Abstract

Background: Deep, restorative sleep is needed for Intensive Care Unit patients to help with healing and recovery. However, sleep in the ICU is not easily attained. Noise is one factor that limits patient sleep. Although many studies have acknowledged that the Intensive Care Unit (ICU) is noisy, few studies have compared the nurses’ perception of noise to actual noise levels. Therefore, the purpose of this study was to compare actual noise levels to perceived noise by nursing staff in the ICU.

Methods: A pilot study was conducted at Rex Hospital to compare actual sound levels with the nurses perception of noise. Actual sound was measured using the Decibel 10th Iphone application by SkyPaw Co. Ltd, and perceived sound was measured using a Familiar Noise Survey developed by the researcher. Following the pilot study, the Familiar Noise Survey was revised and actual and perceived noise was measured at 6 Intensive Care Units at Duke University Medical Center. A random sample of nurses were surveyed twice in a 3-day period (n = 18) to measure their perception of sound on the unit. Sound pressure levels and nurse perception were compared using descriptive statistics.

Results: Critical care nurses perceived the ICUs to be noisier than the actual values. There did not appear to be a substantial difference in noise during the morning, evening, or weekend shifts. The ICU was quieter than the actual noise of the lobby or cafeteria, but louder than the recommended noise level for restorative sleep.

Conclusion: Nurses perceive the ICU to be the loudest area of the hospital. This finding raises the question of how we can assist nurses to reduce what they perceive to be a loud environment. Future work is needed to develop interventions specifically for nurses to assist in reducing noise in the ICU.
Background

The Intensive Care Unit, or ICU, is a specialized unit of the hospital that provides comprehensive and constant care for critically ill patients. In the ICU, the health care team provides critical care and around-the-clock intensive monitoring and treatment. The role of an ICU nurse is to ensure that these medically unstable and severely ill patients receive optimal care. Nurses who work in critical care are responsible for performing assessments, providing ordered interventions, and advocating for their patients (Sole, Klein & Moseley, 2013).

It is a recognized problem that patients treated in the ICU fail to meet their individual daily sleep requirements (Frisk & Nordstrom, 2003). Patients regularly report poor sleep in the ICU related to environmental factors that are possibly modifiable, such as auditory, tactile, and pharmaceutical stimulation (Little, Ethier, Ayas, Thanachayanont & Mehta, 2012). Lack of sufficient sleep negatively impacts all body systems. It is essential that nurses maximize sleep in ICU patients, as it is a fundamental component of life that has protective and restorative functions. Deep sleep is considered to be a time of body renewal, energy conservation and tissue building (Frisk & Nordstrom, 2003).

Sleep loss is associated with decreased immune function, altered mental status, and abnormal hormonal changes (Friese, 2008; Patel et al., 2008). Sleep deprivation has also been linked with increased falls, medications, and restraint use (Maidl, Leske & Garcia, 2013). Insufficient sleep is associated with delusions and memory loss, which may meet the criteria for ICU acquired delirium (Friese, 2008; Patel et al. 2008). Research by Bartick et al. concluded that decreasing sleep disruptions resulted in the use of fewer sedatives and increased the sleep quality of ICU patients.
Sleep disturbance in the ICU is attributed to many factors, including the severity of the underlying critical illness, and the pain and discomfort it may cause. The analgesics and sedatives used to promote comfort during mechanical ventilation have also been shown to contribute to sleep deprivation. Other aspects that interfere with the patients biological sleep clock include continuous light sources and frequent awakenings that patients experience during night hours (Tembo & Parker, 2009). Frequent assessments, laboratory tests, interdisciplinary rounds, and spontaneous breathing trials are also specific reasons for why patients have sleep disturbances in the ICU. Creating a quiet, more restful environment may have positive effects on a patient’s sleep experience and improve recovery (Maidl, Leske & Garcia, 2013).

Noise, defined as unwelcome sounds, can affect patients both physiologically and psychologically (Xie, Kang, & Mills, 2009). In the ICU, the primary health effect resulting from noise is sleep disturbance (Lawson, Thompson, Saunders, Saiz, Richardson, Brown, & Ince, 2010). According to Xie et al, between 17% and 57.6% of awakenings and arousals are attributed to noise. It is difficult for patients to sleep in the first place at the hospital, and noise makes restorative sleep even more difficult to achieve.

