

CDC *Vital Signs* Town Hall Teleconference

Preventing Norovirus Outbreaks from Contaminated Food

June 10, 2014

2:00 pm EDT

Coordinator: Welcome and thank you for standing by. All participants will be in a listen-only mode for the duration of today's call. During the presentation we will conduct a question-and-answer session.

If you would like to ask a question please press star 1 and when prompted record your first and last name. Once again, that's star 1 and when prompted please record your first and last name. To withdraw your question you may press star 2.

This call is being recorded. If you have any objections you may disconnect at this time. Your host for today's call is Dr. Judy Monroe, Director of CDC's Office for State, Tribal, Local and Territorial Support facilitator. Thank you and you may now begin.

Dr. Judy Monroe: Thank you. So good afternoon everyone, good to be with you. As the operator said, I'm Dr. Judy Monroe and I direct OSTLTS here at CDC, the Office for State, Tribal, Local and Territorial Support. I want to welcome all of you and really glad that you could join us to discuss this really important topic, which is the topic of our latest *Vital Signs* report on preventing norovirus outbreaks from contaminated food.

But before we get started let me go over a few housekeeping details. You can go online and download today's PowerPoint presentation and that will allow you to follow along with the presenters.

The web address is www.cdc.gov/STLTpublichealth, that's S-T-L-T, public health, all one word. This is a link directly to the *Vital Signs* Town Hall webpage. Under

highlighted products and resources, on the lower right-hand side of the page is where you'll find this.

On this town hall webpage you can also view the bios for each of the presenters. This is where we'll add the audio recording after today's call and the transcript for today's teleconference. And they'll be available next week.

So that's our topic. Preventing norovirus outbreaks from contaminated food, which is an important public health topic because norovirus is the leading cause of disease outbreaks from contaminated food in the United States.

Each year about 20 million people get sick from norovirus, most from close contact with infected people or by eating contaminated food. States and communities can investigate norovirus outbreaks thoroughly to identify sources and causes and to improve control strategies.

They can also participate in CDC supported surveillance efforts to improve monitoring and evaluation of outbreaks.

On today's call you're going to hear from three of your colleagues. First we will hear from Dr. Aron Hall, an epidemiologist on the Viral Gastroenteritis Team in the National Center for Immunization and Respiratory Disease at CDC. He will provide a summary of this month's *Vital Signs* report.

Dr. Hall will hand the call over then to Danny Ripley, a food inspector for the Metro Public Health Department at the Metro Government of Nashville and Davidson County in Tennessee. Danny will discuss the lessons learned through local norovirus outbreak investigations in Metro Davidson County.

He will then hand the call over to Amy Saupe, an epidemiologist in the Foodborne Diseases Unit at the Minnesota Department of Health. Amy will talk about norovirus outbreak surveillance in Minnesota.

There will then be time for questions after our presentation today and what you can do is get into the queue to ask a question at any time during the teleconference. So if you press star 1 and record your name when prompted then you'll be in the queue when we get ready to go to our questions.

So now I'd like to turn the call over to Aron. So Dr. Hall, take it away.

Dr. Aron Hall: Thank you very much, Dr. Monroe, and thank you everyone for attending today's teleconference. And we appreciate your interest in our topic, which is norovirus outbreaks from contaminated food.

My presentation will begin on slide 5, so if you're following along, starting on slide 5, I'll begin with a little bit of background about norovirus illness. So norovirus illness typically begins after an incubation period of 12 to 48 hours.

The illness itself is characterized by acute onset of vomiting and/or diarrhea. The diarrhea tends to be characterized as a watery, non-bloody form as opposed to other types of diarrhea, more frequently caused by bacterial infections.

It can also be accompanied by abdominal cramps, nausea, headache, muscle ache, and low grade fever. And it's for these reasons that norovirus is sometimes given the moniker of stomach flu, although, of course, it has no relationship to influenza virus.

Generally speaking, most people with norovirus illness recover after about a one to three day course of illness. However, about 10% of people will seek medical

attention, some of these individuals will require hospitalization. Most often due to dehydration and they will receive fluid therapy to treat that.

More severe illness and death are possible and they occur most often in the elderly and young children, immune compromised individuals, and those with other types of illnesses.

