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Effect of Animal-Assisted Activities on Wellbeing of Hospitalized Patients at a Tertiary Care Center: A Pilot Study

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Abstract

The current study was conducted to identify reasons that motivate hospitalized patients or their primary care providers to request AAA and to measure the effects of AAA on common symptoms patients experience. A single pretest-posttest AAA survey conducted in an academic medical center, enrolled 20 adult participants who were hospitalized from December 1, 2016 through November 30, 2017. Participants were asked to fill out a pre- and post-visit visual analog scale (VAS), reasoning behind their request, and satisfaction survey. The care team completed a qualitative survey on AAA interference with patient care. The most common (40%; n=8) reason for AAA was "companionship". Post-visit, VAS scores for fatigue, anxiety, frustration, and stress improved significantly ($P<0.001$). The hospital care team were comfortable with AAA and reported they did not interfere with patient care. These results suggest that AAAs can be beneficial for the emotional wellbeing of hospitalized participants without interfering with care teams.

Keywords: Animal-Assisted Activity; Animal-Facilitated Therapy; Pet Therapy; Wellbeing

Highlights

- There are various reasons for animal-assisted activity (AAA) requests.
- Post-visits, scores improved for fatigue, anxiety, stress, and wellbeing scores.
- All participants were satisfied with the AAA and 75% rated their visit as excellent.
- The care team reported AAAs had no interference with patient care.

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Introduction

Animal-assisted activities (AAA), involve the interaction between a human and a registered therapy dog and its human handler, which provide an opportunity to enhance quality of life, increase motivation, and boost morale [1-3]. Dogs are the most common companion animal. Moreover, AAA is becoming an increasingly common treatment strategy for hospitalized patients and is available in hundreds of hospitals in the United States [4]. As a complementary component of overall treatment, AAA have been shown to have a positive effect on various population groups, such as older adults, adolescents [5], and children [6-9], and improving patients' quality of life [10-13].

Hospitalization is usually stressful for patients and family members. However, AAA has been used during hospitalization to mitigate this stress. Potential stressors include unfamiliar sounds, interruptions for measurements and laboratory testing, unpredictable schedules, and overall uncertainty and lack of control of the patient's situation. Furthermore, these stressors can exacerbate the physical pain experienced by the patient. Pain management during the hospital stay is a clinically significant challenge, and therapy dog visits have been associated with reduced pain and related symptoms [14].

At Mayo Clinic, Rochester, MN, AAA was introduced in 2009. Since then, requests have constantly increased, specifically, for the inpatient population. In total, 1,439 orders for a therapy dog were placed in 2014 and has increased to 2,638 in 2018. Mayo Clinic's therapy dog program, Caring Canines [15], has 33 teams of volunteer handlers and their registered therapy dogs. The therapy dogs in the Caring Canines program range in size and variation in breed. Furthermore, to stay active in the program, all teams must comply with The Society for Healthcare Epidemiology of America's infection control guidelines for animals in health care facilities [16]. As a volunteer service, therapy dog visits can provide an effective, cost-free option for enhancing patients' hospital experiences.

Animal-assisted therapy has been studied in various patient populations [17-19], but no information is available in the literature as to why patients requested these visits. This pilot study aimed to identify the reasons that motivate hospitalized patients or their primary care providers to request an AAA. Furthermore, to measure the effects of AAA on various symptoms, record patient's satisfaction, referral patterns (who referred or suggested participants for AAA), and care team members' feedback.

Materials and Methods

Study Design

This single-group, pretest-posttest intervention, quasi-experimental, pilot study was approved by the institutional review board (protocol number: 16-007730). The study was conducted in the Integrative Medicine and Health department within the Internal Medicine division at a large academic medical center.

One hundred participants were asked to participate in this study from December 1, 2016, through November 30, 2017. Participants who were asked to participate in the study had to be older than 18 years of age, no diagnosis of bipolar disorder, schizophrenia, or dementia, and had to have requested AAA or had a member of their care team request a visit. Written consent was obtained for all participants in this study. Out of the 100 asked, 20 agreed to participate and completed all surveys.