High noise levels affect the quality of sleep even if the patient does not wake up. When patients are subjected to noise during their sleep, they enter a more superficial stage (often stage 1) of the sleep cycle, as opposed to reaching a deeper sleep state. Persistent disturbances make it impossible for the patient to enter deep sleep and REM sleep, as these stages are especially sensitive to turbulence (Frisk & Nordstrom, 2003). Studies show that impaired sleep may reduce healing and increase length of stay in the ICU (Maidl, Leske & Garcia, 2013).
According to Richardson et al. (2007), noise was the most significant cause of sleep disruption in the ICU. Although illness severity and mechanical ventilation are obvious barriers to sleep, the noise created by patient monitoring machines and health care professional conversations also inhibits sleep (Kamdar, Needham, & Callop, 2012). Equipment alarms and staff conversation have been identified as the most disruptive contributing factors to impaired sleep in critical care patients (Xie, Kang, & Mills, 2009). Other sources of noise in the ICU include noise-generating beds, high-intensity alarms to signal medical emergencies, television sound, telephones ringing, and carts rolling on the linoleum floors (Lawson, Thompson, Saunders, Saiz, Richardson, Brown, & Ince, 2010).

The amount of noise at a given time can be quantified by measuring the sound pressure level. The sound pressure level is measured using the decibel scale (dB), which is a ratio between the measured level and the reference level (Maidl, Leske & Garcia, 2013). The specific pressure levels associated with noise in the ICU include: staff conversations (59-60 dB), ventilator sounds (76 dB), and infusion pumps (73-78 dB) (Lawson, Thompson, Saunders, Saiz, Richardson, Brown, & Ince, 2010). Past studies suggest that continuous noise levels, even as low as 60 dB, have physiological effects on salivary cortisol levels and blood pressure (Lawson, Thompson, Saunders, Saiz, Richardson, Brown, & Ince, 2010). For this reason, it is important to reduce noise and improve sleep.

According to the World Health Organization guidelines for noise levels in the hospital, the maximum level of sound events during the night should not exceed 40 dB indoors or 30 dB in patient rooms (Lawson, Thompson, Saunders, Saiz, Richardson, Brown, & Ince, 2010). Research indicates that ICU sound levels are generally much greater than these
recommended levels (Lawson, Thompson, Saunders, Saiz, Richardson, Brown, & Ince, 2010; Xie, Kang, & Mills, 2009).

Previous studies have identified interventions to help reduce the noise level in intensive care units. Some of these interventions include limiting the effect of noise, while others consist of behavioral modifications (Xie, Kang, & Mills, 2009). Previous research shows that earplugs have a positive effect on patients’ sleep while in the hospital. The use of earplugs allowed the patients to achieve longer sleep periods at a cost-effective price (Richardson, Allsop, Coghill, & Turnock, 2007). Sound masking, or the use of white noise machines, is another intervention aimed to reduce noise in the hospital. Evidence shows that white noise increased the arousal threshold in healthy people exposed to recorded ICU noise. By raising the baseline sound level that the participants were exposed to, the ICU noise did not cause arousal as easily as those who did not experience the white noise. Sound masking produced an improvement of 42.7% in promoting sleep in ICU patients (Stanchina, Abu-Hijleh, & Chaudhry, 2005). The use of acoustic absorbers has also been shown to reduce noise levels in the ICU. According to Blomkvist and colleagues, replacing the ceiling tiles to ones that absorbed sound reduced the noise levels by 4 dB. As a result, hospital staff reported significantly less strain and feeling more relaxed related to the improvement in room acoustics (Blomkvist, Eriksen, & Theorell, 2005).

Interventions such as earplugs, sound masking, and acoustic absorbers work to decrease the effect of noise on the ICU patients, but do nothing to decrease the actual noise level on these units. Thus, in order to reduce actual noise, education and modification of the noise-making behavior must be addressed at the nursing level. The implementation of quiet times is an example of a behavioral modification that has been used as a treatment
approach. The introduction of non-disturbance periods during both day and night has changed the nursing and medical routines, which has resulted in reduced sleep disturbance factors in ICU patients (Monsén & Edéll-Gustafsson, 2005).

Although different kinds of noise reduction protocols have been implemented and have been effective in improving patients’ sleep, all nursing staff may not embrace these interventions. Additionally, these interventions can be seen as helpful, but not preventative. Research indicates that staff conversation and alarms seem to be the most disturbing noises for ICU patients’ sleep (Xie, Kang, & Mills, 2009). If we are truly to reduce noise in the ICU and promote restorative sleep, identifying interventions that target nursing perception and recognition of noise in the ICU is important.

