

# IS THERE A RELATIONSHIP BETWEEN NIGHT SHIFT AND NURSING ERRORS?

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# Purpose

- *The aim of this systematic review was to examine the evidence regarding nurse night shift work and errors in patient care.*

# Method

- *An electronic literature search for “night shift nurse errors” conducted using Pubmed, CINAHL, Health Source: Nursing/Academic Edition, & Cochrane Collection Plus databases.*
- *Inclusion criteria: English language, full text available, and published dates between May 1, 2005 and May 1, 2015.*
- ***Ten studies** including subjects from Turkey, Japan, China, Saudi Arabia and the United States were selected for analysis based on the inclusion criteria.*

# Johns Hopkins Strength of Evidence Hierarchy

- *Strength of Evidence*

- Nine of the studies were Level 3
- One study was Level 2

- *Quality Rating*

- Two of the studies had insufficient sample sizes, so were rated as low quality.
- Six of the studies were assessed as good quality
- Two of the studies were assessed as high quality.

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| Miller et al. | 2010 | Centralized database of errors reported from Jan 2008 – Dec 2008 at a 96-bed academic, tertiary care children's hospital | Descriptive Study | Medication error rate for night shift nurses significantly higher than day time nurses (p=0.05)<br><br>Errors in medication administration occurred most frequently |
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| Tanka et al. | 2010 | 1,407 nurses working shifts at one of five teaching hospitals in Japan | Descriptive, Correlational Study | <p>Nurses working in the three-shift system (10 hour shifts) had a significantly higher perception of perceived adverse events than the nurses working in the two-shift (16 hour shifts) system (<math>p&lt;0.001</math>).</p> <p>* Interesting because the literature supports that working 13 ½ hours is predictive of increased errors</p> |
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| Niu et al. | 2012 | Taiwan<br><br>62 nurses randomly assigned to either fixed shift or rotating shift | Prospective, Randomized Parallel Group Study | <p>The night shift workers had <i>significantly higher error rates and poorer overall performance speeds</i> (p&lt;0.01) compared to day and evening shift workers.</p> <p>The reported error rate on the night shift was 0.44 times more than the day shift (p&lt;0.001) and .62 times more than the evening shift (p=0.001).</p> |
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| Arimura et al. | 2010 | 454 Japanese nurses ( 2 medium scale hospitals) | Descriptive, Correlational Study | <p>Shift work and poor mental health significantly associated with medical errors (<math>p&lt;0.05</math>).</p> <p>After adjustment for burnout or depression, only <i>fatigue and distress</i> remained significantly significant associated with errors.</p> |
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| Johnson<br>et al. | 2014 | <p>289 nurses<br/>started<br/>study;</p> <p>255 nurses<br/>finished<br/>study</p> | Cross-sectional,<br>Correlational<br>Study | <p>Sleep deprived nurses reported more patient care errors than non-sleep deprived nurses (p=0.005).</p> <p>The patient care errors were self-reported by the nurses.</p> <p>The sample size of this study was smaller than anticipated due to missing data resulting in a reduced power of the tests.</p> |
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| Ramadan & Al-Saleh | 2014 | 138 Saudi Arabian registered nurses working in intensive care department | Descriptive, Correlational Study | The investigators discovered that “sleep-deprived nurses had higher number of medical errors per participant when compared to non-sleep deprived nurses at 8-,10-, 12-shift lengths, $P<0.001$ , $p,0.014$ , and $p,0.001$ , respectively” |
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| Arkawa<br>Kanoya<br>& Sato | 2011 | 6,445 female<br>hospital<br>nurses<br>engaged in<br>shift work<br>(93 Japanese<br>hospitals) | Descriptive,<br>Correlational<br>Study | <p>Environmental factors correlated with increased errors included:</p> <ul style="list-style-type: none"> <li>-working outpt dept (<math>p&lt;0.0001</math>)</li> <li>-heavy workload (<math>p&lt;0.0001</math>)</li> <li>-# night shifts/mo (<math>p&lt;0.006</math>)</li> <li>-no overtime hours (<math>p&lt;0.0001</math>), - increased stress (<math>p&lt;0.0001</math>).</li> </ul> <p>Health factors</p> <ul style="list-style-type: none"> <li>-being under treatment (<math>p=0.001</math>)</li> <li>-absence due sickness (<math>p&lt;0.0001</math>)</li> <li>-bodily pain (<math>p=0.011</math>)</li> <li>-emotional problems (<math>p=0.007</math>)</li> </ul> |
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| Chang et al. | 2011 | 62 Psychiatric Nurses in Taiwan | Descriptive, Correlational study | <p>Significant differences found on Digit Symbol Substitution Test (<math>p=0.035</math>), Symbol Searching Test (<math>p=.0.045</math>) &amp; info processing scale in Taiwan University Attention Test (<math>p=0.030</math>) between 2 nights &amp; 4 consecutive nights groups</p> <p>A fast shift rotation may increase the risk of medical errors based on the perceptual and motor changes identified with these measurements.</p> |
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| Tanaka et al. | 2010 | 1,737 nurses working in 5 teaching hospitals in Tokyo and Kanagawa Japan | Descriptive, Correlational Study | <p>Factors found to be significantly related to the occurrence of near misses and adverse events for nurses working rotating shifts included:</p> <ul style="list-style-type: none"> <li>-fewer years experience (<math>p&lt;0.001</math>)</li> <li>-frequency of night shifts (<math>p&lt;0.001</math>)</li> <li>-internal ward assignment (<math>p&lt;0.02</math>)</li> <li>-lack of communication (<math>p&lt;0.001</math>)</li> <li>-nursing stressors (<math>p&lt;0.001</math>)</li> <li>-depression (<math>p&lt;0.08</math>)</li> <li>-experience time pressure (<math>p&lt;0.02</math>)</li> </ul> |
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# Conclusions

- Many of the studies based on self-report data collected through a survey method
  - This may be a limitation
- **The error rate on night shift was consistently higher than the day shift rates.**
  - Even when the same nurses rotated from days to nights
- Tiredness was one of the factors reported as contributing to error rate.
  - Other factors included sleep deprivation, decrease in attention, increased frequency of night shifts, number of work hours per week, experiencing time pressure, and decreased years of experience.
- Depressive symptoms and poor mental health might be associated with increase error rates for night shift nurses.

# Leadership Strategies

- Decrease sleep deprivation and improve attention during the night might be effective in reducing the night shift error rate
- Moderate exercise for 30 minutes, taking a nap, and moderate caffeine consumption prior to night shift, have been shown to increase alertness
  - Consuming simple sugars or intense exercise for long periods tend to increase sleepiness (Caruso & Hitchcock, 2010).
- Ruggiero and others (2014) indicate that planned naps during night shifts reduce nocturnal sleepiness and improve sleep-related performance deficits
- Use a self-scheduling method may help nurses establish more of a work-life balance & have some positive health effects (Bambra and others, 2008)
- Studies indicate that it is easier for nurses to adjust to a forward rotation