Implementation of Quiet Hours in the ICU to Prevent Delirium

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Abstract

The benefit of implementing quiet hours to reduce delirium in intensive care units (ICUs) has become an interest of many researchers. In this study, seven research articles examining the effects of scheduled quiet hours in ICUs were analyzed to answer the PICO question: For adult patients in a critical care setting, does the implementation of quiet hours on the unit decrease incidence of delirium? This was accomplished by utilizing a variety of databases to locate articles concerning ICU quiet hours and methods of noise reduction and analyzing the results. The majority of research concluded that implementation of quiet hours and other guidelines for reducing noise and other stimulation in ICUs was effective in reducing delirium. Furthermore, because many ICU patients had comorbidities that increased the risk of delirium, which had been linked to increased mortality, most of the research agreed that these methods to reduce delirium were of vast importance.

Keywords: delirium, prevention, intensive care unit, quiet hours

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The purpose of this study was to explore the PICO question: For adult patients in a critical care setting, does the implementation of quiet hours on the unit decrease incidence of delirium? This question was selected in order to determine what factors are related to delirium and whether the implementation of quiet hours could ultimately reduce the incidence of delirium for adult patients in a critical care setting. The American Association of Critical Care Nurses (AACN), defined delirium as a critical alteration in the patient's level of consciousness, evidenced by a change in cognition or perception (Pun, 2016). Up to 80% of patients in the critical care setting have been affected by delirium, which costs ICUs between $4 billion and $16 billion yearly (Pun, 2016).

In Barr et al.'s (2013) clinical practice guideline, delirium was linked to increased length of stay in the critical care setting, increased mortality rate, and long-term cognitive impairment. Barr et al. (2013) also determined that older age, preexisting dementia, use of mechanical ventilation, metabolic acidosis, coma, multiple organ failure, use of benzodiazepines, preexisting hypertension, and high severity of illness were risk factors for delirium for patients in a critical care setting. In an interrupted time series analysis conducted by van de Pol, Iterson, and Maaskant (2017), interventions implemented to reduce nocturnal sound significantly decreased the incidence of delirium in post-intervention patients. Interventions in this study included closing doors and reducing alarm sounds (van de Pol, Iterson, & Maaskant, 2017).

Additionally, research indicated that early mobilization, identification of delirium risk factors, and sleep promotion could decrease the incidence of delirium in the critical care setting (Barr et al., 2013). Also, the use of eyewear and earplugs has been linked to significant reduction of delirium, as evidenced by decreased rapid eye movement, awakenings, sleep onset

latency, and sleep arousal index (Locihová, Axmann, Padyšáková, & Fejfar, 2017). This study revealed a decrease in early development of delirium by 53% (Locihová et al., 2017).

The purpose of this literature review was to determine the damaging effects of delirium on adult critical care patients and to provide evidence promoting the use of quiet hours in order to decrease the incidence of delirium. The evidence emphasized the importance of increasing nurses' understanding of delirium including its risk factors, signs and symptoms, and interventions to reduce its incidence and improve care within ICUs. It was recommended that nursing care be focused on educating other health care professionals about the benefits of quiet hours and to implement scheduled quiet hours in ICUs.

Reviewing the Evidence

The information collected related to implementation of quiet hours in the ICU setting to reduce the incidence of delirium, was located using data sources accessed through Auburn University's online library. The database sources used were CINAHL, PubMed, and National Guideline Clearing House. The keywords used in the database sources to narrow the search options were "delirium," "quiet time," and "ICU." The search was further limited to articles published from 2013-2017 and in the English language. Both nurses and other medical professionals wrote the articles that were examined.

The primary research articles reviewed consisted of different levels of evidence ranging from level I to level VI. Seven research articles were utilized including one clinical practice guideline, one integrative review or meta-analysis, one systematic review, one randomized control trial, and three control trials without randomization, one specifically, a quasi-experimental study. The articles described various delirium prevention methods within the ICU setting, such as implementation of a delirium prevention bundle, which included quiet time

hours. Not every delirium prevention method used in each article directly related quiet time hours to reduction of delirium; however, each article linked decreased stimulation, including noise reduction, to better delirium outcomes in ICUs.

Synthesis of Evidence

All seven articles were reviewed for the synthesis, and the levels of evidence varied from level I to level III. Level I evidence articles included a practice guideline, integrative review, and systematic review. Level II evidence included a single-blind randomized control trial. Level III evidence included a prospective study, interrupted time series analysis, and a quasi-experimental study. All articles studied the relationship between promotion of sleep and the incidence of delirium.

