



# Regional Trends in the Use of Balloon Sinus Dilation

Kevin J. Choi, MD, MS; Matthew G. Crowson MD; Ralph Abi Hachem, MD; David W. Jang, MD  
Division of Head and Neck Surgery & Communication Sciences, Duke University Medical Center. Durham, NC



## Abstract

**Educational Objective:** The participant should be able to discuss regional trends in the use of balloon sinus dilation (BSD).

**Objectives:** The use of BSD in the treatment of chronic rhinosinusitis has been on the rise. **This study aims to assess regional trends in the use of BSD**

**Study Design:** Independent Commercial Healthcare Claims Database Review

**Methods:** Patients undergoing BSD were identified in the FAIR Health Commercial Healthcare Claims Database from 2013 by CPT codes 31295, 31296 and 31297. Extracted data included associated diagnosis codes (ICD-9), procedure charges, provider location and service settings. Descriptive analysis was performed to describe the findings.

**Results:** 159 patients undergoing BSD in North Carolina were identified. Frontal sinus dilation was most frequently performed (57/159), followed by sphenoid (52/159) and maxillary (50/159) sinus dilations. Procedures were most frequently performed in office-based settings (152/159) compared to outpatient hospitals (5/159) or ambulatory surgery centers (2/159). The mean charge amount per procedure was \$7,325.65. Chronic rhinosinusitis (473.x) was the most frequently associated diagnosis, followed by deviated nasal septum (470.0) and turbinate hypertrophy (478.0). 98.7% (157/159) of BSD were performed in private practice non-academic settings.

**Conclusions:** A bias exists in the use of BSD, as these procedures are most frequently performed in non-academic, office-based settings. Larger studies are necessary to assess whether these trends are applicable at a national level and to explore underlying reasons for this discrepancy.

## Introduction

In the last decade, BSD has been heralded as a new and effective option for the treatment of adult and pediatric rhinosinusitis.<sup>1,2</sup> It can be used in the office setting under local anesthesia, and in the operating room as a standalone or as an assistive device.<sup>3,4</sup>

Proponents of BSD attribute its success to decreased mucosal trauma which prevents scarring and preserves the natural mucociliary clearance of the sinonasal mucosa. The procedure is inherently less morbid and less costly compared to functional endoscopic sinus surgery, and is often preferred by patients due to the conveniences of an in-office procedure with a rapid recovery period.<sup>5</sup>

Since its introduction, only a few studies have reported on the utilization trends of BSD.<sup>6,7</sup> To this effect, we report regional trends in the use of BSD in the state of North Carolina, USA.

## Materials & Methods

The FAIR Health Commercial Healthcare Claims Database was used to identify patients who underwent BSD in 2013. FAIR health is an independent, nonprofit corporation whose aim is to bring transparency to healthcare costs. Data is collected from more than 60 commercial insurance providers covering over 150 million individuals across the United States. It represents the largest collection of privately billed medical claims. Patients were identified by using CPT codes 31295, 31296 and 31297, representing *standalone* BSD of the maxillary, sphenoid and the frontal sinuses respectively. Patients undergoing functional endoscopic sinus surgery of the maxillary, sphenoid, and frontal sinuses were identified by using CPT codes 31256, 31267, 31287, 31288 and 31276. Because the available database included complete information for only those receiving care in North Carolina, patients were excluded if services were rendered in any other state. The extracted data included associated ICD-9 diagnosis codes, provider location by zip code, service settings and procedure charges. These charges represent non-discounted fee for service charges as reported on claims submitted by the providing physician or company. Descriptive analysis was performed to describe the findings.

## Results

Service Location by Zip Code		
ZIP CODE	# of sinuplasties performed	City
28358	92	Lumberton
28054	28	Gastonia
28403	12	Wilmington
28263	9	Charlotte
27518	5	Cary
28304	4	Fayetteville
27103	2	Winston-Salem
28117	2	Mooresville
28359	2	Lumberton
27330	1	Sanford
28112	1	Monroe
28260	1	Charlotte
	159	
Reference Zip Code of NC Academic Institutions		
27514	UNC Healthcare System	
27103	Wake Forest Baptist Health	
27710	Duke University Medical Center	

Table I. Distribution of Balloon Sinuplasty use per zip code within North Carolina in 2013. Zip codes of major academic medical centers with otolaryngology training programs are listed. 157/159 of procedures were performed in regions independent of academic medical centers.