The animal-assisted activities were provided by the institution's Caring Canines program. All teams are registered with an official therapy dog organization, such as Pet Partners, Alliance of Therapy Dogs, or Therapy Dogs International. The therapy dog teams are retested every two years, must attend Caring Canines training events, and undergo institution-specific testing. The AAA team, which comprised a dog handler and registered therapy dog, visited each patient in their hospital room. Therapy dog teams comprised of male and female handlers and dogs and a variety of breeds. Participants cannot request specific breeds, as availability was based on who was volunteering on campus each day. Furthermore, depending on the patient's interest, condition, and availability, 20 to 30 minutes of AAA was provided. Interventions were conducted in an individualized manner according to the patient's choice. Participants could lie with the therapy dog on a bed, sit in a chair next to the therapy dog, or take the therapy dog for a walk around the hospital unit.

Survey Instruments

Participants were asked to grade their symptoms and feelings before and immediately after the AAA, using a visual analog scale (VAS) (range, 0 [best possible] to 10 [worst possible]) [20,21]. Symptoms included pain, fatigue, anxiety, depression, loneliness, frustration, nervousness, and stress. Feelings included anger, cheerfulness, happiness, energy level, companionship, relaxation/calmness, and emotional well-being. This survey was selected as it is frequently used in literature to substantiate a change in patient's symptoms and feelings. Participants were also asked to provide responses to a 5-question satisfaction survey, comments, suggestions for improvement, a reason for the AAA consultation, and the referral source (self-referral, physician suggestion, or other [i.e., friend or family member]). In addition to the participants, care team members completed a 4-question survey about interference of the AAA with patient care. Questions covered topics on if care team was comfortable with the visits, if it interfered or created disturbances to patient care. Care team members were also asked to provide qualitative comments about their experience with AAA. Surveys were selected to investigate the overall effects of the AAA on the symptoms and feelings of hospitalized participants, record patient's satisfaction, and obtain feedback from hospital patient care teams.

Data Collection and Analysis

A study team member administered all surveys, and responses were deidentified. Data were entered into and stored in a secure, password-protected, web-based, REDCap (Research Electronic Data Capture) [22]. Patient demographic characteristics and diagnoses were abstracted from health records. Data analysis used descriptive and inferential statistics to assess outcome measures. Effectiveness of AAA was determined by comparing the VAS scores for symptoms and feelings with a paired *t*-test and significance set at (P=0.05).

Results

Demographics, Reasons, and Referral Patterns

Out of 100 participants asked to participate, 20 agreed to participate (response rate, 20%). Mean (SD; range) patient age was 50.9 (21.7; 19-85) years, and 12 participants (60%) were women. Additional demographics and reasons for hospitalization and admitting department can be found in Table 1.

The most common reason (40%; n=8) why an AAA was requested was "companionship", followed by "animal lover" (35%; n=7), "recommended by care team" (10%; n=2), and "medical condition" (10%; n=2). One patient did not provide a specific reason why a visit was requested (Table 1).

For the referral response, 35% (n=7) was "other" (i.e., friends or family member), followed by "physician suggestion" (30%; n=6), and "self-referred" (25%; n=5). Two participants did not provide a response to why AAA was referred.

VAS Scores and Satisfaction

When comparing post-visit VAS scores to pre-visit, there was a highly significant improvement in symptoms, including stress, anxiety, fatigue, and frustration (P<0.001), depression (P=0.002), nervousness (P=0.003), loneliness (P=0.008), and pain (P=0.01).

There was also significantly improved for the feelings of anger (P=0.047), energy level (P=0.002), companionship (P=0.045), relaxation/calmness (P=0.002), emotional wellbeing (P=0.004), and cheerfulness (P=0.003) (Table 2).

The patient satisfaction survey showed that all 20 participants were satisfied with the AAA, with 75% (n=15) rating their visit as "excellent." All participants stated they would recommend AAA and would be interested in another AAA visit. Furthermore, all participants agreed that the AAA improved the quality of their hospital stay. Descriptive remarks and comments are listed in Table 3.

Care Team Member Satisfaction

Eight care team members returned the satisfaction survey. When the care team was asked if there were comfortable with their patients having AAA, it was reported that all care team members were comfortable with the therapy dog visits. Additionally, the care team was asked if the AAA interfered with patient care flow, all reported that it did not interfere. All team members also agreed that AAA did not create any disturbance in the hospital. Furthermore, the care team responded that they would not object to AAA visits if requested by their

Table 1: Demographics and reason for animal-assisted activity (AAA).

