

**Outbreaks of gastrointestinal illness among students at middle schools in Racine, WI
associated with consumption of flour tortillas
October 31, 2007**

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BACKGROUND

On October 31, 2007 the Racine City Health Department (RCHD) was notified by the Racine Unified School District (RUSD) of an unusual increase in the number of students with signs and symptoms of gastrointestinal illness visiting the health rooms at three RUSD middle schools. Over 90 children and several teachers reportedly became ill shortly after the school lunch period on October 31. Illnesses were characterized by short incubation periods and short durations. That afternoon the RCHD notified the Wisconsin Division of Public Health, Communicable Disease Epidemiology Section (CDES), Racine area health care providers and other Racine County health departments of these illnesses and initiated an investigation.

METHODS

Epidemiologic Investigation

Case Finding and Assessment

The RCHD worked in cooperation with the RUSD to identify students and staff who became ill on 10/31/07. Health room logs at the three schools with illnesses and at other schools in the district were reviewed to ascertain the names of ill students and to determine background rates of illness. With permission of parents and the RUSD, a standardized questionnaire was administered by RCHD staff to ill students and staff, and to a convenience sample of well students and staff, at five middle schools where the number of ill students was found to be elevated on October 31, 2007. The initial questionnaire covered demographic and clinical information and a detailed food history that included all lunch items served at these middle schools during October 29-31, 2007. When preliminary analysis confirmed that a large majority of case patients became sick within two hours of eating lunch on October 31, subsequent interviews and analysis focused on food items served on October 31.

Case Definition

Case definitions were based on those used in previously-reported outbreaks of gastrointestinal illness with short incubation periods (3).

Clinical Case: An illness in a student or staff of Gilmore, Jerstad, McKinley, Mitchell or Starbuck middle schools that included at least one gastrointestinal symptom (nausea, vomiting, abdominal cramping or diarrhea) and at least one neurologic symptom (headache or dizziness) with onset less than 24 hours after eating the school lunch served on October 31, 2007.

Probable Case: An illness in a student or staff of Gilmore, Jerstad, McKinley, Mitchell or Starbuck middle schools that included at least one gastrointestinal symptom (nausea, vomiting, abdominal cramping or diarrhea), with onset less than 24 hours after eating the school lunch served on October 31, 2007, but did not include either dizziness or headache.

Data Analysis

Data from ill and well student questionnaires were entered into an EpiInfo Version 3.4.3 database. A line list of ill students and staff was compiled and an epidemic curve of illness onsets was constructed. Frequency of signs and symptoms and the distribution of cases by gender and age were calculated for clinical case patients. Incubation periods were calculated as the time of illness onset minus the time lunch period started for clinical case patients for whom this information was available. A case-control study was conducted among clinical case-patients and well controls to determine if there were any exposures significantly associated with illness. Univariate analyses were performed using EpiInfo 3.4.3 to calculate odds ratios, Mantel-Haenszel p-values and 95% confidence intervals. Food items found to be significantly associated with illness in the univariate analysis were entered into a logistic regression model using SAS 9.1 to evaluate their independent association with illness.

Laboratory Analysis of Clinical Specimens

Stool specimens were collected from ill students and staff and were submitted to the Wisconsin State Laboratory of Hygiene (WSLH). Specimens were cultured for enteric bacterial pathogens including: *Salmonella*, *Shigella*, *Campylobacter* and *E. coli* O157:H7. Additionally, stools were tested for *Clostridium perfringens* enterotoxin and *Staphylococcus aureus* as well as for norovirus using PCR.

Environmental Investigation

A registered sanitarian from the RCHD inspected kitchens and lunch room facilities at the middle schools with reported illnesses. Additionally, inspections were made at the high school kitchens where lunches were prepared for delivery to the middle and elementary schools. Menus were obtained for lunches served from 10/29-10/31/07 in the RUSD. Food preparation protocols and logs were reviewed and left-over food served on 10/31/07 was sampled and held at the RCHD. Inquiries were made regarding illness in any food workers during the previous week and invoices were obtained to identify the source of food served in the RUSD.

Laboratory Analysis of Food Samples

The RCHD collected tortillas from prep kitchens in the high schools and from one elementary school. Tortillas were submitted to a Food and Drug Administration (FDA) Laboratory to be tested for mycotoxin, deoxynivalenol (DON, or vomitoxin), and levels of calcium propionate and potassium bromate.

