



ABOVE & LEFT: These waiting areas show how a playful array of lights and sculptural lighting elements can assist in transforming a space, providing distraction to users who are often stressed and restless.

Lighting for good health: evidence-based design in hospital environments

BY CLAIRE THOMPSON

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Photographs courtesy of: NDYLIGHT

Hospitals are one of the most complex environments for lighting designers to work in. The vast range of user needs coupled with stringent standards (specifically AS 1680 for interior spaces) and the need for lighting to be used as a tool to enhance patient health, rather than simply illuminate a space, makes health care lighting a challenging prospect.

According to Xiaobo Quan, a senior researcher at the Center for Health Design (CHD) in the USA, hospital lighting design decisions should follow a process known as evidence-based design, in which designers use research findings to drive their creative decisions. Research published in medicine and other fields shows that effective lighting can have a variety of positive impacts in hospital environments, from reducing the length of a hospital stay to reducing

depression in patients, speeding up recovery and assisting clinicians to successfully perform a range of visual tasks, such as dispensing medication and assessing patients.

One important issue for lighting design, according to Quan, is creating lighting that facilitates sleep and healing.

"There are many stressors in the hospital," Quan says.

"When patients recover from anaesthesia and move into the recovery process, lighting, noise and other issues all play together for sleep disturbance or disruption.

"For healthy people like us, if we can't get sleep through the night, the next day we'll feel not the best, right? But for the patients, they need sleep very much, because they need that for recovery."



This patient room has two functional areas that can be separated via a curtain screen. The room has good access to daylight. Individual control has been provided to each area so that separate light levels can be achieved in bed and lounge areas. Ambient and reading lighting is supplied from luminaires located behind the bed. Downlights provide supplementary task lighting as required.

To achieve this, designers need to ensure that ample daylight is made available to patients, that room lighting is positioned so that it doesn't shine directly into patients' faces, and that indirect lighting is used where appropriate. Lighting needs vary significantly between patients. For some patients, the lighting needs change over the course of day and night. Many patients also spend significant time being moved from one location to another (such as from theatre to recovery, or recovery to the ward) via hallways and elevators; making these spaces responsive to patient need should be part of the overall lighting plan.

During waking hours, patients want their space to be calming and comfortable. Aviva Gunzburg, a lighting designer with NDYLIGHT in Melbourne, says that the aim is to try and create an environment that helps patients forget, as

much as possible, that they're away from the comforts of home. Providing good access to daylight along with low glare ambient lighting is key to this approach.

"Hospital and health care lighting is all about trying to make the space feel homely and de-institutionalised," she says.

"Lighting can assist in creating a positive distraction for patients, drawing their attention away from their ill health.

"It is quite challenging as you need to de-institutionalise the space for the patient, whilst still providing quality task lighting for the staff."

It's here that the most significant challenge of hospital lighting emerges: while patients need ambient lighting as part of their recovery process, clinicians need to operate in well-lit environments with high lux levels that



The same lighting philosophy applied to acute trauma and ICU rooms is in use in this IPU room. Daylight and ambient lighting are provided by fittings not in direct view of the patient. The difference in lighting is the examination light, which is produce more light and is moveable and aimable.

enable them to perform clinical tasks (such as dispensing medication and dressing wounds) and operate medical equipment. One area of particular relevance for health care practitioners is performing visual assessments of patients in order to glean information about their current health status. For example, the colour of a patient's skin can provide important indicators of the presence of cyanosis, a bluish discolouration of the skin that indicates dangerously low levels of oxygen in the blood. Lighting that renders skin colour ineffectively can hamper clinicians' ability to pick up on health issues in a timely manner.

So how can lighting designers meet such disparate needs with a single lighting plan? According to Quan, most health care design doesn't sufficiently consider the needs of frontline users. Part of this is a client issue -

clients may be hampered by preconceived notions of what constitutes effective design, and may also be held back by budgetary concerns or a lack of understanding of the evidence supporting patient-centred design - but designers can help mitigate the problem by seeking input from a broad range of stakeholders.

