



Caring for the Caregivers

Research at Georgia Tech shows what nurses really think about lighting

BY KARYN GAYLE, JENNIFER DUBOSE AND KHATEREH HADI

Perhaps more than any other group of professionals, nurses frequently make their needs subordinate to the people they serve—patients and families requiring care and support. Pragmatic, devoted, compassionate and hardworking, nurses play an indisputably important role in healthcare. Surprisingly, though, limited research has been done on understanding nurses' subjective impressions of lighting, and what they need to be more effective on the job.

Nurses perform a number of critical tasks, day and night, in dynamic and unpredictable care environments. Lighting clearly has an impact on nurses' ability to perform these tasks, and Georgia Tech's SimTigrate Design Lab, in collaboration with Acuity Brands, engaged in a research project to understand the specific perceptions and preferences of this important user group.

STUDY METHODOLOGY

This project delved into nurses' opinions about lighting in inpatient medical-surgical hospital units. The three-phase research effort began with a literature review to uncover and summarize current insight on care provider lighting preferences. Phase two focused on survey development and administration, enabling the team to gather feedback about lighting attributes and features from a large cross-section of registered and certified nurses. During phase three, focus group interviews were conducted with a smaller group of day- and night-shift nurses to explore challenges that were gleaned from the questionnaire responses.

The objective was to understand what lighting features nurses reported that they would need to improve job performance, as well as understanding which spaces mattered the most to them and their level of satisfaction with the lighting in their current nursing unit. Looking at subjective perceptions of lighting, as opposed to solely evaluating functional needs, represents a new approach to this topic. Previous studies have evaluated recommended minimum illuminance levels for tasks such as medication administration, but no existing research was found on nurses' preferences in the hospital environment.

LITERATURE REVIEW

For good reason, the challenges of nighttime nursing dominate the literature, specifically, the disruption to nurses' circadian rhythms and the need to maintain alertness throughout the night

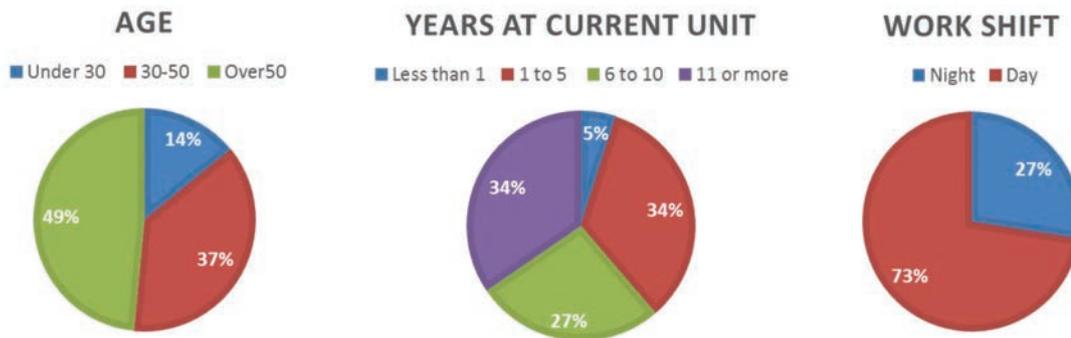


Figure 1. Breakdown of 393 survey respondents.

shift. Nurses experience circadian phase disruptions during night shifts because the timing of their sleep-wake schedule and work schedule is out of phase with the natural light/dark cycle. (While beyond the scope of this study, the promotion of circadian entrainment and alertness for night- and rotating-shift nurses continues to be vigorously studied by researchers, as more is learned about non-visual effects of light.)

Issues related to light and dark adaptation for nurses at night also emerged as an area of concern, as nurses often enter a darkened patient's room from a brightly lit corridor. The stark contrast in light levels can contribute to eye fatigue and diminished visual acuity as nurses travel between patient rooms and nursing stations throughout the night.

Finally, color fidelity and its impact on patient observation and diagnosis were mentioned in industry publications. Accurate color rendering of skin and tissue during examinations and procedures, which often occur at patient bedside, is particularly important.

SURVEY METHODOLOGY

Using a simple survey tool, we designed a questionnaire that asked nurses about their satisfaction with six specific locations within medical-surgical nursing units. The space types covered

in the survey were the *centralized nursing station (CNS)*, *decentralized nursing station (DNS)*, *patient bedside (PBS)*, *patient bathroom (PBR)*, *corridor (COR)*, as well as a "nighttime location" that was used in conjunction with the other space types to gauge satisfaction. In addition to an open-ended question at the end, the participants were asked about their overall satisfaction with the quantity and quality of lighting, including the existence of disruptive lighting conditions such as glare, shadows and photometric flicker, access to lighting controls (switches and dimmers), as well as the importance of lighting controls. A few demographic questions were incorporated into the questionnaire to determine the typical shift worked, age, experience and eye pathologies, factors that could result in differing perceptions of satisfaction (**Figure 1**).

