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# Nonfatal Choking on Food Among Children 14 Years or Younger in the United States, 2001–2009

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## KEY WORDS

aspiration, choking, emergency department, epidemiology, injury prevention, National Electronic Injury Surveillance System—All Injury Program

## ABBREVIATIONS

AAP—American Academy of Pediatrics  
 CDC—Centers for Disease Control and Prevention  
 CI—confidence interval  
 CPSC—Consumer Product Safety Commission  
 ED—emergency department  
 FHSA—Federal Hazardous Substances Act  
 NEISS—AIP—National Electronic Injury Surveillance System—All Injury Program  
 RR—risk ratio

Ms Chapin prepared data for analysis, conducted data analyses with Drs Rochette and Smith, interpreted results, and wrote the first draft of the manuscript; Dr Rochette participated in the conceptualization of the study, supervised and conducted data analyses, assisted with interpretation of results, and critically reviewed the manuscript for revisions; Dr Annest participated in the conceptualization of the study, assisted with interpretation of results, and critically reviewed the manuscript for revisions; Mr Haileyesus prepared data for analysis, conducted preliminary data analyses with Dr Annest, assisted with interpretation of results, and critically reviewed the manuscript for revisions; Ms Conner assisted with data analysis and with interpretation of results and critically reviewed the manuscript for revisions; Dr Smith conceptualized the study, arranged for access to the data with Dr Annest, supervised all aspects of the study, reviewed and interpreted results, reviewed comments by co-authors, and revised the manuscript; and all authors approved the final manuscript as submitted.

(Continued on last page)



**WHAT'S KNOWN ON THIS SUBJECT:** In 2001, an estimated 10 438 children were treated in US emergency departments for nonfatal choking on food. The foods most frequently associated with pediatric fatal choking are hot dogs, seeds, nuts, candy, and certain types of fruits and vegetables.



**WHAT THIS STUDY ADDS:** From 2001 through 2009, an estimated annual average of 12 435 children ages 0 to 14 years were treated in US emergency departments for nonfatal choking on food; 0- to 4-year-olds accounted for 61.7% of episodes. Foods most frequently involved were candy, meat, bone, and fruits/vegetables.

## abstract

**OBJECTIVE:** The objective of this study was to investigate the epidemiology of nonfatal choking on food among US children.

**METHODS:** Using a nationally representative sample, nonfatal pediatric choking-related emergency department (ED) visits involving food for 2001 through 2009 were analyzed by using data from the National Electronic Injury Surveillance System—All Injury Program. Narratives abstracted from the medical record were reviewed to identify choking cases and the types of food involved.

**RESULTS:** An estimated 111 914 (95% confidence interval: 83 975–139 854) children ages 0 to 14 years were treated in US hospital EDs from 2001 through 2009 for nonfatal food-related choking, yielding an average of 12 435 children annually and a rate of 20.4 (95% confidence interval: 15.4–25.3) visits per 100 000 population. The mean age of children treated for nonfatal food-related choking was 4.5 years. Children aged  $\leq 1$  year accounted for 37.8% of cases, and male children accounted for more than one-half (55.4%) of cases. Of all food types, hard candy was most frequently (15.5% [16 168 cases]) associated with choking, followed by other candy (12.8% [13 324]), meat (12.2% [12 671]), and bone (12.0% [12 496]). Most patients (87.3% [97 509]) were treated and released, but 10.0% (11 218) were hospitalized, and 2.6% (2911) left against medical advice.