Age, y	Sex	Hospitalization	Admitting Department	Reason for AAA
70	Female	Respiratory failure	Pulmonary Medicine	Animal lover[b]
85	Male	Laminectomy for malignant tumor	Neurology	Animal lover
82	Male	Cerebral hemorrhage	Neurology	Medical condition[c]
19	Female	Surgical repair of ventricular septal defect	General Surgery	Animal lover
31	Male	Seizure disorder	Neurology	Companionship[d]
23	Female	Descending thoracic aortic dissection	Cardiovascular	Medical condition
27	Female	Trapezius imbrication and scapula stabilization	Orthopedic Surgery	Animal lover
69	Female	COPD requiring mechanical ventilation	GIM[a]	Companionship
64	Female	Pulmonary fibrosis and awaiting lung transplant	Pulmonary Medicine and Critical Care	Care team Recommended
66	Male	Left ventricular assist device placement	Cardiovascular	Companionship
49	Female	Obstructive uropathy	Nephrology and Hypertension	Not reported
54	Male	Opioid withdrawal	GIM[a]	Companionship
47	Male	Alcoholic liver cirrhosis	Gastroenterology and Hepatology	Animal lover
24	Female	Indeterminate pulmonary nodule	Thoracic Surgery	Companionship
47	Female	Pancytopenia and melena	Gastroenterology and Hepatology	Companionship
23	Female	Periauricular cellulitis	GIM[a]	Companionship
79	Male	Transcatheter aortic valve replacement and acute tubular necrosis	Cardiovascular	Companionship
34	Female	Burkitt lymphoma	Hematology	Animal lover
69	Male	Bariatric surgery	General Surgery	Animal lover
56	Female	Renal failure	GIM[a]	Care team Recommended

[a]GIM, General Internal Medicine

[b]Quoted responses on the surveys included "I like dogs", "I love animals", "I like animals", and "Makes me happy."

[c]Quoted responses on the surveys included "Stroke" and "Depression."

[d]Quoted responses on the surveys included "To make me happy. I have a therapy dog at home," "Love and miss my dog", "I used to have a black lab—miss him", "I love dogs and miss mine at home", "Miss pet at home", and "Going stir-crazy".

Table 2: Pre-visit and post-visit visual analog scale (VAS) scores.

Parameters	VAS Score, Mean (SD)[a]		*P* Value
	Pre-Visit	Post-Visit	
Symptom			
Pain	4.6 (3.0)	2.7 (2.3)	0.01
Fatigue	5.6 (1.5)	2.7 (1.9)	<0.001
Anxiety	4.7 (2.5)	1.5 (1.6)	<0.001
Depression	3.5 (2.5)	1.0 (1.6)	0.002
Loneliness	3.1 (2.5)	1.0 (1.5)	0.008
Frustration	4.9 (2.9)	0.9 (1.4)	<0.001
Nervousness	3.8 (3.1)	0.8 (1.1)	0.003
Stress	4.5 (2.8)	0.9 (1.5)	<0.001
Feeling			
Anger	2.4 (2.9)	0.6 (1.1)	0.047
Happiness	4.7 (2.0)	3.0 (2.9)	0.08
Energy level	6.4 (2.2)	3.4 (2.1)	0.002
Companionship	4.7 (2.7)	2.5 (2.9)	0.045
Relaxation/calmness	5.4 (2.3)	2.6 (2.5)	0.002
Emotional well-being	4.9 (2.4)	2.5 (2.5)	0.004
Cheerfulness	4.6 (2.4)	2.2 (2.3)	0.003

[a]Scores range from 0 (best possible) to 10 (worst possible).

Table 3: Results of the patient satisfaction survey.

Survey Question	n (%)
Were you satisfied with the AAA intervention (therapy dog visit)?	
Yes	20 (100%)
No	0 (0%)
If satisfied, please rate your satisfaction?	
Excellent	15 (75%)
Very good	4 (20%)
Good	1 (5%)
Did the quality of your hospital stay improve with AAA?	
Yes	20 (100%)
No	0 (0%)
Would you recommend AAA to other hospitalized patients?	
Yes	20 (100%)
No	0 (0%)
Would you be interested in AAA in your next hospital stay?	
Yes	20 (100%)
No	0 (0%)

Abbreviation: AAA, animal-assisted activity. Survey questions printed with permission of Mayo Foundation for Medical Research and Education; all rights reserved.

patients. Reported qualitative comments by the care team included, "Patients really like pet visits", "The program is great for patients and staff, it spreads joy with every wag!", and "Great experience, hope that the program will continue."

