Variation in Surgical Time-out and Site Marking Within Pediatric Otolaryngology

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Objective: To determine variation in surgical time-out and site-marking within pediatric otolaryngology.

Design: Survey e-mailed via the American Society of Pediatric Otolaryngology (ASPO).

Participants: A total of 167 Children’s Hospital Corp of America (CHCA) operating room (OR) directors and ASPO members were asked about perioperative preparation of their patients.

Results: Most respondents who operate at children’s hospitals report policies that do not require site marking for bilateral placement of ventilation tubes, adenotonsillar surgery, airway endoscopy, or nasal surgery. Policies allowing assistants to perform site marking were identified by 45.0% of respondents from children’s hospitals. Community hospitals were 3.68 times (range, 1.31-10.31 times) more likely than other facilities to permit only the attending to perform site marking. Most respondents operating at children’s hospitals (84.4%) were satisfied with their hospital’s site-marking policy and with their hospital’s surgical checklist policy for pediatric otolaryngology procedures (87.1%). There seems to be a relationship between ear tube insertion marking policy and surgeon’s age (χ² = 12.9; P = .045), area of country (χ² = 29.1; P = .004), and ambulatory centers for children (χ² = 8.1; P = .02). Twenty-one percent of survey respondents reported involvement in a wrong-site surgery at some point in their career.

Conclusions: This survey of ASPO members and CHCA OR directors reveals substantial variation in the time-out and site-marking procedures. There is a dynamic tension between universal, national mandates, and allowing local variation to encourage hospitals to tailor policies to unique needs. Further study is needed to determine if the observed variations are beneficial or harmful.


The past decade has brought about considerable change in perioperative processes aimed at improving the safety and quality of care delivered to surgical patients. One of the more widely known studies, conducted under the auspices of the World Health Organization (WHO), demonstrated that implementation of a surgical checklist across 8 disparate surgical sites in the world resulted in a statistically significant reduction in morbidity and mortality. In addition to checklists suggested from organizations such as the WHO, The Joint Commission’s Universal Protocol is a regulatory requirement for surgical perioperative preparation in the United States. Components of the Universal Protocol include a preoperative verification of the planned procedure, marking of the surgical site, and a “time-out” confirming the surgical site. Although prescriptive and mandatory, there is some latitude in the interpretation and implementation of the Universal Protocol.

The Ad Hoc Health Policy and Economics Committee of the American Society of Pediatric Otolaryngology (ASPO) became aware, through informal discussion with colleagues, of substantial institutional variations in surgical time-outs and site-marking procedures. To understand these variations in a more systematic way, the ASPO Ad Hoc Patient Safety and Quality Improvement Committee conducted the current quality improvement initiative. The goal of this quality improvement initiative was to survey the scope and potential impact of perioperative process variations within our subspecialty and to begin considering what are truly the best practices to ensure the safety of our patients.

METHODS

An online survey was developed to assess the current operative protocols at various facilities where pediatric otolaryngology procedures are performed, including university hosp-
Only to aggregate level data. This quality improvement initia-
the operative time-out.
perform the surgical site marking and must be present during
Universal Protocol specified that the attending surgeon must
were male (74.8%) and were physi-
167 of 297 possible responses (56.2%). Predominantly,
Twelve of 43 CHCA OR directors (27.9%) and 155 of 254
for ear tube insertion? 18.
What area of the country do you live in? 17.
What is the number of years since graduating from fellowship? 16.
What is your sex? 14.
What is your age? 13.
ENT procedures? 11.
What is the policy of the facility where you perform surgery on children regarding
site marking for bilateral myringotomy and tube placement
Specifically, older surgeons are less likely to perform site
marking for obvious surgical sites (neck abscess drainage).
Figure 1. Survey questions to survey titled “Site Marking Policy Survey for
ENT Procedures.” DLB indicates direct laryngoscopy and bronchoscopy;
ENT, ear, nose, and throat; and OR, operating room. There was a total of 167
pititals, community hospitals, pediatric-only ambulatory surgery
centers, and comprehensive surgery centers. A trial of the sur-
vey was undertaken by members of the ASPO Task Force on
Patient Safety and Quality to ensure functionality and accu-
rate recording of responses; then practicing ASPO members and
operating room (OR) Directors of the Child Health Corp of
America (CHCA) Hospitals were surveyed via e-mailed solic-
tations regarding surgical time-out, site marking, and surgical
checklist protocols for routine pediatric otolaryngology pro-
cedures. Neck abscesses were considered “obvious” surgical sites.
The final survey (Figure 1) was administered during the
time frame of January to March 2009. Since The Joint Com-
misson’s Universal Protocol has been modified over time, it is
important to be aware that during the study time period,
the Universal Protocol specified that the attending surgeon must
perform the surgical site marking and must be present during
the operative time-out.
All responses were anonymous, and the authors had access
only to aggregate level data. This quality improvement initia-
tive is exempt from institutional review board approval.