Retrospective analysis of health room visits for gastrointestinal illness

To further investigate anecdotal reports of previous increases in gastrointestinal illness on days that tacos were served, the RCHD asked director of health at the RUSD to examine health room logs from September – mid-November 2007 and report the number of visits on days tacos were served and, for comparison, days when pizza or nachos were served. Tacos, pizza and nachos are popular school lunch items typically eaten by a large proportion of students. Plots of

daily GI visits were examined visually and the number of gastrointestinal illness visits on taco days was compared to the mean plus two standard deviations of the number of gastrointestinal illness visits on non-taco days.

RESULTS

Epidemiologic Investigation

Case Finding

One hundred and fifty-nine people from five middle schools were interviewed. Among the 101 persons who reported illness on 10/31/08, the most frequently reported signs and symptoms included gastrointestinal symptoms of nausea (87%), abdominal cramps (75%), vomiting (56%) and diarrhea (18%), and neurological symptoms of headache (64%), and dizziness (8%). Other reported signs and symptoms included fever (29%), chills (39%), and sweats (22%) (Table 1). No students reported tingling or burning in the mouth as reported in previous outbreaks (3) and no ill individuals were hospitalized. Sixty-seven (66%) of the 101 ill persons had illnesses that met the clinical case definition and 34 illnesses (34%) met the probable case definition. Fifty-one persons interviewed did not report illness and served as well controls. The remaining seven people were excluded because they did not eat the school lunch.

Notification

On November 8, 2007, a “call-for-cases” was posted to EpiX by the Centers for Disease Control and Prevention (CDC), asking health departments to report gastroenteritis associated with flour tortillas in school-aged children. The posting was motivated in part by recognition that the Racine outbreak was similar to a previous outbreak among school children in Iowa that occurred earlier in the fall of 2007. On November 9, 2007 the Wisconsin Division of Public Health submitted a more detailed EpiX posting describing the epidemiology of the Wisconsin outbreak.

On November 9, 2007, the Wisconsin Department of Public Instruction notified school administrators of the RUSD illnesses and their association with Del Rey flour tortillas. Schools were advised to refrain from serving meals with flour tortillas until more information was available.

Descriptive Epidemiology

Of the 67 clinical case patients reporting both gastrointestinal and neurological signs or symptoms, 36 (54%) were male, 63 (94%) were between 11 and 14 years old, and 4 (6%) were between 25 and 37 years old (staff). The median incubation period among the 59 case-patients for whom the lunch period start time and time of illness onset were known was 45 minutes; 34% became ill within 30 minutes of the start of lunch period, 56% within one hour, and 85% within 2 hours (Figure 1). The calculated incubation periods are an estimate based on the time the reported lunch period began, however these estimates may slightly over-estimate the time to onset because schools were not on their typical period schedules due to a late start on October 31. This caused some confusion among students when reporting lunch times. The adjusted

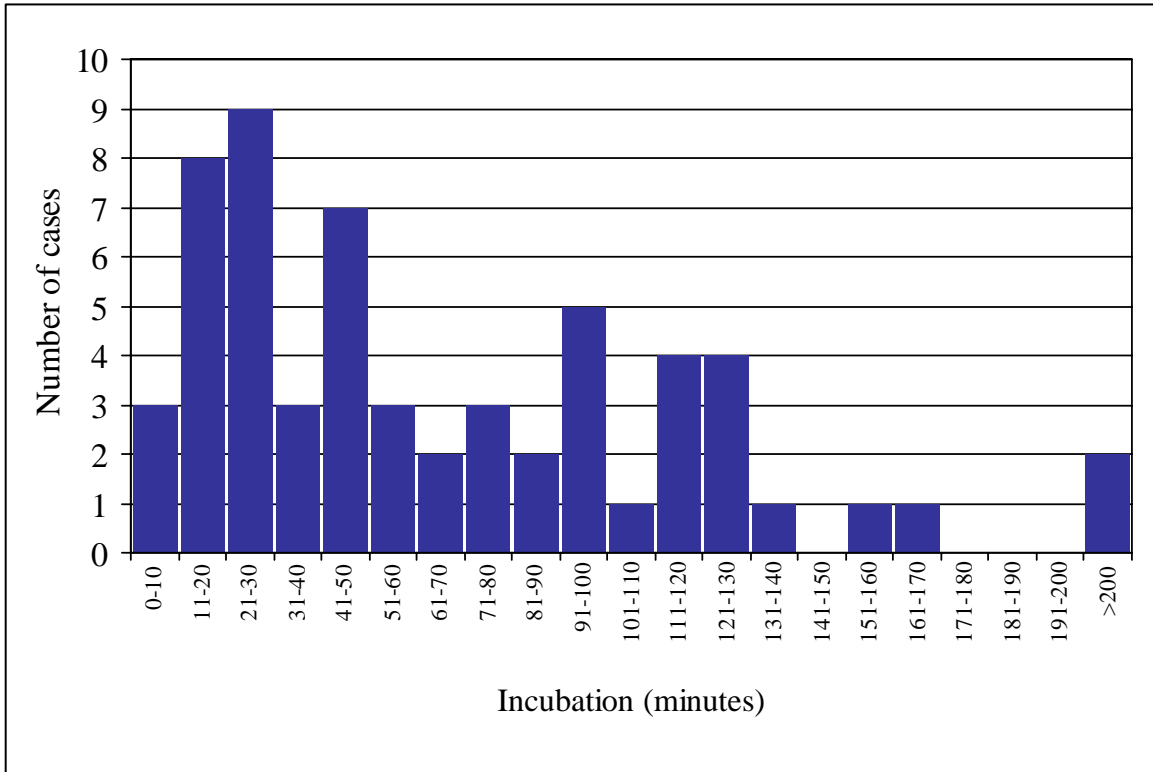
schedule caused lunch periods to begin 15 minutes later than normal, thus incubation periods may actually be shorter for some students. Anecdotal reports indicate that some students felt better soon after a single episode of vomiting and that many were well enough to participate in Halloween holiday activities that evening.

