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# Noise Pollution/Reduction Education for Frontline Staff in the Acute Care Setting

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# Walden University

College of Health Sciences

This is to certify that the doctoral study by

Lopa Patel

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Walden University

2019

Abstract

Noise Pollution/Reduction Education for Frontline Staff in the Acute Care Setting

by

Lopa Patel

MSN, Walden University, 2014

ADN, Algonquin College, 1999

Project Submitted in Partial Fulfillment  
of the Requirements for the Degree of  
Doctor of Nursing Practice

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May 2019

## Abstract

Noise levels in hospital settings have risen beyond the recommended range of 35-40 decibels, resulting in poor patient healing outcomes and other health conditions ranging from sleep deprivation, anxiety, agitation, delirium, depression, and high heart rate and blood pressure. These negative patient health experiences are evidenced by poor scores for the Hospital Consumer Assessment of Healthcare Providers and Systems, which are indicators of patients' perceptions of care. This project explored whether an educational activity for 48 direct care staff, who include registered nurses and nursing assistants, in a cardiac unit on the impact of noise pollution on patient healing would increase staff members' knowledge of interventions to reduce noise pollution. The information processing theory guided this project. Eighty-nine percent of the participants strongly agreed that the educational activity was relevant to their practice as health care providers on the cardiac monitored unit. All participants strongly agreed that they would be able to identify when the unit was noisy and when noise was impacting a patient both physiologically and psychologically. Participants indicated that they could implement the suggested behavioral modifications to promote a healing environment. Participants strongly agreed that the speaker was effective in communicating the importance of noise pollution and its impact on patient healing and ways in which to combat the problem (89%), and they were generally satisfied with the learning activity (91%). Reducing noise pollution might create a healing environment for cardiac patients, thus positively impacting patient satisfaction and well-being.

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## Dedication

To my mother, a strong and gentle soul, who believed that anything could be possible with a little hard work and determination and to my family, especially G.D and my brothers, who provided me with the unwavering support and encouragement to complete my DNP journey.

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## Section 1: Nature of the Project

### **Introduction**

Noise pollution has been a growing concern in healthcare organizations around the nation (Gholamreza & Bahareh, 2015). Florence Nightingale (1860) identified noise as a risk factor for patient healing and its negative impact on a patient's wellbeing. She contended that sleep is a necessary function of life critical to human health, and has the potential to be impacted by unacceptable noise levels. High noise levels continue to be a concern, especially within cardiac monitored units (Darbyshire & Young, 2013). High noise levels have also been associated with patients experiencing both physiological and psychological disorders that can consequently affect patient healing (Kol et al., 2015).

The World Health Organization (WHO) has recommended that noise levels in acute care settings remain below 35 decibels (Berglund et al., 1999). Although, these recommendations exist, very few healthcare organizations are able to overcome the noise pollution challenge. Noise pollution has also been recognized by the Centers for Medicare and Medicaid Services (CMS, 2017). CMS has responded by gaining patients' feedback via the Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS), which incorporates the Institute of Medicine's (IOM) domain of patient-centered care: physical comfort. The feedback provided is tied to incentive payments for quality care provided (CMS, 2003). It should be noted that, as of July 1, 2015, the IOM has changed its name to the Health and Medicine Division. CMS are incentivizing healthcare organizations to focus their attention on noise reduction strategies by including this measure in the HCAHPS (CMS, 2017). Doing so increases the patients' abilities to reduce their stress levels, have improved sleep, and reduce

anxiety, which can impact patient health outcomes (McGough et al., 2017). To confront the matter of noise pollution in hospitals, direct care providers must be cognizant of the impacts of noise on patient healing and their contributions to noise pollution. One method of addressing this issue is through provider education.

From April 1, 2016, to March 31, 2017, only 63% of all hospitals nationwide answered "always" to the HCAHPS question "How often was the area around your room kept quiet at night?" In the state of New Jersey, this percentage decreased to 54% (CMS, 2018). Preliminary evidence has indicated that educating healthcare providers on noise pollution and its impact on patient healing, employing noise reduction strategies, and incorporating behavioral modification programs may assist in mitigating sleep disturbances related to noise, which can improve patient outcomes (Balci & Incekar, 2017; McGough et al., 2017). Highlighting the types of noises that occur frequently, which are caused by modifiable human behaviors, may result in a significant decrease in noise levels that are real or perceived by the patients (McGough et al., 2017.).

Although direct care staff members are not the sole cause of unacceptable noise, the control over a patient's environment is within the domain of a healthcare provider (Nightingale, 1860). Knowledge of the impact of noise on patient healing is critical, and even more critical is employing noise reduction strategies that can be applied to the patient's immediate surrounding (Andrew et al., 2016; Collins et al., 2014). Therefore, my goal for this educational project was to increase direct care providers' understanding of the impact of noise pollution on patient healing, identify the staff behaviors that can lead to high noise levels, and communicate easily employed noise reduction strategies.

This can result in patient's experiencing less sleep disturbance, improving sleep patterns and resulting in to better health outcomes. Additionally, with better health outcomes, improvement in the organization's HCAHPS may also occur, which can have a positive financial impact for the healthcare institution.

Healthcare organizations that commit to educating staff, modifying staff behavior, and utilizing noise reduction strategies, are committing to cultivating a therapeutic environment and improving human conditions for the population they serve. By addressing and overcoming the noise pollution challenge through education, healthcare organizations have the opportunity to improve patients' healing and outcomes. This, in turn, can improve the health of a society (Cunha & Silva, 2015).

### **Problem Statement**

Sleep disturbance is a common experience among hospitalized patients. Sleep disturbance can result in sleep deprivation, anxiety, agitation, delirium, depression, and increased, and worsening heart rate and blood pressure (Cunha & Silva, 2015). Since the 1960s, the recommended decibel values (daytime, 40 decibels; night time, 35 decibels) set for healthcare organizations have not been met, and instead have progressively increased across healthcare organizations (Berglund et al, 1999). This is more evident in cardiac monitored units where the average decibel measurement exceeds 80 decibels (Hu et al., 2015). With continual exposure to high noise levels in the hospital environment, patients are at risk for poor healing (Park et al., 2014). To address this growing concern, initial steps must be taken. This includes building direct care staff members' knowledge of the impact of high noise levels on patient healing and

introducing the benefits of behavioral health strategies, thereby reducing the staff members' gap in knowledge. The resulting impact can lead to an environment that promotes patient comfort, relaxation and sleep, and the possibility of more favorable patient outcomes.

To prevent and/or remove patient harm resulting from high noise levels, nurses and other care providers must have a basic understanding of the harmful effects. Beneficence is the prevention and removal of patient harm (Shahriari et al., 2013). This is one of the hallmark ethical principles that govern nursing practice (Beauchamp & Childress, 1994). By using methods to reduce noise levels, nurses have the potential to create a more healing and caring environment (Incekar & Balci, 2017; McGough et al., 2017). A caring environment emphasizes compassionate care and demonstrates a nurse's intention to strive for a superior standard of care (Wollersheim et al., 2013).

### **Purpose**

The purpose of this evidence-based practice project was to promote patient healing by educating the staff about noise pollution, its impact on patient healing, and noise reduction strategies. The educational activity included information on behaviors that can be modified to facilitate noise reduction, comfort, and relaxation, and promote healing on a unit specialized in the care of patients who have varying cardiac conditions. In this institution, the gap in knowledge relates to the direct care staff members' behaviors that contribute to noise pollution and its impact on patient healing and patients' perception of care. An education program supported the learning needs of the

direct care staff, which may ultimately impact their behaviors, and can enhance patient healing and decrease this practice gap.

### **Practice Focused Question**

Does an educational activity on the impact of noise pollution on patient healing increase knowledge of interventions to reduce noise pollution among direct care staff members in a cardiac unit?

### **Nature of the Doctoral Project**

Sources of evidence included, feedback from the direct care staff members, statistical data obtained from CMS (HCAHPS survey results), and primary research performed by researchers related to high noise levels and patient healing. I gathered evidence from various databases including Medline/Pubmed, CINHAL, Cochrane Library and governmental websites (WHO; CDC; CMS). Additional data collected included those from a pre-test/posttest and summative evaluation. The Walden University education manual guided this DNP project.

I conducted a literature review on noise levels and its impact on patients and patient healing. The review was limited to peer-reviewed full text articles published between the years 2013 and 2018. Key words included the following: *noise and noise reduction, acute care setting, direct care staff, sleep disturbance, noise pollution, and cardiac care unit*. I used the Briggs Level of Evidence and Grades to appraise and grade the selected articles.

