for a wide range of age and conditions.

Another frequently assessed outcome was depression. Significant amelioration in depressive symptomatology was highlighted in psychiatric inpatients(19) and hospitalized women with at risk pregnancy(33). In addition, an improvement in depression symptoms, even if not statistically significant, was observed for elderly institutionalized patients with age-related diseases(6). The impact on depression required more in-depth analysis, especially considering the different scales used for its assessment.

Moreover, the pain (VAS scale, FACES scale or oral pain medication use) seemed to take advantage of animal therapeutic use in various conditions as post-orthopedic surgery(31,32), hospitalized children in acute setting(26) and adult inpatient in different department(35). The effective role of canine assisted therapy on pain was outlined both in surgical and medical conditions. However, not all the studies were concordant regarding this outcome. Indeed, Barker et al. did not find any difference in pain between intervention and control group in children(23).

Besides, the effects of AAI were assessed focusing on physiological parameters. The most assessed were blood pressure(6,27), outlining a significant effect in decreasing this parameter, heart rate(13,28,35) and respiratory rate(13,35). However, the effect on blood pressure was not concordant in all studies. Indeed, Cole et al. did not identify any significant change in this parameter(13). Another positive effect outlined was the actual distance walked in patients with chronic heart failure(29).

Therefore, the implementation of AAI can be interesting in a wide range of age and pathologies, but further and more standardized studies are required to exactly assess the pathologies mostly benefited from these interventions. The main limitations were linked to the heterogeneity of the retrieved studies considering both the outcomes and the quality, making the comparison quite difficult. Indeed, in accordance with previous reviews(4,15), the previous cited findings are limited by the overall low quality of the retrieved studies. Indeed, only few works were RCTs. Moreover, most of the included papers presented limited samples that could affect the overall results. Therefore, more studies are required to completely describe the potential effects of AAI. In fact, some studies lacked of a control group(7,14,20,33), while others were pilot studies considering limited samples(10,11,21). Moreover, some papers lacked of randomization(26,33) or considered only parents or patients opinions(7,8,36).Hospitals are particularly at risk settings, thus introducing animals has to be carefully considered. Various studies explored these risks outlining infections, allergies and animal accidents as major issues(16,37–40). The potential risk of infections was outlined investigating the prevalence of infective agents in animals used for pet-visitation(17,44). These studies outlined the potential risk related not only to typical zoonosis, but also to common human infections as MRSA(17,44). However, reviews and guidelines suggested that the implementation of all security precautions could effectively minimize risks(16,37–40). Therefore, the identification of patients receiving AAI should be carefully conducted. Some studies described in details the sanitary protocols adopted for the animals involved, including regular veterinary visits, vaccination documentation and assessments of controllability and temperament.(11,23,26,35,36) On the contrary, other works did not explicitly refer to any of these procedures. This matter represents another limitation of our review. Indeed, detailed information regarding the health surveillance protocols are desirable in order to correctly evaluate the considered interventions. The extensive Canadian survey regarding dog visitation highlighted how the infection control protocols result variable and occasionally potentially inadequate. In particular, the knowledge concerning the potential risks amongst the dog-handlers seemed insufficient.(45) Consequently, a closer cooperation between hospital staff, AAI-team, and veterinarians seems necessary. In addition, stricter controls about AAI safety in the hospital are desirable.

Furthermore, the data regarding animal welfare during the intervention lacked in most of the studies. Then, it would be interesting to further deepen this topic, investigating, also, any adherence to specific guidelines. Another major concern was the acceptance of AAI programs among healthcare professional. However, all studies considering this issue identified a general acceptance by the staff(22,34,36).

Conclusions

In conclusion, AAT or AAA for hospitalized patients seem useful and safe for a wide range of diseases. However, many aspects remained unclear, in particular regarding the type of intervention, safety, economic issues and diseases that would greatly benefit of these programs. Finally, given the paucity of high quality works about this topic, it would be desirable to conduct more standardized studies considering in details outcomes and interventions in order to describe all the potential benefits and risks.

Anyway, considering the intervention peculiarity, the reproducibility of randomized clinical trials could be difficult to achieve.

Ethical Statement:

The authors declare that they have no conflicts of interest. This article does not contain any studies with human participants or animals performed by any of the authors.

Funding

None.

References

1. Levinson BM. Pets and personality development. Psychol Rep. 1978 Jun 1;42(3c):1031–8.

2. 'Linee guida nazionali per gli interventi assistiti con gli animali (IAA)' - Conferenze Stato Regioni e Unificata [Internet]. [cited 2016 Apr 22]. Available from: http://www.statoregioni.it/testo_print.asp?idprov=13952&iddoc=46922&tipoDoc=2

3. Pet Partners.org - Therapy Pets & Animal Assisted Activities [Internet]. [cited 2016 Apr 22]. Available from: https://petpartners.org/

4. Kamioka H, Okada S, Tsutani K, Park H, Okuizumi H, Handa S, et al. Effectiveness of animal-assisted therapy: A systematic review of randomized controlled trials. Complement Ther Med. 2014 Apr;22(2):371–90.

