

Norovirus in Long-Term-Care Facilities

Annotated Report of Stakeholder Meeting and Interviews

Prepared for

**Oregon Health Authority
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Purpose of Paper

This report is written in fulfillment of Contract No. 144447 with the Oregon Health Authority. The purpose of the paper is to examine the science behind outbreaks of noroviruses and model public health responses to such outbreaks. The report considers issues, suggestions and recommendations that were discussed during a meeting convened by the Oregon Health Authority in September 2013, in follow-up conference calls in early 2014,¹ and explores how state and local public health agencies are addressing those issues around the country.

Background

A prototypical norovirus was first linked to a gastroenteritis outbreak in Norwalk, Ohio in 1968. The virus remained poorly understood and challenging to diagnose until the 1990s. In the absence of reliable diagnostic methods, clinical and epidemiologic criteria were established to assist in linking the virus to outbreaks of gastroenteritis. Substantial advances in norovirus diagnosis, epidemiology and infection control have evolved through work at CDC since 2001. Characterization of the virus was a major challenge owing to lack of a sensitive assay methodology and due to the inability to grow the virus.²

Initially, laboratory diagnosis of norovirus was achieved by electron microscopy, a very expensive and relatively insensitive test. EM testing was largely replaced with application of a set of clinical criteria – The Kaplan criteria – that includes illness duration, incubation period, and symptoms. The Kaplan criteria can still be used where laboratory testing is not available; however, much improved and relatively inexpensive laboratory testing methods have been developed that are more rapid, more specific and less costly.³ Currently, most testing for norovirus in state public health laboratories is done using Real-Time Reverse-Transcription Polymerase Chain Reaction (RT-PCR).⁴

Noroviruses account for most cases of epidemic gastroenteritis worldwide and are the leading cause of foodborne outbreaks in the United States. Noroviruses cause 19–21 million illnesses in the U.S. each year, resulting in 56,000–70,000 hospitalizations and 570–800 deaths annually. About 80% of reported outbreaks occur during winter months.⁵ More than half of all norovirus outbreaks in the U.S. occur in long-term-care facilities.⁶

Noroviruses are a group of single-stranded RNA viruses that occur in six genogroups and more than 25 separate genotypes. Variants of the GII.4 genotype have been the most frequently documented causes of outbreaks in the U.S. since 2012, although outbreaks from that genotype outside the U.S. are rare.

Norovirus infections typically involve an incubation period of 12 to 48 hours, and involve a rapid acute onset of vomiting or watery, non-bloody diarrhea with abdominal cramps. However, not all people exposed will be infected, and some people with norovirus infection will have no symptoms but will shed the virus in their stool. Gastrointestinal symptoms typically last for 24 to 72 hours. Most people infected by norovirus will recover fully, and may have immunity to the type of norovirus they were infected with, although length and degree of immunity is unknown. The most serious complication from norovirus infection is dehydration resulting from acute diarrhea. This most commonly occurs among children, older adults and people whose immune systems are compromised. Such cases can lead to hospitalization and even death.⁷ Each year, noroviruses account for approximately \$2 billion in health care costs and lost productivity in the U.S. alone.⁸

Noroviruses are highly infectious. As few as 18 viral particles can cause infection leading to an outbreak. The virus can be transmitted through a number of routes, including eating contaminated foods (usually handled by a food industry person whose hands were contaminated through contact with fecal matter), drinking contaminated water (usually involving cross-contaminated from sewage), through contact with contaminated surfaces, and through breathing aerosolized vomitus.⁹

CDC tracks norovirus cases and outbreaks through five sentinel states and two electronic surveillance systems. The sentinel states – Oregon, Ohio, Minnesota, Tennessee and Wisconsin – comprise 11% of the U.S. population and have achieved the highest per capita reporting rates of norovirus in the U.S. The surveillance systems include the National Outbreak Reporting System (NORS), which captures data about outbreaks of all enteric diseases including norovirus. The second surveillance system, CaliciNet, is public health laboratory based and collects norovirus genetic typing data, supporting the tracking of national trends of norovirus strains.¹⁰

