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A Diagnostic Dilemma: Chronic Sinusitis Diagnosed by Non-Otolaryngologists

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Abstract

Background—Ambulatory care visits for chronic sinusitis outnumber visits for acute sinusitis. The majority of these visits are with non-otolaryngologists. In order to better understand patients diagnosed with chronic sinusitis by non-otolaryngologists, we sought to determine if incident cases of chronic sinusitis diagnosed by primary care (PC) or emergency medicine (EM) providers meet diagnostic criteria.

Methods—Retrospective cohort. Patients were identified using administrative data, 2005–2006. The dataset was then clinically annotated based on chart review. We excluded prevalent cases.

Results—We identified 114 patients with newly diagnosed chronic sinusitis in EM (75) or PC settings (39). Rhinorrhea (EM 61%, PC 59%) and nasal obstruction (EM 67%, PC 64%) were common in both settings but facial fullness (EM 80%, PC 39%) and pain (EM 40%, PC 18%) were more common in the EM setting. Few patients reported symptoms of 90 days or longer (EM 6.0%, PC 24%) and no patient had evidence of inflammation on physical examination. A minority of patients received a sinus CT scan (22.8%) or nasal endoscopy (1.8%). In total only 1 patient diagnosed with chronic sinusitis met the diagnostic criteria.

Conclusions—Most patients diagnosed with chronic sinusitis by non-otolaryngologists do not have the condition. Caution should be used in studying chronic sinusitis using administrative data from non-otolaryngology providers as a large proportion of the patients may not actually have the disease.

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Keywords

Evidence-based Medicine; Chronic Rhinosinusitis; Chronic Disease; Computed Tomography; Endoscopy; Sinusitis; Rhinosinusitis

INTRODUCTION

Sinusitis is a common reason for patients to seek medical care. Patients are usually diagnosed with sinusitis based on the characteristic symptoms of facial fullness/pressure, purulent rhinorrhea, and nasal obstruction.¹ Primary care (PC) and emergency medicine (EM) providers indicate sinusitis contributes to more than 3% of all patient visits, with chronic sinusitis substantially more common than acute sinusitis.^{2,3}

However, the symptoms of sinusitis overlap with other common conditions, including allergic rhinitis, viral upper respiratory tract infection, deviated nasal septum, and migraine headache.^{1,4,5} For this reason a clinical diagnosis of sinusitis is often inaccurate. Because of the difficulty in differentiating chronic sinusitis from other common conditions, the AAO-HNS clinical practice guideline and the consensus statement that preceded the guideline both indicate that a diagnosis of chronic sinusitis requires evidence of inflammation.^{1,6} Anterior rhinoscopy may demonstrate purulence or edema within the middle meatus, polyps in the nasal cavity, or sinus CT or nasal endoscopy may be used for a more detailed examination.¹ Although the consensus statement was published in 1997, followed by the clinical practice guideline in 2007, we don't know how closely they are followed. The majority of visits for chronic sinusitis are with non-otolaryngologists, yet beyond the otolaryngology journals, there is much less literature about diagnosis and treatment of chronic sinusitis. As one investigator stated, "the information about chronic sinusitis available to internists is scant and occasionally inaccurate."⁷ Furthermore, the otolaryngology literature focuses on chronic sinusitis as it is diagnosed and cared for by otolaryngologists. We know very little about chronic sinusitis care outside our specialty.

In order to better understand chronic sinusitis as diagnosed by PC and EM providers, we sought to descriptively evaluate patients in this setting. We performed a detailed, patient-level analysis of symptoms, nasal examination findings, procedures, and treatments in patients receiving a new diagnosis of chronic sinusitis by PC and EM providers. We expected that most patients diagnosed with chronic sinusitis by PC and EM providers would not meet diagnostic criteria.

METHODS

Data Source and Cohort Creation

Creation of this retrospective cohort has been described in detail previously; please refer to that publication for detailed description of compilation and clinical annotation of the dataset.⁸ In brief, the dataset was compiled from administrative data warehouse of the University of Michigan Health System. We included patients with an ICD-9 code of chronic sinusitis (473.X) for an outpatient PC or EM visit between January 1, 2005 and December 31, 2006. To maximize our ability to capture new cases of chronic sinusitis, as opposed to