Table 1. Frequency of signs and symptoms reported at Gilmore, Starbuck, Jerstad, McKinley and Mitchell Middle Schools, Racine Wisconsin, October 31, 2007

<u>Signs and Symptoms</u>		Gilmore		Jerstad		McKinley		Mitchell		Starbuck		All Schools	
		Total Ill	Cases	Total Ill	Cases	Total Ill	Cases	Total Ill	Cases	Total Ill	Cases	Total Ill	Cases
n =		11	8	4	1	4	1	21	16	61	41	101	67
Nausea	%	91%	88%	100%	100%	75%	0%	76%	81%	90%	90%	87%	87%
	n	10	7	4	1	3	0	16	13	55	37	88	58
Abd. cramps	%	91%	100%	50%	100%	100%	100%	67%	69%	75%	76%	75%	78%
	n	10	8	2	1	4	1	14	11	46	31	76	52
Vomiting	%	55%	75%	50%	0%	75%	100%	76%	81%	49%	49%	56%	60%
	n	6	6	2	0	3	1	16	13	30	20	57	40
Diarrhea	%	36%	25%	0%	0%	0%	0%	19%	13%	16%	12%	18%	13%
	n	4	2	0	0	0	0	4	2	10	5	18	9
Headache	%	73%	100%	25%	100%	25%	100%	76%	100%	64%	95%	64%	97%
	n	8	8	1	1	1	1	16	16	39	39	65	65
Dizziness	%	9%	13%	0%	0%	0%	0%	5%	6%	10%	15%	8%	12%
	n	1	1	0	0	0	0	1	1	6	6	8	8
Chills	%	55%	75%	0%	0%	0%	0%	57%	63%	34%	39%	39%	48%
	n	6	6	0	0	0	0	12	10	21	16	39	32
Body Aches	%	27%	13%	0%	0%	0%	0%	29%	25%	33%	27%	29%	24%
	n	3	1	0	0	0	0	6	4	20	11	29	16
Fever	%	18%	25%	50%	100%	0%	0%	24%	31%	33%	37%	29%	34%
	n	2	2	2	1	0	0	5	5	20	15	29	23
Muscle Aches	%	27%	13%	0%	0%	0%	0%	29%	25%	21%	20%	22%	19%
	n	3	1	0	0	0	0	6	4	13	8	22	13
Fatigue	%	100%	100%	100%	100%	75%	0%	86%	88%	75%	73%	81%	79%
	n	11	8	4	1	3	0	18	14	46	30	82	53

Total Ill = total of all ill persons interviewed including clinical cases and probable cases
Cases = persons meeting the clinical case definition and included in the case-control study

Figure 1. Epidemic curve of illness onset at Gilmore, Jerstad, McKinley, Mitchell and Starbuck middle schools, Racine Wisconsin, October 31, 2007.



