Promoting Inpatient Sleep Quality Through the Distribution of a Sleep-Kit Upon Admission: A Quality Improvement Initiative

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Promoting Inpatient Sleep Quality Through the Distribution of a Sleep-Kit Upon Admission: A Quality Improvement Initiative

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# Table of Contents

Abstract ........................................................................................................................................... 3  
Introduction ..................................................................................................................................... 4  
  Problem Description ..................................................................................................................... 4  
  Available Knowledge .................................................................................................................. 4  
  Rationale ....................................................................................................................................... 7  
  Specific Aim ................................................................................................................................... 9  
Methods .......................................................................................................................................... 9  
  Context ......................................................................................................................................... 9  
  Intervention ................................................................................................................................. 11  
  Study of the Intervention ............................................................................................................. 12  
  Measures ....................................................................................................................................... 12  
  Analysis ....................................................................................................................................... 13  
  Ethical Considerations ................................................................................................................ 13  
Results ........................................................................................................................................... 14  
  Results .......................................................................................................................................... 14  
Discussion ....................................................................................................................................... 19  
  Summary ....................................................................................................................................... 19  
  Interpretation ............................................................................................................................... 20  
  Limitations .................................................................................................................................... 21  
  Conclusion ..................................................................................................................................... 21  
References ....................................................................................................................................... 23  
Appendix A ....................................................................................................................................... 25  
Appendix B ....................................................................................................................................... 26
Abstract

**Background:** Hospitals are expected to provide a quiet and calm environment for the promotion of rest, healing, and well-being for their patients. Excess hospital noise levels and disturbances severely interfere with patient sleep and overall patient satisfaction.

**Local Problem:** Patients have discussed inability to sleep, need for sleeping medications, and lack of appetite due to hindered sleep following admission. An increase in patient withdrawal and decrease in level of participation in the plan of care has recently been observed.

**Method:** This project followed the Plan-Do-Study-Act (PDSA) framework to facilitate a rapid intervention implementation and change cycle. In addition, the Richards Campbell Sleep Questionnaire was used to assess perceived sleep depth, sleep latency, awakenings, return to sleep, and sleep quality pre- and post-intervention. The mean score of the five items was calculated to represent the total score, the measure for patient reported sleep quality. A sixth item regarding perceived nighttime noise was utilized as a reference to identify noise disturbances but was not included in the final sleep scores.

**Intervention:** The intervention includes the pre- and post-intervention questionnaire, a sleep-kit containing a sleep mask, ear plugs, and earbuds, as well as education provided to participating patients and an educational poster designed for nursing staff to promote sleep-kit awareness.

**Result:** The distribution of a sleep-kit upon patient admission improved patient reported sleep quality by 35.94% from baseline by the end of the implementation period. Additionally, the difference between pre-intervention and post-intervention RCSQ responses regarding the noise item revealed a 41.4% improvement from baseline.

**Conclusion:** The improvement in patient reported sleep quality may be attributed to the project intervention. Recommendations for future intervention include analysis of individual sleep-kit contents use and measure of patient satisfaction related to the intervention.

**Keywords:** patient sleep quality, sleep-kit, sleep intervention, quality improvement
Introduction

Problem Description

Ideally, hospitals are expected to provide a quiet and calm environment to promote rest, healing, and well-being for their patients. However, in reality, hospitals experience excess environmental noise levels throughout the day and night that severely interfere with patient sleep and overall patient satisfaction (Garside et al., 2018). Within this microsystem, many patients have discussed the inability to sleep, the need for as needed sleeping medications, and lack of patient appetite. In addition, an increase in patient withdrawal from previous levels of participation in the plan of care has recently been observed. According to the Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS), a survey conducted by the Centers for Medicare & Medicaid Services, only 52% of admitted patients within this macrosystem reported the area around their room was “Always” quiet at night (Hospital Compare, 2022). When compared to the national average of 63% and a New Hampshire average of 56%, this macrosystem’s score reflects a potential for poor sleep quality within this microsystem as well.

