Unplanned Revisits and Readmissions After Ambulatory Sinonasal Surgery

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Objectives/Hypothesis: Determine rates and reasons for revisits after adult ambulatory sinonasal surgery.

Study Design: Cross-sectional analysis of multi-state ambulatory surgery and hospital databases.

Methods: Ambulatory adult sinonasal procedures were extracted from the State Ambulatory Surgery Databases for New York, Florida, Iowa, and California for 2010. Cases were linked to the State Emergency Department Databases and the State Inpatient Databases for visit encounters occurring 0 to 14 days after the procedure. The number of revisits (including readmissions) was determined as well as the reason for revisit. The overall rate of and intervention rate for postprocedural bleeding were determined.

Results: A total of 35,678 ambulatory sinonasal cases were extracted (mean age, 47.5 years). Overall, 5.0% of patients had a revisit after surgery (18.9% revisited the ambulatory surgery center, 67.0% the emergency department, and 14.1% to inpatient admission). The primary diagnoses at the first revisit were bleeding (23.0%), acute pain (3.7%), and fever/dehydration (3.8%). Overall, 0.8% of patients incurred a second revisit. Among all cases, 1.2% and 0.3% presented with a bleeding diagnosis at a first and second revisit, respectively. Among revisits, 1.0% and 17.9% underwent a procedure to control bleeding at the first and second revisits, respectively. Three deaths were noted for an overall 14-day mortality rate of 0.0084%.

Conclusion: There is a nonnegligible revisit rate after ambulatory sinonasal surgery. The most common reasons for revisit include bleeding, but also acute pain and fever/dehydration. These particular complications should be targeted for prevention to reduce postoperative revisit rates.

Key Words: Sinus surgery, septoplasty, readmission, postoperative hemorrhage, complications, dehydration.

Level of Evidence: 2b.


INTRODUCTION

Chronic rhinosinusitis affects approximately 4.9% of the US adult population and over 600,000 ambulatory sinonasal surgeries are conducted each year.1,2 We previously reported that immediate perioperative complications were extremely low after ambulatory sinonasal surgery, with an unexpected admission rate immediately after surgery of 2.65%.3 However, beyond the immediate 24-hour window, complications may arise after sinonasal surgery, forcing patients to revisit the emergency room or be admitted to the hospital for further care. Such revisits are not only a nuisance for patients and physicians, but they also incur a direct cost to the healthcare system. In fact, revisit rates after procedures have been targeted as an increasingly likely quality and performance measure.3,4

There are very few data regarding revisit and readmission rates after ambulatory sinonasal surgery, especially beyond the immediate 24-hour postoperative window. We sought to determine revisit rates as well as complication rates associated with revisits to determine normative data and quantify the morbidity and mortality ambulatory sinonasal surgery. To do this, we examined the State Ambulatory Surgery Databases (SASD), the State Inpatient Databases (SID), and the State Emergency Department Databases (SEDD), which catalog visits and procedures for various states.

MATERIALS AND METHODS

Ambulatory adult (age ≥ 18.0 years) sinonasal surgical cases in which the primary procedure was a sinus or nasal surgery (endoscopic sinus surgery or septoplasty) were extracted from the State Ambulatory Surgery Databases for New York, Florida, Iowa, and California for calendar year 2010. These cases were linked to the corresponding SEDD and the SID for visit encounters occurring after sinonasal surgery, but within a 14-day window postoperatively. These databases are part of the Healthcare Cost and Utilization Project (HCUP) maintained by the Agency for Healthcare Research and Quality.5 This study was reviewed by our hospital’s committee on clinical investigations and deemed exempt from review.

Standard demographic information was extracted and tabulated for the cases of adult sinonasal surgery. Next, for each case, the number of revisits (including readmissions) after the index procedure was determined; the timing (postoperative day from sinonasal surgery) of the revisit was also tabulated. The site of the revisit encounter was determined as return to the ambulatory surgery site, emergency department, or
inpatient admission. Cases in which the primary procedure was a sinus debridement (Current Procedural Terminology (CPT) code 31237) were excluded from the revisit data as that may have been a planned procedure after surgery. The primary revisit diagnoses were determined for the revisit and codified as: postsurgical bleeding (hemorrhage or epistaxis), acute pain (including acute headache), or fever/nausea/vomiting/dehydration. Also, all diagnoses at the time of the revisit(s) were examined to determine if any of the diagnoses encompassed postsurgical bleeding. Next, for the revisit (if such a revisit occurred), procedure codes were examined to determine if a procedure was conducted to control postsurgical bleeding. Similar data were tabulated for a second revisit occurring within the 14 days after the index sinonasal surgical procedure. Finally, we examined the rate of first revisit hemorrhage among three groups: septoplasty alone, endoscopic sinus surgery (ESS) alone, and ESS with septoplasty.

