

Improving Delivery of Care through Standardized Monitoring in Children with Eosinophilic Esophagitis

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Abstract

Introduction: Eosinophilic esophagitis (EoE) is a chronic, antigen-driven disorder for which endoscopic monitoring and multidisciplinary care are recommended to achieve histologic remission. The EoE team at our large academic center developed a quality improvement (QI) initiative aimed to reduce variability in monitoring. This QI project focused on completing 3 process metrics within 6 months of diagnosis: (1) outpatient follow-up with a gastroenterologist; (2) referral to an allergist; and (3) Follow-up esophagogastroduodenoscopy (EGD). **Methods:** In January 2015, our QI team developed a registry of newly diagnosed EoE patients and maintained ongoing, weekly tracking of the process measures. Interventions to increase the completion of the process metrics included educational sessions, proactive reminders to providers, and targeted communications with patient families. Missed opportunities were evaluated by more in-depth chart review and categorized as provider- or patient-driven. **Results:** We tracked 6-month process metrics from 2015 through 2018. During this interval, follow-up visit rates in GI improved from 77% to 86%, and the percentage of referrals placed to allergy increased from 65% to 77%. The percentage of patients completing a repeat EGD improved from 33% to 61%. Among patients without a repeated EGD, nearly 70% of those missed opportunities were provider-driven. **Conclusions:** In patients newly diagnosed with EoE, QI interventions, including patient registry development, implementation of a local standard of care, and creating a patient tracking system, improved adherence with national EoE monitoring guidelines. (*Pediatr Qual Saf* 2021;6:e429; doi: 10.1097/pq9.000000000000429; Published online July 28, 2021.)

INTRODUCTION

The rising incidence of eosinophilic esophagitis (EoE) has led to increased recognition and growth of the pertinent literature.¹ EoE is an antigen-driven, chronic, and progressive immune-mediated process leading to significant gastrointestinal morbidities and healthcare costs.² Delay in diagnosis and treatment can result in



long-term inflammation in the esophageal mucosa and lamina propria.³ This chronic inflammation is associated with tissue remodeling, leading to fibrosis, and, ultimately, may cause clinically significant strictures.⁴

Despite the rise in EoE prevalence and EoE-driven research, much remains unknown. In the 2018 AGREE consensus statement (a working group on proton pump inhibitor-responsive esophageal eosinophilia), the pediatric gastroenterology and allergy communities reversed a long-held stance that gastroesophageal reflux and EoE were separate entities.⁵ As definitions change, studies and their methods diverge, and in turn, the data become heterogeneous and incongruent. Gold standard EoE management is not well established. This lack of standardization results in wide variability in monitoring and treatment approaches as practitioners choose their management pathway. Consequently, widely varied clinical paths are common.

Quality improvement (QI) aims to reduce variance and increase adherence to national recommendations or guidelines. It is associated with the improvement of various chronic conditions in both children and adults.⁶⁻⁸ At our institution, we found that the lack of specific guidance, nationally and locally, led to a wide variation in EoE care across our large academic division. Therefore, to improve outcomes, we developed and implemented a

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standardized monitoring approach based on our interpretation of consensus recommendations.^{4,9}

Management guidelines published before the start of the QI project recommended close follow-up to assess for clinical improvement and allow for adjustment of treatment modalities, allergy evaluation for assistance with EoE treatment and management of atopic comorbidities, and repeated endoscopic monitoring to measure mucosal healing.^{4,9} Therefore, our QI project objective was to improve completion rates of 3 process metrics: (1) completing an outpatient follow-up with a gastroenterologist; (2) referral to an allergist; and (3) Follow-up esophagogastroduodenoscopy (EGD) all within 6 months of diagnosis.

