A Chief of Service Rotation as an Alternative Approach to Pediatric Otolaryngology Inpatient Care

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IMPORTANCE Maintaining an outpatient practice and providing high-quality inpatient care pose significant challenges to the traditional call team approach.

OBJECTIVE To introduce a unique rotating hospitalist inpatient program and assess its clinical, educational, and financial impact. The chief of service (COS) program requires 1 attending physician to rotate weekly as chief of the inpatient service with no conflicting elective duties.

DESIGN, SETTING, AND PARTICIPANTS This was a retrospective internal billing data review performed at a tertiary pediatric hospital. A total of 1241 patients were evaluated by the COS from October 2012 through October 2013.

INTERVENTIONS All patients were treated by the inpatient service under the supervision of the COS.

MAIN OUTCOMES AND MEASURES A retrospective analysis of patient encounters and procedures, including International Classification of Diseases, Ninth Revision (ICD-9) and Current Procedural Terminology (CPT) codes, locations of service, clinicians, service dates, and average weekly relative value units (RVUs).

RESULTS Over the study period, the COS was involved in the care of 1241 patients, generating 2786 billable patient encounters. The COS averaged 11.2 patient encounters per day. The most common reasons for consultation were respiratory distress, dysphagia, and stridor. Of patient encounters, 63.0% resulted in a procedure; 82.8% of those procedures were performed in the operating room with the most common being lower airway endoscopy (340 [19.4%]). The average weekly RVUs for the COS (232) were comparable with those of the average weekly outpatient clinic and procedural RVUs of the other otolaryngology faculty in the group (240).

CONCLUSIONS AND RELEVANCE The COS program was created to meet the clinical, educational, and organizational demands of a high-volume and high-acuity inpatient service. It is a financially sustainable model with unique advantages, particularly for the staff who maintain their outpatient practices without disruption and for the trainees who have the opportunity to work closely with the entire faculty. Patients are provided supervised evaluations and continuity of care. This rotating hospitalist program is a viable alternative to the full-time hospitalist staff model.

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Since its introduction in 1996, the hospitalist concept has grown and expanded as an accepted model of providing inpatient health care. The hospitalist work force tripled from 5000 physicians in 2002 to 15 000 physicians in 2007. As of 2012, more than 30 000 hospitalists staffed approximately 70% of US hospitals.

Studies of hospitalist programs have demonstrated reductions in average patient length of stay and decreased total hospital costs. Patient satisfaction surveys have shown similar levels of satisfaction with inpatient care regardless of being treated by hospitalists or primary care physicians. One qualitative study found general internal medicine units staffed by hospitalists to have more frequent and higher caliber interprofessional communications and collaboration.

Whereas the hospitalist model has been widely implemented across most of the medical specialties, its application to the surgical specialties has been less widespread. Most hospitalists are general internists (74.0%) or pediatricians (5.9%). The early role of hospitalists within the context of surgery was largely restricted to the medical comanagement of patients within surgical subspecialty departments such as orthopedic surgery and neurosurgery. In 2007, the University of California, San Francisco (UCSF), developed one of the first surgical hospitalist models and demonstrated this to be a cost-effective way for general surgeons to provide timely and high-quality emergency surgical care. The UCSF Department of Otolaryngology–Head and Neck Surgery followed soon thereafter with the establishment of the first full-time otolaryngology hospitalist in 2009.

In 2008, a rotating pediatric otolaryngology hospitalist model was developed within the Department of Otolaryngology and Communication Enhancement at Boston Children's Hospital (BCH) to meet the clinical, educational, and organizational demands of a high-volume and high-acuity inpatient service. We retrospectively assess the relative strengths and weaknesses of this system and note its similarities and differences in comparison to the standard hospitalist model.

Methods

The Department of Otolaryngology and Communication Enhancement has grown dramatically over the past 10 years. In fiscal year 2002 to 2003, the Department of Otolaryngology and Communication Enhancement had 30,077 outpatient visits and 4,071 surgical cases. Five years later, in fiscal year 2007 to 2008, the department had 48,195 clinic visits and 5,681 surgical cases. During fiscal year 2012 to 2013, there were 15 attending pediatric otolaryngologists, 4 fellows (postgraduate year 6 [PGY-6]), 3 PGY-3 residents, and 13 physician assistants (PAs). Approximately 59,000 patients were evaluated, and approximately 9,000 surgical cases were performed. Of note, a surgical case is defined as a single operating room visit for 1 patient and potentially involves several procedures.