**CONCLUSIONS:** This is the first nationally representative study to focus solely on nonfatal pediatric food-related choking treated in US EDs over a multiyear period. Improved surveillance, food labeling and redesign, and public education are strategies that can help reduce pediatric choking on food. *Pediatrics* 2013;132:275–281

Choking on food and nonfood substances is a leading cause of childhood morbidity and mortality. In 2001, an estimated 17 537 children ages 0 to 14 years were treated in US emergency departments (EDs) for a nonfatal choking episode involving food or nonfood substances.<sup>1</sup> Nonfood items often responsible for nonfatal choking episodes among children include toys and coins.<sup>2–7</sup> In recent decades, the US Consumer Product Safety Commission (CPSC) has responded to the problem of hazardous toys by issuing numerous safety recalls and regulations. In 1994, the Federal Hazardous Substances Act (FHSA) was amended by the Child Safety Protection Act to require choking hazard warning labels on packaging for small balls, balloons, marbles, and other toys and games that contain small parts when these items are intended for use by children in defined age groups.<sup>8</sup> This act also bans any toy intended for use by children aged <3 years that may pose a choking, aspiration, or ingestion hazard. In addition, the FHSA defines test of an object size by using the small-parts test fixture, which simulates the mouth and pharynx of a small child.<sup>4</sup> An object is considered a small part if it fits completely within the small-parts test fixture. Finally, the Consumer Product Safety Improvement Act of 2008 amended the FHSA to require choking hazard warnings to be displayed on or adjacent to Internet or printed product advertisements that provide a direct means for purchasing a product for which the FHSA requires a warning.<sup>4</sup>

Despite these improvements in the safety and labeling of nonfood items distributed for children, studies have continually shown that the majority of foreign bodies that cause choking-related injuries are not toys but foods.<sup>1,2,9–12</sup> Of the estimated 17 537 nonfatal choking episodes reported among children ages 0 to 14 years in

2001, more than one-half (59.5% [10 438]) were associated with a food substance; candy/gum was the most frequently cited food item.<sup>1</sup> Food accounted for 75.7% of nonfatal choking-related episodes among children ages 5 to 14 years, 58.4% among children ages 1 to 4 years, and 52.1% among children age <1 year.<sup>1</sup> According to the Centers for Disease Control and Prevention (CDC), an average of 57 deaths among children ages 0 to 14 years due to inhalation and ingestion of food causing obstruction of the respiratory tract occurred each year from 2001 through 2009.<sup>13</sup> High-risk foods presenting fatal and nonfatal choking hazards to children include hot dogs, hard candy, nuts/seeds, certain raw fruits and vegetables, and chewing gum.<sup>4–7,9,10,14,15</sup> These foods that present a choking risk to children share many of the physical characteristics often described for high-risk toys: cylindrical in shape, airway sized, and compressible, allowing a tight and complete occlusion of a child's airway. Despite the frequency of pediatric food-related choking, and the risk similarities to hazardous toys, choking on food remains a relatively underaddressed problem in the United States.

To the best of our knowledge, the current study is the first to comprehensively investigate nonfatal food-related choking among children treated in US EDs over a multiyear period. The previous study by the CDC evaluated nonfatal choking episodes among children due to food and nonfood items during only a single year (ie, 2001).<sup>1</sup> The current study provides a much more in-depth analysis of nonfatal food-related choking over a 9-year period.

## METHODS

### Data Source

Nonfatal food-related choking data analyzed in this study were obtained from

the National Electronic Injury Surveillance System—All Injury Program (NEISS-AIP). The NEISS is operated by the CPSC to provide nationally representative data on consumer product-related ED visits using a stratified probability sample of ~100 hospitals, including 7 children's hospitals, which have 24-hour EDs with at least 6 beds in the United States and its territories.<sup>16</sup> The NEISS-AIP is a nationally representative subsample of 66 of the NEISS hospitals, which collects data on all types and external causes of nonfatal injuries treated in the participating EDs, regardless of consumer product involvement. Each year, the NEISS-AIP collects data on ~500 000 injury-related ED visits. Trained NEISS-AIP coders review all ED medical records at participating hospitals daily to extract data, including age, gender, principal diagnosis, primary body region affected (eg, airway-related events for the current study), consumer products involved (eg, food for the current study), disposition at ED discharge, locale where the event occurred, and a short narrative abstracted from the medical record describing the precipitating event for each patient. Sample weights are applied to provide national estimates of nonfatal injuries treated in US hospital EDs.<sup>16</sup>

