

Research project

Lighting during operations

University lecturer Hillevi Hemphälä,
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Balanced lighting during operations creates a better working environment

Skåne University Hospital in Malmö has chosen highly specialised lighting for all new operating rooms. Research carried out by Lund University shows why proper lighting makes a difference to the staff.

Strained eyes, neck pain, headache and fatigue are challenges faced by surgeons, nurses and other staff in operating environments. University lecturer Hillevi Hemphälä from Lund University has done research in operating room lighting since 2013 and has written a PhD on the topic and published several scientific publications.

Together with Helsingborg Hospital, Hillevi Hemphälä has compared various light settings for laparoscopic surgery and open surgery. During laparoscopic surgery, the goal is to create a lighting environment that supports an image on the monitor with clear contrasts without any reflection.

“Our research from Helsingborg Hospital shows that the staff in the operating room prefers coloured lighting during laparoscopic surgery, rather than white lighting,” explains Hillevi Hemphälä.

Open surgery

The challenge during open surgery is the transition from the powerful operating lamp to the room’s basic lighting.

“There is a high luminance ratio, which creates a contrast glare that strains your eyes. For example, it can be difficult for the nurse to see the tools due to glare.”

Hillevi Hemphälä, University lecturer,
Lund University

In order to address this challenge, Hillevi Hemphälä worked with the lighting company Chromaviso on developing a concept where the basic lighting is increased in order to permit a lower light intensity from the operating lamp.



Subsequently, this solution has been studied in a research project, which showed that the solution created an optimal and balanced lighting environment.

The quality of light makes a difference

Lighting has an effect on the working environment as well as the well-being and performance of the staff. However, lighting varies greatly, and here, Hillevi Hemphälä mentions glare and flickering as two areas that can cause great harm. The occurrence of flickering is an indication of low quality of the driver that provides the LED fittings with power.

“Temporal light modulation, which can cause visual as well as non-visual flickering, is problematic for many people. But it is often overlooked, as it is not always visible to the naked eye. Prevention of flickering places great demands on the quality of light. New standards are coming, and it should be easier to assess the quality of light.”

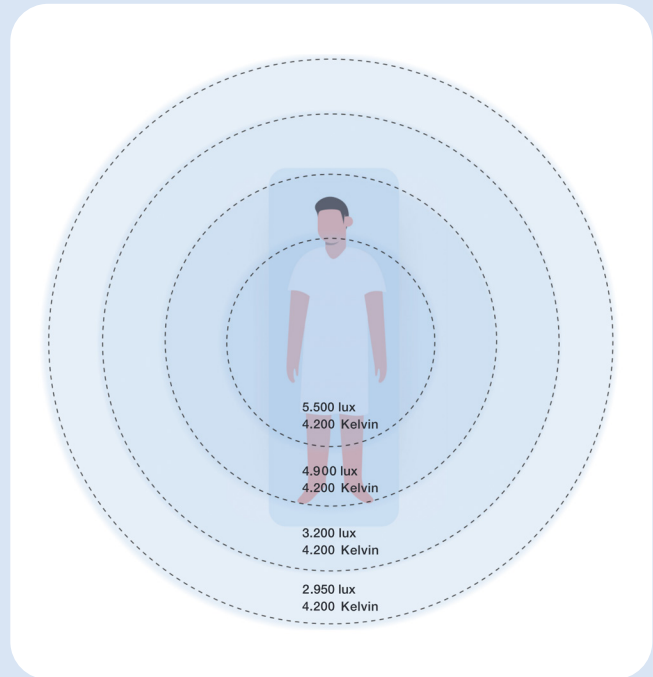
Hillevi Hemphälä, University lecturer,
Lund University

Among other things, it is important for the light to be flicker-free in the entire dimming profile, i.e. at low lighting as well.

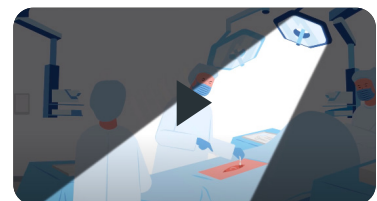
Chosen for the new hospital in Malmö

Based on the research of Hillevi Hemphälä, Chromaviso has developed the concept for open surgeries further. The new and upgraded concept is called Chroma Zona Triple White, and the solution has been chosen for the new hospital buildings in Malmö, which are to be ready in 2023. Here, 19 operating rooms and 4 large hybrid rooms will be provided with this solution for open surgery and laparoscopic surgery.

The solution complies with "no effect" of the standard IEEE PAR1789 as well as the limit values $PstLM \leq 1$ and $SVM \leq 0.4$ for dimming $>5\%$ of the maximum light intensity.



Find more information about Chroma Zona Triple White here:



Scan the QR code to watch the video



About the solution for open surgery

Based on the research of Hillevi Hemphälä, Chromaviso has developed the concept Chroma Zona Triple White:

- Synchronisation of the lux level and colour temperature between basic lighting and the operating lamp
- Optimisation of the evenness of the light in the room – from the operating table/area to the outer area in accordance with EN12464-1
- High lux figures: 5000–6000 lux on the operating table/work area of 3x3 metres
- Dimmable without flickering in the entire dimming profile in accordance with IEEE1789-2015 as well as the value $PstLM \leq 1$ and $SVM \leq 0,4$ for dimming >5% of the maximum light intensity
- Fittings with strong lighting and low glare reduce the number of fittings in the ceiling. Thus, there is more room for soundproofing in order to create a good acoustic working environment as well as increased flexibility for other medicotechnical equipment.

About Chromaviso

Chromaviso is changing the standards of lighting to improve health, treatment quality, care, work environment, and efficiency within the healthcare sector. Through technological innovation and close collaboration with healthcare professionals, we create and apply integrated and highly preferred lighting solutions with proven effectiveness.

Learn more at

www.chromaviso.com, [LinkedIn/Chromaviso](https://www.linkedin.com/company/chromaviso) or [X/Chromaviso](https://twitter.com/Chromaviso).