Published in final edited form as:

J Pediatr Gastroenterol Nutr. 2012 March ; 54(3): 427–429. doi:10.1097/MPG.0b013e318239be75.

A brief report on hospital discharges related to eosinophilic esophagitis over the last decade

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Abstract

Eosinophilic esophagitis (EoE) is a recently characterized chronic, allergic gastrointestinal disorder. Using the Pediatric Health Information System (PHIS), we report trends in diagnostic codes related to EoE in inpatients from 1999 through 2010. Esophagitis not elsewhere classifiable, EoE, and dysphagia have increased over time. Similar to other allergic disorders, EoE appears to be increasing across the country.

INTRODUCTION

Eosinophilic esophagitis (EoE) is a chronic, esophageal inflammatory condition characterized by dense eosinophilic infiltration of the esophagus (1-6). Typically, this disorder is diagnosed by the presence of a threshold number of eosinophils as determined by esophageal biopsy and exclusion of other causes of esophageal eosinophilia (4). Evidence suggests this condition is related to an allergic disease process (7, 8). Symptoms of pediatric EoE tend to mimic gastroesophageal reflux disease (GERD) and often include heartburn, chest pain, feeding intolerance, failure to thrive, dysphagia and food impaction (1, 4-6, 8-12). Older children and adults primarily present with dysphagia and food impaction (1, 4, 10-13).

The first report of EoE was published in 1977 (14) and in the mid 1990s, EoE recognition by gastroenterologists and pathologists increased rapidly with a few published reports (3, 15). The prevalence is now estimated to be approaching that of Crohn's disease and ulcerative colitis (6).

While the number of EoE diagnoses has increased, controversy remains over whether this is a true increase of EoE or simply increased recognition and accurate diagnosing. Straumann and Simon reported an increase from two to 23 cases per 100,000 from 1989 to 2004 in Switzerland (13). Stable demographic and recording conditions support the argument that this is a true increase of EoE. Noel et al reported 315 cases of EoE from 1991 to 2003, with only 2.8% identified prior to 2000 (5). From 2000 to 2003 the prevalence increased from 9.91 to 42.96 per 100,000 children living in the area surrounding the medical center (5). Other studies claim that the identified increase in prevalence is due to definitive guidelines and increased symptom recognition, which may lead to appropriate testing and diagnosis (2, 16). Nevertheless, previous reports were regionally specific, making it unclear whether these trends would be seen in a larger population.

The objective of this study was to use a national administrative database to identify trends in inpatient diagnoses of esophagitis with a focus on EoE in the United States. Because there

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Authors Erwin, Asti, Hemming, and Kelleher have no relevant conflicts of interest to disclose

was not a specific EoE diagnostic code before 2008, trends in other related diagnoses and procedures were examined.

MATERIALS AND METHODS

We queried the Pediatric Health Information System (PHIS) database for all inpatients discharged with specific International Classification of Disease, 9th Revision, Clinical Modification (ICD-9) codes related to EoE. PHIS is an administrative database managed by the Child Health Corporation of America that contains clinical and financial data from over 40 freestanding children's hospitals in the U.S. Between January 1, 1999 and December 31, 2010, there were 29 member hospitals with complete data. These hospitals represented 17 different states in all four regions of the U.S. (Pennsylvania, Michigan, Wisconsin, Ohio, Illinois, Nebraska, Missouri, Virginia, Florida, Tennessee, Alabama, Arkansas, Louisiana, Texas, Colorado, California, and Washington), as well as, Washington DC. For the data we examined, one hospital contributed 166 cases; the remainder reported a range of one to 45 cases.

A specific code for EoE (530.13) was not established until October of 2008; however, prior to that, EoE was most likely coded as esophagitis, not elsewhere classifiable (NEC) (530.19) (17). Among coding specialists, the code not elsewhere classifiable (NEC) is used to describe a condition indicated by details in the medical record for which a specific code does not exist. We speculated that use of the EoE specific diagnosis would rise rapidly after the code was instituted while the nonspecific code, esophagitis NEC, would decline. To address the concern of using the less specific esophagitis NEC code as the case definition, we also evaluated the data using a refined definition by combining the esophagitis NEC and EoE diagnosis codes with a billing charge for an endoscopy.

We included all inpatients discharged with an ICD-9 diagnosis code for any type of esophagitis (530. IX). This includes EoE (530.13) after 2008 and esophagitis NEC (530.19) as previously described. Also included were reflux esophagitis (530.11), acute esophagitis (530.12), and esophagitis, unspecified or NOS (530.10), which would be used when the coding specialist is unable to assign a more specific code due to insufficient information in the medical record (17). To be thorough due to a lack of specificity in the ICD-9 code for EoE prior to 2008, we also included discharge diagnoses of dysphagia (787.2X), foreign body in the esophagus (935.1), and stricture of the esophagus (530.3) in order to determine if symptoms and complications of EoE follow similar trends. Percent increases of related diagnoses and billing charges were examined relative to the percent increase in hospital discharges during varying time periods. All analyses were conducted using SAS 9.2 (SAS Institute, Cary, NC) and Microsoft Excel 2007.

RESULTS

The trends from 1999 through 2010 for the different ICD-9 diagnosis codes can be seen in Figure 1. Between 1999 and 2008, the number of hospitalizations with a diagnosis of esophagitis NEC increased progressively from 204 to 455. During this time period, the discharge diagnosis of esophagitis NEC increased by 123% while total pediatric hospital discharges increased by only 20%. From 2008 to 2010, the total pediatric discharges remained relatively consistent. In 2009, the first full year that the ICD-9 code for EoE was used, 245 pediatric patients were discharged with an EoE diagnosis code. This coincided with a decrease in hospital discharges for esophagitis NEC from 455 to 278 (39% decline). Data from 2010 showed a continued increase (34%) in EoE from 2009 to 2010 based on the specific EoE diagnosis code. Comparatively, during this time period (2009 to 2010), hospital discharges for esophagitis NEC remained relatively constant (less than a 3% increase).

