Slone Epidemiology Center

Epidemiology and Clinical Presentation of Community-Acquired Diarrhea in Infants and Young Children in the United States: The National Pediatric Diarrhea Surveillance Study

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ABSTRACT

Background: Diarrhea is common in young children, but little is known about its entire clinical spectrum, particularly mild cases that do not require medical care.
Objective: To define the epidemiology and clinical presentation of community-acquired diarrhea in young U.S. children.
Design/Methods: Healthy children 6-36 months old were enrolled by their primary care physicians and followed for 6 months. All episodes of diarrhea (defined as a change in stool pattern with more frequent and/or more watery stools) were ascertained. Detailed interviews were conducted every two months and after each diarrhea episode.
Results: 604 children from 34 states were enrolled. Successful follow-up at 2, 4, and 6 months was 93.7%, 90.1%, and 84.6%, respectively. The overall incidence of diarrhea was 2.21 episodes per person-year, with the highest incidence in January (2.94; 95%CI 2.35-3.98) and August (2.73; 95%CI 2.15-3.47) and the lowest in November (1.65; 95%CI 1.16-2.34) and December (1.67; 95%CI 1.23-2.28). The median duration of episodes was 2.0 days (range 1-64) and the median number of stools per episode was 6.0 (range 1-TNTC). 89.9% of episodes were acute (<14 days), 8.2% persistent (14 days), and 1.9% of unknown duration. Accompanying signs and symptoms included loss of appetite (52.4%), cold symptoms (46.3%), fever (28.3%), abdominal pain (18.7%), vomiting (16.7%), mucus in the stool (16.3%), and blood in the stool (0.8%). A physician was consulted in 8.2% of acute episodes and 28.0% of persistent episodes. Hospitalization occurred in 0.3%. Of those who attended daycare, one or more days was missed in 25.2% of episodes. Administered treatments included oral electrolyte solution (10.3%), bismuth subsalicylate (2.5%), loperamide (0.7%), antibiotics (0.7%), and probiotics (0.3%). No use of herbal products was reported.
Conclusions: Infants and young children in the U.S. experience, on average, over two episodes of diarrhea per year. Most episodes are of brief duration and mild severity and do not result in contact with the medical system. Medication use is infrequent. Oral electrolyte solution is the most commonly administered treatment, used in approximately in one-tenth of cases. About 8% of episodes last longer than 14 days and these persistent episodes result in higher health care utilization.

OBJECTIVE

- To describe the epidemiology and clinical presentation of the entire spectrum of community-acquired diarrhea in infants and young children in the U.S.

BACKGROUND

- Diarrhea is a common symptom of illness in childhood
- In U.S., epidemiology of hospitalized cases of diarrhea is well-known, but epidemiology of cases that do not result in hospitalization is not well understood

METHODS

NATIONAL PEDIATRIC DIARRHEA SURVEILLANCE STUDY

- Prospective cohort study
- Subjects recruited and enrolled by SCOR Network primary care physicians throughout U.S.
- Inclusion criteria: healthy children ages 6-36 months without history of intestinal malabsorption, IBD, CF
- Baseline interview and stool specimen
- Active surveillance for all episodes of diarrhea during 6-month study period
- Diarrhea defined as "change in bowel habits involving more frequent and/or more watery stools"
- For each diarrhea episode, interview conducted and stool specimen obtained

SCOR NETWORK

- National office-based research network of pediatricians and family practitioners administered by Slone Epidemiology Center at Boston University
- Currently 479 participating physicians
- Past/current projects include:
  - ✓Boston University Fever Study (RCT of safety of ibuprofen for children)
  - ✓Study of NSAID use and invasive Group A Streptococcal infections complicating varicella (case-control study)
  - ✓National Pediatric Diarrhea Surveillance Study (cohort study)
  - ✓Xylitol for prevention of acute otitis media (pilot RCT)

RESULTS

TABLE 1. CHARACTERISTICS OF 604 STUDY SUBJECTS

Age in months, Mean (SD)	15.2 (7.5)
Sex , No. (%)	
Female	287 (47.5)
Male	317 (52.5)
Geographical region, No. (%)	
New England	45 (7.5)
Mid-Atlantic	122 (20.2)
South	132 (21.9)
Midwest	200 (33.1)
Southwest	57 (9.4)
West	48 (7.9)
Community type, No. (%)	
Urban	157 (26.0)
Suburban	294 (48.7)
Rural	148 (24.5)
Unknown	5 (0.8)
Education of most educated parent, No. (%)	
High school or less	134 (22.2)
Some college	154 (25.5)
College graduate	299 (49.5)
Unknown	17 (2.8)
Annual household income, No. (%)	
Less than $16,000	44 (7.3)
$16,000-34,999	133 (22.0)
$35,000-54,999	149 (24.7)
$55,000 or more	245 (40.6)
Unknown	33 (5.5)

