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A Procedural and Educational Experience Following Creation of an Advanced Pediatric Endoscopy Service

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Abstract

Advanced endoscopic procedures occur infrequently enough in pediatric patients to preclude effective maintenance of competence among all pediatric gastroenterologists. A recent study suggests that fellows are largely unable to achieve the prescribed case volume recommended to achieve competence. We sought to describe the procedural and educational experience following the creation of an advanced pediatric endoscopy service in response to declining confidence among practice members regarding advanced procedures. We found most advanced endoscopy cases (90%) were accomplished during routine business hours with little seasonal variation. Esophageal dilations occurred far more than all other procedures provided by this service. Control of nonvariceal bleeding, feeding tube placement, enteroscopy, and needle knife therapy, among others, were performed exclusively but relatively infrequently by members of this advanced endoscopy service. Fellows were present for many cases though they participated in relatively few. We conclude that the creation of an advanced endoscopy service permits distillation of rare but technically demanding cases to few providers, ensuring maintenance of skills, though the role of fellows remains in question.

Keywords

Pediatric endoscopy; Pediatric gastroenterology; Advanced endoscopy service

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Introduction

A relationship between experience and competency in diagnostic and advanced endoscopy has been reported in both pediatric and adult literature (1–5). Unlike diagnostic endoscopic procedures, cases requiring advanced endoscopic experience and skill may be uncommon in clinical practice such that the achievement of competence at one stage may be gradually lost over time if the number of cases is low. Group practices in pediatric gastroenterology vary in size and more advanced therapeutic endoscopic cases may be deferred to performance by a few group members with the necessary skills to safely and effectively care for the patient. Though varying degrees of organization are found among adult advanced endoscopists by institution, there is a paucity of such organization among pediatric institutions, owing to the relatively smaller case volumes. However sporadic, many general providers still encounter situations where a structured advanced endoscopy service may be necessary or, at minimum, beneficial. This service may also result in fewer complications from advanced therapeutic maneuvers.

In addition to the above restrictions, those entering the field may not have gained sufficient exposure to advanced endoscopic techniques during fellowship training, discouraging them from attempting such procedures as independent providers. Challenges in meeting suggested procedure volumes during fellowship have recently been discussed in the literature (6). Whereas relatively new, advanced techniques such as endoscopic retrograde cholangiopancreatography (ERCP) and endoscopic ultrasound (EUS) require supplemental training, other advanced procedures are not formally learned after primary training (7). To investigate the state of advanced endoscopic procedural education, Lerner *et al.* recently surveyed 12 pediatric gastroenterology fellowship programs in the United States (U.S.) comprising 27% of trainees nationwide (8). They concluded that most training programs do not have an adequate volume of therapeutic endoscopy procedures for all fellows to meet the established training guidelines as put forth by the North American Society for Pediatric Gastroenterology, Hepatology and Nutrition (NASPGHAN) (8). Further, there was great variation in the numbers of advanced cases performed in total at institutions across the U.S. with few offering sufficient numbers to maintain competency among all providers.

We report our experience 1 year after creating an advanced endoscopy service at a pediatric referral hospital in response to an ever-increasing volume of specific and advanced endoscopic procedures. Specifically, we describe those procedures performed during the first year of service as well as the impact on fellow training. We conclude that the identification of a core group of skilled endoscopists permits the experience gained from relatively rare procedures to remain concentrated and thus beneficial. Further, we add that even in a situation where procedure number may approach that recommended to adequately train fellows at a large institution, their participation is often not ensured.

Materials and Methods

During the spring of 2013, the need for a core group of pediatric gastroenterologists with interest and expertise in advanced endoscopic procedures reached a critical mass at our institution. The Cincinnati Children's Hospital Medical Center Advanced Endoscopy

Service (AES) within the division of pediatric gastroenterology, hepatology, and nutrition was organized to meet this need, providing continuous coverage for difficult, complex, or highly specialized endoscopic procedures. Five attending pediatric gastroenterologists among a division of over 30 faculty members were self-identified as having achieved the necessary competence and skill in advanced endoscopic procedures based on their individual level of achieved experience and expertise. More specifically, each AES faculty member has participated in the described procedures for more than 8 years at our center. All of the AES attendings were formally approved to perform the therapeutic/advanced endoscopic procedures by the hospital's credentialing body. A separate therapeutic endoscopy call schedule was established whereby the 5 members would share full-time day and night coverage throughout the year including weekends and holidays. The AES performed outpatient or inpatient procedures upon request of the referring gastroenterologist, or were ready to assist for potentially complicated procedures or advanced therapeutic interventions. Trainee involvement was decided on a case-by-case basis.