Using the refined case definition, examination of patients having *both* a billing charge for an endoscopy and a code for esophagitis NEC or EoE revealed an increase of 203% (Fig 2). Additionally, the growth in endoscopies from 1999 to 2010 was 97%, and the increase in those with a code for esophagitis NEC or EoE was 197%, while total hospital discharges increased only 22% during this time period.

Looking at the symptoms and related diagnoses in Figure 1, there was a slight decrease from 2007 to 2009 for esophagitis NOS and a rapid decline in reflux esophagitis. Similar to esophagitis NEC, both of these diagnoses showed little change from 2009 to 2010. Additionally from 1999 to 2010, dysphagia quadrupled from 1,110 to 4,567 while strictures remained constant (increase of 20%) relative to the hospital discharge increase of 22%.

DISCUSSION

These data show an increase in pediatric hospitalizations with a diagnosis of EoE over the last decade, larger than the increase of total hospital discharges, suggesting an increase in the disease process. Furthermore, the continued escalation in 2010 indicates this is an ongoing increase. Since EoE is most often treated in an outpatient setting, we also believe this increase in inpatients represents an increase in *significant* cases. Our refined case definition was developed as the best identifier of EoE, as the cases were most likely coded as esophagitis NEC prior to 2008 and an EoE diagnosis requires an endoscopy, thus capturing true cases of EoE and indicating an increase in diagnosis over time.

In spite of the lack of a specific code for EoE prior to 2008, we believe that the evidence for an increase in EoE is threefold. First, there was a sudden decrease in esophagitis NEC from 2008 to 2009 suggesting that the earlier continuous increase in esophagitis NEC was actually driven by cases of EoE captured by this code prior to 2008. A plateau in esophagitis NEC was observed from 2009 to 2010 when EoE cases were no longer being coded as esophagitis NEC. Second, the introduction of the specific EoE code also coincides with decreases in esophagitis NOS and reflux esophagitis suggesting that some EoE cases may have been previously captured with these codes. Third, further support for an increased diagnosis of EoE is provided by the observation of increased dysphagia, a well recognized symptom of EoE. However, due to the ambiguity of the diagnosis codes; some variability among individuals assigning the code; and the difficulty in diagnosing EoE; some true EoE cases may still be coded as esophagitis NOS or reflux esophagitis. Failure to include these potential “missed” cases would only make our estimate of the escalation of EoE more conservative than the actual increase. Our results are consistent with the local studies suggesting rapid growth in cases.

The explanation for these increases is unknown. Similar questions have been raised regarding other chronic allergic disorders including asthma and food allergy. EoE is associated with both food and inhalant allergic sensitivities. Timing and dosing of allergen exposures as well as allergen structure and associated particulate inhalation or ingestion can all influence allergenicity and the immune response. Changes in these factors may result from current lifestyle trends such as time spent indoors, increased sedentary activities, and diet.

There are some limitations to this study. We used an observational dataset that did not include any biopsy results, which is how EoE is diagnosed. Without this information, we had to rely solely on ICD-9 codes and billing charges for classification and this did not allow us to identify misdiagnosed cases of EoE. We have attempted to minimize this problem by including an evaluation of billing charges for endoscopy. Using only ICD-9 codes to identify EoE also creates concern because the EoE-specific code only became

available during October, 2008, which makes it difficult to capture the true EoE trends prior to this time. Finally, not all PHIS hospitals contributed data during the entire study period which forced us to exclude several hospitals from the analysis. To account for this potential effect, we also evaluated the trends from 2001 to 2010 allowing us to include more hospitals. While this increased our number of cases, the trends were the same as those we are reporting. Therefore in spite of the limitations, this considerable and representative database allowed us to compile a large number of EoE cases to determine the trends of EoE.

Currently, the long term effects of EoE remain unknown. Studies that have examined the natural history suggest continued or recurrent symptoms in the majority of patients with only a small proportion showing resolution (2, 18). One concern associated with the chronicity of EoE is esophageal thickening or narrowing that could result in strictures (18, 19). Our results do not suggest a significant increase in strictures to date. However, as evidence suggests an increasing prevalence of EoE, and since little is known about the long term effects of this chronic condition, it is important to continue to monitor all features of this disease by utilizing all available resources. Large administrative databases are one such resource and can provide useful epidemiologic information, especially with the current availability of an EoE specific code.

Acknowledgments

Funding: National Institutes of Health grant K23 AI-059317

Abbreviations

(EoE)	eosinophilic esophagitis
(GERD)	gastroesophageal reflux disease
(PHIS)	Pediatric Health Information System
(ICD-9)	International Classification of Disease, 9 th Revision
(NEC)	not elsewhere classifiable
(NOS)	not otherwise specified

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Fig 1.

As reported by Pediatric Health Information System (PHIS), the number of inpatients having diagnoses related to eosinophilic esophagitis (EoE) are shown for the years 1999 to 2010.

Note: not otherwise specified (NOS) and not elsewhere classifiable (NEC).

Fig 2.
Inpatients with esophagitis not elsewhere classifiable (NEC) or eosinophilic esophagitis (EoE) who also had a billing charge for endoscopy are reported from 1999 to 2010.