TABLE 2. INCIDENCE OF DIARRHEA

	No. (%)	Episodes per person-year
All reported diarrhea episodes	611 (100.0)	2.21
Acute diarrhea (<14 days)	549 (89.9)	1.99
Persistent diarrhea (≥14 days)	50 (8.2)	0.18
Unknown duration	12 (2.0)	--

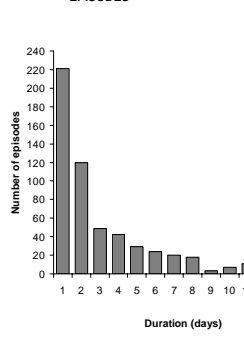### FIGURE 1. DISTRIBUTION OF DURATION OF DIARRHEA EPISODES

TABLE 3. CHARACTERISTICS OF DIARRHEA EPISODES

	All episodes n=611	Acute Episodes n=549	Persistent Episodes n=50	p (acute vs. persistent)
Median duration in days (25th, 75th percentiles)	2.0 (1.0-5.0)	2.0 (1.0-4.0)	22.0 (16.75-29.0)	---
Median number of stools per episode (25th, 75th percentiles)	6.0 (3.0-18.0)	6.0 (3.0-12.0)	TNTC (31.5-TNTC)	---
Associated signs and symptoms, No. (%)				
Loss of appetite	320 (52.4)	284 (51.7)	36 (72.0)	0.006
Cold symptoms	283 (46.3)	252 (45.9)	31 (62.0)	0.03
Fever	173 (28.3)	145 (26.4)	28 (56.0)	0.00001
Abdominal pain	114 (18.7)	103 (18.8)	11 (22.0)	0.6
Vomiting	102 (16.7)	83 (15.1)	19 (38.0)	0.00004
Mucus in stool	98 (16.3)	83 (15.1)	15 (30.0)	0.006
Blood in stool	5 (0.8)	4 (0.7)	1 (2.0)	0.4
Received antibiotics in 10 days prior to onset of diarrhea	75 (12.3)	66 (12.0)	8 (16.0)	0.4
Another person in home with diarrhea	135 (22.1)	118 (21.5)	17 (34.0)	0.04
Medications given, No. (%)				
Electrolyte solution	63 (10.3)	57 (10.4)	6 (12.0)	0.7
Bismuth subsalicylate	15 (2.5)	13 (2.4)	2 (4.0)	0.4
Antibiotics	7 (1.1)	4 (0.7)	3 (6.0)	0.02
Loperamide	4 (0.7)	4 (0.7)	0 (0.0)	1.0
Probiotics	2 (0.3)	0 (0.0)	2 (4.0)	0.007
Herbal products	0 (0.0)	0 (0.0)	0 (0.0)	N/A
Medical care received, No. (%)				
Physician/ER visit	59 (9.7)	45 (8.2)	14 (28.0)	0.0001
Hospitalized	2 (0.3)	2 (0.4)	0 (0.0)	1.0
Child missed daycare/preschool (percentages limited to only those who attend)	62 (25.2)	52 (23.3)	10 (43.5)	0.05

FIGURE 2. DIARRHEA INCIDENCE BY MONTH

Overall Incidence: 2.21 episodes per person-year
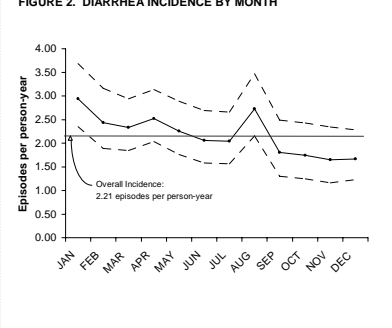
CONCLUSIONS

- Infants and young children in the U.S. experience just over two episodes of diarrhea per child per year
- Most episodes are acute with a median duration of two days; however approximately 8% of episodes are persistent with a median duration of 22 days
- There is a very low rate of medication use for treating diarrhea in this age group; besides oral electrolyte solution used in 10% of episodes, all other medications are used rarely
- Only 10% of diarrhea episodes result in an outpatient medical visit and hospitalization occurs in approximately 3 cases per 1000
- Diarrhea is common throughout the year with small peaks occurring in winter and summer and relatively lower incidence in the fall