Outbreaks of Gastrointestinal Illness of Unknown Etiology Associated With Eating Burritos—United States, October 1997-October 1998

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From October 1997 through October 1998, 16 outbreaks of gastrointestinal illness associated with eating burritos occurred in Florida, Georgia, Illinois, Indiana, Kansas, North Dakota, and Pennsylvania. All but one outbreak occurred in schools, and most of the approximately 1700 persons affected were children. This report summarizes investigations of two of these outbreaks and describes the collaborative efforts of CDC, the U.S. Department of Agriculture (USDA), and the Food and Drug Administration (FDA) to identify the etiologic agent(s); these outbreaks may have been caused by an undetected toxin or a new agent not previously associated with illness.

Georgia

On March 23, 1998, the Hall County Health Department received a report that students in an elementary school became ill after eating lunch. Health officials obtained food and illness histories from 452 (77%) of the 584 students. A case was defined as nausea, abdominal cramps, vomiting, or diarrhea within 24 hours in a person after eating the school lunch on March 23. Of the 452 students, 155 (34%) had illnesses meeting the case definition. Symptoms most commonly reported were nausea (89%), headache (65%), abdominal cramps (53%), vomiting (29%), and diarrhea (17%). The median incubation period was approximately 15 minutes (range: 5-25 minutes), and median duration of illness was 4.5 hours (range: 10 minutes-8 hours).

The children had access to nine foods during lunch. One hundred forty-five (48%) of 304 who ate burritos, and 10 (7%) of 148 who did not eat burritos became ill (relative risk [RR] = 7.1; 95% confidence interval [CI] = 3.8-13.0). The burritos were produced by company A; the main ingredients were beef, chicken, pinto beans, seasoning, textured vegetable protein, and tortillas.

Florida

On October 8, 1998, the Hillsborough County Health Department was notified that students at 12 elementary schools became ill after eating lunch. Health officials conducted investigations at two schools. A case was defined as nausea, abdominal cramps, or vomiting in a person after eating the school lunch on October 8. In both schools, students who initially reported illness and classmates in the three classes with the highest number of cases were interviewed. Twenty-seven cases were identified. The predominant symptoms of the 14 ill children identified in one school were abdominal cramps (88%), vomiting (62%), headache (62%), and nausea (39%). In the other school, symptoms among the 13 identified ill children were abdominal cramps (82%), vomiting (55%), headache (27%), nausea (18%), and dizziness (18%).

In a case-control study at one school, eight (57%) of 14 case-patients and five (13%) of 38 well children ate burritos (odds ratio [OR] = 8.8; 95% CI = 1.8-47.6). In the other school, 11 (85%) of 13 case-patients and 11 (33%) of 33 well children ate burritos (OR = 11.0; 95% CI = 1.8-87.6). The tortillas used to make the burritos were supplied by company B; the fillings, beef at one school and beef and pinto beans at the other, were made in the two school kitchens.

Summary Findings

During October 1997-March 1998, burritos from three outbreaks of gastrointestinal illness were traced to company A, and during May-October 1998, burritos from another 13 outbreaks were traced to company B. Three outbreaks were linked to chicken and bean burritos, pork-sausage and egg burritos, and beef burritos; the other 13 were linked to beef and pinto bean burritos. All burritos used tortillas made with wheat flour. The burritos were distributed frozen and prepackaged except in Florida, where the filling was prepared locally.

The major symptoms were nausea, headache, abdominal cramps, and vomiting, typically beginning within 60 minutes after eating a burrito and lasting less than 24 hours. No one was hospitalized.

USDA requested that both companies A and B initiate timely national recalls, and approximately 2 million lbs of burritos were recalled or withheld from distribution. Company A and its tortilla supplier were unrelated to company B and its supplier.

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CDC Editorial Note: Data from the two outbreaks described in this report and the other 14 outbreaks indicate that the
symptoms, incubation period, and duration of illness were similar. The variations in symptoms in the outbreaks in Florida and Georgia could be associated with differences in case finding methods. Epidemiologic investigations in several of the other outbreaks also have implicated burritos, which consisted of meat or vegetable filling wrapped in a tortilla. Data from the Florida outbreak suggest that the etiologic agent was in the tortillas because the filling was made locally. Outbreaks associated with products made by two unrelated companies that used different tortilla suppliers suggest that the agent was an ingredient common to the products made by both companies. No common first-line suppliers were identified; however, whether the source of any ingredients was shared has not been determined.