The informational process theory (IPT) served as the theoretical framework for this doctoral project and assisted in the analysis of the evidence. I used SPSS to organize



and analyze information obtained from the pre-test and posttest. The institution's Round Plus system, which is a survey/audit platform, served as a means to administer, organize, analyze, and aggregate the data collected from the summative evaluation. Through this process, I had the opportunity to identify and improve the staff's knowledge of how noise pollution can lead to physiological and psychological impairment, and how noise reduction strategies can promote an environment of healing, thereby reducing the existing gap. I secured permission to use the Rounds Plus system from the institution's director of patient relations and customer service.

### **Significance**

#### **Stakeholders**

Stakeholders are individuals within the healthcare organization who have a vested interest in improving the care of the patients being served (Kok et al., 2015). For the purposes of this project, the stakeholders will include the cardiac units' direct care providers, the organizations clinical nurse leaders, nurse managers, and senior administration. It is the responsibilities of these individuals to minimize the physiological and psychological impact on patients that result from high noise levels. Through stakeholder engagement, the organization has an opportunity to foster a healthy and healing environment, improve patient experience and satisfaction, and enhance the organization's financial performance

#### **Contributions to Nursing Practice**

High noise levels have long been an environmental factor that place patients at harm and present a cruel absence of care (Nightingale, 1860). Consequently, health care

organizations have responded by implementing noise reduction protocols (Long, 2017) including the building's physical construction (Tafelmeyer et al., 2017), as well as engaging patients in speaking up about noise levels (CMS, 2017). Furthermore, direct care staff members need to have a clear understanding of their contributions to noise pollution and ways in which to reduce noise (West et al., 2014). A noise reduction educational program can be effective in promoting a quieter environment, thereby improving the way in which care is provided to patients in a cardiac monitored setting.

### **Transferability and Implication**

This doctoral project has the potential for positive social change. Through the use of targeted staff education that introduces noise reduction strategies, behavioral modifications, and environmental solutions, there is an opportunity to minimize or eliminate harm to patients and create a therapeutic healing environment (Fillary et al., 2015). Creating a therapeutic environment increases the opportunity for improved patient outcomes and positive social impact (McGough et al., 2017.). Organizations that commit to prioritizing the improvement of noise levels can become leaders in social change and encourage other healthcare organizations to do the same.

### **Summary**

In Section 1, I introduced the practice problem of noise in the acute care setting. High noise levels in cardiac monitored units continue to be a concern for patients, families, and the healthcare organizations that serve them. Noise pollution can have a detrimental impact on a patient's health and healing. The aim of this project was to provide an educational activity to address the staff's gap in knowledge related to noise

pollution and to identify and address staff behaviors that can impact noise levels on the cardiac unit. The practice question was: Does an educational activity on the impact of noise pollution on patient healing increase knowledge of interventions to reduce noise pollution among direct care staff members in a cardiac unit?

Section 2 will include a review of the background and context of the doctoral project, and will incorporate additional literature to support the need for this project.

## Section 2: Background and Context

### **Introduction**

The purpose of this project was to provide an educational activity that would help address the problem of noise in the acute care setting. Section 2 includes an overview of the theoretical foundation that I built this DNP project on and the significance of addressing noise levels in nursing practice. Additionally, I will discuss the motive for healthcare organizations to address high noise levels in patient care settings and those who were involved in addressing this concern at the DNP project site.

### **Practice Focused Question**

Does an educational activity on the impact of noise pollution on patient healing increase knowledge of interventions to reduce noise pollution among direct care staff members in a cardiac unit?

### **Concepts, Models, and Theories**

#### **Information Processing Theory**

I used IPT as the theoretical framework to guide this doctoral project. Grounded in the study of cognitive development, this theory provides a framework for how individuals think, reasons, and learn (Xiong & Proctor, 2018.). This theory proposes that humans process information received by analyzing information from the environment (Simon, 1995). This processing occurs by bringing information in through the senses, actively manipulating the information through working memory, and passively holding onto the information through long-term memory in order to bring about behavioral change (Aliakbari et al., 2015).

**History of IPT.** Evolving out of the American experimental tradition in psychology, this theory provides a mechanism for learning, through memory encoding and retrieval (Simon, 1995). IPT, whose emphasis is on how humans learn and behave, has primarily supported studies in the computer and artificial intelligence field (Xiong & Proctor, 2018). IPT has also been utilized within the realm of education and learning (Badyal & Singh, 2017).

**Components of IPT.** The IPT model consists of three components that involve sensory memory, working memory, and long-term memory. I provide a description of each of the components below.

1. **Sensory memory:** Sensory memory is created when information is gathered via the senses, and through transduction the brain processes the information to create memories. This requires the information to catch the learner's attention through relevancy and familiarity of information. This allows the learner to recall information immediately following its presentation. If successful, the learner will transition into the working phase of the IPT.
2. **Short term memory:** Information processed in an auditory and visual manner is processed in working memory. During this stage, repetition and elaboration of information is key. This requires the information to be rehearsed through repetition. If information is highly relevant to the learner, the learner will move on to the long-term phase of the IPT.
3. **Long term memory:** The three types of information that are processed in long term memory includes declarative (memory of facts and events), procedural

(memory of knowing how to do something) and mental imagery (ability to access and reactivate information learned).

The IPT model was aligned with the objectives of the learning activity to guide the learner in achieving successful outcomes. The IPT and learning objectives are represented in Appendix A.

### **Joanna Briggs Level of Evidence and Grades**

Revised in 2014, the Joanna Briggs Institute (JBI) adopted a new hierarchy for levels of evidence and grades. This revision allows individuals to identify potential threats to the validity of the research through the literature. The Joanna Briggs evidence appraisal system is an open access tool; therefore permission was not required for usage. I evaluated each article using the Joanna Briggs appraisal checklist and assigned a level of evidence, based on the JBI grades hierarchy for effectiveness. The levels are based on the following study designs: Level 1: experimental designs; Level 2: quasi-experimental designs; Level 3: observational-analytic designs; Level 4: observational-descriptive studies; Level 5: expert opinion and bench research.

### **Relevance to Nursing Practice**

The motivating factors for addressing noise in this project are its influence on patient health outcomes and patient satisfaction (see Long, 2017; CMS, 2017), Lack of quality rest and sleep can lead to lead to impaired levels of healing and delirium (Delaney et al., 2015). Improper sleep can cause a spike in cortisol and norepinephrine levels and increases the risk for insulin resistance (Hirotsu et al., 2015). In hospitalized patients, sleep deprivation is associated with insomnia, reducing the patient's mental capacity for

thinking and concentrating, weakening immune system, and decreasing the use of inspiratory muscles (Darbyshire & Young, 2013). These health conditions can lead to unfavorable health outcomes for patients with cardiac conditions as well as a loss of revenue of the healthcare organization.

To adequately care for patients admitted to cardiac monitored units, it is essential to understand the mechanism of sleep deprivation on patient healing resulting from high noise levels. Through this understanding, direct care staff members are better equipped to evaluate behaviors that can be modified to improve patients' sleep quality and promote a restful environment. Recent evidence has shown that there is a need to improve direct care staff members' understanding of the benefits of adequate sleep, reasons to reduce noise levels, and application of modifiable behaviors. With this knowledge, direct care providers can promote restful sleep for patients (Ding et al., 2017.). Other suggestions to improve noise levels in cardiac monitored units have included the importance of dimming lights at night, the use of earplugs as a means to reduce noise exposure, limiting patient interruptions to only those that are necessary, and keeping communication volumes to a modest level (Hewart & Fethaney, 2016). Moreover, recommendations to improve the patient's ability to sleep throughout the night include the use of eye masks, earplugs, and relaxation music as part of a noise reduction program (Hu et al., 2015; Yazdannik et al., 2014). Through the application of simple interventions, care providers can help improve patients' abilities to sleep within cardiac monitored environments.

There have been various ways in which healthcare organizations have tackled noise level problems. These strategies include encouraging patients and families to speak

up regarding their concerns as well as creating an organizational noise level policy (Park et al., 2014). Other efforts have involved expensive alterations in buildings' construction and the use of sound detection equipment for the purposes of behavioral modification (Tafelmeyer et al., 2017). Although these strategies have been implemented at other organizations, they did not prove to be effective at minimizing the noise levels to acceptable standard when implemented individually (Kaur et al., 2016.). Current interventions that have proven to be successful include a bundled approach (Hammer et al., 2014.) with a rigorous educational component (Alway et al., 2013.). Studies conducted by Kokani et al. (2014) and McGough et al. (2017), demonstrated that an educational activity has the potential to reduce noise related factors within cardiac monitored units.

