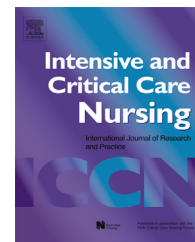




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ORIGINAL ARTICLE

Perceived and actual noise levels in critical care units



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KEYWORDS

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Summary

Purpose: To compare the noise levels perceived by critical care nurses in the Intensive Care Unit (ICU) to actual noise levels in the ICU.

Methods: Following a pilot study ($n = 18$) and revision of the survey tool, a random sample of nurses were surveyed twice in a 3-day period ($n = 108$). Nurses perception of noise was compared to the actual sound pressure level using descriptive statistics.

Major Results: Nurses perceived the ICUs to be noisier than the actual values. The ICU was louder than the recommended noise level for resorative sleep. This finding raises the question of how we can assist nurses to reduce what they perceive to be a loud environment.

Application: Future work is needed to develop interventions specifically for nurses to raise awareness of noise in the ICU and to provide them with skills to assist in noise reduction.

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Implications for Clinical Practice

- Although many studies have acknowledged that the intensive care unit 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.
- 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.
- All of the ICUs surveyed were louder than the recommended 40 dB for restorative sleep, with mean scores ranging from 62.2 to 62.7. There was little variation of noise levels during morning and evening data collection.
- 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 behaviour must be addressed at the nursing level.

Introduction

The intensive care unit (ICU), is a specialised unit of the hospital that provides comprehensive and constant care for critically ill patients. 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 et al., 2013).

Sleep challenges in the intensive care unit

It is a recognised problem that patients treated in the ICU fail to meet their individual daily sleep requirements (Frisk and Nordstrom, 2013). Patients regularly report poor sleep in the ICU related to environmental factors that are possibly modifiable, such as auditory, tactile and pharmaceutical stimulation (Little et al., 2012). It is essential that nurses maximise 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 and Nordstrom, 2013).

Sleep loss is associated with decreased immune function, altered mental status and abnormal hormonal changes (Friese, 2008). Sleep deprivation has also been linked with increased falls, medications and restraint use (Maidl et al., 2013). Insufficient sleep is associated with delusions and memory loss, which may meet the criteria for ICU acquired delirium (Friese, 2008; Maidl et al., 2013; Patel et al., 2008). Decreasing sleep disruptions resulted in the use of fewer sedatives and increases the sleep quality of ICU patients (Bartick et al., 2009).

Factors affecting sleep in the ICU

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 and 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 et al., 2013).

Noise in the ICU

Noise, defined as a perception and subjective measure, can affect patients both physiologically and psychologically (Bailey, 1996; Xie et al., 2009). In the ICU, the primary health effect resulting from noise is sleep disturbance, with an estimated 17% and 57.6% of awakenings and arousals attributed to noise (Lawson et al., 2010).

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 rapid eye movement (REM) sleep, as these stages are especially sensitive to turbulence (Frisk and Nordstrom, 2013). Studies show that impaired sleep may reduce healing and increase length of stay in the ICU (Maidl et al., 2013).

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 et al., 2012a,b). Equipment alarms and staff conversation have been identified as the most disruptive contributing factors to impaired sleep in critical care patients. 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 et al., 2010).

Interventions to address noise in the ICU

Sound is objectively measured using the decibel scale (dB), which is a ratio between the measured level and the typical threshold an average human perceives (Maidl et al., 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 et al., 2010).

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