Calicivirus Outbreaks in Long-Term Care Facilities

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Topics of Discussion

• The Historical Norovirus

• Caliciviruses: Norovirus & Sapovirus

• Calicivirus Outbreak Control

• Questions?
The Historical Norovirus
The Historical Norovirus

✓ Picturesque names
  ✓ Small round structured virus
  ✓ Winter vomiting disease
  ✓ Norwalk virus

✓ Virus has been known since 1968

✓ Epidemiology has changed dramatically since 2002

✓ Wrecks havoc in long term care facilities
The Historical Norovirus

Whence came norovirus?

Oregon

Ohio
The Historical Norovirus

*Bronson-Norwalk Township School*

- **Halloween 1968**
- **116 of 223 students and teachers sickened**
The Historical Norovirus

Bronson-Norwalk School Outbreak

![Graph showing the distribution of norovirus cases over time](image)
The Historical Norovirus

Norovirus has since caused...

- waterborne outbreaks: Arizona, Lawson et al., 1988
- foodborne outbreaks: Louisiana, Kohn et al., 1995
- desmotertic outbreaks: Oregon State Penn, 2005
- military outbreaks: Iraq, Bailey et al., 2005
- maritime outbreaks
  - naval: Persian Gulf, Sharpe et al., 1995
  - cruise ships: United States, Widdowson et al., 2004
- long term care facility outbreaks: Ning et al., 2010
Caliciviruses: Norovirus & Sapovirus

Norovirus

Transmission electron micrograph

Artist’s rendering
Caliciviruses: Norovirus & Sapovirus

non-enveloped SS-RNA viruses

Caliciviruses

Vesivirus  Norovirus  Lagovirus  Sapovirus

Group 1
Norwalk
Desert Shield
more

Group 2
Farmington Hills
Hunter
Minerva
New Orleans
Sydney

more

Group 1
Houston
Manchester
more

Group 2
Cruise Ship
London
Bristol
more

Group 3
poultry

Group 4
Osaka
Angelholm
more
## Caliciviruses: Norovirus & Sapovirus

### Emergent GII.4 Norovirus Variants

<table>
<thead>
<tr>
<th>Variant</th>
<th>Years of Circulation</th>
<th>Pandemic Season</th>
<th>Other Names</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hunter</td>
<td>2003–2006</td>
<td>None</td>
<td>2004</td>
</tr>
<tr>
<td>New Orleans</td>
<td>2009–present</td>
<td>None*</td>
<td></td>
</tr>
</tbody>
</table>

*Based on data available as of September 2010, the New Orleans GII.4 variant has not been associated with an increased number of norovirus outbreaks in the U.S.

Hall 2011 MMWR
Epidemic curve by month
Norovirus outbreaks* in Oregon nursing homes, 2011-2013

December 2012, reported gastro OBs, test results pending (n=20)

December, 2012, reported gastro OBs, 13-year average (n=8)

* ≥ 2 norovirus-positive stool samples
Caliciviruses: Norovirus & Sapovirus

Why are we suddenly having so many gastro outbreaks?

Norovirus strain replacement - i.e., the arrival of a new strain to which no one is immune - occurs about every four years and usually, but not always, results in pandemic spread. Norovirus pandemics occurred with strain replacements in 1995, 2002, and 2006, but not when a new strain emerged in 2009. Genotype II-4 (GII.4) norovirus spreads rapidly and is the most commonly detected strain worldwide.

On November 28, 2012, the Centers for Disease Control and Prevention announced that a new strain of norovirus was identified in Australia and has reached U.S. shores. This new strain, norovirus GII.4 Sydney, was confirmed in Oregon by the Oregon State Public Health Laboratory on December 13, 2012.