### Data Selection

A food-related choking case for the current study was defined as any nonfatal choking event presenting to an NEISS-AIP hospital ED for children aged ≤14 years in which the patient choked on or aspirated a food item (including liquids other than water) and/or a food item was removed from the child's airway or throat. An initial data extraction of the NEISS-AIP database from 2001 through 2009 was made, selecting nonfatal cases with an unintentional injury diagnosis that had a precipitating cause indicating suffocation/inhalation

and a product code involving foods (excluding hot water) or with the words “choke” or “swallow” identified by a keyword search of the narratives. The narrative description for each patient’s choking event was subsequently reviewed by 1 of the study researchers to identify food-related choking cases and classify each case for type of food. Classification of all cases was then reviewed by 3 other study researchers, and differences in coding were resolved by consensus. Case narratives that stated difficulty breathing, foreign body sensation, stuck in throat, or throat pain were retained. Cases in which the narrative indicated smoke inhalation, submersion, strangulation, a breath-holding spell, exposure to noxious or toxic substances, or poisoning were excluded. Cases were also excluded if the child choked on an unknown or nonfood item (including vomitus), if food was found in the esophagus or ingested without mention of a foreign body sensation or choking, or if the only symptom was difficulty swallowing.

### Variables

For analysis, NEISS-AIP variables were collapsed into broader categories to increase statistical stability of national estimates. Consistent with previous research on choking on food in the pediatric population, age was divided into 3 groups: 0 to 4 years, 5 to 9 years, and 10 to 14 years.<sup>1</sup> In addition, single year of age for those aged 1 to 14 years and month of age for children aged <1 year were used to calculate mean ages. Disposition at ED discharge was collapsed into 3 categories: treated and released, hospitalized (including those transferred to another hospital or held for observation), and left against medical advice. Event location was described as home, school (including day care settings), and other. Case narratives were used to generate a variable for type of food. Type of food was classified

into 17 different categories: hard candy, other candy (eg, gum, soft candy), meat (other than hot dogs), hot dogs, bone, fruits/vegetables, formula (including milk and breast milk), seeds/nuts/shells, chips/pretzels/popcorn, biscuits/cookies/crackers, bread/pastries, french fries, noodles/pasta, multiple specified foods, other foods, other/unspecified liquids, and unknown.

### Statistical Analysis

Study results were based on weighted data for 2953 nonfatal choking-related NEISS-AIP cases. Statistical analyses were performed by using SAS version 9.2 (SAS Institute, Inc, Cary, NC) and SUDAAN release 10.0 (Research Triangle Institute, Research Triangle Park, NC) software. Sample weights for NEISS-AIP cases were used to calculate national food-related choking incidence estimates and risk ratios (RRs) with 95% confidence intervals (CIs).<sup>16</sup> Data reported in this study are national estimates unless otherwise specified. Missing values were not included in our analyses. Rates per 100 000 persons were calculated by using 2001 through 2009 national population estimates acquired from the US Census Bureau.<sup>17</sup>

### RESULTS

An estimated 111 914 (95% CI: 83 975–139 854) children ages 0 to 14 years presented to US hospital EDs from 2001 through 2009 for episodes of nonfatal food-related choking, with an average of 12 435 children per year (34 children per day). The overall rate of food-related choking during the study period was 20.4 (95% CI: 15.4–25.3) episodes per 100 000 population. No significant linear trend for the number of choking episodes was found during the 9-year study period. Event location was identified for 73 247 cases (65.4%), and the majority of these occurred at home (89.8%, 65 785 cases [95% CI: 46