And then finally, it's important to note particularly from a public health standpoint that up to 30% of norovirus infections may be asymptomatic.

Next slide. So slide 6 shows the overall annual burden of norovirus illness in the United States. And this pyramid gives our current estimates at each level as far as clinical outcome.

So starting at the bottom and working our way up, we estimate each year about 20 million total illnesses due to norovirus. Nearly 2 million outpatient visits, approximately 400,000 emergency department visits, nearly 70,000 hospitalizations, and about 800 deaths.

And if you look at this on an individual basis in terms of your total lifetime risk, this equates to a risk of death due to norovirus in the range of 1 in 5,000 to 7,000 people. And likewise in terms of total illnesses, people may have as many as five episodes in their lifetime.

Next slide, 7. So our norovirus *Vital Signs* report in the MMWR focus specifically on norovirus outbreaks reported through the National Outbreak Reporting System or NORS during the years of 2009–2012. Over that four year period there were 4,318 norovirus outbreaks reported. These outbreak reports included over 160,000 illnesses, over 2,500 hospitalizations, and over 300 deaths.

The primary transmission mode reported in these norovirus outbreaks was most often person-to-person in 69% and food borne in 23%. Most of the outbreaks - about 70% were laboratory confirmed. Genogroup II was the most common genogroup detected. And of those with genotype data, about two-thirds were caused by genotype II.4.

Next slide, 8. So this graphic which is also included in our report shows the seasonality of norovirus outbreaks. And as depicted, norovirus outbreak activity peaks in the winter time particularly during December, January, and February when we consistently see an increase in the number of norovirus outbreaks reported.

This is driven largely by non-foodborne outbreaks, which occur most often in nursing homes and other long term care facilities. However, foodborne outbreaks are also seasonal and do show a peak in the winter time.

Next slide, 9. So focusing on just these foodborne norovirus outbreaks, and again, over the four year period there were 1,008 of them reported in NORS, a total of 43 states reported outbreaks and they did occur year round although as noted the pronounced winter seasonality of non-foodborne outbreaks was less so among foodborne outbreaks.

And then finally, secondary transmission was noted in 16% of outbreaks and this may be secondary transmission through direct person-to-person spread, environmental contamination, or otherwise.

Next slide, 10. The graphic shown here and this corresponds with a table shown in the MMWR report depicts the settings in which foodborne norovirus outbreaks occurred. And you can see overwhelmingly that the outbreaks occurred in food service settings, restaurants comprised 64% of all foodborne norovirus outbreaks reported; and catering or banquet facilities, another 17%.

Next slide, 11, details some of the information we received about food workers and the foods that are implicated in norovirus outbreaks. So among - about half of foodborne norovirus outbreaks were reported or about 520 of them. We received information from states and local, territorial governments about the factors contributing to contamination.

Among those providing such information an infectious food work was implicated as the source of the outbreak in 70%. Further more, among those in which a food worker was implicated, bare-hand contact with ready to eat foods was specifically identified in over half as a contributing factor.

So from these data we get a sense of both the source of infection as well as the mechanism through which contamination occurred.

Looking specifically at the food items implicated in foodborne norovirus outbreaks we have data reported in 32% of such outbreaks and overwhelmingly among those 92% of them implicated foods that were contaminated during final preparation phases. These are foods that are contaminated when they're being prepared and immediately prior to service and consumption as opposed to further upstream such as during production or processing.

Additionally, 75% of the foods implicated in norovirus outbreaks are those that are eaten raw. And then finally, a single food category was identified in 21% of those outbreaks that implicated a food. And those categories most often identified include vegetable row crops. These are things like lettuces and other leafy greens, fruits, and mollusks and shellfish such as oysters.

Next slide. So on number 12, the conclusion and public health implications from our report. First and foremost is that noroviruses continue to be the leading cause of reported foodborne disease outbreaks in the United States.

Number two is that infected food workers are the most common source of foodborne norovirus outbreaks and the most common scenario is through touching of reach to eat foods in restaurants with bare hands.

So finally, we call upon the food service industry to help foster an environment that promotes food safety and helps ensure that food service workers adhere to recommended practices.

