

Generating Evidence for Perceptions, Knowledge, Beliefs, and Use of
Music, Aromatherapy and Guided Imagery in Critical Care Settings

A Dissertation

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Dedication

**Knowledge belongs to humanity and is
the torch which illuminates the world- Louis Pasteur**

I would like to extend a genuine thank you to my children Shahyan, Alyshan and husband Barket Ali, for their continuous and unconditional support. I would also like to extend my gratitude to my sister Salimah Meghani, my parents Noor and Yousuf Ali and my friends who provided relentless and sincere support during this journey.

Abstract

This dissertation begins with two integrative reviews of literature constituting the current evidence on the use of music, aromatherapy and guided imagery for the symptom management of pain, insomnia and anxiety in critically ill patients. The first integrative review of literature examines the use of music therapy for the management of anxiety, pain, and insomnia in critical care. Following this, the dissertation proceeds with an examination of the evidence of aromatherapy and guided imagery in improving the signs and symptoms of anxiety, pain, and insomnia in critical care. The results of these integrative reviews offer evidence-based insights of the use of these three therapies in critical care. The dissertation also includes a brief background of the development of Tracy et al.'s survey from 2003, which was used in a national survey of critical care nurses on the attitudes, knowledge and use of complementary therapies. Since then no other surveys have been conducted in the United States, thus contemporary perceptions, use and knowledge of critical care nurses regarding complementary therapies are virtually unknown in this area.

This dissertation concludes with results of a study examining the perceptions, knowledge, beliefs and use of complementary therapies of critical care nurses from multiple intensive care units within a single tertiary care hospital. The survey was administered twice 4-6 weeks apart, generating the consistency of responses data of the survey measures. For the cohesiveness of this dissertation, the results presented focus on the domains of perceptions, knowledge, beliefs, and use related to the three primary therapies of interest: Music therapy, aromatherapy and guided imagery. Further, the

consistency of responses data for these three therapies are evaluated pertinent to eight items/measures related to the domains of perceptions, knowledge, beliefs, and use of these three therapies. Finally, the implications of this body of work related to practice, education and research are presented.

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CHAPTER 1: INTRODUCTION

Knowledge of the public interest and use of complementary and alternative therapies (CAT) is important to health care providers in that these therapies may impact health- both positively and negatively. The effects of these therapies may be beneficial if used wisely, they may have no effect on health, or they may even cause adverse health effects or interact with concomitantly prescribed Western therapies.

Nowhere is it more significant to weigh the benefits and risks of Western medicine and CAT than in critical care settings, where the use of Western medicine and technology may be at its greatest intensity. Therefore, critical care nurses must be cognizant of CAT being used by patients, which may be contributing positively or negatively to the patient's condition. Critical care nurses may also want to consider what therapies are *not* being used, which could benefit the patient's health condition, provide comfort, or which could ease adaptation to illness and soften the seeming stark, sharp edges of the intensive critical care environment or life-saving therapies. Awareness of CAT and working knowledge of their potential impact on patients in critical care is thus important to nurses working in critical care environments.

To best illuminate the state of use and perceptions of CAT in critical care, three therapies, music therapy, aromatherapy and guided imagery, were chosen to examine the evidence of their benefits and use in critical care settings. These three therapies were selected because of their easy integration into critical care nurses' daily work and likelihood of acceptability for use with patients. Having current evidence available to critical care nurses on music, aromatherapy and guided imagery therapies can empower

nurses to have the knowledge and evidence for sensible use of these therapies in critical care settings (Meghani, Tracy, Hadidi & Lindquist, 2017).

Survey of Critical Nurses' Use of Complementary Therapies

In 2003, the first large formal survey of a nationally representative sample of critical care nurses was conducted by Tracy and colleagues (Tracy et al., 2005) to evaluate the patterns of use of CAT by nurses in critical care. This important study found that the most predominant CATs used by critical care nurses in their professional practice at that time were diet, exercise, relaxation, and prayer or spiritual direction (Tracy et al., 2005). The survey determined that overall, critical care nurses required less evidence for use of CAT as compared to Western (allopathic) therapies and that the critical care nurses' attitudes were overall positive towards CAT (Tracy et al., 2005). Since that time, no other national surveys of critical care nurses in the United States have been conducted; and critical care nurses' patterns of complementary therapies use in practice may have progressed. However, there is no current data upon which to base our understanding of patterns of critical care nurses' perceptions, knowledge, personal and professional use of CAT or how they may have evolved.

A future goal is to repeat the survey with critical care nurses nationally. Prior to that, it is essential that the quality of the survey instrument be evaluated. In the original development of the instrument, face validity was assured by the inclusion of 28 therapies that were listed on the National Center for Complementary and Alternative Medicine (NCCAM) website (Tracy et al., 2003). In its development, the survey was viewed by several content experts to affirm its face validity. The survey was pilot tested with 4

nurses and a pharmacist for clarity of language and content, relevance to critical care practice and ease of use, and then with two samples of critical care nurses at two tertiary care settings in the Midwest region (Tracy et al., 2003). Since then, the tool used for the national survey (Tracy et al., 2005) has been requested and used in countries outside of the United States [e.g., Cooke, Mitchell, Tiralongo, & Murfield (2012)]. However, recent requests received for the use of the survey have also included requests for evaluations of its psychometric properties (i.e., the evidence of its reliability and validity) when used to assess attitudes, knowledge and use of CAT among critical care nurses.

In the context of this dissertation work, the therapies on the survey were revised and updated with expert consultation. The original instrument included 28 select CAT belonging to 5 categories (mind-body interventions, alternative medical systems, manipulative and body-based methods, biological-based therapies, and energy therapies) based on the NCCAM Classification System (Meghani, Lindquist, & Tracy, 2003; Tracy et al., 2003) at that time. Most of these therapies are still listed on the current National Center for Complementary and Integrative Health (NCCIH) website (NCCIH, 2019). However, currently the complementary health approaches/therapies are categorized into natural products, mind body practices, and other complementary health approaches. “Natural products” includes herbs, vitamins, minerals and probiotics frequently promoted and sold as dietary supplements. “Mind and body practices” include such practices as meditation, yoga, chiropractic and osteopathic manipulation, relaxation techniques, and acupuncture. Whereas, health approaches which do not belong in the above two groups are grouped in “other complementary health approaches” and consist of approaches such

as Ayurvedic medicine, homeopathy, traditional healers, naturopathy and traditional Chinese medicine (NCCIH, 2019).

For this study, the survey has been updated to ensure the inclusion of current complementary therapies that can be feasibly used in the critical care settings. Two therapies were added to the list: Reflexology and Reiki. Additionally, seven therapies which are not commonly used in critical care units were deleted from the list of therapies in the survey: Tai Chi, Native American Medicine, Traditional Chinese Medicine, Qigong, Environmental Medicine, Homeopathic Medicine and Electromagnet Therapy.

For the purpose of this dissertation, the revised survey was administered to critical care nurses at one Midwestern tertiary care center. A repeat administration of the survey was conducted with a small subset of the original critical care nurse respondents. Data related to the sample demographics and broad perspectives on the use of music therapy, aromatherapy, and guided imagery in critical care are presented; data related to the consistency of responses of the measures are also included.

Purpose(s)

The unified theme for this dissertation is the following:

1. To present two integrative reviews of the current evidence of three pertinent therapies, music, aromatherapy and guided imagery, in critical care.
2. To present the perceptions, knowledge, beliefs and patterns of critical care nurses' use of these three therapies in eight domain measures: Perceptions of legitimacy, knowledge, and interest in further knowledge/training; beliefs about harm/benefits of

these therapies to patients; professional use and personal use; recommendations to and requests from patients and families regarding use of these therapies.

3. To present the consistency of responses data of critical care nurses derived from the responses of critical care nurses between Time 1 and Time 2 of survey administration, related to three pertinent therapies- music, aromatherapy and guided imagery.

The next two chapters focus on two integrative reviews of literature related to the evidence-based use of music therapy, aromatherapy and guided imagery for management of pain, anxiety and insomnia in critical care.

It is important to note that there are several different acronyms and terms used in the literature when referring to complementary and alternative therapies. For this paper, complementary, non-pharmacological, adjunctive, unconventional and integrative therapies will all be addressed as complementary and alternative therapies (CAT). If complementary and alternative medicine (CAM), complementary/ alternative therapies (C/AT) or other terminologies are used to refer to complementary therapies in a particular paper, then those terms are used when referring to that article in this dissertation.

CHAPTER 2

Overview

Chapter 2 presents manuscript 1, an integrative review related to the current evidence of the use of music intervention/therapy for the symptom management of anxiety, pain and insomnia in critically ill patients. The results of this review revealed that use of music intervention/therapy was significantly associated with improving the signs and symptoms of pain, insomnia and anxiety in critically ill adult patients. This manuscript was published in the journal, *Dimensions of Critical Care Nursing*.

Meghani N, Tracy MF, Hadidi N, Lindquist, R. Part I: The effects of music for the symptom management of anxiety, pain, and insomnia in critically ill patients: an integrative review of current literature. *Dimens Crit Care Nurs*. 2017;36(4):234-245.

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Title: Part I: The Effects of Music for the Symptom Management of Anxiety, Pain, and Insomnia in Critically Ill Patients: An Integrative Review of Current Literature.

Critical care environments are known for provoking anxiety, pain and sleeplessness. Often these symptoms are attributed to patients' underlying physiological conditions; life sustaining or life prolonging treatments such as ventilators, invasive procedures, tubes, and monitoring lines; and noise and the fast-paced technological nature of the critical care environment. This in turn possibly increases length of stay and morbidity and challenges the recovery and healing of critically ill patients. Complementary therapies can be used as adjunctive therapies alongside pharmacological interventions and modalities. One complementary therapy with promise in critical care for improving symptoms of anxiety, pain and sleeplessness is music. A review of current literature of Ovid MEDLINE, Cumulative Index to Nursing and Allied Health Literature and PubMed was conducted to examine the evidence for the use of this complementary therapy in critical care settings. This review presents the evidence on effectiveness of music for the symptom management of anxiety, pain and insomnia in critically ill adult patients. The evidence from this review supports music in symptom management of pain, insomnia and anxiety in critically ill patients. This review provides practice recommendations, generates dialog and promotes future research. This review is Part I of a two-part series that focuses on evidence for use of music, aromatherapy and guided imagery for improving anxiety, pain and sleeplessness in critically ill patients.

Keywords: Anxiety, Complementary therapies, Critical care, Music, Pain, Sleeplessness

BACKGROUND

National Health Statistics estimates of Americans' out of pocket expenditure for complementary therapies is \$30.2 billion a year. This accounts for 9.2 percent of all out-of-pocket expenditures by Americans on health care.^{1,2} Several studies acknowledge the ubiquitous landscape of health care today in which conventional and unconventional medicine and therapies are practiced together.^{1,3,4} It is estimated that more than 5.7 million patients are admitted to intensive care units (ICUs) in the United States each year.⁵ The estimated cost of critical care in the United States ranges between \$121 to \$263 billion.⁶ Critical care units are often referred to as high tech, low touch environments^{4,7} and critically ill patients face major problems such as anxiety, pain and insomnia because of underlying physiological conditions, noise, and technology in critical care. Critically ill patients are often given intravenous analgesics and sedatives to promote comfort and ventilator synchrony⁸ and to offer relief from distressing monitoring and procedures, which are virtually routine in critical care settings. However, these pharmacological measures can be counterproductive, and can cause delayed weaning and subsequently increased length of stay (LOS) in ICU, and can impede healing.^{9,10} Critical care nurses play a pivotal role in providing holistic care.⁴ Use of Complementary/Alternative Therapies (CATs) as adjunctive modalities, along with pharmacological and other critical care interventions, is within the realm of nursing practice, and CATs as adjunctive modalities have been used by nurses. These therapies have been used by critical care nurses to ameliorate the effects of anxiety, pain and sleep disturbances in critically ill patients.^{7,10}

It is noteworthy that the National Center for Complementary and Integrative Health (NCCIH) distinguishes among complementary, alternative and integrative health. NCCIH generally uses the term “complementary health approaches” when addressing practices and products that are not part of mainstream health care. They use “integrative health” when discussing the integration of complementary therapies into mainstream health care.¹¹ There are several different acronyms and terms used in the literature. For this article; complementary, non-pharmacological, adjunctive, unconventional and integrative therapies will all be addressed as Complementary Alternative Therapies (CAT).

The demand for the use of CATs in health care is on the rise,¹⁻³ and critical care nurses are in a prime position to relieve their patients’ untoward symptoms arising from their underlying physiological conditions, and aggressive and frightening critical care interventions and procedures. However, positive benefits of CAT, if any, may not accrue to patients if the evidence and indications for their use are not known and the therapies are under-utilized or not efficaciously used.

In 2003, the first large formal survey of a nationally represented sample of critical care nurses was conducted by Tracy et al⁴ to evaluate the patterns of use of complementary therapies in critical care. This important study concluded that critical care nurses reported diet, exercise, relaxation and prayer or spiritual direction as the most widely used complementary therapies in their professional critical care practice at that time.⁴ Since then, no other national surveys of critical care nurses in the United States have been conducted, and critical care nurses’ patterns of use may have evolved.

However, studies have been conducted to determine suitability of specific complementary therapies for critically ill patients.

Three complementary therapies with potential promise in critical care are music, aromatherapy, and guided imagery. These therapies were chosen for this two-part integrative review since these can be initiated by the critical care nurse as part of independent nursing functions, are inexpensive, and are within the scope of nursing practice. These were deemed good choices since critically ill patients may have different acuities; and having different complementary therapies to choose from, may empower critical care nurses to provide humanistic and holistic care in a fast paced, technological critical care environment. Part I of this two-part series focuses on music; aromatherapy and guided imagery are the focus of Part II.

PURPOSES OF THE REVIEW

The purposes of Part I of this 2-part series are to review, summarize, and synthesize the most current evidence on the use of music for the symptom management of pain, insomnia and anxiety in critically ill adult patients. The published evidence will be summarized, synthesized, and discussed along with the conclusions and limitations of this review.

LITERATURE SEARCH STRATEGY

A comprehensive literature review was conducted surrounding the use of music for the symptom management of anxiety, pain, and insomnia in critical care. Cumulative Index to Nursing and Allied Health Literature, MEDLINE, and PubMed databases were searched with the consultation of an expert librarian. Three advanced searches used the

keywords “complementary therapies,” “alternative therapies,” “adjunctive therapies,” “integrative therapies,” “complementary and alternative medicine,” “CAT,” “ICU,” “critical care,” “anxiety,” “pain,” “insomnia,” “sleeplessness,” “music,” “music therapy,” and “music intervention.”

Studies were included in the literature review if they were primary sources of research studies examining the effect of music on anxiety, pain, or insomnia in critically ill patients. Studies conducted with non-human subjects, pediatric, hospice, obstetric/gynecologic patients, or patients younger than 18 years were excluded. Those articles which were not published in English language were excluded as well. Studies were also included in this review of music studies, if they used nature-based sounds (N-BS) as an intervention, because N-BS were considered relaxing music, including bird songs, waterfalls, soothing rain, river stream, and others with some background music. Between 2010- 2016, a total of nine studies met the review criteria for music and are therefore included in this review.

MUSIC INTERVENTION: REVIEW OF LITERATURE

The American Music Therapy Association¹² describes music therapy as “the evidence-based use of music by a credentialed music professional”¹³ or a music therapist who helps achieve the personalized goals of music intervention through a therapeutic relationship.¹³ An effective music intervention can be a potent distractor, which can occupy the brain networks with pleasant music instead of pain signals or anxiety-generating thoughts.¹⁴

Aims

All nine music studies reviewed had the primary objective of determining the effects of music on reducing one or more of the untoward symptoms in critical care including insomnia, pain, or anxiety; or physiologic parameters of pain and anxiety. A total of 4 of 9 studies aimed to investigate the effects of music for reducing the physiological signs of anxiety in patients receiving mechanical ventilatory support^{8,15,16} and during weaning trials.¹⁷ Agahie et al¹⁸ and Saadatmand et al¹⁹ used similar methods but examined the effect of relaxing N-BS on agitation and anxiety in patients on mechanical ventilator support instead. Ozer et al,²⁰ on the other hand, aimed to investigate the effect of music on self-reported pain intensity and physiological parameters in open heart surgery patients, whereas, Cooke et al²¹ examined the effect of music on pain/discomfort and anxiety during turning procedure. Su et al's²² study was the only one that investigated the effect of music on the quality of sleep and physiological relaxation indices in medical ICU.

Population / Setting/ Sample

In examining the patient populations, settings, and samples, all studies^{8,15-22} were conducted with critically ill patients in critical care settings. All studies were conducted at single sites,^{15-20,22} except for Chlan et al⁸ who conducted a multi-center study in 12 ICUs at 5 urban hospitals. Cook et al²¹ recruited participants from two hospitals, however the sample size was small. While there are benefits and ease to conducting the study at a single setting, it would have been more effective if other studies also used multiple sites to improve the generalizability of their findings. In addition, the sample sizes in the

examined studies were relatively small, ranging from only 10 patients in the intervention group and 7 in the control group in the Cooke et al's²¹ study, to the largest sample size of 373 patients in the Chlan et al's study.⁸ (see Table).

Study Design

Most studies used randomized clinical trial (RCT) designs^{15,16,18,19,22} and Chlan et al⁸ used a 3-group randomization design. Cooke et al,²¹ on the other hand, used a randomized crossover design in which the intervention and control groups crossed over and switched treatment assignment after the washout period. Hunter et al¹⁷ conducted a feasibility study with matched historical controls based on age, sex, and diagnoses- related groups, whereas Ozer et al²⁰ used a quasi-experimental pretest and posttest design based on convenience sampling and did not use randomization or blinding procedures. The American Association of Critical- Care Nurses' evidence leveling hierarchy was used to indicate the strength of evidence in the 9th column of the evidence table.²³

Intervention

In all studies, the interventions varied in terms of duration, frequency of music intervention, and types of music selected.

DURATION AND FREQUENCY

The duration of music intervention in these studies ranged from a single 20-minute intervention¹⁸ to 90 minutes of listening to N-BS.¹⁹ Other researchers used 15 minutes before and during the turning procedure,²¹ or 30 minutes,^{16,20} 45 minutes,²² and 60 minutes of single music intervention.¹⁵ Two studies used the expertise of a music therapist.^{8,17} Chlan et al's⁸ study used a patient-directed music (PDM) protocol, where a

board-certified music therapist assessed patients' music preferences within 24 hours of randomization and then provided each patient with individually tailored music. The patients were also encouraged to self-initiate PDM over the length of 5-6 days. Similarly, Hunter et al¹⁷ utilized the expertise of a music therapist to determine patient preferences and develop a patient-specific music portfolio to implement the intervention, which lasted 45-60 minutes three times per week during weaning trials.

TYPES OF MUSIC

There was a wide range in the types of music selected for music intervention in these studies. They were all described as relaxing, classical, N-BS, geographically based, or preferred music. Chlan et al⁸ used relaxing music (piano, harp, guitar, and Native American flute). Korhan et al¹⁵ used classical music, and Cooke et al²¹ used classical, jazz, country, western, new age, easy-listening or 'other' music, mostly by contemporary artists, whereas, Su et al²² used soothing piano music. The types and music choices were also geographically based. Ozer et al²⁰ used the researchers' collection of Turkish classical, Turkish folk music and Turkish art music, whereas, Han et al¹⁶ used 40 choices from four categories of relaxing music, including Chinese traditional music, Chinese folk songs with lyrics, Western classical music, and Western light music. On the other hand, Agahie et al¹⁸ and Saadatmand et al¹⁹ used N-BS as the intervention. In the Hunter et al's¹⁷ study, all music interventions were performed "live," including guitar, voice, keyboard, and rhythm instruments (based on patient preferences). A music therapist performed live music and followed a pre-determined protocol with each patient, encouraging the patient to participate in music-playing, improvisation, lip syncing,

moving, song writing, and guided imagery. However, if the patient was not able to participate, then passive participation was allowed.

Some researchers took into account patients' choice.^{8,16-21} Patients' preferences and familiarity are important aspects to consider because personal choice can empower patients to choose their own favorite music, which in turn improves the effectiveness of the music intervention.¹⁴ Many investigators described in their protocols how they solicited input from their participants about the volume of music, and sought feedback from participants about their comfort level with the music intervention.^{8,19,20,22} It was also common for researchers to instruct unit staff to minimize unnecessary disturbances and enhance the patients' environment for their comfort and effectiveness of music intervention.^{8,16,19,20,22}

DOSE OF MUSIC AND PRACTICE RECOMMENDATIONS

In this review, studies with longer durations of music intervention^{8,15,19} demonstrated a cumulative dose effect of music, suggesting that longer durations of music intervention may possibly yield further benefits to patients who wish to listen to music for longer periods. However, more evidence is required to confirm this idea. In a recent review, the researchers suggested that a general rule to consider for relaxation and anxiety reduction is when preferred music is listened to for 20-30 uninterrupted minutes at least twice daily, in a comfortable position and environment.^{10,14} Research has also demonstrated that music is most effective at reducing anxiety when it is simple, familiar to the patient and contains 60 to 80 beats per minute.⁸ Nurses can incorporate music in routine care or protocols to divert patients' attention from distressful monitoring and procedures.

However, whenever possible, patients should be asked personally for their music preferences. Critical care nurses should be cognizant that all types and styles of music are not pleasant to every patient and certain types of music can prompt music memories, which in turn can evoke intense emotional responses.¹⁰ It is recommended that patients' family members be encouraged to bring patients' preferred music to the hospital when the patient is unable to communicate their preference.¹⁰ It is also advised that patients' responses should be assessed throughout the experience to make sure that music listening is relieving patients' distress during the intervention.^{4,24}

Findings

All studies examined the effect of music intervention on one of the outcomes of interest in this review including pain,^{20,21} insomnia,²² and anxiety or physiological signs of anxiety.^{8,15-19} Chlan et al⁸ also focused on the influence of music on sedative exposure, measured by sedative drug intensity and frequency, with the mechanically ventilated patients in their study.