RESULTS

Twelve of 43 CHCA OR directors (27.9%) and 155 of 254
US-based ASPO members (61.0%) responded, totaling
167 of 297 possible responses (56.2%). Predominantly,
the respondents were male (74.8%) and were physi-
cians (95.7%). Almost half (45.7%) of respondents gradu-
ated from fellowship 10 to 20 years ago; those who were
21 to 30 years from fellowship were the next largest co-
hort (28.7%). The proportions of respondents based on
geographic region of the United States were as follows:
Central (24.8%), Northeast (22.4%), West (14.3%), Mid-
Atlantic (12.4%), Southeast (11.2%), and Southwest
(6.8%).

MARKING PER CASE TYPE

For bilateral placement of ventilation tubes, adenotonsil-
sellar surgery, airway endoscopy, and nasal surgery, most
respondents who operate at children’s hospitals report that
their hospital’s policies do not require site marking;
time-out procedures are considered sufficient (Figure 2).
Specifically, older surgeons are less likely to perform site
marking for bilateral myringotomy and tube placement
(χ²=12.86; P= .045). Variation on the need for site mark-
ing for ear tube placement was identified based on the
demographic location of practices surveyed (χ²=29.11;
P=.004); practices surveyed in the Northeast and West
were more likely to mark both ears compared with other
geographic regions. A larger proportion of respondents
in the Mid-Atlantic area did not perform site marking for
bilateral ear tube placement compared with respondents
practicing in other geographic regions.
When examining site marking for ear tube placement
based on the type of surgical center, surgeons based
at an ambulatory surgery center exclusively for children
were significantly less likely to perform site marking com-
pared with those who operate at other surgical facilities
(χ²=8.13; P=.02) (Tables 1, 2, and 3).
For “obvious” surgical sites (such as a neck abscess),
76.9% of respondents who operate at children’s hospi-
tals reported policies that require site marking. For neck
abscesses, as with ear tube placement, a relationship be-
tween site marking and area of the country was identi-
ified (χ²=18.86; P=.004) (Table 4). For example, a greater
proportion of respondents from the Mid-Atlantic area
(55.5%) would not perform site marking for obvious sur-


Figure 2. Site-marking variations for surgeons operating at a children’s hospital.

<table>
<thead>
<tr>
<th>Type of Procedure</th>
<th>Mark both ears</th>
<th>Mark</th>
<th>No mark</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ear Tube Insertion</td>
<td>22</td>
<td>12</td>
<td>3</td>
</tr>
<tr>
<td>Adenotonsillar Surgery</td>
<td>4</td>
<td>3</td>
<td>93</td>
</tr>
<tr>
<td>Airway Endoscopy</td>
<td>70</td>
<td>33</td>
<td>17</td>
</tr>
<tr>
<td>Nasal Procedures</td>
<td>30</td>
<td>26</td>
<td>0</td>
</tr>
<tr>
<td>Obvious Surgical Site</td>
<td>33</td>
<td>23</td>
<td>0</td>
</tr>
</tbody>
</table>

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lar cases. Policies at a university with a children’s ward are 1.25 times (range, 1.15-1.36 times) more likely to require that a neck abscess be marked than all other facility types ($\chi^2=8.09; P=.004$).

**RESPONSIBILITY FOR SITE MARKING**

Forty-five percent of respondents who operate at children’s hospitals reported policies allowing health care providers, including residents, nurse practitioners, or physician’s assistants, to perform site marking. Eighty-four percent of respondents reported that the attending physician must be present at the initial time-out; 31.0% reported that the attending physician must lead the time-out. Community hospitals were 3.68 times (range, 1.31-10.31 times) more likely to allow only the attending physician to perform the site marking, compared with other surgical facilities ($\chi^2=6.72; P=.01$). Ambulatory surgery sites catering to both adults and children were 2.50 times (range, 1.18-5.32 times) more likely to only allow the attending physician to do the site marking, compared with other locations ($\chi^2=5.88; P=.02$).

Most respondents operating at children’s hospitals (84.4%) were satisfied with their hospital’s site-marking policy, and (87.1%) with their hospital’s surgical checklist policy for pediatric otolaryngology procedures. There was no notable difference of opinion about the site marking or checklist policies between the different surgical settings surveyed. Twenty-one percent of survey respondents reported involvement in a wrong-site surgery at some point in their career.

