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Treatment of Childhood Constipation by Primary Care Physicians: Efficacy and Predictors of Outcome

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ABSTRACT. *Objective.* Childhood constipation accounts for 3% of visits to general pediatric clinics and as many as 30% of visits to pediatric gastroenterologists. The majority of children who experience constipation and whose caregivers seek medical care are seen by primary care physicians such as pediatricians or family physicians. Little is known about how primary care physicians treat childhood constipation or the success of their treatments. With this study, we prospectively examined which treatments primary care physicians prescribe to children who present for the first time with constipation and how effective those treatments are.

Methods. A total of 119 children who were between 2 and 7 years of age (mean: 44.1 ± 13.6 months) and presented to 26 different primary care physicians (15 pediatricians and 11 family physicians) for the treatment of constipation for the first time participated in this study. Parents completed daily diaries of their child's bowel habits for 2 weeks before starting treatment recommended by their primary care physician and again 2 months after treatment. The prescribed treatment was identified by reviewing office records of the treating physicians.

Results. After 2 months of treatment, 44 (37%) of 119 children remained constipated. In the majority (87%) of cases, physicians prescribed some form of laxative or stool softener. The most commonly prescribed laxatives were magnesium hydroxide (77%), senna syrup (23%), mineral oil (8%), and lactulose (8%). In nearly all cases, a specific fixed dose of laxative was recommended; in only 5% of cases were parents instructed clearly to adjust the dose of laxative up or down to get the desired effect. In approximately half of the cases, physicians recommended some sort of dietary intervention. Some form of behavioral intervention was mentioned in the office records of approximately one third of cases; however, in most cases, little detail was provided. In 45% of cases, physicians prescribed disimpaction using oral cathartics, enemas, or suppositories followed by daily laxatives. In 35% of cases, physicians prescribed daily laxatives without any disimpaction procedure. In the remainder, physicians prescribed only dietary changes (5%), the use of intermittent laxatives (9%), or no therapy (7%). Treatment success corresponded to how aggressively the child was treated. Specifically, children who underwent some form

of colonic evacuation followed by daily laxative therapy were more likely to have responded to treatment than were those who were treated less aggressively.

Conclusion. Primary care physicians tend to undertreat childhood constipation. After 2 months of treatment, nearly 40% of constipated children remain symptomatic. *Pediatrics* 2005;115:873–877; constipation, treatment, outcome, primary care, children.

Childhood constipation is a common problem accounting for 3% of visits to general pediatric clinics and as many as 30% of visits to pediatric gastroenterologists.¹ Estimates of the prevalence of childhood constipation vary widely from 0.3% to 28%, with younger children affected most often.^{2–4} Sixteen percent of parents of 22-month-old children report constipation in their children.⁵ Thirty-four percent of British children 4 to 11 years of age have been constipated, and 5% experience chronic constipation lasting >6 months.⁶

The majority of children who experience constipation and whose caregivers seek medical care are seen by primary care physicians such as pediatricians or family physicians. Little is known about how primary care physicians treat childhood constipation or the success of their treatments. When we surveyed primary care physicians at the outset of this study, they believed that they successfully treated >80% of their cases of childhood constipation. With this study, we prospectively examined which treatments primary care physicians prescribe to children who present for the first time with constipation and how effective those treatments are.

METHODS

Children who presented to their primary care physician for the first time with constipation were recruited from 26 primary care practices throughout Central Virginia (15 pediatricians and 11 family physicians). When parents first contacted the primary care physician's office about their child's constipation, they were informed of the study by office staff. Parents who expressed interest were contacted by the research team and given additional details about the study. Children were eligible for the study when they were between the ages of 2 years 0 months and 6 years 11 months, were presenting to a physician for the first time with the complaint of constipation, had no underlying physical condition that could account for their constipation, and were taking no medication that could account for their constipation. For purposes of the study, constipation was defined as the passage of <7 bowel movements over 2 consecutive weeks.^{2,7,8}

Experimental Procedure

The Human Investigation Committee of the University of Virginia approved this study. Parents completed daily diaries of their

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child's bowel habits for 2 consecutive weeks before starting treatment recommended by their primary care physician and again for 2 consecutive weeks 2 months after commencing treatment. In these diaries, parents recorded the number of bowel movements that their child passed that day, the size of the bowel movement (1 = tiny, 2 = normal, 3 = huge), the amount of pain associated with passage of the bowel movement (0 = none, 1 = a little, 2 = a lot), and what treatment, if any, was administered that day. For 2 weeks of completed diaries, participating families were given a \$25 gift certificate to a local toy store. Successful treatment of constipation was defined as passage of at least 7 bowel movements during the 2-week follow-up assessment.

