Support Their Sleep: Enhancing Nurses' Knowledge and Implementation of Non-Pharmacological Sleep Protocols to Improve Patient Rest, Recovery, and Reduce Cognitive Impairment.

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Comments
This Quality Improvement (QI) project was conducted to improve nurse-driven, evidenced-based patient care.

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Support Their Sleep: Enhancing Nurses’ Knowledge and Implementation of Non-Pharmacological Sleep Protocols to Improve Patient Rest, Recovery, and Reduce Cognitive Impairment.

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Nursing 952: Clinical Nursing Leadership

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Abstract

**Background:** Sleep and rest play an influential role in promoting recovery and healing in humans. Hospitalized patients are at risk for altered sleep from hospitalization, illness, and stimulation from a hospital environment. Non-pharmacologic interventions preformed by nurses can help to improve sleep and sleep environment for patients.

**Local problem:** There was no protocol or available information regarding patient sleep promotion for nurses to references when caring for patients.

**Methods:** Nurses in the microsystem (n=8) were administered a pre/post questionnaire containing Likert scales and a short quiz containing knowledge-based questions. Questionnaires were distributed to nurses prior to and after one-on-one education surrounding non-pharmacological sleep promotion interventions.

**Interventions:** RNs were educated to perform non-pharmacological interventions to foster a sleep promoting environment for patients. Interventions included, closing blinds in patient rooms during nighttime medication passes, opening patient blinds in the morning to allow sunlight to help regulate circadian rhythm, closing patient room doors to reduce noise from unit hallways, and turning off televisions and lighting in patient rooms to facilitate natural melatonin production.

**Results:** There was a 17.885% increase in quiz scores measuring nurses' knowledge of sleep related topics following education. RNs also showed an increase in self-perceived ability to provide evidenced-based non-pharmacological sleep interventions to their patients.

**Conclusion:** Providing evidenced–based education for Registered Nurses (RNs) in a specific microsystem helped improve nurse knowledge and facilitate an evidenced–based sleep fostering environment for patients.

*Key words: Non-pharmacological, Sleep, intervention, education, microsystem, protocol, RN education, Nurse confidence, Nurse knowledge, Progressive care, Dementia, Cognitive impairment, Circadian rhythm, Melatonin, Stimulus*
Introduction

Problem Description
The progressive care neurotrauma unit (PCNT) consists of 26 beds and a separate wing which acts as an as-needed sleep study unit. Patients often do not get the necessary sleep they need to facilitate adequate recovery. Currently, the hospital is a level II hospital working towards reaching level I accreditation. The neurotrauma unit collaborates on patient care with other medical specialists such as trauma, neurologists, cardiologists, internal medicine doctors and many more. These patients transported or admitted to this unit often require extensive lengths of stay before they are discharged home or transferred to another more suitable level of care, such as the intensive care unit or a medical surgical unit. During these weeks of care, patients spend multiple nights sleeping in the inpatient setting which often contributes to poor sleep.

McPhillips et al., (2023) focused on behavioral and non-pharmacological interventions in older adult populations to promote improved sleep routines (which will be identified as “Sleep hygiene” in this paper). McPhillips describes how poor sleep hygiene (defined as a lack of regulation in nighttime and before bed routine and care) has significant connections to rumination and before bed routine issues. They describe that much of the insomnia issues can be traced back to lack of protocol and hygiene in the older adult population. Burton et al. (2021) further supports this where 2 out of 5 insomnia cases in a hospital environment can be attributed to poor sleep hygiene and adherence to sleep promoting routines by the nurses and other professionals on the unit.

Over recent years, increasing amounts of literature have been published highlighting the importance of therapeutic sleep and environments for patient recovery and outcomes. In the
general adult population sleep is a highly neglected part of life with most adults averaging less than six hours of sleep a night (Morse & Bender, 2019). This number is further worsened in the hospital in-patient environment. Quality sleep in hospitalized patients is crucial for proper rest and recovery when in a state of immunocompromise and illness. Sleep consists of one third (33%) of the human lifespan according to (Curtis, 2023). During this time, the body can prioritize processes that promote recovery and rebalancing, allowing for healing and homeostasis, often in conjunction with the medical care the patient is receiving. It is important that healthcare professionals that take part in direct care of patients be educated and knowledgeable about all the risks and rewards that are linked to sleep and sleep habits.

Unfortunately for the progressive care neurotrauma unit, patients struggle to get and remain asleep during their stay. Call bells and room phones are frequently used by patients throughout the night to let staff know about issues keeping patients awake. Chief patient complaints are monitor alarms going off, issues with turning off lights, and noises which patients are unsure of. In conjunction with the environmental noises and stimuli that keep patients awake throughout the night, the increased need for medication administration in this population throughout the night can often further worsen the issue of sleeplessness. Often nurses will have to enter a patient's room 3-4 times a night to administer medications. These can be as simple as hanging intravenous antibiotics, and as invasive as subcutaneous injections or starting IVs to allow for as needed and ordered medication administration.

Nurses often find it hard to stay up to date with the increasing amount of evidence-based research. There currently is no sleep protocol for this regional hospital or easily accessible piece of education for nurses on the unit about sleep hygiene or guidelines to promote sleep and sleep environments for patients.
Available Knowledge

A literature review was conducted to show the importance of sleep-in hospitalized patients. The following databases were used to conduct this review. CINAHL (Cumulative Index to Nursing and Allied Health Literature), PUBMED, Cochrane Library, and NCBI were used to sort and identify current literature. Boolean operators such as sleep, hospitalized patients, cognitive impairment, sleep protocols, and sleep environments were used along filters selecting for systematic reviews, randomized control trials, and literature reviews published in the last 5-8 years allowed for identification of quality up-to-date literature. The initial literature search of the literature produced 727 results related to the Boolean operators. Duplicate results, literature published prior to the 5-to-8-year time frame, and results that did not meet goals for this project were screened and removed from the literature search. 39 results were also removed as the results that populated were not available. 28 results were removed due to private funding which may have skewed results. Lastly, 632 miscellaneous results were removed due to other conflicting factors which did not align with the needs of the literature search. The final review contained 10 pieces of literature which supported the creation and progression of this project.

Normal sleep cycles are incredibly important to humans for natural healing and body processes. Many times, in a hospital setting, these normal circadian rhythms (the body's natural sleep wake cycle) are disrupted due to external, as well internal stimuli. Busy environments, high stress experiences, pharmacological interventions, and many other factors disrupt the body's natural ability to regulate and control many of these processes such as the wake cycle sleep. During sleep, the human body goes through phases or levels where key body processes happen. As we rest and sleep, cellular processes occur and promote healing, recovery, as well as help “reset” the body for the next and upcoming days. In older adult and younger populations, this time of deep sleep is important for these processes. The hospital environment can be highly
unforgiving to these vulnerable populations. Reduction in sleep due to external stimuli and environmental stressors, compounded with the medical issues that patients currently face can severely affect the patient’s ability to properly recover and be ready to leave the clinical environment. (Grandner et al., 2018)

Often, guidelines set by governing bodies are difficult to achieve in an environment such as a hospital. Due to aforementioned factors, patients often sleep significantly less than the recommendations set out by the world's governing bodies on healthcare. As healthcare professionals, nurses aim to improve all aspects of their patients care in ways that promote recovery. By bringing evidence-based literature to the unit in a way which encapsulates all staff engaging in direct patient care, the burden of self-education and self-directed research can be outsourced. Thus, saving the nurses time and issue identifying proper literature.

Keeping up to date on the latest evidence-based literature and practices for nursing can be tedious and often forgotten by nurses. Burnout and high patient censuses and concurrent needs of care take a consistent toll on the healthcare workers by incorporating education and interventions that are quick, as well as collecting a baseline of knowledge regarding sleep practices and protocols on nursing staff within the progressive care neurotrauma unit, weaknesses were identified that could be affecting the quality and quantity of sleep in the patient population.

Creating an interventional quality improvement project where education was provided to the nursing staff on the unit in conjunction with educational posters, pamphlets and materials about sleep, there may be an improvement in patient outcomes and satisfaction which will reduce the stress on the healthcare team within that unit as well.
Many factors such as blue light from televisions and monitors, noise pollution, and other stimuli can negatively affect the body's natural clock and promote disorders like insomnia and sleep deprivation in in-patient populations (CDC, 2020). By promoting an environment where sleep is nurtured naturally patients may be able to sleep and regulate their circadian rhythms better. Further promoting recovery and positive health outcomes along with increasing patient satisfaction. Interventions such as reducing noise and light from 10pm to 6am have been shown to improve patients' ability to regulate their natural sleep rhythm. Interventions such as opening blinds and windows in patients' rooms allows for the body to regulate the production of the sleep hormone melatonin and realign the person to a natural sleep cycle without the introduction of exogenous hormone replacement or supplementation. Other hospitals in the region have begun to introduce “safe sleep” protocols which center around improving environments to promote sleep. One of these hospitals has an effective and validated sleep protocol which was used to help educate and formulate the evidence-based education of the project we are conducting in this study.

Deep quality sleep is important in hospitalized patients as often they have experienced illness or trauma which requires a higher level of recovery to return to full health. According to the literature published, sleep is one of the most neglected parts of the patients' stay while in a hospital setting (Morse & Bender, 2019). Due to things such as nursing tasks, ambient lighting, and many other external factors as well as internal factors for the patient, there is a severe interruption of sleep. They go on to include that in according to the distinct phases of sleep, often when patients do end up getting to sleep, they do not make it passed the first and second stages of sleep which, while still important, does not fully promote rest and especially recovery in many
scenarios. Simple changes such as closing blinds and doors and reducing noise throughout the room have shown to improve the ability of patients to get to and remain asleep faster.

