Sleep-associated impairment in hospital nurses working 12-hour day or night shifts during the COVID-19 pandemic: A large health system multisite pilot study

Jamie K. Roney, DNP, RN, NPD-BC, CCRN-K
Teresa Bigand, PhD, MSN, RN, CMSRN, CNL
Ross Bindler, PharmD
Trisha Saul, PhD, RN, PMGT-BC
Rebecca Penders, PhD, RNC-OB, C-ONQS
Douglas Weeks, PhD
Lois James, PhD
Marian Wilson, PhD, MPH, RN, PMGT-BC
Background

Nurses working in hospital settings reported high levels of fatigue prior to the pandemic.

COVID-19 is associated with increased nurse fatigue in nurses working in hospitals (Lavague, 2021; Trinkoff et al., 2021; Yuxin et al., 2022).

Fatigue has been linked to adverse outcomes including absenteeism, performance degradation, and increased mental health conditions (Booker et al., 2020; Cho & Steege, 2021).

https://newsinhealth.nih.gov/2019/05/making-up-sleep-may-not-help
Background

- Optimal sleep is 7-9 hours nightly in adults
- Sleep-related impairment (SRI)
  - measures a deficit in alertness and overall function during wakefulness across seven days
- High SRI impacts nursing practice
  - associated with increased patient-care errors
- Limited evidence exists to inform nurses about work and sleep-related factors that may relate to SRI
  - in nurses working full-time, 12-hour shifts
  - in hospital settings
  - during the COVID-19 pandemic
Purpose

To describe sleep-related impairment in acute care registered nurses working full-time, 12-hour day or night shifts during the COVID-19 pandemic.

https://newsinhealth.nih.gov/2021/06/lack-sleep-middle-age-may-increase-dementia-risk
A convenience sample of nurses working in a large health system were recruited from four states to measure lifestyle habits for ten days.
Methods

Cross-sectional secondary data analysis to explore relationships between self-reported variables including:

- Age
- Sleep medication use
- Caffeine consumption
- Shift type
- Morningness/eveningness misalignment
- Length of breaks
- Sleep disturbance
- Sleep duration (hours)

https://medlineplus.gov/healthysleep.html
Methods

SRI and sleep disturbance were measured using Patient-Reported Outcomes Measurement Systems (PROMIS) short form 8a. (Arnedt, 2011)

Scores were compared against benchmark scores using t-score calculation

- > 50 indicates higher than the general population

**Categorical variables compared using chi-square and continuous with t-tests.**

https://www.nia.nih.gov/research/resource/patient-reported-outcomes-measurement-information-system-promis
Definitions

Sleep Related Impairment (SRI) measures the following related to sleep problems:

- Alertness
- Subjective sleepiness
- Perceived functional impairment

Sleep disturbance measures:

- Sleep quality
- Sleep depth
- Perceived restorative nature of sleep

https://www.womenshealth.gov/mental-health/good-mental-health/sleep-and-your-health
Results

Of fifty-seven nurses, 37 (65%) had PROMIS SRI t-scores >50 ($m = 52.6 \pm 6.4$)

Males represented 17.5% ($n = 10$) of the sample

Higher SRI scores were associated with nurses younger than 40 years of age compared with low SRI scores (84% versus 60%; $p < .05$)

https://newsinhealth.nih.gov/2022/04/melatonin-supplement-use-rising-among-adults
Results

Day shift had a higher percentage of nurses in the 40 years old and above age range ($p = .05$)

SHIFT WORKED

- Days: 60%
- Nights: 40%

DAILY HOURS SLEEP

- Days: 6.8 hrs (SD = 1.2)
- Nights: 7.2 hrs (SD = 1.3)

day shift mean = 6.8 (SD = 1.2); night shift mean = 7.2 (SD = 1.3)
Results

**Sleep Disturbance Scores**

- Night shift (Mean = 54.6; SD = 6.3)
- Day shift (Mean = 51.2; SD = 6.6)

Scores similar
- Day shift mean = 49.5 (SD = 3.8)
- Night shift mean = 51 (SD = 4)

**Sleep Related Impairment Scores**

- Statistically significant ($p = .05$)
  - Night shift (Mean = 54.6; SD = 6.3)
  - Day shift (Mean = 51.2; SD = 6.6)
Results

Significantly more RNs working the night shift reported using prescription/OTC or supplements to aid in obtaining sleep

- 56.5% vs. 20.6%; $p = .005$

Daily caffeine consumption was similar between groups

- day shift = 82.4%
- night shift = 91.3%

Total minutes of daily break time were similar between groups

- day shift = 51.2 (SD=14.4)
- night shift = 56.1 (17.6)
- recommended 75-minutes per 12-hour shift
Results

Reduced Morningness/Eveningness Questionnaire

- Day shift RNs score (Mean = 15.7; SD = 3.9)
- Night shift RNs score (Mean = 13.3; SD = 4.3)
- Statistically significant \((p = .03)\) difference between groups
- Day nurses had an increased preference for evenings

PROMIS Sleep Related Impairment (PSRI)

- Inverse correlation with age range (PCC = -0.399; \(p = .002\))
- As age range increased, PSRI decreased
Results

High SRI scores related to:

- Working night shifts
  - 46% versus 30% with low SRI
- PROMIS sleep disturbance $t$-scores > 50
  - 59% versus 35% with SRI $t$-scores < 50
- Younger age
  - 83.7% less than 40 years versus 60% less than 40 with low SRI ($p<0.05$)
- More regular caffeine consumption
  - 83.8% versus 50% with low SRI ($p<0.05$)

**The sample size was inadequately powered ($\beta<0.4$) to detect small to moderate group differences.**
Conclusion

Findings were limited by low statistical power.

Trends suggested a closer examination of sleep disturbance in nurses working 12-hour shifts is warranted.

https://newsinhealth.nih.gov/2022/02/reducing-health-risks-night-shifts
Conclusion

SRI and sleep disturbance measurements indicated older nurses may have higher sleep quality due to less sleep disturbance compared to younger nurses.

Overall nurses in this small sample reported scores higher than the general population.

Despite similar quantity and quality of sleep, night shift nurses reported more sleep-related impairment and use of sleep aids.

Implications for Practice

Future research with adequate sample sizes are needed to establish statistically significant relationships and to test targeted sleep hygiene interventions to alleviate SRI among nurses.
Thank you