Available Knowledge

Research in regard to noise in patient environments invariably recognize a correlation between patient reported sleep quality and patient satisfaction. Sleep is essential for proper physiological functioning and overall health maintenance. In hospitalized patients, poor sleep quality is often associated with excess noise and extrinsic factors such as staff interruption and environmental stimuli (Miller et al., 2019). As a result, patients endure increased medical complications, longer lengths of stay, attenuated healing, decline in cognitive ability, and generally worsened outcomes. Despite the consequences of patients reporting poor sleep quality, healthcare professionals frequently fail to acknowledge sleep disturbances and are generally
unaware of the best practices for sleep improvement (Morse & Bender, 2019). The purpose of this review is to determine the effectiveness of non-pharmacological sleep interventions utilized by inpatient units of similar characteristics and patient populations in order to improve patient reported sleep quality and patient satisfaction.

The circadian rhythm is a natural internal process that regulates the sleep-wake cycle. To feel rested, adults are required to receive, on average, at least seven to eight hours of sleep within a 24-hour timespan. Once asleep, the body cycles through four different stages of rapid eye movement (REM) and non-rapid eye movement (NREM) sleep. Slow-wave sleep, the third stage of NREM sleep, is considered to be the most restorative sleep stage. During this time, the circadian rhythm controls the release of hormones essential to normal body functioning such as adrenocorticotropic hormone (ACTH), melatonin, and norepinephrine (Patel et al., 2021). Given the importance of uninterrupted sleep, The American Board of Internal Medicine (ABIM) published Choosing Wisely, a high-value care list that emphasizes the importance of sleep and sleep hygiene (Baron, 2021). Given its high priority and the frequent, hazardous effects caused by the use of pharmacological interventions, Herscher et al. (2021) discusses a non-pharmacological approach to promote sleep and improve sleep hygiene practices.

In the past, very few studies have evaluated interventions that target the previously stated HCAHPS rating: Patients who reported that the area around their room was “Always” quiet at night. In efforts to improve sleep quality and sleep hygiene among hospitalized patients, The Sleep Hygiene in the Hospital (SHH) intervention project was developed by a High Value Care Committee at an urban, tertiary care hospital (Herscher et al., 2010). This project was measured using the Richards Campbell Sleep Questionnaire (RCSQ) and includes environmental changes as well as a non-pharmacological sleep protocol. The SHH project was implemented on a 34-bed
medical unit with the exclusion of patients who were non-English speaking, confused, or unable to communicate as determined by staff. The sleep protocol included a sleep-kit containing an eye mask, earplugs, lavender scent pad, and noncaffeinated tea bags, and upon distribution patients were asked a series of questions regarding their environment. Herscher et al. found a statistically significant increase in three of the five RCSQ scores and an HCAHPS measure increase from pre-intervention to post-intervention (Herscher et al., 2021).

In a systemic review of non-pharmacological sleep interventions conducted by Miller et al. (2019), an association between poor sleep and both short- and long-term adverse consequences in hospitalized patients was identified. Additionally, fragmented sleep for inpatient populations is linked with poorer health satisfaction, increased risk for chronic conditions, and greater disability at the time of discharge (Miller et al., 2019). In terms of non-pharmacological interventions to improve sleep within an inpatient setting, Miller et al. (2019) stated there would likely be a wide range of positive outcomes depending on the course of intervention. Among the 43 studies that were analyzed, 14 different non-pharmacological interventions were examined. Six of these studies focused on sleep environment modifications for medical inpatients through the use of quiet time initiatives, dimmed lights, and closed doors at night in order to limit excess noise. Due to the ease of ability to adopt environmental modifications into practice, other non-pharmacological, patient-centered modifications such as eye masks, earplugs, and earbuds for audio distraction are likely to be the most beneficial when combined. Other interventions that were discussed included white noise machines, aromatherapy, relaxation techniques, massage, and guided imagery, however, these interventions require an added cost and specialized effort (Miller et al., 2019).
In a similar systemic review, Bellon et al. (2021) analyzed the results from seventeen randomized controlled trials to determine the efficacy of nursing interventions on sleep quality in hospitalized patients. This review focuses specifically on environmental, physical, and behavioral interventions that can be promoted by nursing staff such as aromatherapy, acupressure, music, use of eye masks and earplugs, as well as educational programs (Bellon et al., 2021). In addition, sleep quality tools such as the RCSQ were used as the primary measuring source for the retrieval of pre-intervention and post-intervention scores. Resulting evidence regarding interventions that can be performed by nurses to improve reported sleep quality was found to be positive. Although higher quality research with both subjective and objective measures would further solidify evidence, there were no negative implications to the previously stated non-pharmacological interventions (Bellon et al., 2021).