METHODS

Consistent with national trends, the incidence of children diagnosed with EoE at our center has continued to increase with nearly 130–150 new diagnoses per year. In 2014, our QI team consisting of GI, allergy, process improvement, and QI specialists identified critical interventions for standardizing local EoE care. When available, retrospective baseline data were collected for patients diagnosed with EoE in 2010–2014. In 2015, we began to establish a reliable method to identify newly diagnosed patients and maintain a local patient registry. Our identification method utilized data pulled from our electronic medical record housed in the Enterprise Data Warehouse (EDW). Data included patient records coded with ICD 9 code 530.13 or ICD 10 K20.0 (ICD codes specific for EoE) along with EGD CPT code of 43239. We found that this initial report did not capture the entire population nor did it identify patients promptly after diagnosis. Therefore, our second approach utilized a Copath reporting system (Sunquist Information Systems, Inc., Tuscon, Ariz.) to create a list by searching for the keyword “eosinophils” or “eosinophilia” within the pathology report. Copath is the EMR system. Shiny App, a product of R Studio (Boston), is the application that allows the user to pull the data from the Copath to generate the data report. Beginning January 2016 and continuing through 2018, the new report was generated weekly and reviewed by the QI team to confirm all patients diagnosed with EoE as defined by having esophageal biopsy with ≥ 15 eosinophils per high powered field (eos/HPF).

Our key driver diagram outlines the project process metrics to be completed within 6 months: (1) completing an outpatient follow-up with a gastroenterologist; (2) referral to an allergist; and (3) follow-up EGD (Fig. 1). After confirming the diagnosis of EoE, each patient was prospectively added to the internal registry. For each of these patients, the percentage of patients with a follow-up visit, allergy referral placement, and repeat EGD performed within 6 months of diagnosis was recorded. We chose 6 months to complete the repeat EGD to allow adequate time to assess the impact of treatment upon each patient’s symptoms. For the registry, we created a

spreadsheet to track the various metrics: diagnosis date, provider, original eos/HPF, date of GI follow-up completed, date of allergy referral completed, and date of repeat EGDs. Reasons for missed opportunities for each metric were detailed and tracked.

A consistent method to extract data tracking the placement of an allergy referral through an EDW search was impossible. Internal allergy referrals could be identified, yet EDW could not identify the placement of an external allergy referral, an inherent limitation of EDW searches. Therefore, beginning in the first quarter of 2016, our team recorded if an allergy referral had been placed manually.

We implemented several interventions to impact both patients’ families and providers (Fig. 1). We developed a proactive system for administrative personnel to contact families to schedule appropriately timed follow-up for patients and families. The physicians evaluating these patients also provided patient education at the visit describing the diagnosis of EoE and what to expect as part of standard follow-up after diagnosis. For providers, we presented updated EoE guidelines at regular divisional business meetings to educate them regarding the basis for the standardized plan. We presented the project’s progress to the GI division, and we showed provider adherence to the standardized care plan for each of the metrics. After each new diagnosis, we communicated with individual providers via email, including reminders alerting them of patients newly diagnosed with EoE and reinforced the details on local EoE QI metrics to promote consistent referrals and procedure orders.

We performed tracking mechanisms to determine adherence to the guidelines and monitored progress on a data spreadsheet. Biweekly and monthly QI project meetings were held to discuss results and continuously refine the process by characterizing the reasons for missed opportunities and planning interventions to prevent a recurrence.

We improved access to follow-up visits for newly diagnosed EoE patients by creating designated spaces in the outpatient clinic template. With the Allergy department schedulers’ assistance, we followed up on the placement of allergy referrals and made confirmations of scheduled appointments for children with EoE. To improve the follow-up EGDs, we implemented consistent email reminders to practitioners regarding adherence to the local standard of care. In Q3–4 2018, we developed a more structured communication process to target both practitioners and coordinators in gastroenterology and allergy clinics to more proactively contact families that had canceled or no-showed for appointments or repeat EGDs.

This QI project did not meet the definition of human subjects research and, therefore, it did not require review and approval by the institutional review board.

RESULTS

Between 2015 and 2018, there were a total of 676 new diagnoses of EoE. Ages ranged from 0 to 23 years, with a

