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Constipation-Related Emergency Department Use, and Associated Office Visits and Payments Among Commercially Insured Children

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Abstract

OBJECTIVE: Pediatric constipation is common, costly, and often managed in the Emergency Department (ED). The objectives of this study were to determine the frequency of constipation-related ED visits in a large commercially insured population, the frequency of an office visit in the month before and after these visits, demographic characteristics associated with these office visits, and the ED-associated payments.

METHODS: Data were extracted from the Truven MarketScan database for commercially insured children from 2012 to 2013. Data on the presence and timing of clinic visits within 30 days before and after an ED constipation visit and demographic variables were extracted. Logistic regression was used to predict an outcome of presence of a visit with independent variables of age, sex, and region of the country.

RESULTS: In a population of 17 million children aged 0 to 17 years, 448,440 (2.6%) were identified with constipation in at least 1 setting, with 65,163 (14.5%) having an ED visit for constipation. Of all children with a constipation-related ED visit, 45% had no office visit in the 30 days before or after the ED visit. Increasing age was associated with absence of an office visit. The median payment by insurance for an ED constipation visit was \$523, the median out-of-pocket payment was \$100, for a total of \$623 per visit.

CONCLUSION: One in 7 children with constipation in this commercially insured population received ED care for constipation, many without an outpatient visit in the month before or after. Efforts to improve primary care utilization for this condition should be encouraged.

Keywords

constipation; office visits; chronic disease; emergency department

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Pediatric constipation is a common and expensive problem, with a prevalence of 3% to 17% in the United States and \$3.9 billion per year in direct medical costs.¹⁻⁴ Children with constipation use more health services than children without constipation, contributing to significantly higher costs: \$3430 per year for children with constipation versus \$1099 per year for children without.¹ A significant portion of these costs are attributable to constipation-related Emergency Department (ED) visits. ED visits are rarely necessary for this condition and are associated with a higher cost compared with office visits. Radiographs are more likely to be ordered for the evaluation of constipation in an ED visit (33.3%) compared with an office visit (15.0%), further contributing to the cost.⁵

Evidence-based guidelines, published by the North American Society for Pediatric Gastroenterology, Hepatology and Nutrition (NASPGHAN), exist for the evaluation and treatment of functional constipation.⁶ Specifically, the algorithm for children older than 6 months recommends evaluation of effectiveness of treatment at 2 weeks. They recommend continuing maintenance medication until all symptoms are resolved for 1 month before gradual discontinuation of treatment and at least 2 months after initiation of therapy. Additionally, they stress the importance of following constipated children closely and restarting medications promptly, if necessary. Modified guidelines for children with autism similarly showed that regular follow-up to document continued response was critical for treatment success.⁷ Routine use of an abdominal radiograph to diagnose constipation is not endorsed.

Constipation is often a chronic condition, with symptoms persisting beyond puberty in one-third of constipated children.^{8,9} For this reason, the primary care physician is best suited to provide longitudinal care for this problem. Unfortunately, children frequently seek care in the ED for their management of constipation. In 2011 alone, pediatric constipation accounted for >250,000 ED visits in the United States, representing a 50% increase in the constipation-related ED visit rate from 2006.¹⁰ There is considerable variation in the evaluation and treatment of constipation in the ED, and children often do not have resolution of symptoms after their treatment.¹¹

ED utilization for nonurgent conditions such as constipation is common. Many studies have identified patient characteristics that are associated with frequent pediatric ED visits including chronic disease, minority race, social determinants, age (particularly younger than 1 year), and public insurance.¹²⁻¹⁴ Potential etiologies have included limited clinic office hours, increased clinic wait times, and lack of an identified usual source of care.¹⁵ Parents with low health literacy were inclined to overestimate severity of illness and seek care sooner and visit a clinic only when an appointment is available within hours.¹⁶ Children with constipation often have abdominal pain, which is a symptom of many serious conditions. Although studies have shown that ED use is frequent in publicly insured populations, less is known about commercially insured children's use of the ED for constipation, a population with fewer socioeconomic barriers and perhaps more financial disincentive to use the ED.

