



# Maquet Moduevo Bridge Somnus Light



## Inspired by Circadian Stimulus

## Sleep: an important part of health

Our circadian rhythms -our human responses to light and darkness- play an important role in our health. These patterns of light and darkness synchronize our body's internal clock with day and night. Anyone who has ever experienced jet lag knows how disorienting it can be when these rhythms are disrupted; we see decreases in physiological function and neurobehavioral performance.<sup>1</sup>

Circadian stimulus plays a key role in the field of lighting design for healthy buildings<sup>1</sup>



### Lighting is one of many disruptions in hospital environments

Routine hospital care often causes significant disruption in sleep-wake patterns.<sup>2</sup> Not only are patients distracted by pain and worry, but they face the additional challenge of routine check-ins from clinical staff. Traditionally, hospitals have lighting that supports the clinicians' needs, but not those of the patient's circadian rhythms.

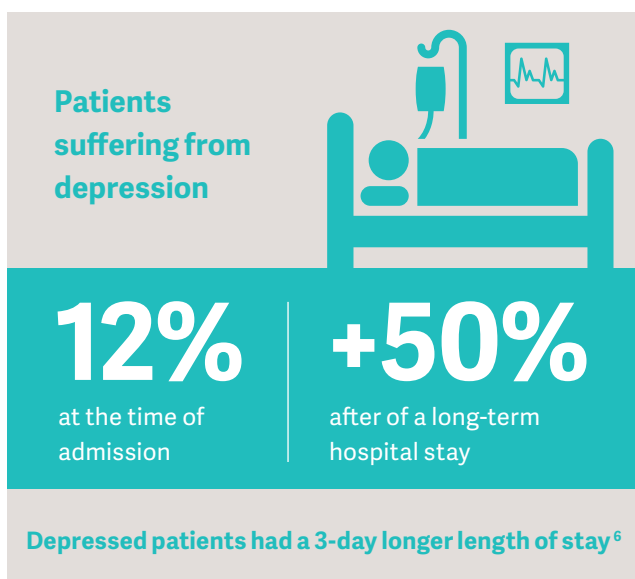
The hospital environment may contribute to patient discomfort by providing a lighting structure that interferes with circadian rhythmicity, sleep, mood, and pain.<sup>3</sup> Disruption in circadian rhythms can adversely impact patients' short- and long-term health outcomes.<sup>2</sup>



### Circadian disruption can lead to increased length of stay, costs

An irregular circadian rhythm can have a negative effect on a person's ability to sleep and function properly, and can result in a number of health problems, including mood disorders such as depression and anxiety.<sup>4</sup> One study showed that more than half of patients were found to be suffering from depression at the end of a long-term hospital stay (three weeks or more) as compared to just 12% at the time of admission.<sup>5</sup>

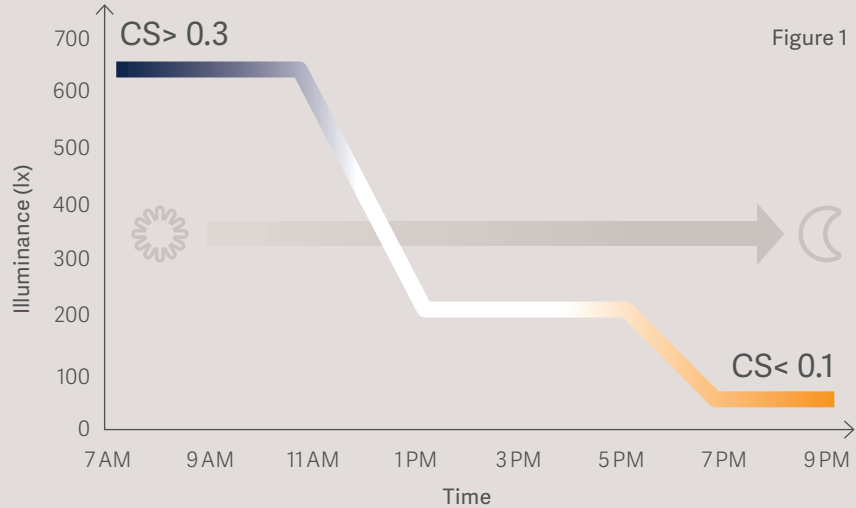
Anxiety and depression significantly prolonged the length of stay of non-psychiatric inpatients in general hospital. Early detection and management of emotional distress should be promoted and applied to better care for patients with non-psychiatric disorders and to conserve medical resources.<sup>6</sup>



## Natural light changes throughout the day

Morning light differs from bright noonday sunshine or the golden light of late afternoon, and our brains respond to that illumination accordingly. Our bodies expect light to change throughout the day.