Of the 393 survey respondents, 14 percent were under the age of 30, another 37 percent were between the ages of 30 and 50, while almost half of the respondents (49 percent) were over the age of 50. The vast majority of respondents were female, with male nurses only representing 5 percent of the respondents. Only 17.8 percent reported that they never wear glasses or contacts to correct their vision.

The respondents were relatively experienced and familiar with their nursing units, with over 60

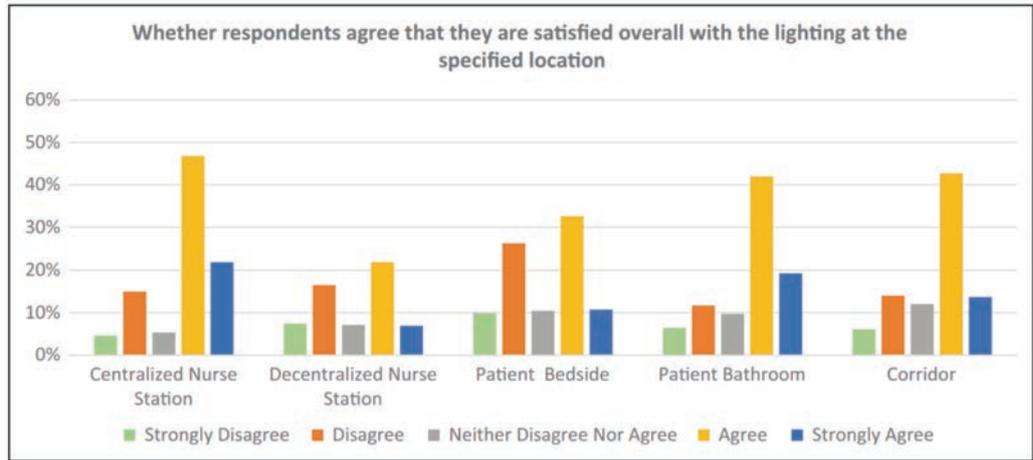


Figure 2. Overall satisfaction with lighting.

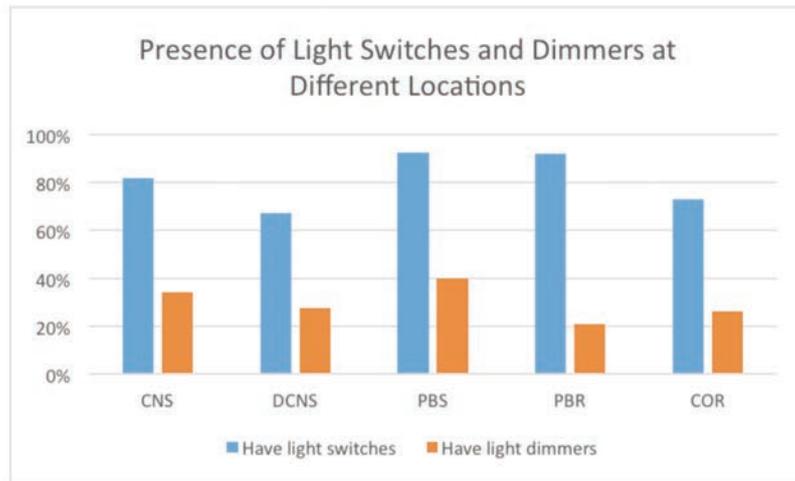


Figure 3. Controls usage by space type.

percent reporting working in their current unit for six-plus years, and only 5 percent reporting tenure in the current unit as less than a year. Most of the respondents worked a day shift (73 percent); however, the survey received enough respondents from the night shift (27 percent) to allow for meaningful statistical comparisons between the two shifts.

NURSES' PAIN POINTS

Of the six space types covered in the survey, two were deemed to be the most problematic:

decentralized nursing stations (DNS) and patient bedside (PBS). Both of these spaces had far lower satisfaction scores than any of the other space types, as shown in **Figure 2**. The researchers used survey responses, as well as follow-up focus groups, to glean further insights on the reasons behind the lower scores.

In both DNS and PBS settings, a “Goldilocks” scenario could be ascertained from the responses, with the majority of nurses characterizing their light levels as “*too little*” (43.3 percent of respondents) or “*too much*” (18.4 percent), as

opposed to just the right amount. Additionally, over 57 percent of nurses reported shadows as impacting their visual performance in their decentralized nursing stations.