### **Local Background and Context**

The level of patient satisfaction related to noise levels has caused a decrease in the HCAHPS scores at the project site. To counteract the low HCAHP scores, the organization has sought ways in which to improve the noise levels within the organization. A first step in addressing the noise level issue includes educating direct care staff members on the effects of noise on the health of the patient (McGough et al., 2017). To combat this problem, as part of my DNP project, an educational program was piloted on a 37-bed cardiac monitored unit in a 237-bed community acute care hospital. This hospital provides inpatient, outpatient, and community services and is committed to improving the quality of care and services being provided.



The hospital, 5 years ago, was designed with the concept of patient healing in mind. The hospital's physical construction included noise abatement architectural features. Other efforts to minimize noise have included the implementation of quiet time hours, use of a nighttime kit, and the elimination of noise contributing equipment. Although these interventions have been put in place, the patients who the organization serves continue to be dissatisfied by the noise levels in patient care areas. This is evidenced by the hospital's HCAHPS scores in the category of quietness surrounding the patient's room over the past 3 years where consumers have rated the hospital between 53.1% (2015) and 43.5% (2018), while the national average remains at 62% (CMS, 2017). The organization has recognized this as a need for improvement not only due to the dissatisfaction amongst its patients, but also the negative health impact it can cause to the community members that they serve.

### **Definition of Keywords**

*Acute care setting:* An acute care setting is a hospital where an individual is treated for various conditions including those cardiac in nature, warranting placement on a cardiac monitored unit. .

*Direct care staff:* Staff members who have direct responsibility for the care and management of the patients that they serve. This includes registered nurses and nursing assistants.

*Sleep disturbance:* A disorder in a patient's sleep pattern resulting in an interference with a person's normal physical, mental, and emotional functioning.

*Noise pollution:* An annoying, offensive, and/or harmful sound in an environment

### **Role of the DNP Student**

I am currently a professional development specialist at the facility where this DNP project was conducted. This project was not a part of my current working responsibilities and was performed outside of my regular work hours. As an employee of the organization, my responsibilities include improving patients' health and experience. One of the chief patient experience complaints is patients' and families' frustrations regarding high noise levels in patient care areas. The persistent high noise levels in healthcare organizations, including this organization, became the motivating factor for this staff education project focused on mitigating current noise pollution in the cardiac unit.

I served as the DNP project team leader. As the project team leader, I was responsible for organizing the project and managing the project team. My extensive knowledge and skills as an educator assisted the team and me in developing and delivering the content of the learning activity.

### **Role of the Project Team**

The project team members worked collaboratively to carry out the tasks related to the project. The team was composed of individuals who have subject matter knowledge of noise pollution, development of learning activities, analysis of data retrieved from educational activities, and the culture of the cardiac monitored unit. Collectively, these project team members used their expertise to ensure that the objectives of the DNP project were met. Key team members included the clinical field experience preceptor the nurse manager and the clinical nurse leader (CNL) of the cardiac care unit, the nurse educator, the

director of support services, and me as the DNP project lead. Each member had a contributing role and associated responsibilities as follows:

The nurse manager has direct oversight of the direct care providers and the day-to-day operations of the unit where this learning activity took place. She is also responsible for improving the cardiac unit's patient experience scores. As a member of the project team, she incorporated her leadership skills in encouraging the unit's leadership staff to attend the educational session. Her additional contributions included providing insight into the current interventions that have been put in place to reduce the unit's noise level and describing the current staff behaviors that are contributing to the unit's noise pollution.

The CNL functions in a leadership role and has a direct responsibility for providing unit-based education for the staff on the cardiac monitored unit. She is also responsible for performing patient rounds to assess the patients' experiences prior to discharge. I used her expertise in developing educational content to review the learning activity content prior to presenting the information to the direct care providers. She also assisted in finding a venue for the learning activity and responded to any indirect questions the direct care providers may have had during the learning activity.

The nurse educator I selected from the education department used her experience and skills in reviewing the educational content and assisted me in developing the pre- and posttest and summative evaluation. Working in collaboration with me, the nurse educator was responsible for the evaluation, interpretation, and analysis of the data obtained from

the pre-and posttest and the summative evaluation, which were provided from the SPSS and the survey/audit tool system.

The director of support services is responsible for minimizing noise levels around patient care areas. He works in collaboration with other leaders in the organization to monitor and implement strategies to improve the HCAHP scores related to the question: During this hospital stay how often was the area around your room quiet at night? The director of support services reviewed the educational content prior to the learning activity, focusing on what the organization has historically implemented to reduce noise levels in the patient care areas.

My responsibilities as the project lead included the initiation, planning, design, execution, evaluation, and closure of the project. Prior to presenting the educational content, the team received an email regarding their roles and responsibilities; items and an estimated project timeline. A team meeting was coordinated thereafter. During this meeting the roles and responsibilities were reviewed, and content of the information was presented with the opportunity for the team to provide constructive feedback. The goal of this meeting was to ensure that the content aligned with the organizations goal of decreasing noise levels. This meeting took place prior to the implementation of the educational activity. Following the learning activity, the analysis of the data was sent via email to the project team and participants.

### **Summary**

Section 2 includes a review of the noise problem in cardiac care units and the body's response to environmental stressors. The IPT provides reasoning for how

individuals learn and how the learning can be recalled for later use in the clinical setting. This theory support the DNP project by allowing staff members to gather, store, and process information from the educational activity to bring about behavioral change. The problem of noise and its relevance to nursing practice was also highlighted as well as the background and context of the practice problem. Last, the role and responsibilities of the DNP student and the project team was defined. Section 3 will include an overview of the archival and operational data that I used to support the DNP project and the evidence that was generated as a result of the DNP project. Furthermore, this section will show how I used the SPSS system and survey/audit tool system to address the need for education at the organizational level.

### Section 3: Collection and Analysis of Evidence

#### **Introduction**

In this DNP project, I addressed the problem of noise in the cardiac monitored unit at my project site. Noise is defined as a sound that can be loud or unpleasant and often causes detrimental health effects if an individual is exposed to it for a prolonged period of time (Byrne, 2013). Noise is also a nuisance to patients and their families (Simmons et al., 2014). This can have a negative impact on a patient's experience, resulting in poor HCAHPS scores (CMS, 2017).

In Section 2, I provided a review of the IPT, the framework I used to assist in developing the learning activity. I also discussed the relevance of this theory in assisting direct care providers, the noise problem in today's care practices, and my role as the DNP student and that of the project team in this DNP project. In Section 3, I address the sources of evidence that I used in the DNP project and how I collected, analyzed, and synthesized data.

#### **Practice Focused Question**

Researchers have shown that noise can lead to poor patient outcomes (Adatia et al., 2014). Providing patients and family members with an acoustically sound environment can produce healthier patient outcomes (Darbyshire & Young, 2013). The current gap in practice is related to direct care staff members' lack of knowledge of noise and the resulting patient response, including modifiable staff behaviors that contribute to high noise levels. The purpose of this project was to evaluate the direct care staff members' current knowledge of the impact of noise on patients and their response to the

learning activity provided. The practice question was: Does an educational activity on the impact of noise pollution on patient healing increase knowledge of interventions to reduce noise pollution among direct care staff members in a cardiac unit?

### **Evidence Generated from the Doctoral Project**

The sources of evidence that supported the practice focus question include a review of the organization's HCAHPS scores over the past 2 years along with the analysis of a pre-and posttest. The HCAHPS scores showed that there is a need to address this concern at the practice site. I used the responses generated from the pre-and posttest to identify the knowledge deficit amongst direct care providers on the cardiac monitored unit.

I reviewed literature collected from databases that included Medline/Pubmed, CINAHL, and Cochrane Library, and governmental websites like those of the WHO, CDC, and CMS. The key search terms that I used included *noise pollution, sleep disturbance, patient healing, and patient satisfaction*. Boolean operators were also utilized to widen the search. The combination of search terms included *noise pollution and healthcare organizations; noise levels and patient healing; high noise, patient satisfaction, and patient healing; noise levels, direct care providers, and education; and noise levels, hospitals, and behavioral modifications*. The initial search yielded 95 articles, which was further narrowed to include noise in cardiac monitored units, resulting in 42 articles, which I organized using the Joanna Briggs Level of Evidence and Grades. Permission was not required to adopt the Joanna Briggs Level of Evidence and Grades (JBI, 2014) for the purposes of this DNP project. The organization of the evidence is

illustrated in Table 1. The table shows that there is very little evidence related to the impact of noise pollution within the acute care setting and the use of education to help address this growing concern. This indicates the need for additional investigation and Research in order to minimize the practice gap that exists today.