A study by (Mulkey et al.,) focused on evidenced based nursing interventions for sleep promotion and reduction in delirium within an inpatient population. Sleep and delirium are highly interconnected. There have been many studies completed that show a clear link to poor sleep and increased onset of delirium and confusion in hospital inpatients. This increased risk of delirium can not only be unsafe for patients and professionals on the unit, but can also increase risk of falls, length of stay, cost associated with the stay of the patient for both the patient and the hospital, as well as negative effects on the surrounding patients in the hospital. Mulkey stated, according to (Siddiqi et al., 2016) delirium has been associated with a 10-fold increase in cognitive impairment post-discharge for patients and a three-fold increase in mortality. When it comes to confusion and delirium regarding length of stay for inpatients, it has been shown to effect 50-75% of older adult populations in hospitals and increase length of stay for these individuals by a total of 17.55 million days (about 48,000 years) over the course of 50 years (Mulkey, harden et al. 2018). A key factor discussed in this study is evidence that non-pharmacological interventions (such as closing blinds, creating nighttime routines, and improving sleep hygiene) have shown better results and be more effective than medications when approaching care of patients with cognitive impairment or delirium due to lack of sleep. Sleeping during the day is a highly prevalent activity for those in the inpatient setting. It is common for patients who struggle to sleep through the night to take naps throughout the day. This inconsistent sleep schedule has negative effects on the release of melatonin from the pineal gland which interrupts regular circadian rhythms (Burry et al., 2017). Patients who experience irregular circadian rhythms are at increased risk for cognitive decline and ineffective healing
when it comes to inpatient admission to an acute setting (Mulkey et al., 2018) and may be able to reduce this risk through proper nursing interventions following nurse-focused education. In this study, there is discussion about nursing intervention that has shown to positively impact sleep hygiene and sleep architecture (the ability to move through the descending phases of (Non-Rapid Eye Movement) (NREM) and REM sleep), which is early ambulation and frequent ambulation of patients early in their recovery and more importantly, early in the day. Nurse specific interventions such as promoting activity early in the day and normalizing a nighttime sleep routine can cause the body to compensate and return to a normal circadian rhythm which improves patient ability to sleep and remain asleep throughout the night.

Further elaborating (Stewart et al., 2018) explains how this ill in-patient, older adult population often is found to normalize and set their sleep wake cycles to higher amounts of light which effects parts of the sleep cycle such as non-rapid eye movement sleep. This stage of sleep is not as restorative and not as deep as other stages, which not only reduces time spent by the body in a protective and recovering state but allows for far easier arousal when in a state of sleep. They further elaborate and explain that older populations in the hospital often are in a state of generalized dysregulation. This not only means their sleep is being disrupted, but they also have trouble regulating things such as blood pressure, blood sugar, temperature, etc. All these metrics have direct links to a person's ability to engage in quality sleep. This means by promoting a healthy sleep environment and sleep protocols in this patient population, we can hopefully influence the status of these other health markers and better control outliers. Negative and positive feedback loops in the body allow for regulation of multiple processes at once which allows us to target multiple of these body systems when we target one.
Supporting research from a study by Miller et al., 2020, reviewed and discussed non-pharmacological sleep interventions. In this systematic review of the literature, heavy emphasis is put on the data emerging that shows a reduced rate of positive patient outcomes following hospitalization and a reduction in inpatient sleep quality. This much needed rest and recovery time that is incredibly important to patients in a hospital setting is easily interrupted by many external stimuli factors. Things such as alarm fatigue (inability of sleep or rest due to the high incidence of alarms sounding), increased ambient lighting from halls, stations, and other rooms, and many other factors reduce nurturing sleep environments. In this systematic review, 1,529 studies, research articles, meta-analysis, and other literature reviews related to sleep in an inpatient setting were found along with 2,713 hospitalized participants data sorted. In these manuscripts, there was an overwhelming amount of literature on melatonin secretion by the pineal gland and how environmental, lifestyle, and nursing interventions can heavily influence its regulation. A truly relevant point was made about prescription of melatonin in these patients. Often in hospitalized settings we see a “as needed” order for melatonin or other sleep aids. When these become frequently used in conjunction with unfavorable environments such as the hospital inpatient setting, we can see decrease in natural amounts of melatonin and other sleep promoting hormones released. The importance of maintaining proper regulation of these hormones through well-educated nursing interventions, such as those laid out in this project are supported by this study. As normal sleep is disrupted by several factors, studies have shown that normal circadian rhythm becomes unpredictable which can lead to further risk factors of delirium and acute confusion which leads to longer length of stay for these patients and less favorable patient outcomes.
**Evidence Synthesis**

Collaboration of multiple specialties helps to facilitate high quality care of acutely ill hospitalized patients. It is important nurses understand the efficacy of non-pharmacological nursing evidenced-based interventions like those in this project. These interventions are imperative to creating quality sleep environments where patients can get adequate rest and recovery. (Ritmala et al., 2021), explain how RNs role on sleep have significantly shown improvements across the board through interventions in these patient populations. An interventional program was implemented for nurses and patients. The use of the Richard Campbells Sleep Questionnaire (RCSQ, 2019) measured perceived sleep quality reported by patients following quality improvement interventions. The use of a patient reported scaled survey allowed for comparison of pre- and post-intervention scores. This comparison model allowed for post-intervention analysis of interventions effects on patients sleep.

**Rationale**

When approaching this specific microsystem, there were numerous issues that required a quality improvement project like the one completed by the project lead. Many of these issues had patient specific goals but due to the time and scope constraints of this project, the most achievable goal was to focus on the nurse's education surrounding patient sleep promotion. Hospitals within the region have begun implementing their own “safe sleep” protocols which aim to promote and nurture environments for their patients' sleep. A local regional hospital has instituted a sleep protocol which is easily accessible to their nurses and other staff in the hospital along with education surrounding the topic. Their sleep protocol is available online and is used as supporting evidence of the aims and interventions of this project and education for nurses in the Neurotrauma microsystem.
The use of a Plan, Do, Study, Act (PDSA) cycle was used for this quality improvement project. In the “plan” stage of the project, the main objective was to understand the current literature surrounding non-pharmacological sleep interventions and set up an educational plan for the nurses on the unit. The education focuses on understanding the current understanding of these interventions and how often the nurses think to incorporate them in their care. The education also focused on supplying information as to why these interventions are important for patients. These educational topics discuss reduced length of stay, improved rehabilitation time, and increased patient satisfaction with care outcomes.

Once the project's planning stages were complete, incorporating these interventions began. To begin, nurses on the unit were administered the pre-intervention questionnaire to establish a baseline knowledge. Initial responses from the pre-intervention questionnaire were used as a starting point for the project lead when identifying priorities in education. Education was to be provided during shift change “huddles.” These short educational sessions were planned to be taught on different days throughout the project's weeks. This ensured that the nurses scheduled on different days could take part in the educational sessions. There was time following huddles for nurses to ask questions. This allotted time hoped to help RNs understand the education topics better. Following the weeks of education and observation, questionnaires (Appendix A) were administered to the same nurses and tested the nurses on their post-education knowledge of these non-pharmacological interventions for patient sleep.

The study section of this project took place after education and the pre/post-test were completed. These were then analyzed to understand if there was an overall increase in scores in the different sections of the questionnaire. The section which measures nurses’ perceived importance surrounding sleep and sleep promotion (Likert scale section), was reviewed to see if
there was a noticeable increase in perceived importance following the education. The second section of the questionnaire (7 question quiz) was also reviewed to identify if education improved nurses scores.

During the last section of the project in the “act” phase, the education was tailored to meet the new needs of the post-education scores. This connects back to a new PDSA cycle where a new plan phase would be started following the new needs of the nurse regarding their competency.

Global Aim
The global aim of this quality improvement project was to improve sleep quality and quantity (hours of restful sleep) for patients through non-pharmacological interventions.

Specific Aim
The specific aim of this quality improvement project was to improve nurses' knowledge regarding non-pharmacological evidence-based sleep promoting interventions by 40% on questionnaire quiz scores by July 31’st.

Methods
Context
In the initial stages of planning for this project, the author conducted a 5 P’s assessment which helped identify the patient population, census, nurse force, and other measures needed to identify the foundation for this project. The microsystem of the PCNT unit normally has a patient census of 20-22. Patients range in age from their early 40’s to late 80’s and have most diagnoses associated with stroke, subdural injury, ideocratic cognitive decline, and other neurological disease states. Many of these patients self-reported having a regular sleep routine and sleep environment which they follow at home prior to hospitalization. Staffing on the unit typically has between 4-5 nurses with two licensed nurse assistants (LNA’s) staggered throughout the night to
assist with tasks such as vital sign measurements, ambulation to and from bathrooms, and bed changes when needed.

It is often difficult for nurses to manage numerous protocols when they are not easily accessible, or while dealing with the complex medical cases admitted to the unit. Many other hospitals in the region have begun implementing a “Safe Sleep” protocol. This protocol focuses on prioritizing the patients sleep and sleep environment first. To help promote quality rest and recovery in this neurotrauma unit, education needs to be the first step for the professionals on the unit.