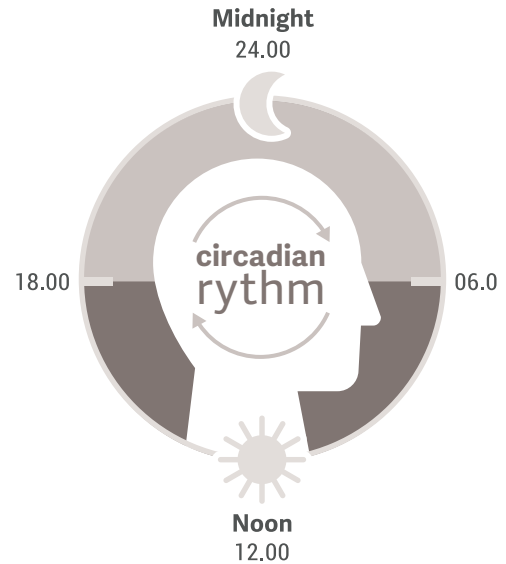
Our experience of light in terms of circadian benefits differs from our experience of light in terms of visual acuity.



Source: Rea et al. Journal of Circadian Rhythms 2010, 8:27

The Lighting Research Center at Rensselaer Polytechnic Institute (RPI) has developed metrics and tools to support the circadian cycle. These metrics -known as circadian stimulus (CS)- show how to apply circadian-supportive light in indoor environments to improve health.<sup>1</sup>

When developing artificial lighting that supports the circadian system, it is important to consider the light level (amount of illumination) and the light spectrum (color), as well as the timing and duration of exposure. As we saw in Figure 1, our natural light exposure is a CS of 0.3 or greater for at least one hour early in the day. The research at RPI shows that for most populations, early-day **exposure to a CS of 0.3 or greater is effective for stimulating the circadian system and is associated with better sleep, improved behavior, and improved mood.**<sup>1</sup>



Somnus light provides an innovative daylight simulation.

## Lighting that incorporates circadian system research

When developing the lighting in its Maquet Moduevo Bridge ceiling supply unit for Critical Care areas, Getinge researchers applied the CS methodology from RPI. The Somnus light mimics changes in natural light between 7:00 AM and 9:00 PM to support natural circadian rhythms. Early in the day, blue-toned light and high illumination simulate morning light and give subtle signals that it's time to wake. By evening, a low CS -golden-toned lighting and decreased illumination- provide cues that signal the end of the day.

With the Somnus light from Moduevo, Critical Care areas now have an extra tool designed help support patients' circadian rhythms. This innovation is especially suitable during winter time, on rainy days when daylight is not sufficient or even for rooms without windows.

## References

<sup>1</sup> Figueiro M, Gonzales K, Pedler D. (2016, January). Designing with Circadian Stimulus. LD+A. 2016;8:31-34.

<sup>2</sup> Milani RV, Bober RM, Lavie CJ, Wilt JK, Milani AR, White CJ. Reducing Hospital Toxicity: Impact on Patient Outcomes. Am J Med. 2018 Aug;131(8):961-966. doi: 10.1016/j.amjmed.2018.04.013. Epub 2018 May 3. PMID: 29729240.

<sup>3</sup> Bernhofer EI, Higgins PA, Daly BJ, Burant CJ, Hornick TR. Hospital lighting and its association with sleep, mood and pain in medical inpatients. J Adv Nurs. 2014 May;70(5):1164-73. doi: 10.1111/jan.12282. Epub 2013 Oct 27. PMID: 24164506.

<sup>4</sup> <https://www.health.harvard.edu/blog/why-your-sleep-and-wake-cycles-affect-your-mood-2020051319792>

<sup>5</sup> Saboo, Ashish & Khapri, Anurag. LONG HOSPITAL STAY MAY LEAD TO DEPRESSION? Journal of Evidence Based Medicine and Healthcare. 2019(6) 531-533. 10.18410/jebmh/2019/110.

<sup>6</sup> Guo WJ, et al. Effects of anxiety and depression and early detection and management of emotional distress on length of stay in hospital in non-psychiatric inpatients in China: a hospital-based cohort study. October 1 2019. Vol 394, Special Issue, S83.

<sup>7</sup> Rea MS, Figueiro MG, Bierman A, Bullough JD. Circadian Light. Journal of Circadian Rhythms 2010, 8:2.



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