Norovirus in Oregon

Norovirus is not one of the communicable diseases for which reporting is mandated by law in Oregon or in any states in the U.S. Accordingly, complete information about the incidence of norovirus infections in Oregon and elsewhere is not available. However, Oregon Administrative Rules (OAR 333-018) require long-term-care facilities and hospitals to report outbreaks of gastroenteritis to the local health authority. The OAR requires local health authorities to investigate such outbreaks and report them to the Oregon Health Authority.¹¹

The most frequently reported outbreak in Oregon is gastroenteritis. During the period 2003 to 2012, gastroenteritis accounted for 1,562, or 85%, of the 1,830 outbreaks investigated. Of that number, 820 were outbreaks of confirmed norovirus, and 126 outbreaks that were presumptive for norovirus. Of the

remaining outbreaks, 314 were of unknown origin or outbreaks with no specimens collected.

In 2012, Oregon experienced 119 outbreaks of infection by caliciviruses, a family of viruses that includes norovirus and sapovirus. Among the outbreaks during this period, 57% were transmitted by person-to-person contact, and 21% were transmitted by ingesting contaminated food. More than 50% of the outbreaks occurred in institutional settings, with most of those occurring in long-term-care facilities.¹²

The following table summarizes the various outbreaks that occurred in long-term-care facilities in 2013.¹³

Etiology			Cases		Cases/ Outbreak
	No.	Pct.	No.	Pct.	
Norovirus	58	46.8%	1,951	62.8%	33.6
Influenza (all types)	31	25.0%	550	17.7%	17.7
Unknown	32	25.8%	572	18.4%	17.9
All others	3	2.4%	32	1.0%	10.7
Total	124		3,105		25.0

Although the number of norovirus outbreaks during 2013 accounted for a significantly smaller percentage of total outbreaks caused by gastroenteritis than for the 2003–2012 period referred to above, the number of cases of norovirus was nevertheless significantly greater than other outbreak causes.

Prevention and Control of Norovirus in Facilities

The CDC and partners have developed a number of documents and web pages that provide definitive guidelines for state and local health agencies, medical facilities and providers regarding the prevention and control of norovirus outbreaks in long-term-care facilities.^{2,6,7,8,14} The principal elements in preventing and controlling outbreaks are:

1. Hand Hygiene: hand washing with soap and running water for a minimum of 20 seconds is considered by CDC to be the “single most important method to prevent norovirus infection and control transmission.” Hand sanitizers have not been demonstrated as effective.
2. Exclusion and Isolation: Isolation of persons with vomiting or diarrhea is of high importance in preventing transmission. It is important to be aware that infected persons may be shedding virus both before and after being symptomatic. Where possible, cohorting ill patients in one separate area, cared for by dedicated staff, may be advisable. Ill personnel should be excluded from work for at least 48 hours after symptoms have ceased. Isolation of both exposed and unexposed well persons might also be

useful to break the cycle of transmission during outbreaks in long-term-care facilities,

3. Environmental Disinfection: The use of chemical disinfectants is of central importance to prevent spread of norovirus from contact with contaminated surfaces in the environment. Sodium hypochlorite solution (bleach) has been documented as effective, while other disinfectants such as quarternary ammonium compounds have been shown to be less effective. Important areas in the environment to focus on include bathrooms and high-touch areas (e.g. doorknobs, hand rails, counters).
4. Use of Personal Protective Equipment: Gowns and gloves should be used by staff at all times when working with infected patients, and when cleaning areas contaminated with stool or vomitus of patients infected or suspected of being infected with norovirus. Standard methods for disposal should be followed to assure that further contamination does not occur.¹⁵
5. Reporting of Outbreaks: While norovirus is not on the CDC list of reportable diseases, and most states follow the CDC listing of reportable diseases, reporting of *outbreaks* is generally required. When a state or local public health agency is notified of an outbreak of norovirus in a LTCF (typically defined as two or more cases among unrelated individuals), public health officials will begin a process that includes the collection of specimens for laboratory testing and provision of support measures to assist the facility in controlling the outbreak.

In most states, including Oregon, local health departments are generally the first responders to outbreaks of noro-like illnesses in long-term-care facilities. Most also make efforts to provide educational materials and information to facilities in advance of outbreaks wherever possible. In an effort to collect more information about approaches being used around the country to prevent and control outbreaks in long-term-care facilities, the authors spoke with state and local health department public health professionals who are actively engaged in norovirus work. The authors used a brief questionnaire that reflected priority issues identified in the earlier meeting and follow-up phone calls referenced in the introduction. Appendix 1 includes a listing of the state and local health officials who were interviewed, and Appendix 2 provides the questions that were asked during the conference call interviews.

