



## KEY POINT SUMMARY

### OBJECTIVES

The objective of this study was to analyze the interaction between the physical environment and user satisfaction and comfort in the context of lighting in four hospitals in Italy and compare the data obtained.

The specific goals of this research were: 1) to identify non-compliance with standards, 2) to analyze visual comfort from the perspective of patients and visitors (P-V), and to analyze how perceived visual comfort can impact performance and health as assessed by doctors, nurses, and nursing aides (NS – for nursing staff).

## Luminous environment in healthcare buildings for user satisfaction and comfort: An objective and subjective field study

Verso, V.R.M.L., Caffaro, F., & Aghemo, C. 2015 | *Indoor and Built Environment*. Pages 1-17

### Key Concepts/Context

Lighting is important in healthcare, and the authors indicate its relevance to patient recovery and staff satisfaction. According to the authors, luminous environmental quality affects visual comfort, which is related to both natural and artificial lighting. This paper presents the findings of a study that investigated lighting in four hospitals in Italy vis-à-vis standards compliance and patient and staff satisfaction in the context of visual comfort. The study found that both patients and staff considered daylight crucial to visual comfort.

### Methods

This study used objective and subjective methods to achieve the above goals. The objective method involved visiting patient rooms and staff workspaces in the hospital to evaluate and/or calculate daylight factor, illuminance value, utilization profile and typologies of medical treatment, illuminance distribution, and horizontal and vertical illuminance. These measurements were undertaken and repeated in 70 rooms during day and night, for different settings of lighting and shading, and under different sky conditions (clear, intermediate, and overcast). The subjective method involved the administering of two different surveys - one to the P-V group and the other to the NS. Data collection took place on days with varying sky conditions between July 2012 and April 2013 and lasted for two weeks in each hospital. Survey data was statistically analyzed.

### Findings

From assessing the patient rooms and the staff workplaces the research team found:



1. The illuminance for electric light was insufficient over patient and exam beds.
2. There was a critical lack of access to daylight in one of the hospitals.
3. The smaller the window area in the studied spaces, the higher the incompliances were in the context of amount of daylight in the same spaces.
4. While the contrast values within the users' visual field were within the recommended range, the contrast value in the case of the computer (where the doctors work) was outside this range, possibly because of the position of the desk and poor maintenance of the blinds on the window.

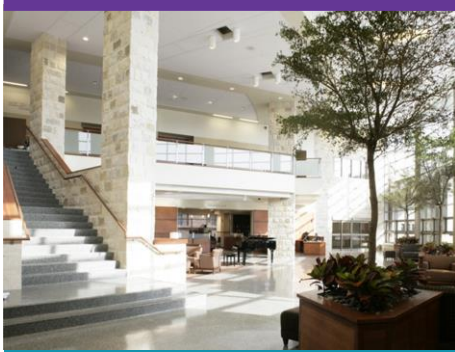
The following were the findings from the surveys:

5. Daylight was considered to be the most important of all comfort aspects by over 70% of patients, visitors, and staff.
6. The staff were less satisfied than the patient and visitors by the amount in light in the context of reading and communications in the patient rooms. This was statistically significant with  $p=0.000$ . Patients were more satisfied than the visitors with the amount of light in this context.
7. With regard to medical treatment in the patient rooms, the staff rated one hospital to be low on the satisfaction scale.
8. Both patients and staff gave low satisfaction ratings to the control system of the blinds and lights. Doctors were less satisfied with this control system than nurses and nurse aides.
9. The satisfaction with glare, window size, and view of the outside decreased when length of stay (for patients) and working hours (for staff) increased. Visitors were less satisfied with window size as compared to patients.
10. In one of the more recently built hospitals, long-term patients expressed low satisfaction with the inaccessibility to the control systems from wheelchairs and the window sill positioned high for patients laying in beds.

## Limitations

According to the authors, the following were the limitations of the study:

11. The study was conducted for two weeks in July and then in March-April. Year-round periodic measurements would have added more rigor to the study.
12. The study focused on visual comfort only; other attributes of comfort – acoustical, thermal, etc., were not taken into consideration.
13. Although the four hospitals were similar in some aspects, they were largely different in most aspects, making the comparison of survey data more difficult.
14. Objective data was collected under extreme conditions (overcast sky with lights off and blinds retracted or darkened room with blinds closed and lights on), whereas the survey data was based on an average judgment of



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- the lighting conditions in the weeks prior to the collection of the objective data.
15. No inclusion or exclusion criteria were taken into consideration for the recruitment of patient participants.
  16. The hospitals are all located in northwest Italy, so the perception was of the participants living in a specific cultural context.

### Design Implications

Design should incorporate natural lighting as much possible in both patient and staff areas.

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