Importance of delirium prevention

Barr et al. (2013) associated delirium with increased mortality, prolonged length of hospital stay, and risk for developing post-cognitive impairment in ICU patients. Because of these findings, Barr et al. (2013) indicated that healthcare providers and nurses must prioritize the identification of risk factors for delirium. Risk factors included, but were not limited to, a history of dementia, hypertension, alcoholism, and high acuity of illness and coma (Barr et al., 2013). The use of benzodiazepine therapy has also been shown to influence the incidence of delirium (Barr et al., 2013). Patients who required mechanical ventilation had a greater risk for developing delirium due to the requirement of heavy sedation and subsequent decreased mobilization (Barr et al., 2013). Elliott and McKinley's (2014) study required health care providers who worked directly with the patient to further identify risk factors for delirium. The providers found that decreased sleep time, significant interruption of sleep-wake cycles, and worsened rapid eye movement during sleep increased the incidence of delirium (Elliott &

McKinley, 2014). The patients in the ICU reported poor quality of sleep due to increased sound and improper lighting for the time of day, which could further lead to delirium (Elliott & McKinley, 2014).

Measurements

Barr et al. (2013), Elliott and McKinley (2014), Moon and Lee (2015), McAndrew et al. (2016), and Patel, Baldwin, Bunting, and Laha (2014) measured delirium through the Confusion Assessment Method for the ICU (CAM-ICU) and Richmond Agitation and Sedation Score (RASS). In addition to the CAM-ICU and RASS assessments, researchers also used the Intensive Care Delirium Screening Checklist (ICDSC) (Barr et al., 2013; van de Pol et al., 2017). The ICDSC measures 8 components of delirium including level of consciousness; inattentiveness; confusion; hallucinations, delusions, and psychosis; psychomotor anxiety; inappropriate mood and speech; sleep-wake disturbances; and variations of symptoms (van de Pol et al., 2017). The ICDSC scores delirium on a scale from 0 to 8 (van de Pol et al., 2017). Zero represents normal while scores ranging from 4 to 8 represent delirium (van de Pol et al., 2017). This assessment method cannot be completed on a heavily sedated patient or a patient who is comatose (van de Pol et al., 2017).

In addition to delirium assessment, researchers also measured the quantity and quality of sleep to determine the relationship between sleep and delirium (Elliott & McKinley, 2014; Locihová et al., 2017). Sleep assessments included 24-hour polysomnography monitoring and sleep staging analysis (Elliott & McKinley, 2014; Locihová et al., 2017). Polysomnography, a sleep study, recorded brain waves, oxygen saturation, heart rate, breathing, and eye and leg movements (Elliott & McKinley, 2014). The sleep staging analysis measured sound and illumination during nighttime hours (Elliott & McKinley, 2014). Sleep quality and quantity were

measured separately to fully analyze how sleep, and specifically what type of sleep, affected delirium (Locihová et al., 2017). Quantity of sleep was measured through actigraphy and bispectral index, while sleep quality was measured through the Richards Campbell Sleep Questionnaire and Verran and Snydern Halpern Sleep Scale (Locihová et al., 2017).

Preventative measures

After reviewing all studies, implementation of quiet hours has been shown to be the most effective method for preventing delirium. Barr et al.'s (2013) guideline and Elliott and McKinley's (2014) study focused on promoting sleep by optimizing the patient's environment through executing strategies to control light and noise, clustering patient care activities, decreasing stimuli at night to protect sleep cycles, managing pain, and explaining unavoidable nighttime disturbances. Specific interventions included early mobilization, routine rounding, education and reorientation, and a multidisciplinary team approach (Barr et al., 2013; Elliott & McKinley, 2014). In order to optimize the environment, Elliott and McKinley's (2014) study recommended reporting damaged equipment, limiting maintenance and cleaning to daytime hours, the quiet shoe rule, soft conservation, appropriate illumination, and offering patients earplugs or eye masks.

In addition to the previous interventions, van de Pol et al.'s (2017) research interventions for nocturnal sound reduction included closing doors, provided that the patient was not delirious, and minimizing alarm sounds. The findings showed a significant decrease in the incidence of delirium in the post-intervention group compared to the pre-intervention group, suggesting a direct relationship between nocturnal sound reduction and decreased incidence of delirium (van de Pol et al., 2017).