Table 1  
*Number of Articles Appraised Using Joanna Briggs Level of Evidence and Grades*

Criteria	Level of evidence	No. Of articles
Systematic review of randomized control tests (RCTs)	1a	1
Systematic review of RCTs and other study designs	1b	2
Randomized control test	1c	3
Pretest-posttest or historic/retrospective control group study	2d	5
Cohort study with cohort group	3c	1
Case controlled study	3d	2
Observational study without control group	3e	2
Systematic review of descriptive studies	4a	4
Cross sectional study	4b	1
Case study	4d	5
Expert consensus	5b	10
Bench research/single expert opinion	5c	7

Note: Evidence and Grades of Recommendation. The Joanna Briggs Institute. 2014. Retrieved from: <http://joannabriggs.org/assets/docs/approach/Levels-of-Evidence-SupportingDocuments-v2.pdf>. Open access document.

### **Archival and Operational Data**

The HCAHPS is a nationally standardized survey designed to measure patients' perceptions of care and experience. The publicly reported data is based on the IOM's domain of physical comfort (CMS, 2003). Healthcare consumers have identified quiet environments within the hospital setting as important aspects of patient centered care, and healthcare organizations have associated noise levels with patient healing (McAllister et



al., 2016). Based on the results of the HCAHPS survey, healthcare organizations have the opportunity to obtain monies from CMS.

I used these organizational scores to help identify whether there was a need to address noise pollution within the doctoral project site. Although the results are publicly reported, I obtained the information from the organization's HCAHPS database with permission from the director of patient relations and customer service. The analysis of this data had the potential to demonstrate that patients who are served by the organization have a negative perception of their experience and care resulting from the high noise levels within the healthcare organization.

Unwanted high noise levels increase the risk of a variety of negative health outcomes (Darbyshire & Young, 2013). Evidence has shown that direct care providers lack the understanding of the adverse impacts of hospital noise pollution (Johansson et al., 2016; Kaur et al., 2016). Although direct care providers have a basic understanding of what high noise levels are, they do not have a clear and current understanding of how it impacts patient healing and what they are able to do to protect patients from the harmful impact of noise (Basner et al., 2014). Educating direct care providers on high noise levels and modifying behaviors can protect patients from the damaging health effects of noise pollution (Kokani et al., 2014).

### **Participants**

The cardiac monitored unit continues to struggle with noise pollution, as shown by the unit's low HCAHP scores related to noise. I selected the 98 direct care staff members on this unit to participate in the learning activity, as they are responsible for

promoting a healing environment so that patients can make attempts to reach their pre-hospitalization baseline status. It was important for all direct care staff members to attend the educational session, so that they would be able to process the information learned and implement it into the practice setting. However, attendance and participation in the educational activity was voluntary. Direct care providers were informed of the unit's low HCAHP scores, which the educational activity aimed to increase, and encouraged to attend the activity.

The nurse manager and the clinical nurse leader sent out an email reminder to the unit's leadership team and staffs' encouraging them to attend the educational offering. The clinical nurse leader communicated the dates and times of the sessions at the unit's monthly staff meeting. Each participant was informed that they would need to attend one of the ten sessions offered. Each session accommodated up to 10 participants. Providing smaller classroom teaching kept the participants engaged thereby encouraging learner participation (Saleh et al., 2013). Each session was approximately 1 hour in length.

The pretest-posttest (See Appendix B) along with the summative evaluation (see Appendix C) captured evidence from the doctoral project, participants who attended the learning activity, were administered the pretest. Those individuals who have completed the pretest and attended the learning activity were the only participants permitted to take the posttest. At the completion of the learning activity, participants were asked to complete an anonymous summative evaluation.

### **Procedure**

I received permission from the institutions senior educator to use and adapt the

organization's standardized pre-and posttest summative evaluation templates. I modified these templates to address the practice-focused question. The pre-and post-questions have been designed to assess the participants' knowledge of facts related to noise pollution and staff behaviors and environmental factors that contribute to high noise levels. The tests and evaluation were administered to the participants at designated times. The pretest was administered prior to the learning activity. This assessed the participants' current knowledge. The test was then repeated following the learning activity (posttest) to determine if there was a growth in knowledge amongst the participants.

The learning activity took place in a designated location, during the week (Monday through Sunday) at times of the day that accommodated both the day and night shift. Each participant was provided with paper and pen to write down information they found valuable and questions they had during the question and answer period. As the DNP student and the project lead, I administered the pre-and posttest, delivered the learning activity content, and administered the summative evaluation. I used a power point presentation to assist in delivering the content. The learning activity content was developed from literature I reviewed to support the need for this learning activity, as well as organizational sources of evidence. The steps outlined below show the process and delivery of the learning activity including alignment with the IPT:

1. Short Term Memory –the learner's senses were stimulated which made the learning activity relevant. This was accomplished by:
  - Providing an introduction of myself as presenter and topic of learning activity

- Administering the pre-test to gain learner attention
  - Described the purpose of the activity and its relevancy to current practice setting by connecting it to current patient experience initiatives and role as direct care providers.
  - Stating the objectives of activity
2. Working Memory – information was presented in a chronological and chunking manner with the use of repetition. This was accomplished by:
- Restating the objectives
  - Elaborating further on objectives by chunking content which included defining noise pollution, identifying sources of noise pollution and describing the impact of noise pollution on patient healing.
  - Discussing the relevancy of addressing noise pollution in the hospital setting and its impact on the organization and its impact on cardiac monitored patients
  - Reviewing the role of the direct care provider in reducing noise levels and the HCAHP data Discussing noise reduction strategies which have been utilized in the past and current strategies behavioral modifications which can be employed to reduce noise
3. Long Term Memory – information was presented in organized manner by creating procedural and imagery memories by:
- Providing a recap of information presented
  - Discussing how to take information learned and apply to practice

setting

- Providing opportunity for Q & A session to clarify information presented
- Administering posttest that assessed the learner's growth in knowledge and required reflection of information learned.
- Administering the summary evaluation, which prompted the learner to reflect back on learning activity.

Following the completion of the learning activity, the data obtained from the pre- and posttest was analyzed to assess the participants' growth in knowledge. I and the nurse educator performed the data analysis using the SPSS system and the organization's Round Plus platform. The summative evaluation provided feedback regarding the learner's satisfaction of the educational content (Lannan,2017). Data analysis of the pre- and posttest along with the summative evaluation helped determine the learning activity's overall effectiveness in meeting the learning needs of the participants as it relates to noise pollution on patient healing.

### **Protections**

Prior to the implementation of this doctoral project, approval from Walden University's Institutional Review Board (IRB) was obtained. The approval number is 02-18-19-0256052. Additionally, in accordance with the organization's policy, approval from the chief nursing officer, the cardiac care unit leadership team, and the organization's research council has been obtained for this doctoral project. Participants were not required to sign consent to participate in the DNP project or identify themselves on any

of the evaluations. The participants were informed via email that attendance for the learning activity was voluntary, but once the participant has committed to attending the learning activity, completion of the pretest-posttest and summative evaluation was required. Participants were also informed that they could elect to leave the DNP project at any point without penalty. No incentives were provided upon election to participate in the learning activity.

The results of each participant's test and summative evaluation remained anonymous, as all data was de-identified. The results obtained from the analysis of the pretest-posttest and program evaluation was provided to organizational leaders in a closed forum session following the completion of the project. The project, and all supporting de-identified data was secured in a locked file cabinet in the organization's administrative suite and will be kept for a time period of 5 years, based on recommendations from the Walden IRB and the institution's Department of Education.

### **Analysis and Synthesis**

I used SPSS and the Rounds Plus system to record, track, and organize the evidence. The SPSS system provided a means to collect and analyze data from the pretest-posttest. Descriptive statistics was used to analyze the results. The Rounds Plus system was utilized to collect and aggregate subjective data related to the participant's satisfaction of the learning activity. The results of the analysis were presented in graph form to the unit's leadership team. Collectively, the evaluation of data from both systems demonstrated that a learning activity has the potential to help combat the staff members' knowledge deficit regarding noise pollution and highlight the benefits of its application to

all clinical areas.

