Trends in inferior turbinate surgery: analysis of patients using the Medicare database

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Background: The aim of this study was to characterize trends in turbinate reduction procedures from 2000 to 2015.

Methods: Annual procedure data were obtained for the period 2000–2015 and detailed Medicare provider and payment data were obtained for 2012–2015. Turbinate procedures analyzed included turbinate soft tissue mucosal ablation (TMA), turbinate soft tissue submucosal ablation (TSMA), turbinate excision (TE), and turbinate submucous resection (TSR). TMA and TSMA were grouped as turbinate soft tissue ablation (TA) for analysis. From 2012 to 2015, the type and location—facility (F) or nonfacility (NF)—of the providers performing the procedures were assessed.

Results: From 2000 to 2015, the total number of turbinate reduction procedures increased by an average of 3.8% annually. TSR had the highest annual increase at 5.4%. TE is the only procedure to show a decrease, by an average of −2.3% annually. From 2012 to 2015, the number of turbinate reduction procedures changed by −1.6% and 107.7% at F and NF locations, respectively. NF TSMA and TSR had the largest increases at 121.6% and 260.1%, respectively. Of the NF TA procedures, there was an average annual increase of 50% by non-otolaryngologists. For TA, the average F charge was 78.0% more than the NF charge, and the average NF otolaryngologist charge 11.5% more than the non-otolaryngologist charge.

Conclusion: The number of turbinate reduction procedures increased steadily between 2000 and 2015, with the majority being TSRs. This is consistent with previous studies demonstrating that TSR leads to better outcomes. There has been a significant increase in turbinate reduction procedures performed in outpatient/ambulatory settings by otolaryngologists, non-otolaryngologists, and midlevel providers. © 2018 ARS-AAOA, LLC.

Key Words:
head and neck; outcome; cost-effectiveness; rhinology, sinus surgery; Medicare utilization

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Inferior turbinate reduction is commonly performed in patients with chronic nasal obstruction due to hypertrophied turbinates.[1] Initial management for turbinate hypertrophy consists of medical management of rhinitis and control of allergies. Surgical procedures to reduce or remove the inferior turbinate tissue can augment medical therapy or be employed in patients who are refractory to medical therapy.[1–4]

Since Jarvis first reported inferior turbinate surgery in 1882, a plethora of inferior turbinate surgery techniques have been developed.[5,6] Common procedures include electrocautery, radiofrequency ablation, turbinate submucous resection, fracture of the inferior turbinate, and turbinectomy (total, subtotal, or partial).[3,7] The success of these techniques is largely based on longevity of results, degree of turbinate function, and complication rate.[1] Disagreement and debate about the best surgical option to address the hypertrophied inferior turbinate has long existed.[5,6,8,9] Recent work has suggested turbinate submucous resection as the optimal technique.[2] Submucosal resection retains the mucosa necessary for proper turbinate function and provides lasting volume reduction not seen with other mucosal-sparing techniques.[1,2,4,5]

With the rise of minimally invasive procedures in medicine, inferior turbinate procedures continue to be developed—not only in terms of technique but also who performs them and where they are performed. In 2012, the Centers for Medicare and Medicaid Services (CMS) released data to the public identifying the type and location of the providers performing the procedures under Medicare Part B. This has provided a valuable resource for analyzing any shift in turbinate procedures performed

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by otolaryngologists to non-otolaryngologists and midlevel providers, and turbinate procedures performed in the operating room (OR) to outpatient or ambulatory settings. Sun et al. predicted that the introduction of the Affordable Care Act would lead to the development of more midlevel providers, and access to the Medicare database allows for assessment of this trend in otolaryngology.[10] Furthermore, many otolaryngology procedures are now being performed in office-based settings, including balloon dilation endoscopic sinus surgery, diagnostic nasal endoscopy, debridement, biopsy, polypectomy, control of epistaxis, turbinate reduction, septoplasty, maxillary antrostomy, and limited ethmoidectomy.[11,12] Inferior turbinate reduction procedures are likely to be impacted by these trends because they are routine procedures that otolaryngologists can easily perform in the ambulatory setting and train midlevel providers to perform. Turbinate reduction is a common otolaryngologic procedure that traditionally has been performed by the surgeon in the OR. With time and technological advances, the modality of turbinate reduction has been redefined. Although most otolaryngologists are aware of these changes, there has been no descriptive analysis of turbinate trends and costs over time in the literature.

