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Contemporary practice among pediatric surgeons in the use of bowel preparation for elective colorectal surgery: A survey of the American Pediatric Surgical Association

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ABSTRACT

Purpose: The goal of this study was to characterize contemporary practice among pediatric surgeons in the use of mechanical bowel preparation (MBP) and oral antibiotics (OA) for elective colorectal surgery.
Methods: A survey of the American Pediatric Surgical Association membership was conducted to characterize variation in the use of MBP and OA for commonly performed elective colorectal procedures in children.
Results: Three-hundred thirteen members completed the survey. The most common approach used was MBP alone (31.1%), followed by diet modification only (26.8%), MBP combined with OA (19.6%), no preparation or dietary modification (12.2%), and OA alone (5.4%). The most common MBP used was a polyethylene glycol–based solution (92.6%), and the most common OA approach was neomycin combined with erythromycin (55.9%). Although MBP alone was the preferred approach among pediatric surgeons, the greatest relative change reported over time was in the adoption of dietary modifications only or no preparation at all.
Conclusions: Significant variation exists in the use of bowel preparation among pediatric surgeons. Although use of MBP alone remains the preferred approach for most procedures, an increasing number of surgeons report abandoning this approach in favor of dietary modification alone or no preparation at all.

Colorectal surgery is associated with high rates of surgical site infections in both children and adults [1]. Although prophylactic intravenous antibiotics are widely considered standard of care for decreasing surgical site infections, the benefits of a mechanical bowel preparation (MBP) and oral antibiotics in addition to intravenous antibiotics in the pediatric population are less clear because of the paucity of high-quality clinical evidence relevant to the pediatric population.

The lack of evidence supporting an optimal preoperative approach in children has led to marked variation in practice among pediatric surgeons in the timing, choice, and setting for bowel preparation [2,3]. In a previous analysis of practice patterns from 42 freestanding children's hospitals, nearly half of children undergoing elective colorectal surgery were preadmitted to the hospital one day before their scheduled procedure for administration of a bowel preparation [3]. Significant variation between hospitals was also found in the preparation approach used, with the frequency of MBP use alone ranging between 0% and 96%, oral antibiotics alone between 0% and 92%, and MBP use combined with oral antibiotics between 0% and 84% [3].

As a step toward understanding where consensus guidelines and high-quality clinical evidence should be prioritized, we must first characterize the variability in contemporary practice among pediatric surgeons in all practice settings. Previous studies have been limited in this regard to the analysis of administrative data from freestanding children's hospitals, which may not be representative of practice in community and nonteaching hospitals, and were not able to capture practice in the ambulatory setting. The goal of this study was to provide the most comprehensive assessment of bowel preparation practices among pediatric surgeons in both inpatient and ambulatory settings through a survey of the American Pediatric Surgical Association (APSA) membership.

1. Methods

1.1. Survey design

Following guidelines established by the APSA Outcomes and Evidence-Based Committee Subcommittee on Survey Development

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and in collaboration with a survey-design epidemiologist at our institution, we developed a survey designed to query surgeons on their bowel preparation practices in children undergoing elective colorectal procedures. Demographic information was collected, including age, sex, years in practice, geographic region and type of practice (e.g. hospital setting and association with training programs), academic affiliation, number of partners, and perceived colorectal case volume relative to other surgeons in their practice.

In order to obtain a more detailed assessment of practice variation, surgeon practices were queried in the context of 4 clinical scenarios spanning a broad range of ages, colorectal conditions, and comorbidity profiles. These included (1) repair of a rectovestibular (posterior fourchette) fistula in a 9-month-old girl that has been managed in the outpatient setting with daily dilations, (2) pullthrough and colostomy closure in a 15-month-old boy with Hirschsprung's disease and a transition zone in the proximal sigmoid colon who was initially managed with a descending colostomy, (3) elective ileocecectomy with primary anastomosis in a 10-year-old boy with medically refractory Crohn's disease (not clinically obstructed), and (4) closure of a diverting descending colostomy in an otherwise healthy 16-year-old teenaged boy, 3 months after sustaining a penetrating injury to the pelvis.