### **Summary**

In Section 3, I provided an outline of the methodology that I used to support the DNP project. This included an overview of how the DNP site's historical HCAHPS data which supported the need for this program, and how the participants generated evidence to help answer the DNP project question. This section also outlined the learning activity and its alignment with the framework that guided the activity, and the overall process and delivery. Information about the modification and adaptation of the organization's pre-and posttest and summative evaluation templates and making them applicable to this DNP project was also included. I also discussed participant protection, organizational approval and participant anonymity throughout the DNP project. Lastly, I offered a description of how the evidence was analyzed and synthesized. Section 4 will provide insight into the findings from the implementation of the DNP project and the recommended solutions that the healthcare organizations should adopt to address the growing noise pollution concern.

## Section 4: Findings and Recommendations

### **Introduction**

In this doctoral project, I focused on the growing problem of noise pollution on a cardiac monitored unit and the impact of such noise on patient health and healing. This project was designed to address the current gap in practice related to the direct care staff members' lack of knowledge about patient healing and the relationship to noise. Due to the lack of staff awareness of the impact of noise levels on patient healing, my goal was to provide healthcare practitioners with information on how to reduce noise and, as a result, enhance the improvement of patient outcomes. Maintaining acoustically healthy environments where the recommended decibel levels can be achieved for both the day (40 decibels) and nighttime (35 decibels) hours (Berglund et al., 1999) can assist in improving the quality of care, which supports the institutional goal of better patient healing outcomes.

### **Gap in Practice & Purpose of Project**

Education can equip healthcare providers with the foundational knowledge required to create a more healing environment (Alway et al., 2013). Reducing noise levels in the acute care setting to more acceptable levels can also help improve the patient's healing experience (Simmons et al., 2014). The purpose of this project was to provide direct care staff on a cardiac monitored unit with an educational learning activity about noise and its impact on healing. I developed the following practice-focused question: Does an educational activity on the impact of noise pollution on patient healing increase knowledge of interventions to reduce noise pollution among direct care staff



members in a cardiac unit? I evaluated participants' knowledge before and after the educational activity. Bringing attention to the growing noise problem through education encourages healthcare providers to be more aware of their behaviors and their impact on patient healing, and their responsibilities in creating a more acoustically welcoming environment. Reducing noise levels can encourage better sleep patterns, reducing the risk of sleep deprivation and its negative physiological and psychological impacts (Always et al., 2013; Delaney et al., 2015).

### **Sources of Evidence and Analytical Strategies**

The sources of evidence I used to guide this DNP project included peer-reviewed journal articles published between 2013 and 2018. I gathered literature from the following databases: Medline/Pubmed, CINHALL, and Cochrane Library, and governmental websites including WHO; CDC; CMS. The organization's HCAHP scores from 2015 to 2018 also provided insight into the patient's perception of care as it relates to the high noise levels on the unit. . Additional sources of evidence included data analyzed from the pre-and posttest and summative evaluation utilizing the two-tailed *t* test and rounds plus systems respectively. In this section, I present details regarding the results of the findings of these evaluations.

## **Findings & Implications**

### **Report of Findings**

The education sessions were held in the assistant nurse manager's office. This room is located across from the central nursing station where staff members frequent throughout the day. The sessions' venue was changed from its original location (the

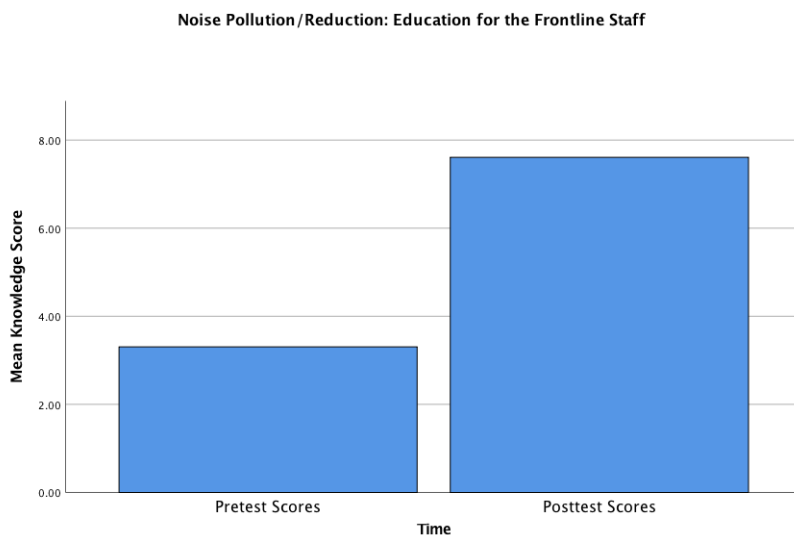
unit's conference room with a room capacity of 20 people) as a result of recommendations from leadership and staff for ease of convenience. The assistant nurse manager's room size only accommodated up to four participants, thereby creating a potential increase in the number of sessions needed to accommodate the 83 expected participants. Originally, I scheduled 10 sessions, however, with 46 project participants, the number of sessions increased to 16.

I used two types of evaluations to support this DNP project, a pre-and posttest, and a summative evaluation. The data analysis from the evaluations demonstrated that the learning activity was effective in increasing staff members' awareness of how high noise levels impact patient healing and that participants were generally satisfied with the education provided. I used a total of 10 questions to create the pre-and posttest evaluation. The question types on this evaluation included multiple choices; fill in the blank, matching, and multiple select. The pre-and posttest questions were designed to assess the staff members' knowledge of the definition of noise pollution, the physiological and psychological impacts of high noise levels on human health, and the degree of loudness of common sounds. Additionally, other questions assessed the participants' knowledge of the degree of loudness of areas within the organization, comparison of sound levels over a 24-hour period, and noise levels that are conducive to healing. Last, questions related to the current state of the patient's perception of care as it relates to quietness on the unit, and behavioral modifications, which can help mitigate high noise levels, were also included.

### **Pre-and Posttest Findings**

I performed a paired-samples  $t$  test, utilizing SPSS to determine if there was a significant difference in the pre- and posttest scores of the 46 participants in this DNP study. The pre-test analysis demonstrated that direct care staff had very little knowledge of the negative impact of high noise levels on patient healing outcomes and behavioral strategies to help minimize noise pollution prior to the delivery of education. The results of the pre-test, which assessed the participants' knowledge before the educational activity were  $M = 3.30$ ,  $SD = 1.07$ . I then compared the pre-test scores the posttest scores. The analysis of the posttest scores showed  $M = 7.61$ ,  $SD = 1.60$ , which revealed an improvement in the staff members' knowledge on noise and its impact on patient healing. The analysis also indicated that there was a statistically significant difference between the pre- and posttest scores, suggesting that the educational activity had an impact on the learners' knowledge and it did not occur by chance ( $t(45) = 16.57$ ,  $p = <0.001$ ).

Cumulatively, the results from the analysis of the paired samples  $t$  test demonstrated that an educational activity has the potential to increase a direct care providers' knowledge regarding noise pollution and its impact on patient healing, in addition to modifying behaviors to mitigate high noise levels. The cumulative results are depicted in Figure 1.



*Figure 1.* Pre-and posttest results.

### **Pre-and Posttest Findings – Manual Analysis**

Due to the significant changes in the pre-and posttest scores, I decided to further analyze the findings from the 10-question evaluation manually. Each question was evaluated individually. The results revealed that there was an overall improvement in all question scores following the learning activity. The results are presented in order as they appear on the pre-and posttest

**Noise pollution (circle all that apply).** Answers to the first question related to the concept of noise pollution indicated that before education, participants did not have a clear understanding of the definition of noise pollution and how humans can contribute to high noise levels. More specifically, 100% of the participants were not able to select the two statements that aligned with the concept of noise pollution on the pre-test. When completing the posttest, the participants were able to choose the correct statements, which correlated to noise pollution. The posttest results revealed that the participants had a better understanding of what noise pollution is and how they can be contributors to the

high noise level on the unit.

**Match the correct noise to the correct decibel (dB) by drawing a line.** The next question asked the learner to match the correct decibel level to a common sound. Interestingly, on the pre-test, 87% of the participants correctly identified that the average noise level of normal conversation is at 60 decibels, and 75% of the participants were able to correctly match the other common sounds to the correct decibels. Following the education, the posttest findings indicated that 100% of the participants were able to correctly match the correct decibel level to all of the common sounds. This indicated that the participants were more aware of louder sounds causing higher decibels and that their voice volumes needed to trend on the lower end of the sound scale to promote patient healing

**List one physiological and psychological effect of noise pollution.** A first look at the analysis of responses to the third question produced greater insight into the direct care staff members' knowledge of the physiological and psychological health impact of high noise levels. Prior to the learning activity, 70% of the participants listed anxiety and agitation as a psychological reaction to high noise levels. The results led me to believe that these particular participants had a solid understanding of how high noise levels can cause psychological harm. Simultaneously, I evaluated the pre-test question related to the impact of high noise levels on a person's physiological status. Only 24% of the participants listed high heart rate and high blood pressure as biological reactions to high noise levels. These findings were surprising given that this study took place on a cardiac monitored unit where the patients' primary condition being monitored and cared for is

elevated heart rate and blood pressure. One can ponder whether the participants had a thorough understanding of the meaning physiological, but one can also argue that they should because they are in a field where this term is common to everyday patient care.