Although many studies have acknowledged that the ICU is noisy, few studies have compared the nurses’ perception of noise to actual noise levels. Nurses have a fundamental role in advancing patient recovery as healthcare professionals and patient advocates. Previous studies have shown that nurses tend to overestimate the quality of patients’ sleep (Kamdar et al.; Maidl, Leske & Garcia, 2013). Any agency can implement protocols that might decrease noise, but if the nurse does not recognize the noise in the ICU, then maximum benefits cannot be achieved. To change practice on the unit, we must invest in the perceptions of the nurses so that they become more vigilant of noise in the ICU and the effect noise levels have on patient sleep and restorative health.

According to the Theory of Reasoned Action (TRA) and the Theory of Planned Behavior, the best predictor of behavior is behavioral intention. TRA suggests that behavioral intention is the most important and direct determinant of behavior (Montano & Kasprzyk, 2008). Thus, the first step in changing the behavior of these nurses [in regard to
noise] is to change their awareness of noise. In order to do this, we must first understand how the nurses perceive noise in the ICU. Therefore, the purpose of this study is to compare nurse’s perceptions of noise in the ICU to actual noise. By comparing the actual sound pressure level to the nurse perception, we will gain insight into this relationship. Critical care nurses’ perception of noise will be compared to the actual noise levels to determine if their perception is greater than, less than, or equal to actual noise. After recognizing the relationship of nurses’ perceived noise to actual noise, personalized interventions can be developed that target nursing attitudes, perception, and response to actual noise levels.

Methods

Procedures

In order to examine the relationship between actual noise to perceived noise, a pilot study was conducted at the Intensive Care Unit at Rex Hospital with 18 critical care nurses. Following analysis of the pilot study, the Familiar Noise Sources survey was revised and six additional units were sampled with critical care nurses at Duke University Medical Center (n = 108). The actual and perceived noise values were then compared. In addition to the ICUs, actual noise levels were captured at the front entrance of the hospital and in the cafeteria as an additional measure of noise level. The University of North Carolina at Chapel Hill Institutional Review Board provided an exemption for this study.

Pilot Study: Rex Hospital

Sound pressure measurements for the pilot study were conducted in the intensive care unit, cafeteria, and Patient Tower Lobby at Rex Hospital in Raleigh, NC. Sound pressure levels obtained at the lobby and cafeteria served as comparison sites for the ICU.
Both settings were selected due to their high traffic volume. The Patient Tower Lobby is located on the second floor of the hospital. This area is where visitors to the hospital must register and receive patient information at the front desk in the lobby. Adjacent to the lobby is the gift shop, which operates from 9am-5pm. The time of data collection in the lobby was always 0800 and 2000. The cafeteria at Rex is open 24 hours a day, seven days a week. The noise measurement was always taken from a booth in the row closest to the cash registers. The time of data collection in the cafeteria was always 0810 and 2010.

The ICU at Rex is a 22-bed general intensive care unit in a 665-bed acute care facility that serves a mix of acutely ill medical and surgical patients. The noise level was recorded at two locations: the central nurses station and also the individual nurse work station located between two patient rooms. The sound pressure was obtained for 30-second periods at 0820 and 2020 for a total of six times, with one morning and one evening measurement being on the weekend. This time period was selected because it is roughly 1 hour after shift change and during a time period when visitors are not allowed on the unit.

Immediately following data collection of actual noise in the ICU, three critical care nurses were randomly selected to participate in the study. Three nurses were selected at each data collection point for a total of 18 nurses. Nurses were instructed to select the item on the Familiar Noise Sources Survey that most accurately represented their perception of the current noise level in the ICU at that time. The Familiar Noise Sources Survey is a survey developed by the student and her Honor’s advisor using a table created by Acoustical Solutions, Inc, that listed familiar noise sources (Figure 1). After completing the pilot study at Rex Hospital using the survey in Figure 1, the survey was revised to list the familiar noise sources in order of increasing decibels, rather than random placement. This
decision was made after discussion with the honors advisor regarding ease of use. The study was then replicated at Duke University Medical Center.

