What are the Sleep Patterns of Residents?

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I do not have an affiliation (financial or otherwise) with a pharmaceutical, medical device or communications organization.

Je n’ai aucune affiliation (financière ou autre) avec une entreprise pharmaceutique, un fabricant d’appareils médicaux ou un cabinet de communication.
Seeking Balance

Patient Safety

Health Care Provision

Education

Resident Health
Most Sleep Data

Actigraphy Study Supplemental Sleep Log

<table>
<thead>
<tr>
<th>Name:</th>
<th>Age:</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Gender:</th>
<th>Education:</th>
<th>Do You Have Children:</th>
<th>Are they &lt; 2 years old:</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Year in Program (e.g., PWEYLO):</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Day</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Call</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Were you on call this day?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>If Surgeon, Home with House Call</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>If PWS, Night or Day</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wrong Call</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Removed the Acthervest?</th>
<th>Time Removed</th>
<th>Time Replacement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>Time Removed</td>
<td>Time Replacement</td>
</tr>
<tr>
<td>No</td>
<td>Time Removed</td>
<td>Time Replacement</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Time In Bed</th>
<th>Time Out Of Bed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time In Bed</td>
<td>Time Out Of Bed</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Time On</th>
<th>Time Off</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time On</td>
<td>Time Off</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Morning of the</th>
<th>Time Wake Up</th>
<th>Time Turned Lights On</th>
</tr>
</thead>
<tbody>
<tr>
<td>next Day</td>
<td>Time Wake Up</td>
<td>Time Turned Lights On</td>
</tr>
<tr>
<td>Day 1</td>
<td>Time Wake Up</td>
<td>Time Turned Lights On</td>
</tr>
</tbody>
</table>
Resident Sleep Patterns?

Call

Program

Year in program

How call is scheduled
Participants
RESULTS
Residents vs. General Population

P=0.00001
Effect of Call

p=0.02
Ortho vs. Peds

p=0.00001
Predictors of Sleep

- Program Type
  - Orthopaedics
  - Paediatrics
- Having children < 2 years old
- Post Graduate Year
  - 1st year– 5th Year
- Call type
  - Day
  - Float
  - Home
  - Nights
  - In Hospital
## Regression Results

<table>
<thead>
<tr>
<th>Predictor</th>
<th>Effect on Sleep per Night</th>
<th>Cumulative Effect on Sleep over 14 days</th>
</tr>
</thead>
<tbody>
<tr>
<td>Program: Orthopaedics</td>
<td>- 30 min/night compared to Paediatrics</td>
<td>- 421 min compared to Paediatrics*</td>
</tr>
<tr>
<td>Year of training</td>
<td>+ 4 min/night/year of training</td>
<td>+ 53 min/year of training*</td>
</tr>
<tr>
<td>Children under age 2 in the home</td>
<td>- 14 min/night</td>
<td>-193 min*</td>
</tr>
<tr>
<td>Call-Type</td>
<td>-2 min/type of call in this order in this order**</td>
<td></td>
</tr>
<tr>
<td>Day</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Float</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Home</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Night</td>
<td></td>
<td></td>
</tr>
<tr>
<td>In-Hospital</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*P<0.001
**p<0.05
Junior vs. Senior Call

P=0.06
Home vs. Hospital Call

\[ p = 0.23 \]
Strengths

- Two week collection period
- Both pediatrics (night float) and orthopaedics (traditional call) represented
- Actigraphy plus sleep logs used
Limitations

- Cross sectional sampling
- Small sample size
- Population skewed towards Orthopaedics
- No measures of performance, subjective sleepiness or caffeine intake
Take Home Points

• Demonstrated an feasible method of measuring resident sleep in a Canadian Resident population

• Residents in this population were sleeping less than the average Canadian

• Factors which affect resident sleep
  – Program Type
  – Call

• Factors which did not affect sleep
  – Home call vs. in house call
Future Directions

• Why aren’t residents sleeping?

• How can we help them sleep?
Acknowledgments

- Dr Valerie Kirk
- Dr Simon Goldstein
- Dr Kathleen Chaput
- Brandy Groot

COREF Grant

Department of Pediatrics Innovation Award
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• Visitez le http://www.collegeroyal.ca/evaluations-cifr afin de remplir une évaluation de la séance.

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Effects of sleep on performance

• No effect
  – Studies of surgical residents and staff doing simulated laparoscopic skills showed no deterioration in performance despite measured lack of sleep or self perceived sleepiness \(^{12,13}\).
  – Furthermore, there is a body of evidence showing no change in gross complication rates when staff surgeons or residents were more sleep deprived or post call \(^{14,15,16,17,18,19}\).
Effect of Sleep on Performance

• Negative
  – Elective surgical cases done the day after a call shift were found to have a higher intra-operative complication rate when the surgeon got six hours or less of sleep the night before\textsuperscript{20}.
  – Furthermore, other studies examining simulated laparoscopic skills \textsuperscript{21,7}, cognitive abilities \textsuperscript{22,23,24}, psychomotor vigilance\textsuperscript{25}, and working memory capacity\textsuperscript{26} all showed deterioration in abilities with decreased sleep.
• Moreover, the odds ratio of a resident being involved in a motor vehicle accident, or near miss accident, following an extended shift was increased at 2.5 and 5.5 respectively\textsuperscript{27}.
The Cumulative Cost of Additional Wakefulness: Dose-Response Effects on Neurobehavioral Functions and Sleep Physiology From Chronic Sleep Restriction and Total Sleep Deprivation

Hans P.A. Van Dongen, PhD; Greg Masiin, MS, MA; Janet M. Mullington, PhD; David F. Dinges, PhD

Figure 1—Neurobehavioral responses to varying doses of daily sleep. Four different neurobehavioral assays served to measure cognitive performance capability and subjective sleepiness. Each panel displays group averages for subjects in the 8 h (○), 6 h (□), 4 h (◇) chronic sleep period conditions across 14 days, and in the 0 h (●) sleep condition across 3 days. Subjects were tested every 2 h each day; data points represent the daily average (07:30–23:30) expressed relative to baseline (BL). Panel A shows psychomotor vigilance task (PVT) performance lapses; panel B shows Stanford Sleepiness Scale (SSS) self-ratings; panel C shows digit symbol substitution task (DSST) correct responses; and panel D shows serial addition/subtraction task (SAST) correct responses per min. Upward corresponds to worse performance on the PVT and greater sleepiness on the SSS, and to better performance on the DSST and the SAST. The curves through the data points represent statistical non-linear model-based best-fitting profiles of the response to sleep deprivation (equation (1)) for subjects in each of the four experimental conditions. The mean ± 1 s.e. ranges of neurobehavioral functions for 1 and 2 days of 0 h sleep (total sleep deprivation) are shown as light and dark gray bands, respectively, allowing comparison of the 3-day total sleep deprivation condition and the 14-day chronic sleep restriction conditions. For the DSST and SAST, these gray bands are curved parallel to the practice effect displayed by the subjects in the 8 h sleep period condition, to compensate for different amounts of practice on these tasks.
Night Float vs Traditional

• Residents on the night float system get more sleep than they do on a traditional call schedule\textsuperscript{28,29}.
• It was also demonstrated that the night float system was associated with a significant decrease in patient mortality on a surgical service (1.1\% vs. 1.96\%, p=0.0002)\textsuperscript{30}, and less missed diagnoses on a radiology service\textsuperscript{31}
• With that said, the night float system also had some negative effects on resident life. It was associated with less educational activities (e.g. teaching rounds, admitting patients), more handovers in care, and a decrease in resident and nurse perceived quality of care\textsuperscript{28}