Discussion

Hospitalized patients may have multiple physical and psychological symptoms and experience stressors that affect their recovery, quality of life, and overall hospital stay [23-25]. This pilot study enrolled 20 hospitalized participants who were receiving various hospital services in a tertiary care center. This study observed significant improvements in the post-visit VAS scores for symptoms of pain, fatigue, anxiety, depression, loneliness, frustration, nervousness, and stress after a 20- to 30-minute individualized session of AAA. Furthermore, VAS scores for the feelings of anger, cheerfulness, energy level, companionship, relaxation/calmness, and emotional wellbeing improved significantly after an AAA. These results are consistent with those of previous studies, noting the benefit of animal visits for older adults, children with autism, hospitalized patients, patients receiving hospice care, and patients with behavioral conditions [26-35].

Notably, VAS scores for pain improved significantly after the AAA. In recent years, pain management has been a considerable challenge for health care providers, and the opioid epidemic has become a public

health emergency [36]. The National Institutes of Health has partnered with 30 pharmaceutical companies and academic centers to develop pain management strategies [37], including investment in studies that explore nonpharmacologic approaches to pain management [38,39]. Studies have reported the correlation of AAA with reductions in self-reported pain scores in pediatric [27] and adult patients [12,24]. Our results support these findings in patients who opt for an AAA during their hospital stay.

Patient satisfaction and experience have been emphasized as key components of health care delivery. Scores from the Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS), a national standardized survey for inpatient hospital care, can be used to measure patient experience [40,41]. A randomized controlled trial conducted by Harper et al [12] reported higher HCAHPS scores for patients who received a therapy dog intervention after total joint replacement than for patients in a control group. Findings from the participants' satisfaction survey also suggest that quality of the hospital stay can be improved with AAA. Our study cohort included participants from various ages (range, 19-85 years), which indicates that younger and older patients are interested in receiving AAA.

Referral pattern has an important role in incorporating integrative therapies into a multidisciplinary approach [42-44] and thereby enhancing patient-centered inpatient care. Our study participants reported that referrals were initiated by physicians, themselves, or others. This demonstrates that physicians, patients, and family members and/or friends are aware of the volunteer-provided AAA program.

Additionally, the care team survey results indicated that AAA did not create any disruption in the hospital, and the care teams were comfortable with the therapy dog visits. Due to the volunteer teams being on campus while other important hospital tasks are taking place, the volunteers are encouraged to wait patiently, never interrupt a care team member or a procedure, and ask before allowing the therapy dogs to enter a room. The volunteer teams are instructed to leave if a care team member comes to see a patient while the therapy dog visit is taking place to prevent disruptions.

The benefit of AAA for hospitalized patients is believed to be related to the stimulation of attraction to the animal and the distraction from the hospital environment, leading to an attachment response in patients that is then reflected in the patient's wellbeing [45]. Preliminary research indicates that the beneficial changes observed in patients who participated in AAA corresponds to physiologic changes. Reduced levels of stress hormones, such as epinephrine and norepinephrine, and increased endorphin concentrations have been observed after brief therapy dog visits [46]. Three recent systemic reviews about dog-assisted intervention in health care and hospital settings were recently published [17,18,47]. These reviews reported generally favorable results [18], including minor-to-moderate effects of dog-assisted therapy on patients with psychiatric conditions and cognitive disorders [17], and stated that additional standardized research is needed to better address the effect of AAA on hospitalized patients [18,47].

Animal-assisted activities are a complementary measure to patient treatment programs, and its value for hospitalized patients must be put into perspective and be considered rationally. These visits certainly enhance the hospital experience for patients who love dogs; however, despite these benefits, AAA may be associated with problems, including allergic reactions, asthma, bites, scratches, and infections [48].

Few studies have examined the effect of AAA on therapy animals and the mechanisms that led to therapeutic effects in humans. Policies and procedures vary between programs, and rigorous, well-designed studies are needed to accurately assess the effect of AAA on hospitalized patients.