In this study we evaluated specific turbinate procedures and costs using the Medicare database. We predict a shift toward more minimally invasive turbinate procedures, as well as a shift in these procedures being performed more frequently in ambulatory settings and by more midlevel providers. We also evaluated the costs of specific turbinate procedures over time, and whether the setting or who performs the procedure significantly affects payments to providers. More specifically, we aimed to describe trends in the Medicare population for inferior turbinate reduction procedures during the period from 2000 to 2015, with a focus on utilization, payment, and charges. We also evaluated changes in the location and provider types for these procedures performed between 2012 and 2015 using provider-specific Medicare data. Understanding common and practical trends for inferior turbinate procedures will help otolaryngologists in the ever-changing health-care environment.

Materials and methods

Annual procedure data for 2000–2015 were obtained from the Part B National Summary Data File (https://www.cms.gov/research-statistics-data-and-systems/downloadable-public-use-files/part-b-national-summary-data-file/overview.html/). Detailed provider and Medicare payment data for 2012–2015 were obtained from the Medicare Provider Utilization and Payment Data: Physician and Other Supplier Public Use File (PUF) from the Centers for Medicare and Medicaid Services (CMS; https://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/Medicare-Provider-Charge-Data/Physician-and-Other-Supplier.html/). All data were accessed online between June 5, 2017 and June 28, 2017.

TABLE 1. Categorization of turbinate procedures

Procedure	CPT code	Alternate Classification	Alternate Classification
TMA	30801	Radiofrequency ablation	Turbinate soft tissue ablation (TA)
TSMA	30802		
TE	30130	Turbinectomy	
TSR	30140	Turbinoplasty	
FIT	30930		
S	30520		

CPT = Current Procedural Terminology; FIT = fracture of inferior turbinate; S = septoplasty; TE = turbinate excision; TMA = turbinate soft tissue mucosal ablation; TSMA = turbinate soft tissue submucosal ablation; TSR = turbinate submucous resection; TA = turbinate soft tissue ablation.

Turbinate reduction procedures analyzed were turbinate soft tissue mucosal ablation (TMA, Current Procedural Terminology [CPT] 30801), turbinate soft tissue submucosal ablation (TSMA, CPT 30802), turbinate excision (TE, CPT 30130), turbinate submucous resection (TSR, CPT 30140), and fracture of the inferior turbinate (FIT, CPT 30930). These five listed procedures can be further categorized as radiofrequency ablation, turbinoplasty, and turbinectomy.[2,6,7] TMA and TSMA are radiofrequency ablation procedures. TSR and FIT are considered turbinoplasty techniques. TE is considered a turbinectomy and involves total or partial removal of the turbinate.[6,7] In a subset analysis, TMA and TSMA were grouped together as turbinate soft tissue ablation (TA). See Table 1 for categorization summary.

For the period 2012–2015 the locations of providers performing the procedures were categorized as facility or nonfacility. For comparison, data on septoplasty (S, CPT 30520) procedures for 2000–2015 were obtained. In contrast to turbinate procedures, there are limited techniques for septoplasty—open/traditional vs endoscopic. The septoplasty procedure was used a reference for "nasal" procedure to compare with turbinate reduction, which has multiple techniques, often driven by technological advances. For TMA and TSMA, the number of services and allowed charges were also assessed for non-otolaryngologists. Nonotolaryngologists/midlevel providers include general practitioners (GPs), family medicine providers (FMs), nurse practitioners (NPs), internal medicine providers (IMs), and physician assistants (PAs).