The evidence from this review reveals that music intervention was effective in reducing the physiological signs of agitation and anxiety such as blood pressure, heart rate, respiratory rate, and oxygen saturation.^{8,15-19} Chlan et al,⁸ Sadatmand et al,¹⁹ Korhan et al,¹⁵ and Han et al¹⁶ also found a progressive decrease in these parameters in the music group over time, suggesting a cumulative dose effect. Hunter et al¹⁷ found significant reduction in heart rate and respiratory rate in pre and post music sessions revealed through subject analyses. There was also a reduction in self-reported levels of anxiety, and music intervention was reported by patients to be helpful and valuable. In this study,

126 nurses also reported positive perceptions of music, as determined by intervention assimilation nurse surveys.¹⁷

In one study, music slightly improved patients' self-reported pain.²⁰ On the other hand, Cooke et al²¹ found no significant effects of music on patients' self-reported pain and anxiety scores, which they attributed to the small sample size; hence, it was possible that they were not able to capture the true effect of music intervention. Another study in this review, found music intervention to be effective in improving self-reported sleep quality, and improved sleep parameters N2 and N3, Non-rapid eye moment (NREM) sleep as determined by polysomnography, compared to the control group.²² In the Chlan et al's⁸ study, the PDM intervention reduced anxiety and sedative exposure over time more effectively in the music therapy group. Over time, music decreased patients' anxiety and need for sedative medications. Patients in the music group had self-reported anxiety scores that were 19.5 points lower than the patients in noise cancelling headphone group. Over the course of 5 days, there was a 36.5% reduction in anxiety levels in the music group. Subjects in the music group also received 2 fewer sedative doses than subjects in the usual care group.⁸ Hence, it was concluded that music intervention can be used as a simple, safe, and effective method of reducing potentially detrimental physiological responses arising from anxiety,⁸ pain²⁰ and insomnia²² in critically ill patients.

Discussion

This review demonstrates that there is evidence to support that music and N-BS as interventions in critical care can ameliorate the common symptoms of anxiety, insomnia,

and pain in adult critical care patients. These findings are consistent with previous articles and reviews.^{10,14,25} Nature-based sounds are a good addition to the music intervention, because this provides another avenue for patients who prefer N-BS or for culturally diverse patients whose music styles or preferred music styles may not be available. In this review, the music and N-BS intervention provided relief of the common symptoms of anxiety, insomnia, and pain experienced in critical care by these patients. There is a need for future studies with bigger sample sizes, and more rigorous designs and methodologies that examine the long-term outcomes of music on other parameters such as analgesic and sedative medication use, ventilator days, weaning time, mortality, and LOS. In addition, most of these studies were conducted at single sites, and more multicenter studies need to be conducted to improve the generalizability of these findings.

Another reason music is an appealing intervention in critical care is because patients are not required to actively participate in it for it to be effective. Hence, it is well suited for critically ill patients who have low energy or are easily exhausted.¹⁰ Studies have demonstrated that music was well accepted by both patients and staff, which adds to its practicality in practice.^{8,17,26} However, patient preferences of music should always be considered when using music or N-BS as a complementary therapy. There are several tools and resources available for critical care nurses interested in incorporating music intervention into their practice, such as assessment tools to assist with music preference assessment.²⁷ Nurses who are interested in incorporating music in the plan of care should also ensure the availability of equipment such as compact disk players, ear phones and music compact disks.¹⁰ Where resources are available, music therapists can also be used

to help determine patient preferences, and during the course of music therapy. Critical care nurses who are interested in consulting with music therapy professionals should visit www.musictherapy.org.¹²

IMPLICATIONS FOR THEORY, ETHICS, PRACTICE AND RESEARCH

This integrative review provides a summary of the evidence related to the state of science regarding music as a highly promising CAT for symptom management of pain, insomnia, and anxiety in adult critically ill patients. For theory building, future studies need to be conducted, testing or using middle range theories when using music or other CAT for critically ill patients. Middle range theories address the practical knowledge of the discipline by elucidating and elaborating on specific phenomena that are related to the caring and healing processes. These theories elaborate concrete concepts and their relationships. Some of the middle-range theories such as the theory of uncertainty in illness, the theory of symptom management, the theory of unpleasant symptoms, and the theory of self-efficacy²⁸ can be tested and used with CAT and symptom management in critical care. Nurses with advanced knowledge such as nurses with doctoral degrees, nurse scientists, and advanced practice registered nurses (APRNs) can elucidate concepts, mechanisms, and their relationships by which complementary therapies are beneficial in symptom management in critical illness. This will give the scientific community a broader knowledge base to generate findings and use and recommend them in professional use.

From an ethical standpoint, it is asserted that nurses have an ethical responsibility to consider the use of beneficial CAT therapies such as music. Evidence-based CAT use

can assist critical care nurses in relieving their patients' untoward symptoms such as pain, insomnia, and anxiety in critical care. When appropriate CAT therapies are not used, patients may be treated with medications which have systemic side effects or invasive treatments. Likewise, to avoid harm to patients, nurses need to know the adverse effects and interactions of one CAT therapy with another and other simultaneously prescribed critical care treatments. For example, herbal preparations, which increase bleeding time, would be contraindicated with a concurrently prescribed anti-coagulant because of the risk of internal or prolonged bleeding.⁷ Herbal interactions with other medications is a growing concern; therefore, critical care nurses should consult pharmacists, medical databases, NCCIH, or other resources when questions arise.

A notable finding from this review of music is that most studies were conducted with cardiac or ventilated patients and aimed for only short-term reductions in pain, anxiety, insomnia or other variables. Future studies with music and other CAT should also focus on non-cardiac and non-mechanically ventilated critically ill patients. Music has a solid preliminary base of evidence for use with critically ill adult patients and warrants further scientific investigation in critical care. Future studies should use longitudinal designs and should also assess the impact of music on long-term outcomes like LOS, complications, cost, quality indicators like need for analgesic and sedative medications, and patient/nurse satisfaction variables. Furthermore, the effects of music on other symptoms commonly experienced by patients with critical illness could also be examined. Moreover, these studies should include critically ill geriatric patients, women, critically ill newborns, children or pregnant women, and more ethnically diverse

populations in their samples. Making CAT available to our patients' families is yet another potentially fruitful direction for future research. As we build the knowledge base for the use of CAT for persons with critical illness, it is imperative to deliberate on the safety and effectiveness of these therapies, their appropriateness for specific signs and symptoms, frequency of use, and patient populations that will benefit in critical care.⁷

Several practice recommendations related to music for adults with critical illness and important sites to access information and consultants from are embedded within this article. Hence, nurses can consider how to incorporate music into their routine care and protocols. It is recommended that critical care nurses use resources and judiciousness in assessing patients' underlying conditions, treatments and situations to find the best use of CAT. Patients and their families should be involved in this discussion.¹⁰ APRNs are in an ideal position to champion the safe integration of CAT therapies in critical care, having specialized education in synthesizing and using evidence. They can also facilitate humanizing practice changes for the incorporation of CAT²⁹ and evaluate safe therapies for managing pain, insomnia and anxiety in critical care.

LIMITATIONS

This review has several limitations. Only one author reviewed the primary sources and only published studies in English language were included. The studies reviewed were conducted with patients who were 18 years and older. Music could have positive influences on younger patients and other patient populations however, it was not determined by this review.

CONCLUSION

In conclusion, patients in critical care settings deal with many physiological, technological, and environmental stressors that can impede healing and recovery. Incorporating CAT such as music as an adjunctive therapy with other mainstream treatments is paramount in softening the harsh edges of the critical care environment and has been promoted by critical care nursing leaders as therapies, which can turn critical care into a humanistic care environment.³⁰⁻³² Critical care nurses play a vital role in reinstating the humanistic essence in critical care settings by providing an environment where patients and their families can share their complementary/alternative practices and request and use beneficial therapies.^{4,10,29,32}

By incorporating appropriate complementary therapies along with other mainstream critical care practices, critical care nurses have opportunities to introduce compassion, healing, and humanity in critical care.^{7,10,29,30,32} Critical care nurses, APRNs and critical care managers can serve as champions and facilitate appropriate integration of evidence-based safe therapies in critical care.

This review provides evidence for the use of music in symptom management of pain, insomnia, and anxiety in critically ill patients. In addition, although beyond the scope and evidence presented in this review, music has potential to positively affect other critical care variables such as LOS, complications, and cost; other quality indicators such as need for analgesic and sedative medications; and patient/nurse satisfaction with CAT. The evidence for these questions and practice applications needs to be determined in future reviews or sought with future studies.

TABLE Effects of Music on Anxiety, Insomnia, and Pain in Critically Ill Patients: A Review of Primary Sources

Reference, Year	Aims/Objectives	Population/Sample	Study Design/Intervention	Analysis	Outcomes/Measures	Findings	Limitations	Level of Evidence ²³
Aghale et al, 2014 ¹⁸	To examine the effect of NB-S therapy on agitation and anxiety on coronary artery bypass graft patients during weaning from mechanical ventilation	N = 120 CABG patients undergoing weaning n = 60 NB-S n = 60 Control	RCT Intervention: 20 min of NB-S CD listening with HP Control: HP no music-standard care	Baseline comparisons with χ^2 tests, Mann-Whitney U test to detect any significant difference in the FAS and RASS scores, SpO ₂ , and MAP Independent t test to detect any difference between the groups' mean values for physiological signs	Reduction in agitation with FAS and RASS, SBP, DBP, HR, RR, SpO ₂ , and MAP	Patients in the NB-S therapy had significantly lower anxiety ($P < .002$) and agitation levels ($P < .001$) than the control group	As reported by researchers, the study was conducted with adult patients during weaning from mechanical ventilation following CABG and findings should only be generalized to similar settings and samples.	B
Chan et al, 2013 ⁸	To test whether listening to self-initiated, patient-directed music can reduce anxiety and sedative exposure during ventilatory support in critically ill patients	N = 373 ventilated patients (12 ICUs at 5 hospitals) n = 126 PDM n = 122 HP n = 125 UC	3-Group RCT Intervention: PDM: self-initiated preferred music tailored by a music therapist 30 min twice a day HP: self-initiated application of NCH Control: UC	Descriptive statistics to assess distribution of variables. Bivariate analyses to identify covariates for subsequent analyses Mix model analysis: change over time in anxiety and sedative exposure assessed as the slope of outcome variable, from a day to the next, by the best fitted line	Daily assessment of anxiety (on 100-mm VAS) and sedative exposure measured by sedative drug intensity and frequency	Patients in the PDM group had an anxiety score that was 19.5 points lower than the patients in NCH group ($P = .003$) There was a 36.5% reduction in anxiety levels in music group by day 5 By the 5th study day, PDM subjects received 2 fewer sedative doses than subjects in the UC group ($P = .01$)	As reported by researchers, ICU nurses were not blinded to the assignment of intervention and control groups, which may have introduced bias in the study	B
Özer et al, 2013 ²⁰	To examine the effect of music on pain in CABG patients	N = 87 valve or CABG patients on first postoperative day n = 44 Music n = 43 Control	Quasi-experimental design Intervention: patients selected music via earphones, 30 min Control: rest period, no music	t tests for comparison of means of (VS, SpO ₂) pain, paired t tests for difference between prephysiological and postphysiological parameters (VS, SpO ₂) and pain for each group	Pain assessed through verbal pain intensity scale	Pain intensity decreased from pretest (2.13) to posttest (1.2) in music group ($P = .001$) SpO ₂ increased from pretest (91.7) to posttest (93.7) in music intervention group ($P = .001$)	As reported by the researchers, single-site study Convenience sampling No blinding or randomization	C

(continues)

TABLE Effects of Music on Anxiety, Insomnia, and Pain in Critically Ill Patients: A Review of Primary Sources, Continued

Reference, Year	Aims/Objectives	Population/Sample	Study Design/Intervention	Analysis	Outcomes/Measures	Findings	Limitations	Level of Evidence ^{2,3}
Su et al, 2013 ²²	To examine the effects of noncommercial music on quality of sleep and relaxation indices, including HR, mean arterial pressure, and respiratory rate in patients in a medical ICU	N = 28 Medical ICU patients n = 14 Music n = 14 Control	RCT Intervention: noncommercial music—45 min at nocturnal sleep time Control group: UC	t tests for demographics, GEE analysis to control for changes in time and baseline values	Vital signs, self-reported sleep quality questionnaire, and polysomnography	The music group patients had significantly lower HR ($P < .003$) and RR ($P < .001$) shorter stage N2 sleep ($P = .0014$), and longer stage N3 deep sleep ($P = .008$) in the first 2 h of the nocturnal sleep and improved self-reported sleep quality compared with those in the control group. Music had sedating effects on the participants	As reported by the researchers, 2-h period possibly missed opportunities to capture REM sleep	B
Saadatmand et al, 2012 ¹⁹	To investigate the effect of N-B5 on agitation, anxiety level, and physiological signs of stress in patients under mechanical ventilator support	N = 60 mechanically ventilated patients n = 30 NB-S therapy n = 30 Control	RCT Intervention: N-B5 listening for 30 to 90 min Control group: 30-min rest period with headphones, no music	Baseline comparisons were performed using the χ^2 tests, Mann-Whitney U test to detect any significant difference in the CCS, FAS and RASS scores, repeated measures ANOVA for vital signs across the intervention period, measured at 30-min intervals within groups and between groups	Anxiety levels and agitation were assessed using the FAS and RASS, respectively	The experimental group had significantly lower SBP ($P < 0.001$), DBP ($P = 0.001$), and anxiety and agitation levels ($P < 0.001$) than the control group. These reductions increased progressively in the 30th, 60th, 90th minutes, and 30 min after the procedure, indicating a cumulative dose effect	As reported by the researchers, the influence of background noise in rooms could have been a potential confounding variable	B
Korhan et al, 2011 ¹⁵	To investigate if relaxing music is an effective method of reducing the physiological signs of anxiety in patients receiving mechanical ventilatory support	N = 60 mechanically ventilated patients n = 30 Music n = 30 Control	RCT—experimental repeated measures design Intervention: classical music listening for 60 min Control group: UC	Independent t tests for vital signs, repeated measures ANOVA for vital signs across the intervention period, measured at 30-min intervals within groups and between groups	Vital signs measured immediately before the intervention at the 30th, 60th, and 90th minutes of the intervention and 30 min after the intervention	The music group had significantly lower RRs, and SBP and DBP than the control group; there was a progressive decrease in SBP ($P = .001$) and DBP ($P = .001$) in the 30th, 60th and 90th minute of the intervention, indicating a cumulative dose effect	As reported by the researchers, the research nurse was not blinded to the allocation of intervention or control group	B
Cooke et al, 2010 ²¹	To identify the effect of music on discomfort and anxiety experienced by postoperative ICU patients during turning procedure	N = 17 n = 10 Music n = 7 HP, no music	Single blinded, randomized crossover study Intervention: 15-min music via earphones before and after turning Control: HP, no music	Descriptive statistics for demographic data GLM analysis showed no treatment effect, order effect, or treatment x order interaction effect in discomfort or anxiety scores	Pain assessed with 0-10 NRS anxiety and agitation assessed using FAS	The music group did not have any significant reduction in discomfort or anxiety with turning procedure; no treatment effect was found ($P = .12$) with GLM	As reported by the researchers, the sample size was likely too small to detect any true effect size if it existed	C

(continues)

TABLE Effects of Music on Anxiety, Insomnia, and Pain in Critically Ill Patients: A Review of Primary Sources, Continued

Reference, Year	Aims/Objectives	Population/Sample	Study Design/Intervention	Analysis	Outcomes/Measures	Findings	Limitations	Level of Evidence ^{2,3}
Han et al, 2010 ¹⁶	To examine the effects of music intervention on the physiological stress response and the anxiety level among mechanically ventilated patients in the ICU	N = 137 mechanically ventilated patients n = 44 Music n = 44 HP n = 49 Control	3-Group RCT Intervention: listening to relaxing music for a single 30-min session HP with no music for a single 30-min session Control with quiet rest for a single 30-min session	Descriptive statistics for demographic data ANOVA and Kruskal-Wallis for mean differences among 3 groups; Friedman test to detect any within-group interactions over time	Self-reported anxiety (STAI) Physiological parameters of anxiety (HR, RR, SaO ₂ , and BP)	Significant differences among groups for HR, BP, RR, and anxiety A significant reduction in physiological stress response over time in music-listening group ($P < .001$) Significant reduction in anxiety ($P < 0.001$) for the music group and the HP group	As reported by the researchers, only 4 broad categories of music might be seen as a limitation	B
Hunter et al, 2010 ¹⁷	To determine the feasibility of incorporating music therapy into the weaning process and to evaluate the efficacy of the intervention based on levels of anxiety, days to wean, and patient/nurse satisfaction	N = 61	Feasibility study with historical controls matched to similar patients admitted on the same unit in past 2 y Intervention: patient-tailored live music 45-60 min, 3 times/wk during weaning trials	Within subjects matched t tests	Patients anxiety assessed by patient and staff survey Vital signs before and after each music session Days to wean Satisfaction measured by a patient/staff survey	Significant difference in HR and RR found from beginning to the end of the music therapy session, suggesting that a more relaxed state had been achieved; HR ($t = -1.945, P < .026$), RR ($t = -5.65, P < .0001$) Patient and nurse satisfaction with the intervention were both high Staff assessment of anxiety demonstrated that patient appeared to be less anxious after intervention	Limitations with finding suitable historical controls because of wide heterogeneity of ages, diagnoses, and several comorbidities	C

Abbreviations: ANOVA, analysis of variance; BP, blood pressure; CABG, coronary artery bypass graft; CD, compact disk; DBP, diastolic blood pressure; FAS, Faces Anxiety Scale; GEE, general estimating equation; GLM, generalized linear model; GCS, Glasgow Coma Score; HP, headphones; HR, heart rate; ICU, intensive care unit; MAP, mean arterial pressure; N-BS, nature-based sounds; NCH, noise canceling headphone; NRS, numeric rating scale; PDM, patient-directed music; RASS, Richmond Agitation Sedation Scale; RCT, randomized controlled trial; REM, rapid eye movement; RR, respiratory rate; SaO₂, oxygen saturation; SBP, systolic blood pressure; SpO₂, oxygen saturation; STAI, Spielberger's State-Trait Anxiety Inventory; UC, usual care; VAS, Visual Analog Scale; VS, vital signs.

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CHAPTER 3

Overview

Chapter 3 presents manuscript 2, the integrative review related to the current evidence of the use of aromatherapy and guided imagery for the symptom management of pain, anxiety and insomnia in critically ill patients. The results of the aromatherapy review suggested that aromatherapy was associated with improving the signs and symptoms of pain, insomnia and anxiety in critical care. The guided imagery review suggested promise of its use in critical care however, more studies are needed to further ascertain its effectiveness for the symptom management of the common symptoms of pain, anxiety and insomnia in critical care. This manuscript was published in the journal *Dimensions of Critical Care Nursing*.

Meghani N, Tracy MF, Hadidi N, Lindquist, R. Part II: The effects of aromatherapy and guided imagery for the symptom management of anxiety, pain, and insomnia in critically ill patients: an integrative review of current literature. *Dimens Crit Care Nurs*.

2017;36(6):334-348. (Reprinted with permission. See Appendix B).

Title: Part II: The Effects of Aromatherapy and Guided Imagery for the Symptom Management of Anxiety, Pain and Insomnia in Critically Ill Patients: An Integrative Review of Current Literature

Aromatherapy and guided imagery are two more complementary therapies with potential promise for their use in critical care. A current integrative review of the evidence of these therapies in critical care is presented here.

This review is Part II of a 2-part series that presents evidence on the effectiveness of aromatherapy and guided imagery for the symptom management of anxiety, pain, and insomnia in adult critically ill patients. Evidence from this review supports the use of aromatherapy for management of pain, insomnia, and anxiety in critically ill patients. Evidence also supports the use of guided imagery for managing these symptoms in critical care; however, the evidence is sparse, mixed, and weak. More studies with larger samples and stronger designs are needed to further establish efficacy of guided imagery for the management of anxiety, pain, and insomnia of critically ill patients; to accomplish this, standardized evidence-based intervention protocols to ensure comparability and to establish optimal effectiveness are needed. Discussion and recommendations related to the use of these therapies in practice and needs for future research in these areas were generated.

Keywords: Anxiety, Aromatherapy, Complementary therapies, Critical care, Guided imagery, Insomnia, Pain.

INTRODUCTION

Anxiety, pain, and sleeplessness are commonly experienced by critically ill patients. These symptoms may be attributed to patients' illnesses, physiologic changes, invasive treatments received, or the bustle and noise of the critical care environment itself. These symptoms may cause distress requiring treatments that can contribute to greater lengths of stay (LOSs) and greater morbidity, that may impede the recovery and healing process in critically ill patients. Nurses seek non-pharmacological therapies that can be used to benefit patients as adjunctive therapies, or which can be used in place of pharmacologic therapies. Part I¹ of this 2-part series reviewed current literature to synthesize and analyze the current evidence underlying music as a complementary therapy to manage anxiety, pain, and insomnia experienced by critically ill patients. Two other complementary therapies with promise in critical care for improving symptoms of anxiety, pain, and sleeplessness are aromatherapy and guided imagery (GI). A review of current literature through OVID MEDLINE, CINAHL, and PubMed was conducted to examine the evidence for the use of these 2 complementary therapies to manage symptoms of anxiety, pain, and insomnia experienced by critically ill patients.

BACKGROUND

There is a large segment of our society who seeks and uses complementary therapies to promote their health or to find relief from symptoms.^{2,3} Indeed, approximately 33% of adults in the United States (U.S.) reported use of a complementary health approach in the preceding 12 months.³ Adults using complementary health approaches may wish to continue use of therapies even when hospitalized or admitted to intensive care

environments. Nearly 6 million patients are admitted to intensive care units (ICUs) in the U.S. each year,⁴ and these patients frequently experience symptoms of anxiety, pain and sleeplessness.⁵ Pharmacologic treatments to treat symptoms are not without risks and may increase LOS and impede healing.^{6,7} Therefore, non-pharmacologic alternatives are often desired and sought by both nurses and patients.