**During the daytime, the average noise levels on a cardiac care unit is \_\_\_\_\_ the average noise in the operating room (circle the correct answer).** The participants' knowledge was further tested by asking them which area they perceived as being louder, the cardiac monitored unit or the operating room, or if they believed that the noise levels in both areas are equal. Upon analyzing the pre-test, I found that 82% of the participants believed that the cardiac monitored unit was louder than the operating room, 7% believed that it was less than the operating room, and 2% thought that the noise levels in both settings were equal. The posttest results differed from that of the pre-test results following the delivery of education. The posttest analysis revealed that 78% of the participants correctly identified that the noise levels within the operating room could often be higher than that of the cardiac monitored unit. The participants' responses revealed that they had better awareness of other areas in the organization that are struggling with noise pollution, and that these areas have further to go in reducing noise to a therapeutic level. Other participants continued to select cardiac monitor unit as being louder than the operating room (11%), both settings having similar noise levels (9%), and one participant entering a numerical value instead of selecting the correct answer (2%). These particular results may have been due to the participant's lack of attention during the education session, or not reading the question before answering the question.

**Average noise levels on the dayshift should not exceed \_\_\_\_\_ (dB) with a**

**maximum of \_\_\_\_ (dB) overnight (fill in the blank).** When completing the pre-test, more than half of the participants did not answer the question (67%), while the remaining participants (43%) provided values greater than the recommended range for creating a therapeutic environment of 40 dB for days and 35 decibels for nighttime (Berglund et al., 1999). These results clearly demonstrated that the participants were not aware of what the level of sounds should be over a 24-hour period. Following the delivery of the education program, 78% of the participants were able to list the correct decibel levels for the day and night shift. The analysis of the posttest demonstrated that the participants had a better understanding of the optimal sound level range that would promote patient healing. The remaining participants continued to record decibel levels higher than the recommended range, which may have been due to their lack of attention during the presentation of the information.

**Who is responsible for monitoring and reducing the noise levels on the unit and As a direct care staff caring for patient on your unit it is your responsibility to promote a healing environment? (circle the correct answer).** These two questions were evaluated simultaneously due to the premise of the questions. Both questions were asking the participants to address the responsibility and accountability of the direct care provider. All of the participants answered the questions correctly both in the pre- and posttest, indicating that they not only understood they had a role in mitigating the high noise levels, but they were also engaged in creating a therapeutic environment.

**What are some of the behaviors you can modify to minimize the noise levels on the cardiac care unit (list three things).** When analyzing the pre-test results, it was

clear that the participants did not know how to modify their own behaviors to mitigate high noise levels beyond speaking and speaking volume. The behavior modifications presented by participants prior to the learning activity included lowering of voices and eliminating unnecessary conversations (35%), next to getting equipment fix, which is not modifying a behavior (22%). 13% of the times, participants indicated closing patient doors was a way in which to mitigate high noise levels, and other answers included lowering hospital issued phone volumes (5%) and implementing the use of quiet signs and quiet packs (3%). 22% of the times the participants were not able to provide answers to the question. On the posttest the participants continued to list lowering voices and eliminating unnecessary conversations (17%), reducing phone volumes (17%), offering to close doors (30%) and utilizing the quiet sign or offering a quiet pack (7%). The participants were also able to also list new behaviors, which would help mitigate high noise levels. These included bundling of patient care (15%) and offering to dim lights or the use of white noise to promote relaxation before sleep (14%). The responses to this question suggest that the participants are fully aware of behavioral strategies, which they could implement to address the high noise levels within a patient care setting.

**The cardiac care unit's current HCAHPS scores related to patient satisfaction of noise around the room at night is within the 70<sup>th</sup> percentile (circle the correct answer.** Prior to the learning activity participants were asked if they felt that their patients responded favorably to the HCAHPS question related to quietness around the room, 65% of the participant's felt that the unit was doing well. The results demonstrate the participants' had a false sense of what their patient's perception is of the



unit with regards to being a therapeutic environment. Following the education, the posttest score results were starkly different from that of the pre-test scores. The posttest analysis indicated 58% of the participants were now more aware that more work needs to be done to raise the unit's HCAHP scores to the 70th percentile, and this education can serve as a foundation so that there can an improvement in the patient's experience and perception of care.

**On the cardiac unit, what times of the day do you think is the nosiest? (circle the correct answer).** Lastly, the participants were asked which time of the day was the loudest. When completing the pretest 26% of the participants indicated that the unit was noisy at all times, 27% suggested it was high during mid-day and the remaining participants selected noise levels being high during the change of shift. These responses demonstrated that the participant's acknowledged that they have a noise problem on their unit, which needs to be addressed. The posttest results differed from that of the pre-test results following the delivery of education. More than half of the participants (71%) were able to identify that mid-day correctly is the nosiest time of the day due to the busyness of the unit and the numerous personnel and visitors that frequent the unit. There were still those participants who perceived the unit's noise level is high at all times (11%) and at the change of shift (9%). The remaining participants opted not to answer the question. The lack of answers may have been due to their lack of understanding of the question being asked or feeling rushed to get back to their unit obligations.

### **Summative Evaluation Findings**

The summative evaluation contained a total of 8 questions, 5 of which are based on a Likert scale ranging from strongly agree to disagree strongly and three open-ended questions. The questions were designed to determine the participant's perception of the program. The analysis of the summary evaluation was performed via the rounds plus system and demonstrated a favorable outcome. The analysis of the summative evaluation is depicted in Figure B. The first of the five Likert scale questions analyzed indicated 89% of the participants strongly agreed that the education related to noise pollution and its impact on patient healing is relevant to their practice as health care providers on the cardiac monitored unit. Additionally, the participants also strongly agreed that they would be able to identify when the unit is noisy when noise is impacting a patient both physiologically and psychologically and implement the suggested behavioral modifications to promote a healing environment. Lastly, the analysis demonstrated that the participants strongly agreed that the speaker was effective in communicating the importance of noise pollution and its impact on patient healing and ways in which to combat this growing problem (89%) and their overall satisfaction with the learning activity (91%).

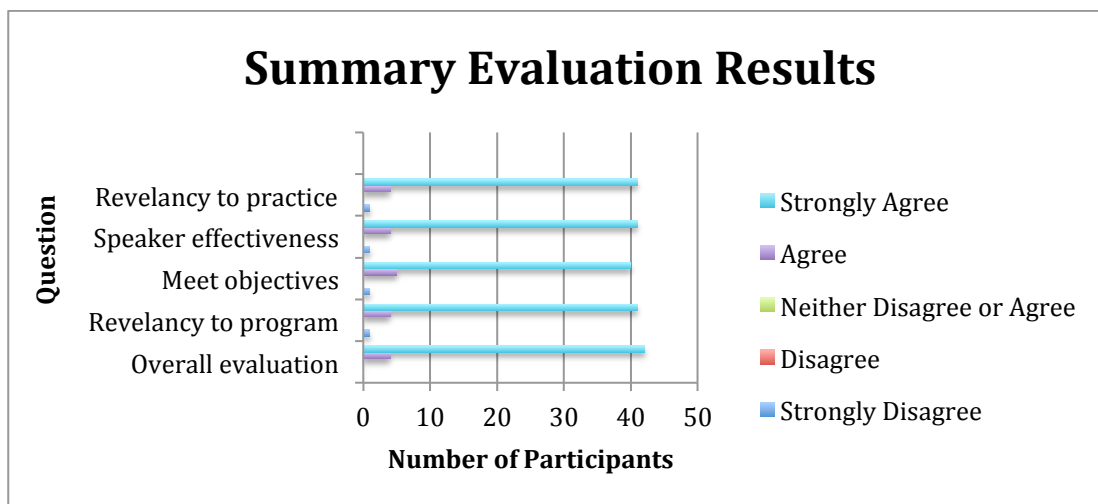
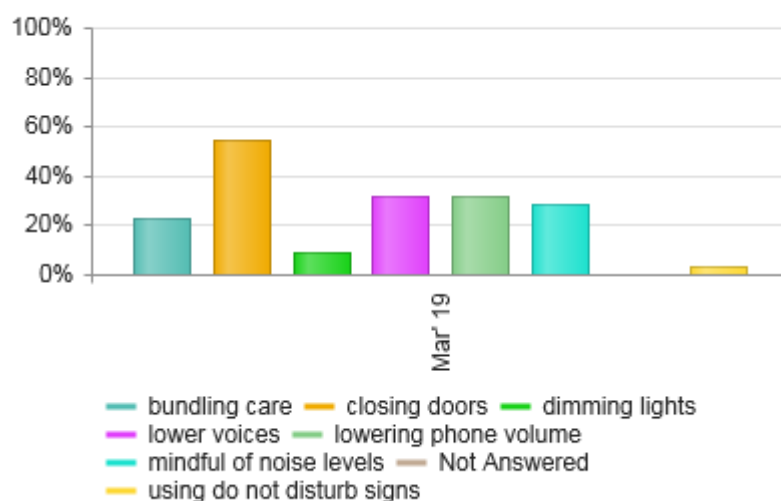