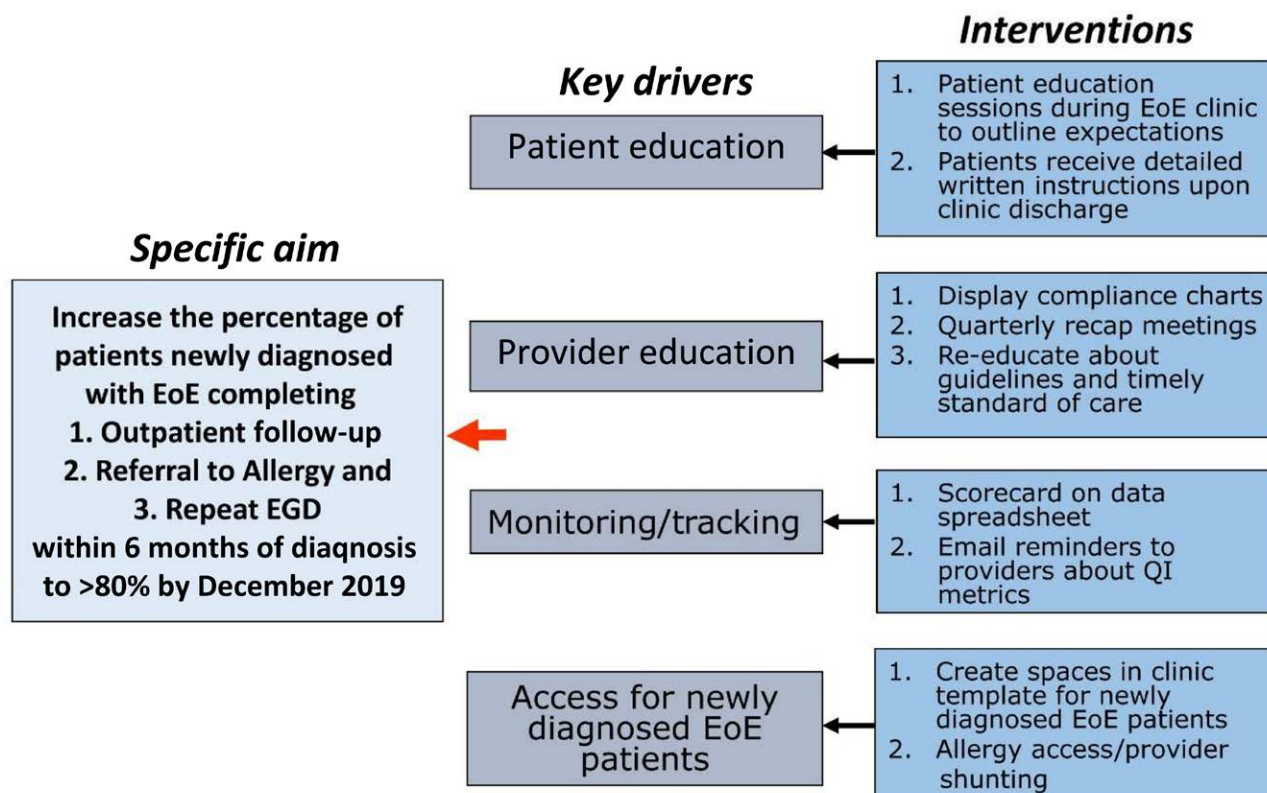


Fig. 1. Standardized monitoring in children with EoE key driver diagram.

median age of 11.8 years. The number of new EoE diagnoses per quarter ranged from 18 to 44, with a median of 31.

GI Follow-up

Baseline data showed that 77% of patients had outpatient GI follow-up before intervention within 6 months of diagnosis (Fig. 2). After project implementation, by Q3 2016, the mean proportion of EoE patients having a GI follow-up visit within 6 months of diagnosis increased to 86%. During the most recent 6 months reported (July–December 2018), an average of 94% of patients completed follow-up visits.

Allergy Referral

The percentage of patients referred to the allergy clinic increased from approximately 65% to 77% by Q1–Q2 2017, as shown in Figure 3. During the most recent 6 months reported (July–December 2018), an average of 81% of patients had allergy referrals placed. Data describing percentages of allergy referrals placed before 2016 were not available.

Follow-up EGD

At baseline, 33% of patients completed repeat EGDs within 6 months of diagnosis (Fig. 4). This percentage improved to an average of 61% having repeat EGDs by Q3 2016. During the most recent 6 months reported

(July–December 2018), an average of 68% of patients completed repeat EGDs within 6 months of diagnosis.

Missed Opportunities

We performed a subanalysis to further focus on specific targets for improvement. Reasons for patients not having repeat EGD within 6 months of diagnosis in Q1–Q4 2018 were reviewed and recorded. Missed opportunities were categorized as *provider-driven* or *patient/family-driven* (Fig. 5). The four most common *provider-driven* categories included scheduled beyond a 6-month interval (28%), not yet seen in follow-up (20%), provider preference not to repeat (9%), and the provider feels the diagnosis may not be EoE (7%). These 4 categories were responsible for 63% of missed opportunities. *Patient/family-driven* reasons for incomplete EGD metrics included family preference not to complete a repeat EGD (15%), patient cancellation or no show (13%), and cannot contact family after ordering repeat EGD (9%) (Fig. 5).