The short incubation periods suggest that a preformed toxin or other short-acting agent was the cause of illness. Possible agents include bacterial toxins (e.g., Staphylococcus aureus enterotoxin and Bacillus cereus emetic toxin); mycotoxins (e.g., deoxynivalenol [DON], acetyl-deoxynivalenol, and other tricothecenes), trace metals, nonmetal ions (e.g., fluorine, bromine, and iodine), plant toxins (e.g., alkaloids such as solanines, opiates, ipecac, and ergot), lectins such as phytohemagglutinin, and glycosides), pesticides (e.g., pyrethrins, organophosphates, and chlorinated hydrocarbons), food additives (e.g., bromate, glutamate, nitrite, salicylate, sorbate, and sulfite), detergents (e.g., anionic detergents and quaternary amines), fat-soluble vitamins, spoilage factors (e.g., biogenic amines, putrefaction, and free fatty acids), or an unknown toxin. Mass sociogenic illness is an unlikely explanation based on the number of different sites where outbreaks have been reported over a short interval and the link to only two companies.

B. cereus emetic toxin and S. aureus enterotoxin are common causes of food poisoning, but headache is not usually a prominent feature, and most outbreaks traced to these toxins have incubation periods of 2-4 hours, which is longer than observed in these outbreaks.\(^1,2\) Food samples from five outbreaks were negative for B. cereus and S. aureus by culture and toxin analysis; testing from these same outbreaks for alkaloids, biogenic amines, and pesticides also did not identify the causative agent.

Some metals, such as cadmium, copper, tin, and zinc, can irritate mucosal membranes and cause gastrointestinal illness after short incubation periods; however, only elemental aluminum was mildly elevated in the burrito samples, and there is no evidence that it causes these symptoms.\(^3,4\) Several plant toxins, such as phytohemagglutinin, may survive cooking and cause gastrointestinal symptoms; however, previous outbreaks associated with phytohemagglutinin have been linked to red kidney beans and not pinto beans.\(^5\)

Outbreaks with symptoms and incubation periods similar to those described in this report have occurred in China and India, where illness has been linked to consumption of products made with grains contaminated with fungi. These fungi produce heat-stable tricothecene mycotoxins called vomitoxin.\(^6\) In China, 35 outbreaks affecting 7818 persons during 1961-1985 were attributed to consumption of foods made with moldy grain.\(^7\) Corn and wheat samples collected during two outbreaks had higher levels of DON than those collected at other times. In India in 1987, 97 persons consumed wheat products following heavy rains.\(^8\) DON and other tricothecene mycotoxins were detected in the implicated wheat products, and extracted toxins caused vomiting in laboratory tests on puppies.\(^8\) High doses of DON are known to cause vomiting in pigs.\(^9\) Laboratory testing from burrito samples from some of the U.S. outbreaks in this report detected DON within the acceptable FDA advisory level of 1 ppm for finished wheat products.\(^10\) However, the possibility remains that a mycotoxin is the cause.

To facilitate coordination of outbreak investigation and traceback activities, local health departments are encouraged to report immediately any outbreaks characterized by an incubation period of <1 hour, duration of <1 day, and symptoms including nausea, headache, abdominal cramps, and vomiting regardless of the suspected vehicle through state health departments to CDC. CDC recommends that vomitus, serum, stool, and urine specimens be obtained from at least 10 ill persons, if possible, in each outbreak and that any leftover food samples and shipping containers be saved.

In addition to testing food specimens for specific toxins and agents, laboratories at USDA, FDA, and CDC are examining these specimens by cell culture assays, biologic toxicity assays, and chemical analyses for toxins. The interagency investigating team seeks to collaborate with groups capable of analyzing suspect burritos and tortillas to identify the etiologic agent. Additional information is available from CDC’s Foodborne and Diarrheal Diseases Branch, Division of Bacterial and Mycotic Diseases, National Center for Infectious Diseases, telephone (404) 639-2206.

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years who have lost all their natural teeth (objective 13.4). Edentulism has been declining in the United States since the 1950s, but few state-specific data are available on adult tooth loss. To estimate the prevalence of edentulism among persons aged ≥65 years, CDC analyzed data from the 46 states that participated in the oral health module of the 1995-1997 Behavioral Risk Factor Surveillance System (BRFSS). This report summarizes the findings from this analysis, which indicate a large state-specific variation in edentulism and that many states have not yet achieved the national health objective for preventing total tooth loss.

