1951 - Pilot Study of Program to Determine Timeline to Competency in Anterior Cervical Discectomy and Fusion

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Introduction

Case minimums on index cases are set by the Residency Review Committee (RRC), but there is a paucity of objective data on how to set those numbers. Duke Neurosurgery developed and implemented an innovative, smartphone-based tool, the Surgical Autonomy Program (SAP), in our spine surgery workflow. We hypothesized that it would provide insight into the number of cases sufficient for junior residents to exhibit competency in performing anterior cervical discectomy and fusion (ACDF).
Methods

The SAP divides each index case into four, sequential Zones of Proximal Development (ZPDs). The resident is given a TAGS (Teach and Demonstrate, Advise and Scaffold, Guide and Monitor, Solo and Observe) score in each ZPD based on perceived competency. Between January 1, 2018 and December 31, 2018, we implemented the IRB-approved SAP, which was made available to all neurosurgical faculty and residents at Duke University Hospital. We present data from three junior residents’ ACDF cases performed and recorded within the SAP software from the time of their first ACDF to the time of Solo and Observe of Zone 4.
Results

The SAP provides a scalable and efficient approach that divides each surgical procedure into four Zones of Proximal Development (ZPD) for focused learning on the key steps of the procedure in a sequential manner, based on the resident’s experience to date. For the Anterior Cervical Discectomy and Fusion procedure, the case was broken into the following 4 zones:

<table>
<thead>
<tr>
<th>Zone 1</th>
<th>Zone 2</th>
<th>Zone 3</th>
<th>Zone 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positioning/Exposure/ Level</td>
<td>Retractor Distractor</td>
<td>Removal of osteophyte</td>
<td>Graft Hardware</td>
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<tr>
<td>Confirmation</td>
<td>placement/discectomy/end plate prep/size</td>
<td>PLL/foraminal decompression</td>
<td>placement/Closure</td>
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<td></td>
<td>graft</td>
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Results

Furthermore, the TAGS scale provides insights into resident expectations and faculty perceptions. The resident self evaluates how they felt they did on each zone. The faculty rates them as well and provides written feedback on specific areas to improve upon.

*T: Teach & Demonstrate:
Faculty teaches and demonstrates through the agreed upon ZPD by Faculty and Resident:
  Primary Surgeon: Faculty  First Assist: Resident  Guiding Case: Faculty

*A: Advise & Scaffold:
Faculty does most of talking, while resident doing more and more in ZPD:
  Primary Surgeon: Resident  First Assist: Faculty  Guiding Case: Faculty

*G: Guide & Monitor:
Resident doing most of case and most of talking, faculty helping with finer points in ZPD:
  Primary Surgeon: Resident  First Assist: Faculty  Guiding Case: Resident

*S: Solo & Observe:
Resident can perform independently the chosen ZPD or train a junior resident in that ZPD:
  Primary Surgeon: Resident  First Assist: Faculty  Guiding Case: Resident
# Results

## Self Evaluation

- How would you rate the difficulty of this case as compared to an average Anterior Cervical Discectomy and Fusion +/- Corpectomy?
  - Easy
  - Average
  - Hard

- Which ZPD were you focused on in today’s Anterior Cervical Discectomy and Fusion +/- Corpectomy?
  - ZPD 1=Positioning/Exposure/ Level Confirmation
  - ZPD 2=Retractor Distractor placement/discectomy/end plate prep/size graft
  - ZPD 3=Removal of osteophyte PLL/foraminal decompression
  - ZPD 4=Graft Hardware placement/Closure

Please select your TAGS value for each ZPD:  

<table>
<thead>
<tr>
<th>ZPD</th>
<th>T</th>
<th>A</th>
<th>G</th>
<th>S</th>
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<td>Positioning/Exposure/ Level Confirmation</td>
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# Image of the Resident Self Evaluation
Results

The SAP provides a mechanism to track the development of surgical competency in a sequential manner, based on the resident’s experience to date. Furthermore, the TAGS scale provides insights into resident expectations and faculty perceptions.

The number of cases required for each resident to achieve Solo and Observe in all four ZPDs was 10 cases for PGY-3a, 19 cases for PGY-3b, and 22 cases for the PGY-2.
Discussion

• This pilot study has demonstrated the ability of the SAP to easily and clearly measure resident learning and progress in performing ACDFs.
• It has shown that residents progress at different rates.
• This information can be used to advise individual residents, modify program curricula, and inform national RRC minimums moving forward, especially if the SAP scales nationally.
Summary Points

1. The Surgical Autonomy Program (SAP) facilitates the tracking of a resident’s acquisition of surgical skills during a residency training program.

2. All three of the residents achieved full competency in less than the RRC case minimums for ACDF, which currently is set at 25 cases.

3. This pilot has demonstrated the ability to easily and clearly visualize resident progress for anterior cervical discectomy and fusion.