Most Frequent ICD-9 Diagnosis		
473.1	112	CRS Frontal
473.9	93	CRS Unspecified
473.3	85	CRS Sphenoid
473	78	CRS
470	38	Deviated Nasal Septum
473.8	37	CRS Other
478	16	Turbinate Hypertrophy
473.2	6	CRS Ethmoid
478.19	4	Other Disease of the Upper Respiratory Tract
477.9	1	Allergic Rhinitis
471	1	Nasal Polyps

Table II. Distribution of associated ICD-9 diagnosis code in relation to all balloon sinuplasty procedures performed. CRS – Chronic Rhinosinusitis

Total Balloon Sinuplasties Performed in North Carolina			
	CPT Code	# Performed	Mean Billed Charge per Procedure
Maxillary Sinus	31295	50	\$6,165.34
Frontal Sinus	31296	57	\$7,300.56
Sphenoid Sinus	31297	52	\$8,468.80
		159	

Table III. Distribution of procedures performed per sinus and the mean charges billed by performing provider per procedure.

Service Location	
Office	95.6% (152/159)
Outpatient Hospital	3.1% (5/159)
Ambulatory Surgery Center	1.3% (2/159)

Table IV. Distribution of balloon sinuplasties performed by clinical settings

FESS vs Balloon Sinuplasty per Zip Code		
Zip Code	FESS	Balloon Sinuplasty
27103	11	2
27330	8	1
27518	23	5
28054	<b>18</b>	<b>28</b>
28112	14	1
28117	6	2
28260	19	1
28263	37	9
28304	5	4
28358	<b>0</b>	<b>92</b>
28359	2	2
28403	<b>2</b>	<b>12</b>

Table V. Ratio of Functional Endoscopic Sinus Surgeries (FESS) performed per Balloon Sinuplasty performed per Zip Code. **RED** represents more frequent use of balloon sinuplasty by zip code.

## Conclusion

- Standalone BSD is performed overwhelmingly in the non-academic setting in North Carolina.
- Standalone BSD is mainly performed in the office setting, presumably under local anesthesia.
- The wide variation in BSD use throughout NC suggests a lack of established indications for BSD, with some providers using BSD, as opposed to FESS, as the predominant surgical treatment for CRS
- Further studies are required to determine if these trends are applicable at a national level and to examine the underlying cause for the wide variations in use.

## References

1. Chandra, RK, Kern RC, Cutler JL, et al. REMODEL larger cohort with long-term outcomes and meta-analysis of standalone balloon dilation studies. *Laryngoscope*. 2016 Jan;126(1):44-50
2. Wang F, Song Y, Zhang X, Tan G. Sinus balloon catheter dilation in pediatric chronic rhinosinusitis resistant to medical therapy. *JAMA Otolaryngol Head Neck Surg*. 2015 Jun;141(6):526-31
3. Albritton, FD, Casiano, RR, Sillers, MJ. Feasibility of in-office endoscopic sinus surgery with balloon sinus dilation. *Am J Rhinol Allergy*. 2012 May-Jun;26(3):243-8
4. Bedrosian, JC, Garcia-Navarro V, McCoul ED, et al. Endoscopic balloon dilation as an adjunct to extended endoscopic approaches to the skull base. *J Neurosurg*. 2012 Jun;116(6):1215-8
5. Friedman M, Schalch P, Lin HC, et al. Functional endoscopic dilatation of the sinuses: subject satisfaction, postoperative pain, and cost. *Am J Rhinol* 22(2):204–209, 2008
6. Halderman, AA, Stokken J, Momin Sr, et al. Attitudes on and usage of balloon catheter technology in rhinology: A survey of the American Rhinologic Society. *Am J Rhinol Allergy*. 2015 Sep-Oct;29(5):389-93
7. Sillers MJ, Lay KF, Holy CE. In-office balloon catheter dilation: Analysis of 628 patients from an administrative claims database. *Laryngoscope*. 2015 Jan;125(1):42-8