Association of illness with food items

Results of univariate analyses comparing 67 clinical case patients with 51 controls demonstrate that 63 (94%) case patients ate soft taco shells (flour tortillas) on October 31 compared to 39 (77%) controls (OR=4.8, 95% CI = 1.5, 16.1) and 57 (85%) case-patients drank chocolate milk on October 31 compared to 33 (65%) controls (OR=3.1, 95% CI = 1.3, 7.5). No other lunch item served by the schools on October 31 was significantly associated with illness (Table 2). In a multivariate logistic regression model, both the soft taco shells (flour tortillas) and chocolate milk were independently associated with case status (tortilla adjOR = 4.1; 95% CI = 1.2, 14.1; chocolate milk adjOR = 2.7; 95% CI = 1.1, 6.7) (Table 3). Among all cases and controls 86% of people ate a flour tortilla, 76% drank chocolate milk and 69% consumed both. Of 67 case individuals, 3 (4.5%) drank chocolate milk and did not eat tortillas, and 9 (13%) ate tortillas and did not drink chocolate milk.

Table 2. Association between illness and lunch items consumed by middle school students at Gilmore, Jerstad, McKinley, Mitchell and Starbuck middle schools, Racine Wisconsin, October 31, 2007.

Menu Item	Case-patients (n=67)			Well controls (n=51)			Univariate Analysis		
	Number who ate	Number who did NOT eat	% who ate	Number who ate	Number who did NOT eat	% who ate	Odds Ratio	Taylor 95% CI	MH p- value
Beef Tacos	54	13	81%	39	11	78%	1.2	0.5, 2.9	0.73
Chicken Tacos	14	53	21%	10	40	20%	1.1	0.4, 2.6	0.91
Corn	17	50	25%	15	36	29%	0.8	0.4, 1.8	0.63
Lettuce	39	28	58%	27	23	54%	1.2	0.6, 2.5	0.65
Cheese	56	11	84%	41	10	80%	1.2	0.5, 3.2	0.65
Applesauce	17	50	25%	18	33	35%	0.6	0.3, 1.4	0.24
Hard Shell	7	60	10%	12	39	24%	0.4	0.1, 1.0	0.06
Soft Shell (flour tortilla)	63	4	94%	39	12	76%	4.8	1.5, 16.1	0.006
Rice	24	43	36%	23	28	45%	0.7	0.3, 1.4	0.31
Cookie	41	26	61%	29	22	57%	1.2	0.6, 2.5	0.64
Sour Cream	29	38	43%	20	31	39%	1.2	0.6, 2.5	0.66
Jalapenos	20	47	30%	11	40	22%	1.5	0.7, 3.6	0.21
Salsa	7	60	10%	8	43	16%	0.6	0.2, 1.9	0.40
Olives	6	61	9%	2	49	4%	2.4	0.4, 25.3*	0.24*
White Milk	5	62	7%	8	43	16%	0.4	0.1, 1.4	0.16
Chocolate Milk	57	10	85%	33	18	65%	3.1	1.3, 7.5	0.01

CI= Confidence Intervals; MH = Mantel-Haenzel Chi Square

* Fischer Exact Test used

Table 3. Results of logistic regression analysis

Menu Item	Multivariate Analysis		
	Adjusted Odds Ratio	95% CI	p- value
Soft Shell (flour tortilla)	4.1	1.2, 14.1	0.01
Chocolate Milk	2.7	1.1, 6.7	0.02

Retrospective analysis of health room GI visits

At 5 of 5 middle schools, the number of school health room visits for GI illness in the afternoon (post-lunch) was highest on the two days in October when tacos made with flour tortillas were served compared to days pizza or nachos were served (see Appendix 1). Using a threshold defined as the mean plus two standard deviations of visits on non-taco days (n=11), visits exceeded threshold at 4 of 5 middle schools on October 18 and at 5 of 5 middle schools on October 31. This threshold was not exceeded on two days in September when tacos made with flour tortillas were served. Flour tortillas were purchased from the same source (Del Rey Tortorilla Inc., Chicago, IL) throughout the fall.

Among elementary school students GI illness visits were also highest on the one October day when tacos were served (see Appendix 1), exceeding threshold at 4 of 7 elementary schools on October 10. However, the baseline level of GI illness among elementary students appeared to be higher generally in October, and on October 1, a day when tacos were not served, visits exceeded threshold at 2 of 7 schools. No increase in visits was observed on the one day in September when tacos were served.