The primary objective of this study was to determine the presence and timing of an office visit in the month before and after an ED visit with a discharge diagnosis of constipation in a

large, commercially insured population. Secondary objectives included to determine the frequency of ED use and additional ED revisits for constipation, demographic factors associated with office visits, and payments associated with ED visits for constipation. We hypothesized that many children would be seen in the ED without any previous clinic visit or follow-up visit.

Methods

Data

We conducted a retrospective study using the Truven MarketScan database of commercially insured children aged 0 to 17 years from 2012 to 2013. This database includes in-patient and outpatient encounter claims and prescription claims for >17 million children from 100 large commercial insurers in the United States. The investigators' institution licenses the database for faculty and student use. Children with constipation in the inpatient or outpatient (including ED) setting were identified by International Classification of Diseases, Ninth Revision diagnosis codes 564.00 to 564.09 similar to Sommers et al.¹⁰ Constipation as a primary discharge diagnosis or in the top 3 secondary discharge diagnoses was included because abdominal pain is often listed as a primary diagnosis with constipation as a secondary diagnosis. Visits that were coded as ED visits were then identified using the code for ED place of service, revenue code 450, or Current Procedural Terminology (CPT) codes 9928x. Any non-ED outpatient visits (regardless of visit diagnosis) were identified using the place of service code for office visit and/or CPT codes 9920x and 9921x. Abdominal radiographs were identified using CPT codes 74000, 74010, 74020, and 74022.

All study data available in the Truven MarketScan are deidentified. Neither institutional review board approval nor waiver of authorization were required for this study of deidentified data.

Variables

Patient-specific variables included age in years, sex, and geographic region. Race/ethnicity is not available in this data set. Age was categorized into younger than 1 year (infants), 1 to 4 years (toddlers), 5 to 9 years (school-aged), and 10 to 17 years (adolescents). Geographic region, as defined in the MarketScan database, was characterized into 5 groups: Northeast, North Central, South, West, and unknown.

Statistical Analysis

Frequency of ED Visits and ED Revisits Determination—The proportion of patients in the data set with constipation in any setting, those with an ED visit, and those who had a second ED revisit with a constipation code was determined.

Presence and Timing of Visits Analysis—The frequency of an office visit in the 30 days before or after an ED visit for constipation was determined. A mean time with SD and median time with interquartile range (IQR) between ED visit and office visit were analyzed. This was conducted for office visits before the ED visit as well as visits after the ED visit.

Demographic Factors Associated With Office Visits Analysis—Descriptive statistics were used to characterize children with an ED visit for constipation and 9 chi-squared tests were used to compare demographic characteristics (age, sex, region) within each group (office visits before ED, office visit after ED, and no office visit). Logistic regression was used to predict the following outcomes: presence of office visit in the 30 days before ED visit, presence of an office visit in the 30 days after the ED visit, or the absence of an office visit in the 30 days before and after the ED visit. The main predictor variable was age with sex and geographic region as potential confounding variables in the model. For the logistic regression analysis, only the first ED visit was included if a child had additional visits.

Payment Determination—We determined the mean and median payments made by insurance companies and patients associated with the constipation-related ED visits, as well as the proportion of the payment attributable to an abdominal radiograph if one was obtained.

All analyses were performed using SAS version 9.4 (SAS Institute, Inc, Cary, NC). *P* values <.05 were considered statistically significant.

Results

Frequency of ED Visits and ED Revisits

Within the MarketScan database, 448,440 (2.6%) of a population of 17 million children aged 0 to 17 years presented with constipation in at least 1 setting between January 1, 2012 and December 31, 2013. Of these, 65,163 (14.5%) had an ED visit with a discharge diagnosis of constipation. A total of 1467 had a second visit to the ED within 30 days after the index visit with a diagnosis of constipation associated with the second ED visit (Table 1).

