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Reducing Hospital Noise Levels Through Nursing Staff Education

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This is to certify that the doctoral study by

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has been found to be complete and satisfactory in all respects,
and that any and all revisions required by
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Walden University
2022

Abstract

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by

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MS, William Carey University, 2015

BS, Mississippi University for Women, 2013

Project Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Nursing Practice

Walden University

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Abstract

Noise levels can negatively affect a patient's hospital experience. Increased noise levels in the hospital can trigger sleep disturbance and affect the length of recovery for patients; the increased noise levels can also cause increased anxiety and exhaustion for nursing staff members. Due to a gap in nursing practice related to nurses' knowledge to safely reduce noise levels, this project addressed if nursing staff education on noise reduction could increase the knowledge among nursing staff members to use specific strategies to reduce noise levels in an intensive care unit (ICU) setting. The purpose of this project was to educate eight ICU nurses on reducing noise levels, with the overall intent to increase the nurses' knowledge on how to safely reduce noise levels in the ICU. This knowledge increase among the nurses regarding noise reduction in the ICU could lead to improved patient outcomes. The development of the nursing staff education was grounded in the analysis, design, implementation, and evaluation model and Florence Nightingale's environment theory. Eight registered nurses volunteered to participate in the staff education. A 15-question multiple choice pretest and posttest based on the "Knowledge Assessment Questionnaire on Noise Level in the ICU" was developed and administered to the participants. Using a paired *t* test, the results revealed that there was an increase in knowledge; the average number of correct answers as a group pretest was 72.5%, and 100 % posttest. The project findings indicate that nurses can use this knowledge to improve the patient experience in the ICU. This project has the potential to create social change as nurses can use this education to decrease noise levels with the overall goal to minimize physiological complications.

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Dedication

I dedicate this long journey to my mother, my two sons, and my sister. My mother is the strongest and wisest person I know. She has always been my number one support system, and I want to make her proud. My sons have given me balance during my weakest and strongest moments: They have given me the inspiration to keep going when things became very challenging. My sister has been there to listen to me vent and assist me as needed with any technical issues I have had while doing multiple revisions of my project. She also kept me inspired and encouraged. Above all, God is so amazing to help me achieve this long-term goal. I am truly thankful for my support system.

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I would like to thank the doctoral committee that has worked with me diligently to assist me with the completion of this doctoral project. Dr. Hubbard showed me so much patience and encouragement when I needed it most. I am very thankful for the many mentors I have had along the way who inspired me to reach this level in my nursing career. I will use the knowledge gained to continue to carry the torch as an instrumental mentor for those who come behind me.

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Section 1: Nature of the Project

Introduction

Increased noise levels in the hospital settings have been a concern nationwide. Noise levels in the hospital setting is a proven cause of sleep disturbance in critically ill patients (Luetz et al., 2016). Excessive hospital noise levels, especially at night, have negative effects on patients' health due to sleep deprivation (Wallis et al., 2019). Ensuring that patients have adequate rest, sleep, and minimal noise volume can be very challenging in the hospital setting (Hedges et al., 2019). Complications of sleep deprivation include increased respiratory rate, increased blood pressure, increased heart rate, and increased stress (Mughal & Ali, 2017). As a result, healthcare corporations around the world have shown an amplified concern regarding increased noise levels (Gholamreza & Bahareh, 2015).

This nursing staff education project was created to improve staff nurses' understanding of ways to minimize the noise level in an intensive care unit (ICU) located in a southern hospital in the United States. According to Wilson (2017), among the studies performed that monitored ward noise levels following implementation of nursing staff education on noise reduction, there was a noted reduction in noise readings from 83.8 dB and 90.7dB preintervention to 53.44 dB and 55.07 dB postintervention on surgical and medical units respectively.

The gap in nursing practice was the lack of staff nurses' knowledge on safe noise reduction techniques in an ICU in a southern hospital in the United States. Nurses at the chosen Doctor of Nursing Practice (DNP) site in the ICU lack the understanding of safely

reducing noise levels, as they have not been trained on noise reduction in the ICU setting. Nurses verbalized concerns regarding the noise levels in this ICU. In addition, nursing administration at the study site has noted the following negative patient outcomes: (a) increased patients' complaints of pain, (b) increased patient anxiety, and (c) increased patient insomnia according to one of the rapid response nurses.

This project can impact social change as nurses can use this education to decrease noise levels with the overall goal to minimize complications. These complications include but are not limited to increased blood pressure, increased heart rate, irregular heart rhythms (atrial fibrillation), increased stress levels, sleep deprivation, and ICU psychosis. This DNP project has the capability to make a great impact on social change by reducing the length of hospital stays that are related to noise levels.

Educating nursing staff on noise reduction supports the mission of Walden University (see Walden University, 2020). Walden University supports projects that promote social change (Walden University, 2020). As a DNP student, I have researched the negative effects of excessive noise levels. As a current health practitioner, I have witnessed the negative repercussions of needless sounds within an ICU.

Problem Statement

Increased noise levels can negatively affect a patient's hospital experience. In hospital settings, the bed alarms, telemetry monitor alarms, and pulse oximetry alarms are in place to ensure patients' safety. However, these alarms may cause increased anxiety and disturbance for patients. Alarms are in place to promote patient safety, but finding a remedy to reduce the noise levels to increase patient satisfaction is germane. Noise can

trigger psychological and physiological effects that may interfere with patient healing (Mughal & Ali, 2017).

The gap in nursing practice was the lack of staff nurses' knowledge on safe noise reduction techniques in an ICU in a southern hospital in the United States. Nurses at this organization lack the understanding of safely reducing noise levels, as they have not been trained on noise reduction in the ICU setting. Nurses are concerned about the noise levels in the ICU. In addition, there is potential for the following negative patient outcomes: (a) increased patients' complaints of pain, (b) increased patient anxiety, and (c) increased patient insomnia.

This doctoral project holds significance for the field of nursing practice because ensuring that noise levels can be minimized can improve nursing practice, yielding improved patient outcomes. Researchers have demonstrated that noise levels in an ICU are far higher than the decibels recommended by the World Health Organization (Wallis et al., 2019). Device alarms are aimed to alert clinicians of a dangerous condition and potential complications; however, when there are excessive alarms, it can disrupt working conditions (McGough et al., 2017). The Centers for Medicare & Medicaid Services (CMS, 2021) has encouraged patients to discuss and report increased noise levels. Alarms are in place to ensure a safer environment, and nurses need this added measure for safer practice in the clinical setting.

Purpose

The gap in nursing practice was the lack of staff nurses' knowledge on safe noise reduction techniques in an ICU located in a southern hospital in the United States.

According to the nurses working in the ICU at the chosen DNP site, many nurses lack the understanding of safely reducing noise levels, as they have not been trained on noise reduction in the ICU setting. Nurses are consequently affected by increased noise levels in the ICU: This can cause fatigue and stress (Darbyshire et al., 2019). Increased noise has the potential for the following negative patient outcomes: (a) increased patients' complaints of pain, (b) increased patient anxiety, and (c) increased patient insomnia (Johansson et al., 2016; Xyrichis et al., 2018).

In this project, I attempted to answer the following question: Does nursing staff education on noise reduction increase the knowledge among nursing staff members to use specific strategies to reduce noise levels in an intensive care setting? The purpose of this project was to educate nurses on ways to safely reduce noise levels in the ICU setting, with the overall intent to use strategies to reduce noise levels in the ICU and to improve patient outcomes.

