

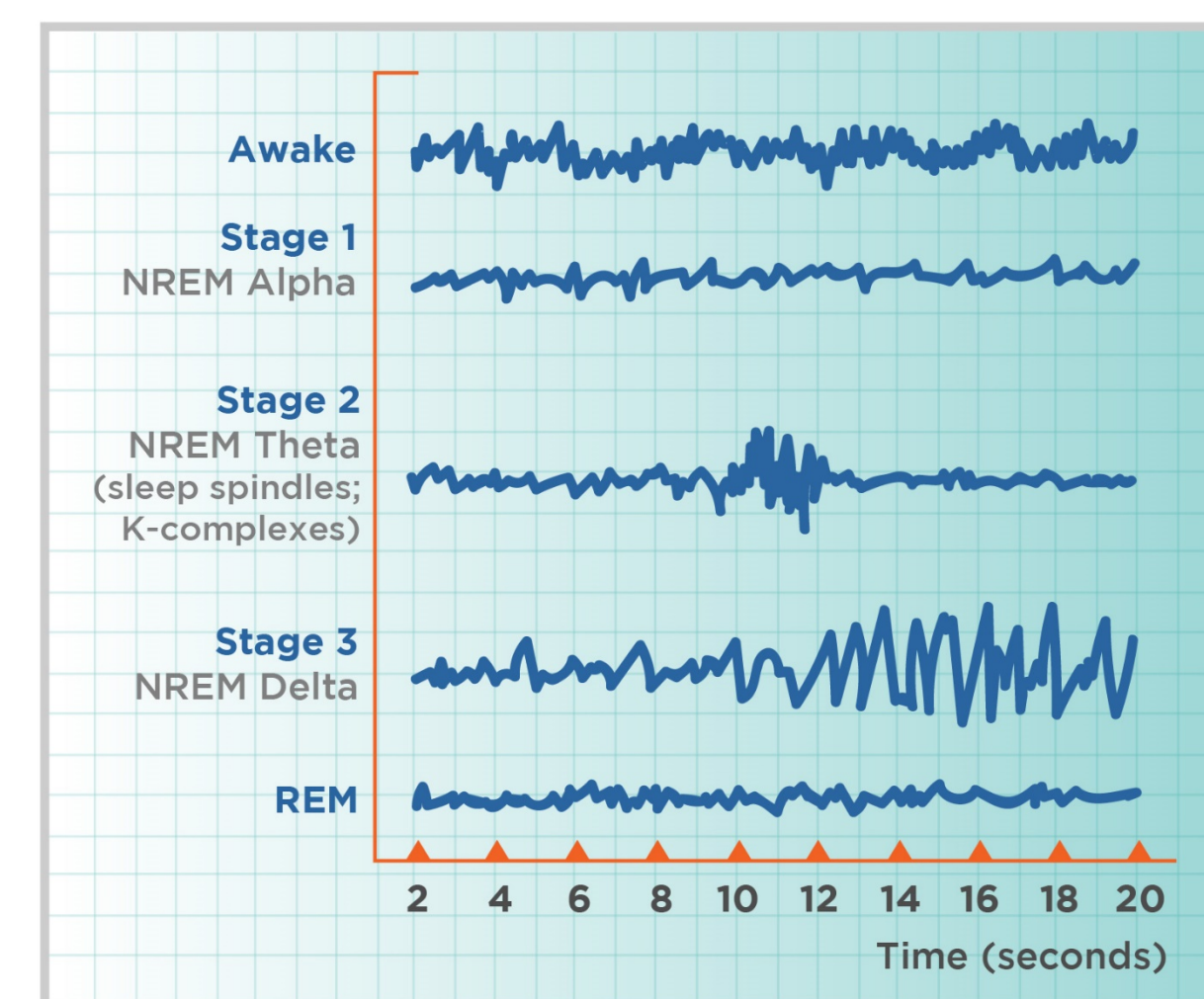
Effects of Sleep Hygiene in the Hospital

