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Light and noise: Environmental factors in intensive care units☆

Factores ambientales de luz y ruido en las unidades de cuidados intensivos

Dear Editor:

Intensive care units (ICUs) are settings characterised by very sophisticated equipment that require specialised facilities and in many instances produce environments with poor natural light and background noise.[1–3] In these high-tech units, the activities involved in advanced life support and subsequent care may predispose to discomfort. Katherine Kolcaba defined comfort as the state experienced through having the human needs for relief, ease, and transcendence addressed in four contexts: physical, psychospiritual, sociocultural, and environmental.[4]

Aware of the importance of these factors in the care of critically ill patients, we reviewed the standards on light and noise in ICUs and studied the characteristics of these two variables in the PICU of a tertiary care hospital.

We measured environmental light with a CEM DT-1308 light metre in luxes (lx). Measurements were made in the morning and at night and taking into account the three types of lighting that predominate in the unit under study: natural light, white/cool light and warm/yellow light. We defined light colour based on colour temperature expressed as Kelvin (K). Based on this parameter, cool light corresponds to white tones exceeding 5000 K (fluorescent lights), while warm light corresponds to yellow tones of less than 3300 K (halogen lights).[5]

We measured environmental noise with a PCE-999 type 2 audiometer in decibels (dB). We recorded the noise level every 2 h for 6 days.

The references used for comparison were the European Union Lighting Standard for Interior Lighting (EN 12464.1) and, for environmental noise, guidelines of the American Academy of Pediatrics (AAP) and the Council on Environmental Health, as well as the standards proposed by the World Health Organization (WHO). We ought to note that in order to avoid the Hawthorne effect (the alteration of behaviour in subjects aware of being observed) we performed these measurements without the knowledge of the health care staff in the unit.

We collected a total of 28 light measurements and 72 environmental noise measurements. The recommended light levels are 100 to 1000 lx during the day and 20 lx at night. The median natural light was 51.7 (0–207.2) luxes. As for direct cool lighting, the daytime median was 195.6 (88.1–347.2) luxes compared to 159.6 (57.0–206.7) at night. In comparison, our analysis of indirect warm light resulted in a median of 67.5 (11.4–193.7) luxes during the day versus a median of 27.4 (13.2–72.4) at night. All daytime light measurements complied with the standards, although nighttime luminosity far exceeded the recommended luxes.

When we analysed the environmental noise in the ICU, we found a mean 57.64 ± 3.67 dB during the day versus 55.48 ± 3.17 at night. Both levels exceed the daytime threshold of 45 dB and the nighttime threshold of 35 dB recommended by the reviewed standards.

Therefore, we can conclude that in order to improve environmental factors in our unit, we must continue to promote the use of natural light or, in its absence, warm lighting

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during the day, as these were the types of lighting that corresponded to the lowest lux values and best fit the standards. However, the use of light during the night should be restricted to strictly necessary procedures, as it exceeds the reviewed standards. As for environmental noise, it exceeded the daytime 10 dB and the nighttime 20 dB recommended by the AAP and the WHO, so we should promote a culture of environmental quiet, limiting all inputs that generate background noise. Continuous monitoring of environmental light and noise may improve the health care staff's awareness of the importance of these environmental factors in the care of critically ill patients, thus promoting a reduction in their levels.[6]

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