BRFSS is a state-based, random-digit-dialed telephone survey of the U.S. civilian, noninstitutionalized population aged ≥18 years. During 1995-1997, 46 states administered the optional oral health module during at least 1 year. Participants were asked how many of their permanent teeth were removed because of tooth decay or gum disease. Of the 28,979 persons aged ≥65 years who were asked this question, 27,736 (95.7%) responded. Edentate persons were those who reported having lost all their teeth. Data were aggregated and weighted according to state population estimates, and prevalence estimates and standard errors were calculated using SUDAAN.

To increase the precision of prevalence estimates within age groups, data from multiple years were aggregated for states that administered the BRFSS oral health module during >1 year.

The prevalence of edentulism among persons aged ≥65 years ranged from 13.9% (Hawaii) to 47.9% (West Virginia). In five states (Arizona, California, Hawaii, Oregon, and Wisconsin), less than 20% of persons were edentate; in three states (Kentucky, Louisiana, and West Virginia), greater than 40% were edentate.

In 1997, edentulism was more common among persons aged ≥75 years (26.7%) than among those aged 65-74 years (22.9%). Edentulism was more prevalent among persons with less than a high school education (42.1%) than among those with more education (10.1%-25.1%); among those without dental insurance (27.0%) than among those who had insurance (18.3%); among non-Hispanic blacks (31.9%) than among Hispanics (18.2%) and non-Hispanic whites (24.1%); and among current everyday cigarette smokers (41.3%) than among occasional smokers (28.9%), former smokers (25.7%), or persons who had never smoked (19.9%).

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CDC Editorial Note: The findings in this report indicate that most states have not yet achieved the national health objective for edentulism prevention. However, edentulism among older persons probably reflects total tooth loss that occurred many years earlier. Because younger birth cohorts seem less likely than persons born earlier in the 20th century to lose all their teeth, the prevalence of edentulism among persons aged ≥65 years will probably continue to decline in succeeding birth cohorts.

Dental caries and its complications are the primary reasons for tooth extraction for persons of all ages. Dental caries is largely preventable, and community water fluoridation remains the most effective and cost-effective prevention method. The destruction of tooth-supporting structures from advanced periodontitis is also a substantial etiologic factor for tooth loss.

The approximately fourfold range in total tooth loss among states and sociodemographic variations in edentulism supports the contention that total tooth loss is not an inevitable consequence of aging. Changes in attitudes toward dentistry, advancements in dental restorative technologies, periodontal treatment, and effectiveness of water fluoridation and other preventive measures have helped ensure tooth retention.

The association between edentulism and educational attainment may reflect differences in access to preventive and restorative dental services and attitudes toward oral health. Racial/ethnic differences in the prevalence of edentulism may reflect varying disease experiences, cultural differences in attitudes toward oral health and dentistry, or socioeconomic status, which can influence use of dental care and type of treatment received. In addition, the higher prevalence of total tooth loss among persons without dental insurance than among those with dental insurance may, in part, result from reduced use of preventive and restorative dental services. However, dental insurance in the United States is almost entirely employment-based, and Medicare does not cover most dental procedures; therefore, relatively few persons aged ≥65 years have dental insurance.

Cigarette smoking is a risk factor for adult periodontitis and tooth loss. The higher prevalence of edentulism among current smokers may be directly related to the adverse effects of smoking on periodontal health. Cigarette smoking among adults in the United States is concentrated among persons with low levels of education and income, and its association with edentulism may reflect some degree of confounding of the association between low socioeconomic status and edentulism. However, the association between cigarette smoking and tooth loss remained after controlling for level of education (CDC, unpublished data, 1999).

The findings in this report are subject to at least two limitations. First, because BRFSS is administered as a telephone survey, only persons with telephones are represented. Second, results are based on self-reported data that have not been validated. However, previous studies have documented strong agreement between self-reported and clinically assessed total tooth loss.

Public health strategies to prevent edentulism include maintenance of optimal levels of fluoride in community water supplies, oral health promotion for all age groups, and expansion of dental insurance coverage, particularly for older persons. Other preventive measures include the appropriate...
use of fluoride-containing or antibacterial agents such as dentifrices, topical gels, mouth rinses, and varnishes. In addition, improved access to clinical dental services and expanded community tobacco-control activities can help prevent total tooth loss.