This DNP project has the potential to address the gap in practice in an ICU in a southern hospital in the United States. Nurses received education on the various noise reduction strategies. Behavior modification and intervention can cause significant noise reduction in the hospital environment (Luetz et al., 2016). The literature has supported the effectiveness of staff education on noise reduction. Brantley et al. (2016) conducted a nurse staff education program on individualizing alarm setting resulting in a 39% reduction in monitor alarms in an ICU.

Nature of the Doctoral Project

I obtained literature from looking at Elton B. Stephens (EBSCO) Company, Cumulated Index to Nursing and Allied Health Literature (CINAHL) published research articles, Medline/Pubmed, Cochrane Library, and governmental websites, including Centers for Disease Control and Prevention (CDC), World Health Organization (WHO), and Centers for Medicare and Medicaid Services (CMS). This project was guided by the Walden University's Manual for Staff Education. The focus of this project included literature search on noise levels and the negative impact on patients in the hospital setting. I conducted a literature review on literature limited to data published between the time frame of 2014 to 2021. I examined 43 articles closely for literature containing chosen key words. The key words used were *hospital, intensive care unit, noise, noise reduction, patient, patient satisfaction, staff nurse, staff education, nursing staff education, sleep disturbance,* and *quality improvement*.

Approach

I obtained facility approval, then approval from Walden University's Institutional Review Board (IRB). I developed a curriculum that was created with input from content experts in the field. I then performed nursing staff education to the eight registered nurses. The curriculum taught was based on professional standards and guidelines related to noise reduction strategies. The analysis, design, development, implementation, and evaluation (ADDIE) model was the conceptual framework for this project.

The education activity consisted of a pretest knowledge assessment, an oral presentation with copies of the PowerPoint handout, and a posttest knowledge

assessment. The educational activity lasted 30 minutes. I recruited eight nurses on the 8-bed critical care unit on a voluntary basis to participate in the educational activity. In order to encourage increased participation, I offered the staff education activity on both the day and night shifts. The educational activity was presented on the unit.

All participants, including the identity of the facility, was kept confidential, and all information such as the knowledge assessment is held confidential, as well. At the beginning of the presentation, the clinical registered nurses were provided with writing utensils. I explained the project, reviewed the consent forms, and answered all questions. After consents were signed and returned, I administered the pretest knowledge assessment tool to the voluntary participants.

The pretest knowledge assessment, entitled "Nurses Knowledge Assessment on Reducing Hospital Noise Levels" was created with modifications from an existing reliable tool (see Johansson et al., 2016; Xyrichis et al., 2018). The pretest and posttest knowledge assessment were comprised of 15 multiple-choice questions. Confidentiality was maintained as data obtained from the knowledge assessments were de-identified and aggregated. Demographics were gathered, and data were analyzed using descriptive statistics.

Significance

Stakeholders

Stakeholders are those individuals who have an interest in the betterment of improving desired outcomes for patients in the chosen healthcare setting (Kol et al., 2015). The involved stakeholders, in reference to this DNP project, were the clinical

director, staff nurses, director of education department, physicians, and hospital administrators. The named individuals have a great interest and capability to make a positive impact in implementing change that can reduce the impact caused by increased noise levels. According to Jung et al. (2020), noise created in the ICU can cause adverse effects on both the seriously ill patients and medical staff. The effects may include increased anxiety and disturbance for patients. Alarms are in place to promote patient safety; however, finding a remedy to reduce the noise levels to increase patient satisfaction is germane. Stakeholders who are committed to the objective allow the opportunity for the project to be implemented in a positive light. The desired outcome of this project is to promote a positive experience for the patients as well as an environment that will foster both psychological and physiological healing.

Contributions to Nursing Practice

Wallis et al. (2019) found that noise levels in an ICU are far higher than the decibels recommended by the WHO. Florence Nightingale's environmental theory (FNET) has one fundamental belief: Nursing ensures that the patient's environment is conducive to healing and recovery. Nightingale believed that adjusting the patient's environment to meet their current needs would foster the healing process (as cited in Zborowsky, 2014). Noise level is an outstanding part of a patient's environment. High noise level has been considered a form of cruelty and is potentially, harmful to patients (Nightingale, 1860). Using the FNET framework, this project has the potential to contribute significantly to nursing practice. The patient's environment has proven to be

fundamental in patients' recovery: Noise reduction has proven to be a key element in positive patients' outcomes.

Transferability and Implication

This DNP project has the potential for transferability. Noise is prevalent throughout a southern hospital in the United States, not limited to the ICU setting. This nursing staff education project can be replicated on other units**.**

This project can impact social change as nurses can use this education to decrease noise levels, with the overall goal to minimize complications. These complications include but are not limited to the following: increased blood pressure, increased heart rate, irregular heart rhythms (atrial fibrillation), increased stress levels, sleep deprivation, and ICU psychosis (Kol et al., 2015; Wallis et al., 2019). The impact on social change for this project is the potential to reduce noise levels that impact patient care and healing, which can cause prolonged or increased length of hospital stay.

Summary

In section 1, I discussed the practice problem regarding increased noise levels in the intensive care setting. Increased noise levels in the ICU in a southern hospital in the United States can be quite concerning for both nurses and patients. A gap in nursing knowledge has been identified. The goal of this DNP project was to educate staff nurses on noise reduction strategies in the ICU. The project provided nursing staff education to address the gap in knowledge related to increased noise levels in the ICU. The practice question addressed was as follows: Does nursing staff education on noise reduction increase the knowledge among nursing staff members to use specific strategies to reduce

noise levels in an intensive care setting? In Section 2, I introduce the theoretical frameworks, the relevance of the project to nursing practice, and the project setting. The role of the DNP student and the project team are also addressed.

Section 2: Background and Context

Introduction

The current practice problem was that staff nurses lack knowledge in understanding ways to minimize noise in the ICU at the chosen DNP project site. This project attempted to answer the following question: Does nursing staff education on noise reduction increase the knowledge among nursing staff members to use specific strategies to reduce noise levels in an intensive care setting? Noise level in the ICU is a growing concern for hospitals and other medical institutions.

The purpose of this project was to implement an educational teaching project that focuses on reducing noise in the ICU setting. Section 2 includes an overview of the theoretical foundation I used to guide this DNP project. I also discuss the pertinence of addressing increased noise levels in the critical care setting. Section 2 also includes the role of the DNP student, the role of the project team, and the benefits of noise reduction at the DNP project site.

Concepts, Models, and Theories

ADDIE Model

The ADDIE model was the conceptual framework for this project. This framework guided the planning and implementation of the curriculum. ADDIE is an instructional designed model that is relevant and widely used by educators to develop modules, models, courseware, and software for learning and instruction (Latif & Nor, 2020). The steps aligned in this model support the delivery process of the DNP project. The ADDIE model is designed with an intent to ensure effective learning for both the

educator and the learner. The ADDIE model can be a very effective instrument in nursing education, presenting an established structure for enhancing educational programs (Kim et al., 2020). I used the ADDIE model to enhance my teaching strategy and to improve the participating staff nurses' performance in noise reduction in the ICU. The specific phases of the ADDIE model provide a specific guideline to ensure effective teaching and understanding. According to Latif and Nor (2020), the ADDIE instructional design process is broken down into five phases: (a) assessment and analysis – the identification of the problem and the discovery of the learner's capabilities; (b) design -- the process of forming objectives and establishing the delivery format; (c) develop -- the formation of test items, course material, and plan instruction or pilot session; (d) identify or implement -- the gathering of resources and smart/measurable objectives for observation; and (e) evaluate -- the awareness of interpreted test results and determining the effectiveness of teaching/ information delivered.