**Interventions**

By creating an educational program for professionals on the PCNT unit, information was easily accessible by both an education session and posters. Education would focus on topics such as reducing ambient lighting and noise in the unit during night shift, closing binds and doors to promote dark sleep environments, and clustering of care to allow for normalization of sleep cycles. Posters were placed around the unit with information used in education for nurses but in simplified form. This supported national guidelines which allowed nurses to provide effective non-pharmacological interventions to patients on the unit. Using pre-established protocol implemented in another hospital in the region adds validity to the interventions as, these protocols have been verified and backed by evidence.

Use of the PDSA cycle grants access to concurrent improvement and amendment of a quality improvement project like this one. By identifying current problems in the unit and setting up education in the form of discussions and posters, a target problem can be identified and improvised on. Creating a pre/post-test survey like the one attached in the appendices of this project is imperative to understanding if the project was effective. Simple, subject perceived
grading scales in the initial parts of the survey, allow for a baseline understanding of the nurses’ perception on sleep promotion. This can be reassessed following education (specifically targeting the risk factors of poor sleep) to help identify if the nurses understand the level of importance that sleep promotion holds. In the second part of the survey, the questions let us understand if the actual education was effective in improving nurse knowledge surrounding sleep and sleep promotion. Concurrent reminders of sleep risks and sleep promoting interventions using physical posters throughout the unit also aim to help visually educate the nurses. All these project components combined with verbal education sessions during shift “huddle”

Continuing education for nurses can be lost in the busyness of the healthcare system. While topics such as basic life support (BLS) and basic nursing skills classes are often mandatory for healthcare professionals, staying up to date with the latest sleep promotion literature does not always make its way to the top of the priority list for practicing nurses. This is not only a detriment to the nurse’s clinical practice but can also reduce a patient's ability to recover properly while in a hospital setting.

In conducting this quality improvement project, education was centered around nurse comprehension and retention of sleep promoting actions and activities. Topics such as improved patient outcomes and satisfaction, reduction in cognitive impairment, and improvement in reception to rehabilitation and care methods were prioritized as per the studies and research being published currently. Once professionals have been educated and informed during huddles, nurses were asked to keep the interventions they were educated on in mind. Nurses and other professionals were educated on sleep promoting topics such as closing blinds during medication passes around 10pm and re-opening blinds around 6am to promote regulation of circadian
rhythm. Nurses also aimed to reduce light and noise pollution in the room and throughout the night by closing doors and curtains when appropriate for the patients they are caring for.

To provide the best possible outcome and allow nurses to gain confidence in the education they received, the project leader remained in the nurse's station for an allotted time of 30 minutes to an hour following shift change. This gave time for nurses to ask questions they might have about protocols, promotion of sleep, and other things such as clarification on topics they have been implementing. Following time for clarification, a list of commonly asked questions and answers were noted and included in the following days education and shift change report to help other nurses maintain competency.

Conducting a quality improvement project requires the help and collaboration of multiple highly skilled professionals such as nurses, LNA’s, physicians, surgeons, and other supportive staff. For this project, the main care team (involving nurses and LNA’s on the unit) were the ones most involved with the patients and the intervention (improving and controlling sleep hygiene and protocols.). Due to the amount of contact that these professionals have with patients, they were the target audiences and adaptors of the educational program interventions. The author is the main educator and the main implementer of the quality improvement project on the unit. All education was conducted through the author, their posters and flyers posted at the nurse's station.

Education was prioritized with night-shift care team members as they are the most likely to be initiating the interventions aligned within this project. Day-shift care members were educated through presentation at huddles, hand off and ready access to the posters and information provided to the unit.
The supportive part of the quality improvement team encompasses the graduate studies team at the University of New Hampshire and the administrative team at progressive care neurotrauma unit. Stakeholders from the unit aided in the distribution of flyers and set up of posters.

**Study of interventions**

The project lead administered a pre-education questionnaire to nurses working in the PCNT available from 6/5/2023 to 6/16/2023. To track the progress of the intervention, the author provided the nurses on the night shift with a focused version of the education questionnaire from “Implementing bedside handoff in the emergency department: a practice project.” (Allenbaugh 2019) which assesses their implementation of sleep protocols and their understanding of educational topics. This survey covered their knowledge of basic sleep promotion and the rate of implementation of these protocols by nurses. This same survey was given at the end of implementation to reassess nurses' rate of these interventions. Further review of this survey can be found in the appendices.

The original questionnaire was focused on educational intervention retentions for physicians and their understanding of evidenced-based outcomes of bedside handoff and report. The original questionnaire was broken into a pre-test and a post-test which allowed the authors to understand if the actual education that was being delivered to the students and physicians was improving their ability to give and receive bedside report in an emergency trauma center. The original study found that following this education, the pre and post tests showed valid results that could mark measured improvements in efficacy of bedside handoff due to the education.

Interventions in this quality improvement project are focused on educational topics selected to identify the first phase of promotion of patient sleep.
Studying these interventions' outcomes is another integral part of the project's initiation. Being able to track the understanding and the importance of implementation of quality sleep protocols and hygiene in this population by setting baseline knowledge of nurses surrounding sleep and its importance to patients on this unit, the author was able to understand where to put emphasis on education. Sections such as “actual interventions implemented” and “how often do you actively think about promoting sleep hygiene and environments before leaving a patients room” allowed the author to alter the education as time goes on and nurses' perception of implementation changes. Other sections in the education that were more specific such as understanding risks and outcomes associated with promotion of sleep let the author fine tune the education on a day-to-day basis as to focus on “weak points” that may be commonly shared throughout the unit. Throughout the intervention, checkups were completed to identify these weak points and can be elaborated on during these “huddles” to encourage communication and transparency of weaknesses in nurse education.

The survey proposed and utilized by Allenbaugh 2019 in their “Health Literacy and Bedside Clear Communication” project focuses on the educational aspect of bedside handoff; the validity of the tool allows for slight alteration to project specific educational topic while remaining a valid tool.

When completing the pre and post surveys and educational programs, being able to identify the improvements and overarching progress related to sleep on the unit is important. This step is where the Plan, Do, Study, Act cycle (PDSA) begins implementation. Due to the time constraints the nurse education is the focal point of this intervention. In the future, we will be able to conduct the same project but incorporate the patients' responses to a similar survey (Using the Richard Campbells sleep questionnaire) and identify if there is a linear improvement
between nurse education and patient sleep quality and satisfaction. In the current timeline, to understand if the interventions and the teaching had a positive effect, the nurses answered a similar questionnaire (alteration of the pre and post-test by Allenbaugh et At. 2019) which also incorporates a self-identified section where nurses can elaborate on questions asked. This alteration asked if they believe that the education has improved their knowledge of protocols, risks and rewards accosted with improving sleep environments, and if they feel they have actively made improvements to their patients’ rooms at night to promote sleep following the education. This section also aimed to identify they felt the education directed their critical thinking of implementation.

Measures

Selection of methods and measures in this quality improvement project were identified due to alignment with the Institute for Healthcare Improvement (IHI model). These were chosen due to their simple nature and their ability to be constantly reworked and developed over time through a PDSA cycle as new and emerging literature is published. Education was selected as the main outcome in this project due to time constraints, simplicity of retention by nurses, and scope of practice as a student leading a quality improvement project. Educational retention can be easily measured using a survey or test such as the one the author has established from the Allenbaugh test, which has been previously validated through another educational quality improvement project aimed at physicians rather than nurses (Allenbaugh 2019). The retention of this education by the nurses measured through pre/post-questionnaires allowed for understanding of education efficacy. These outcomes of the questionnaires also set a foundation for future projects which may be similar in nature to this QI project.
Further elaborating on the reasoning behind choosing education measurement with a pre
and post-test rather than other methods, the use of two separate tests (pre and posttest) allows for
the comparison of individuals, as well as group responses to understand if the teaching was
effective. A separate test was drafted up but not included in the analysis of the data but further
extrapolated on in the discussion section which looked at and see based off nurse responses
which form of educational materials had the biggest impact on not only their comprehension but
their implementation of sleep promoting interventions.

Successful implementation of this education and nurse directed intervention was assessed
and identified following the collection of the data self-reported by the nurses educated through
these pre and posttest tests.

The project questionnaire was selected due to the breadth of literature that surrounds the
data it helped collect in their study. When looking to choose a questionnaire to assess the
outcomes of the educational grasp of this project, there was heavy emphasis on teach back
retention. Being able to identify the strengths and weaknesses of the education for nurses through
the questionnaire was a priority. Attached to the appendices is the pre- and post-questionnaire
which identifies the measures taken to identify the project's success. The questions asked were in
two forms which aim to assess the nurse's competency surrounding sleep promotion and
knowledge of sleep related risk factors. These questions are categorized into distinct sections
which each aim to identify and draw out specific measures to be analyzed.

Assessing the data collected from surveys and questionnaires allows for first-hand
responses that encourage valid data pertaining to the self-perceived level of knowledge and
competency of nurses involved in the project.
Specifically looking at the first section of the questionnaire which analyzes nurses' perceptions on topics such as how important it is to promote restful environments, promote sleep even when patients are not tired. These prompts contrasted the nurses' answers following education to identify and see if there was an increase in urgency to promote sleep due to related health risks. Post-education surveys aim to have a marked increase of 1-2 scaled point improvement across the board on all questions to show retained knowledge of sleep disturbance related health risks and non-pharmacological related interventions to prevent them.

Moving onto the second section of the questionnaire, to measure validity and measure outcomes of the educational program, the aim is to see an improvement of about 40% on quiz averages which indicates the retention of education for nurses. Measuring an increase in sustained knowledge and understanding by the nurses on the unit through education and posters allowed for the data to reflect validity in educational success by the author.

