

## **Project Title**

Evaluation of Human Centric Lighting in an Acute Care Ward: Impact On the Sleep Quality and Fatigue Of Nurses

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## **Organisation(s) Involved**

Singapore General Hospital, Singapore Institute of Technology

## **Healthcare Family Group(s) Involved in this Project**

Nursing

## **Applicable Specialty or Discipline**

Psychology, Occupational Therapy, Mental Health

## **Aim(s)**

This study aimed to evaluate the impact of human centric lighting in workspaces on nurses' reported sleep quality and fatigue.

## **Background**

See poster appended/ below

## **Methods**

See poster appended/ below

## **Results**

See poster appended/ below

## **Conclusion**

See poster appended/ below

## **Project Category**

Care & Process Redesign

Build Environment, Green Building, Quality Improvement, Design Thinking, Job Effectiveness

## **Keywords**

Humanistic Lighting, Sleep Quality, Fatigue, Satisfaction Survey, Shift Work

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# Evaluation of Human-centric Lighting in an Acute Care Ward: Impact on the Sleep Quality and Fatigue of Nurses

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## BACKGROUND

- Research has shown the impact of light spectral distribution, illuminance levels, and the timing and duration of light exposure on health, physiology and behavior (Acosta, Leslie & Figueiro, 2017; Barger et al., 2012; Lunn et al., 2017).
- For nurses, it could be beneficial in improved performance at work, increasing work efficiency, reducing errors and improving the overall well being of the nurse (McCunn & Wright, 2019).
- This could lead to improved patient safety and staff retention rates.

## AIM

- This study aimed to evaluate the impact of human-centric lighting in workspaces on nurses' reported sleep quality and fatigue.

## METHODS

### Study Design

- An evaluation study was performed.

### Sample

- Nurses were recruited from an intervention ward with humanistic lighting; and control wards installed with fluorescent lighting.
- Humanistic lighting changes in colour and temperature throughout the day. Refer to images below.



Day time



Night time

### Eligibility Criteria

- Aged between 21 and 80
- Rostered to three rotating shifts
- At least one night shift a month
- Worked in their current ward for at least a month

### Tools

- Pittsburgh Sleep Quality Index (PSQI) – represent overall quality and patterns of sleep
- Flinders Fatigue Scale (FFS) – level of fatigue

These were administered at 3 timepoints (First: Pre-installation of human-centric lighting; Second: Two months post-installation; Third: Three months post-installation)

### Data Analysis

- Mann-Whitney U Test and Friedman Test were used to analyse the PSQI and FFS scores between and within groups, respectively.
- Descriptive statistics were used to analyse the light satisfaction survey.

## RESULTS

- A total of 38 nurses participated in the survey.
- No statistically significant differences were found in PSQI or FFS median scores between groups at all timepoints. Refer to Table 1a and 1b.

**Table 1a. PSQI scores at three timepoints**

Time Points	Intervention Median (IQR)	Control Median (IQR)	U statistic	p-value
Pre-installation	6.5 (6)	6 (5)	181.5	0.977
Post-installation (2 mths)	7(10) <sup>¥</sup>	6.5 (5) <sup>¥</sup>	160.5	0.963
Post-installation (3 mths)	8(8) <sup>¥</sup>	6.5 (5)	172.5	0.964
X <sup>2</sup> (2)	1.254	2.281		
p-value	0.534	0.32		

<sup>¥</sup> 1 missing data

**Table 1b. FFS scores at three timepoints**

Time Points	Intervention Median (IQR)	Control Median (IQR)	U statistic	p-value
Pre-installation	11 (8)	8 (6)	142.5	0.271
Post-installation (2 mths)	11.5 (8) <sup>¥</sup>	10 (7) <sup>¥</sup>	157	0.685
Post-installation (3 mths)	8.5 (8) <sup>¥</sup>	10 (8)	177	0.65
X <sup>2</sup> (2)	4.344	5.851		
p-value	0.114	0.054		

<sup>¥</sup> 1 missing data

## CONCLUSION

- There was no significant difference in sleep quality and fatigue among nurses in the intervention and control wards.
- Human-centric lighting alone may not negate the negative consequences of shift work to improve sleep quality or fatigue levels of nurses.
- Fatigue among nurses is detrimental in the healthcare setting.
- More research is needed on the effectiveness of strategies to mitigate the negative impacts of shift work on nurses' well-being beyond infrastructure fixtures.

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