Pre-Incision vs. Post-Incision Frequent Door Openings During Total Joint Arthroplasty

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**Background**

- Surgical Site Infections (SSIs) are a serious complication of total hip and total knee arthroplasty
- Several studies have implicated frequent door openings in the operating room with higher rates of airborne contamination and subsequently increased rates of SSIs
- High rates of door openings during total hip and total knee arthroplasty have been previously established in the literature
- Previous studies have also shown an increase in airborne contamination during the pre-incision period compared to the post-incision period
- We sought to understand the reasons for door openings during total hip and total knee arthroplasty and to determine if door openings are significantly different between the pre-incision and the post-incision period

**Methods**

- Cross-sectional, observational study
- Data was collected at 3 large academic institutions between June 2019 to August 2020
- Observations were made by 4 observers who all underwent identical training and used a standardized data collection form
- The number of door openings, the reason for the door opening and the period in which the door was opened were recorded
- Distractions associated with door openings were also recorded and rated according to severity using a scale adopted from Healy et. Al
- The pre-incision period was defined as the time between the opening of the sterile instrument tray to the first incision. The post-incision period was defined as the time between the first incision and the application of the bandage
- This study met the classification for “not human subject research” by our institutional review board
- Data were analyzed using the Wilcoxon 2-sample median test

**Results**

**Table 1. Reasons for Pre-Incision and Post-Incision Door Openings**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Total Staff Break</th>
<th>Nurse Supplies</th>
<th>Vendor Supplies</th>
<th>Surgical Team</th>
<th>Hallway Door</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-Incision Median no. per case</td>
<td>0</td>
<td>8</td>
<td>2</td>
<td>7</td>
<td>3</td>
<td>7</td>
</tr>
<tr>
<td>% of total door openings</td>
<td>0</td>
<td>25.4</td>
<td>5.43</td>
<td>20.53</td>
<td>11.98</td>
<td>19.74</td>
</tr>
<tr>
<td>Post-Incision Median no. per case</td>
<td>4</td>
<td>6</td>
<td>6</td>
<td>1</td>
<td>0</td>
<td>8</td>
</tr>
<tr>
<td>% of total door openings</td>
<td>12.50</td>
<td>18.60</td>
<td>18.75</td>
<td>3.70</td>
<td>0</td>
<td>17.14</td>
</tr>
</tbody>
</table>

- We found 0.56 (IQR, 0.40–0.70) door openings per minute in the pre-incision period and 0.34 (IQR, 0.26–0.45) door openings per minute in the post-incision period
- We found a significant difference between these 2 periods (P = .0036)

**Discussion**

- 36% of door openings associated with a question or conversation regarding surgical equipment were rated as severe distractions and may contribute to surgical error and increased risk of SSI
- However, 97% of door openings that did not result in a subsequent conversation were rated as mild distractions
- Given the previously reported significant increase in airborne contamination during the pre-incision period and the high rate of pre-incision door openings, it is reasonable to hypothesize that door openings may affect the sterility of the instrument tray
- We found a significant difference in the reasons for door opening between the pre-incision and post-incision periods, which signifies that their roles in the increased rates of SSI are likely distinct and that they should be investigated separately
- Nurse and vendor supplies constituted a considerable number of pre-incision door openings (25% and 5%, respectively) and post-incision door openings (18% and 18%, respectively)
- A promising intervention to address these door openings would be the implementation of a checklist to ensure the presence of all necessary supplies prior to the pre-incision period
- Further research is needed to understand the effect of door openings in the pre-incision and post-incision period as well as to discover an effective and sustainable door-opening intervention

**Reference**

4. Healy AN, Sevdalis N, Vincent CA. Measuring intraoperative interference from distraction and interruption observed in the operating theatre. Ergonomics 2008;51:589–604