Nursing Theory: Florence Nightingale's Environmental Theory

FNET supported my project that noise reduction supports healing. Nightingale believed that a quiet environment is an important component of the environmental theory of nursing. Nightingale believed that the following contributed to healing: cleanliness, warmth, light, fresh air, adequate nutrition, and a quiet environment.

Nightingale believed that noise is a detriment to health (as cited in Mughal & Ali, 2017). FNET has one fundamental belief: Nursing ensures that the patient's environment is conducive to healing and recovery (Mughal & Ali, 2017). FNET aligned with this DNP project in that Nightingale thought that modifying the patient's environment to meet their

present needs would foster the healing process. In Florence Nightingale's theory, the environment plays a significant role in ensuring early patient recovery (Mughal & Ali, 2017).

Relevance to Nursing Practice

In hospital settings, bed alarms, telemetry monitor alarms, and pulse oximetry alarms are in place to ensure patients' safety. However, excessive noise levels in ICUs have been an ongoing issue. A study was performed on noise levels in an ICU at a Veteran's Administration Hospital located in Roxbury, Massachusetts in three separate areas of the ICU. The study revealed that the noise level recorded exceeded the recommended WHO standards of 40dB and peaks of 45 dB, even during sleeping hours (Ryan et al., 2016). Darbyshire et al.'s (2019) research demonstrated that there continues to be excessive noise in ICUs, especially in areas closest to the patient. de Lima Andrade et al. (2021) found that noise levels in the ICU are far higher than the decibels recommended by the WHO.

Current nursing practice has revealed that ICU nurses continue to lack knowledge in noise reduction techniques. A research study performed in Jordan assessed ICU nurses' knowledge regarding noise levels in the ICU. The results confirmed that the ICU nurses lacked knowledge in noise reduction techniques (Al-Tarawneh et al., 2020). In addition, studies performed in nine ICUs in Sweden assessing staff knowledge regarding noise levels in the ICU demonstrated further need for interventions to reduce noise levels in the ICU (Johansson et al., 2016).

Recognizing the lack of ICU nurses' knowledge in noise reduction techniques has led some experts to implement nursing staff education as a strategy to resolve this issue. Brantley et al. (2016) conducted a nurse staff education program on individualizing alarm setting, resulting in a 39% reduction in monitor alarms in an ICU. Xyrichis et al.'s (2018) research demonstrated that noise reduction can occur by educating staff nurses and modifying behavior of hospital staff members. The literature supported the need for this DNP nursing staff education project.

This DNP project has the potential to address the gap in practice in an ICU in a southern hospital in the United States. Nurses received education on the various ways of noise reduction strategies. The literature supports the effectiveness of staff education on noise reduction.

Local Background and Context

The gap in nursing practice was the lack of staff nurse knowledge on safe noise reduction techniques in an ICU located in a southern hospital in the United States. Nurses lack the understanding in a southern hospital in the United States of safely reducing noise levels, as they have not been trained on noise reduction in the ICU setting. Nurses verbalized concerns regarding the noise levels in this ICU. In addition, nursing administration has noted the following negative patient outcomes: (a) increased patients' complaints of pain, (b) increased patient anxiety, and (c) increased patient insomnia. This DNP project focused on educating registered nurses on methods to reduce noise levels. The project focus was to answer the following question: Does nursing staff education on noise reduction increase the knowledge among nursing staff members to use specific

strategies to reduce noise levels in an intensive care setting? This project may promote social change as nurses can use information from the education to create methods to reduce noise in an ICU centrally located hospital in a southern hospital in the United States. The unit director, nursing educator, and staff were supportive of this project as they would like to improve patient satisfaction. The context was conducive to this project; eight registered nurses voluntarily participated in the education. The project supports Walden University's mission to impact social change. The sources of evidence also supported the need of this project. This project took place on an eight-bed critical care unit in a southern hospital in the United States. This project has the potential to impact social change as noise reduction in an ICU can reduce negative patient outcomes. Nurses were educated on the various ways to reduce the noise levels in the hospital setting without compromising patient safety.

As a DNP student, I have researched the negative effects of excessive noise levels. As a current health practitioner, I have witnessed the negative repercussions of needless sounds within an ICU. According to Hedges et al. (2019), psychological impairment can be a negative result of sleep disturbance caused by hospital noise levels. The costs related to inadequate sleep during a hospital stay can have an end result of financial consequences as well as unfavorable publicly reported surveys that measure patient satisfaction in relation to noise levels that can show a negative impact regarding satisfaction with care (Hedges et al., 2019). Noise levels can be reduced with the effectiveness of this teaching project; this can lead to increased patient comfort and healing. This project took place in a facility that is part of a hospital system that has

Magnet status in an intensive care setting. This project was feasible in this context, as the nursing staff were offered ways to enhance patient's experiences by reducing noise levels within the ICU unit. In addition, my goal was to gain the support of the clinical director for this teaching project. The primary focus of this project was promoting patient comfort and improving patients' outcomes.

Federal Context Applicable to the Problem

Excessive noise in the ICU setting has a negative impact on patients and, therefore, may have a negative impact on patient satisfaction resulting in lower Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) scores. The end result decreases hospital reimbursement. According to CMS (2021), patients' hospital experiences and quality of care are publicly tracked through the HCAHPS survey, a questionnaire that is usually given between forty-eight hours and six weeks post discharge. The HCAHPS survey (a standardized, national tool comprised of 32 questions) was developed by CMS and the Agency for Healthcare Research and Quality in 2002, according to CMS (2021). The HCAHPS survey was developed for public reporting purposes with the intent to improve the quality of care while creating incentives, to display patients' perspectives of care received, and to enhance accountability in healthcare through transparency Centers for Medicare and Medicaid (CMS, 2020). Hospital participation in HCAHPS surveys have incentives that were created by the enactment of the Deficit Reduction Act of 2005, which requires hospitals to collect and submit HCAHPS data in order to collect their full Inpatient Prospective Payment System) annual payment update (CMS, 2021).

The Patient Protection and the Affordable Care Act of 2010 used HCAHPS as a measure to calculate value-based incentive payments in the Hospital Value-Based Purchasing program (CMS, 2021). The Affordable Care Act of 2010 set the tone for enforcing high quality care for all medical institutions. Certain guidelines must be met in order to receive the full incentives. The HCAHPS Project Team oversees the survey process to ensure that survey protocols are properly followed (CMS, 2021).

Definition of Keywords

Hospital: Licensed institution that provides medical treatment for individuals (Wallis et al., 2020).

Intensive care unit: A critical care setting is a unit in the hospital where the patient requires very close monitoring due to conditions such as compromised airway, decreased level of consciousness, organ failure, and other unstable conditions (Ding et al., 2017).

Noise: Unpleasant, offensive, harmful, and/or annoying sound in an environment (Wallis et al., 2020).

Noise reduction: To decrease unpleasant, offensive, harmful, and/or annoying sounds (McGough et al., 2018).

Nursing staff education: Information provided to licensed nurse employed by a hospital with intent to improve job performance and patient outcomes (McGough et al., 2018).

Patient: An individual in healthcare institution being cared for by medical staff, including but not limited to physicians, nurses, and other staff members (Berkowitz, 2016).

Patient satisfaction: Approved, desired, or favorable outcomes rated by an individual who has received service from hospital (Berkowitz, 2016).

Quality improvement: Desired outcomes to enhance level of care for patients and the hospital, usually increasing patient safety and patient's hospital experience (Berkowitz 2016).

Sleep disturbance: A disruption in a patient's sleep pattern that may negatively affect normal physical, emotional, and psychological functioning (Ding et al., 2017).

Staff education: Information provided to a person employed by a hospital with intent to improve job performance and patient outcomes (McGough et al., 2018).