Analysis
The data collected from questionnaires and surveys in this quality improvement project focused more on quantitative analytical data. The individual responses on the nurses' questionnaires (both pre and post) were collected and grouped as data points to plot out the averages for the first section and the overall group average grade on the second section. Then once education was completed the same set of data points were recollected to identify if there was an increase in perceived importance and overall grade on the knowledge portion of the test.

These data points also attempted to identify if posters, verbal communication, and knowledge improvement correlate with an improvement in cognitive decision to implement a nightly schedule of incorporating and continuously monitoring sleep environments within the hospital unit.
Variation in data points is expected, but to rule out variation and outliers in the analysis of the data collection, certain criteria and methods such as retention of the participant nurses was required throughout this project's completion. A few nurses on the progressive care neurotrauma unit have prioritized sleep for their patients. These nurses may skew data points but should not be counted out of the data completely. These nurses verbalized that even though they-themselves feel like they have cognitively made the choice to self-educate on sleep hygiene for patients, they have no way to fully engage and remind the other nurses on the unit regarding these interventions. To understand the effect of education, there was further explanation of this perceived improvement in sleep promotion by this specific group of nurses in the discussion section of the final paper.

Finally, measuring variables such as time was a component of data analysis. Many current positions on the PCNT are held by traveling nurses. This demographic may facilitate the understanding of educational outreach. Conversations were held with travel nurses in efforts to understand if they felt the education was sufficient to allow them to help teach and promote quality sleep environments in their successive units and further discussed as well in the discussion section of the final paper.

**Cost Benefit Analysis of Education for Nurses**

There is little to no cost to the hospital, nursing staff or patients. The cost of printing out surveys and posters by the author was included in the cost benefit analysis when identifying an appropriate project to complete for this unit and population. Costs associated with this project were the cost of printing materials ($35 USD) and the time the project lead needs to educate and field questions and updates the professionals on the unit may have. Allotted education for nurses on the unit is about 5–10–minute sessions broken down into multiple days over the project. The
extension of time is not “allotted” in the breakdown but consisted of an hour to field any questions the nursing staff might have followed education during handoff and shift report from other nurses. A final educational session was held briefly during a monthly staff meeting and posted on the staff walls in the nurse's lounge and the nurses’ station.

The benefits associated with good sleep in the hospital are invaluable to patients' health and nurses' clinical knowledge and high financial burdens. According to the literature by (Grandner 2018), 36% of adults in the United States are regularly getting less than six hours of sleep a night. This is further exacerbated in the hospital inpatient setting. In these patient populations the cost of poor sleep can amount to an extra $3,400 to $5,200 per person (Grandner et al., 2018). While the financial aspect of poor sleep is substantial, the toll it takes on patients and their professionals are just as severe. Poor sleep is attributed to poor environments and sleep hygiene in the hospital setting and poor protocol adherences. By improving knowledge for nurses regarding sleep promoting environments, the risk to patients and the cost burden to the hospital as the patient is reduced.

**Ethical Considerations**
Ethical aspects to patients and nurses have been considered and pose no risk of harm to anyone who participated in the project. There was no financial gain for the nurses that decided to respond to tests and interact with the quality improvement project conducted. The project was reviewed by the Quality Review Committee of the University of New Hampshire Department of Nursing to verify it met standards and was exempt from full International Review Board (IRB) review.
Results

Initial Steps of Data Collection and Education

In the planning stages of the project's proposal, data was planned to be collected using paper surveys during a two-day timeline. Due to the activity and acuity of the specific unit the education was completed on; data such as room lighting, unit noise, blinds being open or closed, and patients' asleep was collected over 11 days. This allowed multiple nurses from different shifts to partake in the original data collection. Concurrently with the distribution of the pre and post education questionnaires, initial data was collected on the number of patients awake at midnight, the number of rooms with lights on, and the number of doors open with patients in the room. These data points were collected on several random nights over a week and a half for both the pre and post assessments to allow for randomization of patients and nursing staff. The data was analyzed to find biweekly averages of these (averages).

Quantitative Data Collection and Outcomes

Eight nurses met the criteria (full time nurses employed in the PCNT) and agreed to partake in the educational project. These nurses answered the initial pre-education questionnaire and quiz to collect baseline data before education. These eight nurses then partook in one-on-one education over 2 weeks to improve their knowledge of sleep promotion. Nurses then took the same questionnaire and reattempt the quiz not having known the correct answers to see if there was an increase in knowledge.

Following survey data collection, the initial Likert scale data, and answers to the knowledge section of the questionnaire were tallied and expressed in an excel sheet to allow for total running averages. Pre survey information (Pre-education Likert scale and quiz results- appendices b) while the post education questionnaire results are viewed in (Post-education Likert
scale and quiz results). To support the education data collected from the questionnaires, the data in figures 14 and 15 show the pre-education data for things such as rooms with lights off, patients awake, and doors closed against the data collected following education.

**Figure 1**
Pre-Education Raw Likert Scale and Quiz Results

<table>
<thead>
<tr>
<th>Pre-survey questions: Likert</th>
<th>Pre survey average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Providing dark environment importance</td>
<td>4 5 5 3 5 3 5 2 4</td>
</tr>
<tr>
<td>Encouraging sleep</td>
<td>5 3 4 4 5 3 5 4 4.125</td>
</tr>
<tr>
<td>Prioritizing patient sleep</td>
<td>3 3 5 5 5 4 5 4 4.25</td>
</tr>
<tr>
<td>Asking about sleep</td>
<td>5 4 4 4 5 2 5 3 4</td>
</tr>
<tr>
<td>Ask about bettering sleep</td>
<td>5 4 5 4 5 4 5 3 4.375</td>
</tr>
<tr>
<td>Confidence in providing EBP</td>
<td>4 5 3 4 5 3 5 3 4</td>
</tr>
<tr>
<td>Understanding what helps patients sleep</td>
<td>5 3 5 4 5 5 5 2 4.25</td>
</tr>
<tr>
<td>Reducing noise pollution</td>
<td>3 4 4 3 5 3 5 5 4</td>
</tr>
<tr>
<td>Teach back method importances</td>
<td>5 3 4 5 5 4 5 4 4.375</td>
</tr>
<tr>
<td>Asking about sleep Limitations</td>
<td>5 4 2 4 5 2 5 4 3.875</td>
</tr>
<tr>
<td>Confidence in ability to explain sleep importance</td>
<td>4 5 4 5 5 2 5 4 4.25</td>
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<table>
<thead>
<tr>
<th>Pre-survey questions: Knowledge questions</th>
<th>Pre survey average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delirium caused by lack of sleep</td>
<td>A C D D D D D C C</td>
</tr>
<tr>
<td>Americans not meeting guidelines</td>
<td>B C C C B B B B C</td>
</tr>
<tr>
<td>Most effective for promoting sleep</td>
<td>A C B C C B C A</td>
</tr>
<tr>
<td>Sleep cycle timeline</td>
<td>C B D B C A C C</td>
</tr>
<tr>
<td>Stages of sleep</td>
<td>A C A A C D B B</td>
</tr>
<tr>
<td>Highest population at risk for cognitive impairment</td>
<td>D D D D D D D D</td>
</tr>
<tr>
<td>Which are associated with impaired sleep</td>
<td>D D D D D D D D</td>
</tr>
<tr>
<td>Delirium caused by lack of sleep</td>
<td>42.8 57.1 71.4 57.1 85.7 42.8 57.1 42.8 57.1</td>
</tr>
</tbody>
</table>

**Figure 2**
Post-Education Raw Likert Scale and Quiz Results

<table>
<thead>
<tr>
<th>Post-survey questions: Likert</th>
<th>Post survey average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Providing dark environment importance</td>
<td>5 5 4 5 4 4 5 5 4.625</td>
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<tr>
<td>Encouraging sleep</td>
<td>4 5 3 5 5 3 4 4 4.125</td>
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<tr>
<td>Prioritizing patient sleep</td>
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</tr>
<tr>
<td>Asking about sleep</td>
<td>4 4 2 4 5 4 5 6 4</td>
</tr>
<tr>
<td>Ask about bettering sleep</td>
<td>4 3 3 4 5 5 4 4 4</td>
</tr>
<tr>
<td>Confidence in providing EBP</td>
<td>5 5 4 5 5 5 5 5 4.75</td>
</tr>
<tr>
<td>Understanding what helps patients sleep</td>
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</tr>
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<td>Reducing noise pollution</td>
<td>4 5 3 3 4 5 5 4 4.125</td>
</tr>
<tr>
<td>Teach back method importances</td>
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</tr>
<tr>
<td>Asking about sleep Limitations</td>
<td>4 3 3 4 5 5 4 4 4</td>
</tr>
<tr>
<td>Confidence in ability to explain sleep importance</td>
<td>5 5 5 5 5 5 5 5 5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Post-survey questions: Knowledge questions</th>
<th>Post survey average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delirium caused by lack of sleep</td>
<td>D D D D C B D C D</td>
</tr>
<tr>
<td>Americas not meeting guidelines</td>
<td>C C C C C D C C</td>
</tr>
<tr>
<td>Most effective for promoting sleep</td>
<td>B A C B B B D A</td>
</tr>
<tr>
<td>Sleep cycle timeline</td>
<td>C C C B B B C C</td>
</tr>
<tr>
<td>Stages of sleep</td>
<td>C B C C A C A C</td>
</tr>
<tr>
<td>Highest population at risk for cognitive impairment</td>
<td>D D D D D D D D</td>
</tr>
<tr>
<td>Which are associated with impaired sleep</td>
<td>D D D D D D D D</td>
</tr>
<tr>
<td>Delirium caused by lack of sleep</td>
<td>100 71.4 85.7 71.4 57.14 71.4 57.14 85.7 74.985</td>
</tr>
</tbody>
</table>
From the data in the tables, we can see trends which suggest education that was provided altered the nurses perceived importance of topics asked.