Primary care physicians were not given any instructions or restrictions regarding the treatment of their patients. Treatment prescribed was identified by reviewing the office records of the treating physicians. Records were reviewed for recommendations of (1) behavior modification strategies, such as prompts or incentives to use the toilet; (2) dietary modifications, such as increasing fiber or fluids; (3) use of fiber supplements; (4) colonic evacuation with oral cathartics, suppositories, or enemas; and/or (5) use of over-the-counter or prescription laxatives or stool softeners. The aggressiveness of therapy was categorized with a 5-point ordinal scale, where 0 = no specific treatments, 1 = diet recommendations only (eg, increasing intake of juices and/or fiber, decreasing intake of so-called constipating foods such as milk and milk products), 2 = the use of laxatives or stool softeners on an intermittent or as-needed basis, 3 = the daily use of laxatives or stool softeners, and 4 = disimpaction with suppositories and/or enemas and/or oral cathartics followed by daily use of laxatives or stool softeners. When multiple treatments were prescribed over the 2-month study period, we picked the most aggressive form of treatment prescribed.

Compliance with treatment recommendations was estimated by parental self-report. Two months after initiation of treatment, parents were interviewed and asked what their doctor's treatment recommendations had been. They then were asked to rate how compliant they had been with these recommendations using a 6-point scale with 0 = "not at all," 3 = "about half," and 6 = "totally."

Statistical Analysis

Continuous variables were compared using unpaired two-tailed *t* tests or 1-way analysis of variance. Dichotomous variables were compared using Fisher exact test. Differences were considered statistically different at $P < .05$. Unless otherwise stated, all results are presented as mean \pm SD of the mean.

RESULTS

A total of 130 children enrolled in the study. Eleven families were either lost to follow-up or failed to complete their 2-month diaries. The demographics of the 119 children who completed the 2-month study protocol are summarized in Table 1.

After 2 months of therapy by their primary care physician, 75 (63%) of the 119 children were no longer experiencing constipation, whereas 44 (37%) were still constipated. Pediatricians were no more likely to treat constipation successfully than were family physicians. Pediatricians successfully treated 62% of children, whereas family physicians successfully treated 67% of children ($P = .8063$). As summarized in Table 2, children who responded to the therapy prescribed by their primary care physician had a greater weekly bowel frequency at baseline than did those children who did not respond to treatment (3.1 ± 2.3 vs 1.8 ± 1.0 ; $P = .0016$). All other baseline characteristics were comparable between the children who responded to treatment and those who did not. Treatment responders were no more likely to be boys than were nonresponders (49% vs 45%; $P = .6891$). Age at entry into the study (44.0 ± 14.2 months vs 44.5 ± 12.7 months; $P = .8543$), the

TABLE 1. Demographics of Patient Population

	N = 119
Gender, %	
Female	48
Male	52
Age, mo	44.1 \pm 13.6
Age toilet training started, mo	28.4 \pm 7.0
Duration of constipation, d	17.1 \pm 15.36
Bowel movements per week	2.7 \pm 2.0
Average size of bowel movements (1 = tiny, 2 = normal, 3 = huge)	1.7 \pm 1.5
Average amount of pain with passage of bowel movements (0 = none, 1 = a little, 2 = a lot)	1.5 \pm 1.2
History of constipation in a parent, %	30
History of constipation in a sibling, %	18
Type of primary care physician, %	
Pediatrician	82
Family physician	18
Mother's age, y	32.7 \pm 6.1
Mother's education, y	14.2 \pm 2.7
Father's age, y	34.5 \pm 5.7
Father's education, y	14.7 \pm 2.7