Environmental Investigation

An inspection was performed on October 31 at the Starbuck Middle School kitchen by a registered sanitarian. RCHD was also in communication with Chartwells food service company which provides meals for the schools under contract with the RUSD. Lunches were prepared in three different RUSD high school prep kitchens and then distributed to the middle schools. Meals prepared at Case High School were distributed to Starbuck Middle School and McKinley Middle School, meals prepared at Horlick High School were distributed to Gilmore Middle School and Jerstad Middle School and meals prepared at Park High School were distributed to Mitchell Middle School and Walden Middle School.

On 11/1/08 the production kitchens at Case, Horlick and Park High Schools were inspected. Leftover food items that were served to the middle schools on 10/31/08 were collected from the production kitchens and from Starbuck Middle School and McKinley Middle School. Review of food safety procedures, both in the high school production kitchens and at the middle schools where the food was held and served, did not reveal any violations. No food service workers were reported ill during October 29-31.

On 10/31/07, the same menu items were served at all five middle schools. Items were purchased from one distributor, prepared in the three different high school kitchens, and delivered ready to serve. Tacos were assembled on the serving line where students could indicate their preference for hard or soft shell (6" flour tortilla) tacos, beef or chicken filling, and other fillings (rice, salsa, lettuce, sour cream, jalapenos, olives, and cheese). Other menu items were applesauce, cookies, white milk, and chocolate milk. All flour tortillas consumed in the five Racine middle schools were produced by a single manufacturer (Del Rey Tortilleria, Inc., Chicago, Illinois). The product was packed in a plastic bag, 12 tortillas per package and 12 ounces per bag. The cases in which packages were shipped contained 40 packages and were labeled "Del Rey Flour Tortillas 6".

On 11/1/07 Starbuck, Gilmore and Mitchell Middle Schools and Mitchell Elementary School were voluntarily closed in order to allow for cleaning of the school facilities including extra cleaning in the kitchens, dining areas, bathrooms, nurses room, common areas and anywhere a student became sick. The schools were provided the *Checklist for Schools when Outbreaks of Gastroenteritis are Suspected*, the DPH norovirus fact sheet and handwashing fact sheets. All four schools re-opened on 11/2/07.

On 11/8/07 FDA officials obtained Del Rey 6" flour tortilla samples from the RCHD. These samples had been obtained previously from Park and Horlick High Schools following the outbreak. In addition, FDA obtained samples from one Racine elementary school which had

noted an increase in illness among students on October 10 and from the food distributor that supplied the tortillas for the school district.

Laboratory Investigation

Laboratory Analysis of Clinical Specimens

Stool specimens were obtained from five ill individuals and tested at the WSLH. All five specimens were negative for norovirus, and four tested negative for bacterial pathogens (one sample could not be cultured due to errors in submission). Two of the samples were tested for bacterial toxins and were negative.

Laboratory Analysis of Food Samples

Initial results of FDA food sample testing were reported to CDES on December 5. In 16 samples of the 6" flour tortillas obtained no mycotoxin was detected, trace amounts of vomitoxin (Deoxynivalenol or DON) were detected, and calcium propionate levels ranged from 1.2% - 2.9%. On February 1, 2008, FDA reported that 4 6" flour tortilla samples were tested for potassium bromate and none was detected. The validity of the test method used was demonstrated by recovering 100% of the chemical from two control samples fortified at a level of 190 ppm bromate and detecting standard additions equivalent to about 50 ppm and 80 ppm bromate.

DISCUSSION

Illnesses in this outbreak were characterized by short incubation periods and short durations. One third of case patients became ill within 30 minutes, 56% within 1 hour, and 85% within 2 hours of the start of lunch period. The actual incubation periods were likely several minutes shorter, depending on the exact time that food was eaten during the 30-minute lunch periods. Such rapid onset of the majority of cases is consistent with a chemical rather than viral or bacterial etiology. Even the most fast-acting biological toxins, for example those produced by *Bacillus cereus*, only rarely cause illness within 30 minutes of exposure and more typically the range is 2 to 4 hours.

The school lunch served on 10/31 is the only common exposure that can explain the near simultaneous onset of illness among students from different classes and different schools. Two items served at this lunch were found to be significantly and independently associated with illness: soft taco shells (6" flour tortillas) and chocolate milk. It is notable that none of the specific taco fillings were associated with illness. These fillings, which included chicken, beef, lettuce or cheese, were selected by each individual at the serving counter and could be ordered with either a soft or hard shell taco. This suggests that the association between illness and the soft shell tacos can be attributed to the flour tortilla itself, not the fillings. The soft shell tacos had a stronger association with illness than chocolate milk (OR 4.8 vs. 3.1) and were consumed by a higher proportion of case individuals than was chocolate milk (94% vs. 85%), nevertheless, the epidemiologic investigation implicated both items as significantly associated with illness.