The authors interviewed state and local public health officials in all five sentinel states – Ohio, Minnesota, Tennessee, Wisconsin and Oregon. In four of the states, primary responsibility for working directly with long-term-care facilities experiencing outbreaks of communicable diseases, including norovirus, was with local health departments. In Minnesota, most responsibility for communicable disease follow-up rests with the state health department, with the local health

departments serving Hennepin County and the City of Minneapolis doing limited CD work.

Preventing/Controlling Norovirus in Sentinel and Other States

State or local public health departments around the country have access to CDC guidelines and typically follow them when responding to outbreaks of norovirus. There is, however, a fairly significant degree of variability in the response to outbreaks, as accounted for by a number of factors:

1. Delayed (or no) recognition of the outbreak by the long-term-care facility.
2. Lack of reporting because of low regard for the importance of controlling gastrointestinal disease in long-term-care facilities. There is commonly a background of nausea, vomiting or diarrhea among residents of long-term-care facilities, particularly among older residents. Staff often regard the symptoms as “routine,” “undesirable to deal with,” and “of limited concern because they are self-limiting.”
3. Delayed or no reporting because of fear of the consequences of reporting an outbreak. Possible outcomes may be perceived as including the exclusion of staff in an already short-staffed facility, punishment from the licensing agency for mistakes made, negative publicity in the local press, and loss of referrals from hospitals or private individuals.
4. Lack of availability of stool specimens to support diagnosis because of delayed reporting.
5. Inconsistent compliance with control guidelines by long-term-care facilities because of inadequate staff training, lack of experience and staff shortages.
6. Lack of (or inadequate) intervention by local health departments because of lack of staffing, lack of jurisdictional authority, or limited expertise. (In most cases where very small local health departments are unable to intervene during an outbreak, the state public health agency will step in.)

To address challenges such as those outlined above, many state and local health departments have developed tool kits to help guide facilities in preparing for and responding to outbreaks. CDC guidelines on norovirus outbreak management and disease prevention has been widely adapted for use in toolkits.¹⁶

Staff from the Multnomah County (Oregon) Health Department worked with communicable disease staff at the Oregon State Public Health Division to adapt

materials from the Oregon State website, from CDC materials, and from its own materials to create a “Toolkit for Noro-like Illness in Long-Term-Care Facilities.” The Toolkit includes the following:

- A case log (also called a “Line Log” in some states) for use by long-term-care facilities
- An assessment flow chart
- A CD Procedure for Assessing Reports of Noro-like Illness in Long-Term-Care Facilities
- A local Long-Term-Care Facility Outbreak Management Guideline
- A Noro Information Packet, comprising several one and two page pieces
- Criteria for Environmental Health Support in Long-Term-Care Facilities.¹⁷

Another notable example can be found in the sentinel state of Tennessee. Their “Recommendations for the prevention and Control of Viral Gastroenteritis Outbreaks in Long-Term-Care Facilities” includes content that may be regarded as an “Outbreak Control Kit.”¹⁸ Contents include:

- Frequently Asked Questions
- Detailed steps for controlling outbreaks
- Disinfection procedures
- Sample signage to be used during an outbreak in a facility
- A sample case log or “line list” for use by facilities during outbreaks
- A “Viral Gastroenteritis Fact Sheet”

The Tennessee deputy state epidemiologist noted that distribution of the recommendations to long-term-care facilities resulted directly in the reporting of outbreaks.¹⁹

Epidemiology staff at Washington County, Oregon, surveyed outbreak tools in other states. They identified the “Norovirus Toolkit for Long-Term-Care Facilities” from San Diego County’s Health and Human Services Agency as one of the best.²⁰ The toolkit was designed to be used in conjunction with the state’s guidance for controlling outbreaks in long-term-care facilities²¹ and includes the following:

- Best practices: Control of Viral Gastroenteritis Outbreaks in Group Residence Facilities
- Norovirus Cleaning and Disinfection
- Q&A: Norovirus
- NORO-Clean!
- Case Log of Residents and staff with Acute Gastrointestinal Illness.²²