DISCUSSION

By developing a systematic QI approach and establishing a local standard of care, our EoE center improved adherence with expert recommendations for follow-up monitoring and care for children diagnosed with EoE.⁵ We improved local practice and reduced

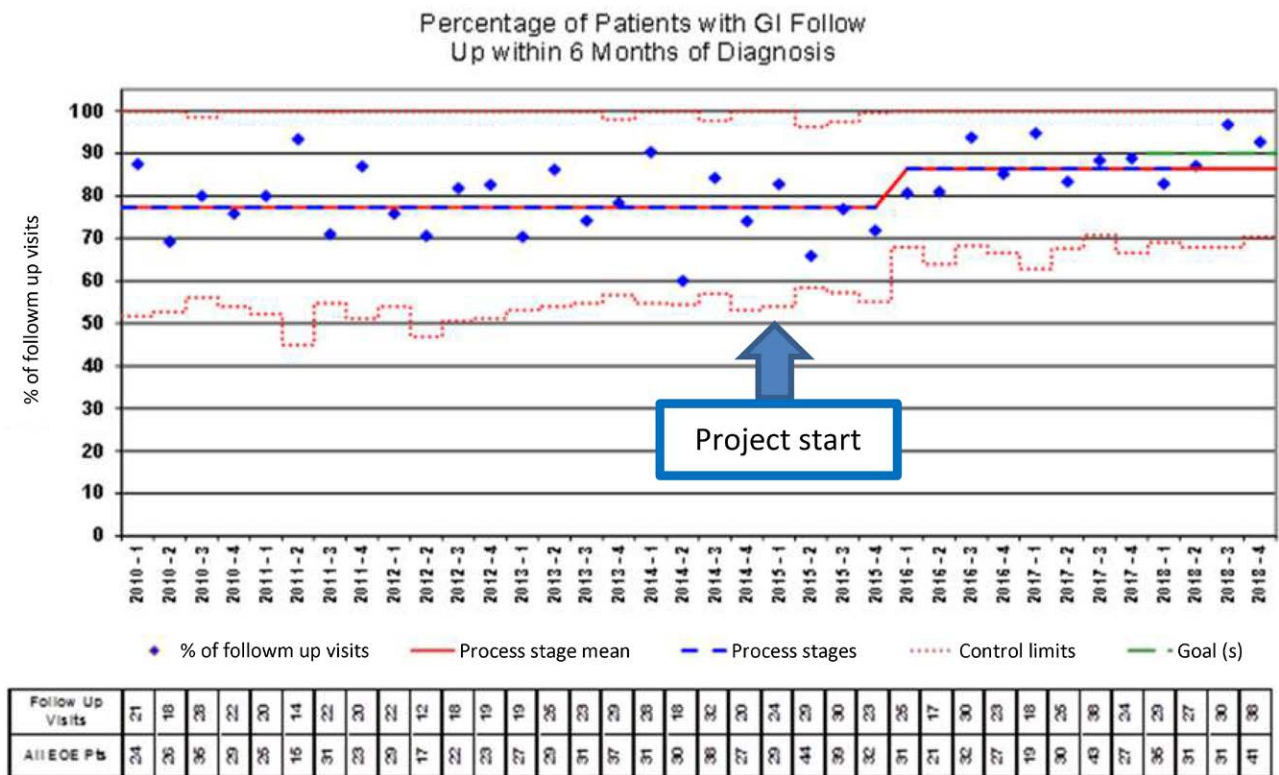


Fig. 2. Percentage of patients with GI follow-up within 6 months of diagnosis.