The chief of service (COS) program was implemented in September 2008. One pediatric otolaryngologist devotes his or her week to managing the inpatient service as the COS without any conflicting outpatient responsibilities. This attending physician covers the inpatient service from 6 AM to 6 PM Monday through Friday. The COS manages all otolaryngology inpatient admissions and consultations and staffs all emergent operative procedures during this time period. The COS also provides coverage for the otolaryngology portion of procedures jointly scheduled with other services; for example, if a child scheduled for hydrocele repair also needs tympanostomy tubes, the COS performs this procedure in lieu of the child’s attending otolaryngologist. The COS is responsible not only for inpatient and emergency department consultations at BCH but also for pediatric consultations at 2 neighboring hospitals—the Brigham and Women's Hospital (BWH) and the Beth Israel Deaconess Medical Center (BIDMC). The BWH is connected to the BCH by a bridge, and the BIDMC is across the street; therefore, both institutions are accessible by foot within 5 minutes. The COS also covers urgent office consultations when there is no other outpatient attending otolaryngologist available.

The COS has no overnight call responsibilities. The other members of the pediatric otolaryngology faculty cover evening and night calls. The care of patients admitted or operated on from 6 PM through 6 AM is subsequently transferred to the COS. Similarly, patients requiring urgent but nonemergent procedures the following day are staffed by the COS. A different pediatric otolaryngologist covers the inpatient service on the weekend from 6 PM Friday through 6 AM Monday.

The inpatient service structured around the COS program focuses on team-based care with tiered coverage. The inpatient service is comanaged by 4 pediatric otolaryngology fellows, 3 otolaryngology PGY-3 residents, and 2 PAs. Similar to the COS rotation, the 4 fellows rotate on a weekly basis as the inpatient service fellow of the week. The PGY-3 resident who was on call the night prior leads morning rounds. The COS, fellow of the week, and PAs staff all consultations during the day. The entire team rounds twice daily, typically at 6 AM and 3 PM; the afternoon time varies depending on the operating room schedule.

A retrospective review of patient encounters and procedures performed by the COS over the 12-month period from October 2012 to October 2013 was conducted. The following data were analyzed for each COS encounter: International Classification of Diseases, Ninth Revision (ICD-9) codes, Current Procedural Terminology (CPT) codes, location of service, patient demographics, and billing charges. Both ICD-9 and CPT codes were grouped into subspecialty domains for a more descriptive analysis. These domains were based on the Accreditation Council for Graduate Medical Education (ACGME) Residency Review Committee procedure domains for pediatric otolaryngology fellowship training to enhance educational relevance. The BCH institutional review board approved this study, and its guidelines were followed.

Results

The administrative data included 248 business days staffed by the COS. Over this time period, the COS saw 1241 patients with...
4908 diagnoses. This resulted in 2786 billable encounters. There were more than twice as many patient encounters as there were patients because 52.1% of patients were seen more than once. For example, a patient with orbital cellulitis may have been seen by the inpatient service every day during his or her hospitalization, and each evaluation was counted as a separate encounter. During this time frame, the COS averaged 11.2 patient encounters per day and 56 patient encounters per week. Of these encounters, over half (63.8%) involved a procedure; 82.8% of these procedures were performed in the operating room, while the remaining 17.2% of procedures were performed at the bedside. These encounter numbers do not include postoperative patients seen but not billed because of the global period associated with their surgery.

Patients evaluated by the COS ranged from neonates to adults up to 53 years of age. A small number of adult patients (77) with primarily congenital cardiopulmonary disorders required ongoing care at BCH. Excluding those individuals older than 18 years, the average patient age was 4.8 years (median age, 2.7 years). The infant age group (1 month to 1 year of age) was most common. With the exception of the newborns and adults, there was a fairly even distribution of patients across the different age groups (Table 1).