For each scenario, surgeons were queried for their preferred approach to bowel preparation (no preparation or dietary modifications, dietary modification only, MBP alone, oral antibiotics alone, or MBP combined with oral antibiotics). Surgeons who reported use of an MBP (with or without oral antibiotics) were further queried whether they would preadmit their patient to the hospital specifically to have the preparation administered. For the purposes of the survey, an MBP was defined as an enterally administered polyethylene glycol or electrolyte-based preparation solution, and oral antibiotics included oral neomycin, erythromycin, or metronidazole given individually or in any combination. Surgeons were further queried on how their management has changed over time (increased use, unchanged, decreased use, or never used) with respect to each of the bowel preparation choices above.

1.2. Survey administration and data analysis

The survey was distributed using SurveyMonkey.com via a website link and e-mailed to all 1148 active APSA members over a 4-week period in January 2014 [4]. Reminder emails were sent weekly to nonresponders. Participation in the survey was anonymous and voluntary. Practice patterns were examined in aggregate and also stratified by major categories of demographic characteristics. These included age (younger or older than 55 years), years in practice (greater or fewer than 15 years), academic affiliation, number of partners in practice (greater or fewer than 6 partners), and relative colorectal case volume (greater vs equal to or less than colleagues in their practice). These cutoffs were chosen after a preliminary analysis of median values from survey responses for each demographic category.

Descriptive statistics were used for variation in demographic characteristics and preparation choices, and χ^2 statistics were used for the comparison of proportions. The Cochran–Mantel–Haenszel statistic for repeated tests of independence was used to examine differences in bowel preparation approach and preadmission across demographic characteristic while controlling for each of the 4 scenarios. Only responses from surgeons who completed the entire survey were included in the analysis. All statistical analyses were performed using Microsoft Excel (Microsoft, Redmond, WA) and SAS Enterprise Guide v. 5.1 (SAS Institute, Cary, NC). This study was approved by the institutional review board at our institution (BCH#P00005670).

2. Results

2.1. Characteristics of survey respondents

Surveys were completed by 313 of 1148 surgeons, for a response rate of 27%. Respondents were evenly distributed across age groups, years in practice, and geographic region (Table 1). The majority of respondents practiced at freestanding children's hospitals and were affiliated with a university or academic institution. Most respondents were in a practice with 6 or fewer surgeons, and most reported similar or lower colorectal case volume compared with their colleagues.

2.2. Variation in bowel preparation approach

The most common approach used for all procedures was an MBP alone (31.1%), followed by dietary modification only (26.8%), MBP combined with oral antibiotics (19.6%), no preparation or dietary modifications (12.2%), and oral antibiotics alone (5.4%). The remaining 4.8% of respondents provided a free-text response describing an approach other than the options given. The distribution of relative preferences was similar across all scenarios with the exception of ileocecectomy associated with inflammatory bowel disease (IBD), where the most common preparation used was dietary modification alone, followed by MBP alone, MBP with oral antibiotics, no preparation or dietary modification, and oral antibiotics alone (Fig. 1). Sixty-six percent of respondents (207/313) used an MBP alone in at least 1 of the 4 scenarios, and the most common MBP used was a polyethylene glycol–based solution (92.6%). Thirty-three percent (107/313) of surgeons reported using oral antibiotics (with or without an MBP) in at least 1 of the scenarios, with the most common approach being neomycin and erythromycin used together (55.9%) followed by neomycin as a single agent (14.1%)

Table 1
Demographic characteristics of pediatric surgeons who completed the survey.

Characteristics	n = 313 (%)
Male	242 (77.3)
Age (y)	
<45	114 (36.5)
45–54	97 (31.1)
55–64	66 (21.1)
65–74	28 (8.9)
>75	8 (2.6)
Years in practice	
<5	64 (20.4)
5–10	65 (20.8)
11–15	49 (15.7)
16–20	41 (13.1)
>21	94 (30.0)
Geographic region	
Northeast	75 (23.9)
Midwest	80 (25.6)
South	105 (33.5)
West	53 (16.9)
Academic/university-affiliated	250 (79.9)
Hospital setting	
Freestanding children's hospital	177 (56.6)
Children's hospital within a hospital	128 (40.9)
Nonchildren's hospital	8 (2.6)
Practice associated with	
Pediatric surgery fellowship	138 (44.1)
General surgery fellowship	275 (87.9)
Partners in group	
1–3	90 (28.8)
4–6	118 (37.7)
7–9	60 (19.2)
10–12	26 (8.3)
>12	19 (6.1)
Colorectal case volume	
Less than colleagues	42 (13.4)
Same as colleagues	204 (65.2)
More than colleagues	67 (21.4)