Locihová et al. (2017) research focused on the implementation of earplugs and eye masks. The Environmental Protection Agency recommendation for the amount of acceptable noise in the ICU was to keep noise levels at no more than 45 decibels during the day and 35 decibels during nighttime hours; however, findings revealed that ICU noise levels nearly always exceeded 60 to 80 decibels (Locihová et al., 2017). After the implementation of eyewear and earplugs, findings showed a decrease in rapid eye movement, sleep onset latency, number of awakenings, sleep arousal index, and delirium (Locihová et al., 2017). The results of this study also showed a decrease in early development of delirium by 53% (Locihová et al., 2017). Other non-pharmacological interventions aimed at decreasing the incidence of delirium included music therapy, aromatherapy, acupuncture, massage, phototherapy, and adherence to hygiene protocol (Locihová et al., 2017).

Due to the higher risk of delirium in mechanically ventilated patients, McAndrew et al. (2016) completed a study regarding the implementation of quiet time from 14:00 to 16:00 for these patients. In this study, quiet time was defined as a period of time when lights and sounds were reduced in the patient's room to promote rest (McAndrew et al., 2016). Upon the initiation of quiet time, the hall lights were dimmed, room lights and televisions turned off, and blinds and doors closed (McAndrew et al., 2016). Care was clustered before the start of quiet time and after quiet time ended; however, immediate needs were still seen to and required tests were continued as usual (McAndrew et al., 2016). After quiet hours, the nurse documented the patient's sleep based on decreased movement and closed eyes, as well as estimated length of uninterrupted sleep. Nurses rated the sleep on a scale from 0 to 10 with 0 representing no sleep and 10 representing very good sleep (McAndrew et al., 2016). The results of the study showed that quiet time did not have a significant effect on the incidence of delirium for mechanically

ventilated patients; however, some patients who were CAM-ICU positive became CAM-ICU negative, and patients who were CAM-ICU negative remained CAM-ICU negative (McAndrew et al., 2016).

Implementation

Moon and Lee (2015) created a protocol designed to prevent delirium. The study was a randomized control trial where the control group received standard care and the intervention group received the implemented protocol (Moon & Lee, 2015). This protocol included screening for risk factors for delirium upon admission to the ICU, assessment of cognition through the CAM–ICU test, environmental changes, and therapeutic interventions (Moon & Lee, 2015). Environmental changes included providing indirect light during the night hours, continuity of care with the same nurse on consecutive days if possible, placing personal items within reach, reduction of bed movement within the unit, and allowing family members to bring items from home to promote patient comfort (Moon & Lee, 2015). Therapeutic interventions in the protocol included nutritional balance, early ambulation, and a thorough nursing assessment for signs of increasing delirium (Moon & Lee, 2015). After implementation of the protocol, findings revealed that the protocol did not decrease the incidence of delirium (Moon & Lee, 2015).

Patel et al. (2014) also completed a study to research the incidence of delirium through implementation of a personalized delirium-reduction bundle. This quasi-experimental study recorded baseline data of measured noise, light, and patient care; implemented the bundle during the nighttime hours of 23:00 to 07:00; and recorded the findings (Patel et al., 2014). The bundle included interventions to combat light and sound (Patel et al., 2014). To promote reduction of noise levels, the bundle recommended closed doors and decreased telephone volumes, prohibited personal conversations at bedside, encouraged quiet voices, offered earplugs to patients, and

turned monitors to night mode to decrease the light and sound produced (Patel et al., 2014). Interventions to reduce light included dimmed hall lights throughout the unit, dimmed lighting as appropriate for patient care at the bedside, and offering patients face masks (Patel et al., 2014). During the night, patient care was clustered whenever possible, care practices were completed before bed or after 07:00, and the patient was oriented every 8 hours (Patel et al., 2014). The nurse reviewed the medication administration record if the patient showed signs of increased delirium, sedation targets were implemented, and pain levels were monitored every hour (Patel et al., 2014). Early mobilization was also implemented as part of the bundle and patients on the mechanical ventilator were required to have a daily awakening and spontaneous breathing trial (Patel et al., 2014). The results of the quasi-experimental study showed a decrease in the incidence of delirium from 33% to 14% in addition to a reduction in the amount of time patients were delirious from 3.4 days to 1.2 days (Patel et al., 2014).