It is evident that the implementation of non-pharmacological sleep interventions is feasible in an inpatient hospital setting by nurses and healthcare professionals. In order to limit excess noise as well as improve patient reported sleep quality and patient satisfaction, a thorough understating of the various factors that have an influence on these issues should be identified. While the implementation of a complete sleep protocol was outside of the scope of this quality improvement (QI) project, there are several interventions discussed in this review that may be applicable to this project’s microsystem such as a sleep-kit or environmental modifications.

**Rationale**

The framework that was used to guide this QI project was the Plan-Do-Study-Act (PDSA) cycle (Deming, 2022). Among the many QI frameworks, the PDSA cycle focuses on the essence of change and promptly leads clinicians through a structured experimental approach to test an intervention. For the purpose of this QI project, the PDSA cycle was appealing as it
provided prompt resolution regarding the success of the intervention and would recognize ongoing opportunities for improvement to further support the intervention’s effect on this microsystem (Reed & Card, 2016).

Plan

During the planning phase, a 5P assessment was conducted on this microsystem’s purpose, patients, professionals, processes, and patterns. The observations collected from this assessment guided the remainder of this PDSA cycle and objectives of this entire QI project (Wilcox & Deerhake, 2020).

Do

Within the do phase of the PDSA cycle, the intervention selected for this QI project was implemented and tested on a small scale. Throughout the implementation of the intervention, problems and unexpected observations were noted and a beginning analysis of the collected data was initiated (Science of Improvement, 2022).

Study

Within the study phase, an in depth and complete analysis of the collected data was conducted and further studied. This data was compared to previously stated expectations, summarized, and thoroughly reflected on (Science of Improvement, 2022).

Act

The final phase, known as the act phase, granted the opportunity for the intervention to be refined on the basis of observations made during the implementation phase. This QI project was refined by reestablishing the desired results and determining specific intervention modifications to foster those results. Following this phase, the PDSA cycle can begin once again (Science of Improvement, 2022).
Specific Aim

The global aim for this QI project was to improve patient reported sleep quality upon admission by distributing a sleep-kit and reinforcing awareness from nursing staff regarding patient sleep quality and sleep promotion.

The specific aim for this QI project was to observe a 35% increase from baseline in patient reported sleep quality within this microsystem by June 30, 2022. By improving patient reported sleep quality, it was expected that there will be an influence on this microsystem’s patient satisfaction scores as well.

Methods

Context

As previously noted, a 5P assessment was conducted on this microsystem. To better understand the microsystem’s current state and for the purpose of this QI project, relevant information regarding purpose, patients, professionals, and processes, have been identified.

Purpose

This microsystem is a 47-bed mixed medical/surgical telemetry unit consisting of three private rooms, 22 semi-private rooms, and a nurses’ station equipped with a central monitoring system for access to continuous or intermittent cardiac monitoring. The purpose of this microsystem is to provide the highest standards of quality and excellence in care to their diverse patient population.

Patients

The age distribution for this microsystem varies from 18 years and older, but typically averages around 65 years old. Patients admitted to this microsystem are often too critical to remain on a medical, surgical, or orthopedic unit, but are stable enough to be transferred from the
intensive care unit (ICU). These patients require treatment for various diagnoses such as heart failure, cardiac arrhythmia, myocardial infarction (MI), stroke, chronic obstructive pulmonary disease (COPD), sepsis, and/or drug or substance withdrawal. Common procedures include cardiac catheterization, synchronized cardioversion, pacemaker insertion, automatic implantable cardioverter-defibrillator (AICD) implantation or revision, and ablation. The current average length of stay (ALOS) for patients admitted to this microsystem is 3.82, yet a LOS can range from less than 24 hours to more than ten days.

Professionals

Within this microsystem, members of the interdisciplinary team include hospitalists, a cardiology team composed of physicians, physician’s assistants (PAs), nurse practitioners (NPs), and other specialty teams such as nephrology, surgery, and palliative care. On average, 13-15 staff registered nurses (RNs) and 3-4 licensed nursing assistants (LNAs) provide patient care each shift. Ancillary and support staff for this microsystem also consist of the unit manager, clinical nurse leader (CNL), a telemetry technician, pharmacy, lab, imaging, dietary, physical, occupational, and speech therapy, spiritual care, case managers, social workers, environmental services, and transport services.