capturing previously diagnosed chronic sinusitis, we excluded patients if they had a diagnosis of acute or chronic sinusitis within the previous year and we also excluded patients who did not have at least one visit to a PC provider in the preceding 365 days. We used a web-based search engine to review the EMR and capture diagnostic criteria for chronic sinusitis.⁹ We based the criteria on the 1997 consensus statement from the Task Force on Rhinosinusitis,⁶ including 12 weeks of symptoms, pain, facial fullness/pressure, nasal obstruction, purulent rhinorrhea, hyposmia and visible purulence on examination. Symptom duration was defined as the number of days from symptom onset and common non-numerical terms were codified (few = 3, several = 7, week and a half = 10, many = 11, couple weeks = 14, few weeks = 21, several weeks = 28, last month = 30, couple months = 60, several months = 90). In cases where there was more than one symptom duration described (e.g. rhinorrhea for 7 days, facial fullness for several months), the longest duration was recorded. Hyposmia was coded as present or absent and we defined this to include hyposmia, anosmia, or dysosmia. We excluded concepts not specifically related to hyposmia, including sour taste in mouth, foul-smelling nasal discharge and halitosis. We reviewed the physical examination for evidence of chronic sinusitis: purulent mucus or edema within the middle meatus or polyps in the nose.

We noted treatment prescribed or recommended at the PC or EM visit and collected endoscopy (nasal endoscopy or flexible laryngoscopy), head CT and sinus CT procedures performed within 3 months. We were unable to calculate Lund McKay scores for head CT scans for 2 reasons. First, the radiology protocol for a head CT at our institution generates axial images only, making it difficult to evaluate the ostiomeatal complex. Second, the axial images do not include the most inferior aspect of the maxillary sinuses, precluding complete evaluation. For this reason, we devised a qualitative system for categorizing CT scans based on severity of sinus disease. All of the imaging studies were read by radiologists at the UMHS. We reviewed the radiologists' narrative reports. We categorized the extent of CT abnormalities as mild, moderate, or severe based on textual analysis of the radiology report. We categorized CT abnormalities as mild if the report described the extent of sinus disease as "mild" or "minimal." We categorized studies as moderate severity if the report described the sinus disease as 'moderate' or 'partial' or if the report contained no descriptors. We categorized studies as severe if the report described the sinus disease as "pansinusitis", "complete", or "severe." In the same fashion, we reviewed the reports for otolaryngology consultations and nasal endoscopy procedures performed within 3 months of the visit. This study was approved by the Institutional Review Board at the University of Michigan, Ann Arbor. Simple descriptive statistics were calculated using Stata SE 13 (College Station, Texas).

RESULTS

Patient characteristics

The cohort consisted of 114 patients diagnosed with chronic sinusitis, including 75 patients diagnosed by an EM provider (65.8%) and 39 patients diagnosed by a PC provider (34.2%). The majority of patients were women in both patient groups with mean ages in the 4th – 5th decades. Consistent with our local demographics, most patients were white and had private

health insurance. (Table 1) There were 32 PC physicians and 32 EM physicians who were the attending physicians for this cohort.

Symptom duration was documented for 96/114 patients (84.2%). Although the diagnostic criterion for chronic sinusitis is symptom duration of 3 months or more, only 11/114 (9.6%) patients met this criterion: 24.1% of patients in the PC group, 6.0% of patients in the EM group. Mean symptom duration was 22 days in the EM group and 62 days in the PC group. Nasal obstruction and rhinorrhea were reported by most patients in both groups although patients in the EM group were more likely to report facial fullness (80.0% vs 38.5%), pain (40.0% vs 18.0%), and subjective fever (22.7% vs 12.8%). The absence of hyposmia was documented for a single patient in the PC group. In the remainder of the PC group and in the entire EM group there was no documentation of whether or not hyposmia was even assessed. Of the 114 patients, none of them had documentation of any middle meatal pathology or even clear documentation of examination of the middle meatus. Most had non-specific findings documented, including sinus tenderness (45/114), “boggy mucosa” or “erythematous turbinates.”

Diagnosis

By virtue of the inclusion criteria for this study, all of the patients had been given an ICD-9 diagnosis of chronic sinusitis. However, only 7.0% of corresponding provider narrative assessments reflected a diagnostic impression of chronic sinusitis. Among the rest of the providers’ assessments, 63.1% indicated sinusitis without specification of acute versus chronic, 5.3% indicated acute sinusitis, and 24.6% had no indication of sinusitis.

