

# Lighting and noise contribute to kids' sleep deprivation in hospitals

May 12 2021, by Rebecca Biason

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Researcher Robyn Stremmer with a child who is wearing an actigraph. Credit: Lawrence S. Blomberg Faculty of Nursing

Most hospitalized children experience significant sleep deprivation—and light and sound are two major culprits.

That's the finding of researchers at the University of Toronto and the Hospital for Sick Children (SickKids) who measured, minute by minute, how well children sleep in the [hospital](#)—as well as their exposure to light and sound.

The study was recently published in *JAMA Network Open*.

"This is the first time we can show how much of an impact light and sound have on awakenings in particular," says lead author Robyn Stremler, an associate professor in the Lawrence S. Bloomberg Faculty of Nursing.

"It has been assumed that when children are sick, they might be awake or have disrupted sleep due to pain or illness, but with these data, we are able to show that light and sound are the largest contributors to sleep problems and that sleep could and should be improved."

Using actigraphy, a non-invasive way of measuring rest and activity cycles, Stremler and her team were able to objectively measure sleep by having patients wear a device on their ankle or wrist that contained an accelerometer—similar to how a Fitbit measures sleep. They then assessed waking and sleep periods over the course of multiple nights. Sound and light meters were time-synchronized to the actigraphy device and were placed at the child's bedside to measure any light and sound that occurred in the room around waking.

After considering additional variables, such as the reason for the child's admission, how ill they were, whether they were residing in the [pediatric intensive care unit](#), or PICU, and whether a parent or nurse was present in the room, the study found that light above 150 lux, or about the same brightness as an [incandescent bulb](#), and sound over 80 decibels, which is equivalent to a sudden loud noise, had the most significant impact on sleep.

"What we can see is that these disruptions are part of the hospital environment and are modifiable—not easily, but we can look at doing something about it," says Stremler, who is also an adjunct scientist at SickKids.

One of the main reasons patients get woken up at night is so caregivers can monitor their temperature and blood pressure, or administer certain medications. The sicker the patient is, the more likely they are going to need frequent assessments. Stremler says that while there is a clinical imperative to check on these patients, there could be a greater effort to tailor care to each patient's situation.

"Rather than, across the board, saying, "Every four hours, patients need to have their vitals assessed," can we look more critically at patients to see if that level of monitoring is necessary? Can we make different choices about when medications are given? We need to think about how we can preserve as much sleep as possible given that we know that more sleep benefits patients' physical and mental health and recovery."

That said, Stremler notes it can be challenging to modify such assessments because they involve [policy change](#) and care co-ordination across many groups of caregivers in hospital. Stremler's previous research has shown that while nurses know that preserving sleep is particularly important for pediatric patients, they also emphasize it can be difficult to provide adequate care and ensure there are limited sleep disruptions.

There may be other ways that hospitals can help to reduce light and sound within a patient's room. Hospitals designing new spaces, for example, can consider how loudly or often doors close, lighting options and the use of materials that can absorb sound.

"We've suspected for some time that aspects of the environment were

affecting sleep in young patients, but with this granular look at sleep intervals we are able to emphasize the importance of taking measures to reduce [light](#) and [sound](#) to improve sleep for [patients](#) who need it most," Stremler says.

**More information:** Robyn Stremler et al. Objective Sleep Characteristics and Factors Associated With Sleep Duration and Waking During Pediatric Hospitalization, *JAMA Network Open* (2021). [DOI: 10.1001/jamanetworkopen.2021.3924](#)

Provided by University of Toronto

Citation: Lighting and noise contribute to kids' sleep deprivation in hospitals (2021, May 12) retrieved 27 April 2024 from <https://medicalxpress.com/news/2021-05-noise-contribute-kids-deprivation-hospitals.html>

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