Next slide, 13, outlines what we feel state and local governments can help do to address this problem. First, we suggest adopting and enforcing all provisions of the FDA model food code to better safeguard food.

Second, we stress the importance of investigating norovirus outbreaks thoroughly so that we can identify the sources and causes, which can then guide us on how best to improve control strategies.

And then finally, we urge state and local governments to participate in CDC-supported surveillance efforts to improve monitoring and evaluation of outbreaks, specifically through our system such as NORS and CaliciNet.

We have several products available as noted on slide 14 related to this *Vital Sign* including the MMWR fact sheet, social media, podcasts, graphics, and videos; many of which are also available in Spanish, as well as the materials posted on the *Vital Signs* Town Hall teleconference.

So finally slide 15, I thank you for your attention and now I'll turn it over to Danny Ripley.

Danny Ripley: Thank you, Dr. Hall. Hello everyone, my name's Danny Ripley. I'm with the Metro Public Health Department in Nashville, Tennessee.

I'm on slide 17 and we'll give you a background of Metro Davidson County in terms of the demographics here. We have about 658,000 in our population. That population will grow to over 1 million during the day - throughout the week.

We permit approximately 4,500 restaurants and markets here in Davidson County and we are under contract through the Tennessee Department of Health and Tennessee Department of Agriculture.

We conduct about - excuse me, 160 - or we take in approximately 160 isolated foodborne illness complaints per year and of those complaints we generate approximately 10 outbreak investigations. Now these investigations may or may not be reported depending on the data that we have, reported to NORS that is. And we do confirm approximately three foodborne outbreaks per year, those being confirmed and reported to NORS.

From 2004 - slide 18, 2004 to present we've investigated 35 outbreaks. Of those 35 outbreaks bacterial outbreaks have been 11. Nine of those confirmed, two suspected. And 22 of the 35 have been in fact norovirus, either confirmed or suspected.

It should be noted that manager certification among those norovirus outbreaks were only four. In other words, of those locations only four locations had a certified manager present when the outbreak occurred.

Also, an ill worker policy was not in place with any of those locations involved in a norovirus outbreak. There were two other outbreaks, not associated with either bacteria or viruses.

Slide 19 illustrates the occurrences of norovirus throughout the years. You'll notice in 2009 we had a relative spike of four - and these of course are outbreaks again that are investigated and reported to NORS.

Slide 20, in this particular outbreak we had on December 5, 2007, a food handler experiencing vomiting at around - approximately 4:00 am. The food worker comes to work, clocks in at 11:00 am, works until noon, and prepares during that time - prepares sandwiches.

And reportedly wore gloves and washed hands before and during work. The worker left because of lethargy, no symptoms of vomiting or diarrhea were reported since the 4:00 am.

Later on we identified multiple cases with an onset between December 6 and December 7, stool cultures from both the food worker and customers indicated norovirus.

And in this particular outbreak there was no certified manager nor was there an ill worker policy in place. I'll talk a little bit more about some of our changes or conclusions with each of these outbreaks.

The next outbreak, slide 21, illustrates the persistence of the norovirus in the host. And in this particular case it was actually a host or hostess in this case. We had a cluster of eight confirmed cases of norovirus. These were lab positive.

A common establishment was linked and through our investigation we learned that there was at least one employee who was sick during the expected incubation period. We collected a stool sample from this employee ten days following their last symptom and it in fact tested positive for norovirus, which helped us link the food worker with the ill customers.

Again, in this particular outbreak there's no manager certification nor was there an ill worker policy in place - ill worker reporting policy I should say.

The third example I have, slide 22, is the importance of ill worker reporting. And this particular outbreak, we had a food worker who became ill at work. During the work period this person exited the kitchen at least four different times, vomiting each time in a nearby restroom.

Later the worker notified the manager who sent the worker home. This worker did prepare food, which was not destroyed or discarded by the staff at the facility. During interviews the worker reported washing their hands and wearing gloves following each restroom visit.

This particular outbreak, as you see on the right, you'll see the epi curve. We had 17 of 28 people at the banquet became sick. Norovirus was suspected in this outbreak. This was an outbreak involving folks who were not from Nashville Davidson County, acquiring stool specimens in the length of time between the outbreak and notification limited our sample collection.