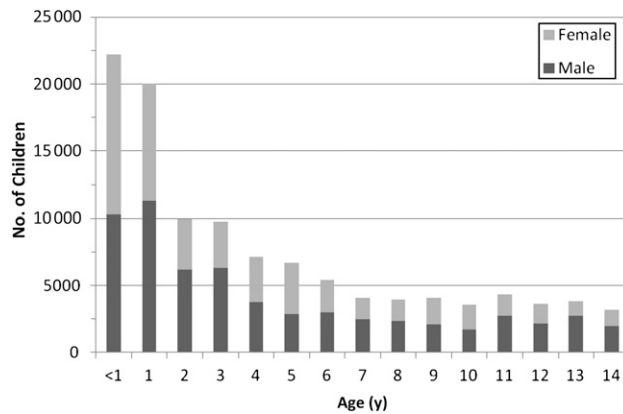
988–84 581]), followed by school (3.3%, 2384 cases [95% CI: 1416–3352]). Most patients with food-related choking were treated and released from the ED (87.3%, 97 509 cases [95% CI: 72 395–122 623]), whereas 10.0% (11 218 cases [95% CI: 7614–14 822]) were hospitalized and 2.6% (2911 cases [95% CI: 1455–4366]) left against medical advice.

### Patient Age

The mean  $\pm$  SE patient age in this study was  $4.5 \pm 0.2$  years. Patients aged  $\leq 1$  year accounted for 37.8% (42 296 cases [95% CI: 30 832–53 760]) of all food-related choking episodes. The estimated number of choking episodes decreased with increasing age until age 7 years, after which the estimated number remained relatively unchanged through age 14 years (Fig 1). There were 69 087 (95% CI: 51 946–86 229) food-related choking episodes among children ages 0 to 4 years, 24 263 (95% CI: 16 384–32 141) episodes among children ages 5 to 9 years, and 18 564 (95% CI: 13 467–23 660) episodes among children ages 10 to 14 years. Patients 0 to 4 years of age experienced the highest rate of choking during the study period (37.6 [95% CI: 28.5–46.7]) episodes per 100 000 population, followed by children ages 5 to 9 years (13.5 [95% CI: 9.2–17.8] episodes per 100 000 population) and children ages 10–14 years (10.0 [95% CI: 7.3–12.7] episodes per 100 000 population).

### Patient Gender

Male patients accounted for 55.4% (61 942 cases [95% CI: 46 411–77 474]) of all food-related choking episodes. Although not statistically significant, the percentage of female patients treated for food-related choking episodes was higher than that of male patients at several single age levels (ie, <1 year, 5 years, and 10 years) (Fig 1). The rate



**FIGURE 1**

Number of children presenting to US hospital EDs for food-related choking, grouped according to age and gender (2001–2009).

of food-related choking episodes for male subjects during the study period was 22.0 (95% CI: 16.6–27.4) episodes per 100 000 population and for female subjects, it was 18.6 (95% CI: 13.9–23.3) episodes per 100 000 population.

### Food Type

The types of food that contributed to choking episodes among children in this study are shown in Table 1. Of all known food types, hard candy caused the most choking episodes (15.5%), followed by other candy (12.8%), meat (other than hot dogs) (12.2%), and bone (12.0%). These 4 food types alone accounted for more than one-half (52.5%) of choking episodes with a known food type. The mean age of those treated for food-related choking varied according to food type. Children with bone-induced choking episodes had a mean age of 7.6 years, whereas those with formula/milk/breast milk-induced choking episodes had a mean age of 0.3 year (ie, 4 months). Although formula/milk/breast milk was responsible for 6.7% of all food-related choking, it accounted for more than one-third (36.3%) of the choking episodes among children aged <1 year.

Hot dogs accounted for 2.6% of food-related choking (Table 1). Patients who choked on a hot dog were more

likely to require hospitalization than those who choked on another type of food (RR = 2.23 [95% CI: 1.20–4.15]). In addition, patients who choked on a seed/nut/shell were more likely to require hospitalization than those who choked on another food type (RR = 2.58 [95% CI: 1.56–4.25]).

The distribution of the most common food types involved in choking episodes among patients ages 0 to 4 years, by year of age, is displayed in Table 2. The number of choking episodes involving candy (both hard and other candy combined) increased with increasing age. By age 4 years, 55.2% of choking episodes involved candy. In addition, patients 0 to 4 years of age were more likely to choke on fruits/vegetables than patients aged 5 to 14 years (RR = 1.94 [95% CI: 1.41–2.68]).