The clinical and epidemiologic characteristics of this outbreak were similar to those in outbreaks previously occurring in 1997-98, 2003-04, and 2005. Sixteen reported school lunch related outbreaks occurred during October, 1997 through October, 1998 in 7 states. Illnesses were characterized by nausea, vomiting, abdominal cramps, headache or diarrhea that affected more than 1900 people (1,2). These outbreaks were all associated with eating burritos made by two unrelated burrito companies who had unrelated tortilla suppliers; however, all tortillas were made with wheat flour and the fillings differed suggesting that the tortillas were the specific food item associated with illness. While the investigation of these outbreaks did not identify a causal etiologic agent, the signs and symptoms suggested illness that was associated with either a biotoxin or chemical agent (1,2).

Ten separate school outbreaks occurred in Massachusetts during 2003-04 and were associated with the consumption of flour tortillas (3). Epidemiologic and laboratory findings from the investigation of three of these 10 outbreaks provided more detailed information (3). The case definition of illness included having at least one gastrointestinal sign or symptom (nausea, vomiting, abdominal cramps or diarrhea) and one neurologic symptom (headache, dizziness, tingling or burning in the mouth). The illnesses in the Massachusetts outbreaks were associated with consumption of flour tortillas made by a single manufacturer in Chicago, IL, and laboratory results suggested that there were elevated levels of potassium bromate and calcium propionate in the implicated tortillas. The levels of these two chemicals in the tortillas were qualified as elevated in relation to common industry practices (3).

The Illinois Department of Public Health and the CDC joined the FDA in an investigation of an outbreak of acute-onset illnesses at five middle schools in early December, 2005. Most illnesses occurred within 30 minutes of eating a school lunch; 53 children and three staff members at these schools reported illness. Investigation by the local health department implicated soft tacos made with flour tortillas. The same manufacturer of flour tortillas, located in Chicago, was implicated in previous (2003-04) outbreaks that were investigated by state health departments, the CDC (NCEH and NCID), and the FDA.

The epidemiologic and clinical characteristics of the October 31, 2007 outbreaks in Racine, WI are very similar to the school outbreaks described above that occurred in seven states in 1997-1998 (2) in Massachusetts during 2002-2003 (3), and in Illinois in 2005. In each of these outbreaks, illnesses were associated with consumption of flour tortillas. The outbreaks that occurred during 2003-2005 and the Racine outbreaks were all associated with flour tortillas produced by Del Rey Tortilleria, Inc. of Chicago, IL.

In the course of the Racine investigations school nurses from the RUSD commented that health room visits for gastrointestinal illness had been elevated on previous days when tacos were served. Our retrospective review of health room visit logs confirmed this on three days in October when tacos were served, but not on three days in September. This ecological analysis should be interpreted with caution as we do not know whether the children who were ill on these days ate tacos, but it does raise the possibility of unrecognized illness associated with tacos prior to the October 31 outbreaks. It is not known whether the ingredients or proportions of the ingredients of Del Rey flour tortillas changed during the fall of 2007.

As in previous investigations, laboratory testing of tortilla samples obtained during this investigation did not definitively identify the chemical component of the tortillas responsible for causing illness. Of 16 flour tortilla samples tested, 9 had levels of calcium propionate between 2-3%, a range which was described in previous reports as “5 to 10 times the expected amount, based on common industry practices” (3). However, given that there is no specific upper limit of calcium propionate codified in FDA regulations, the significance of these levels is unclear.

Despite the absence of definitive laboratory results to implicate a specific component of the flour tortillas, the epidemiologic evidence of an association between rapid onset gastroenteritis and consumption of flour tortillas is strong. In March 2006 a Health Hazard Evaluation Board was convened by the FDA’s Center for Food Safety and Applied Nutrition (HHE #6463) to assess seven documented outbreaks of acute gastroenteritis associated with consumption of flour tortillas from 1998-2005. The HHEB reviewed the available epidemiology and findings from environmental investigations and evaluated several proposed hypotheses for these outbreaks.