Processes

Upon admission to this microsystem, the patient will receive a welcome packet consisting of information regarding the macrosystem and microsystem, cafeteria menu, and list of television channels, as well as a hospital gown, non-slip socks, and oral hygiene items. Depending on supply, patients can be given supplementary self-care supplies such as tissues, hair comb, earbuds, chap stick, etc., however, this is by request only. Without knowledge of these supplies, patients often endure a less than ideal experience despite the presence of accessible solutions.
Cost Benefit Analysis

The costs for this QI project include materials to create pre-intervention and post-intervention questionnaires, poster, supplies to create sleep promotion kits, also known as a sleep-kit, and time of the project team: patients, care staff, the unit manager, CNL and this project lead. The cost for pre-intervention and post-intervention questionnaires and poster was determined to be around $10, and a total of at least 500 hours spent. The total cost of supplies is unknown. In terms of the benefit without factoring cost of supplies, this QI project was relatively inexpensive, but required around 300 hours of planning and 200 hours of project implementation.

Intervention

This QI project intervention was comprised of a sleep-kit, and educational component, and a poster. The team involved in this project included patients, care staff, the CNL for guidance and support, the unit manager for project approval, as well as this project lead.

Sleep-Kit

Upon admission to this microsystem, patients were offered a sleep-kit containing resources to promote sleep as well as limit noise and light disturbances. Included in this sleep-kit was a sleep mask, ear plugs, earbuds, and a lavender scent pad, which are regularly stocked within the microsystem’s clean utility room. Each sleep-kit was pre-assembled and placed in a clear bag for easy distribution.

Education

Education regarding the purpose and contents of the sleep-kit was first provided to the microsystem’s RNs and LNAs. Additionally, staff received reinforcement on the topic of this QI project and which patients are qualified to receive a sleep-kit. This ensured that the staff
distributing the sleep-kit was familiar with the process and could answer patient questions. Reinforcement of environmental modifications to promote patient sleep quality such as closing shades and doors when applicable, dimming lights, and reducing sources of excess noise was provided to staff as well.

**Poster**

A poster regarding environmental modifications to promote sleep and reminders to distribute the sleep-kit to patients were posted within the three nurses’ stations and near patient rooms as a reference and reminder of their importance.

**Study of the Intervention**

The goal of this intervention was to improve patient reported sleep quality. Since patient sleep quality is relatively subjective, verbal and physical signs of improvement following an intervention did not provide enough evidence to denote the effectiveness of that intervention. In order to better assess the impact of this intervention, data was collected and measured during pre-intervention and post-intervention phases by a convenience sample of patients via the RCSQ.

**Measures**

The RCSQ was developed by Richard Campbell in 2000 for the assessment of sleep quality in critical care units (Amirifar et al, 2018). Due to its success, the RCSQ has subsequently been adapted into other inpatient health care settings. This questionnaire is a five-item, self-reporting questionnaire that is used to assess perceived sleep depth, sleep latency (time to fall asleep), awakenings, return to sleep, and sleep quality. In addition to these five items, there is a sixth item regarding perceived nighttime noise that is not to be included in the total score but rather utilized as a reference to identify noise disturbances (see Appendix A). Each item in the RCSQ is scored on a visual analog scale which ranges from 100mm to 0mm, with the
higher number representing better sleep and the lower number representing poorer sleep. Once a questionnaire is complete, the mean score of the five items is calculated to represent the total score and overall perception of patient sleep (Pneumol, 2020).

The RCSQ was chosen due to its relevancy to this QI project and the supporting evidence following a psychometric evaluation. According to Amirifar (2018), sleep is defined as an indispensable need for the recovery of hospitalized patients. In terms of reliability, this questionnaire was measured using inter-rater reliability and Pearson correlation coefficient ($r = 0.714, P < 0.0001$) and an internal consistency through Cronbach alpha $r = 0.906$ or 96%, and $r = 0.714$ or 71% ($P < 0.0001$). In addition, the face and content validity of the RCSQ was qualitatively at a desired level and as a result the RCSQ is expected to contribute to the success of this QI project (Amirifar et al, 2018). The RCSQ was distributed to patients for the purpose of pre-intervention and post-intervention data analysis.