### DISCUSSION

This study estimated that >12 000 nonfatal choking-related injuries attributable to food occurred annually from 2001 through 2009. This estimate is higher than that previously reported (10 438) by the CDC in a study of nonfatal choking-related injuries in 2001.<sup>1</sup> In the current study, male subjects accounted for a higher number of nonfatal food-related choking episodes than female subjects. This higher frequency among

males is similar to that observed in previous studies, including both fatal and nonfatal food-related choking episodes.<sup>1,2,14,18</sup>

The mean age for choking on foods in this study was 4.5 years. Previous investigations that included both food and nonfood items have typically reported a younger mean age; the most hazardous age range for choking-related injuries is reportedly younger than 3 or 4 years,<sup>1,4–6,11,12,15</sup> with several studies finding more than one-half of patients to be aged <2 years.<sup>1,14,18</sup> In the current study, ~62% of all nonfatal cases occurred among children aged <4 years. Compared with older children, those <4 years of age are at greater risk of food-related choking. Before molars erupt (age ≤2 years), children are able to bite off a piece of food with their incisors but lack the ability to grind it adequately. By 3 to 4 years of age, children have developed molars but are still learning to chew and swallow effectively. Children in this age range also may be easily distracted and not focused on the task of eating. In addition, behavioral factors, such as high activity levels while eating, as well as developmental disabilities and neurologic conditions may increase choking risk among young children.<sup>4,6</sup>

Similar to the study by the CDC in 2001,<sup>1</sup> the current study found that candy was the top contributor to nonfatal food-related choking episodes. In addition to candy, our study also identified meat, bone, and fruits/vegetables as common causes of nonfatal food-related choking episodes among children. Previous studies have identified hot dogs, seeds, nuts, candy, and raw fruits/vegetables as the most common foods associated with fatal choking episodes.<sup>2–7,14</sup> Seeds/nuts/shells and hot dogs were the seventh and 12th, respectively, most commonly noted foods in our study of nonfatal

**TABLE 1** Mean Age and Number of Children Presenting to US Hospital EDs for Choking Episodes due to Specific Types of Food, 2001–2009

Type of Food	Age 0–4 Years			Age 5–14 Years <sup>a</sup>			Total		
	Mean ± SE Age, y	Actual No.	National Estimate	95% CI	% <sup>b</sup>	Actual No.	National Estimate	95% CI	% <sup>b</sup>
Hard candy	4.90 ± 0.27	197	8280	6219–10 340	12.9	164	7889	5295–10 482	19.6
Other candy	4.22 ± 0.29	205	9224	6646–11 801	14.4	102	4100	2443–5758	10.2
Meat (other than hot dogs)	6.89 ± 0.46	121	5025	2904–7147	7.9	186	7645	5397–9894	19.0
Bone	7.58 ± 0.28	104	3621	1886–5356	5.7	228	8875	5270–12 480	22.1
Fruits/vegetables	3.33 ± 0.31	194	7609	5137–10 080	11.9	54	2466	1217–3715	6.1
Formula/milk/breast milk	0.27 ± 0.05	230	6930	3794–10 067	10.8	3	NR <sup>c</sup>	NR <sup>c</sup>	NR <sup>c</sup>
Seeds/nuts/shells	3.86 ± 0.32	152	4789	2941–6637	7.5	51	1981	1189–2774	4.9
Chips/pretzels/popcorn	3.08 ± 0.32	110	3796	2419–5173	5.9	43	1030 <sup>d</sup>	430–1630	2.6 <sup>d</sup>
Biscuits/cookies/crackers	1.59 ± 0.18	65	2960	1576–4345	4.6	9	NR <sup>c</sup>	NR <sup>c</sup>	NR <sup>c</sup>
Multiple specified foods	3.90 ± 0.61	45	1983	851–3115	3.1	25	1022 <sup>d</sup>	349–1695	2.5 <sup>d</sup>
Hot dogs	5.92 ± 0.74	36	1542	730–2354	2.4	34	1118 <sup>d</sup>	516–1720	2.8 <sup>d</sup>
Bread/pastries	2.76 ± 0.51	41	2051	1005–3098	3.2	8	NR <sup>c</sup>	NR <sup>c</sup>	NR <sup>c</sup>
French fries	3.38 <sup>e</sup>	25	683 <sup>d</sup>	217–1148	1.1 <sup>d</sup>	8	NR <sup>c</sup>	NR <sup>c</sup>	NR <sup>c</sup>
Noodles/pasta	2.99 ± 0.66	22	524 <sup>d</sup>	157–891	0.8 <sup>d</sup>	2	NR <sup>c</sup>	NR <sup>c</sup>	NR <sup>c</sup>
Other/unspecified liquids	1.00 ± 0.29	63	1355 <sup>d</sup>	293–2418	2.1 <sup>d</sup>	3	NR <sup>c</sup>	NR <sup>c</sup>	NR <sup>c</sup>
Other foods	5.23 ± 0.54	99	3570	1922–5217	5.6	87	3120	1895–4345	7.8
Unknown	3.46 ± 0.61	180	5145	2793–7498		57	2598	1208–3988	
Total	4.48 ± 0.17	1889	69 087	51 946–86 229		1064	42 827	30 327–55 326	