This finding indicates that we could see widespread norovirus activity this year. The number of outbreaks of norovirus-like illness reported from November 1 through December 11, 2012 (n=24), is nearly twice that seen during the same period in 2011 (n=14).
**Caliciviruses: Norovirus & Sapovirus**

**Aggravating characteristics of caliciviruses:**

- very low infectious doses
- high percentage of “vomitors”
- widespread environmental contamination
- easy transmission from person-to-person
Caliciviruses: Norovirus & Sapovirus

Norovirus Transmission Cycle

- Symptomatic
- Asymptomatic
- Infected
- Present (Protected)
- Absent (Susceptible to Infection)
- Previously Acquired Immunity
- Non-secretor (Innately Resistant)
- Secretor (Susceptible to Infection)
- Exposed Population
- Intestinal Pathology
- Viral Shedding
- Stool
- Vomit
- Transmission Vehicles
- Person-to-Person
- Environment & Fomites
- Water
- Food
Caliciviruses: Norovirus & Sapovirus

Classic profile of signs and symptoms

<table>
<thead>
<tr>
<th>Signs (residents and staff, 03-12)</th>
<th></th>
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</thead>
<tbody>
<tr>
<td>Diarrhea</td>
<td>86%</td>
</tr>
<tr>
<td>Vomiting</td>
<td>72%</td>
</tr>
<tr>
<td>Fever</td>
<td>16%</td>
</tr>
</tbody>
</table>

Symptoms (staff only, 2003 data only)

<table>
<thead>
<tr>
<th>Symptoms (staff only, 2003 data only)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Cramps</td>
<td>67%</td>
</tr>
<tr>
<td>Nausea</td>
<td>78%</td>
</tr>
<tr>
<td>Myalgia</td>
<td>42%</td>
</tr>
<tr>
<td>Fatigue</td>
<td>80%</td>
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</tbody>
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Pathognomonic: Vomiting
Calicivirus outbreak control
Calicivirus outbreak control

What to do?

✓ Be afraid. Be very afraid when 2+ residents or employees have abrupt onsets of vomiting, diarrhea or both

✓ Call your county health department

✓ Implement control measures vigorously & immediately

✓ Collect stool specimens

✓ Collect patient data
Calicivirus outbreak control

What to do? Call your county health department

✓ It’s the law

Long term care facilities (LTCFs) and hospitals are required to report gastroenteritis outbreaks to the county health authority under OAR 333-018.0000.

County health authorities are empowered to investigate such outbreaks under OAR 333-019.0000.

✓ They can help

✓ http://public.health.oregon.gov/DiseasesConditions/CommunicableDisease/Outbreaks/Pages/gastro.aspx
Calicivirus outbreak control

What to do? Implement control measures vigorously & immediately

Control Measures for Patients
- Discontinue admissions or transfers to the outbreak-affected unit until the last patient with vomiting or diarrhea has been symptom-free for 48 hours.
- Ask sick patients to stay in their rooms until symptom-free for 48 hours.
- Discontinue group activities (including meals) until the outbreak is over.
- Do not transfer patients symptomatically or non-symptomatically from outbreak-affected to unafflicted units until the outbreak is over unless it is absolutely, medically necessary.
- Ask sick visitors to stay home until symptom-free for 48 hours.
- Do not permit children in the facility until the outbreak is over.
- Dedicate patient-care equipment to a single patient or among similarly ill patients. Clean and disinfect the equipment between sick patients if using common equipment is unavoidable.
- Consider giving anti-emetics to patients with vomiting and anti-peristaltics to patients with diarrhea.
- Use control precautions with sick patients until they are symptom-free for 48 hours.
- Move sick patients to a private room or a room with other sick patients (coughing).

Control Measures for Staff
- Use plain soap & water to WASH YOUR HANDS, WASH YOUR HANDS, WASH YOUR HANDS.
- Use alcohol-based hand sanitizers (60-95%) ONLY IF FEASIBLE washing hands with plain soap and water.
- Keep the same staff to patient assignments (coughing nurses).
- Stop “bathing” staff from outbreak-affected to unafflicted units.
- Do not unnecessarily send home staff who are sick at work, having sick staff until symptom-free for 48 hours.
- Evaluate non-essential staff from outbreak-affected units.
- Wear gloves and gowns when caring for sick patients.
- Remove protective gear before leaving the room, wash hands immediately.
- Clean up vomit and diarrhea following guidelines for Cleaning Up Vomit and Other Unpleasant Tasks.
- Use a 1000 ppm bleach solution (1/2 cup household [0.25%] bleach to 1 gallon water) or other disinfectants EPA-registered for norovirus disinfection. The solution to be used during a norovirus outbreak. Bleach solutions must be freshly made within 24 hours of use and mop heads and cloths changed between batches of bleach.