**COMMENT**

The ASPO Ad Hoc Patient Safety and Quality Improvement Committee surveyed ASPO members and CHCA OR directors to determine practices regarding perioperative procedures for some of the more common surgical procedures: myringotomy and placement of ventilation tubes, adenotonsillar surgery, airway endoscopy, nasal surgery, and drainage of neck abscesses in an effort to assess how ASPO members and CHCA OR directors interpret and apply national guidelines for the surgical time-out and site marking, and to illuminate variations in these processes.

The striking finding of this survey is the large variation among different institutions in the processes they follow to ensure safe perioperative practices. For identical procedures, different institutions have quite differ-

## Table 1. Variations in Site Marking for Myringotomy and Tubes According to the Age of the Surgeon in Response to the Question, “What Is the Policy of the Facility Where You Perform Surgery on Children Regarding Site Marking for Ear Tube Insertion?”

<table>
<thead>
<tr>
<th>Marking</th>
<th>Age Range, y</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marked in a way surgery will be identified</td>
<td>30-40: 7 (53.8)</td>
<td>34 (20.7)</td>
</tr>
<tr>
<td>No site marking required</td>
<td>41-50: 10 (14.5)</td>
<td>108 (65.9)</td>
</tr>
<tr>
<td>Both ears must be marked</td>
<td>51-60: 14 (24.6)</td>
<td>22 (13.4)</td>
</tr>
<tr>
<td></td>
<td>&gt; 60: 3 (12.0)</td>
<td></td>
</tr>
</tbody>
</table>

## Table 2. Variation in Site Marking According to the Region of the United States

<table>
<thead>
<tr>
<th>Marking</th>
<th>NE</th>
<th>C</th>
<th>SE</th>
<th>W</th>
<th>MA</th>
<th>SW</th>
<th>Other</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marked in a way surgery will be identified</td>
<td>10 (27.0)</td>
<td>9 (21.4)</td>
<td>4 (22.2)</td>
<td>4 (15.4)</td>
<td>4 (20.0)</td>
<td>3 (27.3)</td>
<td>0</td>
<td>34 (20.7)</td>
</tr>
<tr>
<td>No site marking required</td>
<td>15 (40.5)</td>
<td>31 (73.8)</td>
<td>13 (72.2)</td>
<td>16 (61.5)</td>
<td>16 (80.0)</td>
<td>7 (63.6)</td>
<td>10 (100)</td>
<td>108 (65.9)</td>
</tr>
<tr>
<td>Both ears must be marked</td>
<td>12 (32.4)</td>
<td>2 (4.8)</td>
<td>1 (5.6)</td>
<td>6 (23.1)</td>
<td>0</td>
<td>1 (9.1)</td>
<td>0</td>
<td>22 (13.4)</td>
</tr>
</tbody>
</table>

## Table 3. Variations in Site Marking for Myringotomy and Tubes Based on the Type of Surgical Facility Answering the Question, “What Is the Policy of the Facility Where You Perform Surgery on Children Regarding Site Marking for Ear Tube Insertion?”

<table>
<thead>
<tr>
<th>Marking</th>
<th>Other Surgical Facility</th>
<th>Ambulatory Surgical Center Exclusively for Children</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marked in a way surgery will be identified</td>
<td>35 (23.3)</td>
<td>1 (5.3)</td>
<td>36 (21.3)</td>
</tr>
<tr>
<td>No site marking required</td>
<td>93 (62.0)</td>
<td>18 (94.7)</td>
<td>111 (65.7)</td>
</tr>
<tr>
<td>Both ears must be marked</td>
<td>22 (14.7)</td>
<td>0</td>
<td>22 (13.0)</td>
</tr>
</tbody>
</table>

*Data are given as number (percentage); N=167; total does not add up to 167 owing to missing data or incomplete responses.

*Abbreviations: C, Central; MA, Mid-Atlantic; NE, Northeast; SE, Southeast; W, West; SW, Southwest.

*Data are only for procedures that are performed in pediatric ambulatory settings; N=167; total does not add up to 167 owing to missing data or incomplete responses.
ent requirements for site marking and time-out processes. It is important to note, however, that these are practice variations; this survey was not constructed to measure differences in outcomes.

There is a dynamic tension in patient safety (and in safety processes within other industries) between a universal mandate that ensures that all patients receive the exact same processes of care and allows for local variation. Local variation may be in the patient’s best interest for a number of reasons. Different health care facilities are staffed with different nurses and physicians and may face quite different challenges. For example, a rural OR with a total of 2 surgeons and 4 nurses on staff may find the recommendation that all team members introduce themselves at the start of a case unnecessary.

Second, in many cases the “best practices” are genuinely unknown. It was recently shown that wrong-site sinus surgery occurs more often than commonly recognized. However, because all the sinuses are inside the face and are generally accessed through the nose, it is physically impossible to unequivocally mark the sinus that is intended for surgery. Currently, sinus surgeons use different protocols to prevent wrong-site sinus surgery: some make custom marks on the patient’s face; others use a structured review of the radiographs; others use a structured review of the medical chart notes. Surgeons who already follow a rigorous, structured protocol may justifiably feel imposed on if a national body requires that they change their processes without sufficient, relevant data to support the change.