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10 available

Norwalk-Like Viral Gastroenteritis in US Army Trainees—Texas, 1998

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1 figure, 1 table omitted

DURING AUGUST 27-SEPTEMBER 1, 1998, 99 (12%) of 835 soldiers in one unit at a US Army training center in El Paso, Texas, were hospitalized for acute gastroenteritis (AGE). Their symptoms included acute onset of vomiting, abdominal pain, diarrhea, and fever. Review of medical center admission records for AGE during the previous year indicated that fewer than five cases occurred each month. This report describes the outbreak investigation initiated on August 30 by a U.S. Army Epidemiologic Consultation Service (EPICON) team; the findings indicated the outbreak was caused by a Norwalk-like virus (NLV).

The EPICON team reviewed data from the inpatient records of 90 ill soldiers. AGE was defined as three or more loose stools and/or vomiting within a 24-hour period in a soldier or employee at the training center during August 26-September 1. Illness was accompanied by a minimally elevated leukocyte count, mild thrombocytopenia, and low-grade fever. The median duration of hospitalization was 24 hours (range: 12-72 hours). Stool samples collected from persons with AGE on hospital admission were negative for bacterial and parasitic pathogens. Of 24 stool specimens sent to CDC for viral agent identification, 17 were positive by reverse transcriptase polymerase chain reaction assays for NLVs (genogroup 2).

Interviews with foodhandlers in the base’s two dining facilities (DF1 and DF2) revealed illness in a confection baker, who had become ill in DF1 while baking crumb cake, pie, and rolls on August 26. One other DF1 employee, who was not a foodhandler also reported self-limited gastrointestinal illness during August 27-29. No worker in DF2 reported illness.

Cultures of food specimens from the ice cream dispenser in DF1 grew non-pathogenic coliform bacteria (Citrobacter diversus and Serratia liquefaciens); however, the sample was at room temperature before culture. Enterobacter cloacae coliform bacteria were cultured from the soda fountain in DF2. Water samples taken from multiple sites in the training compound and from elsewhere on post were all negative for coliform contamination.

A questionnaire about food preferences, based on the previous week’s menu, was administered to 86 hospitalized soldiers (84 of whom had eaten in DF1 during the 10 days before answering the questionnaire) and to 237 randomly selected soldiers from the training unit. Of the 237 nonhospitalized soldiers, 41 (17%) did not eat at DF1 during the 10 days before answering the questionnaire; 40 (17%) had illnesses that met the case definition. Thus, cases of AGE were characterized in 126 soldiers.

To determine the point source of the outbreak, cases with onset during August 27-28 (n = 98) were analyzed separately for odds ratios (ORs) of selected exposures. The univariate OR for illness associated with dining at DF1 during the week before the outbreak was 9.8 (95% confidence interval = 2.8-40.2). Two soldiers who ate exclusively at DF2 became ill, and one ill soldier reported not eating at either facility. Food items (crumb cake, pie, cinnamon rolls, and ice cream) and soda fountain dispensers were associated with illness by univariate analysis. Using multivariate analysis, only DF1 and the carbonated beverage dispensers remained strongly associated with illness.

CDC Editorial Note: NLVs, previously known as small round-structured viruses, are the most common cause of nonbacterial gastroenteritis outbreaks in adults.1,2 Classified in the family Caliciviridae, NLVs are transmitted by the fecal-oral route and have been implicated in 42%-71% of viral outbreaks associated with contaminated water and food since the Norwalk virus was identified.1,3,4 NLV outbreaks have been caused by eating contaminated raw shellfish and by unsanitary food preparation practices by foodhandlers.1,3,4 NLVs are hardy, ubiquitous, and extremely persistent in the environment, resisting disinfection and chlorination, and have caused serogastroenteritis outbreaks.1,3,4

The epidemiologic evidence described in this report indicates that the outbreak was a point-source, propagated, foodborne viral illness. Although cases occurred before the onset of acute illness in the confection baker, he could have been the point source because he probably shed virus before the onset of clinical symptoms. The strong association with drinking carbonated beverages is not easily explained and may represent increased thirst among ill persons. The use of the Army hospital as a quarantine bay probably decreased secondary propagation of the illness.

Prevention of future outbreaks of NLVs in U.S. military dining facilities or any food service establishment depends on vigilance and rigorous enforcement of simple measures to prevent food contamination. These measures include handwashing, exclusion of ill foodhandlers from the workplace, and basic hygiene and sanitation measures.

REFERENCES
6 available

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