Reducing Wrong Level Spinal Surgeries Through Root Cause Analyses: A Ten-Year Longitudinal Analysis of a Single Tertiary Institution's Iterative Policy Improvements

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Background

Methods

Specific aims

- To examine iterative WLSS prevention strategies as they relate to WLSS events and RCA's to determine which regulations are imperative to preventing WLSS
- To provide a potential roadmap for how to develop a rigorous WLSS prevention protocol
- To illustrate that no one policy is completely effective but can be combined with several strategies to create a robust safety net

Sample case

51 y o patient scheduled for C5/6 ACDF. Intraoperative XR obtained with bayoneted spinal needle in disk space, identified by primary surgeon, resident, and second independent staff surgeon as being in C5/6 disc space. Decompression surgery performed at this level. Subsequent lateral XR after hardware in place confirmed that surgery erroneously performed upon C4/5 level. Decision made to complete procedure at intended C5/6 level. Patient ultimately received 2 level decompression and fusion from C4-6 rather than intended 1 level procedure from C5-6.

Sample case conclusions:

- Ensure real time staff radiologist confirmation of level in all surgical spine cases
- Ensure all X-ray and fluoroscopy machines used for spine surgery are Wi-Fi enabled
- For ACDF: bone fiducial should be placed into vertebral body and remain at that level throughout the case

References


Results

WLSS by surgery type:

- Block – 2
- ESI – 2
- ACDF – 2
- PCDF – 1
- Thoracic decompression and fusion – 1
- Lumbar decompression and fusion – 2
- TLIF – 1
- Cervical corpectomy, discectomy – 1
- Lumbar microdiscectomy – 1
- Cervical hemilaminotomy and foraminotomy – 1

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Conclusions

- This stepwise method is crucial to identifying gaps in institutional system
- No one policy is 100% effective on its own & together, they increase the number of layers in the swiss cheese model
- Further WLSS incidence monitoring is necessary to determine efficacy of current guidelines
- 1 approach: Impartial radiologist should receive improved quality intraoperative radiograph (with retractors in place) & assess vertebral level. Radiologist should then skype/call into OR to speak directly with operating surgeon & together they should walk through thought process of spine localization
- These guidelines may expedite the process for other healthcare systems attempting to patch holes in their own organizations

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<tr>
<th>What worked</th>
<th>What didn't work</th>
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<td>1. Specific, enforceable changes in intraoperative imaging</td>
<td>1. Vague guidelines for intraoperative imaging improvement</td>
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<td>2. Increased use of Wi-Fi C-arm for localization</td>
<td>2. Vague guidelines for vertebral body marking</td>
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<td>3. OR culture modification to create a culture of safety</td>
<td>3. 2-surgeon verification system</td>
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<td>4. Radiologist in-person verification system</td>
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