A breakdown of the location and type of service provided by the COS is outlined in Table 2. Inpatient consultations at BCH accounted for approximately 63.8% of all COS patient encounters. Approximately 25.7% of encounters were considered BCH outpatient consultations, and nearly all of these patients required procedures (657 of 715 [91.9%]). This group comprised patients who either required an ambulatory procedure or were admitted for observation for less than 24 hours’ duration. Ambulatory surgical procedures performed by the COS included urgent outpatient procedures (eg, closed reduction of a nasal fracture) or procedures in patients who were scheduled to have surgery with another surgical specialty but required an otolaryngology procedure under the same anesthetic (eg, tympanostomy tube placement at the time of hernia repair). Emergency department consultations comprised 3.4% of encounters, and urgent office appointments made up another 4.1%. The relatively low number of emergency department consultations was at least partially due to most patients being admitted to an inpatient service, such as pediatrics or intensive care, prior to otolaryngology consultation. The COS consultations to the BWH and to the BIDMC comprised 2.4% and 0.6% of all consultations, respectively.

Also demonstrated in Table 2 is a breakdown of procedures by location. Of the 2786 patient encounters, 1755 (63.0%) involved a procedure; 1453 (82.8%) took place in the operating room, and the remaining 302 (17.2%) were performed at the bedside. Of note, the high percentage of patients who required an operating room procedure is largely attributable to the clinical acuity and relatively young age of our patient population. Many pediatric patients cannot tolerate bedside procedures, such as incision and drainage of auricular hematoma, thereby requiring general anesthesia. As mentioned, most of our outpatient consultations are seen by the COS specifically for a surgical procedure. Finally, we have a large population of complex patients who require emergent airway management.

Common bedside procedures included nasopharyngoscopy, laryngoscopy, and aural foreign body removal. Of the total procedures performed, more than half (56.5%) involved BCH inpatients. The higher percentage of bedside compared with operating room procedures at the BWH and BIDMC hospitals reflects the fact that the most common procedures in the neonatal age group were flexible laryngoscopy and frenulotomy.

Clinical diagnoses, based on ICD-9 codes, are outlined in the Figure. The top 5 diagnoses were respiratory distress, dysphagia, stridor, eustachian tube dysfunction (ETD), and chronic serous otitis media. Note that many patients had more than 1 diagnosis. For example, a patient who presented with acute

Table 1. Age Distribution of Patients

<table>
<thead>
<tr>
<th>Demographic</th>
<th>No. (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Newborn (≥28 d)</td>
<td>78 (6.3)</td>
</tr>
<tr>
<td>Infant (&gt;1 mo, ≤1 y)</td>
<td>259 (20.9)</td>
</tr>
<tr>
<td>Toddler (&gt;1-3 y)</td>
<td>215 (17.3)</td>
</tr>
<tr>
<td>Preschooler (&gt;3 y, ≤6 y)</td>
<td>213 (17.2)</td>
</tr>
<tr>
<td>School-age (&gt;6 y, ≤12 y)</td>
<td>239 (19.3)</td>
</tr>
<tr>
<td>Adolescent (&gt;12 y, ≤18 y)</td>
<td>160 (12.9)</td>
</tr>
<tr>
<td>Adult</td>
<td></td>
</tr>
<tr>
<td>&gt;18 y, ≤21 y</td>
<td>47 (3.8)</td>
</tr>
<tr>
<td>&gt;21 y, ≤25 y</td>
<td>18 (1.5)</td>
</tr>
<tr>
<td>&gt;25 y</td>
<td>12 (1.0)</td>
</tr>
<tr>
<td>Total</td>
<td>1241 (100)</td>
</tr>
</tbody>
</table>

* Percentages do not sum to 100% because of rounding.

Table 2. Locations of Service

<table>
<thead>
<tr>
<th>Location</th>
<th>Patient Encounters</th>
<th>Procedures</th>
<th>Location</th>
<th>Bedside</th>
</tr>
</thead>
<tbody>
<tr>
<td>BCH</td>
<td></td>
<td></td>
<td>Operating Room</td>
<td>Bedside</td>
</tr>
<tr>
<td>Inpatient service</td>
<td>1777 (63.8)a</td>
<td>991 (56.5)</td>
<td>776 (53.4)</td>
<td>215 (71.2)</td>
</tr>
<tr>
<td>Outpatient service</td>
<td>715 (25.7)</td>
<td>657 (37.4)</td>
<td>640 (44.0)</td>
<td>17 (5.6)</td>
</tr>
<tr>
<td>Emergency department</td>
<td>96 (3.4)</td>
<td>38 (2.2)</td>
<td>19 (1.3)</td>
<td>16 (6.3)</td>
</tr>
<tr>
<td>Office appointments</td>
<td>115 (4.1)</td>
<td>22 (1.3)</td>
<td>7 (0.5)</td>
<td>15 (5.0)</td>
</tr>
<tr>
<td>BWH inpatient service</td>
<td>66 (2.4)</td>
<td>37 (2.1)</td>
<td>10 (0.7)</td>
<td>27 (8.9)</td>
</tr>
<tr>
<td>BIDMC inpatient service</td>
<td>17 (0.6)</td>
<td>10 (0.6)</td>
<td>1 (0.1)</td>
<td>9 (3.0)</td>
</tr>
<tr>
<td>Total</td>
<td>2786 (100)</td>
<td>1755 (100)</td>
<td>1453 (100)</td>
<td>302 (100)</td>
</tr>
</tbody>
</table>

