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)¥	6.5 (5)¥	160.5	0.963
Post-installation (3 mths)	8(8)¥	6.5 (5)	172.5	0.964
X^2 (2)	1.254	2.281		
p-value	0.534	0.32		

¥ 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)¥	10 (7)¥	157	0.685
Post-installation (3 mths)	8.5 (8)¥	10 (8)	177	0.65
X^2 (2)	4.344	5.851		
p-value	0.114	0.054		

¥ 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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