COST-UTILITY ANALYSIS OF PREOPERATIVE SCREENING STRATEGIES FOR OBSTRUCTIVE SLEEP APNEA AMONG PATIENTS UNDERGOING MAJOR ELECTIVE NON-CARDIAC SURGERY

Ashwin Sankar, Peter R. Dixon, Lavarnan Sivanathan, Stavros Memtsoudis, John de Almeida, Mandeep Singh*

*Assistant Professor, University of Toronto
Conflicts of Interest

- Early Career Investigator
- Peer reviewed grants
- No Industry Funding
- Educational presentation
- Unedited Images: Image search_Google
Background
Key Messages:
• High prevalence of OSA, Low clinical recognition
• Cost vs. Patient safety
• OSA <-> Perioperative complications
• Use of perioperative CPAP < 20% OSA patients
• Adherence to guidelines < 20% of hospitals in North America
Preoperative Screening

Recommended and makes sense. But how?
STOP-Bang Questionnaire: 93% of undiagnosed moderate to severe OSA patients were at risk of OSA.
Diagnostic Work-up

Recommended, and makes sense. But how?
Lab vs. portable

Meliana V, Chung F, Li C, Singh M. Interpretation of sleep studies for patients with sleep disordered breathing: what the anesthesiologist needs to know? CJA 2018 Jan;65(1):60-75
What is the most Cost-Effective Pathway?
Methods
Methods

• *Ethics requirement waived*

• **Objective:** Evaluate the cost-utility of the following screening strategies:
  i. No Screening;
  ii. SB only;
  iii. SB with level 3 PM (SB+PM) if SB+;
  iv. SB with laboratory PSG (SB+PSG) if SB+

• **Cost-utility analysis using Individual-level Markov model**
  • Hospital perspective; lifetime horizon
Methods

• Base-case modeled after historic surgical cohort
• Diagnostic accuracy, probabilities, hazard ratios, weighted utilities
  • Structured Literature search
• Costs: Ontario Case Costing Analysis Tool in 2016 CAD with 1.5% discounting
• Outcome: $/QALY with 1.5% discounting
Methods – Model Structure
Methods – Model Structure

* Postoperative Complication
  - Pneumonia
  - Arrhythmia
  - Myocardial Infarction
  - Reintubation
  - Cardiac Arrest
  - Pulmonary Embolus

‡ Long-term Complication
  - Myocardial Infarction
  - Stroke
Results
Model comparison

Predicted, untreated OSA (model)
Predicted, severe untreated OSA (Tan et al 2015, model)
Observed, severe untreated OSA (Young et al 2008, mean age 55, 72% male)
Observed, severe untreated OSA (Marin et al 2005, mean age 50, 100% male)
Observed, severe untreated OSA (Marshall et al 2014, mean age 55, 72% male)
Observed, severe untreated OSA (Punjabi et al 2009, mean age 65, 71% male)
### Probabilistic Analysis

<table>
<thead>
<tr>
<th>Strategy</th>
<th>Cost (CAD)</th>
<th>QALY (Quality-adjusted Life-years)</th>
<th>ICER (vs. No Screen)</th>
<th>ICER (vs. above strategy)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Screen</td>
<td>11196.22</td>
<td>18.73</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>SB and PM</td>
<td>11439.03</td>
<td>18.80</td>
<td>3511.72</td>
<td>3511.72</td>
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<tr>
<td>SB and PSG</td>
<td>11464.65</td>
<td>18.93</td>
<td>1362.07</td>
<td>200.24</td>
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<tr>
<td>SB Alone</td>
<td>11985.74</td>
<td>19.00</td>
<td>2859.40</td>
<td>6592.88</td>
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</tbody>
</table>

The diagram shows the percentage of iterations that are cost-effective for different willingness-to-pay levels, with strategies including No Screening, Screen with STOP-Bang only, Screen with STOP-Bang, and Formal Sleep Study (PSG), Screen with STOP-Bang, and Overnight Level 3 monitor.
Interpretation

• Main Findings:

  • Screening with any strategy was cost-effective compared with No Screening
  • Of the screening strategies, SB > SB+PSG > SB+PM in terms of cost-utility
  • SB alone: Most costly
Interpretation

• **Strengths:**
  • Novel methodology, evidence-based
  • Examined new technologies in the perioperative period
  • Prospective studies limited by cost, and resources
  • Inform key stakeholders (OR, hospital, provincial/state levels)

• **Limitations:** Heterogeneous associations of OSA with outcomes; variability in costs
Acknowledgements

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SASM, Of Course!

Happiness is a choice