Staff nurse: Licensed staff nurse who is responsible for the management of care for patients assigned to their unit. This is usually a registered nurse (McGough et al., 2018).

Role of the DNP Student

I am a nursing professor as well as an intensive care nurse who formerly worked for several years in the hospital system where the DNP project took place. As a critical care nurse and educator, my focus has always been safety and patient advocacy. I believe that educating nursing staff is enough to change practice and implement noise reduction strategies; this may be a bias concerning this DNP project. One of the most verbalized complaints was the increased noise level in the critical care unit. The DNP project

addressed the increased noise level in the intensive care setting, which has had ongoing complaints of patients, as well as staff. Addressing this issue was important because minimizing this problem can produce highly favorable and desired outcomes. Through educating the nursing staff in the chosen critical care area, noise reduction can occur. I presented a DNP project educating staff nurses on ways to reduce noise levels in the critical care nursing unit. I guided the project team by organizing, planning, managing, and facilitating the educational teaching project.

Role of the Project Team

The project team was comprised of myself, the clinical director, and the nurse educator. I guided the project team by organizing, planning, managing, and facilitating the educational teaching project. My experience as an intensive care nurse and a nursing professor provided the knowledge base necessary to assist with the implementation and presentation of the DNP project.

The role of the clinical manager was to encourage staff nurses' participation in the teaching project. The nurse manager assisted in disseminating information regarding educational offerings to staff members. The nurse manager notified potential participants of the educational offerings via email.

The nurse educator collaborated with me in offering any suggestions to implement this project in an efficient and timely manner and fostering assistance for IRB facility approval. However, IRB approval was not required for this project. Facility approval was required, and the nurse educator facilitated the facility's approval process. In addition, the nurse educator assisted in facilitating the collection of the pretest and

posttest data. Finally, the nursing director and nurse educator provided the data analysis for the institution's records.

Summary

Section 2 highlighted the review of the problems created by increased noise levels in the critical unit. The information revealed specific end results caused by increased noise levels. The ADDIE system and FNET model created a framework for this DNP project. I also discussed the project contexts and the roles of the DNP student and the project team. Section 3 addresses the collection and analysis of this project using the ADDIE model. Furthermore, Section 3 addresses how the FNET demonstrated the need for more focus toward noise reduction in the hospital setting.

Section 3: Collection and Analysis of Evidence

Introduction

The current practice problem was that staff nurses lack knowledge in understanding ways to minimize noise in the ICU at the chosen DNP project site. The purpose of this project was to amend the gap in practice that can lead to noise reduction in the ICU setting by educating nurses on ways to reduce noise levels.

In Section 2, I discussed how the use of the ADDIE model and the FNET were used as foundations to create the framework for delivery of this DNP project. Section 2 also highlighted the key words, the role of the DNP student, and the role of the project team. In addition, there was discussion on how staff education can be the fundamental driver to reduce the noise levels in the critical care area at the chosen DNP project site. In Section 3, I discuss the various sources of evidence that I used in this DNP project and how I collected, analyzed, and synthesized the data.

Practice-Focused Question

The focus of this doctoral project was the lack of staff nurses' knowledge to minimize noise levels in a southern hospital in the United States. Currently, there is a meaningful gap in practice, which is the lack of staff nurses' education regarding minimizing noise levels in an ICU in a southern hospital in the United States. The purpose of this project was to educate nurses on reducing noise levels with the overall intent to improve patients' outcomes and improve the patients' hospital experience. In this project, I attempted to answer the following question: Does nursing staff education on noise reduction increase the knowledge among nursing staff members to use specific

strategies to reduce noise levels in an intensive care setting? Staff nurses lack full understanding of the potential and hazardous impact increased noise levels may have on patients. Education for staff is essential to foster a culture that considers noise reduction an important part of safe high-quality care (Xyrichis et al., 2018). Noise reduction can occur by educating staff nurses and modifying behavior of hospital staff members. Knowledge regarding ICU noise appears to be crucial for nurses and other healthcare professionals (Al-Tarawneh et al., 2020). Nurses are the healthcare members that spend the most time at patients' bedside in the ICU setting. Increasing nurses' knowledge regarding noise levels in ICUs could ultimately reduce the negative effects of the stressor of increased noise levels; this could promote a healing, comfortable, and pleasant environment (Al-Tarawneh et al., 2020).

Sources of Evidence

I conducted a literature review to determine if the literature supported the need for this project. Information was gathered from nursing journals, clinical guidelines, articles, and research reports to teach the registered nurses about reducing hospital noise levels. I obtained literature from looking at EBSCO Company, CINAHL, published research articles, Medline/Pubmed, Cochrane Library, and governmental websites, including the CDC, WHO, and CMS. The concentrated focus was on published research articles, literature published within the past 5 years, and key words search such as *noise reduction* and *nursing education on noise reduction*. While conducting the literature review, particular attention was given to the effects of noise levels, outcomes of noise level reduction, patient experience, FNET, and the ADDIE model. I examined over 40 articles

closely while paying special attention to the level of evidence, both the evidence strength and quality. As the literature review progressed, some articles were replaced with more updated articles to try to stay within the current 5-year span. The literature review demonstrated that adverse patient outcomes such as reduced patient satisfaction, sleep disruption, poor quality of sleep, and extended recovery time in patients remaining in areas with elevated noise levels (Garside et al., 2018).

A study was performed over a 1-month time expansion in an ICU at a Veteran's Administration Hospital located in Roxbury, Massachusetts in three separate areas of the ICU: The end result showed that the noise level recorded exceeded the recommended WHO standards of 40dB and peaks of 45 dB, even during sleeping hours (Ryan et al., 2016). Patients in the ICU require various types of alarm monitoring to ensure safety. There is still a need for noise reduction to promote patient healing in the ICU. Further interventions are essential to reduce noise levels and to evaluate the effects on clinical outcomes, patient satisfaction, and length of stay (Ryan et al., 2016).

The U.S. Environmental Protection Agency suggested sound limitations in the hospital to be between 35dB (at night) to 45dB continuous sound level (during the day) according to Darbyshire et al., 2019 . A second study was able to pinpoint the loudest and most disturbing area of the increased noise levels in the ICU, which exceeded the WHO and U.S. Environmental Protection Agency recommended noise level as well. This study was performed by collecting data for 248 whole days out of 365 days in a four-bed general adult ICU (data were collected between April 2017 and April 2018); the study revealed that the majority of the loudest sounds originated very close to the patients' ears

(Darbyshire et al., 2019). Most of the noise was due to the equipment alarms located close to patient's bedside (Darbyshire et al., 2019). Again, studies have continued to demonstrate that excessive noise levels in the ICU adversely affect patients' sleep and recovery and can cause increased stress and fatigue (Darbyshire et al., 2019).

I also reviewed a study performed in Jordan that assessed ICU nurses' knowledge regarding noise levels in the ICU; the results from the questionnaire confirmed that the ICU nurses had poor knowledge (Al-Tarawneh et al., 2020). Studies performed in nine ICUs in Sweden assessing staff's knowledge regarding noise levels in the ICU demonstrated further need for interventions to reduce noise levels in the ICU.

Data

Literature from studies as well as patients' surveys evaluating their hospital experience regarding the care received and their overall hospital experience were used to determine the need to address noise level in the ICU at this chosen DNP project site. The HCAHPS results are publicly reported and used to measure the patients' hospital experience (CMS, 2020). The HCAHPS survey, furthermore, is used to improve the quality of care while also creating monetary incentives (CMS, 2020).