Complementary/alternative therapies (CATs) may be used as adjunctive modalities along with pharmacologic and other critical care interventions.⁸ They are within the realm of nursing practice and these therapies have been used by nurses to address symptoms such as anxiety, pain, and sleeplessness in critically ill patients.^{7,9} Critically ill patients often experience sustained levels of pain and extraordinary levels of stress in critical care; interventions such as music therapy, GI, relaxation, and massage appear to have a positive impact on these symptoms and may improve outcomes during critical illness.¹⁰

The National Center for Complementary and Integrative Health (NCCIH) refers to “complementary health approaches” as practices and products that are not part of mainstream health care,² whereas “integrative health” refers to the processes surrounding the integration of complementary therapies into mainstream health care.² For this article, complementary, non-pharmacologic, adjunctive, unconventional, and integrative therapies will be referred to as CATs.

The positive benefits of CAT cannot be experienced by patients if the evidence and indications for their use are not known and the therapies are underused or not

efficaciously used. Indeed, if evidence of effectiveness or safety, potential risks, and proper administration are not known, harm may result to critically ill patients.

In this review, we examine two additional complementary therapies having potential promise for the use with critically ill patients - aromatherapy and GI. These therapies may be good options for use in the critical care setting because they are relatively inexpensive, could be readily available, and could be delivered to a wide variety of patients having different underlying conditions, needs, and symptom experiences. These modalities are different in their modes of action and, along with music, could offer critical care nurses a range of therapies to use in the critical care environment.

PURPOSE OF THE REVIEW

The purpose of this article is to review, summarize, and synthesize the evidence on the use of aromatherapy and GI for the symptom management of pain, insomnia, and anxiety in adult critically ill patients. The published evidence is summarized and synthesized in two separate sections for each complementary therapy - aromatherapy and GI.

LITERATURE SEARCH STRATEGY

A literature review was conducted regarding the use of aromatherapy and GI for the symptom management of anxiety, pain, and insomnia in critical care. CINAHL, MEDLINE, and PubMed databases were searched with the consultation of an expert health sciences librarian. Three advanced searches were performed using the keywords “complementary therapies,” “alternative therapies,” “adjunctive therapies,” “integrative therapies,” “complementary and alternative medicine,” “complementary and alternative

therapies,” “ICU,” “critical care,” “anxiety,” “pain,” “insomnia,” “sleeplessness,” “aromatherapy,” and “guided imagery.”

In the initial search, studies were included in the literature review if they were primary sources of research studies examining the effect of aromatherapy or GI on anxiety, pain, or insomnia in critically ill patients (in ICU settings) that were published from 2010 to the present 2017. Studies conducted with non-human subjects, pediatric, hospice, obstetric/gynecologic patients or patients younger than 18 years were excluded; studies not published in the English language were also excluded. To be included, aromatherapy had to be specifically named as the intervention. Whereas “aroma” seems to imply the olfactory sense, aromatherapy embraces use of oils for massage or other physical uses. In the process of searching, to expand capture of studies broadly relevant to critical care symptoms, studies of aromatherapy in acute care settings were also included. Six studies that were published from 2013-2017 met the criteria for aromatherapy. For GI, a decision was made to expand the time frame of the review to include additional GI studies relevant to our search; a broader window and inclusion of additional studies enabled a potential comparison of the findings of this review with a new review of GI by Hadjibalassi and colleagues¹¹ published in 2017; the broader time frame also enabled us to include the important work of Diane Tusek who pioneered GI in acute and critical care settings. To be included in this review, the published study report had to specifically contain the words “guided imagery” (or, separately the words “guided,” “guidance,” and “image” or imagery”). Thus, articles using the terms “self-hypnosis,” “guided relaxation,” and/or “progressive muscle relaxation,” or terms for the

intervention other than GI were excluded. Studies were identified that are underway for GI with results not yet published; these studies were not included in this review. A hand search of reference lists was also done to identify other potentially relevant studies. Using these strategies, nine studies published between 1997 and 2013 were identified that met the inclusion and exclusion criteria for GI pertinent to the outcomes of interest in critical care settings.

AROMATHERAPY: REVIEW OF LITERATURE

Aromatherapy was defined as the administration of essential oils applied through topical modes such as massage, compresses, ointments, or baths, or via olfactory inhalation to reduce pain and promote relaxation or comfort.¹²

Aims

All 6 studies reviewed¹²⁻¹⁷ had the primary aim of determining the effects of aromatherapy on reducing one or more of the untoward symptoms of interest in critical care including insomnia, pain, or anxiety, or physiologic parameters of pain and anxiety. Five studies, aimed to investigate the effects of aromatherapy on anxiety,^{12-15,17} and two determined its effects on sleep^{13,15} of patients in the coronary ICU settings. Two studies also determined the effects of aromatherapy on pain in acute/critical care settings.^{14,16}

Population / Setting/ Sample

In examining the patient populations, settings, and sample, most studies^{12,13,15,17} were conducted with critically ill patients except for 2 studies that were conducted in acute care settings.^{14,16} The acute care studies were included in this review because they examined the effects of aromatherapy on similar outcomes of interest such as pain,

insomnia, and anxiety. In addition, most studies^{12,13,15-17} were conducted at single critical care settings except for 1 study that was conducted at 10 acute care settings.¹⁴ Although there are benefits and ease to conducting the study in a single critical care setting, it is likely that the generalizability of the findings would be greater if multiple institutions had participated. In addition, the sample sizes in four of the examined studies were relatively small, with only 28 patients in the intervention group and 28 in the control group in the Cho et al¹³ study, whereas Johnson et al¹⁴ had the largest sample size with 10,262 patients in the sample and, concomitantly, 10,372 nurse-led aromatherapy sessions (see details of studies in Table 3.1).

Study Design

Four of the 6 aromatherapy studies used a randomized controlled trial (RCT) design.^{12,15-17} Cho et al¹³ used a quasi-experimental design, and Johnson et al¹⁴ conducted a retrospective effectiveness study using electronic health records from a large sample of 10 acute care hospitals within a health system.

Intervention

The intervention of aromatherapy in the studies varied greatly in terms of amount and concentrations of essential oils used, their mode of intervention, and the duration and frequency of delivery.

In these studies,¹²⁻¹⁶ the aromatherapy intervention was primarily the inhalation of lavender essential oil with different concentrations and combinations. In Lee et al,¹⁷ the aromatherapy mode was a lavender essential oil massage on the patient's back for 5 minutes by a nurse who was trained in aromatherapy massage.

In 1 retrospective effectiveness study,¹⁴ multiple different essential oils were used (lavender, ginger, sweet marjoram, mandarin, and other combinations of oils). The aromatherapy sessions were nurse-led and were provided via different modes of administration including inhaled, topical, and a combination of both inhaled and topical.¹⁴ In another study, the patients in the experimental group inhaled a concentration of 10% lavender for 5 minutes during three sessions, whereas, the control group patients did not receive lavender aromatherapy.¹⁶ In the study by Karadag and colleagues,¹⁵ 2 drops of 2% lavender oil on a gauze pad attached to the patient's clothes was inhaled for 20 minutes each night for 15 days, whereas, the control group received standard care. Seifi et al¹² used a different approach, administering 2% lavender oil via an absorbable patch attached inside the patient's oxygen mask for inhalation for 20 minutes on 2 consecutive nights after surgery. The patients in the control group received 2 drops of distilled water as a placebo through a patch in their oxygen mask. In the Cho et al¹³ study, the essential oils lavender, Roman chamomile, and neroli were blended in a 6:2:0.5 ratio. Participants inhaled the treatment 10 times before percutaneous coronary intervention and 10 times after the intervention. The control group received the usual standard of care.

Findings

All studies examined the effect of aromatherapy on one of the outcomes of interest in this review: pain,^{14,16} improvement in sleep^{13,15} and anxiety or physiological signs of anxiety.^{12-15,17} Although the specific treatment intervention with aromatherapy differed in these studies, evidence from this review revealed that all studies found positive benefits of aromatherapy in the reduction of anxiety and pain, and in the promotion of sleep. In 4

studies, researchers found significantly reduced anxiety,^{13-15,17} significantly reduced pain,^{14,16} and improved sleep.¹³⁻¹⁵ One study did not find any significant difference between the mean scores of anxiety in the aromatherapy group versus the control group.¹² In 4 of 6 studies, the mode of aromatherapy was primarily the inhalation of lavender essential oil, and 1 study by Lee et al,¹⁷ used lavender essential oil massage as the mode of intervention. Johnson et al¹⁴ used several different forms of essential oils. However, in this study, too, lavender was determined to be the essential oil most frequently used with patients regardless of mode of administration. This was followed by ginger, sweet marjoram, mandarin, and combination oils. Sweet marjoram was found to be the most effective oil for pain relief while lavender and sweet marjoram were both equally effective for anxiety.¹⁴ Investigators found that the essential oils used resulted in significant improvement in desired clinical outcomes, although each oil also showed additional benefits for other symptoms.¹⁴ In this study, the aromatherapy was also given via inhalation, massage or in a combination mode, making it hard to discern whether it was the effect of the massage or inhalation that caused the difference in outcomes. However, these complementary therapies together produced clinically significant outcomes.

Safety of Lavender (*Lavandula angustifolia*)

The NCCIH considers diluted lavender oil or lavender aromatherapy safe for most adults when applied topically,¹⁹ but the full-strength application of lavender oil to the skin can be irritating.¹⁹ Safety precautions and monitoring for drowsiness should be the goals for critical care nurses who use lavender aromatherapy for their patients. One caution that is

specifically important for critically ill patients is that using lavender with sedative medications may increase drowsiness.¹⁹ Because critically ill patients are often sedated to promote comfort and ventilated patients are often sedated to achieve ventilator synchrony,²⁰ this should specifically be kept in mind. In addition, lavender oil may be poisonous if taken by mouth and may cause headache, constipation, and changes in appetite.¹⁹ Therefore, patients' allergies to plants and flowers, history regarding any previous use, and whether they have any impairment of sense of smell should be assessed and addressed before the intervention. Patients should be monitored during and after aromatherapy to assess the effectiveness of the intervention.

In addition, if aromatherapy combined with massage is the mode of intervention with critically ill patients, nurses should use caution because of the possibility of dislodging any clots, to prevent the risk of pulmonary emboli and subsequent stroke. None of the studies in this review reported any patients with adverse events.

It is also recommended to be cautious with the types and concentrations of essential oils. Nurses should be knowledgeable about the products being used. The herbal industry is largely unregulated.²¹ The effectiveness and potency of essential oils may be compromised if they have been prepared with inconsistent or variable quality control methods or have additional contaminants or chemicals in them that may also pose risks to patients who have sensitivities or allergies to these products or compounds.^{9,22} It is important to educate consumers²¹ and practitioners about these risks. The NCCIH can be used as a resource and provides an overview, side effects, cautions, and resources related to many herbs including essential oils.²³

Discussion

This review demonstrates that there is evidence to support aromatherapy as an intervention in critical care, which can ameliorate the common symptoms of anxiety, insomnia, and pain in adult ICU patients. Although, the concentrations of essential oils used in the studies were different, and in different combinations, modes and frequencies, 5 of 6 studies in this review supported the benefits of aromatherapy use in acute and critical care to reduce symptoms of anxiety, insomnia, or pain. There is a clear need to conduct more aromatherapy studies in critical care settings. One previous systematic review²⁴ identified only 1 aromatherapy intervention study which studied its effects on promoting sleep in the ICU. That study²⁵ compared aromatherapy intervention versus usual care measuring perceived sleep quality and indicated no significant difference in sleep scores in either group. Authors of the review concluded that the evidence was limited;²⁴ the researcher was unable to assess whether combining aromatherapy along with massage provides relief of pain, anxiety, depression, distress, or improved quality of life.²⁵ However, another aromatherapy review that examined evidence for the use of essential oils for management of symptoms (not specifically pain, anxiety, and insomnia) of critically ill patients was relatively more positive,²⁶ and the author encouraged future studies to build a knowledge base for the aromatherapy intervention in critical care.²⁶ For future studies, research questions could focus on the discernment of whether individual aromatherapy sessions are as effective as multiple ones and whether longer durations or multiple sessions of aromatherapy lead to a cumulative dose effect.²⁶ Studies about the

safety and control of the quality of essential oils, and their interactions with other therapies or medications need to be evaluated as well.²⁶

Future studies need to be conducted with larger sample sizes and rigorous designs and methodologies, which can examine whether certain concentrations and combinations or modes of delivery are more effective than others. Furthermore, it is recommended that researchers examine the long-term outcomes of aromatherapy on other parameters such as analgesic and sedative medications, mortality, hospital and ICU LOSs, and patient and staff satisfaction. In addition, all but one¹² of these studies were conducted at single sites; more multicenter studies would improve the generalizability of these findings.

In the study by Johnson et al,¹⁴ the aromatherapy was given via inhalation, massage, or both depending upon patient preference, making it hard to discern whether it was the effect of the massage or aromatherapy which resulted in the difference in outcomes. However, clinically, it is possible that multiple, safe complementary therapies used together would be more effective in targeting these symptoms, which needs to be further validated. Critically ill patients experience a wide variety of symptoms because of their underlying conditions, and frequently experience invasive, diagnostic, and therapeutic treatments. Therefore, aromatherapy can target several symptoms commonly experienced by critically ill patients.²⁶ Patient preferences of aromatherapy should be sought, and its effectiveness should be monitored. Critical care nurses should also be cognizant of the cultural aspects of essential oils, massage or preferences with aromatherapy. The decision to accept or decline aromatherapy should be up to the patient. Where resources are available, aromatherapists could be consulted to assess

patients' preferences, allergies, and previous histories to administer the intervention.

Aromatherapy has long been promoted by critical care nursing leaders such as clinical nurse specialists to humanize care in critical care settings.²⁶⁻²⁸ Critical care nurses who are interested in achieving basic or advanced Holistic Nursing certification or obtain certification in wellness nurse coaching should refer to the American Holistic Nurses Credentialing Center (www.ahncc.org).²⁹ The organization also provides professional development and other resources for nurses who want to learn more or seek certification.

GUIDED IMAGERY (GI): REVIEW OF LITERATURE

Imagery is an intervention that is thought to augment the mind-body connection^{30,31} to relieve untoward symptoms or enhance a sense of well-being.^{7,32} It is believed that imagery works by using the senses to invigorate a more positive emotional response that can moderate stress arising from negative experiences^{7,32} of symptoms such as pain, sleeplessness, fear, or anxiety. For GI, the practitioner directs the imagery, using positive suggestions to relieve specific symptoms.^{31,33} Fitzgerald and Langevin³² assert that images that participants create do not need to be anatomically correct or even vivid. Symbolic images are considered powerful healing images because patients draw them from their individual beliefs and culture and these images are more meaningful in enhancing a positive emotional response.³²

Aims

All 9 studies³⁴⁻⁴² reviewed had the primary objective of determining the effects of GI on improving one or more of symptoms of interest (anxiety, pain, and insomnia). Kshetry et al.³⁶ examined the effects of GI on the primary outcome variables of pain and

anxiety/tension measured by self-reported pain and anxiety/tension scores. Other studies examined the effects of GI on pain,^{37,39,40,42} anxiety,^{35,39,40,42} and sleep.^{34,38,41}

Population, Setting, and Sample

In examining the patient populations, settings and samples, all studies included in this review were conducted with patients who received nursing care in ICUs during their hospital or treatment course, and studies were conducted at single institutions or ICUs, except for the study conducted by Richardson.³⁸ Many studies^{34-36,39,40} were conducted with cardiac surgery patients in critical care settings at single sites. Sample sizes ranged from 36 in the Richardson³⁸ study to 130 in the Tusek et al⁴² study (see details of studies in Table 3.2).

Study Design

Most studies examined in this review employed RCT designs.^{34-38,40-42} Hasse et al³⁷ and Stein et al³⁵ conducted a 3-group RCT. Casida et al³⁴ used a pretest/posttest repeated-measures design. Dietsch et al³⁹ used a quasi-experimental design.

Intervention

In all studies reviewed, the intervention was delivered through GI audio tapes. However, the tapes differed across the studies. In Stein et al³⁵ study the GI intervention was administered via a Belleruth Naperstek audiotape. Dietsch et al³⁹ used the GI tapes developed by Tusek et al. In the Tusek et al⁴⁰ 1999 study, the GI intervention was delivered via tapes developed by Guided Imagery, Inc. In the Casida et al³⁴ study, the GI program was used 2-3 days preoperatively; then after the surgery every night on postoperative days 1 to 4 at bedtime for 1 hour, provided by the nurse; and again, during

the night if sleep was disrupted. In the Kshetry et al³⁶ study, GI audio tape listening was encouraged in the first 2 days postoperatively for stress and pain management. The type, duration, and frequency of the GI intervention were not elaborated on in the article.

Findings

Over all, the findings from this review suggests that the GI interventions in these primary studies provided marginal positive effects on the outcomes of pain, anxiety, and insomnia in critically ill patients. Some studies^{36,38,41} used several complementary therapies together in their intervention (e.g., massage, music and GI,³⁶ relaxation and GI,³⁸ teaching on relaxation, and an audio tape with muscle relaxation, mental imagery, and background music⁴¹); therefore, more studies are needed to distinguish the individual effects of the GI outcomes obtained. However, it was favorable that two of these combination studies^{36,38} provided statistically significant and clinically improved outcomes.

Three studies^{35,37,41} found no significant effects of the GI intervention on the outcomes of interest, whereas, other studies^{34,41} found no effects on the sleep parameters. One study had mixed results, finding statistically significant results only on a certain day (postoperative day 2) during the course of GI intervention.³⁹

Hence, this review reveals that evidence supporting the effectiveness of a GI intervention to address pain, insomnia, and anxiety was found to be limited. The evidence was not sufficient to detect statistical significance in several studies and more studies are needed to further establish the effectiveness of this promising intervention for symptom management in critical care.

Discussion

Guided imagery has been identified as one of the most well studied complementary therapies;⁴³ literature demonstrates its use in areas such as colorectal and cardiac surgeries, chronic back pain, and anxiety with both adults and children.⁴³ This review demonstrates its utility to treat pain, anxiety, and sleeplessness experienced by critically ill patients. In the studies examined, combining GI with other interventions such as music, relaxation or massage^{36,38,41} confounds the interpretation of the findings. In addition, the content of the audiotapes varied across studies. Therefore, it is not clear which of these interventions resulted in the reduction in pain or anxiety. Was it GI, music, relaxation, or massage? From the research standpoint, if the aim was to establish causality or effectiveness of a selected intervention, it is imperative that different designs such as 3-group designs, where 2 separate interventions are compared with each other and a standard care group, would provide more reliable evidence. It is possible that studies with larger sample sizes and different durations and frequencies of the imagery intervention may significantly improve the outcomes, which needs to be established with future studies. Furthermore, the limited descriptions of the GI interventions (content, script, or technique) in these studies also impedes the evaluation of the imagery intervention provided.

In some instances, it was difficult to discern whether the intervention described was actually GI. In some cases, studies were excluded from the review, because authors did not specifically call the intervention GI. Our selection criteria, search methods, years included, and variables of interest, distinguish this review from that of Hadjibalassi and

colleagues.¹¹ However, the findings of our review were consistent with determination of favorable effects of GI for pain and anxiety. Likewise, both our review and theirs suggest improvement in sleep quality, but that claim would require additional evidence generated by future research. Indeed, the studies reviewed had a wide range of intervention protocols, including such differences as times frames studied, number of interventions received, intervention delivered, and outcomes assessed, wording of the GI intervention, length of intervention time, and combination with other interventions.

Future research may also consider the contributions of potential personal characteristics, for example, greater imaging ability, outcome expectancy, and lower number and intensities of symptoms concurrently experienced by patients in a breakdown of intervention effects as determined in responder analyses such as described by Kwekkeboom and colleagues.⁴⁴ Such variables may be helpful in future research to further tailor the intervention and generate useful evidence for greater precision in practice. Outcomes other than sleep, pain, and anxiety were not included, resulting in differences in studies included in the review of Hadjibalassi et al's¹¹ review.

Imagery is generally considered a safe intervention.³⁰ However, Fitzgerald and Langevin³² caution that, occasionally, a participant may feel out of control during imagery when feeling deeply relaxed or may report dizziness, which is related to mild hyperventilation. The imagery guide in that case, can encourage the participant to breathe slowly and less deeply. The therapeutic relationship between the imagery guide and the patient plays a key role. The expertise of the GI coach/nurse is essential in guiding the

imagery experience and utilizing imagery for alleviating the symptoms of pain, nausea, vomiting, and anxiety and promoting relaxation and sleep.³²

Nurses who are interested in incorporating GI in the protocols or routine care of patients should gain some expertise or use guides or consultants in using the intervention. A practitioner with expertise motivates the patient in generating images, which helps with improving or alleviating untoward symptoms. Patients' ability to concentrate and relax is a vital component for the effectiveness of imagery.⁷ Keeping this important consideration in mind, critical care nurses can use this intervention to improve anxiety, pain and insomnia in critically ill patients who are successfully able to engage in the imagery intervention. The session can last from 10 to 30 minutes. The goal is to guide the patient to imagine a familiar, peaceful, and relaxing place originating in the patient's imagination⁶ using 1 or more senses.³³ Ideally GI practitioners should have expertise in guiding the imagery session; however, several scripts, videotapes, and audiotapes of relaxation are also available from www.innerhealthstudio.com⁴⁵ The American Holistic Nurses Association⁴⁶ (www.ahna.org) can also be a great resource for critical care nurses incorporating holistic nursing. As suggested with other CAT interventions, patients' willingness and preference of imagery should be established. The patient should also be assessed and monitored for the effectiveness of the intervention.

IMPLICATIONS FOR THEORY, ETHICS, PRACTICE, AND RESEARCH

This integrative review summarizes and synthesizes evidence related to the state of science regarding aromatherapy and GI, therapies viewed as having high potential for use in critical care.