**Figure 3**

![Bar chart showing the increase in perceived importance from pre- to post-education](image)

The average perceived Likert score from this question had an increase from a pre-educational value of 4 to a post educational value of 4.625. This increased average value shows that education increased the nurses overall perceived importance of providing a dark room for patients when they sleep.

**Figure 4**
Between pre- and post-questions, the data showed no increase in nurses perceived importance following the educational project.

*Figure 5*
Pre-education average data from the Likert scale was 4.25. Following education, the average score was 4.5, showing a .25 increase from before education was provided on things such as risk factors, negative patient outcomes and other risks associated with limited sleep.

Figure 6

![Chart showing change in pre- and post-education average data from the Likert scale.](image)

There was no increase in average perceived importance for this question following education of nurses with both Likert averages being 4 on a 1 to 5 scale.

Figure 7
Communication was an important part of the education provided to the nurses engaging in the project. Following the educational project, the Likert average had decreased from 4.375 pre-education to a post-education average nurse perceived importance of 4. Communication between the project leader and nurses improved but showed a decrease in initiative to communicate with patients on this topic.

*Figure 8*
This average was tied for the highest reported improvement with a .75 increase from its pre-education average of 4 to a post-education average of 4.75. This large jump helps support the specific aim of this quality improvement project which looks to improve the knowledge and understanding of non-pharmacological sleep interventions for nurses.

Figure 9
The Likert score from the pre-education questionnaire was 4.25. Following the project's implementation, this score dropped to an average of 4. This did not support the project’s aim of increasing nurse’s rates of communicating to patients about what may help patients sleep better.

**Figure 10**

![Figure 10](image)

This prompt aimed to understand if education on health risks associated with decreased sleep due to noise would improve nurses attempts to keep the unit quiet during the night. The pre-education average score for this question was 4 which showed nurses prioritized quiet for their patients before education. Following the nurses' education, nurses' answers showed that reducing noise pollution in the unit increased in importance to them with a post-education average response of 4.125.

**Figure 11**
Nurses’ responses to this topic during pre-education averaged 4.375 on the Likert scale. Following the education for nurses, average Likert scores dropped .125 to an average of 4.25. This decrease in Likert scores is consistent with other findings of post-education reductions in communications between nurses and patients.

*Figure 12*
Contrary to other changes in Likert scores from nurses discussing communication with patients, following the education, nurses reported they were more likely to ask about limitations on rest. Prior to education, nurses reported an average Likert score of 3.875. Education of nurses elicited an increase in average score of .125 to a post-education average of 4.

*Figure 13*
Tied for the largest increase in Likert scores, self-reported confidence in sleep importance showed an increase of .75 following education. Prior to education nurses averaged 4.25 on Likert scores. While this was rated as higher importance in the pre-education questionnaires, following education there was a substantial increase in nurses' self-confidence with all nurses answering 5 (confident) about their ability to explain why sleep is important in this population.

Compared to the pre-education Likert scale, there were small but substantial improvements in the nurse's perceived importance for all the questions. One of the largest improvements in these questions was the nurse's perceived importance of providing a dark environment. This question was highlighted in many educational topics and showed improvements in the collected data from the unit, seen in figure c. Originally in the proposal of the project, it was hoped that there would be a 2-question average improvement overall in the testing section of the questionnaire. Results showed that there was a 1.5 question improvement (57.1% to 74.985%) which did not meet the proposed expected outcome but still carries significance.
Figure 14

**Pre and Post Education Unit Data Collected**

<table>
<thead>
<tr>
<th>Day</th>
<th>Number of Doors open</th>
<th>Number of patients awake</th>
<th>Number of rooms with blinds closed</th>
<th>Number of rooms with lights on</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre education Averages:</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6/5/2023</td>
<td>12</td>
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<td>3</td>
<td>2</td>
</tr>
<tr>
<td>6/6/2023</td>
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<td>7</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>6/7/2023</td>
<td>13</td>
<td>7</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>6/13/2023</td>
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<td>2</td>
<td>8</td>
</tr>
<tr>
<td>6/14/2023</td>
<td>11</td>
<td>6</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>6/15/2023</td>
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<td>1</td>
<td>4</td>
</tr>
<tr>
<td>6/16/2023</td>
<td>8</td>
<td>4</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Pre education Averages:</td>
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<td>5.57</td>
<td>2.4</td>
<td>4.14</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Day</th>
<th>Number of Doors open</th>
<th>Number of patients awake</th>
<th>Number of rooms with blinds closed</th>
<th>Number of rooms with lights on</th>
</tr>
</thead>
<tbody>
<tr>
<td>Post education Averages:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7/3/2023</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>7/4/2023</td>
<td>7</td>
<td>4</td>
<td>3</td>
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</tr>
<tr>
<td>7/5/2023</td>
<td>6</td>
<td>4</td>
<td>7</td>
<td>3</td>
</tr>
<tr>
<td>7/6/2023</td>
<td>5</td>
<td>2</td>
<td>10</td>
<td>3</td>
</tr>
<tr>
<td>7/7/2023</td>
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<td>1</td>
<td>9</td>
<td>2</td>
</tr>
<tr>
<td>7/8/2023</td>
<td>2</td>
<td>1</td>
<td>10</td>
<td>3</td>
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<td>7/9/2023</td>
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<td>2</td>
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<td>1</td>
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<tr>
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<td>7.857142857</td>
<td>2.714285714</td>
</tr>
</tbody>
</table>

Data points measuring education topics were collected before and after the educational project was completed. As shown in the tables above, there were significant improvements in all areas of care. There was an average decrease of 7 more doors closed following education when compared to the pre-educational data. There was also an average weekly decrease of 3 less patients awake on the unit (number of patients are capped on the unit which helps to reduce skewed data points.). Increases in the number of rooms with their blinds closed at midnight by 5.65 rooms in the post education helped support the success of this small non-pharmacological intervention. Finally, we can see there was a modest decrease in the number of rooms with lights on from a weekly average of 4.14 to 2.71.

Figure 15
**Pre-Education and Post-Education Unit Data Points**

![Bar Chart](Image)

**Process Measures**

While conducting education for the nurses on the unit, progress was measured using the teach back method. It was important to measure the progress of education in real time to understand if the information being presented was being received effectively. Using the teach-back method, the nurses signified that the basic education concepts were understood. In one instance, a nurse explained that verbal explanations of interventions were not sufficiently explaining the rationales behind why certain interventions were done. This prompted one-on-one specific teaching with more emphasis placed on receiving teach back from the nurses. This interaction elicited a new round of flyers and posters to be put up around the unit which were more in depth with their explanations and poster images. The new posters around the unit had explanations and scenarios under each intervention to give descriptive explanations on how and
why to perform each intervention. To support the educational topics which were signified in the questionnaires, the supplemental information and posters were titled in bolded print with titles such as “Nurse them to sleep” and “Keep sleeping”

Following the education for nurses, more patients were in rooms with doors closed or at least ajar (as supported by the data in appendices c), which reduced light and noise pollution in the rooms. Upon further inspection there also seemed to be fewer patients awake each night during the end of initial data collection. This was further supported following the collection of post-education data. Following education, there were higher incidences of lights being off in patients' rooms, closed doors, and more patients being asleep during nightly rounding. These post-education data also correlated with what was seen in the nurses' post-project questionnaires. Across the data collected there were increases in nurses perceiving the importance of sleep promotion and ability to facilitate improved sleep environments.

**Contextual Elements That Interacted with the Project**

During the project’s beginning phase, there were many elements not accounted for that interrupted the project’s flow. Things such as acuity level on the unit and absence of full-time nurses which left mostly travel nurses who were uninterested in completing the survey, played a part in altering the implementation of education. Prior to implementing the education on the unit for the nurses, there was buy-in from key stakeholders. Both the nurse director and the nurse supervisor were given copies of the questionnaires and copies of the topics that would be discussed and were asked their thoughts on the material.

The unit this project took place on was highly supported using traveling, floating, and per diem nurses. This made data collection and the number of participants in the project difficult to increase. Out of the 14 full-time night shift nurses and the 16 full-time day shift nurses, the
project collected data and educated 8 nurses from beginning to end, with 2 nurses dropping out due to issues with hospital contracts. The data from these 2 nurses were eliminated from the dataset as their inability to complete the post-educational questionnaire and quiz would skew data.

*Association Between Education and Outcomes*

Following education there was a shift in attitudes from the nurse population in the unit. More interest was expressed between nurses about sleep importance. There were increased discussions happening at the nurse's station which relate to patients' sleep and how to identify issues with patients' sleep. Although this was not planned in the proposal as a measured outcome, the interactions between different members of the healthcare team were considered when evolving education over the project's timeline. As education and explanation of the project happened at the nurse's station, medical residents became interested in it too. This further increased the number of interested parties and helped facilitate buy-in. Stakeholder support grew with interest from the nurses. There was a new curiosity instilled surrounding education and what it would bring for nurses and their patients.