**Analysis**

To analyze collected data, a descriptive statistical analysis was conducted in order to describe and summarize the results of the RCSQ and patient demographic data which included gender, age, and diagnosis. Based on the nature of the RCSQ, data is considered continuous and resulted in a mean, standard deviation, and range that was then used for further reference and analyzation. The benefits of continuous data included the possibility for mathematical manipulation during a descriptive statistical analysis, such as finding sums and differences, as well as the infinite number of values it can assume at any given time (Larson, 2006).

**Ethical Considerations**

The ethical considerations of this project were extensively considered. Although this project involved patient contact, informed consent was received prior to the completion of each
questionnaire and patient information remained confidential by means of the Health Insurance Portability and Accountability Act (HIPAA). The aggregate data does not include any patient identifiers and remained an anonymous, deidentified data set that was stored on a password protected personal laptop throughout the completion of this project. Permission and rights of use have been granted by the original author of the RCSQ. As a recently hired RN to this microsystem, perceived conflict of interest as an employee has been acknowledged. During this QI project implementation, identification as a student rather than an RN as the project lead role has been established. This project was reviewed to determine it meets the criteria for QI by the University of New Hampshire Department of Nursing Quality Committee.

Results

Initial Steps and Evolution Over Time

The initial components of this intervention included the distribution of a sleep-kit, an educational component, and a poster. Due to the time constraint of this QI project, aspects of the original intervention workflow plan were modified to better facilitate the implementation process.

Figure 1

Workflow of Proposed and Actual Intervention Phases
The sleep-kit was originally intended to include a sleep mask, earplugs, earbuds, and a lavender scent pad. After further consideration, the lavender scent pad was excluded from this project in order to prevent the occurrence of an unknown patient sensitivity or allergy to lavender. The sleep-kit was also intended to be distributed to patients by the microsystem’s RNs and LNAs, which lead to the educational component of this intervention. Instead, this project lead distributed the sleep-kits, provided instruction, and conducted both pre-intervention and post-intervention questionnaires, eliminating a large part of the nursing staff educational component. Sequentially, improving nurse awareness on the topic of sleep quality and sleep promotion through education on environmental modifications, was no longer address.

Furthermore, the poster that was implemented within the microsystem exclusively displayed the educational content and purpose of the sleep-kit, the dates and plan for the intervention implementation by the project lead, as well as encouragement for staff to get involved by reminding their patient to use their sleep-kit. This was a significant alteration from the initial poster proposal that displayed information on the sleep-kit as well as sleep promoting environmental modifications. Finally, rather than displaying the poster within the microsystem, it was uploaded to the microsystem’s Facebook group for the greatest exposure to this intervention.

To help staff identify patients that agreed to participate in this sleep-kit intervention, the image of a sleep mask icon was displayed on their care board and an example of that image,
without any patient information, was uploaded to the unit’s Facebook group as well. The evolution of this QI project resulted in more concise steps that made use of valuable time and ensured data collection would be consistent with the specific aim of this QI project.

**Process Measures**

For this QI project, the RCSQ sleep scores were used to measure the process and specific aim. Further analysis of the five individual RCSQ questions were essential to the interpretation of the sleep score results.

**Figure 2**

*RCSQ Patient Sleep Score*

![RCSQ Patient Sleep Score](image)

*Note.* Comparing individual patient RCSQ sleep scores pre- and post-intervention.

**Contextual Elements**

The contextual elements of this intervention were centered around the patient population within this microsystem. Considering the pre-intervention questionnaires were to be distributed throughout various days of the week, it was important to establish the criteria and determine patient eligibility. Since the RCSQ is structured around last night’s sleep, it was determined the patients admitted to the microsystem the day prior, before 10 p.m. (2200 military time), were
eligible to the take the questionnaire and receive the intervention. In total, there were 26 patients of various demographics who completed the pre-intervention questionnaire and received a sleep-kit, however, only 20 patients completed the post-intervention questionnaire.