The interviews with health departments serving the sentinel states yielded several interesting observations. Other insights, themes and ideas shared during the sentinel state interviews included the following:

- Outbreak Kits: Information is shared by public health agencies with long-term-care facilities, usually in advance of the beginning of the fall outbreak season. Kits ranged from very basic to much more comprehensive in content, such as those described earlier. The basic kits contain little more than a “line-list” form, health department contact information, basic information about norovirus, and perhaps stool sample collection kits. The kits with more comprehensive contents tended to provide a very broad range of information; in some cases, it appeared to the authors that the information might have been too extensive, possibly limiting the utility. As an epidemiologist from a local health department in Tennessee said, “We try to keep the information we share with long-term-care facilities pretty succinctly stated so that people will actually read the material. Most staff in these facilities really just want 10 bullets telling them what to do.”²³
- Case Reports: Outbreak kits typically included line-list forms (case-report forms). Most were similar in appearance, capturing key demographic and illness information for facility residents and staff experiencing symptoms. The forms are designed to capture information that will support epidemiologic analysis of outbreaks. However, nearly all public health staff interviewed indicated that long-term-care facilities usually don’t complete and return the forms. One exception is in the State of Wisconsin, where return rates of completed line lists from long-term-care facilities is about 90%. Two factors help explain the higher return rate: (1) the state agency responsible for licensing long-term-care facilities, the Division of Quality Assurance, issues citations to facilities that are not reporting, citations that may include financial penalties or closure orders, and (2) significant follow-up by local health departments.²⁴
- Role of Licensing Agencies: Most people interviewed indicated that the state agency responsible for licensing long-term-care facilities plays little if any role in applying pressure or enforcement actions with facilities with poor reporting or infection-control procedures. As noted earlier, Wisconsin is an important exception, where the licensing agency is very involved in assuring long-term-care facilities respond appropriately to outbreaks. Another exception is in Tennessee, where the licensing agency sent letters to all long-term-care facilities, emphasizing the reporting requirement as part of licensure. According to a local epidemiologist in the state, “This got their attention and resulted in an increased number of reports.”²⁵
- Role of Environmental Health Specialists: Most local health departments interviewed indicated that their sanitarians are key members of outbreak response teams. Some noted that environmental health staff members are often the first to discover an outbreak, particularly related to facility food services. One noted, “our sanitarians are particularly effective in reinforcing the control measures during an outbreak in a facility. They are

viewed more as regulators by LTCF staff, and that seems to improve compliance.”²⁶ However, in Minnesota, environmental health staff are reluctant to act if they don’t have or believe they have jurisdiction.²⁷

- Main keys to success: Those interviewed for this project seemed to agree that preventing norovirus outbreaks in long-term-care facilities is a “nice idea,” but unachievable unless and until an effective vaccine is developed. The key, then, is in controlling outbreaks to limit the number of facility residents and staff that are infected. Most agreed that three elements are critically important in working with facilities:
 - Relationship: The local health department representatives interviewed invariably emphasized the importance of having a relationship with the long-term-care facilities in order to receive early reporting of outbreaks, get some degree of compliance with control methods, and assure receiving data from line lists. “We try to get the long-term-care facilities to see us as a resource to help them during outbreaks,” suggested a local epidemiologist in Tennessee.²⁸ In Wisconsin, local health department relationships and persistent follow-up with long-term-care facilities are seen as important strategies in securing significantly improved reporting rates, completion of line-lists, and following of outbreak control guidelines. In that state, where the regulatory agency plays an enforcement role, the local health department tends to be viewed as a partner and important resource to the long-term-care facility. These two factors have resulted in a smaller number of cases per outbreak and shorter duration of outbreaks.²⁹ However, in Minnesota where most outbreak work is done by the state health department, “we don’t have enough resources to work with all the facilities statewide, and don’t really know how many are reporting or how much help our materials are to them. Centralizing communicable disease work helps optimize expertise, but probably at the expense of relationships.”³⁰
 - Involvement or Appearance of Enforcement: Several mentioned that in the absence of potential enforcement, there are too many disincentives to following prescribed control measures, including the potential for exclusion of ill staff, bad publicity, and lack of staff availability for in-service education sessions. However, when the state licensing agency weighs in or when facility operators view public health responders – especially environmental health staff – as regulators, better and more effective control measures tend to be taken. In the Tennessee example cited above, the state agency that is responsible for licensing long-term-care facilities is distributing a norovirus outbreak kit developed by the state health department, and expects it to contribute to increased compliance

from licensed facilities.³¹ The Wisconsin examples cited above demonstrate how strong enforcement by the state regulatory agency can contribute significantly to improving results.³²