*Unintended Consequences and Issues with the Project*

The project followed the outlined course of events close to what was outlined in the planning phases. Issues with the education format were the main problems encountered in this project. Patient acuity and nurse involvement were issues that did not correlate and follow the prescribed timeline of the project. Education that was originally aimed at group sessions during shift change was unable to be completed and had to be altered to fit the environment. This education was now completed in a one-on-one format during the shift. While this did not follow the planned format of education, this proved to work better in encouraging the nurses to have stakeholder buy-in to the project. This also seemed to help to facilitate direct education of the
interventions through demonstration. Thorough discussion with the project's stakeholders showed that identifying individuals who had taken the questionnaire and were actively participating in the project allowed for subsequent nurse-to-nurse teaching of interventional topics. This further helped to solidify nurses' understanding of education topics. The use of one-on-one education would facilitate the nurse to take the information and hopefully use it to teach and inform other nurses which would then make them a stakeholder themself. By turning the education from a group activity into a more intimate education, this would convey the nurse being educated to have personal involvement in the education of other nurses.

Along with interruptions in educational formatting, the timeline of the project was moved back one week. Post survey data would have been collected during the week of 6/25/2023; however, with the changes in education and the discrepancies in the nurses' schedules, post data collection was delayed to the following week (7/2/2023).

**Missing Data**
Initially, it was planned that nurses who were educated would also complete an exit interview in which they would explain their perceptions of education and changes in the unit. Due to multiple staff who partook in the education leaving for vacations, ending of travel contracts, and other unexpected departures from the unit, data was limited to the collected data points as well as pre- and post-assessments.

**Discussion**

**Summary**

**Key Findings**

The data collected from surveys and questionnaires illustrated that when new evidence of approaching care of patients puts nurses at the forefront of interventions, interest and education can be effective at improving adherence to protocols. Before the education was provided, there
were mixed interests in identifying, understanding, and promoting nonpharmacological sleep-in patients. Nurses put little time and effort into learning ways to promote sleep for patients on the unit as there was no substantial available information which presented them with the possible improvements in patients' sleep. Following education and the interventions, nurses' perception of sleep promotion changed to reflect an increased perceived importance of promoting and supporting patients sleep and rest throughout the night.

Before the interventions began, the unit regularly kept hall lights and the nurse's station lighting on. Patient doors were also kept open most of the time. These combined factors lead to excessive amounts of ambient light and noise that would radiate through patients' rooms throughout the night and disrupt the patient’s circadian rhythms. This resulted in patients remaining awake and being unable to fall asleep each night. Patients remaining awake lead to increased use of call bells, patient needs (such as questions on medication, needs for snacks and water, and toileting) and other interruptions throughout the night.

During the initial stages of data collection nurses in the unit were asked to complete a questionnaire to identify initial beliefs and gather baseline quantitative data which could identify what should be the focus of the education. Early in the project timeline, it was identified that there was no “sleep protocol” or any sort of sleep promoting materials’ for nurses to follow/reference in the hospitals database. This lack of protocols or information left an entire portion of patient care to be interpreted freely by nurses without guidance. The lack of knowledge about sleep protocols in general from the unit nurses and administration allowed for identification of project goals/objectives.

When distributing the pre-project surveys, each nurse was quick to answer questions on the Likert scale and take the short seven question quiz at the end which measured their
knowledge on topics. This short quiz served two purposes for this quality improvement project. Firstly, the initial purpose of obtaining baseline knowledge/data was to identify weak points for the project's education focus. These questions were put into the survey strategically to cover each key point and topic researched over the years relating to sleep and sleep-related illness in hospitalized patients. Secondly, nurses taking the pre assessment quiz quickly became interested in scoring highly. This innate interest in performing well on the quiz portion of the pre-assessment allowed for easy buy-in of the nurses which helped to facilitate a smooth institution of the educational part of the project.

Following each questionnaire and quiz, nurse-specific education was given. The nurse would be guided through the quiz and given the correct answers with supplemental information to help them identify why that was the correct answer. Often this elicited natural teach back from the nurses which further helped improve their knowledge. This method of self-education for the nurses also helped further instill education provided. Being able to teach the material back to the researcher, the ability to now teach and spread the education to other nurses each professional would work with increased. This teaching had even gone as far as conversations outside of the hospital. Text messages in nursing group chats were being sent to “remind nurses to close doors and reduce lighting in the unit to help promote patient sleep and recovery.”. This finding spoke to the true interest and attention that was obtained by the project.

**How Do These Key Findings Reflect the Project's Rationale?**

The use of a pre/post assessment to gauge nurses’ improvement on non-pharmacological sleep promoting topics allowed for comparison of multiple datasets. The use of a Likert scale on both assessments allows for analysis of each nurse's perceived importance value on multiple topics. These values can then be averaged to understand the overall average of the unit's
perceived importance of each value. Having two separate (pre and post) Likert averages also allow for understanding of improvement or regression in importance following education. Like the average scoring on the Likert scale, the pre/post quiz also allowed for data to be collected and compared on understanding of information related to sleep promotion activates, risk, and other metrics.

On the most basic level, this project was implemented to start conversations in the unit surrounding the importance of sleep for patients. The rationale of this project was to facilitate nursing interventions that could be implemented over time to create a desired outcome for patients. This outcome is one that does not require a multidisciplinary team or physicians orders. The use of focused education for nurses was done to promote direct contact of interventions for nurses engaged in the project. Nurses-specific education meets the rationale's needs and the guidelines for the proposed model. Data collection, analysis of the data, specific education, followed by repeat collection of data helped meet the PDSA cycle guidelines. Findings from the nurses' interactions and education helped identify what would need to change and be removed if there was a second or third cycle of this PDSA cycle.

*How This Project Meets the Specific Aim*

When creating the specific aim of this project, heavy emphasis was put to connect a specific and global aim. During the initial parts of preliminary survey collection, education was prioritized to meet the project's specific aim, which was to improve nurses' knowledge of non-pharmacological interventions to promote patient sleep. On sections of the pre-education quiz that showed high scoring, there was less education performed. Instead, more review and deeper dives into outcomes that could stem from these interventions were prioritized. While working on the other sections of the education (primarily surrounding risk factors and outcomes related to
sleep timing and sleep promotion in the form of reducing lighting and noise), the specific aim evolved to identify supportive measures that would help illicit an improved recollection of the interventions. As nurses were educated, many of them stated that they had heard of these things and knew that these interventions would help but often forget because of the lack of constant reminders. A new set of posters was created to help remind nurses to continue these practices while actively practicing.

**Strengths of the Quality Improvement Project**

As increased education and data were collected throughout the project, nurse interest increased. Discussions surrounding sleep and how to provide good sleep for the patients began. Nurses began asking each other to complete interventions such as turning off hall lights, turning off nursing station lighting and closing doors as they walked by them. These small but meaningful actions were slowly becoming increasingly normal as time went on. These even went as far as multiple charge nurses sending text reminders to the nurses in a group chat on their days off to remind them about the interventions and how they should be doing them.

Another strength of the project comes as a preliminary project. Being that there is currently no protocol or guidelines for the hospital or the company for that matter, regarding sleep interventions, moving forward there will be massive overhauls to institute protocols surrounding sleep. Using the information from this project as a foundation, the hospital will bring the data and the outcomes to the administration to help formulate and identify an appropriate plan of action in making sleep protocols. This helps to meet the specific and global aim of the project. Being able to collaborate with unit directors and managers to help bring this new evidenced-based practice to the bedside to improve rest, recovery, and all other forms of care is incredibly important.
These interventions taught, helped nurses increase patient satisfaction and recovery time, while also helping improve patient outcomes. Improving nurses understanding about sleep interventions they can implement by themselves will help improve care and reduce patient risk related to sleep disorders while in an acute care setting.

**Interpretation**

*Association Between Education and the Project Outcome*

The expected outcomes of this project aimed to improve the understanding and the perceived importance of promoting sleep in patients. Education for the nurses was adapted to fit the changing availability of the professionals in the unit as well as the match the needs of the nurses following the pre assessment. Education for individual nurses as they complete tasks aimed at assessing and intervening directly during the act. This ensured that there was not only verbal training performed, but also allowed a visual demonstration of what should be completed and asked of the patient. This included having nurses ask about sleep promoting activities and prioritizing reducing lighting and noise for patients while also supporting normal sleep routines for the patients. This bedside education was reflected in post project interviews and data collection which showed improved understanding and success of intervention implementation. During post-education interviews several nurses stated that the act of consistent bedside education as well as reminders from other nurses to complete sleep promoting activities through text messages in group chats elicited an improved adherence to the education.

Throughout the intervention, emphasis was placed on simple acts such as shutting off hallway lighting and excess lighting at the nurse's station. This simple intervention reduced light pollution throughout the hallways of the unit. Although doors were closed as per education, when patient doors were unable to be closed or simply were not, the reduced lighting in halls from subsequent interventions (shutting off hall lighting and reducing noise in halls) further
decreased lighting and stimulus entering open doors. Throughout the project, there was a substantial reduction in lighting throughout the unit, which the data showed. Even on days when full-time nurses that were educated were not present, the lights remained off due to posters and signage placed around the unit. This was consistent following education for the following weeks of data collection.

Along with the reduction in lighting throughout the unit, there were significantly more doors closed, patients asleep, and televisions off throughout the unit following the education. This mirrored the aim of the interventions that were determined and set out in the beginning of the project's proposal. Consistent reminders and actively engaging with the nurses on the unit throughout the project elicited desired outcomes of improvements in patients' sleep and reduction in stimulus in the unit.