RESULTS
A total of 35,678 ambulatory sinonasal cases were examined with a mean age of 47.5 years and a slight male predominance (56.6%). There were 15,083 (42.3%) septoplasties alone, 12,686 (35.6%) ESS cases alone, and 7909 (22.2%) ESS with septoplasty cases. Table I presents the distribution of CPT-coded procedures in the population. There were 1,784 cases (5.0%, 95% confidence interval (CI), 4.8–5.2%) with a revisit within 14 days after the index nasal surgery. Figure 1 presents the histogram distribution of days to the first revisit. Revisits to the ambulatory surgery center, emergency department, and inpatient admission were distributed as 18.9%, 67.0%, and 14.1%, respectively. There were a total of 274 cases (0.8%, 95% CI, 0.7–0.9%) with a second revisit among the population. Figure 2 presents the histogram distribution of days to the second revisit. As presented in Figure 2, 28 patients had their second revisit within the first postoperative 24 hours, among the 352 patients who had their first revisit during the first postoperative 24 hours. Revisits to the ambulatory surgery center, emergency department, and inpatient admission were distributed as 18.6%, 68.2%, and 13.1%, respectively.

Table II presents the relative frequency of bleeding and principal diagnoses at the time of the revisit, both

<table>
<thead>
<tr>
<th>CPT Code</th>
<th>Brief description</th>
<th>N</th>
<th>% of cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>31240</td>
<td>Concha bullosa resection</td>
<td>1486</td>
<td>4.2</td>
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<tr>
<td>31254</td>
<td>Partial ethmoidectomy</td>
<td>4139</td>
<td>11.6</td>
</tr>
<tr>
<td>31255</td>
<td>Total ethmoidectomy</td>
<td>11723</td>
<td>32.9</td>
</tr>
<tr>
<td>31256</td>
<td>Maxillary antrostomy</td>
<td>6456</td>
<td>18.1</td>
</tr>
<tr>
<td>31267</td>
<td>Maxillary antrostomy tissue removal</td>
<td>9514</td>
<td>26.7</td>
</tr>
<tr>
<td>31276</td>
<td>Frontal sinusotomy</td>
<td>6535</td>
<td>18.3</td>
</tr>
<tr>
<td>31287</td>
<td>Sphenoidotomy</td>
<td>2714</td>
<td>7.6</td>
</tr>
<tr>
<td>31288</td>
<td>Sphenoidotomy tissue removal</td>
<td>2630</td>
<td>7.4</td>
</tr>
<tr>
<td>30520</td>
<td>Septoplasty</td>
<td>22992</td>
<td>64.4</td>
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</table>
among revisits and among the overall population under-
going sinonasal surgery. Postoperative bleeding/epistaxis was substantially more likely to be associated with a revisit relative to acute pain or nausea/vomiting/dehy-
dration after surgery ($P < 0.001$). Overall, 17 patients (0.05%; 95% CI, 0.03–0.08%) underwent a surgical pro-
cedure to control postoperative bleeding at their first revisit. Also presented in Table I are similar data for second revisits after ambulatory sinonasal surgery. Finally, Table III presents the most common principle revisit diagnoses at the first revisit not previously cate-
gorized in Table I (e.g., chest pain). Among the revisits, there were three deaths noted among the first revisits (none among the second revisit) for a revisit mortality rate of 0.0084%. The postoperative hemorrhage rates for septoplasty alone, ESS alone, and ESS with septoplasty were 1.4%, 0.9%, and 1.4%, respectively ($P = 0.001$).

### DISCUSSION

In this cross-sectional, multistate analysis with—to our knowledge—the largest sample size in the United States to date, we found a nonnegligible rate of revisits after ambulatory sinus and nasal surgery for first and second revisits of 5.0% and 0.8% within a 14-day postop-
erative window. Given that approximately 600,000 ambulatory sinus and nasal surgeries are performed each year, this would extrapolate to approximately 30,000 first revisits and 4,800 second revisits after sur-
gery per year. On a national level, there is clearly a burden incurred to the healthcare system with this revisit frequency.