- Follow-up: It would seem intuitive that for outbreaks where local or state public health workers have an ongoing presence in a long-term-care facility, the probabilities of controlling the outbreak earlier are increased. A public health presence can help correct improper practices (e.g. use of disinfecting agents that aren't effective, continued presence of ill staff during outbreaks³³), reinforce the importance of hand washing, increase reporting and completion of line lists,³³ and provide positive reinforcement and technical support. On the other hand, in states where limited public health resources are made available for norovirus outbreaks, outcomes are less clear and data less available.^{35,36}
- Education of LTCF staff: One might expect that providing training to staff of long-term-care facilities in advance of “norovirus season” might be widely practiced and a key to successful control strategies. However, virtually all of the health professionals interviewed in the sentinel states indicated that such sessions are difficult to schedule, to staff, and to attract attendance, even when done on-site. One local public health person stated, “We have intended to be proactive with educational sessions, but just haven't been able to. It gets intense during noro season, and our staff has to juggle a lot of things. We tend to do on-on-one training during outbreaks, but depending on what the LTCF is open to.”³⁷ One unique approach will occur later in 2014 in Knoxville, TN, where the health department's emergency preparedness division is convening a meeting with all area long-term-care facilities as one element of the county preparedness plan. Public health staff responsible for norovirus (and other communicable diseases) will be providing a session on infection control.³⁸
- Lab results timing: One of the issues mentioned during the Oregon meeting in September 2013 was that laboratory testing during outbreaks can involve delays. When asked about delays with laboratory testing, all of those interviewed in the other four sentinel states indicated that laboratory results, when testing is done by the state laboratory, are usually turned around in one to two days. In Tennessee, results are obtained in a day owing to the decentralization of state laboratory services. A centralized laboratory is located in Nashville, and four regional labs are located around the state.³⁹ In Wisconsin, the state laboratory uses a statewide courier system that provides for no-cost transport of specimens that results in quick turnaround of results.⁴⁰ Based on the comments of several of those interviewed, delays in laboratory testing — including in Oregon — probably result principally from delays in responses from long-term-care facilities in collecting stool specimens.

- Unique ideas: One of the purposes of this project was to identify model practices or unique ideas used in other states to prevent and control outbreaks of norovirus. Those the authors judged to be unique or the most promising included the following:
 - Table-top training: Minnesota is considering constructing hands-on table-top exercises for long-term-care facilities as a means of increasing both preparedness and skills for responding to norovirus outbreaks.⁴¹
 - Hand-washing training: Minnesota is considering using black light hand-washing units as one component of training. Materials to be cleaned during the training, perhaps simulating stool or vomitus, would contain materials that fluoresce when placed under a black light. The health officials may also use a dummy called “Vomiting Larry” to increase the reality of simulations.⁴²
 - Improved Laboratory Access: Tennessee’s use of regional laboratories to speed testing, described above, is interesting, particularly given the size of the state (440 miles long by 124 miles wide). Wisconsin’s use of a courier system to speed up submission of specimens works well in that state.
 - Licensure Agency Agreement about Reporting: As noted earlier, there are a number of disincentives that tend to delay long-term-care facility reporting of outbreaks, including the release of information that may suggest that the facility is of low quality. In Ohio, the state licensing bureau and the state health department worked out an agreement wherein if a facility submits a timely self-report of an outbreak, the agency will not log the outbreak as a quality complaint. A local public health person stated, “Getting something back from us reflecting the work they’ve done is a real positive for the facilities.”⁴³
 - Sharing results: In Wisconsin, the state public health division compiles and analyzes each outbreak of norovirus in long-term-care facilities. A summary of the analysis is sent to the corresponding local health department, facility, and to the regulatory agency. The data are valuable for assessing success in containing outbreaks and is valued by the facilities. They see from the summaries the value of their completing the line lists and to their efforts to contain outbreaks.⁴⁴
 - Combined Trainings: Given the challenges in arranging for trainings in long-term-care facilities experienced by local and state health departments in nearly every state interviewed, the approach being

used in Knoxville, described above, offers an innovative approach to “getting in the door” with norovirus training for long-term-care facility staff. Perhaps other models of multiple agency trainings can be explored.