Figure 2. Summative evaluation results

The outcome gleaned from the three open-ended questions included the direct care staff members desire to change their clinical practice as a result of the learning activity. 93% of the participants provided at least one if not more behaviors they would modify to reduce noise levels on their unit. Further analysis demonstrated that the top behavioral modification participants desired to incorporate into their daily practice included lowering their hospital-issued cell phones and their voices, secondary to offering patient's if they would like their door closed upon exiting the room. The behavioral modifications are depicted in Figure C. Comments offered included an appreciation for the education in raising the participant's awareness of how noise can impact humans and general appreciation for the activity and the presenter. Participants also offered comments on how education can serve as a reminder in creating a healing environment and increase the staffs' awareness of which actions are contributing to the unit's noise pollution. Furthermore, participants suggested that education should be provided to other disciplines throughout the organization to increase their awareness of the growing noise

problem and how healthcare providers can promote a healing environment through behavioral modifications and education on how to reduce noise being produced from equipment and proper placement of equipment. The final question on the summative evaluation asked the participants for ideas of future topics and or implementation ideas. Requests received included education on how to improve patient care for the population the unit serves, and consider the implementation of quiet hours on the unit as a means to improve care and mitigate noise levels.



*Figure 3.* Behavioral modification results

### **Unanticipated Limitations**

The most significant limitation, potentially impacting the findings of this project was the unanticipated departure of the Nurse Manager, who was a member of the project team, before the start of the education sessions. As part of the project team, the Nurse Manager's role was to promote the educational activity and provide the financial resources so that the staff members could come in on off shift hours. Upon her departure,

the Interim Nurse Manager was not able to approve additional instructional hours for staffs' outside of normal working hours for this DNP project. Therefore, readjustments had to be made, and the staffs were informed that they had to attend the educational sessions during work hours. Many of the staffs on this unit commented on the difficulty in getting their assignments covered during their shift by the unit's leadership team so that they would be able to attend the educational offering. When possible, the Assistant Nurse Manager's and the Clinical Nurse Leaders provided coverage; however, they were not able to provide coverage for all sixteen sessions, especially those that were offered during the evening, at night, and on the weekends. For these reasons participation in this project was decreased and therefore the sample size did not reflect the entire unit staff.

## **Implications**

### **Individual**

This research and its findings indicate that there is a need to make more of a concentrated effort in providing healthcare workers with information related to noise pollution and its impact on patient healing. Educating frontline staff about the negative health impacts resulting from high noise levels and ways in which to promote a healing environment can engage staff in becoming effective healthcare providers and thereby improve a patient's ability to heal within a hospital setting. Armed with the knowledge of how to modify behaviors, the participants of this project are now able to promote an environment where patients can rest, decreasing the likelihood of sleep deprivation and other physiological and psychological stressors resulting from high noise levels including anxiety, agitation, delirium, depression and high blood pressure and heart rate.

**Communities (Schools)**

Creating an optimal healing environment should be necessary for any individual pursuing and involved in a health profession. Patient Care Teams (PCT) who are comprised of various health professionals including physicians, case managers, certified nursing assistants, and pharmacists should be aware of noise levels and the recommended parameters within the environments in which they work. Facilitating provider promoted patient healing environments can occur through education. If appropriately educated and equipped with the knowledge of how to create a therapeutic environment, health professionals can collectively and quickly respond to behaviors, which are negatively impacting patients. They can also hold themselves and each other accountable for modifying noise producing behaviors, to create an acoustically sound environment.

Due to a large number of nursing students who perform clinical rotations within healthcare settings, it is essential also to consider this community when promoting education. Integrating this education into the existing nursing curriculum or clinical orientation prioritizes the need to mitigate high noise levels and create a healing that allows the new graduate nurse to have a greater understanding of the negative impacts of noise pollution. Educational institutions that embrace could strengthen the relationship between themselves and their partnering healthcare organization.

**Institutions**

Leading healthcare organizations have sought creative ways in which to improve patient's perception of care as it relates to high noise levels. One strategy that hospitals have rarely implemented is targeted education (Gholamreza & Bahareh, 2015). Providing this education to other healthcare organizations can help engage their frontline staff in

addressing noise level concerns they may also be experiencing. Through education, these organizations and their employees can improve practice, thereby improving patient outcomes and the patient's perception of care. Care delivery can have a positive impact on an organization's HCAHP scores, a trajectory that most if not all hospitals are striving for.

### **Social Change**

Noise levels in hospital settings have become uncontrollable (Berglund et al, 1999). These noise levels can have damaging effects on patient health and on their ability to rest and recover. The data demonstrates a clear need to educate healthcare workers regarding noise pollution and its impact on patient healing. Increasing healthcare providers' understanding of ways in which to reduce noise levels can create a culture, which promotes healing through noise reducing behavioral modifications. This education can also revamp patient experience, by prioritizing noise pollution as a growing concern on patient healing. Collectively, these efforts can create a global movement amongst all healthcare organizations. Through this movement, healthcare workers can be encouraged and energized to brainstorm and discuss additional ways in which to make healthcare environments acoustically friendly where patients can heal. The resulting impact can lead to a healthier and happier society.

### **Recommendations**

A review of literature and current practices demonstrate that noise reduction education should be coupled with a noise reduction protocol (Collins et al., 2014; Gholamreza, & Bahareh, 2015). The evidence-based strategies incorporated into these

protocols include dimming of lights, bundling care, providing earplugs and masks and designating quiet time hours (Always et al., 2013). Researchers who have implemented the strategies mentioned above have found some success in reducing noise levels, thereby creating an environment where patients can heal. Other suggestions include monitoring staff following the delivery of the education (Wilson et al., 2017), to determine if the suggested behavioral modifications have been implemented. Performing these audits will help determine if training had an impact on the staffs' clinical practice. Periodic review of the HCAHPS survey following the DNP project will also help determine the effectiveness of the education and subsequent practice change. For the remaining employees who did not participate in this project, future staff development education will be scheduled. The educational content of this project will need to be reviewed on an annual basis to help ensure that the content and suggested practices remain relevant and positively improve the patient experience and outcomes. Furthermore, future recommendations also include further engaging other leaders in addressing noise pollution through education, by requiring all staff to attend the education sessions and to do so at the designated times. Providing extra staffing to provide coverage during the dates and times of the education sessions will ensure that staff will have the opportunity to participate in the learning activity

### **Contributions of the Doctoral Team**

The DNP Project team consisted of the: nurse manager, director of support services, the clinical nurse leader and the nurse educator. Each team member was informed of their role(s) and responsibilities including dates and times of meetings and



due dates of project related items. Following initial and ongoing contact and review of educational content the DNP project team provided approval to proceed with the DNP project.

### **Nurse Manager**

The unit's Nurse Manager, unfortunately, was not able to fulfill all of her role responsibilities due to her unexpected departure before the educational offerings. Although she was not able to assist in engaging the staff in attending the education sessions, prior to her departure she provided approval to move forward with the project. She also met with the unit's leadership team to initiate the process of informing staffs of the DNP project and its value. Furthermore, the Nurse Manager and the project lead were able to meet on a regular basis prior to the Nurse Manager's departure. During these times the Nurse Manager provided insight into the behaviors, that were contributing to high noise levels and the current strategies used to help combat noise pollution. This information was included in the education.