Limitations

One of the main limitations of this study was the study team was only able to enroll 20 participants out of 100 that were asked. More than likely, this was due to the selected cohort, which included only hospitalized patients in tertiary care, which limits generalizability, and other types of patients (i.e., outpatients, pediatric patients) could be enrolled in future studies. In addition, our pilot study lacked a control group and had a low response rate. The low response rate may be partly explained by the serious illnesses of our hospitalized patients and their busy schedules, which left little enthusiasm to complete multiple surveys.

Conclusion

Animal-assisted activities may be a helpful adjunct integrative medicine intervention to traditional medical care for appropriate patients (i.e., patients who love animals and patients without a medical contraindication) who are hospitalized at a tertiary care center. Furthermore, AAA may provide emotional support and may improve the quality of hospital stay for patients and their family members. However, additional standardized research is needed to better assess the mechanisms of AAA that affect hospitalized patients and the welfare of therapy dogs.

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Conflict of Interest

The authors declare that there is no conflict of interest.

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References

1. Creagan ET, Bauer BA, Thomley BS, Borg JM (2015) Animal-assisted therapy at Mayo Clinic: The time is now. Complement Ther Clin Pract 21: 101-104. https://doi.org/10.1016/j.ctcp.2015.03.002
2. Lasa SM, Ferriero G, Brigatti E, Valero R, Franchignoni F (2011) Animal-assisted interventions in internal and rehabilitation medicine: A review of the recent literature. Panminerva Med 53: 129-136.
3. Turner DC (2011) Animal-assisted interventions for children and adolescents: What animals mean to them, why and when AAIs work, and who should be involved. Eur Child Adolesc Psych 20: S24.
4. Foster M, Beppler E, Holder T, Dieffenderfer J, Erb P, et al. (2018) A system for assessment of canine-human interaction during animal-assisted therapies. Conf Proc IEEE Eng Med Biol Soc 2018: 4347-4350. https://doi.org/10.1109/EMBC.2018.8513384
5. Stefanini MC, Martino A, Allori P, Galeotti F, Tani F (2015) The use of animal-assisted therapy in adolescents with acute mental disorders: A randomized controlled study. Compl Ther Clin Pract 21: 42-46. https://doi.org/10.1016/j.ctcp.2015.01.001
6. Stinchi A, Cardinale V, Pompa G (2012) Perceptible benefits of pet therapy in a paediatric unit. Medico E Bambino 31: 53-54.

7. Schuck SE, Emmerson NA, Fine AH, Lakes KD (2015) Canine-assisted therapy for children with ADHD: Preliminary findings from the positive assertive cooperative kids study. J Atten Disord 19: 125-137. https://doi.org/10.1177/1087054713502080

8. Braun C, Stangler T, Narveson J, Pettingell S (2009) Animal-assisted therapy as a pain relief intervention for children. Compl Ther Clin Pract 15: 105-109. https://doi.org/10.1016/j.ctcp.2009.02.008

9. Sobo EJ, Eng B, Kassity-Krich N (2006) Canine visitation (pet) therapy: Pilot data on decreases in child pain perception. J Holist Nurs 24: 51-57. https://doi.org/10.1177/0898010105280112

10. Marcus DA, Bernstein CD, Constantin JM, Kunkel FA, Breuer P, et al. (2013) Impact of animal-assisted therapy for outpatients with fibromyalgia. Pain Med 14: 43-51. https://doi.org/10.1111/j.1526-4637.2012.01522.x

11. Abate SV, Zucconi M, Boxer BA (2011) Impact of canine-assisted ambulation on hospitalized chronic heart failure patients' ambulation outcomes and satisfaction: A pilot study. J Cardiovasc Nurs 26: 224-230. https://doi.org/10.1097/JCN.0b013e3182010bd6

12. Harper CM, Dong Y, Thornhill TS, Wright J, Ready J, et al. (2015) Can therapy dogs improve pain and satisfaction after total joint arthroplasty? A randomized controlled trial. Clin Orthop Relat Res 473: 372-379. https://doi.org/10.1007/s11999-014-3931-0

13. Urbanski BL, Lazenby M (2012) Distress among hospitalized pediatric cancer patients modified by pet-therapy intervention to improve quality of life. J Pediatr Oncol Nurs 29: 272-282. https://doi.org/10.1177/1043454212455697