The HHEB did not believe calcium propionate levels found in tortillas “tested-to-date explain[ed] the short incubation, short-duration gastrointestinal illnesses reported from multiple schools. Nor [did they] believe a role exists for bromate in the levels that have been identified in the tortillas tested to-date”. The board did cite a third hypothesis which suggests contamination of tortillas with one or more chemicals from the production line and noted that this hypothesis is supported by two outbreaks which were traced to tortillas produced on a Monday which would be the first production day following a cleaning process that occurred on Saturday. This is also

consistent with reports in several outbreaks of burning in the mouth which suggests a direct chemical /toxic reaction in the oral mucosa. The inspections also noted numerous deficiencies in routine equipment maintenance and quality control measures which leave open the possibility of improper cleaning and rinsing of equipment. However, they did note that corn tortillas produced in the same facility have not been implicated which would seem to counter the argument for improperly cleaned and rinsed equipment. While the etiologic agent of disease has not been determined, in March 2006 the HHEB did state that flour tortillas produced by Del Rey held the potential for causing additional illnesses in the future.

In the past 10 years, as outlined above, there have been numerous outbreaks of acute gastrointestinal illness associated with flour tortilla consumption among school aged children. To date, no conclusive evidence has been produced to pinpoint the causative agent. One explanation for the inability to identify contaminants or elevated levels of accepted components is that there may be inconsistent distribution of the contaminant. This could account for the sporadic nature of these outbreaks if occasional lapses in good manufacturing practices result in contamination with adulterants or poor mixing of acceptable components resulting in isolated pockets of contaminated product.

It would appear that sporadic outbreaks due to these products will likely continue to occur unless the etiologic agent is identified. Additionally, because tortillas produced by Del Rey Tortilleria, Inc. have repeatedly been linked to these outbreaks and investigations have noted deficiencies in their manufacturing practices, greater scrutiny of their production processes is warranted.

In the event of a future outbreak, we hope that the recommendations provided in the attached Appendix will be useful to health, environmental and school officials (Appendix). These include CDC guidelines for the collection of vomitus and/or urine specimens from affected persons as soon as possible and within 24 hours of illness onset. These specimens may be key to any subsequent investigation as a specific chemical agent associated with illness is more likely to be detectable in biologic samples from acutely ill individuals. With vomitus, the initial vomitus is the critical specimen to obtain which is difficult to achieve but it can be anticipated in an individual who has nausea but has not yet vomited. Furthermore, collection of any left-over food from the ill individuals, while difficult could potentially be achieved by searching discarded food from trash receptacles.

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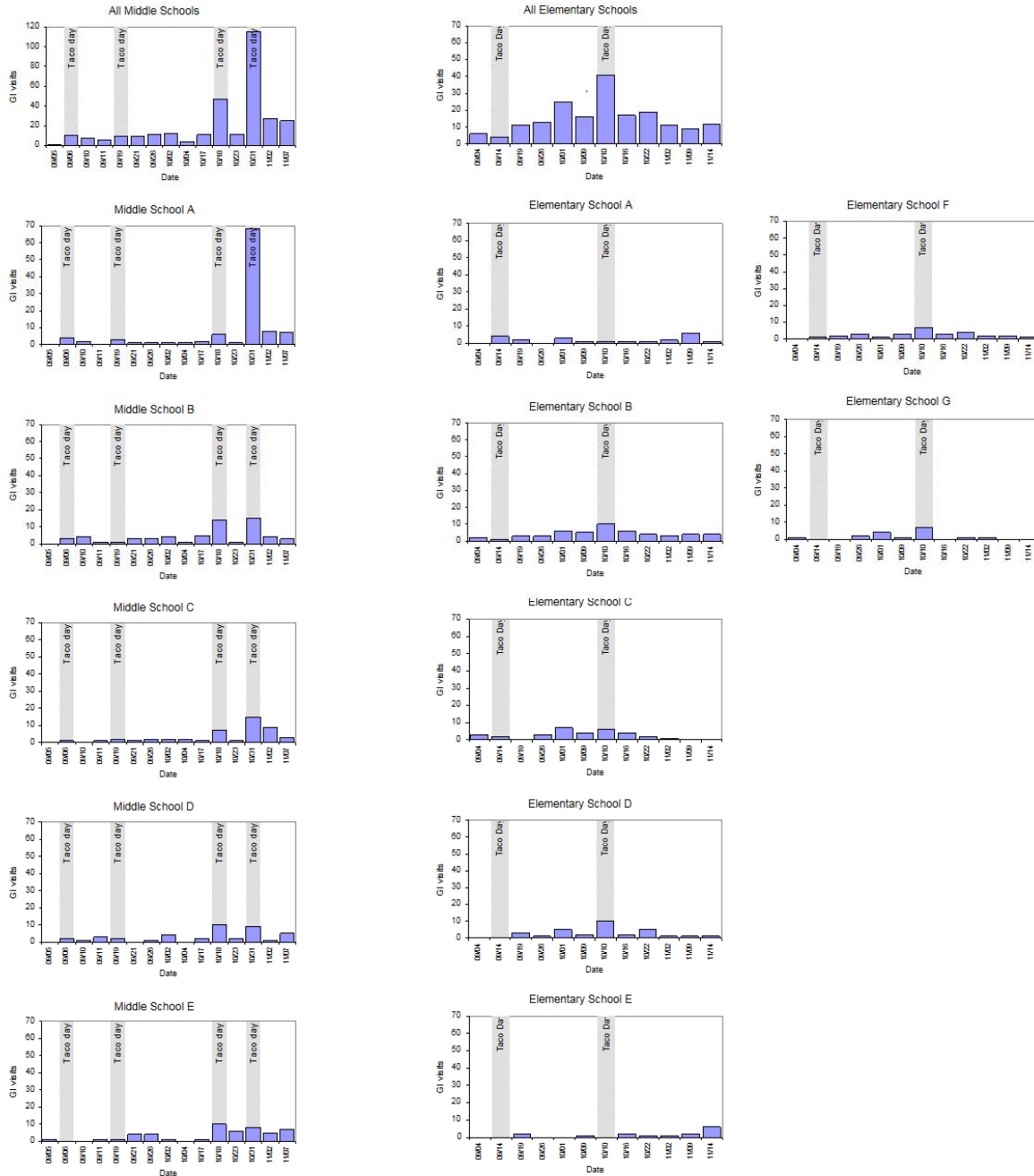
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Appendix 1