It is critical that nurses have access to evidence regarding therapies of potential therapeutic benefit to patients with symptoms of anxiety, pain, and insomnia or other nonpharmacological therapies that can be used to address their patients' symptom experiences. It is important that research is conducted to provide information regarding both the safety and efficacy of interventions in an intensive care environment where time and attention to other traditionally Western therapies may thwart efforts to apply CATs. Competing demands of preserving life and comforting and soothing the anxiety and pain concomitantly experienced are challenges faced daily by critical care nurses. Evidence needs to be readily available to arm nurses with therapies that are effective, that do not adversely interact with other medical treatments, and that do not have negative adverse effects or have potential harm to critically ill patients. Therapies that are of low cost, are easy to administer, and which can be readily be available for use are particularly needed. Aromatherapy and GI are 2 therapies with high potential and limited but growing evidence to support their use.

LIMITATIONS

The reviews of aromatherapy and GI have limitations. First, the evidence for use of these therapies is limited. The evidence presented found that the therapies were safe, with no untoward effects. It is challenging with differing types of treatments and patient populations to identify common findings across studies and determine specific applicability to practice. In addition, as can be observed in the tables, the diversity of measures used to assess the 3 symptoms make it difficult to have a clear perspective of the effect of the differing interventions across studies. Therefore, the findings should not

be overgeneralized to all populations and individuals in critical care, and the therapies should be used with thoughtful consideration and caution. The reviews were limited to adults 18 years and older, and the efficacy of therapies was examined with only short-term use. This review was limited to interventions naming GI or aromatherapy and excluded related interventions. Only studies published in the English language were included. Aromatherapy and GI could be beneficial to younger patients who are critically ill as well as to family members in critical care environments. However, evidence addressing these applications was not examined in this review.

CONCLUSION

This review provides evidence for the use of aromatherapy in symptom management of pain, insomnia, and anxiety in critically ill patients. The review of GI studies has also shown some promise in critical care; however, more studies are needed to further establish its effectiveness. In addition, both aromatherapy and GI have the potential to positively impact other critical care variables such as LOS, complications, cost, quality indicators such as the need for analgesic and sedative medications, and patient/nurse satisfaction, which were beyond the scope of the present review. Studies with larger samples and stronger designs are needed to further establish the efficacy of GI for the management of anxiety, pain, and insomnia of critically ill patients; to accomplish this, standardized evidence-based intervention protocols to assure comparability and to establish optimal effectiveness are needed. It would be beneficial to systematically examine other benefits of these interventions including their effects on other symptoms in additional reviews or future studies. The therapies reviewed here may be used with

judiciousness with an eye to evaluate the effects of such therapies, and to observe for patient response, safety and satisfaction.

TABLE 1 Effects of Aromatherapy on Anxiety, Insomnia, and Pain in Acute and Critically Ill Patients: A Review of Primary Sources

Reference, Year	Aims/Objectives	Population/Samples	Study Design/Intervention	Analysis	Outcomes/Measures	Findings	Limitations	Level of Evidence ¹⁸
Lee et al, ¹⁷ 2017	To examine the effects of aromatherapy and music intervention on reducing anxiety for ICU patients undergoing mechanical ventilation.	Mechanically ventilated patients in med/surg ICU Aromatherapy group, n = 47 Music intervention group, n = 41 Control group (rest only), n = 44	RCT • Intervention Aromatherapy: lavender essential oil massage on back for 5 min Music group: listened to 30 min of music Control group: noise-cancelling headphones	χ^2 tests to examine the differences in the demographic and clinical characteristics between the 3 groups. ANOVAs to test each baseline measure (VAS-A, C-STAI, HR, RR, SBP, DBP, and MAP). GEEs to analyze the effects of both interventions compared with the control group.	Anxiety assessed with C-STAI and VAS-A at baseline, posttest, and 30-min follow-up. HR, RR, and BP measured q 10 min from baseline to 30-min follow-up.	The aromatherapy group had significantly better VAS-A score and lower HR than the control group. The 30-min follow-up revealed that both aromatherapy and music groups had lower HR and BP compared with the control group.	As reported by researchers, the randomized controlled trial design used was not robust because researchers did not use a placebo as control for aromatherapy intervention.	B
Johnson et al, ¹⁴ 2016	To examine the use and effectiveness of essential oils on pain and anxiety in multiple hospitals within a large health system	10,262 acute care admissions from 10 hospitals in 1 health system 10,372 nurse-delivered aromatherapy sessions	Retrospective, observational effectiveness study using electronic health record. • Intervention Multiple modes of administration included inhaled, topical, or both inhaled and topical.	Mixed effects linear regression was used to estimate changes in pain and anxiety.	Change in patient-reported pain and anxiety, before and after aromatherapy using a numeric rating scale (0-10).	Lavender had the highest absolute frequency of use (49.5%) regardless of mode of administration, followed by ginger (21.2%), sweet marjoram (12.3%), mandarin (9.4%), and combination oils (7.6%). Sweet marjoram resulted in the largest, single oil, average pain change at -3.31 units (95% CI, -4.28 to -2.33), whereas lavender and sweet marjoram had equivalent average anxiety changes at -2.73 units. Essential oils generally resulted in significant clinical improvements based on intended use; each oil also showed additional benefits for other symptoms.	Observational design and self-reported scores by patients, which are considered to be standard clinical practice.	B

(continues)

TABLE 1 Effects of Aromatherapy on Anxiety, Insomnia, and Pain in Acute and Critically Ill Patients: A Review of Primary Sources, Continued

Reference, Year	Aims/Objectives	Population/Samples	Study Design/Intervention	Analysis	Outcomes/Measures	Findings	Limitations	Level of Evidence ¹⁸
Karadag et al, ¹⁵ 2017	To investigate the effects of lavender essential oil on the sleep quality and anxiety levels of coronary ICU patients	N = 60 patients in coronary ICU n = 30 intervention n = 30 control	RCT • Intervention The intervention group received 2% lavender night before sleep for 15 d; the control group received standard care.	PSQI and BAI analyzed with independent and paired t tests.	Sleep quality assessed through PSQI, and anxiety assessed with BAI.	The intervention group had significant improvement in sleep ($P = .006$), and reduction of anxiety ($P = .001$) compared with the control group.	As reported by researchers, findings only relevant to short-term effects of lavender on sleep and anxiety.	B
Bagheri-Nesami et al, ¹⁶ 2014	To determine the effects of lavender aromatherapy on pain after fistula needle access in hemodialysis patients	92 hemodialysis patients n = 46 aromatherapy n = 46 control	RCT • Intervention The experimental group patients inhaled 10% of lavender essence diluted 1:10 with sweet almond oil, for 5 min, during 3 hemodialysis sessions. Control group patients received aromatherapy without lavender.	Demographic comparisons performed using χ^2 tests. Independent t test to detect any difference between the groups' mean scores of pain severity; also, paired t tests and ANOVA.	Pain severity assessed with VAS.	A significant difference was found between the 2 groups in terms of mean pain scores after 3 aromatherapy sessions ($t = 2.66$, $P = .009$). The paired t test showed significant differences between the mean pain score before and after 3 aromatherapy sessions in both the experimental and control groups ($P = .0001$).	Authors reported that patients' fatigue, distress, and reluctance to participate may have influenced results.	B

(continues)

TABLE 1 Effects of Aromatherapy on Anxiety, Insomnia, and Pain in Acute and Critically Ill Patients: A Review of Primary Sources, Continued

Reference, Year	Aims/Objectives	Population/Samples	Study Design/Intervention	Analysis	Outcomes/Measures	Findings	Limitations	Level of Evidence ¹⁸
Seifi et al, ¹² 2014	To investigate the effects of lavender essential oil on anxiety in CABG patients	N = 60 CABG patients n = 30 intervention n = 30 control	Double-blind RCT • Intervention The patients in the aromatherapy group inhaled 2 drops of 2% lavender essential oil via an absorbable patch connected inside an oxygen mask for 20 min on the second and third days after surgery. The control group received 2 drops of distilled water as placebo via an oxygen mask for 20 min on the second and third days after surgery.	Independent t test for continuous variables and χ^2 for categorical variables	Mean anxiety scores assessed with STAI.	There was no statistically significant difference in the mean scores of anxiety between the aromatherapy and control groups ($P > .05$).		C
Cho et al, ¹³ 2013	To investigate the effects of aromatherapy on anxiety and sleep of PCI patients in ICU	56 patients with PCI in ICU n = 28 aromatherapy n = 28 control	Quasi-experimental design • Intervention Aromatherapy essential oils were blended with lavender, Roman chamomile, and neroli with a 6:2:0.5 ratio, and 2 drops were placed on aroma stones. Participants inhaled 10 times before PCI and another 10 times after PCI, and then the stone was placed under the patient's pillow until the following morning. The control group received usual care.	The homogeneity tests of the general characteristics of the aromatherapy and control groups were performed using the χ^2 test and the t test. t Tests and repeated-measures ANCOVA were used to analyze anxiety and sleep quality before and after the treatment in the aromatherapy and control groups.	The patients' state and trait anxiety assessed with STAI-KYZ, VAS, and the Korean translation form of the VSH Sleep Scale.	The aromatherapy group showed significantly lower anxiety ($t = 5.99, P < .001$) and improved sleep quality ($t = -3.65, P = .001$) compared with the control group.		C

Abbreviations: ANCOVA, analysis of covariance; ANOVA, analysis of variance; BAI, Beck Anxiety Inventory; BP, blood pressure; CABG, coronary artery bypass graft; C-STAI, Chinese version of the State-Trait Anxiety Inventory; DBP, diastolic blood pressure; GEE, generalized estimating equations; HR, heart rate; ICU, intensive care unit; MAP, mean arterial pressure; PCI, percutaneous coronary intervention; PSQI, Pittsburgh Sleep Quality Index; RCT, randomized controlled trial; RR, respiratory rate; SBP, systolic blood pressure; STAI, Spielberger's State-Trait Anxiety Inventory; STAI-KYZ, Korean translation of Spielberger's State-Trait Anxiety Inventory; VAS, visual analog scale; VSH, Verran and Snyder-Halpern Sleep Scale.
Descriptions of studies in the table are limited to the specific aspects of the study relevant to the treatment of anxiety, insomnia, and pain; therefore, all the measures of the study are not included.

TABLE 2 Effects of Guided Imagery on Anxiety, Insomnia, and Pain in Critically Ill Patients: A Review of Primary Sources^a

Reference, Year	Aims/Objectives	Population/Sample	Study Design	Analysis	Outcomes/Measures	Findings	Limitations	Level of Evidence ¹⁸
Casida et al, ³⁴ 2013	To test the use of GI as a sleep-promoting intervention after cardiac surgery and to determine potential differences in sleep patterns, duration, and quality.	Elective "on-pump" cardiac surgery patients in 1 tertiary care hospital (N = 52)	Pretest/posttest repeated-measures design GI, n = 27 Control, n = 25 GI program was used at night 2-3 d preoperatively and after surgery, the comparison group received usual care (postoperative days 1-4) GI was delivered via an MP3 with the commercially available Healthful Sleep program.	Repeated-measures ANOVA, ANCOVA, and η^2	Time it takes to fall asleep; total duration of nocturnal sleep, both with wrist actigraphy (accelerometer) Perceived sleep quality on a 10-point scale	No significant difference in any sleep outcomes between the 2 groups.	No power analysis was conducted; less rigorous treatment fidelity	B
Stein et al, ³⁵ 2010	To determine whether preoperative use of GI would reduce postoperative distress including anxiety in patients undergoing CABG.	Patients undergoing CABG surgery (N = 43)	3-group RCT GI, n = 14 Music, n = 11 Standard care, n = 18 GI was administered via Belleruth Naparstek audiotape. Patients in the GI and music groups were asked to listen to tapes at least daily for 1 wk before surgery and intraoperatively	χ^2 and ANOVA	7-item anxiety scale from the Hospital Anxiety and Depression Scale	No significant difference in anxiety between groups at 1 wk or at 6 mo postoperatively	Small sample; no power analysis; high rate of refusal to participate in the study	B

(continues)

TABLE 2 Effects of Guided Imagery on Anxiety, Insomnia, and Pain in Critically Ill Patients: A Review of Primary Sources^a, Continued

Reference, Year	Aims/Objectives	Population/Sample	Study Design	Analysis	Outcomes/Measures	Findings	Limitations	Level of Evidence ¹⁶
Kshetty et al, ³⁶ 2006	To evaluate the impact of CAM package (light massage, music, and GI intervention) on postoperative outcomes in heart surgery patients.	Heart surgery patients (N = 104)	RCT (single blind) • The intervention group received CAM package (massage, music, and GI) preoperatively and postoperatively. Guided imagery listening encouraged first 2 d postoperatively for stress and pain management (n = 53). Control condition (n = 51)	t Tests to compare mean baseline scores of physiological variables and pain and tension.	Pain and anxiety/tension numeric scores on a 0-10 scale	Pain and anxiety/tension reduced in days 1 (P = .01) and 2 (P = .038)	Investigators used a combination intervention; more studies are needed to distinguish unique effects of GI.	B
Haase et al, ³⁷ 2005	To determine whether brief psychological interventions to reduce preoperative stress impact postoperative course of patients undergoing abdominal surgery.	Patients undergoing abdominal surgery at 1 site (N = 60)	3-group RCT (partially blinded) GI, n = 20 PMR, n = 22 Control, n = 18 Patients were encouraged to listen to GI or PMR tapes 3 times/d before and after surgery.	t Tests and Mann-Whitney U tests as appropriate	Analgesic (morphine) consumption; pain scores (general intensity and when coughing)	Analgesia consumption, pain intensity, and pain while coughing not different between groups (P = 6 and P > .15, respectively)	Small sample, partial blinding Limited "brief" intervention may not have been of sufficient strength to show difference.	B
Richardson, ³⁸ 2003	To examine effects of relaxation and GI on sleep in critically ill patients.	Convenience sample from 3 critical care units in 2 large metropolitan hospitals (N = 36)	RCT with repeated-measures design Experimental (relaxation and imagery), n = 16 Comparison, n = 20 Outcomes measured on 3 mornings	2 × 3 ANOVA with repeated measures	Visual analog sleep scale	A significant difference in sleep scores on the basis of the unit (P = .035). Strong significant interaction between intervention, sex, and time (P = .003).	Combined intervention renders findings of GI not distinguished from relaxation; small sample size	B
Deisch et al, ³⁹ 2000	To determine whether GI might influence outcomes of CABG patients.	Patients undergoing first-time CABG surgery at 1 institution (N = 100)	Quasi-experimental prospective GI, n = 50 Control, n = 50 Used tapes of GI developed by Tusek et al. Patients instructed to use tape every morning and evening for 7 d postoperatively.	t Tests to compare mean baseline scores of physiological variables and pain and tension.	10-point visual analog scale; pain and anxiety/tension numeric scores on a 0-10 scale	Patients experienced reduced pain and anxiety in the GI group; only day 2 pain was statistically significant (P < .05).	Nonstandard instruments used. Study may be dated.	B

(continues)

TABLE 2 Effects of Guided Imagery on Anxiety, Insomnia, and Pain in Critically Ill Patients: A Review of Primary Sources^a, Continued

Reference, Year	Aims/Objectives	Population/Sample	Study Design	Analysis	Outcomes/Measures	Findings	Limitations	Level of Evidence ¹⁸
Tusek et al, ⁴⁰ 1999	To determine whether perioperative GI reduces cardiac surgical pain and anxiety.	Patients undergoing a variety of cardiac surgeries (N = 100)	Unmasked RCT, N = 100 GI, n = 51 Control, n = 49 Intervention was delivered via tapes by Guided Imagery, Inc. Patients were instructed to use tape twice daily 1-3 d before surgery and 1-5 d postoperatively.	ANCOVA	Pain and anxiety measured separately on Numeric Rating Scale (0-10).	Pain and anxiety scores decreased significantly for patients receiving GI ($P < .001$, for both measures)	Old study, current length of stay shorter; GI may have been confounded by music tapes listened to during anesthesia and recovery periods.	B
Richards, ⁴¹ 1998	To determine differences in the effects of back massage, combined muscle relaxation/imagery/music, and usual care.	Older men with cardiac illnesses in 1 critical care unit (N = 69)	RCT Massage, n = 24 Combination intervention, n = 28 Usual care (control), n = 17	ANOVA	Polysomnography for 1 night's sleep, sleep efficiency index	No significant effect for GI/relaxation/music intervention	Investigators used a combination intervention; more studies are needed to distinguish the unique effects of GI; insufficient power.	B
Tusek et al, ⁴² 1997	To determine the effects of GI perioperatively on colorectal surgery patient outcomes.	Patients having first elective colorectal surgery at 1 tertiary care center (N = 130)	RCT Group 1, n = 65 (standard care) Group 2, n = 65, comprising GI for 3 d preoperatively; music-only tape during induction, during surgery and in recovery room; and a GI tape during the first 6 d postoperatively	ANOVA or χ^2	Pain and anxiety measured on a linear analog 0-100 scale Narcotic consumption was also recorded.	Pain perception, opioid consumption, and anxiety were significantly different (lower) in the GI group ($P < .001$).	Study is old, and length of stay and procedures may not directly apply to contemporary practice.	B

Abbreviations: ANCOVA, analysis of covariance; ANOVA, analysis of variance; CABG, coronary artery bypass graft; CAM, complementary/alternative medicine; GI, guided imagery; PMR, progressive muscle relaxation; RCT, randomized controlled trial.

^aInformation reported in cells focuses exclusively on the symptoms of anxiety, insomnia, and pain and not on other symptoms or outcomes that may have been reported.

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CHAPTER 4

Overview

Chapter 4 presents the results of a survey of critical care nurses using the aforementioned Tracy et al. (2005) Critical Care Nurses' survey. The socio-demographic, professional, and work setting characteristics of the sample of critical care nurses from a single site of an academically-affiliated tertiary care medical center are described; their perceptions, knowledge, beliefs and use of music therapy, aromatherapy and guided imagery in critical care are presented. This chapter also presents an evaluation of the consistency of responses generated by this critical care nurse sample when the survey was administered on two separate occasions 4-6 weeks apart. The limitations of this study, future directions and implications for practice, education, and research are also presented.

The paper is formatted for publication in *Dimensions of Critical Care Nursing*: Meghani N, Tracy MF, O'Conner-Von S, Hadidi N, Mathiason MA, Lindquist R. Generating evidence of critical care nurses' perceptions, knowledge, beliefs, and use of music therapy, aromatherapy and guided imagery in critical care.*

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Background: Critical care settings are globally known to be fast-paced and technologically advanced. Critical care nurses confront difficult and complex life-sustaining and life-prolonging decisions in their work with their patients. To optimize humanistic care, integration of evidence-based complementary and alternative therapies (CAT) holds promise. However, evidence of critical care nurses' use of CAT in clinical practice has not been evaluated recently.

Objectives: This study sought to determine evidence related to music therapy, aromatherapy and guided imagery (GI) from a sample of critical care nurses pertinent to critical care, including their perceptions of legitimacy, self-reported knowledge, interest in gaining knowledge, beliefs of harm/benefits, professional use, personal use, recommendations for use in critical care practice, and requests for these therapies by critical care patients or families.

Methods: A descriptive correlational design with repeated measures at Time 1 and Time 2 was conducted with critical care nurses' (N=53) to evaluate their current perceptions, knowledge, beliefs, and use of music therapy, aromatherapy and GI. In addition, an evaluation of the consistency of participants' responses of the above-mentioned domains/measures using the *Critical Care Nurses' Use of Complementary Therapies*® survey was done. This work is part of a larger study designed to evaluate the reliability and validity of the critical care nurses' survey of their use and perspectives on the use of CAT in critical care. The consistency of responses was also evaluated on a subset of the sample of critical care nurses (N=15) at two time points 4-6 weeks apart. The study was

conducted with critical care nurses at three intensive care units and included the critical care flex team at an academic-affiliated tertiary care medical center in the Midwest.

Results: Findings revealed that a majority of critical care nurses in this sample (66% - 83%) endorsed the legitimacy of the three therapies for use with their patients. Nurses had the most knowledge of aromatherapy, followed by music therapy and GI; they showed interest in gaining further knowledge of all three therapies. Nurses showed a positive response regarding their beliefs about the benefits on a harm/benefit scale for each of these therapies. Professional use was reported highest for aromatherapy (85%) followed by music therapy (75%); personal use was highest for aromatherapy (77%), while less than half of the participants reported use of the other two therapies. A strong majority recommended aromatherapy and music in practice and reported that these therapies were requested by their patients or families. Participant responses on the survey items at two time points of administration showed consistency.

Discussion: Based on the overall survey responses including perceptions of legitimacy, interest in further knowledge, and beliefs of positive benefits of these therapies, developing a robust scientific base, addressing educational needs through expanding the resources, integration in nursing curricula, and continuing education programs may promote evidence-based use of these therapies to benefit patients in critical care.

Keywords: Complementary therapies, Critical care, Complementary health approaches, Integrative health.

Generating Evidence of Critical Care Nurses' Perceptions, Knowledge, Beliefs, and Use of Music Therapy, Aromatherapy and Guided Imagery in Critical Care

INTRODUCTION

Critical care settings are considered highly technological and fast-paced environments.¹ Critical care nurses care for patients who often have multiple complex symptoms originating from their conditions and diseases, or from potential effects of therapeutic interventions. Several studies and reviews support that complementary and alternative therapies (CAT) can help alleviate untoward symptoms¹⁻⁶ and that evidence-based CAT can work harmoniously with other conventional treatments in critical care.^{7,8} The first formal survey of a nationally representative sample of critical care nurses' use of complementary therapies was conducted by Tracy and colleagues in 2005.¹ However, critical care nurses' perceptions, knowledge, beliefs, and personal and professional use of CAT have not been recently examined. Furthermore, there are no recent studies determining critical care nurses' current use of CAT in clinical practice in the United States (U.S).