**Figure 1: Pilot version of Familiar Noise Sources Survey**

<table>
<thead>
<tr>
<th>Example Source</th>
<th>dB</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lawn Mower @ 5’</td>
<td>68</td>
</tr>
<tr>
<td>Library</td>
<td>68</td>
</tr>
<tr>
<td>Car Horn @ 15’</td>
<td>97</td>
</tr>
<tr>
<td>Amplified Rock Music</td>
<td>127</td>
</tr>
<tr>
<td>Filling a Bath Tub</td>
<td>74</td>
</tr>
<tr>
<td>Ringing Telephone @ 4-15’</td>
<td>59</td>
</tr>
<tr>
<td>Pistol Shot @ 250’</td>
<td>106</td>
</tr>
<tr>
<td>Vacuum Cleaner @ 3’</td>
<td>81</td>
</tr>
</tbody>
</table>

Figure 1. The pilot study survey consisted of a user-friendly noise chart that listed easily recognizable sounds. Nurses did not have the decibel column on their version of the survey.

**Study Setting and Sample**

**Intensive Care Unit.**

The setting for this study was a combination of six intensive care units at the Duke University Hospital Campus in Durham, NC. Duke University Hospital is an academic medical center with 924 acute care beds. In July 2013, the Duke Medical Pavilion (DMP) opened after a major expansion to accommodate the needs of patients and their families. In building this medical pavilion, the design teams worked with the Patient Advisory Council to be sure to incorporate patient-and-family centered approaches to critical care. The 8-floor, 608,000 sq. ft. pavilion includes 160 critical care rooms, 18 operating rooms and an imaging suite. This expansion was in addition to the patient rooms in Duke North, which is the original hospital building.
As with the pilot study, the sound pressure levels were obtained at the patient lobby and cafeteria and served as comparison sites for the ICU (n = 6). Sound measurements were recorded in the lobby at 0920 and 1720 and in the cafeteria at 0930 and 1730. In the six ICUs, sound measurements were recorded at the central nurses station. The sound pressure was obtained for 30-second periods between 0800 and 0910 and between 1600 and 1710 for a total of six times.

**Sample.**

At Duke University Hospital a total of 108 critical care nurses were surveyed using the Familiar Noise Sources survey. Nurses were instructed to select the noise source that most closely matched their perception of the actual noise in the ICU. The sound pressure levels were recorded immediately prior to asking nurses to select their perception of the noise level.

**Measures**

**Sound measurement.**

Sound pressure levels were measured using the decibel scale (dB), which is a ratio between the measured level and the reference level (Lawson, Thompson, Saunders, Saiz, Richardson, Brown, & Ince, 2010). Using the Decibel 10th Iphone application version 3.8.1 by SkyPaw Co. Ltd, actual sound levels were recorded by the researcher. This application enabled the researcher’s Iphone to work as a professional sound meter to accurately measure the sound pressure level surrounding it. The Skypaw application displayed the average and peak values with a clear digital and analog layout. Data was exported to Microsoft Excel for further analysis.

*Familiar Noise Sources Survey*
Three nurses in the ICU were surveyed at random immediately after each noise pressure measurement recording to assess their perception of sound on the unit. Nurses were given the revised Familiar Noise Sources survey (Figure 2) and asked to select the sound source example on the survey that most accurately represented their perception of the current noise level in the ICU. In addition to the ranking of familiar noise sources, items were added that were lower on the decibel chart than that of the pilot study. This was done because some of the higher decibel (louder) noise sources from the earlier data collection did not fall into a range that was relevant to the recorded decibel range. The revised survey used for the study at Duke University Hospitals is shown as Figure 2. While the researcher and her advisor were aware of what decibel each example source corresponded to, the nurses completing the survey did not. Once the nurses made their selection, it was then matched on the noise chart to determine the noise level the nurse perceived in decibels.

**Figure 2: Final Version of Familiar Noise Sources Survey**

<table>
<thead>
<tr>
<th>Example Source</th>
<th>dB</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wind in trees</td>
<td>43</td>
</tr>
<tr>
<td>Ringing Telephone @ 4-15'</td>
<td>59</td>
</tr>
<tr>
<td>Clothes Washer @ 2-3'</td>
<td>62</td>
</tr>
<tr>
<td>Toilet Flush</td>
<td>63</td>
</tr>
<tr>
<td>Library</td>
<td>68</td>
</tr>
<tr>
<td>Filling a Bath Tub</td>
<td>74</td>
</tr>
<tr>
<td>Vacuum Cleaner @ 3'</td>
<td>81</td>
</tr>
<tr>
<td>Lawn Mower @ 5'</td>
<td>86</td>
</tr>
</tbody>
</table>

Figure 2: The revised survey consisted of a user-friendly noise chart that listed easily recognizable sounds. Nurses did not have the decibel column on their version of the survey.
Data Analysis

Sound pressure levels and nurse perception from the pilot study and the six 30-second collection intervals were calculated using descriptive statistics (mean and ranges). The actual and perceived values of sound in the ICU were compared to see if a difference in perception exists.