Presence and Timing of Visits

Among children seen in the ED for constipation, 34% had an office visit within 30 days before, 37% had an office visit within 30 days after, including 16% who had both. The cohort without an office visit in the 30 days before or after the ED visit comprised 45% (Table 1). In patients with an office visit within 30 days before the ED visit, the mean time to office visit was 10.2 days (SD, 8.4). The median time from office visit to ED visit was 8 days (IQR, 3–16 days). In patients with an office visit within 30 days after the ED visit, the mean time to office visit was 8.8 days (SD, 8.1). The median time from ED visit to office visit was also 8 days (IQR, 2–14 days).

Demographic Factors Associated With Office Visits

Children aged 5 to 9 and 10 to 17 years, male children, and children living in the West were less likely have an office visit in the 30 days before or after the ED visit ($P < .001$ for all comparisons; Table 2). Logistic regression revealed that increasing age increased the risk of not having a follow-up visit in the month before or after the ED visit after adjusting for region of the United States and sex of the child (Table 3).

Payments

The median total payment by insurance for an ED constipation visit was \$523 (mean, \$779), and the median out-of-pocket payment was \$100 (mean, \$202) for a total of \$623 (mean, \$981) per visit. For this population of 65,163 children, the total payment was >\$63 million. Abdominal radiographs were obtained in 53% of ED visits and represented 27% of the total payments associated with these ED visits. The total mean payments associated with these visits with an abdominal radiograph was \$1035 compared with \$922 without.

Discussion

We found that of >400,000 commercially insured children with constipation included in the Truven MarketScan database, a significant proportion (14.5%) had an ED visit with a discharge diagnosis of constipation. Forty-five percent were not seen in the office setting in the month before the ED visit or seen for a follow-up office visit in the month after the visit. Some of these ED visits might have been entirely appropriate urgent evaluations for abdominal pain. However, the absence of office care before and after signal an opportunity for improved adherence to guidelines. This might be attributed to lack of an identified medical home or failure on the part of caregivers, emergency physicians, and pediatricians to recognize constipation as a chronic illness. Considering that ED care is more expensive than office management and constipation is generally regarded as a chronic condition that does not require acute ED care, this finding represents a target for potential health care-related cost savings.

Ambulatory care-sensitive conditions are defined as conditions for which appropriate outpatient care reduces the need for hospitalization.¹⁷ Although constipation is not currently listed as a pediatric ambulatory care-sensitive condition, some authors have suggested that it meets the definition.¹⁸ Although this term generally refers to prevention of hospitalization, ED visits often represent a precursor to hospitalizations. Our study shows that many children with commercial insurance were not seen in the office setting before the ED visit. A study by Stephens et al showed in a publicly insured population the median spending for 1 constipation admission was 50 times the median spending for 12 months of outpatient constipation visits.¹⁹ A visit in the 30 days before the ED visit represents a potential opportunity to manage this problem before abdominal pain or stool impaction occurs.

Additionally, many children did not have an office follow-up visit in the month after the ED visit, despite the NASPGHAN recommendation for evaluation at 2 weeks. A recent study reported that pediatricians desire follow-up after an ED visit for constipation in 1 to 2 weeks.²⁰ Because constipation is generally considered chronic, close follow-up would be desired. Having commercial insurance has been shown to be a statistically significant factor in predicting better compliance with follow-up recommendations.²¹ However, it is not known whether ED providers are consistently recommending follow-up for constipation to families or in what time frame. Increasing age was associated with decreased odds of a follow-up visit in the 30 days before or after the ED visit after controlling for sex and region of the United States. This might be related to the bowel habits of older children being less scrutinized by parents or less health care utilization overall. A similar study addressing asthma follow-up visits also observed this trend.²²