It is noteworthy that several terms/acronyms are used in the literature when referring to complementary/alternative therapies. For this paper, complementary, alternative, adjunctive, non-pharmacological, complementary health approaches, complementary and alternative medicine, unconventional and integrative therapies are all addressed as complementary and alternative therapies (CAT). If CAM (Complementary Alternative Medicine), C/AT (Complementary/ Alternative Therapies), complementary health approaches or other terms are used to refer to these therapies in a particular paper

cited, then those terms are retained when referring to that specific paper. Further, it is noted that the American Music Therapy Association (AMTA) defines “music therapy” as an evidence-based use of music provided by a credentialed music therapist or professional, achieved through a personalized therapeutic relationship to meet the goals of music intervention.⁹ However, in this paper, music intervention/therapy will be referred to as music therapy to maintain the original language of the survey.

PERCEPTIONS, KNOWLEDGE, BELIEFS, AND USE OF COMPLEMENTARY THERAPIES

Critical care nurses’ perceptions of the legitimacy, benefits, risks and knowledge of CAT are important factors that may drive the use of CAT with their patients in critical care.¹ In a recent review,¹⁰ researchers concluded that 66% of nurses reported positive perceptions towards CAT but a majority of participants (77%) reported lack of knowledge related to the benefits and risks of these therapies.¹⁰ The findings from the review reveal that while nurses are open to integrating the therapies into their clinical practice, a potential barrier was their lack of knowledge related to the evidence of CAT.¹⁰

A 2005 nation-wide study of critical care nurses (N=726) conducted in the U.S. also demonstrated that critical care nurses reported having some knowledge of more than half of the 28 therapies listed on the survey.¹ A significant number of respondents indicated interest in gaining additional knowledge and education of CAT, including respondents who had already reported that they had some or a lot of knowledge related to CAT therapies.¹ A 2012 Australian national study¹¹ of critical care nurses (N=379) also revealed that critical care nurses had limited education or knowledge of several CAT

therapies. In fact, for 22 of the 28 CAT therapies listed on the survey, nurses indicated that they had absolutely no training or knowledge. However, it was noted that a considerable number of respondents disclosed interest in acquiring further knowledge.¹¹

Similarly, in a study of nurse practitioners (NPs) (N=410) in the Midwest, 95% of NPs believed that they should acquire knowledge of the most commonly used C/AT. A majority (81%) of NPs believed C/AT have a genuine use in practice; 79% believed that having this knowledge would result in better patient outcomes.¹² They additionally reported that evidence-based information and C/AT resources were lacking and if made available, would enhance the knowledge base to use or recommend beneficial C/AT therapies.¹² Similarly, a recent qualitative review of 15 studies revealed that nurses are supportive of and desire further education related to CAT.¹³ In another study, critical care nurses believed that knowledge of CAT can provide nurses with potentially beneficial alternatives for their patients who are unable to physiologically endure some conventional treatments.¹ Likewise, another qualitative study found that nurses (N=11) who do not believe they have enough knowledge of CAT express a desire to get involved in complementary and alternative medicine continuing education programs.¹⁴

A recent study revealed that nurses perceived CAM to be beneficial and were open to recommending them to their patients, however, reported that insufficient knowledge impeded their integration of CAM.¹⁵ Similarly, past studies in critical care indicate that critical care nurses are open to gaining further knowledge, and assimilation and integration of clinically appropriate CAT into care for their patients.^{1,11,16}

BACKGROUND OF THE STUDY

With continued interest and use of CAT in the public sector, a growing number of studies have been conducted with nurses and other health care professionals using different tools to determine and understand their knowledge and patterns of CAT use.^{10,17-19} However, there are fewer such studies conducted with critical care nurses. Moreover, there are no standardized tools to assess critical care nurses' perceptions, knowledge, beliefs and use of CAT in critical care. There are a few published studies which have examined the attitudes, knowledge and patterns of use of CAT among critical care nurses.^{1,11,20} A survey developed by Tracy et al.¹ was used in a national study in the U.S. in 2005 and the same survey was used in a 2012 national Australian study¹¹ to discern critical care nurses' knowledge, attitudes and use of CAT. Because of the paucity of current, relevant data, it is timely that critical care nurses' perceptions, knowledge, beliefs and use of CAT be evaluated.

STUDY PURPOSE(S)

The purpose of this study was to evaluate current perceptions, knowledge, beliefs, and use of select therapies including music therapy, aromatherapy and guided imagery (GI) by a sample of critical care nurses at one Midwestern academically affiliated tertiary care medical center.

A secondary purpose was to evaluate the consistency of responses of critical care nurses to the items of the national survey developed by Tracy and colleagues,¹ with the focus on three selected therapies- music therapy, aromatherapy and GI. To evaluate the

consistency of responses from this critical care nurse sample, the survey was completed by critical care nurses at two time points 4-6 weeks apart.

It is important to note that this paper reports findings of a subset of data from a larger parent study designed to determine the reliability and validity of the Tracy et al.¹ survey. In the larger study, the survey was conducted of critical care nurses from an academically-affiliated tertiary care medical center and nurses who were affiliated with an academic center focused on integrative therapies.

METHODS

An electronic version of the Tracy et al.¹ survey was created in REDCap, a secure, web application created specifically to support data capture for research.²¹ The survey took approximately 25-30 minutes to complete.

Study Design

The study was conducted using a descriptive, cross-sectional, repeated measures design to assess the perceptions, knowledge, beliefs, and use of music therapy, aromatherapy and GI. The study also evaluated the participants' consistency of survey responses for the eight domains for each of the three therapies when assessed 4-6 weeks apart (Time 1 and Time 2).

Sample and Setting

All critical care nurses (N=322) on the three adult intensive care units (ICUs) (i.e., a 19-bed medical ICU, a 27-bed surgical/neurological ICU, and a 16-bed cardiovascular ICU) and the critical care flex team from one large >800-bed urban Midwestern academically-affiliated tertiary care medical center were invited via email to participate in the study.

Patients in these ICUs exhibit high acuity and have a range of cardiovascular, neurological, medical (e.g., pulmonary, renal, liver, etc.), and surgical diagnoses, including organ and blood and marrow transplants.

Data Collection Instrument

The Tracy et al.¹ national survey was developed in 2005 and used in a nation-wide study of critical care nurses, discerning their patterns of use of CAT in critical care.¹ A team of experts in critical care and CAT were involved in the development of the original critical care nurses' survey. The content of the original survey was based on the National Center for Complementary and Alternative Medicine (NCCAM) Classification System.¹ Most of these therapies are still listed on the current NCCIH (National Center for Complementary and Integrative Health) website. (NCCIH, 2019).

The survey was updated for the present study. The survey was updated to ensure the inclusion of 23 CAT that were considered feasible for use in the critical care setting and the format was changed from paper to electronic. Two therapies that were added to the list were reflexology and reiki. Additionally, seven therapies which are not commonly used in critical care units were deleted (e.g., Tai Chi, Native American Medicine, Traditional Chinese medicine, Qigong, Environmental Medicine, Homeopathic Medicine and Electromagnet Therapy), leaving 23 therapies in the survey used for the present work (see Appendix C). The survey was slightly modified by removing the demographic and work-related variables section for the second (Time 2) administration (see Appendix D) to establish the consistency of responses of critical care nurses between 2 administrations.

SURVEY DESCRIPTION

Socio-demographic and professional/work profile.

The demographic and professional profile items from the survey that were included in this work included age, gender, marital status, race/ethnicity, income, primary setting, primary role, hours worked per week in primary role, years of experience as a nurse, years of experience as a critical care nurse, number of CAT courses taken, highest nursing education/degree and highest non-nursing degree (if any), and professional certifications.

CAT-Related Domains/Items

The questions related to the domains of CAT evaluated for each of the three selected CAT (music therapy, aromatherapy, GI) included: Perceptions of legitimacy (*legitimate practice, not legitimate, don't know*); self-reported knowledge/training (*none, some, a lot*); interest in additional knowledge/training (*no/yes*); belief about the overall effects of therapies on a scale of 1 (*harmful*) to 5 (*beneficial*); use in practice (*have considered using, have not considered*); personal use whether self-administered or if they consulted with provider (*no/yes*); recommended CAT in critical care practice (*no/yes*); and whether specific therapies were requested by critical care patients or families (*no/yes*).

Procedures

The nurse managers of the three adult critical care units and critical care flex team assisted by emailing all critical care nurses in their respective ICUs or flex team (Time 1) with an invitation authored by the principal investigator that invited participation in the survey with an embedded online REDCap survey link (see Appendix E). After 2 weeks,

the nurse managers sent another email to the nurses in their respective units as a reminder to take the survey if they wished to participate and had not already done so.

Four weeks after the first email invitation, the survey was closed for enrollment, followed by a two-week period of inactivity. Following that, critical care nurses who completed the first survey, had expressed willingness to take the survey a second time and who had provided their emails, received an individual email invitation from the principal investigator (see Appendix F) to participate in a repeat administration (Time 2) of the survey. A shorter version of the same survey excluding the demographic and professional/work profile questions with a relevant invitation to participate was sent to examine the consistency of participant responses over time.

Ethical Considerations

The study was reviewed and deemed to not meet the federal definition of human subject research by the University's Institutional Review Board (IRB) (see Appendix G). The Nursing Research Proposal Review Committee (see Appendix H) and the Research Administration of the medical center approved the study protocol and consent procedures prior to study initiation (see Appendix I).

Analyses

Data analyses were performed using SAS 9.4 version. Descriptive statistics including means, standard deviations, frequencies, and ranges for measures are described at Time 1 (N= 53). The critical care nurse sample at Time 2 (N=15) was a subset of baseline participants from Time 1 who completed the survey a second time, to evaluate the consistency of participants' survey responses between Time 1 and Time 2. Simple

percentages of response agreement of participants from Time 1 to Time 2 were calculated to evaluate consistency of responses over time.

RESULTS

There were 53 completed surveys returned from the 322 critical care nurses at Time 1, a response rate of 16%. At Time 2, 15 surveys were returned from the 39 nurses who had agreed to participate in the repeat administration, a response rate of 38%. Since there were no statistically significant differences in the socio-demographic/ professional and work profiles between Time 1 and Time 2, Time 2 participant characteristics are not presented.

Socio-Demographic and Professional/Work Profile

The critical care nurse sample comprised primarily females (81%). The mean (standard deviation) age of respondents was 36.1(10.8) years. A majority of respondents were White (96%), with reported household incomes \geq \$75,000. Most nurses reported their highest degree as baccalaureate 81% (n=43) and additionally, 13% (n=7) reported earning graduate degrees. These nurses had an average of 7.8 (9.4) years of critical care experience and an average of 10.2 (10.1) years of RN experience. Thirty-two percent of the sample (n=17) reported holding certification as a critical care RN (CCRN). More than half of the sample 54% (n=28) reported to have attended 1-3 integrative health courses and three participants reported to have attended four or more CAT courses. While a majority 81% (n =43) had a baccalaureate degree in Nursing, 43% also reported having a baccalaureate degree outside of Nursing; 64% reported having professional

certifications as registered nurse certified (RN, C), or critical care RN (CCRN) (see Table 4.1).

Table 4.1 Socio-demographics and professional/work profile (N = 53)

Characteristics	Mean (SD) Range
Age (years)	36.1 (10.8) 22-69
Gender	
Male	10 (19%)
Female	43 (81%)
	n(%)
Marital status	
Married	23 (43%)
Living in marriage like relationship	9 (17%)
Divorced/Separated	1 (2%)
Never married	20 (38%)
Race/Ethnicity* (N=52)	
Hispanic/Latino	1 (2%)
American Indian	2 (4%)
Asian	1 (2%)
White	50 (96%)
Annual household income (N=52)	
25,000- 39,999	1 (2%)
40,000-54,999	1 (2%)
\$55,000- \$74,999	15 (29%)
≥\$75,000	35 (67%)
Primary setting	
Combined ICU/CCU	4 (8%)
ICU	7 (13%)
Cardiovascular/ Surgical ICU	5 (9%)
Surgical ICU	14 (26%)
Medical ICU	21 (40%)
Other	2 (4%)
Primary role (Direct care)	53 (100%)
	Mean (SD) range
Hours worked per week in primary role	30.8 (8.5) 8-50
Years worked as an RN	10.2 (10.1) 0-46
Years worked as a critical care nurse	7.8 (9.4) 0-38
	n (%)
CAT courses (N=52)	

0 courses	21 (40%)
1-3 courses	28 (54%)
≥ 4 courses	3 (6%)
Highest nursing degree earned	
Associate degree/ Diploma	3 (6%)
Bachelors	43 (81%)
Graduate	7 (13%)
Highest degree outside nursing*	
None	24 (45%)
Associate degree	5 (9%)
Bachelor's degree	23 (43%)
Graduate degree	1 (2%)
Professional certifications*	
None	25 (47%)
CCRN	17 (32%)
RN, C	8 (15%)
Other	9 (17%)

*Note: All Ns are 53 unless otherwise noted. Abbreviations: CAT, complementary and alternative therapies. CCU, coronary care unit; ICU, intensive care unit. *Percentages added together do not equal 100% for all variables because more than one category could be chosen by respondents, or because of rounding.*

Perceptions, Knowledge, Beliefs, and Use of Music Therapy

A majority (83%) of the sample responded to music as a legitimate therapy. Although more than half of the sample responded that they have ‘some’ to ‘a lot’ of knowledge about music therapy, 74% showed interest in gaining further knowledge of, or training in the therapy. A majority of nurses reported that they believed music therapy was beneficial to critical care patients (greater than neutral on the scale). In this sample, 75% reported having used music therapy in practice, and 40% participants reported they have used music therapy or consulted providers for personal use. A majority (64%) reported recommending music therapy in practice, and 62% reported that music therapy has been requested by patients and/or their families (see Table 4.2).

Table 4.2 Perceptions, Knowledge, Beliefs, and Use of Music Therapy (N=53)

Domains: Measures/Items	Responses, n (%)				
Perceptions					
View regarding therapy's legitimacy	Legitimate Practice 44 (83%)		Not legitimate 6 (11%)		Don't know 3 (6%)
Knowledge					
Self-reported knowledge or training in therapy	None 23 (43%)		Some 22 (42%)		A lot 8 (15%)
Interest in additional knowledge of therapy	No 14 (26%)				Yes 39 (74%)
Beliefs (n=52)					
Beliefs about therapy's overall effects	Harmful (1) 0 (0%)	(2) 1 (2%)	Neutral (3) 16 (31%)	(4) 16 (31%)	Beneficial (5) 19 (37%)
Uses					
Use of therapy in practice	Have used in practice 40 (75%)		Have considered using 8 (15%)		Have not considered using 5 (9%)
Therapy self-administered or provider consultation	Yes, personally used/ consulted providers 21 (40%)				Not personally used/ consulted 32 (60%)
Recommended therapy in critical care practice	Yes, I have recommended 34 (64%)				No, I have not recommended 19 (36%)
Therapy requested by critical care patients or families	Yes, requested by patients/ families 33 (62%)				Not requested by patients/families 20 (38%)

Note: Some (%) percentages do not equal 100% due to rounding.

Perceptions, Knowledge, Beliefs, and Use of Aromatherapy

A majority (74%) of critical care nurse participants responded that they perceive aromatherapy as a legitimate therapy. A strong majority (85%) reported that they have ‘some’ or ‘a lot’ of knowledge about the therapy, yet 75% of nurses had interest in gaining further knowledge. Nurses reported that they believed aromatherapy was overall beneficial to critically ill patients (response greater than neutral on scale). In this sample of nurses, 85% reported that they have used aromatherapy in practice, and 77% responded that they have personally used or consulted providers for the therapy. Additionally, a majority (79%) recommended the therapy in practice and 72% reported that the therapy was requested by critical care patients or families (see Table 4.3).

Table 4.3 Perceptions, Knowledge, Beliefs, and Use of Aromatherapy (N=53)

Domains: Measures/Items	Responses, n (%)				
Perceptions					
View regarding therapy's legitimacy	Legitimate Practice 39 (74%)		Not legitimate 3 (6%)		Don't know 11 (21%)
Knowledge					
Self-reported knowledge or training in therapy	None 8 (15%)		Some 34 (64%)		A lot 11 (21%)
Interest in additional knowledge of therapy	No 13 (25%)				Yes 40 (75%)
Beliefs					
Beliefs about therapy's overall effects	Harmful (1) 0 (0%)	(2) 2 (4%)	Neutral (3) 17 (32%)	(4) 19 (36%)	Beneficial (5) 15 (28%)
Uses					
Use of therapy in practice	Have used in practice 45 (85%)		Have considered using 5 (9%)		Have not considered using 3 (6%)
Therapy self-administered or provider consultation	Yes, personally used/consulted providers 41 (77%)				Not personally used/consulted 12 (23%)
Recommended therapy in critical care practice	Yes, I have recommended 42 (79%)				No, I have not recommended 11 (21%)
Therapy requested by critical care patients or families	Yes, requested by patients/families 38 (72%)				Not requested by patients/families 15 (28%)

Note: Some (%) percentages do not equal 100% due to rounding.

Perceptions, Knowledge, Beliefs, and Use of Guided Imagery

A majority of this sample (66%) responded that GI was a legitimate therapy, and 57% responded that they have ‘some’ knowledge of GI, but none reported to possess ‘a lot’ of knowledge about the therapy and 60% reported an interest in additional knowledge or training related to GI. The most common response about beliefs in the effects of GI was ‘neutral’ (43%), while 51% responded with 4 or 5 on the scale, tending to be more positive. Only 38% of the nurses responded that they have used GI in practice, and 30% of the nurses reported to have used it personally or consulted providers. Only 45% had recommended GI to their patients, and 19% reported that they received requests for GI from their patients or families (see Table 4.4).

Table 4.4 Perceptions, Knowledge, Beliefs, and Use of Guided Imagery (N=53)

Domains: Measures/Items	Responses, n (%)				
Perceptions					
View regarding therapy's legitimacy	Legitimate Practice 35 (66%)		Not legitimate 4 (8%)		Don't know 14 (26%)
Knowledge					
Self-reported knowledge or training in therapy	None 23 (43%)		Some 30 (57%)		A lot 0 (0%)
Interest in additional knowledge of therapy	No 21 (40%)				Yes 32 (60%)
Beliefs					
Beliefs about therapy's overall effects	Harmful (1) 0 (0%)	(2) 3 (6%)	Neutral (3) 23 (43%)	(4) 15 (28%)	Beneficial (5) 12 (23%)
Uses					
Use of therapy in practice	Have used in practice 20 (38%)		Have considered using 13 (25%)		Have not considered 20 (38%)
Therapy self-administered or provider consultation	Yes, personally used/ consulted providers 16 (30%)			Not personally used/consulted 37 (70%)	
Recommended therapy in critical care practice	Yes, I have recommended 24 (45%)			No, I have not recommended 29 (55%)	
Therapy requested by critical care patients or families	Yes, requested by patients/ families 10 (19%)			Not requested by patients/families 43 (81%)	

Note Some (%) percentages do not equal 100% due to rounding.

Summary of Results -Patterns of Responses

There were common patterns in the use of these three therapies presented by this sample of critical care nurses. Our findings indicate that a majority of critical care nurses identified these therapies as legitimate and have either used them or have considered using them in practice; however, 38% of the sample reported that they have not considered using GI. This could be attributed to their lack of knowledge about GI, since none of the nurses reported 'a lot of knowledge' about GI. However, it was interesting that more than half of the sample (66%) viewed this therapy as legitimate and 45% responded that they have recommended GI to their patients. Similarly, 43% of these critical care nurses responded that they had 'no knowledge' of music therapy or GI. However, all therapies were fairly highly recommended in critical care practice. Music therapy, aromatherapy and GI were all viewed as legitimate therapies by more than half of this sample of nurses. Critical care nurses responded to having 'some' to 'a lot' of knowledge about these therapies but reported being most knowledgeable about aromatherapy. A majority of respondents also reported interest in gaining more knowledge about each therapy. Personal and professional use was lowest for GI as compared to music and aromatherapy. Professional use was highest for aromatherapy, which was consistent with their greater reported knowledge and personal use of this therapy compared to other therapies in this study. Many nurses reported that they have recommended therapies to their patients, most frequently recommending aromatherapy to their patients, followed by music therapy, then GI. Nurses reported that GI was the therapy least requested by their patients and families.

Consistency of Responses Between Time 1 and Time 2

Simple percentages were used to summarize the agreement of participants' (N=15) responses from Time 1 to Time 2. Percentages reflecting consistency (the exact same response or "perfect agreement" between Time 1 and Time 2 responses) to the domain measures were calculated in an initial evaluation of the reliability of the instrument. The percent range for agreement across therapies ranged for legitimacy, for example, from 80% -100%, and 67% - 87% for self-reported knowledge. The percent ranges of perfect agreement of responses across domains within each therapy are presented in the bottom row of the table (see Table 4.5).

Table 4.5 Consistency of Responses by Domains/Measures and Therapies (N=15)

Domains: Measures	Music Therapy nPA/N (%)	Aromatherapy nPA/N (%)	Guided Imagery nPA/N (%)	Range of % for domains
Perceptions				
View of therapy legitimacy	14/15 (93%)	15/15 (100%)	12/15 (80%)	80-100%
Knowledge				
Self-reported knowledge	10/15 (67%)	10/15 (67%)	13/15 (87%)	67-87%
Interest in more knowledge	9/15 (60%)	12/15 (80%)	10/15 (67%)	60-80%
Beliefs				
Beliefs of therapy's overall effects	12/14 (86%)	8/15 (53%)	9/15 (60%)	53-86%
Uses				
Use of therapy in practice	11/15 (73%)	12/14 (86%)	7/15 (47%)	47-86%
Personal use	11/15 (73%)	13/15 (87%)	13/15 (87%)	73-87%
Recommended therapy in practice	13/15 (87%)	10/14 (71%)	14/15 (93%)	71-93%
Therapy requested by patients/families	9/14 (64%)	13/15 (87%)	12/14 (86%)	64-87%
% Range for therapy	60-93%	53-100%	47-93%	

*Note: There were 14 participants for some items as noted in item denominator.
Abbreviations: nPA/N, number of participants having 'perfect agreement' (nPA) in responses of Time 1 & 2 (numerator) divided by responses received (N) the (denominator) for the measure.*

DISCUSSION

In this study, we aimed to determine from a sample of critical care nurses, their current perceptions, knowledge, beliefs, and use of music therapy, aromatherapy, and GI in their critical care practice settings. These therapies were chosen to assess current local patterns of use and deliberate the future use of these therapies in critical care settings since these therapies are within the realm of nursing practice, can be incorporated into practice without extensive equipment or specialized training, and are therapies that could be administered to treat common symptoms experienced by critically ill patients.⁸ It is also asserted, considering the stress inherent in critical care practice, that therapies which are comparatively easier to integrate in critical care should be introduced and integrated first.¹⁶ However, it is recommended that nurses should use prudence in evaluating each patient's unique situation (e.g., diagnoses, comorbidities, other treatments, patient's abilities to engage, and their responses to these therapies) to find the therapies that best fit according to patient preference and situation.