Results

Turbinate reduction procedure: volume

The number of turbinate reduction procedures completed by Medicare providers was categorized as allowed services in the Part B National Summary Data File. For the period 2000–2015, the total number of turbinate reduction procedures increased from 27,670 to 48,285, with an average

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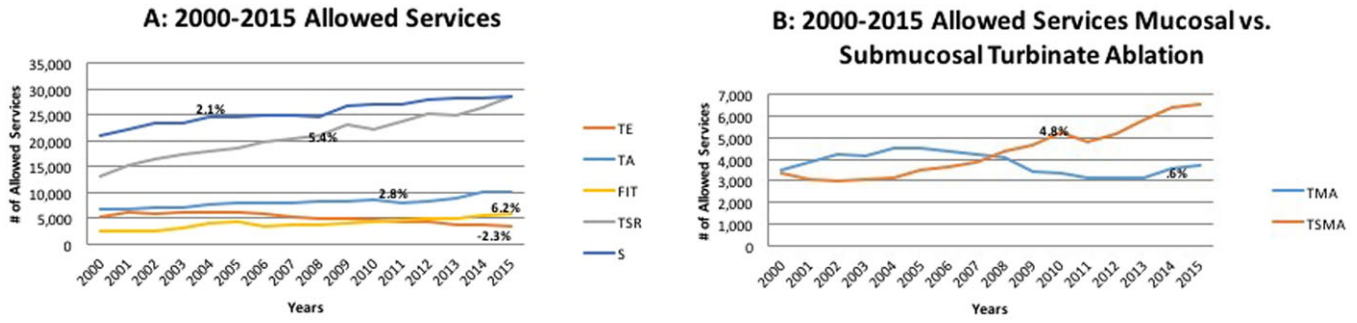

FIGURE 1. (A) Turbinate reduction allowed services for the period 2000–2015. Percent annual increase/decrease labeled on the graph line. (B) Allowed services for the period 2000–2015 for TMA and TSMA, ungrouped from TA. Percent annual increase/decrease labeled on the graph line. FIT = fracture of inferior turbinate; TA = turbinate ablation; TE = turbinate excision; S = septoplasty; TMA = turbinate mucosal ablation; TSMA = turbinate submucosal ablation; TSR = turbinate submucous resection.

annual increase of 3.8% (range, −2.3% to +6.2% per CPT code) (Fig. 1A). When looking at individual procedures, the number of TSRs increased the most from 13,218 to 28,757, with an average annual increase of 5.4%. Furthermore, in 2015, the number of TSR procedures (28,757) outnumbered the second most common procedure, TA (10,254), by 18,503 (Fig. 1A). In 2008, the yearly number of TSMA (4,367) procedures surpassed the yearly number of TMA (4,058) procedures. TSMA and TMA procedures increased annually by an average of 4.8% and 0.6%, respectively (Fig. 1B). TE is the only procedure to show a decrease in the number of services, by an average of 2.3% annually. The number of septoplasty procedures changed modestly, increasing by 2.1% annually. In 2015, the numbers of septoplasty procedures (28,754) and TSR procedures (28,757) were nearly identical (Fig. 1A).

Turbinate reduction procedure: charges/payment

The Part B National Summary Data File also details the total yearly allowed charges (US dollar amount) per procedure. This is the amount of money the Medicare providers submit for reimbursement for a given procedure. For 2000–2015, the total amount of allowed charges for turbinate reduction procedures analyzed (TA, TSR, TE) increased by an average of 10.4% annually. The major contributor to this annual increase was TSR, as the total allowed charges increased by an average of 12.2%. The average annual increase was smaller for both TA and TE at 8.5% and 3.5%, respectively (Fig. 2). In 2015, the total allowed charges for TSR was $14,967,311 compared with $2,117,440 and $1,306,406 for TA and TE, respectively. The amount of allowed charges for TSR far surpassed the charges allowed for TA and TE (Fig. 2). For reference, the amount of Medicare payment was also assessed for the aforementioned procedures (TA, TSR, TE). Medicare payment is similar to the allowed charges, yet slightly decreased for each procedure (Fig. 2).

Turbinate reduction procedure: venue

The Physician and Other Supplier PUF details the volume of procedures and yearly allowed charges completed at

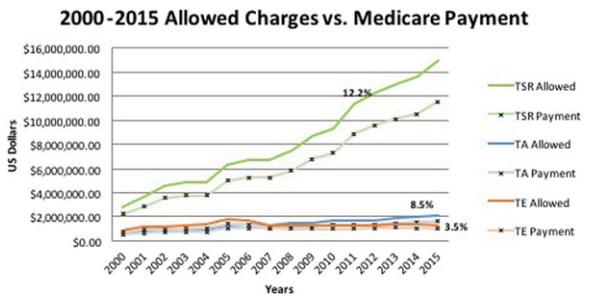

FIGURE 2. Select turbinate reduction procedure allowed charges and Medicare payment for the period 2000–2015. Percent annual increase labeled on the graph line. Lines without "×" indicate allowed charges and lines with "×" indicate Medicare payment. TA = turbinate ablation; TE = turbinate excision; TSR = turbinate submucous resection.