age toilet training was commenced (27.2 ± 0.8 vs 29.6 ± 8.2 ; $P = .2063$), the duration of constipation (15.3 ± 14.5 days vs 20.4 ± 16.6 days; $P = .1013$), the average stool size (1.6 ± 1.5 vs 1.8 ± 1.5 ; $P = .5859$), and the amount of pain associated with passage of bowel movements (1.6 ± 1.0 vs 1.7 ± 1.0 ; $P = .5309$) were comparable in children who did and did not respond to therapy. Nonresponders were not more likely than responders to have a parent with a history of constipation (26.1% vs 37.5%; $P = .2796$) or a sibling with a history of constipation (21.7% vs 12.5%; $P = .3072$). There were no differences in parental age or level of education between the 2 groups ($P > .1$ in all cases). At the time of entry into the study, 16% of the children who responded to treatment had received some previous form of laxative therapy as compared with 30% of the children who did not respond to treatment. This difference was not statistically significant ($P = .1033$).

The frequency of treatments prescribed by primary care physicians is summarized in Fig 1. In the majority (87%) of cases, physicians prescribed some form of laxative or stool softener. The most commonly prescribed laxatives were magnesium hydroxide (77%), senna syrup (23%), mineral oil (8%), and lactulose (8%). In 15% of cases, 2 laxatives were prescribed together. In all but 1 of these cases, magnesium hydroxide and senna syrup were combined. Dosages prescribed varied fairly widely. The average recommended dose of magnesium hydroxide was 3.67 ± 1.93 teaspoons daily with a range of 1 to 9 teaspoons. The average recommended dose of senna syrup was 3.71 ± 2.15 teaspoons daily with a range of 1 to 8 teaspoons. The average recommended dose of mineral oil was 5.33 ± 2.50 teaspoons daily with a range of 2 to 9 teaspoons. The average recommended dose of lactulose syrup was 3.2 ± 2.28 teaspoons daily with a range of 1 to 7 teaspoons daily. In nearly all cases, it was recommended that laxatives be administered once a day (55%) or twice a day (44%). In nearly all cases, a specific fixed dose of laxative was recommended; in only 5% of cases were parents

TABLE 2. Treatment Responders Versus Nonresponders

	Nonresponders (n = 44)	Responders (n = 75)	P Value
Gender, %			.6951
Female	45	49	
Male	55	51	
Age, mo	44.5 ± 12.7	44.0 ± 14.2	.8543
Age toilet training started, mo	29.6 ± 8.2	27.2 ± 0.8	.2063
Duration of constipation, d	20.4 ± 16.6	15.3 ± 14.5	.1013
Bowel movements per week	1.8 ± 1.0	3.1 ± 2.3	.0016
Average size of bowel movements (1 = tiny, 2 = normal, 3 = huge)	1.8 ± 1.5	1.6 ± 1.5	.5859
Average amount of pain with passage of bowel movements (0 = none, 1 = a little, 2 = a lot)	1.7 ± 1.0	1.6 ± 1.0	.5309
History of constipation in a parent, %	37.5	26.1	.2796
History of constipation in a sibling, %	12.5	21.7	.3072
Type of primary care physician, %			.8065
Pediatrician	84	81	
Family physician	16	19	
Mother's age, y	32.4 ± 5.5	32.9 ± 6.4	.6857
Mother's education, y	14.8 ± 2.3	13.9 ± 2.9	.1110
Father's age, y	35.2 ± 5.5	34.1 ± 5.9	.3674
Father's education, y	14.7 ± 2.7	14.7 ± 2.7	.9864

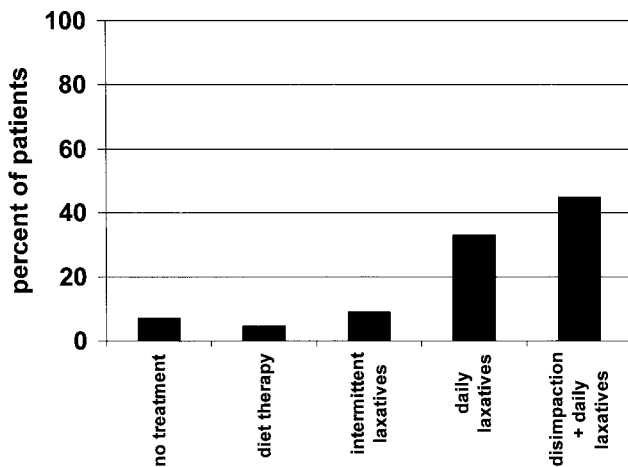


Fig 1. Frequency of treatments prescribed by primary care physicians.

