

Improving healthcare with light

A report by

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Hospitals and health centres are made up of tens or even hundreds of different kinds of rooms. Many of these – restaurants, technical rooms and lobbies – are also to be found in other large public buildings. Many others, however, are completely unique to the healthcare environment. Lighting such a variety of spaces presents a significant challenge. The European norm for the lighting of indoor workplaces defines nearly 50 different healthcare premises, all with their own, often widely differing, lighting requirements. For example, the required level of maintained illuminance varies from 5 lux for night lighting (observation lighting) in maternity wards to 5000 lux in the pathology lab. In the operating theatre it is even higher – between 10,000 and 100,000 lux.

Biological clock

Visual task performance is not, however, the only key light-related issue in the hospital environment. Most hospitals are open 24 hours per day, 7 days per week. This means that a large proportion of the workforce is working back shift or night shift – times when the *activating* effects of light are even more important than during the day. Light plays a key role in regulating many biochemical processes in the human body. In 2002, US scientists discovered that there is a direct link between the eye and the part of our brain commonly referred to as the ‘biological clock’. Many biological cycles in the human body – body temperature, alertness, the release of hormonal substances such as melatonin and cortisol – are controlled on the basis of the signals received by the biological clock. It is the rhythm of day and night, of light and darkness, that synchronises our biological clock. Accordingly, light has a direct and significant impact on people’s alertness and well-being. So, while the emphasis in the past may have been primarily on the visual effects of lighting, now there is increasing interest in its biological effects too.

The dynamics of ‘natural’ lighting

Two of the characteristics of light that strongly influence how we feel in a given environment are the brightness and colour appearance of the light. First of all, the light should always be bright enough to facilitate visual task performance. And better visual task performance results in better work performance. Increased lighting levels can also help to counter well-known effects such as the ‘after-lunch dip’ among day workers.

The colour appearance of the light also has substantial biological relevance. For example, the bluish light of morning has a stimulating effect on us, while the red sky of the early evening is relaxing. Daylight – the form of light with which we are most comfortable – is never constant. It changes throughout the day, affecting our emotions, moods, perception and performance. By bringing the dynamics of daylight into the hospital through our innovative lighting solutions, we can create ‘natural’ lighting that puts patients and visitors at ease and helps healthcare professionals to perform even more effectively, for instance by boosting alertness and concentration levels at times when this is needed.

Of course, the nature of daylight doesn't just change over the course of the day, but over the seasons. During winter, the amount of light a person receives is relatively limited, especially if they are working in an indoor environment like a hospital. Some people are known to suffer from ailments such as Seasonal Affective Disorder (SAD), the 'winter blues'. Here too, exposure to bright light can improve vitality and alleviate distress. Long-term dynamics may therefore be another way to enhance the performance and/or sense of well-being of all those in the hospital environment.

Making hospital more pleasant for the patient

No one actively wants to be a patient. To a degree, one's independence is lost. Patients have to give up some of their privacy and sleep in the same room as total strangers. They often feel quite helpless, especially if the surroundings are not particularly pleasant. One of the problems is that their ability to control their environment is very limited. Headphones, task lighting and the position of the bed are often the only possibilities for control. This is why task lighting is extremely important. It should be designed in such a way that it does not disturb others and can be controlled even when the patient is partially incapacitated.

When lighting hospital wards, conflicting requirements have to be taken into account. Many of the patients spend quite a lot of time horizontal, lying on the bed. Lighting that would be suitable for doctors and nurses working in the area could create discomforting glare for the patients, who would be looking directly up into the lamps. In a case like this, indirect light can be a solution.

Obviously, the scope to use light to enhance the environment depends, to a certain extent, on the architecture of that particular part of the building. In many parts of the hospital – for instance corridors, TV rooms and lobbies – solutions like accent and coloured lighting can be very effective. One important factor is to avoid fluorescent lamps with conventional gear, which work at 50 Hz, because they can cause headache and eye strain in some people. Using electronic gear instead with fluorescent lamps solves this problem.

Better experiences for visitors

There is another, sometimes overlooked category of users of healthcare premises – those visiting friends or relatives. On most days they outnumber the patients and staff. They are also potential future patients. The impressions they receive influence their mood and, in turn, the mood of the patient they are coming to visit. Evening is one of the main visiting times. Outdoor lighting in the hospital grounds – e.g. on roads, in gardens and pedestrian zones – principally serves the visitors and should 'welcome' them as they approach the hospital. That is where people get their first impression.

Lighting can also be used as a means of communication to visitors. Floor-mounted fibre optics or LED lines in the ceiling could show the way to the restaurant. The floors could be marked with coloured light, with a change in the colour temperature of the lights indicating the end of visiting time.

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