**Comparisons Of Results from This Quality Improvement Project with Other Studies**

Of similar studies that have been conducted, this specific project compared well. In a study by Allenbaugh 2019, bedside handoff was conducted directly under the resident physician's supervision, researchers aimed to identify if the direct bedside handoff improved retention of patient history and interaction of the patient. Much like this specific quality improvement project focusing on sleep, nurse education, and interactions of those being educated; interventions were conducted primarily at the bedside. In both studies, this elicited a higher adherence to the prescribed interventions. Bedside education also allowed for an improvement in interactions of those being educated surrounding the interventions. Nurses were more likely to ask questions about why and how to perform interventions correctly when education was completed in the patient's room. This was also reflected by a 17.88% increase in post education performance on nurse quizzes. Much like the Allenbaugh study, professionals
being educated were also able to use kinesthetic learning by performing the interventions during the education, which helped to further improve muscle memory of these interventions.

When comparing sleep related studies, Rottweiler et al., conducted a study on non-pragmatic non-pharmaceutical interventions to promote sleep. Many of the interventions and topics discussed in the Rottweiler paper were also studied in this project. Of the interventions from both studies, the act of noise and light reduction to decrease delayed melatonin secretion and improve regulation of circulating melatonin levels were both extraordinarily successful. This was seen through the data presenting a decrease of 3.15 patients awake in the unit averaged out over the post education data collection week. These interventions, along with other interventions such as closing and opening blinds, were imperative to creating and promoting restfulness and recovery favoring sleep levels targeted in the studies.

In other studies, and projects like this quality improvement project, patients were researched and used as markers for success. Due to project constraints, outcomes and success rates were measured through scoring on pre and post assessments and Likert scaling of the nurses. As discussed in the proposal, future studies may be completed using the current PDSA cycle and outcomes to research the interventions and their successes from the patient's direct perspective. While this project did not include patient answers like other studies, the data collected from the nurses in the unit matched and helped to support similar educational projects that have been completed.

**Impact of the Project**

This project affected the patient population subsequently by targeting the nursing staff in a specific microsystem. This educational project, which targeted all nurses on the unit, allowed for education of all people interacting with the unit at night. Education is not limited to the
specific hospital and unit which it took place in. During their time in this specific unit, the interventions that were taught will continue to improve and increase the quality and quantity of sleep for these nurses' patients. These small educational interventions which can be performed by anyone in any setting can carry over into other areas of practice for those involved. Applying the topics that were taught in less critical settings can also transform the educational objective.

While in a critical setting such as the current unit, sleep promotion aims to help increase quality and quantity of sleep, reduce risk of hospital acquired delirium, and improve early recovery activity readiness; these can be changed in other settings. Some of the transitional outcomes in less acute settings may be reduction in sleep limitations to improve recovery, improve patient satisfaction with their stay at the hospital, and even reduce patients awake to decrease nursing care interruptions throughout the shift.

Several of the nurses in the specific unit are traveling nurses. This education passed on to the traveling nurses will allow them to bring these interventions into other practice settings. Educational topics were identified based off literature which did not require site-specific objects or specific materials. These general requirements allow for these interventions to be performed anywhere. Travel nurses who interacted and were part of the educations can step into the role of educator in their subsequent environments and help educate other nurses about the practices. This begins to support the global aim of improvement in general nurse perceived importance of sleep-in hospitalized patients.

The impact of this project also goes beyond the perimeters of the hospital. Education of nurses allows for education of patients. Currently about two-thirds (or 68%) of the American population fails to meet sleep guidelines set by governing healthcare bodies. By educating nurses who can instruct patients and their families on non-pharmacological interventions which can be
implemented, this may help slowly improve the general population's understanding and approach surrounding sleep. While this is not a direct intervention or change to a singular hospital or mesosystem, these educational points brought to nurses and families can help with overall patient health. Improvements of out-of-hospital health practices due to education in the hospital lead to general improvements in health across the population which may lead to a reduction in illness and disease in the general population. This cascade of education which is nurses-specific leads to a larger global aim impact.

**Differences Between Expected Outcomes and Actual Outcomes**

When planning education for nurses, the expected outcome was a dark, quiet, and calm environment for the patients and nurses. Although over time with consistent reinforcement of educational topics the unit slowly became darker and quieter, outliers in the outcomes were still present. When planning a project's outcome, it is hard to foresee the issues and the challenges that will appear. In the project's unit, patients often (due to their cognitive status) will present delirious and aggressive. This leads to screaming, consistent arguing regarding orientation, as well as other disturbances in the unit. During the final nights of data collection surrounding lighting, doors, blinds, and patients asleep on the unit following education and interventions; a single patient who was confused and disoriented spent much of the night screaming. This obviously posed a challenge for creating a restful and quiet unit for the rest of the patient population. However, even throughout the nights where disturbances were present, the rest of the unit remained quiet and dark due to interventions such as closing doors. Heavy emphasis was placed on closing doors to patients' rooms when appropriate for this reason. This allowed minimal ambient noise and light from hallways and other rooms. Closed doors and reduction of ambient hall and room lighting were the two most followed interventions as shown in the collected datasets. This correlated with an increased number of patients sleeping in the unit. As
less stimulus was present to keep patients awake and depress their melatonin secretion, patients were able to sleep through the night without awakening from other stimulus. By combining the multiple interventions, restful environments were created which helped to improve patients' ability to fall and stay asleep throughout the night despite outside disturbances.

**Project Costs**

As described in the project's proposal, the cost of this project was financially minimal. The project's creator did direct costs when printing out posters, pamphlets, and markers to write on boards. The project allowed for near zero cost to implement education and interventions. By using the hospital's materials and environment as the intervention materials, this allowed there to be no cost to the hospital environment.

Although the cost of this specific quality improvement project was zero for the meso and microsystem, there is a tradeoff that needs to be addressed. Education for nurses' costs nothing for the hospital when completed in this format. This form of education does not allow group dedicated interventions to be fully explained or additional materials provided to the patients to improve sleep. Future projects surrounding related topics can be expanded by integrating mandated times and educational seminars by the hospital to improve the focus of the nurses during education. This will come at a cost for the hospital through the costs of paying staff during the time of the educational seminar. While this will have an upfront cost to the hospital, it may also come with a reduction in cost to the patients as improved sleep and sleep promotion have been shown to decrease length of stay for certain populations of hospitalized patients. Improvements in sleep quality and recovery from increased sleep protocol adherence from seminars also may allow for improvements in both patient and hospital staff attitudes surrounding sleep and hospitalization.
Limitations

Limits to Generalizability

The basis of this quality improvement project was proposed so there is little need for special accommodations for the education and interventions. As discussed, the education for nurses centered around non-pharmacological interventions that can be performed in any unit. The outcomes of these interventions will change depending on the patient population cared for but are widely applicable. Education for nurses will be specific for the unit the interventions take place within. In some settings like intensive care units where patients must be closely monitored, some of these interventions must be changed. In settings where doors are glass and transparent for patient viewing, curtains should be closed to rooms if possible. This will mimic the action of closing an opaque door and help to reduce the amount of light allowed into the patient's room. In an environment with open patient rooms and bays, education can be altered to place more emphasis on the act of shutting off lighting at nurse's stations, in the halls, and other public areas.

Patient population also plays a part in creating the foundational education and intervention plan. In this project’s specific microsystem, the acute, cognitively impaired population made it slightly more difficult for complete darkness to be achieved. While rooms were dark and quiet, unlike a less acute unit, cameras and nurse sitters were used to watch over certain patients. This was due to confusion and risk for rapid decline of this specific patient census. The education laid out in this project can be specific to any setting depending on what is needed. The project's simple nature means it can be completed and reworked in any setting to keep either the common outcome of improved sleep for patients or a more specialized outcome such as reduction in cognitive impairment.

Outcomes that were seen in this specific project are semi-specific to the current project unit, however with similar educational topics and similar interventions being performed, this can
elicit comparable results. Shutting of doors, blinds, and lighting while educating on reducing ambient noise will translate into other units as it is not a site-specific outcome.

**Factors that Limited the Validity of the Project**

This project focused on education of nurses without any direct education or interventions on patients. There was no incentive to follow the interventions or partake in the project. While education was provided to specific nurses who partook in the project, the validity of the results may have been skewed due to translational education. During the nurse selection in the beginning of the project, many of the charge nurses volunteered to help with the project. This made it difficult to understand if some data collected on the unit was directly due to the nurse being educated or if it was another nurse following the charge nurses’ actions. Three of the nurses in the project were charge nurses. This meant that any given night, the nurse in charge of the unit would also tell other nurses to close lights, blinds, and reduce noise on the unit. While this is good for the outcome of the project, this makes it slightly difficult when finding the extent of the individual nurse's actions.

Another factor that may have affected the outcomes of this project was a certain nurse's interest in the study. One of the nurses who was partaking in the study had wanted to trial a project like this for the unit. This charge nurse spent extra time and effort making sure all interventions were followed and integrated to all nurses on the unit's practice. This may have affected the outcomes of nurse education retention and intervention. Although this is a positive for this project's outcomes, this makes the data more favorable than the same project being conducted in another unit without the help of a highly interested highly influential nurse participant.
Unfortunately, due to time constraints and preservation of quality for this project, a single moderm of the sleep protocols was isolated to specifically isolate an intervention and be able to complete the intervention to the best of its ability. A larger multi-stage quality improvement project would be optimal. Time constraints also does not allow for creation and validation of a unique survey that targets the sleep protocol education on the progressive care neurotrauma unit, however the use of the questionnaire from a Allenbaugh paper with minor focused education changes allows for a validated tool to be used for this project.