Findings Compared to Previous Studies

In this sample, 43% of critical care nurses reported having 'no knowledge' of music therapy and only 15% reported of having 'a lot' of knowledge about the therapy. For aromatherapy, only 21% reported possessing 'a lot' of knowledge; none reported having 'a lot' of knowledge of the GI therapy. However, 64% of these nurses agreed to recommending music therapy; 79% responded that they have recommended aromatherapy and 45% recommended GI in their practice. These findings are consistent

with a recent study which also highlights the concern of study investigators that many nurses recommend complementary and alternative therapies to their patients, regardless of any formal education or having adequate knowledge of CAM.¹⁰ In another recent study, nurses reported limited knowledge of basic CAM terminologies and CAM practices based on their self-reported knowledge. Nonetheless, they agreed that patients have the right to have complementary therapies integrated into their regular medical treatment.²² This study documents that nurses support CAM integration with other conventional treatments, however, they acknowledged that unclarity of their role and inadequate knowledge is an impediment in the safe integration of CAM.²²

In our study, the findings support that these critical care nurses showed fairly high interest in achieving further knowledge about all three therapies even when they reported having ‘some’ or ‘a lot’ of knowledge about them. Similarly, Chang and Chang’s 2015 review of 15 studies suggests that nurses were interested in the use of CAM therapies in their practice and acknowledged that their ability to integrate CAM into their practice is greatly challenged by their lack of knowledge.¹⁰

Our findings revealed that a majority of participants believed that the therapies were beneficial to patients, especially music therapy and aromatherapy. A notable finding was the reported use of aromatherapy as the highest in professional practice which also corresponded with their high reported knowledge and personal use of the therapy. These findings are consistent with a previous study (N=726) where the nurses’ personal use of CAT was related to perceptions of efficacy, knowledge of therapies, openness to use, recommendations to patients, and professional use of therapies.²³ Similarly, a recent study

of nurse practitioners' knowledge and use of C/AT, revealed that greater practitioner knowledge of C/AT was positively associated with higher perceptions of their effectiveness, referral and use.¹²

Comparisons to Previous Data from the Same Setting

Critical care nurses were surveyed in a previous pilot study²⁰ using the original Tracy et al.¹ survey in the same Midwestern institution. This study was an excellent comparator to the present work, in that despite the small sample size and inherent response bias, it enabled us to gauge potential shifts in critical care nurses' perceptions, knowledge, beliefs and use; the sample was drawn from the same institution as the present study. The views of legitimacy increased from 77% in the previous study for music therapy to 83% in this study. Likewise, GI was deemed legitimate by 52% of the sample in the previous study which increased to 66% in this sample. Aromatherapy had significant increases in perceptions of legitimacy, from 36% in the previous study to 74% in this sample. The reported knowledge related to therapies also improved in this sample, with aromatherapy showing the most improvement; 85% of nurses reporting having 'some' or 'a lot' of knowledge in this study compared to 35.5% in the previous study. Likewise, the interest for gaining additional knowledge related to all three therapies also increased compared to the previous survey findings. Personal use, recommendations and requests of aromatherapy, was highest compared to the previous pilot study. However, overall, the survey results revealed an improvement in the domains of personal use, recommendations and requests of all three therapies. Similarly, use in practice also increased for all therapies with an increase from 66% to 75% for music, and an increase in GI from 29%

to 38% in this sample. Professional use of aromatherapy increased from a reported 13% in the previous sample to 85% in this sample. This increase may be in part due to the fact that this academically-affiliated medical center has developed a policy on aromatherapy use, provided house-wide education to their nurses on how and when to use different aromatherapies, and has ensured access to a handful of essential oil aromatherapies on each unit. Therefore, it is not surprising that such a high percentage of respondents reported having used aromatherapy professionally in the current study.

Comparison to Data from the Previous National Survey

With limited evidence in literature pertinent to the critical care nurses' perceptions, knowledge, beliefs and use of complementary therapies, an attempt was also made to examine the current evidence pertinent to the domains/measures relevant to the three therapies with the previous national survey findings.

Examining nurses' perceptions from the previous national survey,¹ 43% of the nurses perceived aromatherapy as legitimate, whereas, in the present study, a majority 74% responded to aromatherapy as a legitimate therapy which is a notable increase from the previous survey. In the previous study,¹ 58% of the sample viewed GI as legitimate, whereas, in the current sample 66% viewed GI as a legitimate therapy. Music therapy perceptions of legitimacy also improved slightly from 81% in the previous sample to 83% in this survey. Overall, the self-reported 'some' or 'a lot' of knowledge and interest in further knowledge or training of all three therapies also demonstrated improved results in the current survey especially for aromatherapy. Similarly, recommendations by nurses

and requests from patients and families increased for all three therapies in the present study when assessed with the national survey findings.

The use of music therapy in professional practice also increased by the reported use of 75% of nurses in this sample, which reflects an increase from 52% of nurses who reported use in practice in the previous national study.¹ The professional use of aromatherapy in practice was reported by 16% of the nurses in the previous survey, whereas 85% of nurses in this sample reported that they have used aromatherapy in practice. This again could likely be explained by the institution's efforts to educate nurses to expand the appropriate use of aromatherapy to benefit their patients. It is notable that the overall use of these therapies in practice has increased for all three therapies, and the views of the effects of these therapies (i.e., harm/benefit) has also carried a positive response, with more nurses reported believing the therapies to be beneficial in the current study.

It is evident that the efforts of this institution in providing additional knowledge and availability of aromatherapies on each unit were visible in the positive perceptions, knowledge, beliefs and use of this therapy by critical care nurses in this sample. This implies that evidence-based education and availability of therapy/equipment can be translated into positive perceptions, beliefs, and use of those complementary therapies in critical care.

Looking at the critical care nurses' responses across these studies, it also appears that their perceptions of legitimacy, knowledge and openness to gaining further knowledge and use of complementary therapies has continued to improve. Hence, unit

and institution-based innovative approaches to incorporate the evidence informed therapies into routine care and protocols and providing resources can help nurses use these therapies effectively to benefit their vulnerable critical care patients.

While it is difficult to make direct comparison of responses between these surveys (the national survey, pilot study, and the present survey), due to changes in the survey items, format, national vs. local sampling, and sample sizes; such comparison provides an opportunity to consider the present perceptions, knowledge, beliefs, and use of these therapies as currently provided by critical care nurses, in relation to the previously conducted surveys available in literature.

With new findings generated for practice, critical care nurses have more evidence to evaluate for safe and effective integration of these therapies in critical care.²⁴⁻²⁷ The new evidence can also guide the future use of CAT and can be used to educate critical care nurses who have reported a desire for more CAT knowledge.

Consistency of Responses Between Time 1 and Time 2

An effort was made to evaluate the consistency of nurses' responses with time interspersed between consecutive administrations of the survey. The consistency of responses across the measures taken, by therapy, was satisfactory, given the small sample size. The agreement in participant responses (Time 1 to Time 2) across therapies for individual item measures had a broader range in response consistency. These results prompt an examination in future investigation to determine whether there are issues related to the clarity or understanding of specific item measures or the potential ambivalence or uncertainty surrounding measures. Reliability data generated from a

future study with a larger sample size could more definitively establish the test-retest reliability of the survey.

LIMITATIONS

There are limitations in this study. First, the study had a small sample size (N=53) and a low response rate (16%), and only 15 participants' test-retest responses. These factors introduce potential response bias and limit the generalizability of findings. These results are from a single institution, so they reflect the perceptions, knowledge, beliefs, and use of critical care nurses from one urban, academically-affiliated tertiary care medical center in the Midwest. Additionally, since the sample comprised mostly White females, it is possible that different results would be found from an ethnically, culturally or gender diverse critical care nurse sample.

It is also important that the results of this survey did not capture essential information from critical care nurses who were non-responders, potentially contributing in unassessed sampling bias.²⁸ It is possible that the sensitive constructs (e.g. personal use) may be under-represented in the results because of the self-reported nature of the survey. Furthermore, it is likely that nurses who are polarized negatively may not have responded and the nurses who embrace CAT positively would have been inclined to respond to the invitation to participate.

IMPLICATIONS

It is imperative that nurses educate themselves and seek resources to gain knowledge of these therapies, so they are able to incorporate the effective therapies in their practice and are cognizant of their patients' use of complementary therapies and prepared to pursue

discussions related to them. Nurses' interest in gaining further education of these therapies was evident from the findings of this study and several other studies cited in this paper. Hence, the time is suitable for providing education and resources to nurses. APRNs and institutional administrators can facilitate critical care nurses' use of CAT by synthesizing and disseminating current evidence, through education, policy development, and through provision of equipment, expertise and consultation for the sensible use of CAT.

CONCLUSION

Our results support that a sample of critical care nurses belonging to a tertiary care setting perceive these CAT therapies to be legitimate and beneficial to their patients. These therapies were used in personal and professional use to varying degrees and have been recommended to patients for the alleviation of symptoms or promotion of well-being. Hence, it is concluded that this sample of critical care nurses have used these therapies to a certain extent and are willing to gain further knowledge of these therapies for ongoing integration in their practice. In our preliminary evaluation of the consistency of participant responses, the percent agreement of responses was satisfactory.

Future recommendations include, developing evidence-based resources for nurses, and educating them for the use and integration of CAT in the care of critically ill patients. Further, it is desirable that more evidence be generated by conducting ongoing studies and evaluation of CAT use in critical care. Future research will benefit from inter-professional research and multi-center clinical trials to establish the effectiveness for the short-term and long-term effects of these therapies for critically ill patients and other

patient populations. It is important to conduct a national survey of critical care nurses again for a broader understanding of their perceptions, knowledge, beliefs and use to elucidate future directions of complementary therapy use. Findings from a larger national sample of critical care nurses could be compared to our initial findings to further examine the reliability of the survey.

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Chapter 5

Synthesis

This chapter highlights the major findings from the three manuscripts presented in this dissertation. Further, it presents the contributions of this knowledge to the overall body of science. Finally, the implications of this body of work for practice, education and research are presented.

Results Manuscript 1

The first manuscript presented findings of an integrative review of music therapy and was designed to gather current evidence on music therapy and music intervention with different types of music and nature-based sounds on the effects of pain, anxiety and insomnia in critically ill patients. The results showed significant improvements in the short-term reductions of these symptoms in critically ill adult patients. Three studies in this review (Chlan et al., 2013; Korhan et al., 2011; Saadatmand et al., 2013), where longer durations of music therapy or intervention were used, demonstrated a cumulative dose effect, indicating that longer durations of music intervention may provide further benefits to patients. However, this evidence needs to be substantiated with future studies.

This manuscript concluded that future studies should also examine the effects of music therapy on long-term outcomes of pain, anxiety and insomnia and other indicators, for example, patient satisfaction, patient's need for analgesics, sedatives, ventilator days, weaning time, and length of stay (LOS). Future studies would benefit from robust research designs, larger sample sizes and multi-center studies to establish further evidence of music therapy for critically ill patients.

Results Manuscript 2

The results of the aromatherapy review suggested that aromatherapy was significantly associated with improving the signs and symptoms of pain, insomnia and anxiety in critical care. Primarily, lavender was the aromatherapy used in these studies with different strengths, modes and combination of oils. This manuscript concluded that there is a critical need for future studies to examine different aromatherapies and establish their effectiveness in critical care; to find proper doses, modes of intervention, and frequency of administration; and determine their effectiveness for common patient symptoms and other patient outcomes such as patient satisfaction and LOS in critical care.

The guided imagery (GI) review presented mixed results. Three of the nine studies did not provide significant impact of the intervention on the pain, anxiety and insomnia outcomes (Hasse, Schwenk, Hermann & Muller, 2005; Richards, 1998; Stein et al., 2010). One study found significantly lower pain scores only on post-operative day 2 while patients received GI intervention (Deisch, Soukup, Adams, & Wild, 2000), while other studies combined GI intervention with other complementary therapies like music, massage, and relaxation, making it difficult to discern the effects of GI intervention on outcomes (Kshetry et al., 2006; Richards, 1998). However, it was concluded that GI is a promising intervention with a growing body of evidence in critical care. Future studies need to focus on the authentication of this intervention and ways to tailor the intervention for select critical care patients and populations. The frequency, doses and different ways

of administering GI intervention for different acuities of critically ill patients needs to be established in future studies to inform clinical practice.

Results Manuscript 3

Germane to the current study are the results which affirm that critical care nurses in this study considered music therapy, aromatherapy and GI as legitimate therapies, and are using them personally and professionally in practice for their critically ill patients. More than half of the sample reported that they have ‘some’ to ‘a lot’ of knowledge about these therapies and showed willingness for achieving more knowledge of these therapies. This study revealed that patients have requested these therapies from their critical care nurses and the nurses agreed that they have recommended music, aromatherapy and GI to their patients. The perceptions, knowledge, beliefs and use of GI received lower responses from critical care nurses on the measures of this survey compared to music therapy and aromatherapy. It is recommended that future studies develop further evidence for the safe and effective integration of this therapy for critically ill patients.

Contribution of findings to the overall body of science

This dissertation adds to the body of knowledge by providing evidence that several primary studies and reviews are being conducted to generate evidence related to music therapy, aromatherapy and GI in critical care.

The findings from our study confirm that critical care nurses from one Midwestern tertiary care center have used music, aromatherapy and GI in their practice and endorsed these therapies as legitimate and overall beneficial to their patients. Nurses agreed that a fair majority of their patients have requested music and aromatherapy and

have recommended these therapies to their patients to improve symptoms. Personal and professional use was highest for aromatherapy, followed by music therapy and GI. More than half of the sample acknowledged that they possess knowledge of these therapies to some or a large extent and showed willingness for achieving more knowledge of these therapies.

A definite majority responded that they have used music therapy in their practice and have recommended it to their patients. These results are harmonious with the recent music review (Meghani et al., 2017a) which showed significant results of music therapy/intervention in improving the common signs and symptoms of pain, anxiety and insomnia in critically ill patients. The evidence was strong and consistent among studies and hence nurses are encouraged to integrate music in routine care and protocols to improve their patients' symptoms and bring empathetic care to their patients. These results are consistent with the previous national study findings where nurses also clearly embraced that complementary therapies were advantageous in treating several common symptoms in critical care like headache, anxiety, pain and insomnia (Tracy et al., 2005). Few studies have been published since 2017 (Khan et al., 2017; Khan et al., 2018; Mofredj et al., 2016), and it is promising to see that a larger body of knowledge is being developed with rigor and disseminated for providers including nurses to evaluate the evidence and for the integration of these therapies in critical care.

Overall, aromatherapy had favorable results in most of the measures including legitimacy, knowledge, interest in gaining further knowledge, perceptions of benefits, professional use, personal use, recommendations to patients, and requests of therapy by

patients or families. This is likely due to the efforts of this academically-affiliated institution which has promoted use of aromatherapy through policy development and house-wide education of staff and availability of different aromatherapies on each unit. It is encouraging to see that this reflected in this sample of critical care nurses' views and use of this therapy as noted in the results of this study. This is consistent with the aromatherapy review findings (Meghani et al., 2017b), which showed promise of this therapy for the symptom management of pain, anxiety and insomnia for critically ill patients. The essential oil most commonly used was lavender in those primary studies. These data do not show which aromatherapies were being used or deemed legitimate or which aromatherapies these nurses were knowledgeable. However, this study gives an overall picture of how aromatherapies were viewed and used by this sample of critical care nurses. It is encouraging to see that more studies have been conducted since our review in 2017 (Anderson, Deng, Anthony, Attalla, & Monroe, 2017; Schneider, Singer, & Singer, 2019). This ongoing generation of new evidence is favorable and needs to continue to establish a robust body of knowledge of integrative health approaches in critical care.

The results of this study demonstrate that the nurses were recommending GI to their patients, however, a little less than half (43%) of the sample were not knowledgeable about the therapy and no participant reported 'a lot' of knowledge about the therapy. Similarly, we do not know if or how much patients or their families are familiar or knowledgeable about GI either. This is concerning since our recent GI review (Meghani et al., 2017b) showed marginal effects for improving the symptoms, and the

evidence was incongruent and mixed. The review recommended future studies to establish the efficacy of GI intervention in critical care, explicating intervention dose, frequency, patient characteristics and other aspects of GI to enhance the applicability and effectiveness of the intervention with critically ill patients. However, it is favorable to see that these nurses are supportive of and interested in gaining further knowledge of all these therapies and would likely benefit from more education and resources.

Considering the current results in view of the previous surveys (Tracy et al., 2003; Tracy et al., 2005), overall, it is encouraging to see that the perceptions of legitimacy, reported knowledge, interest in knowledge, reported use of these therapies in practice, requests of and recommendations has improved for all three therapies and the views of beliefs/efficacy of these therapies also shows a positive response from these critical care nurses.

While the intent is not to directly compare between these surveys or responses from participants, this study provides an opportunity to see the present perceptions, knowledge, beliefs, and use of these therapies as revealed by the current sample of critical care nurses, compared to the previous national survey.

Implications

It is recommended that CAT be incorporated into nursing curricula to lay a strong foundation for the nurses of the benefits, risks, use and resources of complementary health approaches. Future research needs to continue to study the safety, risks and benefits of these complementary therapies with robust research designs, bigger sample sizes and multi-center studies for the safe integration of these therapies into practice.

Nurses with advanced degrees need to generate more evidence and disseminate knowledge related to CAT to inform practice. Advanced practice registered nurses can provide education and resources, and refine protocols for critical care nurses for the safe and effective use of complementary therapies as newer evidence is generated and disseminated.

Conclusion

Evidence-based use of complementary therapies can harmonize nursing care of critically ill patients while nurses balance competing priorities like conserving lives and offering comfort and compassion to their patients simultaneously. This body of work focuses on the perceptions, knowledge, beliefs, and use of three commonly available therapies in the critical care settings: Music, aromatherapy, and GI. The present evidence strongly suggests that evidence is growing for the safe and effective use of these therapies; nurses endorse their use in critical care and believe them to be genuine and beneficial for their critically ill patients.

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doi:10.1089/acm.2008.0427.

Appendix A

Waiver Copyright Release Manuscript I – Wolters Kluwer



Title: Part I: The Effects of Music for the Symptom Management of Anxiety, Pain, and Insomnia in Critically Ill Patients: An Integrative Review of Current Literature

Author: Naheed Meghani, Mary Tracy, Niloufar Hadidi, et al

Publication: Dimensions of Critical Care Nursing

Publisher: Wolters Kluwer Health, Inc.

Date: Jul 1, 2017

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Appendix B

Waiver Copyright Release Manuscript II – Wolters Kluwer

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 **Wolters Kluwer**

Title: Part II: The Effects of Aromatherapy and Guided Imagery for the Symptom Management of Anxiety, Pain, and Insomnia in Critically Ill Patients
An Integrative Review of Current Literature

Author: Naheed Meghani, Mary Tracy, Niloufar Hadidi, et al

Publication: Dimensions of Critical Care Nursing

Publisher: Wolters Kluwer Health, Inc.

Date: Nov 1, 2017

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Appendix C Survey University of Minnesota Medical Center Time 1

Confidential

Page 1 of 26

UMMC-Critical care nurses: Use of Complementary therapies

If you agree to be a participant in this study, we would ask you to complete this online survey. Your participation in the survey constitutes consent.

Dear UMMC Critical Care Nurse,

You are invited to participate in a survey related to critical care nurses' knowledge, perceptions, and use of complementary therapies at UMMC. This study is being conducted by Naheed Meghani, a Ph.D. student at the University of Minnesota School of Nursing.

Procedures:

This survey will take approximately 20-30 minutes to complete. It is best visualized on a computer or tablet device.

Confidentiality and Anonymity

This is an anonymous and confidential survey. Data will be password protected and only de-identified data will be used. Your individual answers to survey questions will not be identified during the study or when writing the results.

The study data will be in the REDCap database through a secure web server operated by the University of Minnesota Academic Health Center's Information Systems group (AHC-IS).

Voluntary nature of the survey

Participation in this study is completely voluntary. Your decision of whether or not to participate in this study will not affect your relations with the University of Minnesota Medical Center (UMMC) or MHealth. The survey does not need to be completed at one time. You can save answers and return at a later time to complete the survey. Although all your information is valuable, you may choose not to answer any specific question.

Potential benefits

Aggregate results will be shared with unit managers and staff and you may learn about the critical care nurses' collective patterns of complementary therapy use, knowledge, and perceptions related to them at UMMC. There are no direct benefits to participating in the survey.

Incentive

As a thank you for your time and participation in this study, at the end of the survey, you will be offered an opportunity to provide your email to be placed in a drawing for a \$100 Amazon

gift card

www.projectredcap.org



You will also be offered an opportunity to provide your email to indicate your willingness to participate in completing a 2nd slightly shorter version of this survey approximately 4 weeks later.

If you choose to provide your email and complete the repeat administration of the survey, you will again be offered to be placed in another drawing for a \$100 Amazon gift card.

The emails are only retained for the purpose of participation in the drawing and for the follow-up survey. The emails will be kept for a short amount of time and will then be destroyed. The emails will not be linked to your survey answers.

Contacts and Questions

The researcher conducting this study is Naheed Meghani. If you have any questions, you can contact the principal investigator at megh0002@umn.edu or 612-206-0433. You can also contact Fairview Research Administration at 612-672-7690.