"Instead of just asking the clients, health care provider, or organisation or the CEO or facilities manager about staff and patient needs, designers can work directly with staff - the frontline staff - or other representatives to find out their needs, because sometimes there's an aha moment or surprise there. The facility owner may think they know very well about their staff and patients, but in effect maybe the designers will find the other way," he says.



ABOVE & RIGHT: Staff bases operate 24/7 and generally do not have access to daylight. These bases are provided with three lighting systems to allow staff to control light levels throughout the day and night.

For Gunzburg, the answer to meeting such a variety of user needs lies in the use of lighting control systems. These systems perform a multitude of tasks: they allow patients to control their immediate environment, providing different lighting options for activities such as reading and resting, while also allowing staff to access task lighting on an as-needs basis. Gunzburg says that technological advancements in lighting have given lighting professionals more opportunities to implement advanced lighting control systems in health care projects, and that allowing patients to personalise their surroundings can have a positive impact on recovery.

"A lot of it comes into lighting control. We can provide several lighting systems within a space which can be individually controlled to suit the need at the time," Gunzburg says.

"For example, we provide the patient with a light that they can read by - if they turn that light off, there's still a general ambient level of

light that nurses can use to do what they need to do. That ambient light is out of direct view of the patient and doesn't really interfere with them; they're not looking up at bright downlights."

The use of daylight is also gaining popularity in health care environments, not only for its potential to help clients save on energy costs but also for its proven positive impact on a variety of bodily systems, from circadian rhythms to mental health. Gunzburg says there is a clear push for lighting designers to work concepts like this into health care lighting plans, and to use research evidence as the foundation for their design.

Says Quan: "I think how to do that is in the hands of designers to use research, available research evidence, to use some of your creativity. It's innovation, somehow - it should involve some creativity in the design.

"I think that's where science and art come together." ■

Obstetrics is one of many health care disciplines in which tailored lighting plans have a demonstrable impact on patient health outcomes. Research from numerous sources shows that women who give birth in an ambient environment with minimal medical equipment on display, low lighting and other design features that depart from those in a conventional birthing room are more likely to labour without pain relief; less likely to require oxytocin, a drug used to speed up labour; more likely to give birth without intervention, such as Caesarean section, forceps or other instrumental assistance; more likely to still be breastfeeding at 6-8 weeks postpartum; and more likely to view their birth experience in a positive light.

The flow-on effects of these outcomes for both mother and baby are significant, and hospitals are starting to take notice. According to Professor Maralyn Foureur at the University of Technology Sydney, a design approach that considers patient needs as much as considers the needs of hospital staff is key. Foureur and her team in the Faculty of Health undertook a project to develop guidelines for the optimal design of hospital birth units, with the aim of delivering better outcomes for both patients and hospital staff.

According to Foureur, creating ambient spaces in which women had a sense of privacy, security and some control over their immediate environment was key, with lighting a

primary component of the overall design approach.

"What we currently find is that birth rooms are as well lit as operating theatres, so that there are bright - usually fluorescent - overhead lights, as well as an operating-theatre-style directional light hanging from the centre of the room above the foot of the bed, neither of which is necessary or fit for purpose," she says.

"What the woman needs is privacy, dimmable lighting or very low lighting and certainly not overhead lighting that glares in the eyes of anyone sitting or lying in bed."

Foureur and her team worked with architecture firm Woods Bagot to implement best practice birth unit design principles into new obstetrics spaces at Sydney's Royal North Shore Hospital. The new birthing rooms have dimmable lighting throughout, as well as adjustable blinds on the windows, allowing patients to better control their lighting environment. While there's still room for further improvements - "We were unable to locate a sufficiently unobtrusive directional procedure light that could be located where we wanted it to be located within the room- so had to go for what was standard and on offer," Foureur says - the team believes that birth unit design could be enhanced by lighting designers taking the time to engage with users of birthing spaces - both patients and staff - in order to develop lighting plans that are responsive to the spectrum of user needs.