Appraisal of Evidence

The levels of evidence reviewed ranged from level I to level VI. The highest level of evidence included a clinical practice guideline by Barr et al. (2013), an integrative review by Elliott and McKinley (2014), and a systematic review by Locihová et al. (2017). The second level of evidence included a single-blind randomized control trial by Moon and Lee (2015). The third level of evidence included a control trial without randomization by McAndrew et al. (2016), an interrupted time series analysis by van de Pol et al. (2017), and a quasi-experimental study by Patel et al. (2014). There was an abundance of information available and the majority of reviewed articles were consistent with the recommendations of implementation of quiet time hours to reducing the incidence of delirium in the ICU. Five of the seven articles stated that there was a positive relationship between noise reduction interventions within the ICU setting

and a decreased incidence of delirium. However, Moon and Lee's (2015) randomized control trial and McAndrew et al.'s (2016) control trial without randomization concluded that evidence was not significant enough to denote a relationship.

Medical providers used the data collected from patients to implement the newest evidence based practice protocols of delirium prevention based on the findings in the research studies. Because of the positive relationship between quiet hours and decreased delirium, the newest evidence based practice suggested that the ICU floors should implement the interventions as stated in the majority of research articles used in this paper. There were few risks involved because non-pharmacological methods were implemented to decrease delirium, excluding the study that involved patients on mechanical ventilators who also required sedatives and analgesics. The risk involved for the sedated patients was increased confusion associated with delirium (McAndrew et al., 2016).

There was a cost analysis identified in the quasi-experimental study by Patel et al. (2014). The article suggested that delirium in the ICU setting increased costs in the hospital (Patel et al., 2014). The delirium prevention bundle benefited the hospital by decreasing rates of delirium thus, decreasing hospital costs (Patel et al., 2014). The estimated increase in overall hospital costs was related to the prolonged stay in the ICU due to the presence of delirium. No other cost studies were identified in the other six articles.

Recommendations

Based on a review of the literature, a delirium prevention bundle is recommended as evidence-based practice. Research indicates that this recommendation will decrease the incidence of delirium in the ICU setting by reducing noise and other forms of stimulation to provide adequate quiet hours for patients. This recommendation has been graded as a B based

on the July 2012 United States Preventive Service Task Force grading system. This rating has been assigned because the recommendation possesses moderate certainty, rather than high certainty, that the net benefit is substantial. Both Moon and Lee (2015) and McAndrew et al.'s (2016) studies state that there is no significant connection between quiet hours and decreasing the incidence of delirium; therefore, these articles are contributing factors for the decision to grade the recommendation as a B.

This recommendation bundle focuses on patient reorientation, early mobilization, and reducing stimulation from light and sound during two scheduled daytime quiet hours, as well as during nocturnal hours, to reduce the incidence of delirium. Reorientation of the patient every eight hours and early mobilization is recommended as a part of the delirium prevention bundle (Patel et al., 2014; Barr et al., 2013; Elliott & McKinley, 2014). The Environmental Protection Agency suggests reducing noise to no more than 45 decibels, which can be achieved in part by providing patients with earplugs (Locihová et al., 2017). Additionally, Patel et al. (2014) and van de Pol et al.'s (2017) studies recommend closing the patient's door, turning off the patient's room lights, dimming the hall lights, and decreasing telephone volumes and alarm sounds. While not a part of daytime quiet hours, decreasing nocturnal noise is also of great importance for preventing delirium (van de Pol et al., 2017). According to Barr et al.'s (2013) study and Elliott and McKinley's (2014) studies, decreasing stimuli at night, particularly sound stimuli, protects patient's sleep cycles. Decreasing stimulation from light is also a key component of the delirium prevention bundle. Use of eye masks is an effective method to decrease light stimulation and is therefore of great importance for allowing adequate rest during quiet hours and at night (Locihová et al., 2017). Finally, clustering patient care and limiting care to only

necessary interventions during these hours is crucial for promoting adequate rest and reducing the incidence of delirium (Barr et al, 2013).

Conclusion

Delirium in the ICU has been determined to be a significant problem associated with increased patient mortality, length of hospital stays, and hospital costs. Therefore, researchers have invested time and energy into developing effective methods to reduce the incidence of delirium in the ICU setting. In this literature review, research articles were explored to answer the PICO question: For adult patients in a critical care setting, does the implementation of quiet hours on the unit decrease incidence of delirium? The majority of research supported this PICO question and emphasized the effectiveness of scheduled quiet hours and specific noise reduction methods in reducing delirium.

Authors' Contributions

- Virginia Cottrell – PICO question and significance
- Allie Collins – synthesis of evidence, recommendation
- Catherine Kinney – abstract, conclusion, recommendation, editor
- Jessica Newton – review of evidence, appraisal of evidence
- Blake McClellan – synthesis of evidence

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