Noise reduction in the hospital setting promotes healing and increases patient satisfaction (Ding et al., 2017). Healing environments help the patients gain their physical, psychological, and social steadiness back (Mughal & Ali, 2017). Psychological impairment has been unswervingly linked to environmental stressors such as sleep deprivation, social isolation, and noise (primary). The costs related to anxiety, agitation, sleep deprivation, stress, and lower pain thresholds that are a result of ambient hospital

noise are also measured in extra medication, increased length of stay, and additional complications (Hedges et al., 2019).

Participants

The participants were comprised of eight registered nurses at the chosen DNP site. The participants were on a voluntary basis. The participants assisted in answering the following question: Does nursing staff education on noise reduction increase the knowledge among nursing staff members to use specific strategies to reduce noise levels in an intensive care setting? Evaluation of the participants' knowledge with a pretest and posttest assisted in answering this question. The participants were notified of educational sessions by the unit nurse manager. Participation for this project was on a voluntary basis from the nurses. The ICU benefited from staff education on noise reduction strategies. I addressed increased noise levels in the ICU at the chosen DNP site.

The nurse manager and the nursing educator sent out email notifications regarding any and all educational activities and meetings for this DNP project to ensure timely and accurate information was conveyed to participants.

Procedure

The Walden University DNP manual was used as a reference and guideline for completion of this project. I sought approval from the facility and from the IRB at Walden University prior to proceeding with the implementation of this DNP project. I performed nursing staff education based on the literature on quantitative studies conducted at various hospital settings that used various strategies to reduce noise and improve patient satisfaction. The project was performed in-person at the hospital in a

clinical space that allowed for adequate social distancing. The teaching activity lasted 30 minutes. I developed education created with input from content experts in the field. The education material was provided to the participating registered nurses during the teaching project. The ADDIE model was the conceptual framework for this project. All participants, including the facility, were kept confidential, and all information such as tests or any surveys will be held confidential as well. At the beginning of the presentation, the clinical registered nurses were provided with writing utensils and light refreshments. I was introduced to the nursing participants at the presentation at the hospital clinical room. I then explained the project, reviewed the consent forms, and answered any questions. After consents had been signed and returned, I administered the survey tool to the group participants.

The pretest, titled "Nurses Knowledge Regarding ICU Noise Levels," is a modified data collection tool designed for the present project to evaluate staff registered nurses' perceptions of their roles regarding the reduction of noise levels in the hospital. The pretest and posttest consisted of 15 questions, in addition to five demographic questions from which the participant could select from multiple choices. The second part comprised of 15 knowledge multiple choice questions grouped into four main items: (a) two questions regarding aspect and acceptable noise levels, (b) two questions regarding main sources of noise in the ICU, (c) eight questions regarding negative effects of ICU noise levels, and (d) three questions about strategies to reduce noise level in the ICU (Al-Tarawneh et al., 2020). I used survey and evaluation via both a pretest and a posttest to identify the effectiveness of the teaching project. Confidentiality was maintained as data

obtained from the survey and evaluation were aggregated. Demographics were gathered. Data were analyzed using a paired *t* test. I gathered the information findings and documented the quantitative responses based on the answers to the survey questions to evaluate the effectiveness of the nursing education delivered to the clinical staff registered nurses. The nursing staff education was performed at the chosen hospital with permission of the hospital and with IRB approval from Walden University.

Protections

Prior to the implementation of this doctoral teaching project, I sought approval from the facility, then Walden University's IRB. I obtained approval from the DNP site, which comprised of the approval from the hospital's chief nursing officer, the ICU leadership team, and the organization's nursing education department. The participants and the participants' results remained anonymous. The participants were also informed by email that the participation was solely voluntary; each participant could elect not to participate at any time. The requirement for this educational activity required both a pretest and a posttest. The analyzed results from this project will be shared with the organizational leadership in writing. All deidentified data aggregated from this project will be provided to organizational leadership and secured under lock and key for a specified time period based upon the facility's requirement as well as the requirement of Walden IRB.

Analysis and Synthesis

The data collection was obtained using a modified multiple pre- and post- test, which was primarily based on an instrument used in a previous study conducted to assess

nurses' knowledge regarding noise levels in the ICUs (see Johansson et al., 2016). The published literature on noise pollution in the hospital settings was also used for the tool (see Johansson et al., 2016; Kol et al., 2015; Xyrichis et al., 2018). The instrument consisted of a total of 20 questions, including five demographic questions such as age, gender, years of experience, shift most frequently worked in the hospital, and highest level of education. The results from the pretest /posttest regarding noise and methods to reduce noise levels in the ICU were analyzed using nonparametric and descriptive statistics. The goal of this assessment was to investigate staff knowledge concerning noise levels in the ICU and to improve the staff's knowledge regarding noise reduction in the ICU. I used Statistical Package for the Social Sciences and descriptive statistics to analyze the data. The Statistical Package for the Social Sciences system was used to collect and analyze the data from the pretest and posttest. Descriptive statistics were used to analyze the results. I used a paired *t* test to evaluate the findings. The results of the analysis will be presented in a graph formation to the leadership team. The data gathered demonstrated the effectiveness of the teaching project. All in all, the evaluation demonstrated that the DNP teaching project can help mend the gap in the lack of education among staff nurses regarding the noise level in the ICU.

Summary

Section 3 addressed the methods of data collection and utilization to deliver education to a group of staff registered nurses in a chosen ICU. Information collected has proven a need for this project to make a positive impact in noise reduction in the ICU. Upon successful implementation, a positive impact can occur. This impact has the

capability to lead to a higher level of patient satisfaction. Furthermore, this impact can lead to more improved outcomes for patients during their hospital stay in the ICU. Section 4 highlights the results of the nursing education project that was administered to the nursing participants. Section 4 demonstrates effectiveness of this DNP project.

Section 4: Findings and Recommendations

Introduction

The current practice problem was that staff nurses lack knowledge in understanding ways to minimize noise in the ICU at the chosen DNP project site. The purpose of this project was to amend the gap in practice that can lead to noise reduction in the ICU setting by educating nurses on ways to reduce noise levels.

The aim of this doctoral project was to educate ICU staff nurses' on ways to minimize noise levels in the ICU in a southern hospital in the United States. Currently, there is a meaningful gap in practice, which is the lack of staff nurses' education regarding minimizing noise levels in an ICU in a southern hospital in the United States. The purpose of this project was to educate nurses on reducing noise levels with the overall intent to improve patients' outcomes and improve the patients' hospital experience. This project answered the following question: Does nursing staff education on noise reduction increase the knowledge among nursing staff members to use specific strategies to reduce noise levels in an intensive care setting? Staff nurses lack understanding of the hazardous impact that increased noise levels have on patients. Education for staff is essential to foster a culture that considers noise reduction an important part of safe high-quality care (Xyrichis et al., 2018). Noise reduction can occur by educating staff nurses and modifying behavior of hospital staff members. Knowledge regarding ICU noise appears to be crucial for nurses and other healthcare professionals (Al-Tarawneh et al., 2020). Nurses are the healthcare members who spend the most time at patients' bedside in the ICU setting. Increasing nurses' knowledge regarding noise

levels in ICUs could ultimately reduce the negative effects of the stressor of increased noise levels; this would promote a healing, comfortable, and pleasant environment (Al-Tarawneh et al., 2020).