Tina Bhakta, Paxton Arsenault, Maya Ahluwalia, Rachel Coats
University of New England

Background

Just like eating and drinking, sleep is required for the human body to function normally. Sleep is a condition of body and mind that occurs for several hours every night. The nervous system is relatively inactive - the eyes closed, the postural muscles relaxed, and consciousness practically suspended. Sleep hygiene is defined as a variety of different practices that are necessary to have normal, quality nighttime sleep. Sleep deprivation adversely affects health and personal well-being. All individuals (healthy or ill) require adequate sleep. Sleep architecture refers to the basic structural organization of normal sleep. There are two types of sleep, non-rapid eye-movement (NREM) sleep and rapid eye-movement (REM) sleep. NREM sleep is divided into stages 1, 2, 3, and 4, representing a continuum of relative depth.

EEG RECORDINGS DURING SLEEP



NATIONAL SLEEP FOUNDATION RECOMMENDATIONS:

- Routine- sleep and wake up at same time every day
- Sleep when tired - avoid spending time awake in bed (watching tv, listening to music, etc.)
- Exercise- 20- 30 minutes a day (do not exercise up to 4 hours before bed)
- Eating dinner 2-3 hours before bedtime
- Modify environment - decrease noise and lighting
- Control substances- avoid intake of stimulants 4 -6 hours prior to bed
- Stress and physical effects of acute illness combined with the hospital environment make it difficult for patients to receive sufficient amounts of quality sleep
 - Prevents ability for patient to spend time out of bed while awake

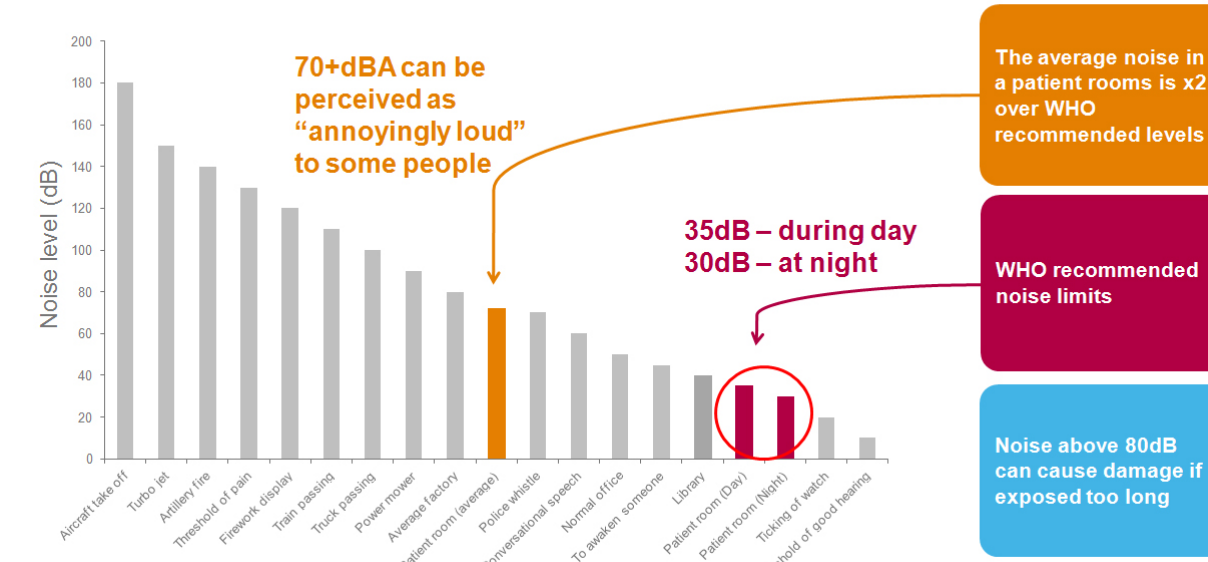
Less than 50 percent of sleep occurs during the normal nighttime hours. Patients in the hospital commonly report noise as a main source of sleep disturbances. Alarms, rolling carts, and medical equipment in patient rooms account for almost half of all noise complaints. In addition, televisions, telephones, and staff conversation also create a loud environment. Many patients are provided pain medication by doctors and nurses, increasing the chances of substance intake, such as opioids and benzodiazepines, which have been shown to decrease the amount of REM sleep. Other adverse effects include: decreased immune function, reduced inspiratory muscle strength, prolonged length of stay, delirium, and increased levels of fatigue, anxiety, and stress.