Studies

Of the 114 patients diagnosed with chronic sinusitis, 26 (22.8%) had a sinus CT scan within 90 days of diagnosis, including 8 sinus CT scans and 18 head CT scans. CT was more common among patients in the EM group (23/75, 30.7%) compared to the PC group (3/39, 7.7%). CT findings were categorized as no sinus disease (7/26, 26.9%), mild sinus disease (11/26, 42%), or moderate sinus disease (8/26, 30.8%). No patient had severe disease. Representative examples of CT scans classified as mild and moderate disease are shown in Figures 1 and 2. We calculated Lund MacKay scores for the 8 sinus CT scans in the study. Those scores are shown with the qualitative scores in Table 2. Only 2 patients (1.8%) were subsequently evaluated by otolaryngology within 90 days of initial diagnosis. Both patients underwent nasal endoscopy and neither patient had endoscopic evidence of chronic sinusitis. Overall, of the 114 patients diagnosed with chronic sinusitis, only one of them had symptoms of sufficient duration and had evidence of sinus inflammation. Although no examination of the middle meatus was documented, a subsequent sinus CT scan demonstrated moderate sinus disease.

Treatment

Medical treatment differed according to treatment location. Patients in the EM department were more often treated with an antibiotic compared to those in the PC clinics (76.0% vs 26%). The types of antibiotics are shown in Table 3. Conversely, patients in the EM were

less likely to be treated with a nasal steroid spray compared to patients in the PC clinics (8.0% vs 23.1%).

DISCUSSION

This retrospective cohort study was designed to identify a cohort of patients at the time of the initial diagnosis of chronic sinusitis by a non-otolaryngologist and to provide 7 years of follow up data including use of specialty consultation, frequency of visits, use of antibiotics and sinus surgery. However, in this study we find that most patients diagnosed with chronic sinusitis by non-otolaryngologists have symptoms of short duration and based on this measure alone, do not meet the diagnostic criterion of 12 weeks. In this study fewer than 10% of patients had symptoms for 3 months or more. Not one patient had documentation of a middle meatal exam.¹ Only a small proportion of patients received a CT scan or was referred to otolaryngology for evaluation. Of the patients who did undergo CT, most studies were normal or demonstrated mild disease. Taken together, these findings mean that most patients diagnosed with chronic sinusitis by PC and EM providers in our institution do not have the condition.

Our findings are consistent with a recent publication which found that unless a patient was diagnosed with chronic sinusitis by an allergist or otolaryngologist, the diagnosis was unreliable.¹⁰ Investigators in that study attempted to identify patients with chronic sinusitis and to confirm the diagnosis using procedure codes for nasal endoscopy and sinus CT. They ultimately concluded that administrative data alone are inaccurate to identify cases of chronic sinusitis unless the chronic sinusitis diagnosis was made by an allergy or otolaryngology provider.

Our study provides clinical context for these apparent misdiagnoses. We found that most patients had symptoms of short-duration; most patients were managed with observation or narrow spectrum antibiotics, most of the providers' notes do not specifically indicate a diagnosis of chronic sinusitis; and very few patients were referred to otolaryngology. Together, these findings suggest that in the non-otolaryngologist's vernacular, there may be little difference between acute and chronic sinusitis. It is possible that PC and EM providers use the diagnosis chronic sinusitis simply to indicate a patient whose sinusitis-type symptoms last longer or recur more often than expected. If providers indeed misuse the terminology and diagnostic codes in this manner, it would substantially conflate statistics pertaining to acute and chronic sinusitis and may help explain the disparate prevalence estimates that range from 1–16%.^{11–13}

The most noteworthy implication of this study is the frequency with which misdiagnosis might occur. Although we must be careful not to over generalize the results of this study, the implication is that a substantial proportion of the millions of PC and EM visits attributed to chronic sinusitis every year may be misdiagnoses.^{2,3,14,15} Many patients may have migraine, tension headache, other neurologic conditions, and rhinitis—conditions known to be common among patients misdiagnosed with chronic sinusitis.^{4,5,16,17} Given the burden of disease attributed to chronic sinusitis this is an economically important issue.

Some limitations of this study must be acknowledged. This study is a retrospective cohort design, and therefore our knowledge of the diagnostic process for chronic sinusitis is limited to the information available from patient records and is limited to the clinical encounters from 10 years ago. Additionally, because we were interested in the clinical presentation at the time of initial diagnosis, we made every effort to exclude prevalent cases of chronic sinusitis—in other words, those cases that might have been previously diagnosed. However, this may have resulted in a very select subgroup of patients with limited generalizability. Finally, this study was limited to a single institution and for this reason also is of limited generalizability.

CONCLUSION

Based on this detailed clinical review, substantial discrepancy exists between ICD-9 coding and clinical documentation for patients diagnosed with chronic sinusitis in a PC or EM setting. Most patients diagnosed with chronic sinusitis in 2005 and 2006 had symptoms of short duration and did not meet the definition of chronic sinusitis as set forth in a 1997 consensus statement nor would they have met the more narrow definition of chronic sinusitis described in subsequent clinical practice guidelines. We do not know if the same diagnostic patterns hold true today. Caution should be used in studying treatment and outcomes in chronic sinusitis based on a cohort identified by ICD-9 coding alone, as there is may be a large proportion of the cohort that does not meet diagnostic criteria for this disease.