Conclusions

*Usefulness of the Work*

Through completion of this quality improvement project, the knowledge of the nursing community surrounding alternative methods of sleep promotion by nurses is expanded. This project gives support to future projects of similar nature by way of nurse education. This project necessitated little supportive funding and effort from the nurses involved. Although the project focuses primarily on education for the nurses it aimed to involve, patients benefited from the nurse education. Quality improvement projects can often solve multiple problems for diverse groups by focusing on one single group’s action. In this project, the patient’s sleep improvement is a byproduct of focusing on the nurse's knowledge and improving sleep promotion knowledge through education. This project also comprised multiple recent studies and meta-analysis's and created a format in which future educational projects can be based around. This project also may function as a foundational PDSA cycle for future projects. Changing the project's focus, such as education for nurses in outpatient, hospice, or lower acuity settings, may allow for comparison in data outcomes. A change such as educational unit change may also allow for future projects to understand the differences in education focuses needed and set the foundation for what is important to teach nurses depending on the unit's census, acuity, and materials available.
Sustainability of the Project

This project has large room for growth in this specific mesosystem and in the general healthcare systems. The continual growth of knowledge surrounding non-pharmacological sleep interventions will continue to contribute to the possible education that can be provided to nurses. In settings where there is more funding available as well as more time allotted for project undertaking, a project of this format or based on this format can be easily recreated and expanded on. In this specific unit and concurrent units which use this project as a foundation for their own education; the data and education can continue through reoccurring PDSA cycles. The data from this project can be used in the planning stages of a new project which lends to its sustainability moving forward in many settings.

Potential to Spread to Other Contextual Situations

As discussed, the proposal of this project was kept simple to remain applicable to many different situations and settings. The need for limited resources and funding makes this project extremely applicable. In this specific project setting, several of the nurses in the unit were traveling nurses. Education was kept simple to allow for application in other settings no matter the census, acuity, resources, and time allowance. This project can also expand to other forms of care. Simple projects such as education for nurses are not limited to sleep interventions. Any topic of intervention may be completed in this format and following the outlined PDSA cycle in this project. Replacing the focus of education on sleep to something such as admission time, actions for discharge, transport effectiveness, etc., can all elicit similar paths as this project. These other projects can be focused on nurse education with improvement in patients experience or outcome as a byproduct of focusing on nurse education.
**Implications for Practice**

Sleep importance for patients is increasingly more popular in today's healthcare. Promotion of quality sleep is a growing field of study which the patient and those who care for them all play a part in. Patient education is a large factor when approaching sleep promotion. Physicians, nurses, and other medical professionals are the frontlines when it comes to patient health promotion education. This means that the need for well-educated healthcare professionals and well-established ways of practice need to be continuously studied and improved. With the current American adult population reporting poor sleep at a rate of 68%, improvements in protocols and sleep intervention promotion are key factors in improving these national statistics. Individuals in a hospital setting are not limited to being patients. Poor sleep is and should be treated as a chronic illness as it leads to various health issues. The need for continued interventions and education for both patients and those who care for them (nurses, physicians, therapists, etc.) should continue to grow in importance.

**Suggested Next Steps**

As this project and its data collection end, continuation of intervention education and sleep promotion should continue to be studies. Collection of baseline data much like the collection process of this project should be completed in all healthcare settings. This baseline data and knowledge assessment of sleep promotion and perceived importance by healthcare professionals will allow for understanding of educational needs. As humans spend 33% of their entire life asleep, and increased time asleep needed during times of recovery, all healthcare settings should complete a sleep study such as this project to understand the gaps in care. These gaps in care related to sleep and sleep-promoting activities can improve patient experiences and outcomes, which also helps support nurses and other professionals that care for them. This format should be used to understand other aspects of patient care which could be improved.
Using healthcare professional education can not only support patients' outcomes but also help improve nurse knowledge and understanding of important patient health promotional topics.
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Appendix A

Dear nursing staff,

I am a nursing student at the University of New Hampshire, and I am working on a quality improvement (QI) project to learn about **Non-Pharmacological interventions effects on patient sleep**. By participating in this survey, you are participating in this QI project. This information sheet describes the project and helps you to decide if you want to participate. It provides important information about what you will be asked to do in the project, about the risks and benefits of participating in the project, and about your options as a participant. You should:

- Read the information in this document carefully, and ask me or my faculty advisor any questions, particularly if you do not understand something.
- Not agree to participate until all your questions have been answered, or until you are sure that you want to.
- Understand that your participation in this project involves your completing a survey that will take about **5 to 8** minutes.
- Understand that the potential risks of participating in this project are minimal.

You must be at least 18 years old to participate in this project, and you must be a **Nurse** at the **Progressive care Neuro trauma unit**.

If you agree to participate in this project after reading this document, you will be asked to participate in a survey that will take approximately 15 minutes. You will not be paid to participate in this project.

You should complete this survey only once. I may exclude your data if I determine that you did not meet the eligibility criteria for the project. For questions about eligibility, please contact me (information provided at the end of the form).

As a participant in this project, you may benefit from any changes made in the program or process being reviewed. Further, the information may help guide **HCA** to potentially improve **Patient sleep protocols**.

Taking part in this project is completely voluntary. You may choose not to take part at all. If you agree to participate, you may refuse to answer any question. If you change your mind, you may stop participating at any time. Any data collected as part of your participation will remain part of the project records. If you decide not to participate or if you stop participating at any time, you will not be penalized.

I plan to maintain the confidentiality of all data and records associated with your participation in this project. Due to the low number of respondents, I do not ask for individually identifiable information in this survey in order to protect your identity. Responses are anonymous. As a
reminder, any communication via the internet poses minimal risk of a breach of confidentiality.

To help protect the confidentiality of your information, I will store data on the USNH IT secure cloud storage. Only I and my faculty advisor, __Elizabeth Evans____, will have access to the data. Data, even de-identified, will not be used for future projects. I will report the de-identified data in an educational paper that will be available via the UNH Scholar’s Repository. I may share the aggregate results with the organization. The results may be used in reports, presentations, and publications for educational purposes only.

If you have any questions about this project or would like more information before, during, or after the project, you may contact me at ____ (914)-610-9487 _____. If you have questions about your role as a participant, you may contact Dr. Pamela Kallmerten at UNH to discuss them (pamela.kallmerten@unh.edu).

Thank you for your consideration.

Sincerely,

David C. Barry
UNH Nursing Student

Dcb1020@wildcats.unh.edu
Email contact
Objective: Improve Sleep promotion interventions in the inpatient setting

Attitudes, comfort level and confidence

Questions 1-6 ask about your general attitudes and opinions about ability to implement sleep promoting environments. Please circle the number according to the scale provided.

1. How important for patient care is it for you as a nurse to provide a dark environment for your patients sleep? (1= not important and 5= very important)

   1. 2 3 4 5

2. How important for patient satisfaction is it for you as a nurse to encourage patients to sleep even when they are not tired? (1= not important and 5= very important)

   1. 2 3 4 5

3. How important is it for patient care is it to prioritize sleep in patients on your assignment? (1= not important and 5= very important)

   1 2 3 4 5

4. How important is it to ask patients “How are you sleeping at night?” (1= not important and 5= very important)

   1 2 3 4 5

5. How important is it for nurses to ask the patient what they can do to provide them with better sleep? (1= not important and 5= very important)

   1. 2 3 4 5
6. How confident are you in your ability to effectively provide a restful and evidence based sleep environment for your patient? (1= not at all confident and 5= very confident)?

1 2 3 4 5

7. How important for patient care is it for you as a nurse to understand what helps your patient sleep? (1= not important and 5= very important)

1 2 3 4 5

8. How important for patient satisfaction is it for you as a nurse to reduce noise pollution on your unit? (1= not important and 5= very important)

1 2 3 4 5

9. How important is it to use the teach-back method when understanding new information? (1= not important and 5= very important)

1 2 3 4 5

10. How important is it to ask patients "What is limiting your ability to rest?" (1= not important and 5= very important)

1 2 3 4

11. How confident are you in your ability to explain why sleep is important for hospitalized patients? (1= not at all confident and 5= very confident)?

1 2 3 4 5
6. Which population is at the highest risk for cognitive impairment?
   a. Younger populations
   b. Middle age adults
   c. Infants
   d. Older adults

7. Which of the following are also associated with impaired sleep?
   a. Increased stroke risk
   b. Cognitive impairment
   c. Obesity
   d. All of the above
Appendix B

**KEEP SLEEPING**

**KEEP IT DARK**
Reducing excess light and ambient lighting helps improve natural regulation and production of melatonin.

**KEEP IT QUIET**
Excess noise and noise pollution from halls and outside rooms can also reduce natural production of sleep promoting hormones.

**KEEP IT CONSISTENT**
Facilitating a consistent schedule with your patient helps regulate the body and its sleep cycle.

**KEEP IT ADJUSTED**
Opening and closing blinds in the patient’s room allows for vitamin D absorption. This change is vitamin D helps regulate sleep wake cycles.

**SLEEP AND YOUR PATIENT**
2 out of every 5 diagnoses of hospital acquired dementia are linked to poor sleep. Use of the actions above have been proven to reduce this risk drastically.