As noted by survey respondents, there was variation in hospital policies in their interpretation and use of the Universal Protocol2 vis a vis surgical site marking and time-out processes. The Universal Protocol is an evolving protocol and does undergo periodic iterations. It is imperative to remember that at the time of this quality improvement initiative, an earlier iteration of the Universal Protocol was in effect. It is of interest that 12.0% of institutions require the site marking for bilateral tympanostomy tube placement; however, the Universal Protocol noted that “the site does not need to be marked for bilateral structures.” This is an example of the local interpretation being more stringent than national guidelines. Again, we do not know the effect of this on patient outcomes; however, it is important to highlight this variation. We do not know from the respondents why some institutions have decided to adopt a stricter standard—it may be easier to have 1 policy for every surgery or they may not completely understand the guidelines and the latitude allowed in their interpretation. Figure 2 demonstrates that for tympanostomy tube placement, a sizeable proportion of surgeons and hospitals mark the site.

The tension between national recommendations and local interpretation is further highlighted by the fact that most respondents (84.4%) are satisfied with their hospital’s site-marking policy as well as with their hospital’s surgical checklist policy for pediatric otolaryngology procedures (87.1%).

The Universal Protocol in effect when this survey was conducted indicated that the attending surgeon should do the site marking. However, the survey data demonstrate that the attending surgeon is present for the initial time-out for 84.3% of respondents. What is a cause for concern is that the attending surgeon is not present in the other 15.7% of cases. The Universal Protocol is a dynamic guideline from The Joint Commission and has undergone iterations, most recently indicating that site marking can be done by a licensed independent practitioner who will be accountable and present during the procedure. Prior to these recent revisions/updates to the Universal Protocol, the presence of the attending surgeon was required during the time-out; however, the results from this survey indicated that a large proportion of respondents were not doing so.

Ambulatory surgery centers do not routinely require marking the ears for bilateral ear tube placement compared with nonambulatory venues (Table 3). It must be taken into consideration that some free-standing surgery centers may not fall under the auspices of The Joint Commission and, as such, may not follow the Universal Protocol. Ambulatory surgery centers serve a very specific role in handling the surgical cases in a community and perform limited types of elective cases. It may be that ambulatory surgery centers are well versed in the nuances of the Universal Protocol and apply them in a manner that does not impede the efficiency of their operations. Efficiency and the need to focus on a limited range of cases are not paramount at nonambulatory surgery locations, and hence these facilities may be more apt to create extra levels of redundancy. At ambulatory surgery centers, attending surgeons routinely operate without assistants, and hence, the site marking is usually directly from the surgeon; this is reflected in the survey responses.

The survey data demonstrate that, surprisingly, 21.0% of respondents have been involved in a wrong-site surgery at some point in their career. Similar data regarding wrong site and wrong procedures are very hard to find in the peer-reviewed literature because these errors are not routinely discussed for fear of embarrassment, liti-
gation, and damage to one’s reputation; such normative data have not been reported previously for pediatric otolaryngology. This quality improvement initiative was not intended to study this variable, and this finding requires deeper investigation. Briefly, the high proportion of survey respondents who have been involved in such an event may be the result of recall bias. The career risk for a spine surgeon to operate on the wrong spinal level is 1 in 2\(^5\); such data do not exist for pediatric otolaryngologists, but because high-volume surgeons may perform as many as 15,000 procedures in a career, such data may be elucidating.

In conclusion, this survey of ASPO members and CHCA OR directors reveals dynamic tension between the regulations of national organizations and the allowable local interpretations of such policies. Society members and OR directors are aware of these policies and most follow them; however, there are notable variations in their interpretation of these policies. Furthermore, the dynamic nature of these policies makes compliance at times inconsistent within our specialty. There are substantial variations in hospital policy that are not explained fully by the requirements of regulatory bodies, a concern which needs further studies to be properly addressed.

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Author Contributions: Dr Derkay had full access to all the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis. Study concept and design: Arjmand, Roberson, and Derkay. Analysis and interpretation of data: Shah, Arjmand, Roberson, Deutsch, and Derkay. Drafting of the manuscript: Shah, Arjmand, Deutsch, and Derkay. Critical revision of the manuscript for important intellectual content: Arjmand, Roberson, Deutsch, and Derkay. Statistical analysis: Shah. Administrative, technical, and material support: Shah, Arjmand, and Roberson. Study supervision: Arjmand, Roberson, Deutsch, and Derkay.

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REFERENCES