Our prevalence of constipation of 2.6% was slightly lower than what has previously been described in the literature. Stephens et al performed a similar analysis of pediatric constipation patients with public insurance and reported 5.4% of patients had a diagnosis of constipation, more than double what we observed in a commercially insured population.⁵ This difference might be attributed to an increase in psychosocial stress and other health problems in the publicly insured population, which have been identified as a risk factor for constipation.²³ Because Stephens et al⁵ included a wider range of diagnoses, additional risk factors might contribute to the greater prevalence seen in that study. The gender-specific prevalence in our study was similar to other studies, slightly higher in female patients.²³

The sum median payments made by insurance companies as well as patients was more than \$600 per ED visit. This is more than double the mean spending per visit of \$248 per ED visit in the Medicaid population.⁵ Approximately a sixth of the amount was out-of-pocket cost to the family. A significant portion of the payments was attributed to abdominal radiographs, which are not necessary in the diagnosis of routine constipation according to the most recent NASPGHAN guidelines and have been shown to prolong length of stay in the ED.^{6,24} Our proportion of visits with an abdominal radiograph performed (53%) is similar to others' findings of 46% to 78%.^{25,26} Although some abdominal radiographs might be appropriate in the evaluation of severe abdominal pain, many studies have shown that their rate can be significantly reduced by ED provider education and quality improvement interventions (sharing best practices, metrics reporting).^{27,28}

Our study has limitations. Some children might have presented to the ED with severe abdominal pain, and urgent evaluation in that setting would have been appropriate. Although our sample size was large and represented a diverse geographical distribution, administrative claims are limited by a lack of clinical information and depend on accuracy of coding of diagnosis. Our measured prevalence might represent an underestimate of the true prevalence because some children might not have been recognized in this data set if their primary discharge diagnosis was abdominal pain or fecal incontinence. Additionally, the Truven MarketScan data do not provide information regarding socioeconomic status or race/ethnicity.

Conclusions

This study illustrates the cost of a potential missed opportunity to reliably care for a common chronic condition in the outpatient setting. Screening for constipation at health supervision visits and advising early outpatient visits might prevent severe symptoms. Strengthening of medical homes and education for families on the chronic nature of pediatric constipation might realize cost savings by encouraging families to seek care in the outpatient setting rather than the ED. Pediatricians should recognize the need for close follow-up and treat aggressively with evidence-based therapies to decrease ED utilization.

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WHAT'S NEW

Constipation is often a chronic condition, best managed by an outpatient pediatrician. Commercially insured children were seen frequently for constipation in the Emergency Department with significant cost. Nearly half had no office visit in the 60 days surrounding the Emergency Department visit.

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Table 1.

Demographic Characteristics of Children With ED Visits for Constipation and Presence of Office Visits (N = 65,163) *

Variable	Category	n (%)
Age	Less than 1 year	3939 (6.0)
	1 to 4 years	14,715 (22.6)
	5 to 9 years	21,659 (33.2)
	10 to 17 years	24,850 (38.1)
Sex	Male	31,185 (47.9)
	Northeast	11,644 (17.9)
	North Central	17,075 (26.2)
Region	South	24,034 (36.9)
	West	10,659 (16.4)
	Unknown	1751 (2.7)
ED revisits in 30 days	Present, with constipation code	1467 (2.3)
	30 Days before ED visit [†]	22,119 (33.9)
Office visits	30 Days after ED visit [†]	24,100 (37.0)
	No visit in 30 days before or after	29,426 (45.2)

ED indicates Emergency Department.

* Within the Truven MarketScan database from 2012 to 2013.

[†] Some children (16.1%) had a visit before as well as after the ED visit.

Table 2.

