Waking up to Safety: Nurse Work Hours and Patient Safety

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The planners and faculty have declared no conflict of interest

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Background

• The risk of error was **three times higher** when nurses worked **12.5 or more** consecutive hours (Scott, Rogers, Hwang, & Zhang, 2006).

• Nurses who worked **more than 40 hours per week** had increased errors and near errors (Rogers, Hwang, Scott, Aiken, & Dinges, 2004).

• **Excessive work hours** resulted in decreased work effort (Hughes & Rogers, 2004).
Background

• As a 12-hour day workweek progressed, errors were more frequent on the fourth and fifth work day (Rosa, 1988).

• When nurses worked consecutive 12-hour shifts they slept an average of 5.5 hours per day (Trinkoff, Le, Geiger-Brown, & Lipscomb, 2007).

• Cognitive performance was impaired with less than 6 hours of sleep (VanDongen, 2003).
Background

• The more frequently a nurse worked overtime, the greater the risk of work related injury or illness (Castro et al.).

• After 24 hours of sustained wakefulness, observed performance was similar to a blood alcohol level of 0.10% (Dawson & Reed).

“Registered nurses are indispensable to healthcare; yet fatigued nurses put their patients at risk” (Scott, et al., 2010b, p. 239).
What percentage of RN’s in 24-hour patient care units worked more than one job?

A. 2%
B. 9%
C. 15%
D. 22%
I Wondered

What percentage of nurses in 24 hour patient care units work 12-hour shifts?

A. 50%
B. 60%
C. 70%
D. 80%
Problem Statement

Work-hour guidelines and education on fatigue countermeasures have been required in several safety-sensitive jobs; however, minimal requirements exist for nurses that volunteer to work overtime (Rogers, 2004).
Purpose

To determine if nursing work hour guidelines and education had an impact on:

- excessive work hours
- fatigue management practices
- patient outcomes
Interventions

• Computer Based Education Program
  - ALEX StayAlert
  - Viewed by 92% of nurses

• Implementation of Work Hour Guidelines
  - No greater than three 12-hour shifts in a row
  - No greater than 100 hours in a pay period
Methods

1) Survey a sample of nurses at the research & control hospital

   Research hospital implemented interventions
   Control did not

• Inclusion Criteria
  - Clinical Registered Nurses (RNs)
  - Departments providing 24 hour patient care

• Exclusion Criteria
  - RNs required to report for emergencies
Population

- **Group I** – Research hospital nurses, pre-intervention
  \[N = 210 (70.2\%)\]

- **Group II** – Research hospital nurses, post-intervention
  \[N = 196 (64.5\%)\]

- **Group III** – Control hospital nurses, no intervention
  \[N = 191 (39.5\%)\]

- **Group IV** – Research hospital nurses, pre-intervention and post-intervention; matched pairs
  \[N = 80 (44.4\%)\]
Demographics

Work Shift Group I

- Days: 49%
- Nights: 38%
- Evenings: 8%
- Rotating: 5%

N = 210

Work Shift Group III

- Days: 49%
- Nights: 28%
- Evenings: 13%
- Rotating: 10%

N = 191
Demographics

Scheduled Hours
Group I

- Other: 2.9%
- 8 Hours: 8.6%
- 12 Hours: 1.4%
- N = 210

Scheduled Hours
Group III

- Other: 3.7%
- 8 Hours: 28.9%
- 10 Hours: 65.8%
- 12 Hours: 1.6%
- N = 190
Methods

2) Actual work hours collected:
   - Payroll records > 100 hrs per pay period
   - Schedules > three 12-hour shifts in a row

3) Risk Management adverse events collected:
   - Total events
   - Type of events
   - Harm vs. no harm
Research Question

1. What impact did work hour guidelines and fatigue education have on the implementation of fatigue management countermeasures?

DATA COLLECTED

- Self report of fatigue management countermeasures from RN survey
- Survey utilized Likert scale

ANALYSIS

- ANOVA
- Tukey post hoc
- Paired sample t-tests
Total Fatigue Countermeasures

Higher Mean = Greater Utilization of Fatigue Countermeasures

Group I: Total Mean
F (2,592) = 7.758
p < .01

Group II: Total Mean

Group III: Total Mean

Group IV: Total Mean

Post Paired Total Mean

\( t(79) = -2.122 \)
\( p < .05 \)
Research Question

2. What impact did work hour guidelines and education have on hours worked?

DATA COLLECTED

- Self-report of work hours from RN survey
- Actual hospital work hours
  - > 100 hours per pay period
  - > three-12-hour shifts in a row

ANALYSIS

- ANOVA
- Tukey post hoc
- Paired samples t-test
- Crosstabs
- Chi-square
## Schedules Reflecting Greater Than Three 12-Hour Shifts in a Row

<table>
<thead>
<tr>
<th></th>
<th>June/July 2011</th>
<th>Jan/Feb 2012</th>
<th>Control Hosp</th>
<th>$\chi^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Research Hosp</td>
<td>Research Hosp</td>
<td></td>
<td></td>
</tr>
<tr>
<td>n=299</td>
<td>n=312</td>
<td>n=483</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Four 12-Hour Shifts in a Row</td>
<td>19(6.4%)</td>
<td>8(2.6%)</td>
<td>14(2.9%)</td>
<td>7.810*</td>
</tr>
<tr>
<td>Five 12-Hour Shifts in a Row</td>
<td>5(.02%)</td>
<td>4(.01%)</td>
<td>2(.004%)</td>
<td>3.272</td>
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<tr>
<td>Six – 12 Hour Shifts in a Row</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seven – 12 Hour Shifts in a Row</td>
<td>1</td>
<td></td>
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</tbody>
</table>

* $p < .05$
3. What impact did the implementation of work hour guidelines and education have on adverse safety events?

**DATA COLLECTED**

- Number of reported safety events
  - Type of events
  - Harm vs. No Harm
- Events proportioned per patient volume

**ANALYSIS**

- Crosstabs
- Chi-square
- Z score
Number of Adverse Events

- June/July 2011 Research Hospital: $\chi^2_{(3)} = 3.613$, $p > .05$
- Jan/Feb 2012 Research Hospital
- Jan/Feb 2012 Control Hospital: $z = 0.123$, $p > .05$
Findings

• Despite education and work hour guidelines, some nurses continued to exceed the recommended guidelines.

• Work hour guidelines and fatigue education increased the use of fatigue countermeasures:
  - resulted in a statistical difference with work greater than three 12-hour shifts in a row
  - demonstrated differences due to the setting (typical work hours per day)
  - demonstrated no difference in the number of adverse events
Limitations

• Lack of randomization of participants
• Survey tool
• Work hour guidelines were not mandatory
• Voluntary reporting of adverse safety events
• Comparison data was seasonal
• Multiple initiatives to improve safety present
• Hawthorn effect
Implications

• No single action, by itself, can affirm the delivery of safe patient care

• The role of the scheduling manager is key in providing safe patient care

• Nurses must take action to self-regulate their work hours to avoid the potential of being regulated
Wake-Up To Safety

• Errors will continue to occur if people continue to have schedules that inhibit sleep