However, we strongly suspect that this was norovirus based on the onset and symptoms reported. And this particular case, again, no manager certification or no ill worker reporting policy was in place for this outbreak.

So some of the lessons that we learned from these outbreaks - and this is slide 23. One of the very important lessons is exclusion may be the only sure way to prevent an infection or an infected worker from spreading the norovirus.

In several of these instances we have barriers in place from bare-hand contact. We also have hand washing, at least reported hand washing taking place, yet still these individuals managed to contaminate food.

Another key lesson is that a manager awareness of employees is critical to understanding what to do when someone becomes sick. And in the last example where food should have been destroyed once the manager knew that this employee had been ill that morning, certainly those actions weren't taken and resulted in - or at least facilitated the outbreak.

Manager awareness of illnesses is essential in manager food safety training. And we feel like that if more firms have food - manager food safety training, manager food safety certification, that these important messages will be communicated to the management and hopefully will be carried out on daily - day-to-day activities.

Also an ill worker reporting policy, having that implemented and in place is essential in helping communicate the importance of reporting illnesses to management.

Both of these two items, manager certification and ill worker reporting policies are part of the current FDA food code.

So as a result of the outbreaks that we've worked here involving norovirus in Davidson County, some of the things that we emphasize during our inspections and also during our training can be wrapped up into four primary items.

The first is identifying and excluding ill workers. And we believe an ill worker policy or reporting policy is essential to both communicating and helping identify ill workers present in the establishments.

Also establishing a strong hand washing culture in the environment, ensuring that hands are properly washed in the event someone has been experiencing symptoms, perhaps they have been asymptomatic for 24 hours, they're back to work, yet they could still be infectious, perhaps at lower levels. So we want to ensure the hand washing cultures are strong in each establishment.

Also creating conditions that are conducive to no bare-hand contact of ready to eat foods, whether that be glove use or utensils, or just the systems themselves, ensuring that no bare-hand contact with ready to eat foods is carried out by all operations.

And of course, when utensils or items such as gloves are used that they're used appropriately.

And then finally, developing protocols for proper cleaning and sanitizing. We want to ensure that folks identify the surfaces - and these surfaces may not always be food contact surfaces in the kitchen. It may be surfaces out in the dining area or restrooms that we want to ensure are cleaned and sanitized properly to help reduce spread of this virus.

We want to make sure folks understand and have on hand the appropriate chemicals and have systems or protocols in place for cleaning and sanitizing.

And with that I will turn the call over to Amy Saupe with the Minnesota Department of Health.

Amy Saupe: Thanks, Danny. And good afternoon everyone. I am Amy Saupe, one of the foodborne disease epidemiologists at the Minnesota Department of Health of MDH. And I'm just going to give a brief overview of norovirus outbreaks surveillance in Minnesota.

So we're on slide 26 and advancing to slide 27. One of the cornerstones of norovirus outbreak detection in Minnesota is our foodborne illness complaint hotline, established in 1998. It is centralized at the state level and staffed by one person who takes complaints from the public, from physicians, and restaurants using a routine interview form.

Once interviewed complaint intake forms are then forwarded to the local jurisdiction for any restaurants, delis, or other food service vendors that are listed by the complainant during a four day food history.

Environmental health follow up on a complaint could include a phone call to the establishment, an inspection, or nothing. If we feel that an investigation of a particular establishment is warranted we do call the Environmental Health directly to initiate one.

We receive between 676 and 991 complaints a year with a median of 768. And identified 39 to 81 confirmed foodborne outbreaks, 75% of which are identified through a call to the hotline including the vast majority of all of our norovirus outbreaks for all transmission routes.

Centralizing that hotline does allow us to identify outbreaks rapidly, particularly outbreaks where we may have multiple complaints that would have otherwise been reported to several different local jurisdictions.

Of course, we do also identify a large number of acute gastroenteritis cases through the hotline that are not part of a recognized outbreak. And as part of an enhanced surveillance project in conjunction with CDC and several other states we did begin offering viral stool testing to these callers in October of 2011. And approximately half of those tested are positive for norovirus.

Advancing to slide 28. Shown here are three main components of a norovirus outbreak investigation. Step 1 is identification of the outbreak, of course. We investigate all potential outbreaks without delay.