**Table 1**

*Patient Demographics*

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Pre-intervention n = 26, n (%)</th>
<th>Post-intervention n = 20, n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>14 (54)</td>
<td>12 (60)</td>
</tr>
<tr>
<td>Female</td>
<td>12 (46)</td>
<td>8 (40)</td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
</tr>
<tr>
<td>45-54</td>
<td>4 (15)</td>
<td>3 (15)</td>
</tr>
<tr>
<td>55-64</td>
<td>10 (38)</td>
<td>7 (35)</td>
</tr>
<tr>
<td>65-74</td>
<td>7 (27)</td>
<td>5 (25)</td>
</tr>
<tr>
<td>75-84</td>
<td>5 (20)</td>
<td>5 (25)</td>
</tr>
<tr>
<td>Diagnosis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heart failure</td>
<td>5 (19)</td>
<td>4 (20)</td>
</tr>
<tr>
<td>Cardiac arrhythmia</td>
<td>8 (30)</td>
<td>7 (35)</td>
</tr>
<tr>
<td>MI</td>
<td>1 (4)</td>
<td>1 (5)</td>
</tr>
<tr>
<td>COPD</td>
<td>3 (12)</td>
<td>2 (10)</td>
</tr>
<tr>
<td>Stroke</td>
<td>3 (12)</td>
<td>3 (15)</td>
</tr>
<tr>
<td>Other</td>
<td>6 (23)</td>
<td>3 (15)</td>
</tr>
</tbody>
</table>

*Observed Associations*

The greatest observed associations noted from pre-intervention to post-intervention was a 40.7% change for sleep latency as well as a 41.4% change for the RCSQ noise item, indicating a significant difference in patient perceived noise. Awakenings had the lowest observed percent change from pre-intervention to post-intervention at 24.44% (Figures 3 and 4).
Figure 3

*RCSQ Score*

![Graph showing RCSQ scores pre- and post-intervention for various measures including sleep score, sleep quality, return to sleep, awakenings, sleep latency, and sleep depth.](image)

*Note.* The pre- and post-intervention means of total individual responses for questions 1-5 compared with the patient sleep score aggregate mean (see Appendix B).

Figure 4

*RCSQ Noise Item*

![Graph showing RCSQ noise item scores pre- and post-intervention for each patient.](image)

*Note.* Pre- and post-intervention reported noise item scores for each patient. Patient noise scores are consistent with patient sleep scores.

**Unintended Consequences**

The most prevalent unintended consequences for this QI project was the delay of intervention implementation related to competing priorities of microsystem staff and overall management of time. As the intervention began to evolve, additional time was required in order to reidentify key stakeholders, solidify the implementation timeline, and update unit management
of the modifications. Furthermore, the fluctuation in admission rates required a greater amount of questionnaire days necessary to obtain sufficient data, causing a greater delay in the implementation of intervention.

**Missing Data**

Missing data predominately derives from incomplete post-intervention questionnaires due to patient absence from the microsystem at the time of questionnaire distribution. This includes patients who were discharged, transferred, or temporarily absent from the microsystem. Patients that did not take part in the pre-intervention questionnaire also did not receive the intervention. These patients were scheduled to discharge that same day or refused the questionnaire for undisclosed reasons.

**Discussion**

**Summary**

**Key Findings**

Following the analysis of this QI project measure, several key findings emerged. The most notable finding addressed this QI project’s specific aim of observing a 35% increase from baseline in patient reported sleep quality. A post-intervention sleep score aggregate mean of 55.51 resulted in a 35.94% increase from the pre-intervention sleep score aggregate mean of 35.56. This indicates that patients who are offered a sleep-kit upon admission, have an improved patient reported sleep quality. Furthermore, the additional RCSQ questions including sleep depth, sleep latency, and return to sleep, and excluding awakenings, also resulted in percent changes greater than 35%. The RCSQ noise item also exhibited a 41.4% increase indicating less perceived noise on a 100-0 mm scale with a pre-intervention mean of 25.35, a post-intervention
mean of 43.25, and the lowest calculated standard deviation (SD) of 20.608 making the data set the most reliable.

As previously stated in the rationale, this QI project was implemented and tested on a small scale with a sample of 20. Anticipating a smaller sample allowed for the opportunity to revise plans as needed and to collect data valuable to this QI project.

**Strengths**

The particular strengths of this QI project included the reliability and validity of the RCSQ, the sleep-kit distribution by this project lead, as well as its applicability to other inpatient healthcare settings of similar characteristics. The generalizability of this QI project allows for it to be replicated among the many diverse inpatient microsystems.