In Section 3, I discussed the various sources of evidence that I used in this DNP project, and how I collected, analyzed, and synthesized the data. I conducted a literature review to determine if the literature supported the need for this project. Information was gathered from nursing journals, clinical guidelines, articles, and research reports to teach the registered nurses about reducing hospital noise levels. I obtained literature from looking at EBSCO Company, CINAHL, published research articles, Medline/Pubmed, Cochrane Library, and governmental websites, CDC, WHO, and CMS. The concentrated focus was on published research articles, literature published within the past 5 years, and key words search such as noise reduction and nursing education on noise reduction. When conducting the literature review, particular attention was given to the effects of noise levels, outcomes of noise level reduction, patient experience, FNET, and the ADDIE model. I examined over 40 articles closely while paying special attention to the level of evidence, both the evidence strength and quality. As the literature review progressed, some articles were replaced with more updated articles to try to stay within the current 5-year span. The literature review demonstrated adverse patient outcomes, such as reduced patient satisfaction, sleep disruption, poor quality of sleep, and extended recovery time in patients remaining in areas with elevated noise levels (Garside et al., 2018).

Section 3 also highlighted the process of how I would deliver the teaching project to a group of volunteer staff nurses in the ICU, how I would obtain IRB approval from both Walden University as well as the DNP project site. In addition, there was discussion on how staff education can be the fundamental driver to reduce the noise levels in the critical care area at the chosen DNP project site. In Section 4, I discuss the findings and recommendations from the results obtained from the "Knowledge Assessment Questionnaires." Section 4 also addresses how I gathered the information to develop statistics from this DNP teaching project.

Findings and Implications

The analysis and synthesis of the teaching project proved that learning did occur. The teaching project was highly effective according to the measurement of the pretest and posttest outcomes from the "Knowledge Assessment Questionnaire on Noise Level in the ICU." The average number of correct answers as a group pretest was 75% and posttest was100%.

There were limitations in this project because I had to reduce the presentation time due to staff shortages. I also would have liked more participants in the teaching project; however, getting 100% participation would have been very difficult due to staff members out on leave due to various reasons. Due to the teaching project being held on the unit, it increased the distraction with the normal noise of the ICU setting.

The staff nurses stated that the brief, specific content delivered in the education was very helpful and was also conveyed in a manner that the information was easily retained. My intent was to deliver pertinent information in such a way that was received

as important and concise. The final results demonstrated that the education raised participant knowledge, as evident by all participants receiving a score of 100% on the posttest. The knowledge level pretest showed no true significance upon testing, using both a one tailed and two tailed random testing. The only small notable difference is that the female participants answered slightly more correct answers than the male participants; the male participants answered an average of 70% questions correctly while the women answered an average of 75% questions correctly.

The demographics of the participants included their sex, age range, level of education, years of experience in nursing, and the usual shift worked. Eight staff nurses participated in this educational activity. There were two men and six women. The participants were from all age categories, both shifts, and all educational levels. There was a diverse group of participants in all categories (see Table 1).

Table 1

Demographics of Sample Study

Variable	*N*	%	Mean (STDEV)
Gender			
Male	2	25%	Mean 4
Female	6	75%	*SD* 2.82843
Age			
Under 25	1	12.5%	Mean 2.66667
26-40	3	37.5%	*SD* 1.52753
40 or greater	4	50%	
Level of education	2	25%	Mean 2.66667
ADN	3	37.5%	*SD* 0.57735
BSN	3	37.5%	
MSN			
Years practice			
0-5	3	37.5%	Mean 2.66667
6-10	1	12.5%	*SD* 1.52753
10 or more	4	50%	
Shift usually worked	6	75%	Mean 4
Days	2	25%	*SD* 2.82843
Nights			

Table 2 demonstrates the scores among the different groups, with the *p* scores that were obtained using a *z* test (one tailed). The scores have been categorized into many ways based on the demographics, yet there was no significant correlation in the scores reflected during the pretest. The pretest results had minimal significant values. The significant value was set at 0.05.

Table 2

Total Number of Questions Answered Correctly by Demographics

Variable	# of correct answers out of 15 total answers (pretest)	Mean *SD*	*P* value
Gender			
Male	19 (22%)	43.5	0.240
Female	68 (78%)	34.64823	0.240
Age			
Under 25	11 (13%)	29	0.152
26-40	30 (34%)	17.521242	0.478
40 or greater	46 (53%)		0.166
Level of education	22 (25%)	29	0.017
ADN	31 (36%)	6.244998	0.374
BSN	34 (39%)		0.211
MSN			
Years practice			
0-5	30 (34%)	29	0.480
6-10	46 (53%)	17.5214155	0.152
10 or more	11 (13%)		0.166
Shift usually worked	65 (75%)	43.5	0.240
Days	22 (25%)	30.4055916	0.294
Nights			

Table 3 reflects the pretest results before the educational informational session occurred. The results in this table reflect each question and the total number of questions answered correctly as a group and by level of education as well. A two tailed test was randomly conducted on a couple of the questions, with the shown end result using a *t* test, addressing the questions that were answered correctly attached as Appendix B-- detailing different variables. The most consistent variable in the *t* test (two-tailed) indicated that the Master of Science in Nursing (MSN) level nurse was most consistent, as indicated by the data concluded in the pretest questions.

Overall, the level of knowing was not specific to a particular level of education using the *z* test (one tailed). The level of knowing pretest was very random among the groups. The level of significance was set at 0.05. However, the levels overall were shown to be insignificant. Questions 2, 4, 5, and 9 were answered (as a total group) at the 50% percentile or less correctly. These questions covered the acceptable level of noise according to the WHO; structural noise in the ICU, physiological effect of noise, and the effect of noise on patient sensory perception (see Johansson et al., 2016; Xyrichis et al., 2018). These data demonstrated a need for more concentration in the hospital on educating staff members about this and monitoring the effects of the noise level regarding this information for improvement.

Table 3

Pretest Results

	Questions	Column A Correct answers total	Column B Correct answers ADN	Column C Correct answers BSN	Correct answers MSN
1.	Defining noise	5 (62.5%)	2 (25%)	2 (25%)	1 (12.5%)
2.	Acceptable noise level according to WHO	2 (25%)	1 (12.5%)	1 (12.5%)	0 (0%)
3.	Operational noise in ICU	5 (62.5%)	1 (12.5%)	2 (25%)	2 (25%)
4.	Structural noise in ICU	4 (50%)	0 (0%)	2 (25%)	2(25%)
5.	Physiological effect of noise	3 (37.5%)	1 (12.5%)	1 (12.5%)	1 (12.5%)
6.	ANS effect of noise	8 (100%)	2 (25%)	3 (37.5%)	3 (37.5%)
7.	Psychological effect				
8.	Physiological change of high noise	5 (62.5%)	2 (25%)	1 (12.5%)	2 (25%)
9.	Effect of high noise on patient sensory perception	8 (100%) 4 (50%)	2 (25%) 1 (12.5%)	3 (37.5%) 1 (12.5%)	3 (37.5%) 2 (25%)
10.	Psychological effect of noise on ICU staff	8 (100%)	2 (25%)	3 (37.5%)	3 (37.5%)
11.	Stimulation of the axis of the endocrine system	8 (100%) 6 (75%)	2 (25%) 1 (12.5%)	3 (37.5%) 2 (25%)	3 (37.5%) 3 (37.5%)
12.	Noise level that stimulates psychological effect	6 (75%)	1 (12.5%)	2 (25%)	3 (37.5%)
13.	Physical design to reduce noise level	7 (87.5%)	2 (25%)	2 (25%)	3 (37.5%)
14.	Staff behaviors to safely reduce noise				
15.	Staff interaction strategy to safely reduce noise	8 (100%)	2 (25%)	3 (37.5%)	3 (37.5%)

Note. (Xyrichis et al., 2018; Johansson et al., 2016). Reprinted with permission

Table 4 reflects the posttest results after the educational informational session occurred. The participants answered all questions correctly after the educational informational session. My goal was to deliver the information in a concise, effective manner that highlighted the most important literature. The audience was very interested and engaged. This method resulted in increased scores among all the participants. The overall test scores went from 72% pretest to 100% posttest.