Limitations within the Hospital

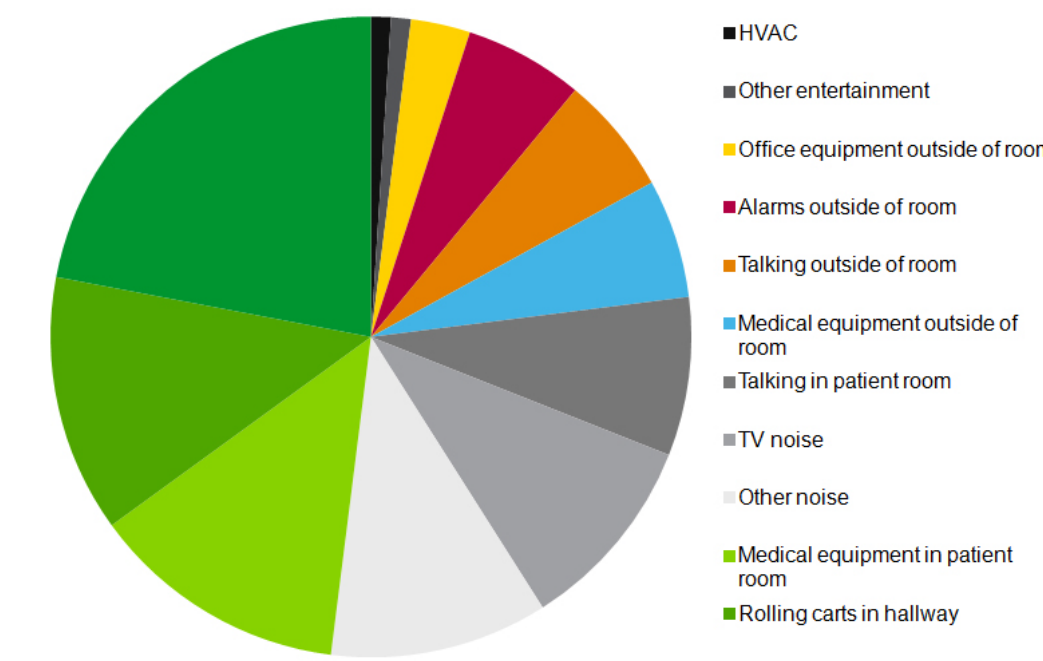
NOISE:

The Environmental Protection Agency (EPA) and World Health Organization (WHO) recommend a maximum noise level of 30 -35 dB during day and 35 dB at night. However, nocturnal noise levels range from 50 to 70 dB in a general unit and up to ~70 dB during the day. Both of which are almost two times or more the recommended levels. Quieter noise levels would promote better sleep hygiene. Healthcare providers coming in and out throughout the day can make it difficult to sleep at the same times each day.