Service Experience

Following IRB approval, the details of advanced procedures performed by a member of the AES from July 1, 2013 and extending through June 30, 2014 were retrospectively collected. Advanced procedures were defined as endoscopic procedures not including routine diagnostic procedures such as esophagogastroduodenoscopy or colonoscopy. Advanced procedures included, but were not limited to, small bowel dilation, entero-enteric anastomosis dilation, needle knife utilization, esophageal dilation, steroid injection, fluoroscopically-assisted enteric tube placement or replacement, complex foreign body removal, pyloric dilation with botulinum toxin injection, evaluation for and control of gastrointestinal hemorrhage, and ERCP. The date of each encounter was recorded, along with patient age, AES physician, procedure performed, and procedure start time.

Fellow Experience

A pediatric gastroenterology fellowship in the U.S. is universally a 3-year training program. During the 12-month evaluation period, the details of fellow involvement in each case were prospectively recorded by AES faculty. These details included the presence or absence of a fellow as well as the degree of involvement. Lastly, as each fellow of the program's 12 fellows receives training over three years yet the study occurred over one, total procedures were divided by four to determine the potential for each fellow to receive adequate training to achieve competency in each of the advanced endoscopy categories recognized in the 2013 NASPGHAN training guidelines.

Results

Over the 12 month study period, AES physicians completed a total of 499 advanced endoscopic procedures. Three hundred patients were subjected to these procedures, 82 of whom required more than one procedure (27%). Thirteen patients required 5 or more procedures and 4 required more than 10. Two patients required 15 procedures through the study period, both for serial esophageal dilations for difficult strictures.

Of the 365 study days, 232 (64%) involved at least one therapeutic procedure performed by an AES physician. Procedures per month varied between 30 and 53, with the median monthly occurrence of 40 (Supplemental Figure 1). Twenty-three procedures began on weekdays after 5:00 PM but before 7:30 AM (5%) and 24 procedures were performed on weekends (5%). There was no holiday coverage need. All providers were called on for both night and weekend coverage. The most common after-hours procedure was complicated foreign body removal, followed by ERCP (Figure 1). Evaluation or therapy for gastrointestinal bleeding, as well as enteric tube placement were occasionally needed overnight or on weekends.

Provider A performed 205 procedures (41%), the most of the 5 providers. Provider B performed 109 (22%), provider C performed 100 (20%), provider D performed 62 (12%), and provider E performed 23 (5%). Esophageal dilation was the most frequently performed AES procedure, 192 times over the 12 month study period (38%)(Supplemental Figure 2). Pyloric dilation and botox injection was the second most common procedure (72, 14%) followed by ERCP (54, 11%), gastrojejunostomy (GJ) tube replacement (38, 8%), complex percutaneous endoscopic gastrostomy tube placement (32, 6%), and complex foreign body removal (31, 6%). Of those procedures done more than 5 times through the study period, only ERCP and Savary esophageal dilatation were performed exclusively by a single provider.

The median age at the time of endoscopy was 7.75 years (range 25 days to 38.5 years; 1). Most providers were involved in cases with patients ranging from 1 to 19 years of age. Endoscopy with older patients was primarily performed by Provider A. There were no significant complications resulting from any AES procedures over the time course of the study.

Fellow experience

The subset of advanced procedures in which details regarding fellow participation were prospectively collected numbered 228 (46%). A fellow was present for 162 (74%) of these procedures. Among the 130 procedures in which a fellow was present and the endoscopist was recorded, the fellow performed all or part of 33 procedures (25%). Fellows performing procedures varied by year of training. Fourteen of these 33 procedures (42%) were attempted or completed by a first year fellow, including multiple episodes of treatment for bleeding duodenal or gastric ulcers, dilation of an esophageal stricture, or complicated foreign body removal.