Table 4

Posttest Results

Questions	correct answers
1. Defining noise	8 (100%)
2. Acceptable noise level according to WHO	8 (100%)
3. Operational noise in ICU	8 (100%)
4. Structural noise in ICU	8 (100%)
5. Physiological effect of noise	8 (100%)
6. ANS effect of noise	8 (100%)
7. Psychological effect	8 (100%)
8. Physiological change of high noise	8 (100%)
9. Effect of high noise on patient sensory perception	8 (100%)
10. Psychological effect of noise on ICU staff	8 (100%)
11. Stimulation of the axis of the endocrine system	8 (100%)
12. Noise level that stimulates psychological effect	8 (100%)
13. Physical design to reduce noise level	8 (100%)
14. Staff behaviors to safely reduce noise	8 (100%)
15. Staff interaction strategy to safely reduce noise	8 (100%)

Recommendations

Literature reviewed has demonstrated that through education and behavior modification noise reduction can occur. Knowledge regarding ICU noise appears to be crucial for nurses and other healthcare professionals (Al-Tarawneh et al., 2020). I

recommend that the staff nurses continue to share the information that they have acquired to help others in the unit with noise reduction strategies. Utilizing the strategies that this project has highlighted will assist in reducing the noise levels in the hospital. Nurses are the healthcare members that spend the most time at patients' bedside in the ICU setting. Education for staff is essential to foster a culture that considers noise reduction an important part of safe high-quality care (Xyrichis et al., 2018). There are care packs available for the patients which include earplugs, masks, and lavender inhalers that may enhance sleep: the offering of these to the patients may be helpful. Maintaining patient safety in the process of noise reduction is germane. Silencing patient alarms and omitting taking vital signs are not approved measures for noise reduction. However, some approved strategies include monitoring IV and tube feeding bags volumes to prevent alarms; appropriately placing electrodes, probes, and monitor equipment on patients to avoid false alarms; closing doors lightly; and the avoidance of opening packages and equipment in patients' rooms during sleep hours (Xyrichis et al., 2018; Johansson et al., 2016). These are a few suggested behavior modifications to ensure noise reduction in the ICU. Literature from studies, as well as, patients' surveys evaluating their hospital experience regarding the care received and their overall hospital experience indicated the need to address noise level in the ICU at this chosen DNP project site. The periodically monitoring of the HCAHPS scores will be an excellent way to monitor the effectiveness of noise reduction. The HCAHPS scores results are publicly reported and used to measure the patients' hospital experience and are utilized to improve quality of care (CMS, 2020).

Contribution of the Doctoral Project Team

The project team was comprised of the author, clinical director, and nurse educator. The DNP student assumed the lead of the project team by organizing, planning, managing, and facilitating the educational teaching project. The DNP student's experience as an intensive care nurse and a nursing professor provided the knowledge base necessary to assist with the implementation and presentation of the DNP project.

The role of the clinical manager was to encourage staff nurses' participation in the author's DNP teaching project. The nurse educator was highly involved in disseminating information regarding educational offerings to staff members. The clinical director and nurse educator contacted potential participants of the educational offerings.

The nurse educator, as a content expert, collaborated with the author in offering any suggestions to implement this project in an efficient and timely manner, and fostered assistance for implementation of the DNP project. IRB facility approval was not necessary for this type of teaching project. In addition, the nurse educator assisted in facilitating the collection of the pretest and post-test data. Finally, the nurse educator and nursing director will be provided the data analysis for the institution's records.

Strengths and Limitations of the Project

The strength of this project is that it can be utilized in a lot of settings to improve nurses' knowledge regarding noise reduction in the hospital setting. Even though this project was targeted for the ICU setting, it can work , as well, in other hospital settings. I plan to continue to work toward educating nurses on noise reduction in the hospital on multiple platforms- to include in-services, nursing magazines, seminars, nursing forums,

as well as nursing organizations. As a true advocate of patient safety and patients' hospital experiences, I believe noise reduction is key to better patient outcomes and improved hospital experiences for patients and families.

A major limitation of this project is that I was unable to involve all of the nursing staff members from both shifts. Secondly, the reduction of time to deliver the teaching project required me to decrease the amount of information disseminated. The current pandemic affected the time frame, as well as the implementation of this project. I almost had to deliver my DNP teaching project virtually. I was not able to get as much involvement and live feedback from the participants, because they had limited time to participate while on duty.

Section 5: Dissemination Plan

Due to staffing schedules and lack of staffing related to the current pandemic, the results from the pre-and post-test will be electronically disseminated. I will share the summary evaluation with the project team and the unit's leadership team via email. I was able to deliver the educational content in person, but in two smaller sessions. My initial plan was to deliver the educational information by PowerPoint presentation to the entire group at one time. However, the current hospital staffing crisis altered my plan. I made copies of my educational information and gave an oral presentation to two separate groups of nurses in the ICU unit. In hopes to expand the delivery and wide spread of this DNP educational project, I shared a copy of the Power Point with the nurse educator for future in-services and dissemination of information. The nurse educator will expand the scope of this project by using this information for future hospital in-services across other units. The nurse educator and staff nurses verbalized that they felt that noise is an ongoing issue, and the educational activity was very informative. I have spoken with other nursing leaders and colleagues about noise levels in the hospital settings. Finding ways to minimize hospital noise levels is a common goal for most institutions, and disseminating this educational activity would be a great way to implement better practice among staff nurses. The educational activity will be provided to other nursing staff members who were not able to participate or attend any of the educational activities presented. I plan to reach other healthcare members through nursing forums, nursing seminars, and nursing schools. I am a nurse educator and a promoter of patient safety and patient advocacy. The dissemination of this educational activity would be a promotion of

safety and advocacy for the patients as well as the nurses. Furthermore, I plan to reach other healthcare professionals at healthcare conferences, seminars, and through nursing journal publications. All in all, I believe that this fundamental approach on such a small level can have a huge impact as the information begins to spread across the nursing arena. I truly believe one great action can cause a huge impact.

Analysis of Self

This DNP project has given me great insight into the realm of nursing. I have been afforded the opportunity to interact with so many disciplines in the nursing field to reach this point. This educational activity has shown me that I have the capability to be a real agent of change. I have been exposed to many leadership styles, and I have enhanced my interpersonal skills. Furthermore, I have gained great insight on my weaknesses and strengths. Learning the best ways to reach a diverse group of people was quite challenging. However, I was able to use the skills that I have learned along the way to find creative ways to reach all the learners. Being able to connect with the audience in a relatable way is germane. This DNP project has afforded me the capability to use the knowledge obtained throughout my doctoral studies to implement change and to transfer knowledge. This DNP project has afforded me the opportunity to form alliance with other professionals, enhance my leadership skills, and collaborate with other hospital leaders to transfer knowledge.

The implementation and completion of this project has given me the experience to see a project from the beginning to the end. This experience has taught me how to communicate effectively, how to use my resources, how to appropriately delegate, how to

effectively build a team, and how to be persistent. These are just a few of the essential skills that I had to use to get the job done. As a leader, I know how much is involved in creating social change, making improvements, and transferring knowledge throughout an organization. As an educator and a leader, I am prepared to introduce many more projects that can improve healthcare and promote social change. Education is key to promoting change in the realm of nursing. Healthcare leaders are responsible for ensuring that the profession is constantly evolving and being performed in the safest ways. As a healthcare leader, my intent is to ensure that I guide others to promote safety and advocacy in the realm of nursing. Noise reduction in the ICU is one small step toward a major difference.