Thank you in advance for your participation in this study!

Please complete the survey below.

Please read each question carefully. There are no right or wrong answers. Your first thought is usually the best response. All answers are important.

- D1 Gender Male
 Female
- D2 What is your primary professional role?
 Direct Care/Bedside/Staff Nurse
 Manager
 Clinical Nurse Specialist
 Other
- Please describe _____
- D3 What is your primary practice setting? (choose one)
 Combined ICU/CCU
 ICU
 Cardiovascular/Surgical ICU
 CCU
 Cath lab
 Telemetry/Progressive care
 Surgical ICU
 Medical ICU
 Other
- Please describe _____
- D4 Overall, how stressful is your critical care work environment? (choose one)
 Not at all
 Mildly
 Moderately
 Extremely

D5 If your primary practice setting is in a hospital, what is the size of the hospital? (choose one)

- 1- 50 beds
- 51- 150 beds
- 151- 300 beds
- 301- 500 beds
- 500 + beds

D6 What kind of area does your primary practice setting serve? (choose one)

- Urban area
- Suburban area
- Rural area

D7 In what state is your primary practice setting?

- Alabama
- Alaska
- Arizona
- Arkansas
- California
- Colorado
- Connecticut
- Delaware
- Florida
- Georgia
- Hawaii
- Idaho
- Illinois
- Indiana
- Iowa
- Kansas
- Kentucky
- Louisiana
- Maine
- Maryland
- Massachusetts
- Michigan
- Minnesota
- Mississippi
- Missouri
- Montana
- Nebraska
- Nevada
- New Hampshire
- New Jersey
- New Mexico
- New York
- North Carolina
- North Dakota
- Ohio
- Oklahoma
- Oregon
- Pennsylvania
- Rhode Island
- South Carolina
- South Dakota
- Tennessee
- Texas
- Utah
- Vermont
- Virginia
- Washington
- West Virginia
- Wisconsin
- Wyoming

-
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- D 8 How many hours per week do you spend in your primary role? _____
- D9 Years of critical care experience.
(If < 1 year: enter 0) _____
- D10 Years of experience as a Registered Nurse.
(If < 1 year: enter 0) _____

D11 In what year were you born?

- 1940
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- 2000

D12 Education: Choose the highest nursing degree/credential you have earned. (choose one)

- Associate degree
- Diploma degree
- Bachelor's degree (BS, BSN, etc.)
- Graduate degree (MS, MSN, MN, DNP, PhD, DNS, etc.)

D13 What if any, is your highest academic degree outside of nursing? (choose one)

- None
- Associate degree (AA)
- Bachelor's degree (BA, BS)
- Graduate degree (MA, MS, MPH, MBA, etc.)

D14 What are your professional national certifications? (choose all that apply)

- None
- CCRN
- RN, C
- Other

Please list

D15 How many complementary/alternative therapy-related courses have you taken?

- 0 courses
- 1-3 courses
- 4-6 courses
- 7-9 courses
- 10
- >10 courses

D16 Do you have any certificates/certifications in complementary/ alternative therapies?

Please choose your certificates/certifications in complementary/ alternative therapies. (choose all that apply)

- Yes
- No
- Massage
- Music therapy
- Acupuncture
- Reiki
- Aromatherapy
- Guided Imagery
- Relaxation techniques
- Biofeedback
- Chiropractic/Manipulative therapy
- Counseling/Psychotherapy
- Other

Please list:

D17 Do you have any memberships or belong to any complementary/alternative therapy-related organizations? (choose all that apply)

- None
- American Music Therapy Association (AMTA)
- American Holistic Nurses Association (AHNA)
- American Massage Therapy Association (amta)
- National Association for Holistic Aromatherapy (NAHA)
- Reiki Association/International Association of Reiki Professionals (IARP)
- American Association of Acupuncture and Oriental Medicine (AAAOM)
- Other(s)

Please list:

D18 Annual household income (before taxes)

- \$24,999 or below
- \$25,000 to \$39,999
- \$40,000 to \$54,999
- \$55,000 to \$74,999
- \$75,000 or more

D19 What is your current marital status?

- Married
- Living in a marriage-like relationship
- Divorced or Separated
- Widowed
- Never married

D20 Which groups below best describe your racial/ethnic background? (choose all that apply)

- Hispanic or Latino
- American Indian or Alaskan Native
- Asian
- Black or African American
- White

D21 Religious preference (choose one)

- Protestant
- Catholic
- Jewish
- Muslim
- None
- Other

Please list:

D22 How important is religion to you?

-
- Not at all
 - Somewhat important
 - Very important
 - Don't know

Evidence

S1a. How important are the following types of evidence to you to consider recommending or using an orthodox (traditional or conventional) treatment?

	Unimportant	Somewhat Unimportant	Somewhat Important	Essential
a. Proven mechanism	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b. Proposed mechanism	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c. Clinical trials	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d. Epidemiologic data	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
e. Published case studies	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
f. Successful use in my own practice	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
g. Colleague recommendation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
h. Personal Use	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
i. Patient's report	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

S1b. How important are the following types of evidence to you to consider recommending or using a complementary/alternative therapy?

	Unimportant	Somewhat Unimportant	Somewhat important	Essential
a. Proven mechanism	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b. Proposed mechanism	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c. Clinical trials	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d. Epidemiologic data	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
e. Published case studies	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
f. Successful use in my own practice	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
g. Colleague recommendation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
h. Personal use	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
i. Patient's report	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Attitudes

S2. Choose the most appropriate column reflecting your view of the legitimacy of each of the following complementary/alternative therapies (choose one for each therapy)

	Legitimate practice	Not legitimate	Don't know
a. Diet	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b. Megavitamins	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c. Exercise	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d. Acupuncture	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
e. Herbal Medicine	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
f. Acupressure	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
g. Chiropractic/Manipulative Therapy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
h. Massage	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
i. Therapeutic Touch	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
j. Art Therapy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
k. Music Therapy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
l. Behavioral Medicine	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
m. Biofeedback	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
n. Relaxation Techniques	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
o. Counseling/Psychotherapy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
p. Prayer and Spiritual Direction	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
q. Meditation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
r. Hypnotherapy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
s. Pet Therapy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
t. Guided Imagery	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
u. Aromatherapy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
v. Reiki	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
w. Reflexology	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

S3. Choose the most appropriate column reflecting the use in your practice for each of the following complementary/alternative therapies (choose one for each therapy)

	Have used in practice	Have considered using	Have not considered using
a. Diet	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b. Megavitamins	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c. Exercise	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d. Acupuncture	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
e. Herbal Medicine	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
f. Acupressure	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
g. Chiropractic/Manipulative Therapy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
h. Massage	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
i. Therapeutic Touch	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
j. Art Therapy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
k. Music Therapy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
l. Behavioral Medicine	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
m. Biofeedback	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
n. Relaxation Techniques	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
o. Counseling/Psychotherapy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
p. Prayer and Spiritual Direction	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
q. Meditation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
r. Hypnotherapy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
s. Pet Therapy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
t. Guided Imagery	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
u. Aromatherapy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
v. Reiki	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
w. Reflexology	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Knowledge/Training
S4a. How much knowledge/training do you have in each of the following therapies?

	None	Some	A lot
a. Diet	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b. Megavitamins	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c. Exercise	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d. Acupuncture	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
e. Herbal Medicine	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
f. Acupressure	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
g. Chiropractic/Manipulative Therapy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
h. Massage	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
i. Therapeutic Touch	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
j. Art Therapy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
k. Music Therapy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
l. Behavioral Medicine	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
m. Biofeedback	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
n. Relaxation Techniques	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
o. Counseling/Psychotherapy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
p. Prayer and Spiritual Direction	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
q. Meditation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
r. Hypnotherapy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
s. Pet Therapy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
t. Guided Imagery	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
u. Aromatherapy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
v. Reiki	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
w. Reflexology	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

S4b. Would you be interested in additional knowledge/ training related to these therapies?

	No	Yes
a. Diet	<input type="radio"/>	<input type="radio"/>
b. Megavitamins	<input type="radio"/>	<input type="radio"/>
c. Exercise	<input type="radio"/>	<input type="radio"/>
d. Acupuncture	<input type="radio"/>	<input type="radio"/>
e. Herbal Medicine	<input type="radio"/>	<input type="radio"/>
f. Acupressure	<input type="radio"/>	<input type="radio"/>
g. Chiropractic/Manipulative Therapy	<input type="radio"/>	<input type="radio"/>
h. Massage	<input type="radio"/>	<input type="radio"/>
i. Therapeutic Touch	<input type="radio"/>	<input type="radio"/>
j. Art Therapy	<input type="radio"/>	<input type="radio"/>
k. Music Therapy	<input type="radio"/>	<input type="radio"/>
l. Behavioral Medicine	<input type="radio"/>	<input type="radio"/>
m. Biofeedback	<input type="radio"/>	<input type="radio"/>
n. Relaxation Techniques	<input type="radio"/>	<input type="radio"/>
o. Counseling/Psychotherapy	<input type="radio"/>	<input type="radio"/>
p. Prayer and Spiritual Direction	<input type="radio"/>	<input type="radio"/>
q. Meditation	<input type="radio"/>	<input type="radio"/>
r. Hypnotherapy	<input type="radio"/>	<input type="radio"/>
s. Pet Therapy	<input type="radio"/>	<input type="radio"/>
t. Guided Imagery	<input type="radio"/>	<input type="radio"/>
u. Aromatherapy	<input type="radio"/>	<input type="radio"/>
v. Reiki	<input type="radio"/>	<input type="radio"/>
w. Reflexology	<input type="radio"/>	<input type="radio"/>

Personal Experiences

S5. Have you personally used (self-administered) or personally consulted provider(s) of any complementary/alternative therapies? (choose one for each therapy)

	No, have not used/consulted	Yes, personally used or consulted provider(s)
a. Diet	<input type="radio"/>	<input type="radio"/>
b. Megavitamins	<input type="radio"/>	<input type="radio"/>
c. Exercise	<input type="radio"/>	<input type="radio"/>
d. Acupuncture	<input type="radio"/>	<input type="radio"/>
e. Herbal Medicine	<input type="radio"/>	<input type="radio"/>
f. Acupressure	<input type="radio"/>	<input type="radio"/>
g. Chiropractic/Manipulative Therapy	<input type="radio"/>	<input type="radio"/>
h. Massage	<input type="radio"/>	<input type="radio"/>
i. Therapeutic Touch	<input type="radio"/>	<input type="radio"/>
j. Art Therapy	<input type="radio"/>	<input type="radio"/>
k. Music Therapy	<input type="radio"/>	<input type="radio"/>
l. Behavioral Medicine	<input type="radio"/>	<input type="radio"/>
m. Biofeedback	<input type="radio"/>	<input type="radio"/>
n. Relaxation Techniques	<input type="radio"/>	<input type="radio"/>
o. Counseling/Psychotherapy	<input type="radio"/>	<input type="radio"/>
p. Prayer and Spiritual Direction	<input type="radio"/>	<input type="radio"/>
q. Meditation	<input type="radio"/>	<input type="radio"/>
r. Hypnotherapy	<input type="radio"/>	<input type="radio"/>
s. Pet Therapy	<input type="radio"/>	<input type="radio"/>
t. Guided Imagery	<input type="radio"/>	<input type="radio"/>
u. Aromatherapy	<input type="radio"/>	<input type="radio"/>
v. Reiki	<input type="radio"/>	<input type="radio"/>
w. Reflexology	<input type="radio"/>	<input type="radio"/>

Professional Experience

S6. This question is asked to determine what you believe about the overall effects of these therapies. Please choose the response that best reflects your belief about each therapy on a scale of 1 ("Harmful") to 5 ("Beneficial").

	Harmful (1)	(2)	Neutral (3)	(4)	Beneficial (5)
a. Diet	<input type="radio"/>				
b. Megavitamins	<input type="radio"/>				
c. Exercise	<input type="radio"/>				
d. Acupuncture	<input type="radio"/>				
e. Herbal Medicine	<input type="radio"/>				
f. Acupressure	<input type="radio"/>				
g. Chiropractic/Manipulative Therapy	<input type="radio"/>				
h. Massage	<input type="radio"/>				
i. Therapeutic Touch	<input type="radio"/>				
j. Art Therapy	<input type="radio"/>				
k. Music Therapy	<input type="radio"/>				
l. Behavioral Medicine	<input type="radio"/>				
m. Biofeedback	<input type="radio"/>				
n. Relaxation Techniques	<input type="radio"/>				
o. Counseling/Psychotherapy	<input type="radio"/>				
p. Prayer and Spiritual Direction	<input type="radio"/>				
q. Meditation	<input type="radio"/>				
r. Hypnotherapy	<input type="radio"/>				
s. Pet Therapy	<input type="radio"/>				
t. Guided Imagery	<input type="radio"/>				
u. Aromatherapy	<input type="radio"/>				
v. Reiki	<input type="radio"/>				
w. Reflexology	<input type="radio"/>				

S7a. Have you recommended complementary/alternative therapies in your critical care practice?

	No, you have not recommended	Yes, you have recommended
a. Diet	<input type="radio"/>	<input type="radio"/>
b. Megavitamins	<input type="radio"/>	<input type="radio"/>
c. Exercise	<input type="radio"/>	<input type="radio"/>
d. Acupuncture	<input type="radio"/>	<input type="radio"/>
e. Herbal Medicine	<input type="radio"/>	<input type="radio"/>
f. Acupressure	<input type="radio"/>	<input type="radio"/>
g. Chiropractic/Manipulative Therapy	<input type="radio"/>	<input type="radio"/>
h. Massage	<input type="radio"/>	<input type="radio"/>
i. Therapeutic Touch	<input type="radio"/>	<input type="radio"/>
j. Art Therapy	<input type="radio"/>	<input type="radio"/>
k. Music Therapy	<input type="radio"/>	<input type="radio"/>
l. Behavioral Medicine	<input type="radio"/>	<input type="radio"/>
m. Biofeedback	<input type="radio"/>	<input type="radio"/>
n. Relaxation Techniques	<input type="radio"/>	<input type="radio"/>
o. Counseling/Psychotherapy	<input type="radio"/>	<input type="radio"/>
p. Prayer and Spiritual Direction	<input type="radio"/>	<input type="radio"/>
q. Meditation	<input type="radio"/>	<input type="radio"/>
r. Hypnotherapy	<input type="radio"/>	<input type="radio"/>
s. Pet Therapy	<input type="radio"/>	<input type="radio"/>
t. Guided Imagery	<input type="radio"/>	<input type="radio"/>
u. Aromatherapy	<input type="radio"/>	<input type="radio"/>
v. Reiki	<input type="radio"/>	<input type="radio"/>
w. Reflexology	<input type="radio"/>	<input type="radio"/>

S7b. Have these therapies been requested by your critical care patients or families?

	No, not requested by patients/families	Yes, requested by patients/families
a. Diet	<input type="radio"/>	<input type="radio"/>
b. Megavitamins	<input type="radio"/>	<input type="radio"/>
c. Exercise	<input type="radio"/>	<input type="radio"/>
d. Acupuncture	<input type="radio"/>	<input type="radio"/>
e. Herbal Medicine	<input type="radio"/>	<input type="radio"/>
f. Acupressure	<input type="radio"/>	<input type="radio"/>
g. Chiropractic/Manipulative Therapy	<input type="radio"/>	<input type="radio"/>
h. Massage	<input type="radio"/>	<input type="radio"/>
i. Therapeutic Touch	<input type="radio"/>	<input type="radio"/>
j. Art Therapy	<input type="radio"/>	<input type="radio"/>
k. Music Therapy	<input type="radio"/>	<input type="radio"/>
l. Behavioral Medicine	<input type="radio"/>	<input type="radio"/>
m. Biofeedback	<input type="radio"/>	<input type="radio"/>
n. Relaxation Techniques	<input type="radio"/>	<input type="radio"/>
o. Counseling/Psychotherapy	<input type="radio"/>	<input type="radio"/>
p. Prayer and Spiritual Direction	<input type="radio"/>	<input type="radio"/>
q. Meditation	<input type="radio"/>	<input type="radio"/>
r. Hypnotherapy	<input type="radio"/>	<input type="radio"/>
s. Pet Therapy	<input type="radio"/>	<input type="radio"/>
t. Guided Imagery	<input type="radio"/>	<input type="radio"/>
u. Aromatherapy	<input type="radio"/>	<input type="radio"/>
v. Reiki	<input type="radio"/>	<input type="radio"/>
w. Reflexology	<input type="radio"/>	<input type="radio"/>

S8. For which of the following symptoms that your patients experience, would you find it helpful to use complementary/alternative therapies? (choose one for each symptom)

	No	Yes	Don't know
a. Headaches	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b. Back Pain	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c. Pain/Discomfort	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d. Nausea	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
e. Vomiting	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
f. Anxiety	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
g. Stress	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
h. Restlessness	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
i. Insomnia	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

S9. Which barriers, if any, do you experience in your institution related to the use of complementary/alternative therapies? (choose one for each barrier)

	No	Yes	Don't know
a. Physician reluctance in utilization	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b. Peer reluctance in utilization	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c. My reluctance to utilize	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d. Unavailability of credentialed providers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
e. Lack of knowledge regarding appropriateness of complementary /alternative therapies	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
f. Lack of staff training	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
g. Lack of appropriate equipment	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
h. Lack of time	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
i. Lack of reimbursement	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
j. Institutional concerns about legal issues	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

S10. How helpful do you believe complementary/alternative therapies are to the following groups? (choose one for each)

	Not helpful	Somewhat helpful	Moderately helpful	Very helpful
a. Patients	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b. Family	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c. Nurses	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d. Other staff	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

S11. What sources of information have you personally used to gain knowledge of complementary/alternative therapies? (choose one for each source)

- | | No | Yes |
|---|-----------------------|-----------------------|
| a. Peer(s) | <input type="radio"/> | <input type="radio"/> |
| b. Physician(s) | <input type="radio"/> | <input type="radio"/> |
| c. Other provider(s) | <input type="radio"/> | <input type="radio"/> |
| d. Nursing/Health/Medical Journal(s) | <input type="radio"/> | <input type="radio"/> |
| e. Mass media (TV, radio, newspapers, magazines, etc.) | <input type="radio"/> | <input type="radio"/> |
| f. Internet (world wide web, list-serve, etc.) | <input type="radio"/> | <input type="radio"/> |
| g. Coursework or formal training | <input type="radio"/> | <input type="radio"/> |
| h. Other | <input type="radio"/> | <input type="radio"/> |

Please describe

S12. How strongly do you desire to increase the availability of complementary/alternative therapies to the following? (choose one for each)

- | | Not at all | Somewhat | Moderately | Very much |
|--|-----------------------|-----------------------|-----------------------|-----------------------|
| a. Patients and families in your critical care setting | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| b. The nursing staff for personal use | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

S13. Overall, how open are you to the utilization of complementary/alternative therapies? (choose one)

- Not open to use
- Reluctant to use
- Open to use
- Eager to use

General questions:

- G1. How important is strong evidence to you for recommending or using complementary/alternative therapies as interventions in your practice?
- Unimportant
 - Somewhat unimportant
 - Somewhat important
 - Essential
- G2. Have you used or have considered using complementary/alternative therapies in your professional practice?
- Have used in practice
 - Have considered using
 - Have not considered using
- G3. What is your view about the legitimacy of complementary/alternative therapies in our health care system?
- Legitimate
 - Not legitimate
 - Don't know
- G4. How much knowledge do you have about complementary/alternative therapies?
- None
 - Some
 - A lot
- G5. Are you interested in gaining additional knowledge or training related to complementary therapies?
- Yes
 - No
- G6. How many different complementary/alternative therapies have you personally used?
- 0
 - 1
 - 2
 - 3
 - 4
 - 5
 - 6
 - 7
 - 8
 - 9
 - 10
 - >10
- G7. For how many complementary/alternative therapies have you personally consulted a provider(s)?
- 0
 - 1
 - 2
 - 3
 - 4
 - 5
 - 6
 - 7
 - 8
 - 9
 - 10
 - >10
- G8. What are your beliefs about the overall effect of complementary/alternative therapies?
- Harmful
 - Somewhat harmful
 - Neutral
 - Somewhat beneficial
 - Beneficial

G9. What number of complementary/alternative therapies have you recommended in your clinical practice?

- 0
- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- >10

G10. How many types of complementary/alternative therapies have been requested by your patients and their families in your clinical practice?

- 0
- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- >10

G11. Do you believe that complementary/alternative therapies are helpful for the management of patient symptoms?

- None
- Yes, for some
- Yes, for most
- Don't know

G12. How many barriers do you face in your institution regarding the use of complementary/alternative therapies?

- None
- Some
- A lot
- Not applicable

G13. How helpful do you believe complementary/alternative therapies are to different groups such as patients, families, nurses and other staff?

- Not helpful
- Somewhat helpful
- Moderately helpful
- Very helpful

G14. Do you desire to increase the availability of complementary /alternative therapies for patients, families, and staff in your institution?

- Not at all
- Somewhat
- Moderately
- Very much



Are you willing to participate in a shorter follow-up survey?

- Yes
- No

Please provide your email.

Would you like to enter a drawing for a \$100 Amazon gift card?

- Yes
- No

Please provide your email.

If you have additional comments related to the survey, please share in this section.

Appendix D

Survey University of Minnesota Medical Center Time 2

Confidential

Page 1 of 17

UMMC-Critical care nurses: Use of Complementary therapies

You have completed parts of this survey previously. This is a repeat administration.

Dear UMMC ICU Nurse,

You are invited to participate in this repeat administration of a survey on critical care nurses' perspectives, knowledge and use of complementary therapies in critical care. You have attempted this survey before and agreed to receive a follow-up survey by providing your email address. This study is being conducted by Naheed Meghani, a Ph.D. student from the University of Minnesota School of Nursing.

Procedures:

If you agree to be a participant in this study, I would ask you to complete this online survey. This survey will take approximately 15-25 minutes to complete.