Afternoon health room visits for gastrointestinal illness (GI) on dates tacos were served and selected other dates, at middle schools and elementary schools in the Racine Unified School District, Racine Wisconsin, September – November 14, 2007.

Middle Schools

Elementary Schools



Appendix 2 (adapted from information provided by CDC)

When investigating outbreaks of rapid-onset gastrointestinal illness

- Investigate promptly.
- Record exact exposure and illness onset times to the nearest minute.
- Inquire about neurological symptoms (headache, dizziness, tingling, numbness)
- Ask whether food smelled, tasted or looked odd.

Collecting samples associated with illnesses of unknown or suspected chemical/toxin etiology
Samples useful in determining etiology of an unknown exposure from food:

- Food consumed prior to illness, especially partially consumed meals that are believed to be associated with the illness;
- Some chemicals can be measured in blood and/or urine samples. However, these samples must be collected within 24 hours of illness, and follow the sample collection guidelines referenced below
- Vomitus may be collected and stored for possible testing. The first vomitus is best for determining the agent that may have caused illness. If the first vomitus is not collected it is unlikely that an agent will be detected. The specimen should be frozen and sent as per the urine guidelines referenced below.
- If a specific chemical exposure is suspected then please contact NCEH Division of Laboratory Sciences for appropriate specimen collection guidelines. Metal or Volatile Organic Compounds assays may require special collection materials or empty blood tubes or urine cups from the same lots as those used for collection may be needed.

It is extremely important that the following information accompany any collected samples. Incomplete information may prevent analysis of samples.

1. Collect human samples according to sample collection guidelines available at: <http://emergency.cdc.gov/chemical/lab.asp>. How long after initial illness was sample obtained?
2. Collect suspected food (or other consumed items) in clean containers and keep refrigerated. Are collected items ingredients, leftovers, partly consumed meals, or other?
3. How was the initial report of illness made?
4. What is the spectrum of symptoms (including latency and any neurologic symptoms)?
5. Has an environmental investigation indicated the presence of any potential contaminants (ex. pesticide, cleaning solutions, etc)? What is the location where illness occurred/food consumed--a home, restaurant, farm, etc?
6. Are there any initial hospital test results available? Are hospital records/medical charts available?

7. Do patients have any residual sequelae from their initial illness? Are they recovered or worsening?
8. What is the interest in determining the cause of the illnesses (prevention, forensic or other)?

For specimen collection, packaging or shipment contact: Ernest McGahee, emcgahee@cdc.gov, 770.488.7579.