The Effect of a Night Float Call System on Resident Fatigue, Cognition, and Motor Function: The Day Resident

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

• Duty hour mandates & fatigue management
  » Varies worldwide\(^1,2\)
  » No consensus in Canada\(^3\)

• Plethora of call schedule options
  » Overnight? Night Float? Shift?
  » Variable duration/frequency
Background and Rationale

• Controversy: Are concerns in night float valid?
  » Impact on education and life
  » Impact on patient care
  » It depends on...
    • Call Structure\(^4,5\)
    • Where you work\(^6\)
    • Who you compare\(^7-10\)
  » Unmeasured benefits to day team
Purpose

• What about the day resident?
  » How do they fatigue?
  » How does it affect cognition and motor function?
  » Do they recover?
  » How do they compare to overnight residents?
Study Design

• 2 Resident groups
  » Night float group: 14 orthopaedic surgery day residents
  » Traditional call group: 15 general surgery residents

<table>
<thead>
<tr>
<th></th>
<th>NF (n=14)</th>
<th>TC (n=15)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male (%)</td>
<td>13 (93%)</td>
<td>9 (60%)</td>
</tr>
<tr>
<td>Age ± sd</td>
<td>30 ± 3.3</td>
<td>27.7 ± 2.3</td>
</tr>
<tr>
<td>PGY 1-3 (%)</td>
<td>7 (50)</td>
<td>14 (93)</td>
</tr>
<tr>
<td>PGY 4-5 (%)</td>
<td>7 (50)</td>
<td>1 (7)</td>
</tr>
<tr>
<td>Prior CTIP/RSPT Use (%)</td>
<td>0 (0)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Prior Purdue Pegboard Use (%)</td>
<td>4 (29)</td>
<td>1 (7)</td>
</tr>
</tbody>
</table>
Study Design

• Night Float Call Structure
  » Resident on night float
    • 5:00 PM to 8:00 AM Sunday to Thursday x 1 month

  » Daytime resident on call 1 in 5
    • 5:00 PM to 11:00 PM Monday to Thursday

  » Traditional call
    • 24 hours, Friday & Saturday (by Daytime residents)
Study Design

• Testing at 3 time points
  » Pre-Call (T1)
    • 7:00 am pre-shift (all)
  
  » Post-Call (T2)
    • 11:00 pm (NF)
    • 7:00 am following day (OC)
  
  » 1 day post-call (T3)
    • 7:00 am day of return
Study Design: Measures

- Measures
  - Quality of Life: Brief Fatigue Inventory (BFI)\textsuperscript{11}
    - Validated for short term assessment
  - Sleep Hygiene
Study Design

» **Motor: Purdue Pegboard (PP)**\(^{12,13}\)
  - Dominant hand
  - Non-dominant hand
  - Both hands
  - Assembly task
Study Design

» Cognition: Computerized Test of Information Processing (CTIP) $^{14,15}$
  - Simple
  - 3 tasks
    - Simple Reaction Time (SRT)
    - Choice Reaction Time (CRT)
    - Semantic Search Reaction Time (SSRT)
Study Design

» Cognition: Road Signs Perception Test (RSPT)\textsuperscript{16}
  • Perception /cognition post-TBI
  • Challenging
Results

• Sleep Hygiene in NF group
  » Slept more day of call (6.4 vs 2.6, p<0.01)
  » Awoke less (0.9 vs 3.1, p<0.01)
  » Worked shorter hours (15.2 vs 21.5, p<0.01)
Results

- **Subjective Fatigue**
  - No difference pre-call (p = .12)
  - NF: no change (p = .18)
  - TC: Fatigued post without recovery (p < 0.01)
Results

• Motor Function
  » NF: no change x 4
  » TC: decline without recovery x 4
Results

Dominant Hand

Non-Dominant Hand

Both Hands

Assembly Task
Results

• CTIP: Response time
  » Simple
    • SRT/CRT no change in both groups
  » Complex
    • SSRT decline in TC without recovery
Results

SRT Response Time

SSRT Response Time

CRT Response Time
Results

• RSPT: Response time & Accuracy
  » NF: no change
  » TC: slowed and more errors post-call, but recovered
Results

RSPT Score

<table>
<thead>
<tr>
<th></th>
<th>Pre</th>
<th>Post</th>
<th>Post + 1</th>
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</thead>
<tbody>
<tr>
<td>NF</td>
<td>100</td>
<td>105</td>
<td>110</td>
</tr>
<tr>
<td>TC</td>
<td>110</td>
<td>115</td>
<td>115</td>
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</tbody>
</table>

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Results

RSPT 1Sign

RSPT 2 Signs

RSPT 3 Signs

The International Conference on Residency Education   |   La Conférence internationale sur la formation des résidents
Summary of Findings

1. TC had poorer sleep hygiene, more fatigued
2. Motor deficit in the TC group
3. Simple cognitive tasks not impaired
4. Complex tasks slowed and less accurate in TC group
5. Deficits persist
Considerations

• Learning effect
• Rescheduling of tests
• Different PGY distribution
Closing Remarks

• Day residents are subjectively and objectively less impaired and recover quicker
  » Unmeasured benefits to day team

• Does it work?
  » 6 residents per block
  » Overall duty hours and education unchanged\textsuperscript{17}

• Unclear clinical significance
  » Controversy in literature\textsuperscript{18,19}
  » Error preventive measures in place

• Night float is a great option, but not for everyone
References


References


• 16 - Ory J. *Examining reliability and validity of the Roadsign Perception Test* [Master's Thesis]: Psychology, Southeastern Louisiana University; 2012.