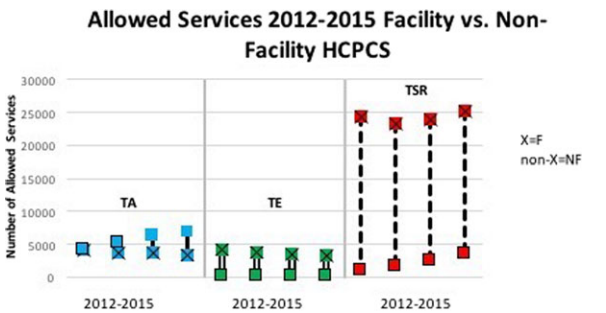

FIGURE 3. Select turbinate reduction procedure allowed services at facilities compared with nonfacilities for the period 2012–2015. Boxes with "×" indicate facility and boxes without "×" indicate nonfacility. F = facility; NF = nonfacility; TA = turbinate ablation; TE = turbinate excision; TSR = turbinate submucous resection.

facility (F) and nonfacility (NF) Medicare locations. The available data are for 2012–2015. The number of turbinate reduction procedures changed by −1.6% and 107.7% at F and NF locations, respectively (Fig. 3). Both TSMA and TSR had the largest percent increase in NF procedures at 121.6% and 260.1%, respectively. The total number of TA procedures performed at NFs surpassed the number of procedures performed at Fs in 2015, with a total of 6818 TA procedures being performed at NFs compared with 3436 TA procedures performed at Fs. The amount of NF

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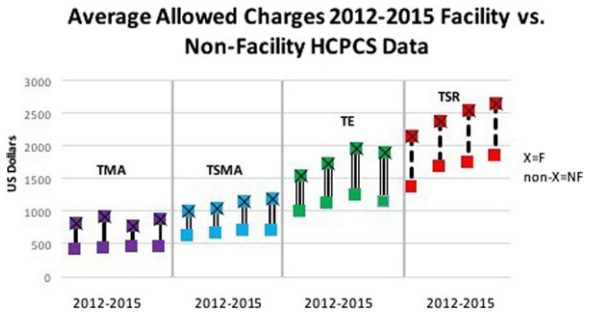

FIGURE 4. Select turbinate reduction procedure average allowed charges at facilities compared with nonfacilities for the period 2012–2015. Boxes with "×" indicate facility and boxes without "×" indicate nonfacility. TA has been ungrouped into TMA and TSMA. F = facility; NF = nonfacility; TA = turbinate ablation; TE = turbinate excision; TMA = turbinate mucosal ablation; TSMA = turbinate submucosal ablation; TSR = turbinate submucous resection.

TSR and TE procedures performed at NF locations did not surpass the amount performed at F locations (Fig. 3).

When comparing the yearly allowed charges per procedure at different locations, F-based procedures were more expensive. For TA, the average F-location charge was 78.0% greater than the NF-location charge. For TSR, the average F charge was 48.0% greater than the NF charge. The least expensive procedure was TMA performed at an NF location. However, the allowed charges at NFs has been on the rise. The average NF TA charge increased annually by 3.81%. The average NF TSR charge increased annually by 11.0% (Fig. 4).

Turbinate reduction procedure: provider/operator

The final comparison in this study used the Physician and Other Supplier PUF to compare turbinate reduction procedures completed by otolaryngologists vs non-otolaryngologists and midlevel providers. The location, number of procedures, and average allowed charge were analyzed. The available data are for 2012–2015. The 2015 data were unavailable for PA, NP, GP, and FM providers; for IM, the only available data were for 2015.