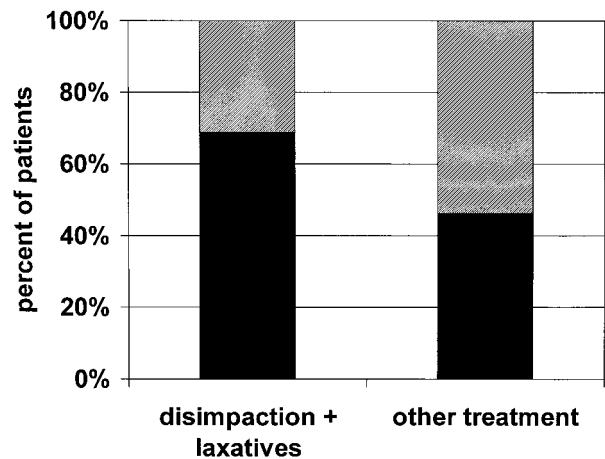


Fig 2. Percentage of children who were cured of constipation (■) or still constipated (▨) after 2 months of treatment by their primary care physician.

clearly instructed to adjust the dose of laxative up or down to get the desired effect.

The laxative prescribed and the dosing regimen did not seem to influence treatment outcome. Treatment success rate was comparable in children who were treated with magnesium hydroxide, senna syrup, mineral oil, and lactulose syrup ($P = .8903$); however, only small numbers of children were treated with mineral oil and lactulose. Children who were treated with twice daily laxatives were no more likely to be cured than were children who were treated with once-daily laxative (53% vs 61%, respectively; $P = .8517$). Similarly, children who were treated with >1 laxative were no more likely to be cured than were children who were treated with 1 laxative (45% vs 58%, respectively; $P = .4535$).

In approximately half of the cases, physicians recommended some form of dietary intervention. Some form of behavioral intervention was mentioned in the office records of approximately one third of cases; however, in most cases, little detail was pro-

vided. Establishing regular toileting times was recommended in 26 cases, and some form of positive reward scheme such as a star chart was recommended in 3 cases. The treatment success rate was no different in cases in which some form of behavioral treatment had been recommended ($P = .08$).

In 45% of cases, physicians prescribed disimpaction with oral cathartics, enemas, or suppositories followed by daily laxatives. In 35% of cases, physicians prescribed daily laxatives without any disimpaction procedure. In the remainder, physicians prescribed no therapy (7%), recommended only dietary changes (5%), or recommended the use of intermittent laxatives (9%).

As summarized in Fig 2, children who were treated with some form of disimpaction procedure followed by daily laxatives or stool softeners were more likely to respond to treatment than were the children who were treated with less aggressive means of therapy ($P = .0480$).

Although mothers of children who responded to

therapy reported slightly greater compliance with treatment recommended by their physician than did mothers of children who did not respond to treatment, both groups reported being compliant, and the difference between groups was not statistically significant (5.1 ± 1.3 vs 4.6 ± 1.8 ; $P = .1380$). Somewhat surprising, parent-reported compliance was no less in children who were treated with some form of disimpaction than in children with other, less aggressive forms of therapy (5.0 ± 1.2 vs 4.7 ± 1.6 ; $P = .3809$).

DISCUSSION

Between 1958 and 1986, the number of physician visits for children 0 to 9 years of age attributed to constipation doubled, and most of this increase was in children who were younger than 2 years.^{1,3} It is unclear whether this increase reflects an increase in the prevalence of childhood constipation or parents are more likely to seek medical attention when their child experiences constipation. Some authors have attributed this apparent increase in childhood constipation to changing patterns in toilet training.³ Others have hypothesized that the prevalence of constipation is increasing because of the diminished dietary intake of fiber associated with modern food processing methods.⁹

In this prospective study of 119 children who presented for the first time with constipation, 44 (37%) were still constipated 2 months after first seeking care from their primary care physician. Successful treatment seemed more related to the form of therapy prescribed than to patient-specific characteristics. Children who were treated with some form of disimpaction procedure followed by daily laxatives or stools softeners were significantly more likely to have been treated successfully at 2 months than were children who were treated with less aggressive measures.