Results

Pilot Study: Rex Hospital

ICU Nurse Perception.

The average sound pressure level at the nurse's station was 61 dB (59.7-62.5), while the average sound pressure level between patient rooms was 64.8 dB (62.6-69.1). The nurse perceived average sound pressure level was 75.1 dB (68.4-78.7). The critical care nurses at Rex Hospital consistently perceived the noise level to be higher than the actual sound level on the unit. On average, nurses perceived the noise to be 14.1 dB higher than the actual noise level at the nursing station, and 9.3 dB greater than the noise between patient rooms.

Comparison to Lobby & Cafeteria.

The average sound pressure level was 64.1 dB (62.3-65.7) in the cafeteria and 61.3 dB (59.3-64.1) in the lobby. The cafeteria was almost always more noisy than the ICU, averaging at 3.3 dB higher than the ICU. The lobby was measured to be noisier than the ICU during 4 of the 6 data collection time periods, averaging approximately 1.7 dB higher than the ICU.

Study: Duke University Hospital
The average noise levels and ranges for the lobby, cafeteria, ICUs, and the nurses’ results from Familiar Noise Sources Survey are presented as Table 1. ICU Actual Noise, denotes the mean and range of actual noise in the ICU and RN dB represents the mean and range of nurses perception of noise using the Familiar Noise Sources Survey.

**Table 1: Actual and Perceived Noise Levels**

<table>
<thead>
<tr>
<th></th>
<th>Day 1</th>
<th>Day 2</th>
<th>Day 3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>AM</td>
<td>PM</td>
<td>AM</td>
</tr>
<tr>
<td>Lobby</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>mean</td>
<td>65.3</td>
<td>69.8</td>
<td><strong>62.5</strong></td>
</tr>
<tr>
<td>(range)</td>
<td>(58.4-66.2)</td>
<td>(60.6-67.2)</td>
<td><strong>(59.3-65.8)</strong></td>
</tr>
<tr>
<td>Cafeteria</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>mean</td>
<td>78.8</td>
<td>74.3</td>
<td>79.3</td>
</tr>
<tr>
<td>(range)</td>
<td>(74.3-79.3)</td>
<td>(74.6-83.8)</td>
<td><strong>(70.6-85.9)</strong></td>
</tr>
<tr>
<td>ICU Actual Noise</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>mean</td>
<td>62.4</td>
<td>62.7</td>
<td><strong>62.6</strong></td>
</tr>
<tr>
<td>(n = 6)</td>
<td>(58.4-66.2)</td>
<td>(60.6-67.2)</td>
<td><strong>(59.3-65.8)</strong></td>
</tr>
<tr>
<td>RN dB</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>mean</td>
<td>65.2</td>
<td>66.2</td>
<td>67.1</td>
</tr>
<tr>
<td>(n = 18)</td>
<td>(49.7-78.7)</td>
<td>(60-76.3)</td>
<td>(61.3-78.7)</td>
</tr>
</tbody>
</table>

All of the ICUs surveyed were louder than the recommended 40 dB for restorative sleep, with mean scores ranging from 62.2 – 62.7. There was little variation of noise levels during morning and evening data collection. In fact, there was only a 0.3 difference in the maximum mean from morning and evening. The cafeteria (74.3 – 79.3) was consistently the loudest area of the spaces surveyed. The maximum mean cafeteria value was 16.6 dB louder than the maximum mean ICU value. The lobby was the next loudest space in the hospital with the maximum mean lobby value of 69.8 dB, being 7.1 dB louder than the loudest actual ICU mean. The only exception was the morning of Day 2, when the ICU was almost equal to the lobby (62.6 vs. 62.5).
Nurses consistently perceived the noise level in the ICU as higher than the actual average sound pressure level, except for in the morning on Day 3, when the nurse perceived average was 1.9 dB lower than the ICU average sound pressure level. The ICU actual (actual noise) on the evening collection of Day 2 was 62.2, which is lower than the minimal value of perceived noise by the ICU nurses (RN dB average) at that time. The nurses surveyed had a wide range of noise perception on the Familiar Noise Sources Survey, with the widest range being on the morning collection of Day 1 (49.7-78.7).