Of those procedures performed in NFs for TA there was an average annual increase of 50% by non-otolaryngologist/midlevel providers and 21.6% by otolaryngologists. The total number of TA procedures by otolaryngologists at NFs was 12,123. This outnumbered the amount of TA procedures by non-otolaryngologists/midlevel providers—only 1,829 were completed at NFs. For TMA at NFs, 82.0% of the procedures were completed by otolaryngologists and 17.9% of the procedures were completed by non-otolaryngologists/midlevel providers. The nonotolaryngologists were FM, GP, and IM providers who completed 5.0%, 1.2%, and 0.1% of the procedures, respectively. The midlevel providers consisted of NPs and PAs, who completed 7.0% and 5.0% of the total procedures, respectively (Fig. 5).

The average yearly allowed charges by individual providers for TMA at NF locations were also assessed. For

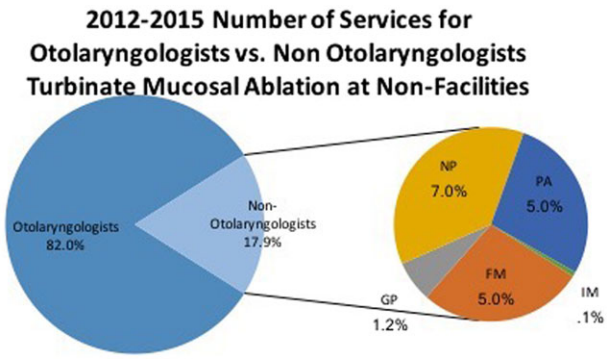

FIGURE 5. Number of TMA procedures completed for the period 2000–2015 by otolaryngologists compared with non-otolaryngologists. Non-otolaryngologists are further divided into NP, PA, IM, FM, and GP subgroups. FM = family medicine; GP = general practitioner; IM = internal medicine; NP = nurse practitioner; PA = physician assistant; TMA = turbinate mucosal ablation.

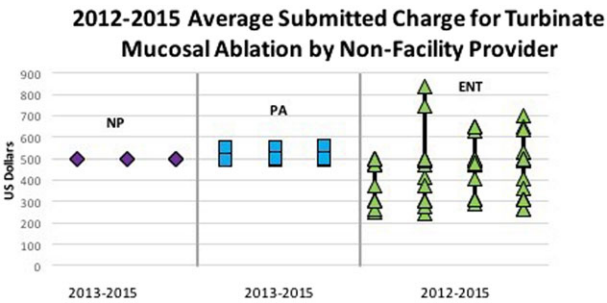

FIGURE 6. Average charge for TMA allowed by select nonfacility providers during the period 2012–2015. Small numbers can be seen for PA and NP. ENT = otolaryngologist; NP = nurse practitioner; PA = physician assistant; TMA = turbinate mucosal ablation.

NF TMA, the average allowed charge by otolaryngologists ranged from $245.90 to $834.80 (average, $430.30). A total of 80 individual otolaryngologist providers were surveyed from 2012 to 2015 (Fig. 6). The range for midlevel providers was not as wide. The average yearly allowed charge for PAs ranged from $492 to $557 (average, $517). All NPs surveyed had an average allowed charge of $500. A total of 12 PAs and 7 NPs allowed charges were available in Medicare database from 2012–2014. GPs, FMs, and IMs performing TMA at NFs had average allowed charges of $300, $289, and $280, respectively.

Discussion

The primary purpose of this study was to evaluate trends in inferior turbinate reduction procedures for the period 2000–2015 using the publically available Medicare Part B database. We also sought to highlight the location and provider type for these procedures for 2012–2015 using data from the Physician and Other Supplier PUF. TSR and TA are the most commonly performed turbinate procedures. TSR provides long-lasting results but is more expensive and is mostly conducted in the OR. Movement to outpatient or ambulatory settings could reduce overall costs.

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TA is less invasive and can be performed at outpatient or ambulatory settings. Further cost-benefit analyses should be conducted on TSR vs TA to determine the optimal treatment. Kizilkaya et al found that TA is just as effective as TSR.[13] De Corso et al also found that, after two years of follow-up, those treated with TA had preserved physiologic function, minor discomfort, and a low risk of side effects.[14] From our study, TA is minimally invasive, less expensive, can be performed by non-otolaryngologists in an outpatient setting. If TSR and TA have similar clinical outcomes, we must acknowledge that nonclinical factors—one of which is reimbursement—may account for the difference in the practice patterns.