When evaluating the responses related to lighting at the patient bedside, it was clear that most nurses felt as though they had “*too little light*” (45.9 percent) and that shadows impacted their task performance (62.5 percent). At night, quality and quantity of light requires balance, as having “*too much*” light during nighttime rounding could be fairly disruptive to patients’ sleep. Many of the focus group comments reinforced these hypotheses, with nurses commenting that “*Lighting is definitely problematic at night in the patients’ room because getting a soft amount of light that is not bothersome to the patient but allows the nurse to adequately assess the environment and the patient’s condition becomes a challenge.*” Others commented that “*...when you turn on that light...it’s so bright that the patient is startled a lot of the times...so they do complain because that light is really bright. It wakes you up; it really frightens [the patient].*”

With respect to respondent variables such as age or vision issues, we found slight increases in overall satisfaction scores for nurses under 30 years old, as well as nurses who did not report any eye conditions; however, these differences were not statistically significant.

GIVING NURSES MORE CONTROL

As expected, dissatisfaction also increased in facilities where lighting controls to adjust intensity and/or light distribution (switching, dimming) were unavailable. Because the survey covered ex-

isting facilities of varying ages, it is reasonable to assume that intensity control would not be pervasive across the six space types covered in the study. The survey results prove this, as only a small percentage of respondents indicated the presence of dimming controls across space types (**Figure 3**).

The diversity of tasks being performed by nurses over the course of a 24-hour day in hospital environments is vast, so having some level of control over lighting intensity, as well as dis-

tribution, through the use of layered lighting strategies can provide the caregiver team with greater flexibility to tailor lighting to their specific needs. One consistent theme in all of the focus group sessions was the desire to have dimming controls in patient rooms and bathrooms, corridors and nursing stations. Multiple nurses commented that being able to reduce intensity in patient corridors would be a welcome change for patients who find the light “*so bright that [they] complain about it all the time,*” also citing that brightly lit

hallways at night “*really [wreaks] havoc with our senior patients because they don’t know that it’s... time to go to sleep because they say it’s light!*”

BETTER LIGHTING, HAPPIER NURSES

The study’s findings about the need for more lighting control are not surprising, since the project focused on existing buildings, and it is an issue that is easily remedied today. For many older buildings, incorporating dimming controls is impossible or cost-prohibitive. However, for facilities that are currently being designed or pursuing partial relight or full renovation, there is no shortage of control options for today’s digital solid-state lighting sources.



Diagnosis

- Too bright
- Too dark
- Shadows

Remedy

- Controls for nurses and patients
- Automatic dimming

When incorporating lighting controls for healthcare, it is helpful to design with three principles in mind: simplicity, flexibility and automation. When it comes to “keeping it simple,” the significant demands on caregivers mean that nurses and support staff have very limited time or patience for complicated systems that are not intuitive for a broad range of users. Controls should be straightforward for nursing staff, through the use of clearly marked lighting presets on control wall stations and other user interfaces. Wherever possible, patients and family members should have control over their lighting, to ease the bur-

den on the nursing team. Several nurses lamented the fact that patients could not control their own lights easily, resulting in potentially unsafe attempts to get out of bed to turn off lights, or time-consuming nurse calls to come back to the room to switch off bothersome overhead lighting.

Designing flexibility in lighting and controls systems can future-proof design choices down the road. There are few settings as dynamic as a hospital, and the needs of a particular room may change over time to accommodate patients of varying levels of acuity or special circumstances. Using layers of light for ambient and task lighting can help minimize lighting disruptions like shadows for critical tasks like patient examination. Preset scenes and light levels are also easily modified through the increasingly prevalent use of intuitive controls software.

Lastly, with respect to automation, the use of schedules and setbacks reduces the burden on care providers and facility staff. One nurse commented that her team often tries to “turn the lights off...around 11[p.m.]. But, if we're all busy, sometimes it doesn't even happen.” Most would agree that caregivers have more pressing concerns than remembering to dim or turn off lights. Automatically dimming light levels in corridors at night and during “quiet times” is a design practice that supports patient comfort, frees up caregivers and staff to perform important and sometimes lifesaving tasks, while saving energy for the hospital.

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THE LAST WORD

Nurses are the “unsung heroes” of care settings, but they, too, have specific concerns about lighting in the workplaces where they provide compassionate care. The survey and statistical analysis in the study contained many significant findings about nurses' levels of satisfaction. Even more compelling, all of the issues that we uncovered are easily addressable using today's lighting technology.

While the literature is largely silent on their subjective impressions of lighting, it is up to the lighting practitioner to honor the needs of our valued care providers. As the late Maya Angelou, whose mother was a nurse, once eloquently stated, “[Nurses] have the opportunity to heal the heart, mind, soul and body of our patients, their families and ourselves. They may forget your name, but they will never forget how you made them feel.”

Isn't it time we returned the favor? □

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Of the six space types covered in the survey, two were deemed to be the most problematic: decentralized nursing stations (DNS) and patient bedside (PBS)

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