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


• 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.
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)

Errors in medication administration occurred most frequently
| Tanka et al. | 2010 | 1,407 nurses working shifts at one of five teaching hospitals in Japan | Descriptive, Correlational Study | 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 (p<0.001).

* Interesting because the literature supports that working 13 ½ hours is predictive of increased errors
<p>| Niu et al. 2012 | Taiwan 62 nurses randomly assigned to either fixed shift or rotating shift | Prospective, Randomized Parallel Group Study | The night shift workers had significantly higher error rates and poorer overall performance speeds ($p&lt;0.01$) compared to day and evening shift workers. The reported error rate on the night shift was 0.44 times more than the day shift ($p&lt;0.001$) and 0.62 times more than the evening shift ($p=0.001$). |</p>
<table>
<thead>
<tr>
<th>Authors</th>
<th>Year</th>
<th>Sample Description</th>
<th>Study Type</th>
<th>Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arimura et al.</td>
<td>2010</td>
<td>454 Japanese nurses (2 medium scale hospitals)</td>
<td>Descriptive, Correlational Study</td>
<td>Shift work and poor mental health significantly associated with medical errors ($p&lt;0.05$). After adjustment for burnout or depression, only fatigue and distress remained significantly associated with errors.</td>
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<tr>
<td>Alemdar et al.</td>
<td>2013</td>
<td>78 Turkish nurses</td>
<td>Descriptive study</td>
<td>Self-reported causes of the medical errors were:</td>
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<td>- tiredness (38.5%),</td>
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<td>- increased workload (36.4%),</td>
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<td>- long working hours (34.6%).</td>
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<td>Johnson et al.</td>
<td>2014</td>
<td>289 nurses started study; 255 nurses finished study</td>
<td>Cross-sectional, Correlational Study</td>
<td>Sleep deprived nurses reported more patient care errors than non-sleep deprived nurses (p=0.005). The patient care errors were self-reported by the nurses. The sample size of this study was smaller than anticipated due to missing data resulting in a reduced power of the tests.</td>
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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”
<table>
<thead>
<tr>
<th>Study Authors</th>
<th>Year</th>
<th>Sample</th>
<th>Study Design</th>
<th>Findings</th>
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<tbody>
<tr>
<td>Arkawa Kanoya &amp; Sato</td>
<td>2011</td>
<td>6,445 female hospital nurses engaged in shift work (93 Japanese hospitals)</td>
<td>Descriptive, Correlational Study</td>
<td>Environmental factors correlated with increased errors included: - working outpt dept (p&lt;0.0001) - heavy workload (p&lt;0.0001) - # night shifts/mo (p&lt;0.006) - no overtime hours (p&lt;0.0001), increased stress (p&lt;0.0001).</td>
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<td>Health factors - being under treatment (p=0.001) - absence due sickness (p&lt;0.0001) - bodily pain (p=0.011) - emotional problems (p=0.007)</td>
</tr>
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</table>
Significant differences found on Digit Symbol Substitution Test ($p=0.035$), Symbol Searching Test ($p=0.045$) & info processing scale in Taiwan University Attention Test ($p=0.030$) between 2 nights & 4 consecutive nights groups.

A fast shift rotation may increase the risk of medical errors based on the perceptual and motor changes identified with these measurements.
<table>
<thead>
<tr>
<th>Study</th>
<th>Year</th>
<th>Participants</th>
<th>Research Design</th>
<th>Key Findings</th>
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</table>
| Tanaka et al. | 2010 | 1,737 nurses working in 5 teaching hospitals in Tokyo and Kanagawa, Japan | Descriptive, Correlational Study | Factors found to be significantly related to the occurrence of near misses and adverse events for nurses working rotating shifts included:  
- fewer years experience ($p<0.001$)  
- frequency of night shifts ($p<0.001$)  
- internal ward assignment ($p<0.02$)  
- lack of communication ($p<0.001$)  
- nursing stressors ($p<0.001$)  
- depression ($p<0.08$)  
- experience time pressure ($p<0.02$) |
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