**Interpretation**

The associations between the intervention and the outcome revealed that patient reported sleep quality can be improved through the distribution of sleep resources such as a sleep-kit. As previously stated, the idea of providing a sleep-kit coupled with educational content has been shown to be an effective intervention to improve patient reported sleep quality. The most notable study was the SHH intervention (Herscher et al., 2010) which similarly utilized the RCSQ to assess the implementation of a sleep protocol and sleep-kit. The results of the SHH intervention revealed an improvement in patient reported sleep quality from 34.1% pre-intervention to 42.5% post-intervention (Herscher et al., 2010).

This QI project had the greatest impact on the patients that participated in this intervention due to the implementation and influence of the sleep-kit. The most significant differences observed between the anticipated outcomes and the actual outcomes were a result of patient circumstances. Reasons that impacted patient circumstances included but were not
limited to admission rates, clinical course and discharge orders, as well as scheduled and
unscheduled procedures. The sleep-kit intervention within this microsystem represented an
opportunity cost of impaired sleep compared to the cost of sleep-kit supplies and limited time
needed to prepare the sleep-kit for distribution. The results of this QI project also proved to be
promising as a low-cost intervention to improve patient reported sleep.

**Limitations**

The results of this QI project should be considered based on the single process measure
used to evaluate the intervention and factors not observed that could have impacted patient
perceptions on reported sleep quality.

In order to limit variability of questionnaire and sleep-kit distribution, the QI process was
modified to include only the project lead. This eliminated the possibility for missed RCSQ
responses, inappropriate distribution of the RCSQ and sleep-kit, as well as greater organization
of data collection for analysis. To promote consistency, the post-intervention questionnaire was
distributed to patients within the same hour of the day following sleep-kit distribution. Finally, a
comprehensive understanding of the RCSQ scale was imperative for all patients to accurately
respond to each of the questions, which likely caused imprecision among participants.

**Conclusion**

To summarize, this QI project intervention contributed to a significant improvement in
patient reported sleep quality among the participants of this microsystem. The distribution of the
sleep-kit as well as the RCSQ was considered sustainable and could indisputably be established
in inpatient microsystems of similarity. For future intervention, recommendations include
assessment of individual sleep-kit contents use and impact on patient satisfaction regarding sleep
within the microsystem. For further success, nursing staff involvement and support would be necessary for ongoing sleep-kit distribution within this microsystem and beyond other contexts.
References


### Appendix A

Sleep Questionnaire

<table>
<thead>
<tr>
<th>Measure</th>
<th>Question&lt;sup&gt;a&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Sleep depth</td>
<td>My sleep last night was: deep sleep (100) … light sleep (0)</td>
</tr>
<tr>
<td>2. Sleep latency</td>
<td>Last night, the first time I got to sleep, I: fell asleep almost immediately (100) … just never could fall asleep (0)</td>
</tr>
<tr>
<td>3. Awakenings</td>
<td>Last night I was: awake very little (100) … awake all night long (0)</td>
</tr>
<tr>
<td>4. Return to sleep</td>
<td>Last night, when I woke up or was awakened, I: got back to sleep immediately (100) … couldn’t get back to sleep (0)</td>
</tr>
<tr>
<td>5. Sleep quality</td>
<td>I would describe my sleep last night as: a good night’s sleep (100) … a bad night’s sleep (0)</td>
</tr>
<tr>
<td>6. Noise&lt;sup&gt;b&lt;/sup&gt;</td>
<td>I would describe the noise level last night as: very quiet (100) … very noisy (0)</td>
</tr>
</tbody>
</table>

<sup>a</sup>Each question is scored on a 100 mm visual analog scale in which the higher score is better.  
<sup>b</sup>Question 6 is not a part of the original five-item RCSQ and should be scored individually. It was included in this QI project for consistency with other studies that utilized the RCSQ.
Appendix B

Patient Reported Sleep Questionnaire Evaluation

<table>
<thead>
<tr>
<th>Measure (100-0 mm)</th>
<th>Pre-intervention (n = 20)</th>
<th>Post-intervention (n = 20)</th>
<th>% change</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean, mm</td>
<td>SD, mm</td>
<td>Mean, mm</td>
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<td>Sleep depth</td>
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mm, millimeters