Bivariate Analysis Assessing for Factors Associated With an Office Visit in the 30 Days Before, 30 Days After, or No Visits in Relation to Emergency Department Visit for Constipation^{*,†,‡}

Variable	Category	n	Office Visit in 30 Days Before ED Visit (%) [‡]		Office Visit in 30 Days After ED Visit (%) [‡]		No Visit in 30 Days Before or After (%) [‡]	
			n = 22,119		n = 24,100		n = 29,426	
			Present	Absent	Present	Absent	No Visit	Had visit
Age	Younger than 1 year	3939	1708 (43.4)	2231 (56.6)	1982 (50.3)	1957 (49.7)	1237 (31.4)	2702 (68.6)
	1 to 4 years	14,715	5262 (35.8)	9453 (64.2)	5989 (40.7)	8726 (59.3)	6049 (41.1)	8666 (58.9)
	5 to 9 years	21,659	6741 (31.1)	14,918 (68.9)	7385 (34.1)	14,274 (65.9)	10,559 (48.8)	11,110 (51.3)
	10 to 17 years	24,850	8408 (33.8)	16,442 (66.2)	8744 (35.2)	16,106 (64.8)	11,581 (46.6)	13,269 (53.4)
Sex	Male	31,185	10,219 (32.8)	20,966 (67.2)	11,203 (35.9)	19,982 (64.1)	14,611 (46.9)	16,574 (53.2)
	Female	33,978	11,900 (35.0)	22,078 (65.0)	12,897 (38.0)	21,081 (62.0)	14,815 (43.6)	19,163 (56.4)
	Northeast	11,644	4207 (36.1)	7437 (63.9)	4487 (38.5)	7157 (61.5)	4932 (42.4)	6712 (57.6)
	North Central	17,075	5520 (32.3)	11,555 (67.7)	6230 (36.5)	10,845 (63.5)	7924 (46.4)	9151 (53.6)
Region	South	24,034	8361 (34.8)	15,673 (65.2)	8793 (36.6)	15,241 (63.4)	10,826 (45.0)	13,208 (55.0)
	West	10,659	3393 (31.8)	7266 (68.2)	3907 (36.7)	6752 (63.4)	5000 (46.9)	5659 (53.1)
	Unknown	1751	638 (36.4)	1113 (63.6)	683 (39.0)	1068 (61.0)	744 (42.5)	1007 (57.5)

ED indicates Emergency Department.

^{*} Some children (16%) had a visit before as well as after the ED visit.

[†] Some row pairs might add up to >100% due to rounding.

[‡] Nine comparisons (age, sex, region) versus (3 visit categories) were performed using chi-square test and were $P < .001$.

Table 3.

Multivariable Logistic Regression Models Predict Presence of or Absence of Office Visits in Relation to ED Visit for Constipation ED indicates Emergency Department.

Variable	Category	Visit Before ED Visit (n = 22,119) [†]			Visit After ED Visit (n = 24,100) [†]			No Visit (n = 29,426)		
		Odds Ratio	95% Confidence Interval	Reference	Odds Ratio	95% Confidence Interval	Reference	Odds Ratio	95% Confidence Interval	Reference
Age Group	<1 year	Reference			Reference			Reference		
	1 – 4 years	0.73 *	0.68 to 0.78		0.68 *	0.63 to 0.73		1.53 *	1.42 to 1.65	
	5 – 9 years	0.59 *	0.55 to 0.63		0.53 *	0.49 to 0.57		2.09 *	1.94 to 2.24	
	10 – 17 years	0.66 *	0.61 to 0.70		0.51 *	0.47 to 0.55		1.95 *	1.81 to 2.09	
Sex	Female	Reference			Reference			Reference		
	Male	0.91 *	0.88 to 0.94		0.91 *	0.88 to 0.94		1.15 *	1.11 to 1.18	
	Unknown	Reference			Reference			Reference		
Region	Northeast	0.99	0.89 to 1.10		0.99	0.90 to 1.10		0.99	0.89 to 1.09	
	North Central	0.83 *	0.75 to 0.92		0.90 *	0.81 to 0.99		1.18 *	1.07 to 1.30	
	South	0.93	0.84 to 1.03		0.90 *	0.81 to 0.99		1.11 *	1.01 to 1.23	
	West	0.81 *	0.73 to 0.90		0.90 *	0.81 to 0.96		1.21 *	1.09 to 1.34	

* $P < .05$.

[†] Some children (16.1%) had visits before as well as after the ED visit.