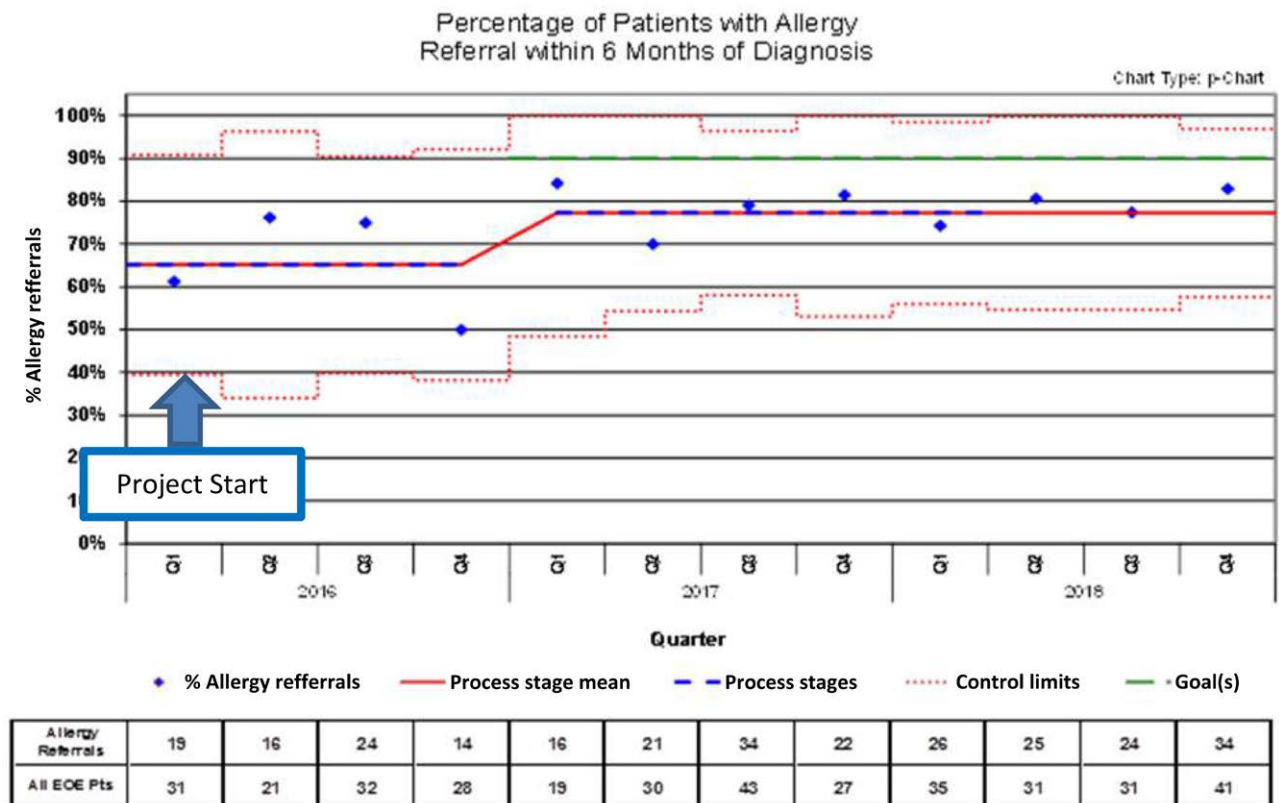


Fig. 3. Percentage of patients with allergy referral within 6 months of diagnosis.