Comparable to a noisy office / factory



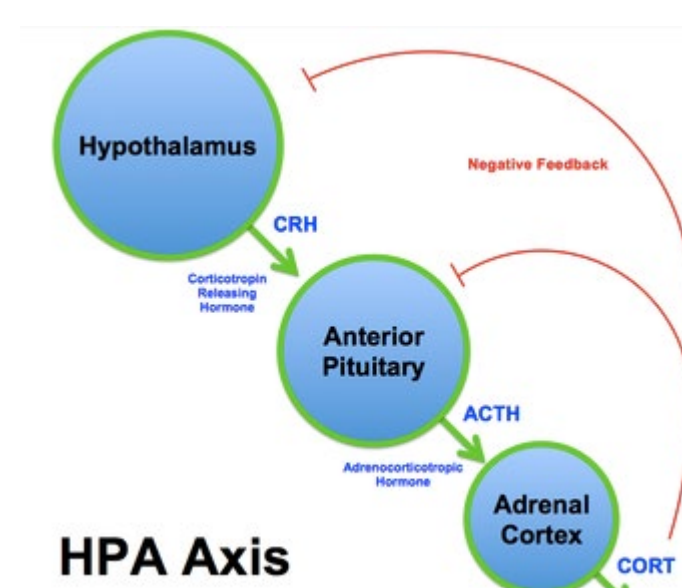
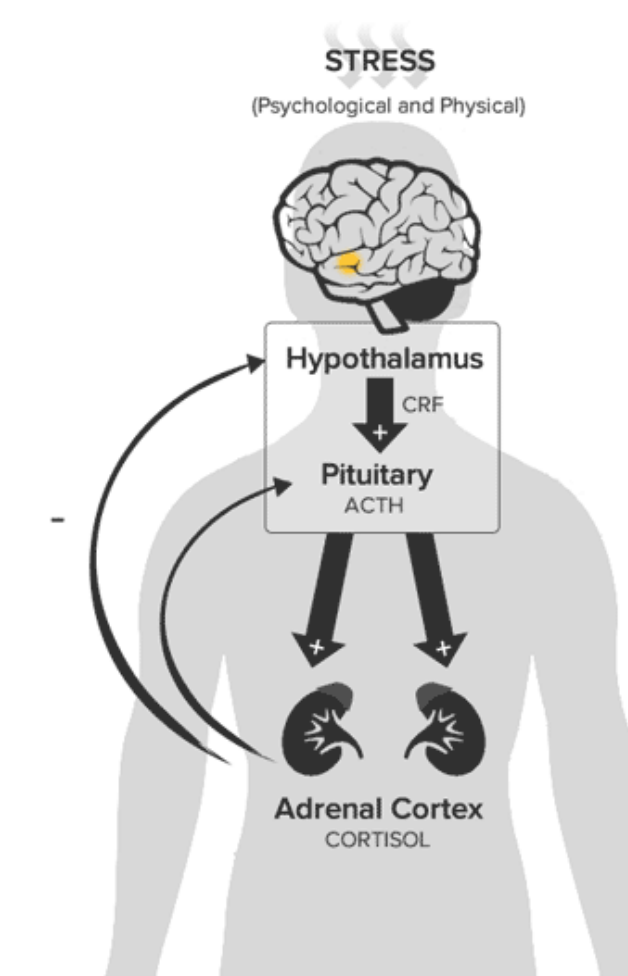
Noise is a common complaint



PHYSICAL EFFECTS:

Sleep deprivation can induce a stress response and result in increased secretion of inflammatory markers. Stress response activates the Hypothalamus Pituitary Adrenal Cortex (HPA) axis and negatively affects immune function leading to the release of cortisol. The HPA axis is responsible for human's stress response. This response is characterized by hypothalamic release of corticotropin-releasing factor (CRF). CRF is also known as CRH or corticotropin-releasing hormone. When CRF binds to CRF receptors on the anterior pituitary gland, adrenocorticotropic hormone (ACTH) is released. ACTH binds to receptors on the adrenal cortex and stimulates adrenal release of cortisol. This disruption of the normal cell distribution causes an increase in susceptibility to opportunistic infections and an impaired ability to fight acquired infections. The immune system experiences a decrease in t-helper and natural killer cell function coupled with an increase in the number of leukocytes and monocytes. The ability to get continuous and consolidated sleep may also become more difficult as we age.

Many patients experience a lack of social cues for the induction of sleep. Lack of cues, such as meal times, leads to alterations in circadian rhythms and leads to sleep deprivation. Anxiety and stress can be caused by an unfamiliar environment. As with other disruptions of sleep architecture, patients with anxiety and stress spend less in the restorative stages of sleep (stage 3 and REM). Difficulty/inability to speak, or new diagnoses of illness cause disruptions in sleep architecture due to things like mechanical ventilation or placement of a tracheostomy tube.