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Figure 1.
Example of a sinus CT scan demonstrating mild sinusitis

Figure 2.
Example of a sinus CT scan demonstrating moderate sinusitis

Table 1

Patient characteristics for adults diagnosed with chronic sinusitis in emergency medicine and primary care clinics at UMHS

Characteristic	EM Department n=75	PC Clinic n=39
Mean age (SD)	41.1 (16.0)	51.7 (16.8)
Female (%)	42 (56.0)	28 (71.8)
Race/ethnicity (%)		
White	55 (75.3)	31 (81.6)
Non-White	18 (24.7)	7 (18.4)
Expected primary payer (%)		
Private insurance	61 (81.3)	30 (76.9)
Public insurance	10 (13.3)	9 (23.1)
No insurance	4 (5.3)	0
Trainee present	39 (52.0)	9 (23.1)
Symptoms 3 months (n=96, %)	4 (6.0)	7 (24.1)
Nasal obstruction (%)	50 (66.7)	25 (64.1)
Rhinorrhea (%)	46 (61.3)	23 (59.0)
Facial fullness (%)	60 (80.0)	15 (38.5)
Pain (%)	30 (40.0)	7 (18.0)
Fever (subjective) (%)	17 (22.7)	5 (12.8)
Fever (objective) (%)	2 (2.7)	0
Hyposmia (n=1) *	not assessed	0
Middle meatus inflammation (%)	0	0

UMHS University of Michigan Health System

* It was documented as absent in a single patient.

Table 2

Comparison between qualitative and Lund MacKay score for sinus CT scans

Radiologist's description	Qualitative score	Lund McKay Score
Minimal mucosal thickening within the left maxillary sinus and trace mucosal thickening within anterior ethmoid cells; other imaged paranasal sinuses as well as mastoid and middle ear cavities otherwise fully aerated.	mild	axial images only
No significant paranasal sinus mucosal disease. Sinuses are clear; tiny amount of lobulated soft tissue along the floor of the right max sinus could represent mucoid secretions.	none	1
There is minimal nonspecific nonaggressive-appearing bilateral maxillary sinus mucosal thickening. The ethmoid air cells, frontal sinus, and sphenoid sinus are clear.	none	2
Minimal mucosal thickening in the left maxillary sinus and ethmoid air cells with mucosal thickening also along the right ostiomeatal complex.	mild	4
Bilateral maxillary mucosal thickening consistent with chronic inflammation. There are Haller cells on the left exerting minimal narrowing upon the left infundibulum. Minimal left frontal opacification.	moderate	7
Stable, partial opacification of bilateral maxillary sinuses and sphenoid sinus. There is slightly increased opacification of the ethmoid air cells and nasal cavity.	moderate	8
Near-complete opacification of the maxillary sinuses bilaterally, right greater than left. There is opacification of the ostiomeatal complexes bilaterally, but no evidence for any bony destruction. There is mild opacification of the ethmoid sinuses anteriorly. There is mild mucosal thickening of the nasofrontal recess of the right frontal sinus, with opacification of the right nasofrontal duct.	moderate	8
Opacification of bilateral superior and middle meatuses as well as bilateral nasofrontal ducts. Demineralization of bilateral uncinate processes and development of likely bilateral non-native ostia. Non- aggressive appearing polypoid mucosal thickening and likely some fluid in the ethmoid, sphenoid and maxillary sinuses. Approximately 20% opacification of the left maxillary sinus, less in other sinuses.	moderate	13

Table 3

Medications prescribed for adults diagnosed with chronic sinusitis in emergency medicine and primary care clinics at UMHS

	EM Department n=75 (%)	PC Clinic n=39 (%)
Nasal steroid spray prescribed	6 (8.0%)	9 (23.1%)
Nasal steroid spray not prescribed	69 (92.0%)	30 (76.9%)
No antibiotic prescribed	14 (18.9%)	28 (71.8%)
Continue current antibiotic	4 (5.3%)	1 (2.6%)
Antibiotic prescribed	57 (76.0%)	10 (25.6%)
Macrolide	16	3
Amoxicillin	15	3
Amoxicillin/clavulanic acid	11	2
Fluoroquinolone	8	0
Sulfamethoxazole/trimethoprim	5	2
Cephalosporin	1	0
Clindamycin	1	0

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