Conclusions:

Outbreaks of norovirus present a significant challenge in virtually every state in the U.S. While prevention of norovirus in long-term-care facilities may be virtually unachievable, at least until a vaccine is developed, interventions following CDC guidelines and good public health practice can certainly limit the extent and severity of outbreaks. Based on the interviews conducted with this project, it is clear that no single state or local health department has all the answers for controlling outbreaks in long-term-care facilities. More needs to be done to enlist full participation from licensing agencies in most of the states. Additionally, state and local public health officials can learn much from their colleagues around the country. The authors heard from most of those interviewed that they would like to see this report from Oregon upon its completion.

Perhaps a broader dialogue could address two of the principal barriers to controlling norovirus outbreaks: (1) the perception that acute gastroenteritis, even in long-term-care facilities, is not a significant health problem, and (2) the current lack of resources that typify most local and state health departments in 2014.

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- ²⁵ Personal Interview with David Sweat, Shelby County Health Department, Tennessee. February 19, 2014.
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²⁷ Personal Interview with Kirk Smith, MD, Minnesota Department of Health. February 25, 2014.

²⁸ Personal Interview with Connie Cronley, RN, Knox County Health Department, Tennessee. February 27, 2014.

²⁹ Personal Interview with Traci DeSalvo, Wisconsin Division of Public Health, and Denise Krueger, Winnebago County Health Department. March 3, 2014.

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Appendices

Appendix 1

State and Local Health Officials Contacted

Oregon:

- Amy Sullivan, PhD, MPH, Communicable Disease Services, Multnomah County Health Department. Amy.d.sullivan@multco.us.
- Sharon Hofer, RN, BSN, Nurse Epidemiologist, Washington County Department of Health and Human Services.
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- David Sweat, MPH, Chief of Epidemiology, Shelby County Health

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- Effie Boothe, RN, MSN, Communicable and Environment Diseases and Emergency Preparedness, Tennessee Department of Health, Nashville, TN. Effie.Boothe@tn.gov.
- John Dunn, DVM, PhD, Deputy State Epidemiologist, Tennessee Department of Health, Nashville, TN, John.Dunn@tn.gov.
- Kathy Brown, MS, Director of Community Assessment and Health Promotion; Regional Epidemiologist, Knox County Health Department, Knoxville, TN, Kathy.Brown@knoxcounty.org,
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Minnesota

- Paula Snippes Vagnone, Microbiology Supervisor, Infectious Disease Section, Minnesota Department of Health. Paula.snippes@state.mn.us,
- Amy Saupe, MPH, Epidemiologist, Acute Disease Investigation & Control, Minnesota Department of Health. Amy.Saupe@state.mn.us,
- Kirk Smith, MD, Supervisor, Acute Disease Investigation & Control, Minnesota Department of Health. Kirk.smith@state.mn.us,
- Erica Bagstad, RN, Epidemiologist, Hennepin County Public Health, Minneapolis, MN. Erica.Bagstad@hennepin.us,

Appendix 2 Survey Questions Asked

Norovirus Interviews Interview with _____ (Title, Health Department) (Phone Number) (Date)

- *What would contribute to overcoming NV?*
- *What works best to modify behavior of LTCFs such that they follow recommendations for controlling an outbreak?*
- *How to get early reporting from LTCFs:*
- *How are Outbreaks Defined:*
- *Do you experience Delays with lab results?*
- *When is an outbreak considered over?*
- *Recommendations re isolation/cohorting within facility?*
- *What Educational approaches do you use with LTCFs?*
- *Role of sanitarians?*
- *Do you have an outbreak tool kit? How is it used?*
- *Do you experience issues with transferring patients between hospitals and LTCFs?*
- *Are NORs and CaliciNet entries made?*
- *Do YOU want information on anything, or have more to add?*