Children who responded to the therapy prescribed by their primary care physician had a significantly greater weekly bowel frequency at baseline than did children who did not respond to treatment, suggesting that children who were more severely constipated were less likely to respond to therapy. Although children who responded to therapy were less likely to have received laxatives before enrollment in the study than were children who did not respond to treatment, this difference was not statistically significant. Other measures of the severity of constipation, including average stool size, frequency and severity of pain associated with defecation, duration of constipation, and previous usage of laxatives or stool softeners, did not discriminate between children who responded to treatment and those who did not. Similarly, gender, age of toilet training, family history of constipation, parental age, and level of parental education were similar in responders and nonresponders.

Constipation is most often defined as a stool frequency of <7 over 2 weeks; however, constipation can also be defined as the painful passage of bowel movements even when the stool frequency exceeds 7 times in 2 weeks.⁷ For the purposes of this study, we

defined constipation as the passage of <7 bowel movements over 14 consecutive days. This definition does not take into account pain associated with defecation. In most cases, young children develop constipation as a result of experiencing pain with defecation rather than as a result of external factors such as family history, age of toilet training, or other forms of physical or psychological trauma.¹⁰ In young children, if the passage of bowel movements is painful, then the child may begin to withhold stool in an attempt to avoid discomfort. As the rectum accommodates, the urge to defecate subsides and a cycle of painful defecation, fear, and withholding begins.⁷ When we reanalyze our data and define constipation as the passage of <7 bowel movements over 2 consecutive weeks and/or any pain associated with the passage of at least half of bowel movements, only 46% of the 119 children in this study had been "cured" of their constipation 2 months after presenting to their primary care physician.

There is some evidence to suggest that aggressive treatment started shortly after the onset of constipation lessens the likelihood that the child will go on to develop chronic constipation.¹¹ Although most young children who experience acute constipation do not go on to develop chronic constipation, 5% of children 4 to 11 years of age experience constipation lasting >6 months⁶ and $>50\%$ of school-aged children with fecal soiling or chronic fecal impaction have a history of painful defecation before 26 months of age.¹ In 1 follow-up study of children who were referred to a university-based constipation clinic, 50% of affected children had recovered within 1 year and 70% had recovered within 2 years; however, the remaining 30% required laxatives for daily bowel movements or continued to soil for years.⁷

There was substantial variability in how primary care physicians elected to treat constipation in the 119 children in this study. Although we collected information about which laxatives or stool softeners primary care physicians prescribed and the dosages that they recommended, there was tremendous variability. As a result, we were unable to draw conclusions about the effectiveness of any particular regimen. There is no convincing evidence that any particular laxative preparation is more effective than any other in the management of childhood constipation. A number of different agents have been proved to be effective. In all probability, when given in sufficient doses to produce soft stools, most laxative preparations and stool softeners have similar efficacy, and differences between different laxative preparations are more related to cost and palatability, which influence compliance.¹²

Although childhood constipation is an extremely common problem, few evidence-based guidelines for its evaluation and treatment currently exist.⁸ In a guideline published by the North American Society for Pediatric Gastroenterology, the authors concluded that in many cases, disimpaction is appropriate before initiation of maintenance therapy.⁸ Our data support this contention as children who were treated with some form of disimpaction procedure followed by daily laxatives were significantly more

likely to respond to treatment than were children who were treated with less aggressive means of therapy.

In summary, constipation is a common problem during childhood, and a significant number of affected children will go on to develop chronic constipation. These data suggest that primary care physicians successfully treat ~60% of the cases of childhood constipation that they see, and if painful defecation is included in the definition of constipation, then primary care physicians successfully treat fewer than half of the cases of childhood constipation that they see. Given that there is evidence that aggressive treatment started shortly after the onset of constipation lessens the likelihood that the child will go on to develop chronic constipation, primary care providers should consider early and aggressive intervention of childhood constipation.

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