A potential outbreak would be considered just any time we have two or more individuals with a common exposure, and that could take the form of two separate complaints made to the hotline on different days, each with one person ill or a single complaint regarding two or more ill from different households.

Investigating all potential outbreaks helps give a truer estimate of norovirus outbreak scope and burden.

One thing to keep in mind, particularly for potential outbreaks that we may be teetering on the edge of investigating, for example, a potential outbreak where the reported incubation or symptom profile is not completely consistent, is that we feel like a norovirus outbreak investigation is never wasted.

At the very least the investigation provides us an opportunity to educate restaurant management and staff to hopefully prevent a future outbreak from occurring.

We often do find employee illness or poor practices during an outbreak related assessment, even if there's no outbreak confirmed.

The second component consists of the immediate interventions that are put in place to prevent ongoing transmission of the illness. And I'll give several examples of those in later slides.

The last component, which is important for preventing future outbreaks, is the statistical analysis and vehicle identification piece of an outbreak investigation.

Vehicle identification also is necessary to obtain the best data on outbreak, contributing factors, and antecedents, and providing feedback to the facility can hopefully stimulate better practices at that facility in the future.

Slide 29. We report our information that we gather from norovirus outbreak investigations to CDC to enable comparison across states and also for national analysis through two different routes. Epi information is reported to the National Outbreak Reporting System or NORS and linked to laboratory information reported through CaliciNet, the National Molecular Subtyping Network for norovirus.

Once we identify an outbreak, if norovirus is suspected or a possible etiology we enter a preliminary report into the NORS web interface based on the information that we have at that time. Each outbreak is assigned a state ID number shown here on this flowchart in yellow, that we enter into NORS to identify that report.

At the same time that the preliminary report is entered and if we'll be sending out any stool kits for the outbreak, the CaliciNet required fields, and then the outbreak ID are shared with the lab. And once the lab receives and sequences two stool specimens that are related to that outbreak they use that same outbreak ID number to upload the specimens to CaliciNet.

Back on the epi side, once we finish an outbreak investigation and it's completed, the outbreak details are either entered or updated in the NORS report and it's finalized.

So then you can see that the NORS and CaliciNet reports are linked through that yellow depicted outbreak ID number so that the lab and epi information can be analyzed together.

We participate in the Norovirus Sentinel Tracking and Testing or NoroSTAT which is a CDC led enhanced norovirus surveillance initiative to track occurrence of norovirus outbreaks and their genotypes in real time. And as part of this - the red bangs on this graph here or the red fireworks indicate critical steps for NoroSTAT timeliness reporting metrics.

So as part of our participation in NoroSTAT we enter our initial report into NORS within seven business days, a report to the state health department. And similarly once our lab has received that second stool sample related to an outbreak we have seven business days to upload those sequences to CaliciNet.

Prior to our participation in NoroSTAT we entered outbreaks into NORS fairly quickly but not immediately. And outbreaks were just sequenced and uploaded to CaliciNet as time in the lab permitted.

So for example, in 2012 58% of our sequences were uploaded within 14 days versus currently we upload about 97% of our sequences within seven days.

Slide 30. One of the great things about receiving the genotypes much faster from our lab as part of our participation in NoroSTAT is our ability to track the genotype trends in real time. You can see here on the graph, three seasons of norovirus outbreak genotypes.

The purple, gray, and black boxes all indicate GII.4 strains. You can see that we typically observe our more rare or non-GII.4 genotypes in the offseason and the beginning and end of the peak season.

This trend was particularly apparent this fall and early winter when we saw five different genotypes that we had never previously identified before in Minnesota. We also had a late start to the season and a late seasonal peak this year, trends which were mirrored in other NoroSTAT sites.

The pie chart shows sequencing data for all Minnesota norovirus outbreaks since 2009. And interestingly you can see that the GII.12 make up about 8% of all genotype outbreaks but we saw this genotype almost exclusively during our 2009 peak season and then not since then.

Slide 31. This next slide depicts an example of how the real time genotyping results have actually influenced our epi conclusions for an outbreak. This was a norovirus outbreak associated with a catered funeral luncheon February of this year.

