



KEY POINT SUMMARY

OBJECTIVES

This study evaluates ambient light levels and their association with clinical outcomes and analgesic/sedative/neuroleptic use in an ICU.

DESIGN IMPLICATIONS

Room orientation, window size, and window placement should be carefully considered so that neither too much nor too little light enters the healthcare facility. Windows should be equipped with curtains or shades so that lighting levels can be more easily controlled.

Ambient light levels and critical care outcomes

Verceles, A.C., Liu, X., Terrin, M., Scharf, S., Shanholtz, C., Harris, A., Ayanleye, B., Parker, A., Netzer, G. 2013 | *Journal of Critical Care*. Volume 28, Issue 1, Pages 110. E1-110.e8

Key Concepts/Context

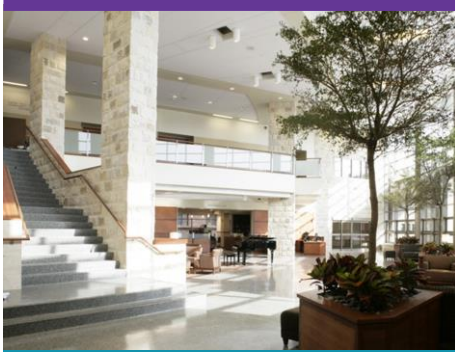
Several U.S. healthcare agencies endorse a guideline that requires the construction of windows in patient care rooms so that naturally regulated sunlight can contribute to interior ambient lighting. This recommendation has been adopted by agencies in 46 U.S. states. Few studies have analyzed the association between light levels and intensive care unit (ICU) outcomes. No previous studies have quantitatively measured light levels or assessed intermediate factors such as analgesic use.

Methods

A retrospective observational study was performed on 3577 single/first admission patients admitted to an American university hospital between 2006 and 2009, and on 3344 patients from this same sample for sedative/analgesic/neuroleptic use analysis. The hospital has a 29-bed ICU with a 1:1.7 nurse/patient ratio. Patients were assigned rooms based on bed availability; acuity did not factor into room assignment.

No protocol was followed for regulation of light, noise, patient care interaction, or designated sleep time or quiet hours.

Light was measured through a luxmeter mounted at the patient's eye level on a central column behind the bed. Measurements were taken continuously over specific recording periods and reported in mean lux/30-second epoch and ranges (lowest to highest in lux). Light was measured in all rooms for 10-minute periods for a total of 20 epochs of light measurements between 11 a.m. and 1:30 p.m. EST on the same day. These hours were chosen to include solar noon. Light levels were also measured in the centrally located nursing station in each cardinal direction continuously for 48 hours on different days.



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Variables of interest were ICU length of stay, ICU mortality, 28-day ICU-free days, and 28-day ventilator-free days.

Findings

Even though a three-fold difference was found in mean light levels among patient rooms, no association with light levels was found with length of stay, ICU mortality, ventilator-free days or 28-day ICU-free. Additionally, no difference in sedative/analgesic/neuroleptic medicine use by proportion was found. This indicates that it is uncertain whether ambient light influences ICU outcomes. Measured differences in light intensity, while statistically significant, did not appear to be physiologically significant. This suggests that current engineering and architectural guidelines governing light regulation in the ICU may be inadequate.

Limitations

The author identified the following limitations: Light levels were not measured in all four seasons. The complex nature of ICU care may have impeded the beneficial effects of ambient light. Patient location within the ICU could have provided varying intensities of light and sound, which could affect biologic rhythms. Regardless of light, noise coming from other nearby care units such as the radiology department may have been disruptive to all patients, thereby diminishing the potential benefit of increased daytime sunlight. The administrative data used to define outcomes lacks the predictive value of other scales such as the Acute Physiology and Chronic Health Evaluation metrics. Implementation of sedative and neuroleptic medications as markers for agitation and delirium are not precise.

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