<sup>a</sup> Age groups 5 to 9 years and 10 to 14 years were combined due to low cell counts.<sup>b</sup> Represents percentage of national estimate for known food types and may not sum to 100.0% because of rounding error.<sup>c</sup> National estimates are not reported (NR) for categories based on <20 NEISS-AP cases because weighted estimates are considered unstable.<sup>d</sup> Estimates may be unstable due to a weighted estimate <1200 or a coefficient of variation >30%.<sup>e</sup> SE is not reportable because of insufficient variation within sampling stratum.

episodes. These differences in associated foods between fatal and nonfatal choking episodes may be due in part to the physical characteristics of certain foods. Hot dogs, for example, are cylindrical in shape, similar in diameter to a child's airway, and compressible, allowing them to completely block a child's hypopharynx and resulting in an increased risk of fatal injury. Some high-risk foods are more difficult to chew (eg, raw fruits and vegetables) or are frequently consumed by the mouthful (eg, seeds, nuts, some candies), which may overwhelm a child's chewing and swallowing abilities, resulting in aspiration of food fragments.<sup>6</sup>

Although the CPSC has well-established surveillance systems in place, as well as legislation and regulations to protect children from nonfood-related choking, no similar monitoring systems, legislation, or regulations currently exist to address food-related choking among children. The American Academy of Pediatrics (AAP) has proposed measures to prevent pediatric food-related choking.<sup>4</sup> These recommendations include instituting a mandatory system to label high-risk foods with appropriate information regarding their choking risk to children, detailed surveillance of food-related choking incidents, and public awareness campaigns to educate the public about food-related choking hazards. The AAP recommends that the US Food and Drug Administration take the lead on these measures, while working closely with the US Department of Agriculture (which has regulatory jurisdiction over meat products) and the CPSC. In addition, more detail in the medical records collected in EDs about the type of foods involved and circumstances surrounding choking episodes would help document the problem and provide data relevant to developing interventions aimed at preventing food choking among children. In

**TABLE 2** Top 3 Types of Food Associated With Choking-Related US Hospital ED Visits for Children Ages 0 to 4 Years, 2001–2009