Aside from the inconvenience and suffering arising from an unplanned revisit after ambulatory sinonasal procedure, the revisit may disrupt hospital admissions and operating room flow; in addition, it creates a financial cost to the provision of care that is also unexpected. Recently, readmission rates have become one of the more

<table>
<thead>
<tr>
<th>TABLE II.</th>
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<tbody>
<tr>
<td>Distributions of Event and Diagnosis on Revisit 1 and Revisit 2 After Adult Ambulatory Sinonasal Procedures.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Diagnosis/Event</th>
<th>Among revisits</th>
<th>%</th>
<th>95% Confidence Interval</th>
<th>Among all cases</th>
<th>%</th>
<th>95% Confidence Interval</th>
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</thead>
<tbody>
<tr>
<td><strong>Revisit 1</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Any bleeding Dx</td>
<td>24.8</td>
<td>22.8–26.8</td>
<td>1.24</td>
<td>1.13–1.36</td>
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<tr>
<td>Bleeding primary Dx</td>
<td>23.0</td>
<td>21.1–25.1</td>
<td>1.15</td>
<td>1.05–1.27</td>
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<tr>
<td>Acute pain primary Dx</td>
<td>6.1</td>
<td>5.1–7.3</td>
<td>0.31</td>
<td>0.25–0.37</td>
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<tr>
<td>Fever/nausea/vomiting/dehydration primary Dx</td>
<td>3.8</td>
<td>3.0–4.7</td>
<td>0.19</td>
<td>0.15–0.24</td>
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<tr>
<td>Procedure to control bleeding, revisit 1</td>
<td>1.0</td>
<td>0.6–1.5</td>
<td>0.05</td>
<td>0.03–0.08</td>
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<td></td>
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<tr>
<td><strong>Revisit 2</strong></td>
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<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Any bleeding Dx</td>
<td>35.4</td>
<td>30.0–41.2</td>
<td>0.27</td>
<td>0.22–0.33</td>
<td></td>
<td></td>
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<tr>
<td>Bleeding primary Dx</td>
<td>34.7</td>
<td>29.3–40.5</td>
<td>0.27</td>
<td>0.22–0.33</td>
<td></td>
<td></td>
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<tr>
<td>Acute pain primary Dx</td>
<td>5.5</td>
<td>3.4–8.8</td>
<td>0.04</td>
<td>0.03–0.07</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fever/nausea/vomiting/dehydration primary Dx</td>
<td>1.5</td>
<td>0.6–3.7</td>
<td>0.01</td>
<td>0.00–0.03</td>
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<td></td>
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<tr>
<td>Procedure to control bleeding, revisit 2</td>
<td>17.9</td>
<td>13.8–22.9</td>
<td>0.14</td>
<td>0.10–0.18</td>
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</table>

Dx = diagnosis.

<table>
<thead>
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<th>TABLE III.</th>
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<tr>
<td>Most Common Revisit Diagnosis Codes Not Previously Classified at the First Visit.</td>
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</table>

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>RETENTION URINE NOS</td>
<td>83</td>
</tr>
<tr>
<td>DIS OF NASAL CAVITY SINUSES</td>
<td>51</td>
</tr>
<tr>
<td>ANXIETY STATE NOS</td>
<td>32</td>
</tr>
<tr>
<td>DEViated NASAL SEpTUM</td>
<td>32</td>
</tr>
<tr>
<td>CHRONIC SINUSITIS NOS</td>
<td>30</td>
</tr>
<tr>
<td>SYNCOPE AND COLLAPSE</td>
<td>22</td>
</tr>
<tr>
<td>DIZZINESS AND GIDDINESS</td>
<td>21</td>
</tr>
<tr>
<td>CHEST PAIN NEC</td>
<td>21</td>
</tr>
<tr>
<td>CHRONIC SINUSITIS NEC</td>
<td>19</td>
</tr>
<tr>
<td>CHEST PAIN NOS</td>
<td>18</td>
</tr>
<tr>
<td>ACUTE SINUSITIS NOS</td>
<td>15</td>
</tr>
<tr>
<td>MIGRNE UNSP WO NTRC MGRN</td>
<td>14</td>
</tr>
<tr>
<td>HYPERTRPH NASAL TURBINAT</td>
<td>13</td>
</tr>
<tr>
<td>UNSPECIFIED CONSTIPATION</td>
<td>13</td>
</tr>
<tr>
<td>RESPIRATORY ABNORM NEC</td>
<td>13</td>
</tr>
<tr>
<td>ABDMNAL PAIN UNSPFC SITE</td>
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</tr>
<tr>
<td>ACQ NOSE DEFORMITY</td>
<td>12</td>
</tr>
<tr>
<td>MALAISE AND FATIGUE NEC</td>
<td>11</td>
</tr>
<tr>
<td>CHR MAXILLARY SINUSITIS</td>
<td>10</td>
</tr>
<tr>
<td>CHR ETHMOIDAL SINUSITIS</td>
<td>10</td>
</tr>
<tr>
<td>SHORTNESS OF BREATH</td>
<td>10</td>
</tr>
<tr>
<td>DIGESTIVE SYST COMPLICAT NEC</td>
<td>10</td>
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</table>
Medicare and Medicaid Services. However, the use of readmission as a quality metric has come under increased scrutiny and may need further refinement, particularly for the surgical population.