Discussion

These results suggest that the ICU much louder than the recommended 40dB for restorative sleep. An interesting finding, however, was that nurses interpret noise in the ICU to be much louder than the actual noise value, and may even have an exaggerated impression of how noisy it actually is. This finding raises the question of how nurses respond to the noise in the ICU. The results of this study indicate that the ICU nurses are aware of the high noise levels, and conscious of the volume on the unit. This makes sense with the current literature on alarm fatigue—a phenomenon where nurses become immune to stimuli over time (Stokowski, 2014). Perhaps the nurses in this study did not notice the noisiness of the unit until they were asked about the noise level. This finding, in addition to the fact that the actual noise values are much louder than the recommended values, indicates a great need for interventions aimed at reducing noise in ICUs.

Prior Interventions On The Units

Following data collection, nurse managers of the unit were asked to discuss past and current interventions to reduce noise in the ICUs. Interventions aimed at reducing noise on the units have included making staff more aware of noise levels through noise STOP signs,
education, and closing patient doors at night. Earplugs have been offered to patients as well. Duke University has instituted quiet time for two-hour intervals each shift, and has also padded the door closures.

**Nursing Implications and Future Research**

Investigating the nurse perception of noise in the ICU will enable nurses to better recognize the current noise levels in their critical care units, and develop interventions to address these noise levels. Further research is needed to determine if there are noise differences associated between day and night shift or medical versus surgical units. Suggested work for future researchers includes comparing the nurse perception to the actual noise level of different types of intensive care units, as high noise levels more negatively influence certain patient populations than others. There is also a need for future research comparing the noise levels in intensive care units compared to their respective stepdown counterparts. It would be interesting to survey ICU nurses and stepdown nurses to determine which group is more accurate or aware of noise levels on their unit.

Another interesting aspect of future research includes the shift in which data is collected. It is possible that night shift nurses perceive units as noisier than day nurses, based on the activity on the unit at that time and also on average. At Duke, much work has gone in to developing the new Duke Medical Pavilion to be conscious of the noise levels, and it would be interesting to compare units in the Medical Pavilion to those in the older, Duke North building, to determine if a difference truly exists.

There was great variation in the nurses’ perceptions of noise and this warrants further investigation. This study did not collect any demographic information on the nurses surveyed, and this information might be useful to determine if certain characteristics of a
nurse make them more sensitive to noise or more accurate in their perception of noise.

Future work should include this, as it would be interesting to determine if there is a difference in nursing perception of noise based on the nurses’ gender or age, as this might also assist in developing interventions to raise awareness of noise levels in the ICU. Also, as demographic information was not collected, it is not possible to determine if nurses participated multiple times in this study. Future work could also explore intra- and inter-rater reliability of the perception of noise using the Familiar Noise Sources survey.

Based on the results of this study, interventions should be aimed at addressing the response of ICU nurses to noise in the ICU. The nurses in this study consistently rated the noise in the ICU as higher than it actually was. This is concerning as it can be interpreted to mean that even though the nurses felt that it was very noisy in the ICU, no attempt was being made to reduce the noise. Interventions must be developed in order to first help nurses recognize the noise level on the unit, and second, help reduce the existing noise level.

In order to best help nurses become more aware of noise, nurses must be educated on the impact that noise has in the hospital. Next, researchers must identify what factors are keeping nurses from currently intervening when they perceive the noise level to be too high. Are the nurses simply not recognizing the noise level until it is brought to their attention? If this is the case, education to help nurses recognize the noise level might help. Otherwise, reasons for not acting on the noise should be explored: are the nurses overworked? Is there not enough time for nurses to address the issue of noise? Regardless of what the reason is, interventions must take place in order to make nurses aware of the
noise level and to entice nurses to advocate for their patients by working to reduce the noise on their hospital unit.

Additionally, interventions focused on alarm fatigue should be explored. Helping nurses recognize alarm fatigue and providing them with strategies to reduce this phenomenon are also important. In a study conducted by Ryherd et al, 91% of surveyed nurses felt that their routine work environment was negatively affected by noise. The study also found that 66% of nurses felt irritation and fatigue, 43% had problems concentrating, and 40% experienced tension headaches related to the noisy work environment. No studies have been found that quantify the relationship between noise and nursing work performance. This is important to explore because nurses are at the center of patient care and must be performing at their best in order to provide quality care.

The constantly elevated noise level in intensive care units has become an acceptable norm that must be changed in order for patients to receive the best care and the most effective recovery during their hospital stay. Changing the perspectives of the nursing staff in regards to noise level is the first step in changing the behavior of these nurses.
References