14. Marcus DA (2013) The science behind animal-assisted therapy. Curr Pain Headache Rep 17: 322. https://doi.org/10.1007/s11916-013-0322-2

15. Mayo Clinic Staff (2018) Pet therapy: animals as healers. Minnesota, United States.

16. Murthy R, Bearman G, Brown S, Bryant K, Chinn R, et al. (2015) Animals in healthcare facilities: Recommendations to minimize potential risks. Infect Control Hosp Epidemiol 36: 495-516. https://doi.org/10.1017/ice.2015.15

17. Lundqvist M, Carlsson P, Sjödahl R, Theodorsson E, Levin LÅ (2017) Patient benefit of dog-assisted interventions in health care: A systematic review. BMC Compl Altern Med 17: 358. https://doi.org/10.1186/s12906-017-1844-7

18. Charry-Sánchez JD, Pradilla I, Talero-Gutiérrez C (2018) Animal-assisted therapy in adults: A systematic review. Compl Ther Clin Pract 232: 169-180. https://doi.org/10.1016/j.ctcp.2018.06.011

19. Bert F, Gualano MR, Camussi E, Pieve G, Voglino G, et al. (2016) Animal assisted intervention: A systematic review of benefits and risks. Eur J Integrative Med 8: 695-706. https://doi.org/10.1016/j.eujim.2016.05.005

20. Ferreira-Valente MA, Pais-Ribeiro JL, Jensen MP (2011) Validity of four pain intensity rating scales. Pain 152: 2399-2404. https://doi.org/10.1016/j.pain.2011.07.005

21. Cutshall SM, Mahapatra S, Hynes RS, Van Rooy KM, Looker SA, et al. (2017) Hand massage for cancer patients undergoing chemotherapy as outpatients: A pilot study. Explore 13: 393-399. https://doi.org/10.1016/j.explore.2017.06.007

22. Harris PA, Taylor R, Thielke R, Payne J, Gonzalez N, et al. (2009) Research electronic data capture (REDCap)—A metadata-driven methodology and workflow process for providing translational research informatics support. J Biomed Inform 42: 377-381. https://doi.org/10.1016/j.jbi.2008.08.010

23. Miller E, Jacob E, Hockenberry MJ (2011) Nausea, pain, fatigue, and multiple symptoms in hospitalized children with cancer. Oncol Nurs Forum 38: E382-E393. https://doi.org/10.1188/11.onf.e382-e393

24. Coakley AB, Mahoney EK (2009) Creating a therapeutic and healing environment with a pet therapy program. Compl Ther Clin Pract 15: 141-146. https://doi.org/10.1016/j.ctcp.2009.05.004

25. Alshemmari S, Ezzat H, Samir Z, Sajnani K, Alsirafy S (2010) Symptom burden in hospitalized patients with cancer in kuwait and the need for palliative care. Am J Hosp Palliat Care 27: 446-449. https://doi.org/10.1177/1049909110362438

26. Nimer J, Lundahl B (2007) Animal-assisted therapy: A meta-analysis. Anthrozoös 20: 225-238. https://doi.org/10.2752/089279307X224773

27. Calcaterra V, Veggiotti P, Palestrini C, De Giorgis V, Raschetti R, et al. (2015) Post-operative benefits of animal-assisted therapy in pediatric surgery: A randomised study. PLoS One 10: e0125813. https://doi.org/10.1371/journal.pone.0125813

28. Caprilli S, Messeri A (2006) Animal-assisted activity at A. Meyer Children's hospital: A pilot study. Evid Based Compl Alternat Med 3: 379-383. https://doi.org/10.1093/ecam/nel029

29. Mudzyk A, Bourque M, Guilbert H, Seguin AD, Savoye MJ (2011) Animal assisted therapy in a long-term care nursing home. Soins Gerontol 88: 11-13.