There were a lot of challenges from the start to the finish of this DNP project. Now, I just want to focus on being consistent and persistent was essential for me to see this project from beginning to the end. All the therapeutic communication that I have learned along the way was essential to break the barriers. I learned that I had to be patient, compromise, listen well, be flexible, and be confident. In the realm of nursing, there are so many ways to get the same end result. This DNP project has shown me that all my nursing experience has been very beneficial to get me to this point. I have been able to use each and every experience in some way to get me through the process. I am very thankful, and I know that this is where I am supposed to be. I have the love, the enthusiasm, and the knowledge necessary to be highly effective as a nursing scholar and leader.

Summary

The purpose of this DNP project was to assess nursing staff members' knowledge regarding noise level in the chosen ICU. The evaluation and analysis of the pre-and post-test results indicated that education could be beneficial to improve the level of understanding on strategies to reduce noise levels in the ICU. The strategies gave further insight on how noise levels can be reduced and the impact that increased noise levels have on patients and nurses. The inclusion of how the noise affected nurses was germane because it affects the care that nurses deliver to the patients. This can ultimately affect the patients' outcomes. Florence Nightingale emphasized that noise levels affect the environment and the ability for the patients to heal. The literature review supported a quiet environment to promote optimal healing. All in all, noise reduction can lead to better patient outcomes as well as a better hospital experience for patients. The results from this DNP project have shown that there was a need to educate the staff nurses at this DNP project site on strategies to reduce the noise levels in the ICU. Through behavior modification and knowledge of the negative effects noise has on patients, noise reduction can occur. The nursing staff in the ICU stated that they were on board with making the necessary changes to improve the noise levels in their unit. The conclusions of this DNP project support the need for education as an essential factor in reducing the noise level in the ICU and promoting better patient outcomes.

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Appendix: A: Knowledge Assessment: Nurses' Knowledge Regarding Noise Level in the ICU

Sociopolitical

1. Noise can be traditionally defined as
a. Sounds above a whisper
b. Unwanted or disturbing sound
c. Sound below 15 dB
d. Steady sound

2. The World Health Organization (WHO) considers the acceptable range of noise level in hospital to be
a. Less than 35 dB
b. Between 70- 75 dB
c. Greater or equal to 50 dB
d. Between 60-70 dB

Source of ICU noise

3. The main source of operational noise is in the ICU is
a. Staff activities: talking, hand washing, closing doors in the room, and opening equipment in the room
b. White noise
c. Walking in the hallway
d. Television

4. The main source of structural noise is
a. White noise
b. Intercom
c. Equipment such as IV pumps, ventilator, suction machines, telemetry monitors
d. Staff members

Effect of ICU noise

5. The most common chronic physiological change that might be seen in a patient who is exposed to high noise is
a. Increased risk of cardiac problems and hypertension
b. Headache and back pain
c. Fever and chills
d. Fear and aggression

6. The part of Autonomic Nervous System (ANS) which might be stimulated by excessive noise level include (s)
a. Pituitary and adrenal glands
b. Urinary system
c. Engorgement of breasts
d. Activation of fight or flight situation

7. Most common psychological adverse effects of high noise on ICU staff is
a. Anxiety
b. Anger
c. Depression
d. Confusion

8. The most common acute physiological change that might be seen in a patient who exposed to high noise is
a. Increased heart rate
b. Decreased metabolism
c. Activation of the immune system
d. Decreased oxygen consumption

9. The major effect of high noise level on patient sensory perceptions is
a. Increased risk of hearing loss
b. Decreased sensation
c. Dry mouth
d. Incontinence

10. Major psychological effect of high noise level on ICU staff includes all except
a. Burnout
b. Low job satisfaction
c. Feeling of achievement
d. Increased stress and anxiety

11. The axis of endocrine system which will be stimulated when exposure to excessive noise level is
a. Hypothalamic-pituitary-adrenal (HPA) axis
b. Thyroid and parathyroid axis
c. Pancreas axis
d. Pineal body axis

12. The noise level which stimulate physiological change either on sick or healthy person is
a. Above 40 dB
b. Below 30dB
c. 20-25 dB

d. 10 dB

Strategies to reduce ICU noise

13. Improving physical design in ICU in order to reduce ICU noise level include
a. Make all equipment in room immobile
b. No biohazard containers allowed in patient's room
c. Rearranging the nurses station and treatment room
d. Keep windows unlocked for easy opening

14. All of the following are considered staff behaviors improvement strategies to safely reduce ICU noise level except
a. Control of monitor alarms- avoid empty IV bags, feeding bags
b. Help prevent false alarms by properly applying monitor equipment
c. Keeping doors closed and closing doors quietly-when possible
d. Do not take vital signs when patient is asleep

15. Staff strategy that should never be done to reduce ICU noise level is:
a. Implementation of noise reduction guidelines
b. Staff awareness and knowledge regarding sound
c. Educational programs about noise levels
d. Silence alarms during quiet hours

Demographics

16. Gender
a. Male
b. Female

17. Age
a. Under 25
b. 26-40
c. 40 or older

18. Level of Education
a. ADN or diploma
b. BSN
c. MSN or higher

19. Years Practice in Nursing
a. 0-5
b. 6-10
c. 10 or more

20. Shift Worked Most Frequently
a. Days

b. Nights

Appendix: B: Two Tailed T Test

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.805847531
R Square	0.649390244
Adjusted R Square	0.433557611
Standard Error	0.078715441
Observations	45

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	16	0.3328125	0.020800781	3.580869565	0.001546122
Residual	29	0.1796875	0.006196121		
Total	45	0.5125			

	Coefficients	*Standard Error*	*t Stat*	***P-value***	*Lower 95.0%*	*Upper 95.0%*
Intercept	0.1875	0.046197612	4.058651349	0.000341086	0.093015275	0.281984725
M	**0.0625**	**0.024892008**	**2.510846038**	**0.017871356**	**0.011590127**	**0.113409873**
Question 1	0	65535	#NUM!	0	0	**0**
Question 2	-0.0625	0.032135444	-1.944892978	#NUM!	-0.128224363	0.003224363
Question 3	-4.57944E-17	0.02142363	-2.13756E-15	1	-0.043816242	0.043816242
Question 4	-0.010416667	0.016067722	-0.648297659	0.521893024	-0.043278848	0.022445515
Question 5	-0.016666667	0.012854178	-1.296595319	0.204993246	-0.042956412	0.009623079
Question 6	0.020833333	0.010711815	1.944892978	0.061542169	-0.001074788	0.042741454
Question 7	-1.23633E-17	0.009181556	-1.34654E-15	1	-0.01877839	0.01877839
Question 8	0.015625	0.008033861	1.944892978	0.061542169	-0.000806091	0.032056091
Question 9	-0.00462963	0.00714121	-0.648297659	0.521893024	-0.019235044	0.009975784
Question 10	0.0125	0.006427089	1.944892978	0.061542169	-0.000644873	0.025644873
Question 11	0.011363636	0.005842808	1.944892978	0.061542169	-0.000586248	0.023313521
Question 12	0.003472222	0.005355907	0.648297659	0.521893024	-0.007481838	0.014426283
Question 13	0.003205128	0.004943915	0.648297659	0.521893024	-0.006906312	0.013316569
Question 14	0.005952381	0.004590778	1.296595319	0.204993246	-0.003436814	0.015341576
Question 15	0.008333333	0.004284726	1.944892978	0.061542169	-0.000429915	0.017096582