Abbreviations: BCH, Boston Children’s Hospital; BIDM, Beth Israel Deaconess Medical Center; BWH, Brigham and Women’s Hospital.

a Percentages do not sum to 100% because of rounding.

b Percentages are represented with respect to the column total. Note that outpatient services include ambulatory procedures and admissions of less than 24 hours’ duration.
facial nerve paralysis secondary to acute otitis media may have ETD listed as 1 of his or her diagnoses. A total of 292 diagnostic ICD-9 codes were used. These were grouped into 10 different categories for further analysis (Table 3). In composing these broader diagnostic categories, 58 ICD-9 codes were grouped as airway-related, 40 as otology, 30 as head and neck surgery, 25 as rhinology, 18 as tonsils and adenoid, and so on. The number of diagnoses within these categories correlated fairly well with the number of ICD-9 codes chosen with the exceptions of head and neck and ankyloglossia. The large number of random nongrouped diagnoses and ICD-9 codes also warrants mention. This group was largely composed of secondary diagnoses not specific to otolaryngology, such as cystic fibrosis and tracheoesophageal fistula.

Current Procedural Terminology codes were used to identify procedures performed by the COS during the study period. The most common surgical procedures included lower airway endoscopies (340 [19.4%]), direct laryngoscopies with the operating microscope (220 [12.5%]), and tympanostomy tube placement (200 [11.4%]). The bedside procedures that occurred with greatest frequency were diagnostic laryngoscopy (159 [9.1%]), nasal endoscopy (47 [2.7%]), and nasopharyngoscopy (22 [1.3%]). A total of 147 different CPT codes were used.

These procedural codes were grouped into 9 different domains for further analysis (Table 4). Such composite grouping was based on ACGME Residency Review Committee procedure domains for pediatric otolaryngology fellowship training, with the addition of a tonsils and adenoid category, to enhance educational relevance. Among the CPT codes, 22 were grouped into the rhinology domain, 19 were classified as endoscopy, 17 as head and neck surgery, 11 as otology, and 18 as airway.

To assess the financial implications of the COS system, data on relative value units (RVUs) over the study period were collected. There was weekly variation in charges, but the average COS produced 232 RVUs per week. The average physician in the group over the same time period produced 240 RVUs per week for outpatient practice and procedures.

Discussion

The original motivation for implementing a COS hospitalist program in the Department of Otolaryngology and Communication Enhancement was to provide continuity of care to a high-acuity patient population. A hybrid system similar to the
original UCSF consortium model was chosen in which 1 attending physician withdraws from his or her clinical practice and devotes that week to managing the inpatient service. This attending physician covers inpatient and emergency consultations, staffs all emergent operative procedures, and sees urgent outpatient office visits. The COS has no scheduled elective office sessions or operative procedures during this week with rare chair-approved exceptions.

Similar to a true hospitalist system, there are several qualitative advantages to this COS program. For the physician who is the week’s COS, the elimination of outpatient clinics and elective procedures frees up the time required to be fully devoted to this duty. Quality of care is improved as greater attending physician availability dramatically decreases the number of uncovered consultations, ensures a more senior level of inpatient care, and promotes continuity of care as the same attending physician manages the inpatient service for the week.

For the faculty members who are not the COS, there are important benefits as well. The COS handles all inpatient care, including the postoperative management of elective cases performed by fellow attending staff. This eliminates the need for the other physicians in the group to attend rounds the following morning to see their postoperative patients. This is especially beneficial for those physicians assigned to satellite outpatient locations on days following operative sessions. In addition, the COS covers most of urgent consultations. This coverage allows the other physicians in the group to maintain their outpatient practices without disruption. The COS also covers emergent or urgent operative cases initially presenting as outpatients; for example, a child who arrives to an outpatient office with a suspected neck abscess can be transferred to the hospital for treatment by the COS and inpatient team.