30. Engelman SR (2013) Palliative care and use of animal-assisted therapy. Omega (Westport) 67: 63-67. https://doi.org/10.2190/om.67.1-2.g

31. Waite TC, Hamilton L, O'Brien W (2018) A meta-analysis of animal assisted interventions targeting pain, anxiety and distress in medical settings. Compl Ther Clin Pract 33: 49-55. https://doi.org/10.1016/j.ctcp.2018.07.006

32. Ein N, Li L, Vickers K (2018) The effect of pet therapy on the physiological and subjective stress response: A meta-analysis. Stress Health 4: 477-489. https://doi.org/10.1002/smi.2812

33. Ambrosi C, Zaiontz C, Peragine G, Sarchi S, Bona F (2019) Randomized controlled study on the effectiveness of animal-assisted therapy on depression, anxiety, and illness perception in institutionalized elderly. Psychogeriatrics 19: 55-64. https://doi.org/10.1111/psyg.12367

34. Schmitz A, Beermann M, MacKenzie CR, Fetz K, Schulz-Quach C (2017) Animal-assisted therapy at a university centre for palliative medicine -A qualitative content analysis of patient records. BMC Palliat Care 16: 50. https://doi.org/10.1186/s12904-017-0230-z

35. Branson SM, Boss L, Padhye NS, Trötscher T, Ward A (2017) Effects of animal-assisted activities on biobehavioral stress responses in hospitalized children: A randomized controlled study. J Pediatr Nurs 36: 84-91. https://doi.org/10.1016/j.pedn.2017.05.006

36. Bernard SA, Chelminski PR, Ives TJ, Ranapurwala SI (2018) Management of pain in the United States-A brief history and implications for the opioid epidemic. Health Serv Insights 11: 1178632918819440. https://doi.org/10.1177/1178632918819440

37. Kuehn B (2017) NIH strategy to combat opioid crisis. JAMA 318: 2418. https://doi.org/10.1001/jama.2017.19920

38. Abbasi J (2018) Robert Kerns, PhD: Researching nondrug approaches to pain management. JAMA 319: 1535-1537. https://doi.org/10.1001/jama.2018.0247

39. Taylor SL, Herman PM, Marshall NJ, Zeng Q, Yuan A, et al. (2019) Use of complementary and integrated health: A retrospective analysis of U.S. veterans with chronic musculoskeletal pain nationally. J Altern Compl Med 25: 32-39. https://doi.org/10.1089/acm.2018.0276

40. Hanson KT, Zalewski NL, Hocker SE, Caselli RJ, Habermann EB, et al. (2018) At the intersection of patient experience data, outcomes research, and practice: Analysis of HCAHPS scores in neurology patients. Mayo Clin Proc Innov Qual Outcomes 2: 137-147. https://doi.org/10.1016/j.mayocpiqo.2018.03.007

41. Cooley LF, Barker SB (2018) Canine-assisted therapy as an adjunct tool in the care of the surgical patient: A literature review and opportunity for research. Altern Ther Health Med 24: 48-51.

42. Griffin KH, Nate KC, Rivard RL, Christianson JB, Dusek JA (2016) Referrals to integrative medicine in a tertiary hospital: findings from electronic health record data and qualitative interviews. BMJ Open 6: e012006. http://dx.doi.org/10.1136/bmjopen-2016-012006

43. Gray B, Orrock P (2014) Investigation into factors influencing roles, relationships, and referrals in integrative medicine. J Altern Compl Med 20: 342-346. https://doi.org/10.1089/acm.2013.0167

44. O'connor BB, Eisenberg DM, Buring JE, Liang CL, Osypiuk K, et al. (2015) Within-team patterns of communication and referral in multimodal treatment of chronic low back pain patients by an integrative care team. Glob Adv Health Med 4: 36-45. https://doi.org/10.7453/gahmj.2014.076

45. Brodie SJ, Biley FC (1999) An exploration of the potential benefits of pet-facilitated therapy. J Clin Nurs 8: 329-337. https://doi.org/10.1046/j.1365-2702.1999.00255.x

46. Odendaal JS, Meintjes RA (2003) Neurophysiological correlates of affiliative behaviour between humans and dogs. Vet J 165: 296-301. https://doi.org/10.1016/S1090-0233(02)00237-X

47. McCullough A, Ruehrdanz A, Jenkins M (2016) The use of dogs in hospital settings. HABRI Central Briefs 2016: 1-9.

48. Khan MA, Farrag N (2000) Animal-assisted activity and infection control implications in a healthcare setting. J Hosp Infect 46: 4-11. https://doi.org/10.1053/jhin.2000.0785