And on February 4 we received a call to the hotline with a physician reporting he had seen two patients with gastroenteritis and both reported attending a February 1 funeral lunch held at a restaurant.

Thirteen or 48% - and I apologize for the typo here, of 21 - of 27 funeral attendees that were interviewed were ill. Sanitarians interviewed all nine of the restaurant employees and five of them did report recent gastrointestinal illness.

And on onset dates for those ill employees were January 30 through February 5. The sanitarians did not observe any bare-hand contact on their visit and did note that the employee hand hygiene practices appeared adequate.

Restaurant management then reported that they had experienced three separate incidents of children having vomited in the restaurant in the week prior to the funeral meal. We did end up receiving and genotyping five stool samples from this outbreak at our public health lab.

You can see here in yellow that two of the stools from funeral attendees tested positive for GII.3 norovirus with identical region C sequences. Three stools from employees tested positive for GII.4 Sydney norovirus with identical sequences.

So genotyping results for this outbreak supported the conclusion that the likely cause of illness in this outbreak was environmental or food contamination from the vomiting incidents and not from the food workers.

However, evidence of transmission among the employees do indicate that this could easily have turned into an outbreak of GII.4 Sydney caused by ill food workers.

Slide 32. The sixth outbreak was from December of this past norovirus season. On December 10 we received a call to the hotline from the school nurse reporting illness among 17 of 275 members of the school's football team after attending a banquet, which is Event A shown here in blue, hosted at a restaurant and banquet facility on December 8.

Local sanitarians visited the restaurant and banquet facility that same day to gather many of the information, evaluate food preparation and handling procedures, and identify staff regarding recent illness and job duties.

Over the next three days our hotline was just ringing off the hook with this outbreak. We received six additional independent complaints to the hotline, which

encompassed two additional catered banquets, which are Events B and C shown here in green and red respectively, a private party and patrons of the facilities restaurant, which are shown in purple.

Meal dates are from December 6 through December 10 and meal dates for the larger catered events are indicated by the arrows. A total of 131 banquet facility guests or restaurant patrons were interviewed as part of the investigation and the epi curve shows 69 identified cases.

Stool samples received from attendees of Events A and B, restaurant patrons and employees, all tested positive for norovirus GII and norovirus GII.4 Sydney nucleic acid sequences from Event A, Event B, and food worker specimens were identical. And you can see that indicated by the subtype C115 on the side there.

A seasonal fruit bowl was the only common food between Events A and B. The fruit for the two events was prepared on December 8 in the same kitchen and by the same employee. Fruit was significantly associated with illness for both Event A and Event B and was the only significant food item in a multivaried analysis.

Thirteen of 60 or 22% of employees reported having a gastrointestinal illness when they were interviewed with onset dates ranging from November 30 to December 9. And the employees are shown in yellow on the epi curve.

One employee reported working on December 8 while actively having diarrhea and the employee that prepared the fresh seasonal fruit for both Event A and Event B reported one episode of vomiting on December 2.

Sanitarians observed staff using gloves for ready to eat food items; however, they also observed a blocked hand sink in the main kitchen that wasn't supplied with any soap or paper towels.

All the food that had been previously prepared was discarded because ill employees had been involved in the preparation. And that food was intended for service at additional banquets that evening and the following weekend.

Sanitarians reviewed the importance of limiting bare-hand contact with ready to eat foods, stressed the importance of hand washing, and ordered disinfection of the restaurant surfaces.

This one was a great example of a large scale outbreak where we were able to rapidly identify the scale of the outbreak using reports to our foodborne illness hotline and sequencing helped provide confirmation of the epi linkage between the separate events at the same facility and additionally rapid environmental health interventions at the facility's kitchen likely prevented a substantial amount of additional illness.

So slide 33. And I just wanted to say thank you and I will turn the call back over to Dr. Monroe.

Dr. Judy Monroe: Wow, well, thanks to all of our presenters for our very engaging presentations. I think they got our attention. So before we go to questions I would like to remind everyone that you can get into the queue to a question by pressing star 1, say your name when prompted, and then you'll be announced into the conference by the operator when it's your turn to ask your question of our speakers.

I encourage you to take advantage of this opportunity to share strategies, lessons learned, challenges and success stories that you might want to share with all of us as well.