Confidentiality and Anonymity

This is an anonymous and confidential survey. Data will be password protected and only de-identified data will be used. Your individual answers to survey questions will not be identified during the study or when writing the results. The study data will be in REDCap database through a secure web server operated by the University of Minnesota Academic Health Center's Information Systems group (AHC-IS).

Voluntary nature of the survey

Participation in this study is completely voluntary. Your decision of whether or not to participate in this study will not affect your relations with UMMC. The survey does not need to be completed at one time. You can save answers and return at a later time to complete the survey.

Potential benefits

Aggregate results will be shared with the unit managers and staff and you may learn about the critical care nurses' collective patterns of complementary therapies' use, knowledge, and perceptions related to them at UMMC. There are no direct benefits to participating in the study.

Incentive

As a thank you for your time and participation in this study, at the end of the survey, you will be offered an opportunity to provide your email to be placed in a drawing for a \$100 Amazon gift card. The emails are only retained for the purpose of drawing and will be kept for a short amount of time and will then be destroyed. The emails will not be linked to your survey answers.

Contacts and Questions

The researcher conducting this study is Naheed Meghani. If you have any questions, you can contact the principal investigator at megh0002@umn.edu or 612-206-0433. You can also contact the Research Subjects' Advocate Line, D528 Mayo, 420 Delaware St. Southeast, Minneapolis, MN 55455; (612) 625-1650.

Thank you in advance for your participation in this study!

Are you willing to participate in this study?

- Yes
 No

Evidence

S1a. How important are the following types of evidence to you to consider recommending or using an orthodox (traditional or conventional) treatment?

	Unimportant	Somewhat Unimportant	Somewhat Important	Essential
a. Proven mechanism	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b. Proposed mechanism	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c. Clinical trials	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d. Epidemiologic data	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
e. Published case studies	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
f. Successful use in my own practice	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
g. Colleague recommendation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
h. Personal Use	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
i. Patient's report	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

S1b. How important are the following types of evidence to you to consider recommending or using a complementary/alternative therapy?

	Unimportant	Somewhat Unimportant	Somewhat important	Essential
a. Proven mechanism	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b. Proposed mechanism	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c. Clinical trials	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d. Epidemiologic data	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
e. Published case studies	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
f. Successful use in my own practice	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
g. Colleague recommendation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
h. Personal use	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
i. Patient's report	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Attitudes

S2. Choose the most appropriate column reflecting your view of the legitimacy of each of the following complementary/alternative therapies (choose one for each therapy)

	Legitimate practice	Not legitimate	Don't know
a. Diet	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b. Megavitamins	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c. Exercise	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d. Acupuncture	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
e. Herbal Medicine	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
f. Acupressure	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
g. Chiropractic/Manipulative Therapy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
h. Massage	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
i. Therapeutic Touch	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
j. Art Therapy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
k. Music Therapy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
l. Behavioral Medicine	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
m. Biofeedback	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
n. Relaxation Techniques	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
o. Counseling/Psychotherapy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
p. Prayer and Spiritual Direction	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
q. Meditation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
r. Hypnotherapy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
s. Pet Therapy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
t. Guided Imagery	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
u. Aromatherapy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
v. Reiki	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
w. Reflexology	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

S3. Choose the most appropriate column reflecting the use in your practice for each of the following complementary/alternative therapies (choose one for each therapy)

	Have used in practice	Have considered using	Have not considered using
a. Diet	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b. Megavitamins	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c. Exercise	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d. Acupuncture	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
e. Herbal Medicine	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
f. Acupressure	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
g. Chiropractic/Manipulative Therapy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
h. Massage	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
i. Therapeutic Touch	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
j. Art Therapy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
k. Music Therapy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
l. Behavioral Medicine	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
m. Biofeedback	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
n. Relaxation Techniques	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
o. Counseling/Psychotherapy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
p. Prayer and Spiritual Direction	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
q. Meditation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
r. Hypnotherapy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
s. Pet Therapy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
t. Guided Imagery	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
u. Aromatherapy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
v. Reiki	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
w. Reflexology	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Knowledge/Training**S4a. How much knowledge/training do you have in each of the following therapies?**

	None	Some	A lot
a. Diet	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b. Megavitamins	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c. Exercise	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d. Acupuncture	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
e. Herbal Medicine	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
f. Acupressure	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
g. Chiropractic/Manipulative Therapy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
h. Massage	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
i. Therapeutic Touch	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
j. Art Therapy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
k. Music Therapy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
l. Behavioral Medicine	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
m. Biofeedback	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
n. Relaxation Techniques	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
o. Counseling/Psychotherapy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
p. Prayer and Spiritual Direction	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
q. Meditation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
r. Hypnotherapy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
s. Pet Therapy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
t. Guided Imagery	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
u. Aromatherapy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
v. Reiki	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
w. Reflexology	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

S4b. Would you be interested in additional knowledge/ training related to these therapies?

	No	Yes
a. Diet	<input type="radio"/>	<input type="radio"/>
b. Megavitamins	<input type="radio"/>	<input type="radio"/>
c. Exercise	<input type="radio"/>	<input type="radio"/>
d. Acupuncture	<input type="radio"/>	<input type="radio"/>
e. Herbal Medicine	<input type="radio"/>	<input type="radio"/>
f. Acupressure	<input type="radio"/>	<input type="radio"/>
g. Chiropractic/Manipulative Therapy	<input type="radio"/>	<input type="radio"/>
h. Massage	<input type="radio"/>	<input type="radio"/>
i. Therapeutic Touch	<input type="radio"/>	<input type="radio"/>
j. Art Therapy	<input type="radio"/>	<input type="radio"/>
k. Music Therapy	<input type="radio"/>	<input type="radio"/>
l. Behavioral Medicine	<input type="radio"/>	<input type="radio"/>
m. Biofeedback	<input type="radio"/>	<input type="radio"/>
n. Relaxation Techniques	<input type="radio"/>	<input type="radio"/>
o. Counseling/Psychotherapy	<input type="radio"/>	<input type="radio"/>
p. Prayer and Spiritual Direction	<input type="radio"/>	<input type="radio"/>
q. Meditation	<input type="radio"/>	<input type="radio"/>
r. Hypnotherapy	<input type="radio"/>	<input type="radio"/>
s. Pet Therapy	<input type="radio"/>	<input type="radio"/>
t. Guided Imagery	<input type="radio"/>	<input type="radio"/>
u. Aromatherapy	<input type="radio"/>	<input type="radio"/>
v. Reiki	<input type="radio"/>	<input type="radio"/>
w. Reflexology	<input type="radio"/>	<input type="radio"/>

Personal Experiences

S5. Have you personally used (self-administered) or personally consulted provider(s) of any complementary/alternative therapies? (choose one for each therapy)

	No, have not used/consulted	Yes, personally used or consulted provider(s)
a. Diet	<input type="radio"/>	<input type="radio"/>
b. Megavitamins	<input type="radio"/>	<input type="radio"/>
c. Exercise	<input type="radio"/>	<input type="radio"/>
d. Acupuncture	<input type="radio"/>	<input type="radio"/>
e. Herbal Medicine	<input type="radio"/>	<input type="radio"/>
f. Acupressure	<input type="radio"/>	<input type="radio"/>
g. Chiropractic/Manipulative Therapy	<input type="radio"/>	<input type="radio"/>
h. Massage	<input type="radio"/>	<input type="radio"/>
i. Therapeutic Touch	<input type="radio"/>	<input type="radio"/>
j. Art Therapy	<input type="radio"/>	<input type="radio"/>
k. Music Therapy	<input type="radio"/>	<input type="radio"/>
l. Behavioral Medicine	<input type="radio"/>	<input type="radio"/>
m. Biofeedback	<input type="radio"/>	<input type="radio"/>
n. Relaxation Techniques	<input type="radio"/>	<input type="radio"/>
o. Counseling/Psychotherapy	<input type="radio"/>	<input type="radio"/>
p. Prayer and Spiritual Direction	<input type="radio"/>	<input type="radio"/>
q. Meditation	<input type="radio"/>	<input type="radio"/>
r. Hypnotherapy	<input type="radio"/>	<input type="radio"/>
s. Pet Therapy	<input type="radio"/>	<input type="radio"/>
t. Guided Imagery	<input type="radio"/>	<input type="radio"/>
u. Aromatherapy	<input type="radio"/>	<input type="radio"/>
v. Reiki	<input type="radio"/>	<input type="radio"/>
w. Reflexology	<input type="radio"/>	<input type="radio"/>

Professional Experience

S6. This question is asked to determine what you believe about the overall effects of these therapies. Please choose the response that best reflects your belief about each therapy on a scale of 1 ("Harmful") to 5 ("Beneficial").

	Harmful (1)	(2)	Neutral (3)	(4)	Beneficial (5)
a. Diet	<input type="radio"/>				
b. Megavitamins	<input type="radio"/>				
c. Exercise	<input type="radio"/>				
d. Acupuncture	<input type="radio"/>				
e. Herbal Medicine	<input type="radio"/>				
f. Acupressure	<input type="radio"/>				
g. Chiropractic/Manipulative Therapy	<input type="radio"/>				
h. Massage	<input type="radio"/>				
i. Therapeutic Touch	<input type="radio"/>				
j. Art Therapy	<input type="radio"/>				
k. Music Therapy	<input type="radio"/>				
l. Behavioral Medicine	<input type="radio"/>				
m. Biofeedback	<input type="radio"/>				
n. Relaxation Techniques	<input type="radio"/>				
o. Counseling/Psychotherapy	<input type="radio"/>				
p. Prayer and Spiritual Direction	<input type="radio"/>				
q. Meditation	<input type="radio"/>				
r. Hypnotherapy	<input type="radio"/>				
s. Pet Therapy	<input type="radio"/>				
t. Guided Imagery	<input type="radio"/>				
u. Aromatherapy	<input type="radio"/>				
v. Reiki	<input type="radio"/>				
w. Reflexology	<input type="radio"/>				

S7a. Have you recommended complementary/alternative therapies in your critical care practice?

	No, you have not recommended	Yes, you have recommended
a. Diet	<input type="radio"/>	<input type="radio"/>
b. Megavitamins	<input type="radio"/>	<input type="radio"/>
c. Exercise	<input type="radio"/>	<input type="radio"/>
d. Acupuncture	<input type="radio"/>	<input type="radio"/>
e. Herbal Medicine	<input type="radio"/>	<input type="radio"/>
f. Acupressure	<input type="radio"/>	<input type="radio"/>
g. Chiropractic/Manipulative Therapy	<input type="radio"/>	<input type="radio"/>
h. Massage	<input type="radio"/>	<input type="radio"/>
i. Therapeutic Touch	<input type="radio"/>	<input type="radio"/>
j. Art Therapy	<input type="radio"/>	<input type="radio"/>
k. Music Therapy	<input type="radio"/>	<input type="radio"/>
l. Behavioral Medicine	<input type="radio"/>	<input type="radio"/>
m. Biofeedback	<input type="radio"/>	<input type="radio"/>
n. Relaxation Techniques	<input type="radio"/>	<input type="radio"/>
o. Counseling/Psychotherapy	<input type="radio"/>	<input type="radio"/>
p. Prayer and Spiritual Direction	<input type="radio"/>	<input type="radio"/>
q. Meditation	<input type="radio"/>	<input type="radio"/>
r. Hypnotherapy	<input type="radio"/>	<input type="radio"/>
s. Pet Therapy	<input type="radio"/>	<input type="radio"/>
t. Guided Imagery	<input type="radio"/>	<input type="radio"/>
u. Aromatherapy	<input type="radio"/>	<input type="radio"/>
v. Reiki	<input type="radio"/>	<input type="radio"/>
w. Reflexology	<input type="radio"/>	<input type="radio"/>

S7b. Have these therapies been requested by your critical care patients or families?

	No, not requested by patients/families	Yes, requested by patients/families
a. Diet	<input type="radio"/>	<input type="radio"/>
b. Megavitamins	<input type="radio"/>	<input type="radio"/>
c. Exercise	<input type="radio"/>	<input type="radio"/>
d. Acupuncture	<input type="radio"/>	<input type="radio"/>
e. Herbal Medicine	<input type="radio"/>	<input type="radio"/>
f. Acupressure	<input type="radio"/>	<input type="radio"/>
g. Chiropractic/Manipulative Therapy	<input type="radio"/>	<input type="radio"/>
h. Massage	<input type="radio"/>	<input type="radio"/>
i. Therapeutic Touch	<input type="radio"/>	<input type="radio"/>
j. Art Therapy	<input type="radio"/>	<input type="radio"/>
k. Music Therapy	<input type="radio"/>	<input type="radio"/>
l. Behavioral Medicine	<input type="radio"/>	<input type="radio"/>
m. Biofeedback	<input type="radio"/>	<input type="radio"/>
n. Relaxation Techniques	<input type="radio"/>	<input type="radio"/>
o. Counseling/Psychotherapy	<input type="radio"/>	<input type="radio"/>
p. Prayer and Spiritual Direction	<input type="radio"/>	<input type="radio"/>
q. Meditation	<input type="radio"/>	<input type="radio"/>
r. Hypnotherapy	<input type="radio"/>	<input type="radio"/>
s. Pet Therapy	<input type="radio"/>	<input type="radio"/>
t. Guided Imagery	<input type="radio"/>	<input type="radio"/>
u. Aromatherapy	<input type="radio"/>	<input type="radio"/>
v. Reiki	<input type="radio"/>	<input type="radio"/>
w. Reflexology	<input type="radio"/>	<input type="radio"/>

S8. For which of the following symptoms that your patients experience, would you find it helpful to use complementary/alternative therapies? (choose one for each symptom)

	No	Yes	Don't know
a. Headaches	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b. Back Pain	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c. Pain/Discomfort	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d. Nausea	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
e. Vomiting	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
f. Anxiety	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
g. Stress	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
h. Restlessness	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
i. Insomnia	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

S9. Which barriers, if any, do you experience in your institution related to the use of complementary/alternative therapies? (choose one for each barrier)

	No	Yes	Don't know
a. Physician reluctance in utilization	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b. Peer reluctance in utilization	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c. My reluctance to utilize	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d. Unavailability of credentialed providers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
e. Lack of knowledge regarding appropriateness of complementary /alternative therapies	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
f. Lack of staff training	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
g. Lack of appropriate equipment	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
h. Lack of time	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
i. Lack of reimbursement	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
j. Institutional concerns about legal issues	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

S10. How helpful do you believe complementary/alternative therapies are to the following groups? (choose one for each)

	Not helpful	Somewhat helpful	Moderately helpful	Very helpful
a. Patients	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b. Family	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c. Nurses	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d. Other staff	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

S11. What sources of information have you personally used to gain knowledge of complementary/alternative therapies? (choose one for each source)

- | | No | Yes |
|---|-----------------------|-----------------------|
| a. Peer(s) | <input type="radio"/> | <input type="radio"/> |
| b. Physician(s) | <input type="radio"/> | <input type="radio"/> |
| c. Other provider(s) | <input type="radio"/> | <input type="radio"/> |
| d. Nursing/Health/Medical Journal(s) | <input type="radio"/> | <input type="radio"/> |
| e. Mass media (TV, radio, newspapers, magazines, etc.) | <input type="radio"/> | <input type="radio"/> |
| f. Internet (world wide web, list-serve, etc.) | <input type="radio"/> | <input type="radio"/> |
| g. Coursework or formal training | <input type="radio"/> | <input type="radio"/> |
| h. Other | <input type="radio"/> | <input type="radio"/> |

Please describe

S12. How strongly do you desire to increase the availability of complementary/alternative therapies to the following? (choose one for each)

	Not at all	Somewhat	Moderately	Very much
a. Patients and families in your critical care setting	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b. The nursing staff for personal use	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

S13. Overall, how open are you to the utilization of complementary/alternative therapies? (choose one)

- Not open to use
- Reluctant to use
- Open to use
- Eager to use

Would you like to enter a drawing for a \$100 Amazon gift card?

- Yes
- No

Please provide your email.

If you have additional comments related to the survey, please share in this section.

Appendix E

University of Minnesota Medical Center Time 1 Survey invitation email

Dear UMMC ICU Nurse,

You are invited to participate in a survey to evaluate critical care nurses' perceptions, knowledge, beliefs and use of complementary therapies. You are being invited to participate in this study because you are a registered nurse caring for critically ill patients at the University of Minnesota Medical Center. This study is being conducted by Naheed Meghani, a PhD student at the University of Minnesota School of Nursing. As a critical care nurse, you are in an ideal situation to give us important first-hand information from your own point of view.

The link to the survey is embedded within this email. The survey will take approximately 20-30 minutes to complete. This is an anonymous and confidential survey. Your responses will help determine the survey's use in identifying critical care nurses' perspectives, knowledge and patterns of use of complementary therapies. This is an ***anonymous and confidential survey***. Data will be password protected and only de-identified data will be used. Your individual answers to survey questions will not be identified during the study or when writing the results.

Participation in this study is completely voluntary. Your decision of whether or not to participate in this study will not affect your relationship with your employer (UMMC or MHealth).

As a thank you for your time and participation in this study, at the end of the survey, you will be offered an opportunity to provide your email to be placed in a drawing for a \$100 Amazon gift card.

You will also be offered an opportunity to provide your email to indicate your willingness to participate in completing a 2nd slightly shorter version of this survey. This is important to evaluate the survey for its reliability and validity. If you choose to provide your email and complete the repeat administration of survey, you will be able to participate, if you choose, in another drawing for \$100 Amazon gift card.

I sincerely hope that you would participate in this study and provide with this important information.

Thank you in advance for your participation in this study!

Survey link is provided here: *****

Best regards,

Naheed Meghani

MS, BSN, RN, PhD Candidate, School of Nursing

University of Minnesota.

Appendix F

University of Minnesota Medical Center Time 2 Survey invitation email

Dear UMMC ICU Nurse,

You are invited to participate in this repeat administration of a survey on critical care nurses' perspectives, knowledge, beliefs and use of complementary therapies in critical care. You have attempted this survey before and agreed to receive a follow-up survey by providing your email address. This study is being conducted by Naheed Meghani, PhD student from the University of Minnesota School of Nursing.

The link to the survey is embedded within this email. This is a shorter version of the survey and will take approximately 15-25 minutes to complete. Your responses will help evaluate the reliability of the survey. This is an *anonymous and confidential* survey. Data will be password protected and only de-identified data will be used. Your individual answers to survey questions will not be identified during the study or when writing the results. The survey is best visualized on a tablet or a computer.

Participation in this study is completely voluntary. Your decision of whether or not to participate in this study will not affect your relations with your employer, the University of Minnesota Medical Center (UMMC) or MHealth.

As a thank you for your time and participation in this study, at the end of the survey, you will be offered an opportunity to provide your email to be placed in a drawing for a \$100 Amazon gift card.

I sincerely hope that you would participate in this study and provide with this important information.

Thank you in advance for your participation in this study!

Best regards,

Naheed Meghani

MS, BSN, RN, PhD Candidate, School of Nursing

University of Minnesota.

Appendix G

University of Minnesota Institutional Review Board determination correspondence

Notification of Not Human Research Determination

To:	Naheed Meghani
Link:	STUDY00003056
P.I.:	Mary Fran Tracy
Title:	Reliability Validity of survey-CC nurses' CAT use
Description:	The committee reviewed this submission and assigned a determination of Not Human Research. For additional details, click on the link above to access the project workspace.

Appendix H

University of Minnesota Medical Center Nursing Research Proposal Review Committee Approval



University of Minnesota Health

University of Minnesota Medical Center
2450 Riverside Avenue
Minneapolis, MN 55454
612-672-6000 Office Phone

University of Minnesota Physicians
720 Washington SE, #200
Minneapolis, MN 55414
612-884-0600 Office Phone

March 26, 2018

Dear Ms. Meghani,

Thank you for your responses to the questions posed by the Nursing Research Proposal Review Committee.

Thank you for providing the information sheets and recruitment emails. I anticipate the Institutional Review Board and Fairview Research Administration will review them in more detail to ensure protection of human subjects. Some recommendations based on my review: 1) state how you will maintain de-identification of data for participants who choose to provide their email addresses for the gift card drawing or to participate in the repeat administration; and 2) remove the question at the end “would you like to participate in this study?” but include a statement that participation in the survey indicates consent to participate in the study.

It is still not clear how you will analyze data to address Aim 1 to describe patterns in the data (in addition to describing the sample). I would recommend a brief description, including examples such as 1) therapies reported as most frequently used, or 2) examining potential relationships in therapies reported as legitimate and the actual use of those therapies.

Thank you for providing the background on the recruitment strategy. We will defer to Jill Cordes’s recommendation and approval of the strategy.

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We have approved your proposal with the understanding that you will address the recommendations above. Again, we appreciate the opportunity to review your proposal and wish you success as you conduct this research. We will contact you periodically for progress updates for our tracking purposes.

Sincerely,

A handwritten signature in blue ink that reads "S. Hagstrom". The signature is written in a cursive style with a large initial "S" and a long, sweeping underline.

Sandy Hagstrom, PhD, RN, APRN, CNP
Nursing Research Proposal Review Committee Chair

Appendix I

Fairview Research Administration Approval



Fairview Health Service

Research Administration
2344 Energy Park Drive
Saint Paul, MN 55108

University of Minnesota
Institutional Review Board
D528 Mayo Memorial Building
520 Delaware St SE
Minneapolis MN 55455-0392

June 27, 2018

Dear UMN IRB:

Regarding the proposed study submitted by Naheed Meghani, MS, BSN, RN entitled:

**“Evaluation of the Reliability and Validity of a National Survey of Critical Care Nurses’
Use of Complementary Therapies”**

Fairview Research Administration has reviewed and finds acceptable the research proposal within the context of Fairview Health Services and the University of Minnesota Health involvement.

Fairview Research Administration acknowledges that the IRB has reviewed and determined this research protocol as not meeting the federal definition of human subjects’ research. We have reviewed the consent form and have determined that it meets minimal consent standards.

Sincerely,

A handwritten signature in black ink, appearing to read "Krista Goldsmith".

Krista Goldsmith, Manager
Fairview Research Administration
Fairview Health Services