Analysis of all procedures performed exclusively by AES providers reveals that fellows would be expected to achieve competency by 2013 NASPGHAN guidelines, if fully participating, in esophageal dilation (48 cases/fellow) and enteric tube placement (5.25 cases/fellow). Complicated foreign body removal (7.75 cases/fellow), PEG placement (8 cases/fellow) approached adequate training volumes and are also offered by non-AES providers. Control of nonvariceal bleeding (2 cases/fellow), polypectomy (2.25 cases/fellow), and enteroscopy using a colonoscope (1.75 cases/fellow) are generally not attempted in the absence of non-AES providers and thus would not be expected to generate sufficient training opportunity at our institution.

Discussion

We report our educational and procedural experience during a full 12-month academic year following the creation of an advanced endoscopy service tasked with performing or providing support for endoscopic procedures requiring unique experience or skill. The wide distribution of patient age among patients subjected to endoscopic intervention occurred as expected. We found very little seasonal variability in the need for advanced endoscopic procedures. AES procedures occurred on only about two of every three days in the year. On nights and weekends, fewer but a greater diversity of procedures occurred than expected. Overall, procedure volume occurred as expected with esophageal dilation occurring far more frequently than other procedures.

Our center performs many advanced esophageal surgical operations resulting in the need for frequent, serial esophageal dilations as part of the comprehensive care provided to these patients. The decision to include ERCP as part of our data assessment is based on the fact that within our institution, ERCPs are independently performed by one of our pediatric gastroenterologists who completed a formal adult ERCP fellowship. We felt inclusion highlighted our aim of describing procedures requiring advanced endoscopic skill which, by virtue of their infrequency, are competently performed by a very small proportion of all pediatric gastroenterologists.

Our experience is in agreement with a previous observation of an insufficient number of advanced cases to satisfy NASPGHAN training recommendations (8). Based on our one year review, our center encountered only a sufficient case load to achieve recommended training volumes for each fellow in esophageal dilation and enteric tube placement. However, as noted in the NASPGHAN guideline report, achievement of the stipulated minimum procedure volume may not equate to procedural competence, and thus there is a need for additional benchmarks to reliably measure trainee competence. We were unable to provide the recommended number of enteroscopy and control of nonvariceal bleeding cases. These insufficiencies are compounded by a low fellow participation rate.

Limitations to our description largely occurred as the result of our methods and the nature of the AES. Our division is segregated to encourage independent hepatology practice. Thus, variceal bleeding cases are not managed by the AES. Furthermore, most gastroenterologists in our division are comfortable treating routine foreign body ingestions and placing percutaneous endoscopic gastrostomy tubes and these cases are thus not included. PEG tube placements performed by the AES included those performed at the request of a relatively few number of physicians who do not perform this procedure; the procedures were included as they represent consultation of the AES though their inclusion may be controversial. The policies and procedures of an institution's perioperative services may influence the timing of emergent, therapeutic, and add-on procedures, thus, rates of after-hours procedures may vary widely by institution. Finally, incomplete prospective reporting of fellow involvement is a limitation though approximately half of cases were included.

In conclusion, our newly developed Advanced Endoscopy Service focuses advanced procedural experience among a restricted number of competent providers who, in turn, offer

endoscopic support in a scheduled fashion. Though the creation of this service did not preclude fellows from participating in advanced cases, improved involvement may lead to satisfaction of some (but not all) of the training recommendations for therapeutic procedures. Another proposed method for promoting competency is the incorporation of endoscopic simulators (9). Overall, our procedural experience and education description are in line with previous reports documenting inadequate volumes for training all fellows (8). After assessing the lack of fellow involvement in these procedures it was determined that senior fellows can “sign up” for AES blocks where they will also be on-call for these procedures and allowed to have a larger role in the procedure. Future studies targeting outcomes from advanced procedures will strengthen the foundation of training guidelines and add support to the value of similarly structured advanced endoscopy services.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Acknowledgments

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What is known?

- Most pediatric gastroenterologists do not routinely perform advanced endoscopic procedures
- Nationwide, many fellows do not meet prescribed case volumes in advanced endoscopic procedures

What is new?

- The creation of an advanced endoscopy service distills rare cases among few, competent providers
- Fellow participation in advanced procedures is low yet high participation may not guarantee satisfaction of all prescribed case volumes

Figure 1.

Distribution of after-hours procedures by procedure. Abbreviations: endoscopic retrograde cholangiopancreatography (ERCP); nasojejunal (NJ); gastrojejunal (GJ); percutaneous endoscopic gastrostomy (PEG)