5. Urbanski BL, Lazenby M. Distress among hospitalized pediatric cancer patients modified by pet-therapy intervention to improve quality of life. J Pediatr Oncol Nurs Off J Assoc Pediatr Oncol Nurses. 2012 Oct;29(5):272–82.

6. Stasi MF, Amati D, Costa C, Resta D, Senepa G, Scarafioiti C, et al. Pet-therapy: a trial for institutionalized frail elderly patients. Arch Gerontol Geriatr Suppl. 2004;(9):407–12.

7. Falk H, Wijk H. Natural activity: an explorative study of the interplay between cage-birds and older people in a Swedish hospital setting. Int J Older People Nurs. 2008 Mar;3(1):22–8.

8. Caprilli S, Messeri A. Animal-Assisted Activity at A. Meyer Children's Hospital: A Pilot Study. Evid-Based Complement Altern Med ECAM. 2006 Sep;3(3):379–83.

9. Chur-Hansen A, McArthur M, Winefield H, Hanieh E, Hazel S. Animal-Assisted Interventions in Children's Hospitals: A Critical Review of the Literature. Anthrozoös. 2014 Mar 1;27(1):5–18.

10. Chu C-I, Liu C-Y, Sun C-T, Lin J. The effect of animal-assisted activity on inpatients with schizophrenia. J Psychosoc Nurs Ment Health Serv. 2009 Dec;47(12):42–8.

11. Stefanini MC, Martino A, Allori P, Galeotti F, Tani F. The use of Animal-Assisted Therapy in adolescents with acute mental disorders: A randomized controlled study. Complement Ther Clin Pract. 2015 Feb;21(1):42–6.

12. Orlandi M, Trangeled K, Mambrini A, Tagliani M, Ferrarini A, Zanetti L, et al. Pet therapy effects on oncological day hospital patients undergoing chemotherapy treatment. Anticancer Res. 2007 Dec;27(6C):4301–3.

13. Cole KM, Gawlinski A, Steers N, Kotlerman J. Animal-assisted therapy in patients hospitalized with heart failure. Am J Crit Care Off Publ Am Assoc Crit-Care Nurses. 2007 Nov;16(6):575–85; quiz 586; discussion 587–8.

14. Edwards NE, Beck AM. Animal-assisted therapy and Nutrition in Alzheimer's disease. West J Nurs Res. 2002 Oct;24(6):697–712.

15. Nimer J, Lundahl B. Animal-Assisted Therapy: A Meta-Analysis. Anthrozoös. 2007 Sep 1;20(3):225–38.

16. Sehulster L, Chinn RYW, CDC, HICPAC. Guidelines for environmental infection control in health-care facilities. Recommendations of CDC and the Healthcare Infection Control Practices Advisory Committee (HICPAC). MMWR Recomm Rep Morb Mortal Wkly Rep Recomm Rep Cent Dis Control. 2003 Jun 6;52(RR-10):1–42.

17. Lefebvre SL, Waltner-Toews D, Peregrine AS, Reid-Smith R, Hodge L, Arroyo LG, et al. Prevalence of zoonotic agents in dogs visiting hospitalized people in Ontario: implications for infection control. J Hosp Infect. 2006 Apr;62(4):458–66.

18. Moher D, Liberati A, Tetzlaff J, Altman DG, PRISMA Group. Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. Int J Surg Lond Engl. 2010;8(5):336–41.

19. Nurenberg JR, Schleifer SJ, Shaffer TM, Yellin M, Desai PJ, Amin R, et al. Animal-assisted therapy with chronic psychiatric inpatients: equine-assisted psychotherapy and aggressive behavior. Psychiatr Serv Wash DC. 2015 Jan 1;66(1):80–6.

20. Hoffmann AOM, Lee AH, Wertenauer F, Ricken R, Jansen JJ, Gallinat J, et al. Dog-assisted intervention significantly reduces anxiety in hospitalized patients with major depression. Eur J Integr Med. 2009;1(3):145–8.

21. Victòria Villalta-Gil MR. Dog-Assisted Therapy in the Treatment of Chronic Schizophrenia Inpatients. Anthrozoos Multidiscip J Interact People Amp Anim. 2009;22(2):149–59.

22. Moody WJ, King R, O'Rourke S. Attitudes of paediatric medical ward staff to a dog visitation programme. J Clin Nurs. 2002 Jul;11(4):537–44.

23. Barker SB, Knisely JS, Schubert CM, Green JD, Ameringer S. The Effect of an Animal-Assisted Intervention on Anxiety and Pain in Hospitalized Children. Anthrozoös. 2015 Mar 1;28(1):101–12.

24. Gagnon J, Bouchard F, Landry M, Belles-Isles M, Fortier M, Fillion L. Implementing a hospital-based animal therapy program for children with cancer: a descriptive study. Can Oncol Nurs J Rev Can Nurs Oncol. 2004;14(4):217–22.