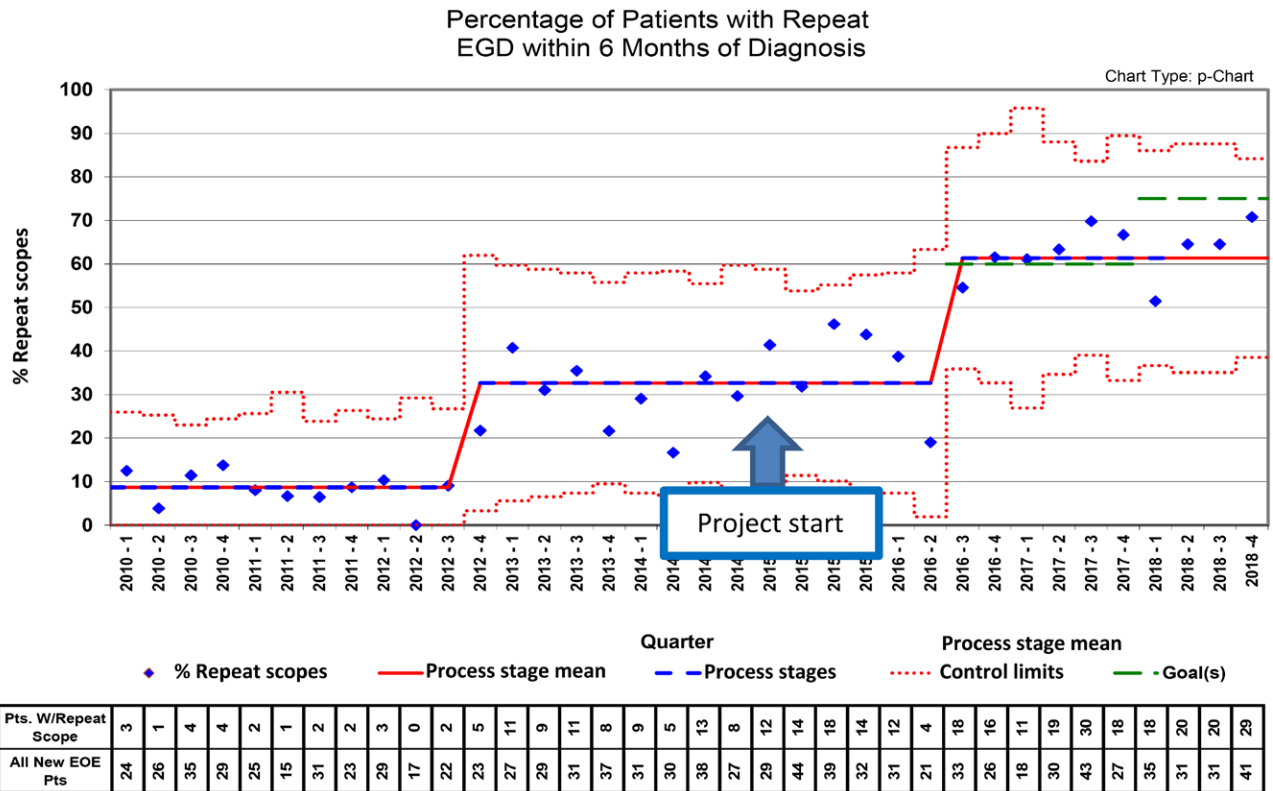


Fig. 4. Percentage of patients with repeat EGD within 6 months of diagnosis.