LIGHT:

Excessive amounts of light and the absence of natural light can cause sleep disruption. Lux is the basic unit of measurement for light. Not only does the WHO determine that 1500 lux is required to awake a person from sleep, but it is also the level required to suppress melatonin secretion. Melatonin secretion is important for sleep induction and aids in circadian rhythms. However, in the hospital, nocturnal light level range reaches up to 1445 lux, preventing patients from falling and staying asleep. The amount of light a patient is exposed to causes a disruption in circadian rhythms. Within the hospital, bright light is often required to complete adequate patient assessment and the performance of patient care activities and procedures, making it difficult for health care personnel to limit lighting.

MEDICATION:

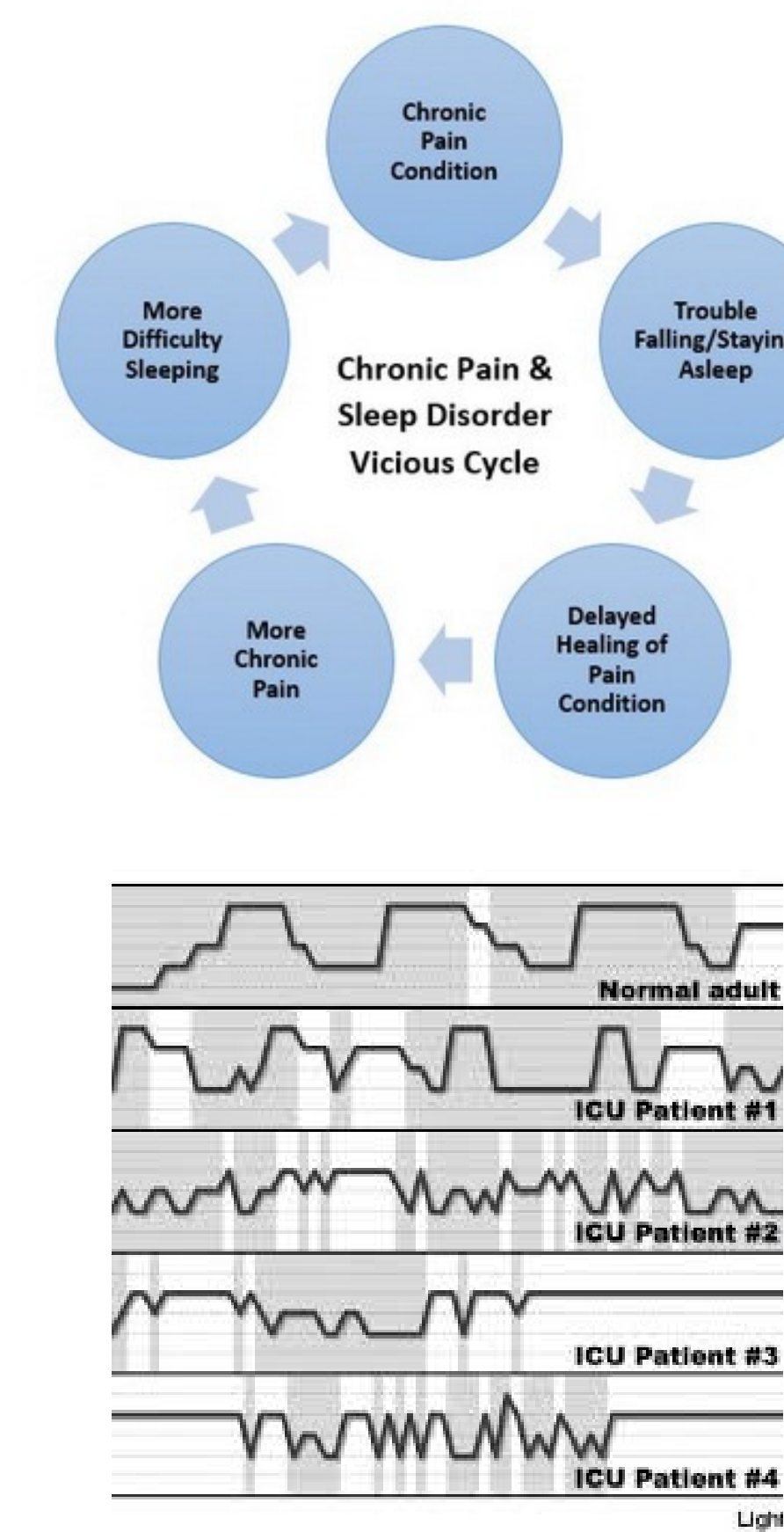
Benzodiazepines are used to treat anxiety and aid with sleep, but limits the amount of REM sleep. Opioids promote sleep onset, but limit REM sleep and cause nocturnal awakenings. In addition to disrupting the sleep cycle, benzodiazepines and opioids are associated with delirium.