25. Bouchard F, Landry M, Belles-Isles M, Gagnon J. A magical dream: a pilot project in animal-assisted therapy in pediatric oncology. Can Oncol Nurs J Rev Can Nurs Oncol. 2004;14(1):14–7.

26. Braun C, Stangler T, Narveson J, Pettingell S. Animal-assisted therapy as a pain relief intervention for children. Complement Ther Clin Pract. 2009 May;15(2):105–9.

27. Tsai C-C, Friedmann E, Thomas SA. The Effect of Animal-Assisted Therapy on Stress Responses in Hospitalized Children. Anthrozoös. 2010 Sep 1;23(3):245–58.

28. Kaminski M, Pellino T, Wish J. Play and Pets: The Physical and Emotional Impact of Child-Life and Pet Therapy on Hospitalized Children. Child Health Care. 2002 Dec 1;31(4):321–35.

29. Abate SV, Zucconi M, Boxer BA. Impact of canine-assisted ambulation on hospitalized chronic heart failure patients' ambulation outcomes and satisfaction: a pilot study. J Cardiovasc Nurs. 2011 Jun;26(3):224–30.

30. Kumasaka T, Masu H, Kataoka M, Numao A. Changes in Patient Mood through Animal-Assisted Activities in a Palliative Care Unit. Int Med J. 2012 Dec;19(4):373–7.

31. Harper CM, Dong Y, Thornhill TS, Wright J, Ready J, Brick GW, et al. Can therapy dogs improve pain and satisfaction after total joint arthroplasty? A randomized controlled trial. Clin Orthop. 2015 Jan;473(1):372–9.

32. Havey J, Vlasses FR, Vlasses PH, Ludwig-Beymer P, Hackbarth D. The Effect of Animal-Assisted Therapy on Pain Medication Use After Joint Replacement. Anthrozoös. 2014 Sep 1;27(3):361–9.

33. Lynch CE, Magann EF, Barringer SN, Ounpraseuth ST, Eastham DG, Lewis SD, et al. Pet therapy program for antepartum high-risk pregnancies: a pilot study. J Perinatol Off J Calif Perinat Assoc. 2014 Nov;34(11):816–8.

34. Nahm N, Lubin J, Lubin J, Bankwitz BK, Castelaz M, Chen X, et al. Therapy dogs in the emergency department. West J Emerg Med. 2012 Sep;13(4):363–5.

35. Coakley AB, Mahoney EK. Creating a therapeutic and healing environment with a pet therapy program. Complement Ther Clin Pract. 2009 Aug;15(3):141–6.

36. Hastings T, Burris A, Hunt J, Purdue G, Arnoldo B. Pet therapy: a healing solution. J Burn Care Res Off Publ Am Burn Assoc. 2008 Dec;29(6):874–6.

37. Khan MA, Farrag N. Animal-assisted activity and infection control implications in a healthcare setting. J Hosp Infect. 2000 Sep;46(1):4–11.

38. Sehr J, Eisele-Hlubocky L, Junker R, Johns E, Birk D, Gaehle K. Family pet visitation. Am J Nurs. 2013 Dec;113(12):54–9.

39. Brodie SJ, Biley FC, Shewring M. An exploration of the potential risks associated with using pet therapy in healthcare settings. J Clin Nurs. 2002 Jul;11(4):444–56.

40. DiSalvo H, Haiduven D, Johnson N, Reyes VV, Hench CP, Shaw R, et al. Who let the dogs out? Infection control did: utility of dogs in health care settings and infection control aspects. Am J Infect Control. 2006 Jun;34(5):301–7.

41. Jofré M L. [Animal- assisted therapy in health care facilities]. Rev Chil Infectol Órgano Of Soc Chil Infectol. 2005 Sep;22(3):257–63.

42. Silveira IR, Santos NC, Linhares DR. [Protocol of the animal assisted activity program at a university hospital]. Rev Esc Enferm U P. 2011 Mar;45(1):283–8.

43. Kobayashi CT, Ushiyama ST, Fakih FT, Robles RAM, Carneiro IA, Carmagnani MIS. [Development and implementation of Animals-Assisted Therapy in a university hospital]. Rev Bras Enferm. 2009 Aug;62(4):632–6.

44. Coughlan K, Olsen KE, Boxrud D, Bender JB. Methicillin-resistant Staphylococcus aureus in resident animals of a long-term care facility. Zoonoses Public Health. 2010 May;57(3):220–6.

45. Lefebvre SL, Waltner-Toews D, Peregrine A, Reid-Smith R, Hodge L, Weese JS. Characteristics of programs involving canine visitation of hospitalized people in Ontario. Infect Control Hosp Epidemiol. 2006 Jul;27(7):754–8.

Caption of Illustrations

Figure 1: Flowchart - The figure summarizes the selection procedures of our review.