2709 - Surgical Autonomy Program (SAP) for Evaluation of Resident Performance of Craniotomy for Tumor Resection

Andrew B. Cutler; Alexander Suarez; Charis Spears; Sarah E. Hodges; Lefko T Charalambous; Rajeev Dharmapurikar; Shivanand P. Lad; Michael M. Haglund
Disclosures

I DO NOT have any financial or organizational relationships with commercial interests or other entities. I hereby certify that to the best of my knowledge, no aspect of my current personal or professional circumstances places me in the position of having a conflict of interest with my duties, responsibilities and exercise of independent judgement as an Officer, Member of the Board of Directors, Nominee for Office, Educational Presenter and/or a representative of AANS/NREF/NPA.
Introduction

Existing tools for evaluating resident operative competence are sometimes disruptive to operative workflow, are resource-intensive, and are often completed long after the procedure in question. Duke Neurosurgery developed and implemented an innovative, smartphone-based tool, the Surgical Autonomy Program (SAP), in our tumor surgery workflow. We hypothesized that it would improve efficiency and efficacy of the resident and faculty feedback process. Here we present our experience in craniotomy for tumor resection.
Methods

The SAP applies Vygotsky’s Social Learning Theory to the process of acquisition of surgical skills and competence. We examined resident and faculty use for index neurosurgical cases in a 26-month pilot at Duke University Hospital. Between August 2017 and October 2019, we implemented the IRB-approved SAP, which was made available to all Duke neurosurgical faculty and residents. We present data from 746 tumor craniotomies performed, comprising 706 adult and 40 pediatric cases and 598 supratentorial and 148 infratentorial cases.
Results

The SAP provides a scalable and efficient approach that divides each surgical procedure into four Zones of Proximal Development (ZPD). Furthermore, the TAGS scale provides insights into resident expectations and faculty perceptions.

<table>
<thead>
<tr>
<th>Case</th>
<th>Zone 1</th>
<th>Zone 2</th>
<th>Zone 3</th>
<th>Zone 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Craniotomy for Tumor (Supratentorial)</td>
<td>Positioning Bony Exposure</td>
<td>Craniotomy Dural Opening</td>
<td>Tumor Resection</td>
<td>Dural closure/Flap placement/closure</td>
</tr>
</tbody>
</table>
Results

Use of the SAP was efficient for resident self-evaluation (median 15 sec, mean 21 sec) and faculty evaluation of residents (median 17 sec, mean 96 sec).
Results

Initial data shows that residents on average achieve “solo” ratings within 3 Cases for Zone 1, 7 for Zone 2, 24 for Zone 3, and 4 for Zone 4 for supratentorial tumors.

Example of a resident’s progression through learning to remove a supratentorial tumor
Discussion

This pilot has demonstrated the ability of the SAP to easily and clearly measure resident learning and progress in performing craniotomy for tumor resection and enhance the efficiency, frequency and timeliness of intraoperative assessment. Initial pilot data shows average mastery of cases below RRC mandated minimums. This information can be used to advise individual residents, modify program curricula, and inform national training guidelines.
Summary Points

1. The Surgical Autonomy Program (SAP) makes real-time intraoperative performance assessment feasible for every index cranial case and can be feasibly integrated into a residency training program.

2. The SAP provides a scalable and efficient approach that divides each surgical procedure into four Zones of Proximal Development (ZPD).

3. This pilot has demonstrated the ability to easily and clearly visualize resident progress for craniotomy for tumor, as an example index cranial case.