PAIN:

Many researchers link sleep deprivation in the hospital to the vicious cycle between pain and sleep. As patients become more sleep deprived, they experience more pain. When patients experience more pain, it prevents them from obtaining a full night of uninterrupted sleep. Poor sleep is also linked to higher pain levels throughout the next day. Untreated and uncontrolled pain contribute to patients' sleep deprivation. In order to reach the restorative stages of sleep, stage N3 and REM, patients must complete the 90 to 110 minute sleep cycle. This cycle limits patients from obtaining a normal sleep cycle.

ICU:

In an ICU setting, focused nursing assessments are required as often as every other hour. Vital signs, equipment adjustments, medication administration and wound care are examples of the necessary assessments that need to be completed around the clock in the hospital. Bed bound patients need to be repositioned at least every two hours to prevent pressure sores, causing severe limitations to sleep. In fact, ICU patients experience between 40-60 interruptions per night, with 75% of ICU patients reporting "poor" or "very poor" sleep. This is due to patients not reaching N3 and REM sleep, the restorative stages of sleep. The graph above illustrates sleep cycles of ICU patients in comparison to the normal adult.



Interventions to Promote OT/PT Participation

Sleep deprivation is directly related to how patients perform in therapy. Poor sleep hygiene can negatively affect how the person functions during the day, which relates to how we engage in occupations. Sleep promotion interventions are designed to minimize sleep disruptions and maintain the normal sleep-wake cycle. Interventions are tailored to counteract the common causes of sleep disruption. Requesting that employees lower their voice and/or customize alarm settings for each patient can decrease the noise level throughout the hospital. Healthcare providers can also offer ear buds or eye masks if controlling the noise or lighting in the hospital is not realistic. Research has showed improved results in sleep hygiene in the ICU with the implementation of these interventions. The maintenance of social cues such as meal times can ensure that patients eat prior to falling asleep. Other social cues, including awareness of time, will aid in maintaining circadian rhythms. Keeping a clock within view or having a phone or watch on hand is an easy fix to this problem. As an interprofessional team, it is important to ensure that the patient is comfortable in bed, has their pain under control, and has their emotional needs addressed prior to sleeping.

ASSESSMENTS:

St. Mary's Hospital Sleep Questionnaire

- This questionnaire has been used to successfully detect changes in sleep pattern.
- 93 subjects in four different groups: 16 surgical inpatients, 21 medical inpatients, 32 psychiatric inpatients
- Results captured sleep onset, length, and awakenings

Richards Campbell Sleep Questionnaire:

- A brief 5-item questionnaire used to evaluate perceived sleep depth, sleep latency
- Scores calculated by mean score of these 5 items, with higher scores representing better sleep
- Approximately 2 minutes to complete by patient or care provider
- Demonstrated strong correlation with measurements of deep sleep and REM sleep

References

Berthofer, E.I., Higgins, P.A., Daly, B., Burant, C.J., & Hornick, T.R. (2013). Hospital lighting and its association with sleep, mood, and pain in medical inpatients. *Journal of Advanced Nursing*, 70, 1164-1173. doi: 10.1111/jan.12282

Delaney, L.J. (2016). The role of sleep in patient recovery. *Australian Nursing and Midwifery Journal*, 23(7), 2629.