Age	First Type of Food			Second Type of Food			Third Type of Food		
	National Estimate	95% CI	% <sup>a</sup>	National Estimate	95% CI	% <sup>a</sup>	National Estimate	95% CI	% <sup>a</sup>
<1 y	Formula/milk/breast milk 6690	3640–9739	36.3	Fruits/vegetables 1906	807–3004	10.3	Biscuits/cookies/crackers 1626	723–2529	8.8
1 y	Fruits/vegetables 3525	2105–4945	18.5	Seeds/nuts/shells 2617	1366–3868	13.7	Other candy 2156	1019–3294	11.3
2 y	Hard candy 2186	1274–3098	22.4	Other candy 1871	1084–2658	19.2	Meat (other than hot dogs) 1012 <sup>b</sup>	339–1685	10.4 <sup>b</sup>
3 y	Other candy 2195	1322–3069	22.7	Hard candy 2121	1230–3013	22.0	Bone 1266 <sup>b</sup>	325–2207	13.1 <sup>b</sup>
4 y	Hard candy 2039	1072–3007	28.9	Other candy 1853	997–2709	26.3	Meat (other than hot dogs) 767 <sup>b</sup>	173–1362	10.9 <sup>b</sup>

<sup>a</sup> Represents percentage of national estimate for known food types in each age category.

<sup>b</sup> Estimates may be unstable due to a weighted estimate <1200 or a coefficient of variation >30%.

addition, food manufacturers can play an important role in prevention by using population-based food choking data, such as those of the NEISS-AIP, to support efforts to better protect the public through changes in the design and manufacturing of food products consumed by children, with the goal of reducing the likelihood of pediatric choking.

### Advice for Child Caregivers

Information from the current study can alert medical and public health professionals and others about the potential dangers of choking on foods and, specifically, which foods pose the greatest risks to children. Child caregivers should also be aware of food choking prevention recommendations and age guidelines provided by professional organizations, such as the AAP. For example, the AAP recommends that children <5 years of age not be given hard candies or gum and that raw fruits and vegetables be cut into small pieces.<sup>4</sup> The current study provides evidence supporting

these recommendations. In addition, the AAP recommends that young children should be supervised while eating, should eat sitting down, and should never run, walk, play, or lie down with food in their mouth.<sup>4</sup> If a choking incident does occur, caretakers can be prepared by being familiar with and practicing choking-related rescue maneuvers.

### Study Limitations

As with all studies using prerecorded data, the current study had some limitations. First, we were unable to document all cases of choking on food, for a number of reasons. For example, choking episodes that resolved at home or were treated in a medical facility other than an ED were not included in this study. In addition, it was sometimes difficult to discern what caused the choking event, which potentially excluded some true food-related choking cases. The cases reported in the current study thus may not be representative of all cases of food-related choking. Second, the

short narratives provided by the NEISS-AIP were unable to provide enough information for several additional variables we attempted to code, including adult presence during the choking event, concurrent activities of the child when the choking occurred, how the child obtained the food, amount of time between the choking event and the child presenting to the ED, whether the food was prepared in a manner thought to reduce the likelihood of choking, the use and success of choking rescue maneuvers, and the performance of any diagnostic or therapeutic medical procedures.

### CONCLUSIONS

This is the first multiyear, nationally representative study on nonfatal food choking among children. The current study found that >12 000 nonfatal choking-related injuries attributable to food occur each year. Improved surveillance, food labeling and redesign, and public education are strategies that can help reduce pediatric food choking.

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## Nonfatal Choking on Food Among Children 14 Years or Younger in the United States, 2001–2009

Meyli M. Chapin, Lynne M. Rochette, Joseph L. Annest, Tadesse Haileyesus, Kristen A. Conner and Gary A. Smith

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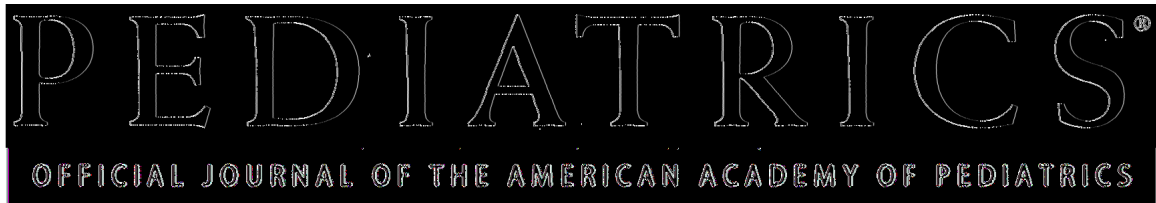
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