### **Director of Support Services**

Communication with the Director of Support Services was limited due to our conflicting schedules. As part of his role he was asked to review the educational content with a focus on what strategies had previously been implemented within the hospital, and provide feedback as to whether they were successful or not. The Director stated he was not able to meet face to face due to conflicting priorities and requested to review the material electronically. Although the in person interaction would have allowed for more transparency and for timely feedback of the content, the Director of Support Services did

spend some time in reviewing and approving the content with respects to noise reducing initiatives used in the past. His feedback back regarding the strategies success was included as part of the presentation. During the course of the education participants were made aware that the Director of Support Services provided input for the purposes of the DNP project to demonstrate the value of interprofessional collaboration.

### **Clinical Nurse Leader (CNL)**

The CNL and the role that she played was integral to the success of this project. The CNL provided ongoing support and was able to meet regularly leading up to the implementation of the project. She was key in the review of the content and provided feedback in how to improve the visual of the powerpoint. Although not part of her initial role, the CNL was proactive in asking to review the evaluations and provided suggestions for improvement. The CNL also stepped into the role of the Nurse Manager, by trying to engage and motivate the staff to attend the educational sessions. She sent email communication and posted flyers throughout the unit highlighting the dates and times of the activity. Upon final review of the content the CNL provided approval to move forward with the project. During the implementation of the project, the CNL assisted in handing out and collecting the evaluations and monitoring the education for an inappropriate behavior when she was able to.

### **Nurse Educator**

The Nurse Educator was also played a significant role. I was able to collaborate with her on a regular basis in reviewing the educational content and developing the evaluation tools. She was also able to provide constructive feedback to enhance the

information that was presented to the staffs. Upon final revisions, of the educational content and evaluations the Nurse Educator approved to move forward with the educational sessions. Following the completion of the sessions the Nurse Educator helped in aggregating. She provided assistance with analyzing the data via SPSS as she was unfamiliar and therefore uncomfortable with SPSS; however, she assisted me with reviewing the data once entered to ensure the values were entered correctly.

With permission from the organizational leaders, the plan is to extend the educational offerings to other units, disciplines, and departments, especially the Intensive Care Unit (ICU) that currently struggles with high noise levels. The ICU have made attempts to mitigate noise levels by introducing noise masking machines and a noise level monitor with the intent to modify behaviors: however, neither one of those interventions has improved their noise levels. Additionally, disseminating this information to all direct and non-direct care employees can assist in increasing staffs' awareness of how noise can impact healing which can then encourage efforts to reduce the noise levels throughout the organization.

### **Strengths and Limitations of the Project**

#### **Strengths**

Although only 46 of the projected 83 participants attended the learning activity, the smaller number of subjects allowed for a controlled manner in which to quickly deliver the educational program despite the last minute change of program venue and subsequent increase in the number of program sessions. The project was conducted with a smaller number in spite of the lack of financial resources to provide coverage for all of

the direct care staff members. Due to the significance and positive outcome of this project, another educational session with additional participant's project as well as a quality improvement project can be incorporated in the future. Doing so will assist in solidifying that the educational activity not only increases the staffs' understanding of noise pollution's impact on patient healing and how behavioral modifications can mitigate high noise levels but also monitor the resulting practice change.

Other strengths include the relocation of the education sessions to the Assistant Nurse Manager's office. This office was able to accommodate up to four participants. Although this can also be seen as a limitation, this change in venue enhanced the project. The leadership and direct care staff members found this location to be more convenient for education and also contained the number of staffs needing assignment coverage to smaller numbers. The smaller group participation encouraged open discussion regarding difficulties in minimizing noise levels within the healthcare setting, as well as sharing of noise reducing strategies that were already being utilized. Additionally, the room size, similar to that of a patient room, allowed the presenter to demonstrate the loudness of a hospital issued phones. The participants left the education program with a better understanding of how to better control their hospital issued phone sounds and motivated them to lower the volume upon leaving the room. Immediately following the learning activity, upon resuming patient care, participants were observed in reducing their speaking volume and closing patient doors. Lastly, most participants expressed their satisfaction with the timeliness of the topic of noise pollution on patient healing being brought to the forefront and most

**Limitations**

Limitations of this project included the unanticipated departure of the Nurse Manager, a project team member, before the start of the educational offerings. As mentioned previously, the Nurse Manager was a source of support and was to actively encourage staffs' participation in the DNP project. She also was to assist in dissemination of the project results. Her departure resulted in the CNL assuming additional responsibilities of motivating and encouraging the staff in attending the learning activity.

Other limitations included the increase in the number of class offerings to sixteen as a result of a change in the room location where the education was to take place. There was a decision to change the venue to the Assistant Nurse Managers office, across from the central nursing station, left me with a room that could only accommodate 4 participants at any one scheduled offering. The decision was based on staffs' and leadership feedback of wanting education to be offered in an area where the staffs often can be found throughout the day and leadership can cajole staff in attending a session if they see a staff member who had not participated. Additionally, before the start of the education sessions, the Nurse Manager reported an inaccurate number of staffs (98). Initially, there were ten sessions set up to accommodate the 98 potential participant members, but in reflecting, this had no real impact as the actual participant number was 46 and the change in venue resulted in extra session changes to adjust for the small room size. Due to the impact on patient outcomes and the organization's HCAHPS scores, making the educational session a mandate rather than a voluntary option would have increased participant numbers. The lack of resources to support the delivery of the

sessions to staff during their respective off working hours may have also boosted participant attendance. Addressing some of these limitations prior to delivering future sessions of this program may prove to be beneficial.

## Section 5: Dissemination Plan

Because of conflicting schedules and organizational priorities, I electronically disseminated the findings from the pre-and posttest and summary evaluation to the project team and the unit's leadership team. Based on interest expressed by the clinical nurse leaders and educators of the healthcare organization, I presented the educational content along with the results of the project to this group via a PowerPoint presentation. In order to expand the scope of this project, I will present the findings to the nurse managers at an upcoming biweekly Nursing Executive Council meeting and the monthly Research Council as well as the Consortium of New Jersey Nurse Educator's monthly meeting. Furthermore, a more concentrated effort will need to be made to provide this information to those unit employees who were not able to attend any of the scheduled offerings. Additional offerings can be scheduled with approval of the unit's leadership team, or the education can be presented via the organization's learning management system to ensure compliance. Last, I can reach other healthcare professionals through patient experience and nursing journal publications and healthcare conferences focusing on creating healing healthcare environments.

### **Analysis of Self**

The DNP project has provided me with the opportunity to translate the knowledge gained throughout my doctoral studies into practice. This practice experience has provided an opportunity to build meaningful interprofessional relationships with organizational leaders, which has resulted in the positive evolution of my collaborative and leadership skills. I now feel more confident in developing, managing, and

implementing a project and discussing the outcomes and findings. It is through this journey that I have also been able to respond to the various challenges that healthcare organizations face, including the budgetary challenges, which require modifications in project plans. As a DNP scholar, I have been able to promote the nursing professional by acting as a change agent in bettering nursing practice through education. This DNP project has allowed me to master my skills as an educator and project leader, thus enabling other opportunities to lead other organization-wide projects influencing patient care and nursing practice.

Although this DNP project presented its challenges, the journey was very rewarding. The major challenge came when the nurse manager, who was a part of the project team, unexpectedly left the organization, which impacted staff participation. The nurse manager was supportive of the project and indicated that she would strongly recommend the staff members' participation and ensure that staff coverage would be provided so that staff could participate. Her departure resulted in a sudden shift in leadership, which resulted in less than optimal engagement. As a result of the decrease in participant numbers, it was necessary for me to assist with the recruiting process by leveraging the assistant nurse managers and clinical nurse leaders in communicating and encouraging staff participation in the DNP project. Although these challenges impacted the overall unit participation numbers, the insights gained through the DNP journey were invaluable. These insights include, the need for strong leadership to help engage and motivate staff to attend planned education sessions, being flexible enough to alter an already approved project plan due to an unexpected departure, and utilizing other



resources to help fill in the gaps when one team member is not able to fulfill their obligations. With the completion of this project, I can now translate the project findings to positively impact nursing practice and actively lead and rally projects in collaboration with interdisciplinary team members for the purposes of improving patient and population health outcomes.

### **Summary**

The aim of this project was to assess staff members' knowledge regarding noise on a telemetry unit. The analysis of the pre-and posttest and the summative evaluation demonstrated staff members' need for heightened awareness of how noise can impact patients and how their actions associated with noise can influence patient outcomes. Literature has shown that a quiet, healing environment can allow for optimal patient outcomes. The evidence generated from this DNP project supports that literature and also highlight's that there is a need at the project site to educate staff on how high noise levels in hospital settings can negatively impact patients and patient outcomes, and how direct care staff can modify their behaviors to mitigate less than desired noise levels. The findings of this project demonstrated that education is an essential component of the approach in addressing noise and its impact on patient healing.

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