Eilassen, K.M. & Hopstock, L.A. (2011). Sleep promotion in the intensive care unit - A survey of nurses' interventions. *Intensive and Critical Care Nursing*, 27, 138-142. doi: 10.1016/j.iccn.2011.03.001

Ellis, B.W., Johns, M.W., Lancaster, R., Angelopoulos, P., Angelopoulos, N., & Priest, R.G. (1981). The St. Mary's Hospital Sleep Questionnaire: A Study of Reliability. *Sleep*, 4(1), 99-107. doi: 10.1093/sleep/4.1.93

Hoey, L.M., Fulbrook, P., & Douglas, J.A. (2014). Sleep assessment of hospitalized patients: A literature review. *International Journal of Nursing Studies*, 51, 1261-1288. doi: 10.1016/j.ijnurstu.2014.02.001

Kamdar, B.B., Khauer, M.P., Jones, S.F., Parsons, E.C., Parthasarathy, S., & Pisani, M.A. (2016). Perceptions and practices regarding sleep in the intensive care unit: A survey of 1,223 critical care providers. *Annals of the American Thoracic Society*, 13, 1370-1377. doi: 10.1513/AnnalsATS.201606070C

Kamdar, B.B., Needham, D.M., & Collop, N.A. (2011). Sleep deprivation in critical illness: Its role in physical and psychological recovery. *Journal of Intensive Care Medicine*, 27(2), 97-111. doi: 10.1177/0885066610394322

Kamdar, B.B., Shah, P.A., King, L.M., Kho, M.E., Zhou, Q., Jantunen, E., Collop, N.A., & Needham, D.M. (2012). Patient nurse interrater reliability and agreement of the Richards-Campbell sleep questionnaire. *American Journal of Critical Care*, 21(4), 264-269. doi: 10.4037/ajcc.2012.111

National Sleep Foundation (2015). National sleep foundation recommends new sleep times. Retrieved from <https://sleepfoundation.org/press-release/national-sleep-foundation-recommends-new-sleep-times>

Pilkington, S. (2013). Causes and consequences of sleep deprivation in hospitalized patients. *Nursing Standard*, 27(49), 36-49.

Pisani, M.A., Friese, R.S., Schibach, B.K., Schwab, R., Jeyaraj, G.L., & Jones, S.F. (2015). Sleep in the intensive care unit. *American Journal of Respiratory and Critical Care Medicine*, 191, 737-738. doi: 10.1164/rccm.2014120950C

Salzmann-Erikson, M., Lagerqvist, L., & Pousette, S. (2015). Keep calm and have a good night: Nurses' strategies to promote inpatients' sleep in the hospital environment. *Scandinavian Journal of Caring Sciences*, 30(2), 356-364. doi: 10.1111/sjcc.12255

Stremel, R., Adams, S., & Dryden-Palmer, K. (2015). Nurses' views of factors affecting sleep for hospitalized children and their families: A focus group study. *Research in Nursing & Health*, 38(4), 314-322. doi: 10.1002/nur.21664

Su, C.P., Lai, H.L., Chang, E.Y., Peng, S.J., & Chen, P.W. (2012). A randomized controlled trial of the effects of listening to non-commercial music on quality of nocturnal sleep and relaxation indices in patients in medical intensive care unit. *Journal of Advanced Nursing*, 69, 1377-1389. doi: 10.1111/j.1365-4248.2012.06130.x

Ugras, G.A., Babayigit, S., Tosun, K., Aksay, G., & Ugras, Y. (2015). The effect of nocturnal patient care interventions of patient sleep and satisfaction with nursing care in neurosurgery intensive care unit. *Journal of Neuroscience Nursing*, 27(2), 104-112. doi: 10.1097/JNN