Turbinate reduction procedures are performed with the goal of increasing nasal airway volume while preserving turbinate function. Techniques have evolved to optimize long-term benefits with minimal complications or morbidities. Preservation of the mucosa allows for continued humidification and mucociliary clearance necessary for preserved turbinate function.[13] In their randomized clinical trial with 382 patients and 6-year follow-up, Passali et al. demonstrated that submucosal resection resulted in the highest degree of nasal patency, restoration of mucociliary clearance, and local secretory immunoglobulin A (IgA) production.[15] There is evidence that ablation procedures are associated with minimal pre- and post-operative complications and can be performed on an outpatient basis.[16] A shift toward more mucosal-sparing techniques in turbinate surgery avoids the potential scarring and fibrosis associated with more invasive traditional techniques.

Turbinate procedures are increasingly and commonly being shifted to outpatient and ambulatory settings. When comparing turbinate reduction procedures completed at Fs vs NFs, there was a rise in procedures taking place in NFs for TA and TSR. TA is also the only turbinate reduction technique where more procedures are completed in NFs than Fs. TA is a minimally invasive procedure that can be performed by otolaryngologists and non-otolaryngologists in the ambulatory setting. As techniques improve and technology continues to make procedures safer, nonablation turbinate procedures will likely shift toward outpatient and ambulatory settings as well. These ambulatory settings offer the potential for decreased cost, reduced recovery time, and avoidance of general anesthesia.[12] In terms of average allowed charges for different turbinate reduction procedures at Fs vs NFs, all Fs charge more than NFs, as expected. As previously mentioned, more invasive procedures, such as TSR, cost more than less invasive procedures, such as TA. This trend is in contrast to that seen for minimally invasive balloon sinus procedures, which render higher reimbursement and often have higher costs than typical endoscopic sinus procedures.[17]

Traditionally, turbinate procedures have been performed solely by otolaryngologists. Midlevel providers, such as NPs and PAs, and, to a lesser extent, non-otolaryngologists, such as primary care and family physicians, have become more involved with turbinate procedures. For turbinate mucosal ablation procedures, there has been a rise in non-otolaryngologists/midlevel providers performing these procedures. The non-otolaryngologists who performed turbinate procedures were FM, GP, and IM practitioners. Midlevel providers who performed turbinate procedures consisted of NPs and PAs. Midlevel providers help to reduce overall costs and help free up the otolaryngologists to address more complex cases. In addition, midlevel providers can increase patient satisfaction and productivity of the practice.[18]

There are several limitations to our study. Because our data come from the Medicare Part B database, our study population is limited to patients who are ≥65 years of age. Although rhinitis and turbinate hypertrophy have no age predilection, a study of the elderly Medicare population may not be representative of turbinate reduction procedure utilization in the larger population. Providers in private practice settings may see a larger proportion of non-Medicare patients, and many minimally invasive high-billing procedures are performed in these settings. Minimally invasive turbinate procedures like TA and high-billing procedures like TSR may be underrepresented in our population. Furthermore, the Medicare Part B database is built around provider billing data and thus may not include variables that could provide further insight into utilization patterns. For example, diagnosis codes are not provided, which limits our ability to identify reasons for the prescribed treatment. Furthermore, these databases do not provide any information about patient outcomes. A final limitation is that these data are based on CPT coding, and therefore study conclusions are based on providers accurately and appropriately coding for the procedures.

Conclusion

Inferior turbinate procedures are among the most common procedures performed by otolaryngologists. The number of turbinate reduction procedures has steadily increased between 2000 and 2015 according to the Medicare data, with the majority being submucosal resection techniques. Various techniques have been described in the literature and are employed in clinical practice. The development of technology, the focus on minimally invasive procedures, and the changing health-care environment have fueled trends in inferior turbinate procedures. Traditionally, surgery for inferior turbinate hypertrophy has been performed by otolaryngologists in a hospital OR setting. More recently, there has been a significant increase in turbinate reduction procedures performed in outpatient or ambulatory settings, and there have been more of these procedures performed by midlevel providers and non-otolaryngologists. Inferior turbinate procedures will continue to be a significant part of otolaryngology practice, and understanding national trends will help in the delivery and improvement of patient care.

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