Readmission rates—and in a broader sense, revisit rates—are not well known for otolaryngology procedures. This is likely because there is a significant mix of both outpatient ambulatory procedures and inpatient procedures and a mix of both academic and nonacademic institutions requiring study. Furthermore, in order to generate sample sizes large enough for meaningful statistical analysis, pooling of resources and data would likely be needed. In a recent timely article, Graboyes et al. quantified readmission rates for inpatient otolaryngology admissions in a single academic, tertiary care institution. They did not find rhinology cases to be associated with higher rates of readmission. However, that study examined inpatient rather than outpatient rhinology cases and the sample size for rhinology was as expected small (N=57) for an inpatient dataset. By way of comparison, we recently demonstrated an 11.6% and 2.1% first and second revisit rate after ambulatory adult tonsillectomy.

Somewhat unique to the current analysis, we have examined not only readmissions to the inpatient hospital setting after ambulatory sinonasal surgery, but we have also quantified revisits to the ambulatory surgery center itself and to the emergency department. Each of these venues will incur costs and inconveniences to patients and physicians alike. Therefore, these data provide a broader metric for the unanticipated use of healthcare resources within the 2 weeks after ambulatory sinonasal surgery, broader than would be encountered if one were to study inpatient readmissions alone. In fact, two-thirds of the revisits occurred at the emergency department level and only 14% encountered a formal readmission. One could of course argue that (re)admission after what was planned as an ambulatory sinonasal procedure would have more serious implications from a quality perspective.

Not surprisingly, bleeding was the most common reason for a revisit after an ambulatory sinonasal procedure. Relatively little is known about the expected bleeding rate after ambulatory sinonasal procedures, but our data suggest that it occurs in approximately 1% of all cases. Whether or not this is completely preventable versus it being an irreducible rate akin to posttonsillectomy bleeding is yet to be determined. Aside from bleeding, almost 10% of the first revisits and 7% of the second revisits were characterized by primary visit diagnoses of postoperative pain or fever/vomiting/dehydration. Perhaps, in contrast to postoperative bleeding, it would be expected that readmissions for postoperative pain and for fever/vomiting/dehydration should be able to be prevented to a greater degree. Therefore, these types of revisits should be the focus of attention in improving the quality of recovery after ambulatory sinonasal surgery. Finally, as Table II points out, not all revisit reasons are directly related to the surgical technique. There are distinct complications that may arise after even straightforward ambulatory sinonasal surgery, including urinary retention, chest pain and shortness of breath, so clinicians and patients alike need to be aware of these potential complications as well. Despite the economic issues that may surround readmission and revisits after surgical procedures, providers should remember that the anxiety and emotional distress that the patient experiences during an unplanned revisit after ambulatory sinonasal surgery is difficult to quantify, but it may be the most important thing that should drive efforts for improvement in this area.

Several limitations of the current analysis merit mention. First, the current methodology would fail to capture visits to urgent care clinics and also unplanned revisits to the physician’s office. Such visits are likely of lesser severity than those incurring an emergency department visit or inpatient readmission, but still incur additional costs and patient anxiety. Therefore, the actual unplanned revisit rate may be slightly higher than reported herein. Second, the analysis relies on coded diagnoses in a secondary data set. We were able to classify the most common complications associated with revisits, but there are inherent limitations in this methodology as some diagnoses codes are broader and less precise than others. Third, there are strengths and limitations of the individual data sets. These individual state databases are dependent on institutions’ submission of data; therefore, they do not encompass 100% of all ambulatory sinonasal surgeries. However, the SASH does include both hospital-based and nonhospital-based facilities, with the exception of Iowa. Finally, while the ability to track individual patient visits across emergency departments and inpatient admissions is a particular strength of this analysis, it is not perfect. Overall, for example, the state emergency department databases have verified reliabilities for revisits of 76% (Iowa), 87% (California), 94% (New York), and 95% (Florida).

CONCLUSION

After adult ambulatory sinonasal surgery, there are nonnegligible rates of first and second revisits after surgery, commonly related to bleeding and less commonly related to acute pain and fever/dehydration. There are specific revisit diagnoses that may be considered targets for improved quality of care surrounding ambulatory sinonasal surgery.

BIBLIOGRAPHY