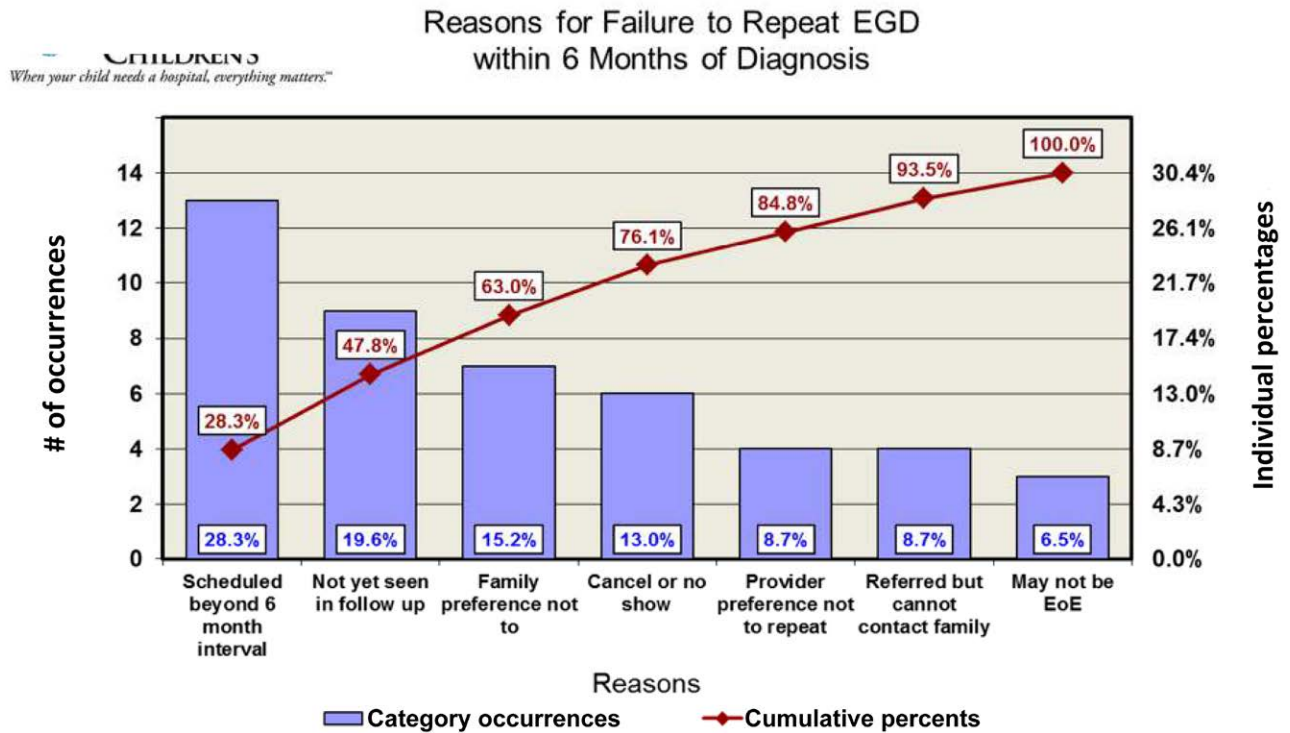


Fig. 5. Pareto chart showing reasons for failure to repeat EGD within 6 months of diagnosis from January to December 2018.

variation at a large academic center consisting of 38 providers by developing a patient registry and tracking system. Additional key drivers of project success

included practitioner and family education, systematic feedback, reminders to providers, and project owners' identification.

Despite these successes, challenges continue to exist. From a diagnostic perspective, there remains an overlap between EoE and gastroesophageal reflux. The clinical features can be indistinguishable, and therefore, practitioners may choose not to perform repeat EGD. Furthermore, other conditions, including Crohn's disease, may result in eosinophil elevation in esophageal biopsies leading to imperfect methods of diagnosing or excluding EoE. Families who may be unreachable via phone or letter, with financial barriers toward completing a repeat EGD or those who choose not to follow up, also pose a challenge to guideline adherence beyond the practitioner's control. We theorize that some families may not recognize the importance of close follow-up and ongoing endoscopic monitoring. Therefore, an increased focus upon patient education at diagnosis could improve the completion of the process metrics within 6 months.

There is currently a lack of literature describing QI interventions in patients with EoE, especially in children. QI efforts reduce variation and optimize adherence to expert recommendations and improve outcomes in other pediatric gastrointestinal diseases such as celiac disease and inflammatory bowel disease.^{10,11} A study by Lomeli et al¹² used educational presentations as the intervention for their QI project to standardize the monitoring and treatment of adult EoE patients. They showed significant increases in patients having biopsies taken from the proximal and distal esophagus, the use of proton pump inhibitors as first-line therapy, and instituting step-up therapy for patients who are not in remission. Our EoE project expands upon that initial study by utilizing a different approach to standardized monitoring in the pediatric setting. We have demonstrated that QI interventions can be effectively performed to standardize EoE management and reduce variation in the care of children.

Although not a primary objective of our QI study, we observed variation in treatment approaches and outcomes, similar to prior studies.¹³⁻¹⁵ The goals for EoE treatment are to achieve histologic remission in addition to symptom control. Yet, we observed that a significant proportion of our patients did not have <15 eos/HPF at the time of the first repeat endoscopy. Due to the variation in symptoms and patient adaptations, it is challenging to establish validated patient-reported outcome measures.¹⁶ This finding reinforces the importance of our QI intervention of encouraging a follow-up EGD and emphasizes the need for reduced treatment variation, perhaps through larger-scale comparative effectiveness studies.

Our project had several limitations. There remains no gold standard first-line management or monitoring algorithm. The most recent updated EoE criteria from the 2018 AGREE conference proceedings and the AGA/Joint Taskforce on Allergy Immunology guidelines from May 2020 have not included formal recommendations regarding repeated endoscopy or follow-up intervals after the initiation of treatment.^{5,17} There is also limited

data on early treatment preventing complications and the relationship between increased tissue eosinophils and worsening outcomes, which influences some providers to question the need for follow-up EGD when symptoms have improved. We chose our process metrics based upon more generally accepted follow-up approaches necessary for successful treatment. We did not attempt to standardize treatment, and treatment variation across our division persists due to these limitations and lack of guidelines.

CONCLUSIONS

Implementation of QI interventions significantly reduced variation and increased the percentage of EoE patients completing a follow-up GI visit, allergy referrals, and repeat EGD within 6 months of diagnosis. Drivers of the improvement included registry development, practitioner and patient/family education, and utilization of a patient tracking system.

DISCLOSURE

The authors have no financial interest to declare in relation to the content of this article.

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