From a hospital standpoint, having a full-time faculty member devoted to inpatient care decreases the chance that an emergent otolaryngology clinical scenario will not have member devoted to inpatient care decreases the chance that a hospital for treatment by the COS and inpatient team.

An emergent otolaryngology clinical scenario will not have bedside staff, so the COS will staff all emergent operative procedures, and see urgent outpatient office visits. The COS has no scheduled elective office sessions or operative procedures during this week with rare chair-approved exceptions.

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From a hospital standpoint, having a full-time faculty member devoted to inpatient care decreases the chance that an emergent otolaryngology clinical scenario will not have appropriate coverage. We suspect that this not only improves quality of care but also decreases liability risk. As shown in the Figure, most of our consultations are for respiratory distress and/or stridor requiring urgent or emergent airway evaluation.

Transitions of care are also facilitated by the COS system. Each day begins with 1 of the PGY-3 residents providing sign out to all members of the team at morning rounds. Complex patients and overnight consultations are seen during morning rounds as a group. Over the course of the day, the fellow of the week manages all inpatient consultations with the COS and PAs. This fellow also performs most of urgent or emergent operative procedures with the COS. At the conclusion of the day, most members, if not the entire team, attend afternoon rounds, ensuring an informed hand-off of information and duties to the resident on call that evening.

There is a distinct educational advantage to a hospitalist system. This inpatient team structure and the elimination of outpatient responsibilities provide the COS with time to teach the trainees in a hands-on fashion. The COS attends both morning and afternoon rounds, allowing trainees the opportunity to discuss any interesting cases with a faculty member. The COS also sees consultations with the trainees. This provides not only another educational venue but also the opportunity to evaluate in considerable detail the clinical skills of the trainees. This is especially important as the specialty moves toward objective standardized assessment of residents and fellows via the ACGME Otolaryngology Milestone Project initiative.

This system has several unique advantages when compared with a pure hospitalist model. With the COS system, the residents and fellows are able to interact closely with a diverse group of experienced physicians rather than a single individual. This allows the trainees the opportunity to learn from the various backgrounds of the different attending physicians both at the bedside and in the operating room. In turn, the COS system also provides each physician in the group the opportunity to work with every resident and fellow. This is important for building attending physician–trainee relationships at all levels—fellows, residents, and medical students—the latter encouraging interest in the field.

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practices. Most otolaryngologists enjoy both the outpatient clinic and inpatient operative aspects of their specialty; indeed, this duality is what attracts many physicians to the field. A full-time hospitalist loses the important component of outpatient practice.

Furthermore, the hospitalist’s role is principally dealing with emergent clinical scenarios. There is the potential for a full-time hospitalist to “burn out” in this position. Whereas the COS does typically find himself or herself worn out by the end of the week, the intermittent role as COS can be refreshing. It also importantly allows all faculty members to maintain their airway and emergency intervention skills.

The structure of the COS program also enhances interdepartmental relationships, particularly with the staffs of the intensive care unit and emergency departments. The hybrid hospitalist system allows every pediatric otolaryngologist within the department to comanage complicated inpatient cases and develop such relationships. These relationships are valuable not only during the COS week, but also in numerous additional patient care scenarios.

The COS system also seems to be sustainable from a financial standpoint. During the study period, the average RVUs for the COS and for the other faculty were near-equivalent. While there is dramatic variability in the group’s outpatient billings based on the specifics of their individual practices and administrative and academic responsibilities, most the physicians do not note a decline in their financial productivity because of the COS system. We attribute this to the fact that most of COS patient encounters require a surgical procedure.

Conclusions

The COS system developed as a response to the increasing volume and complexity of the inpatient population at our institution. With approximately 11 billable patient encounters per day and 63.0% of all encounters requiring a procedure, it became unfeasible for the attending physician staff to both maintain an outpatient practice and cover the inpatient service from a clinical care, educational, and organizational standpoint. The COS system was developed to benefit all involved: the pediatric otolaryngology attending staff, the trainees, and, most important, the patients. This system is a feasible alternative to the hospitalist model, and we recommend its consideration in similar high-volume and high-acuity institutions.