CLEANING UP VOMIT AND OTHER UNPLEASANT TASKS

General Principles
- Handle with care anything contaminated with vomit or diarrhea:
  - Wear protective gear (gloves, masks & gowns).
  - Wear protective gowns (garments), disposable gloves, and face masks.
  - Use safe techniques to avoid spreading disease.
  - Do not wash contaminated items & other materials;
  - Use a 1000 ppm household bleach solution (1/3 cup household bleach to 1 gallon water).
  - Use a 1000 ppm household bleach solution (1/3 cup household bleach to 1 gallon water).

Specific Situations

Cleaning specific situations:
- Carefully remove vomit and diarrhea, follow appropriate techniques and equipment.
- Use a 1000 ppm household bleach solution (1/3 cup household bleach to 1 gallon water).
- Use covers, gowns, and gloves when handling contaminated items.
- Use a 1000 ppm household bleach solution (1/3 cup household bleach to 1 gallon water).
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Cleaning up vomit in the kitchen:
- Carefully remove the vomit and diarrhea.
- Use covers, gowns, and gloves when handling contaminated items.
- Use a 1000 ppm household bleach solution (1/3 cup household bleach to 1 gallon water).
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Calicivirus outbreak control

What to do? Collect stool specimens

The Stool Sample Kit: Instructions for Staff

What is the Stool Sample Kit?
The stool sample kit is a packet of materials for would-be cases who have agreed to give you a stool specimen for pathogen testing.

Although many can be talked into donating a stool specimen, we don’t always get good specimens back from everyone who says yes. Sometimes they don’t come back, and sometimes they aren’t good. After much thought, discussion, and experimentation, we’ve come up with this kit—a revolutionary new packet of materials in English and Spanish that makes collecting a stool specimen simple and fun. You distribute this kit, collect them when they’ve been used, process the specimens back at the health department, and send the specimens to the OSPLH by courier.

Stocking the Stool Sample Kit
Kits can be ordered directly from the OSPLH, or through the Oregon Order Form (OSF). Most counties should try to keep a kit on hand—maybe a few more in the biggest counties.

The kit is never fully assembled, or—if it’s in a kit—never in the room. You can stack the paper bowls and the specimen containers separately. Without those items, the kit contains a piece of the fabric in a large envelope flat in the large envelope flat, but don’t forget to make sure you send them back before you send the kit out!

In addition to the Stool Sample Kit, which are for patients, you’ll need the materials to use for processing the specimen that will start in the box. Keep some Cary-Blair transport media on hand for bacterial cultures. Formalin preservative is recommended for most parasite testing, but if you don’t have the on-hand, you can order it directly at the Oregon Order Form.

You’ll need sterile swabs to inoculate some of the test from the Cary-Blair or parasite specimen container, some cardboards that you can work on to facilitate clean-up, and the official OSPLH specimen submission forms with the bar code stickers.

The kit is shelf stable indefinitely, although the alcohol pads may dry out a bit after a year. Cary-Blair media is best stored at room temperature and have a pretty long shelf life, but they do dry out—check the expiration date before using.

Distributing Stool Sample Kits to Sick People

How you distribute kits to potential donors depends on the circumstances. You may drop off a kit at a school, office, or camp, or they may be handed to restaurant staff. You can take them to someone’s home, or you can ask people to pick them up at the health department. Each kit is a kit—ask people to pick them up at the health department. "Empty" kits can be mailed, and in many areas will be delivered the next day. (This is a modal, and the "empty" kits are mailed the next day. (This is a normal, and the "empty" kits cannot be mailed. The "empty" kits cannot be mailed. (This is a normal, and the "empty" kits are mailed the next day. (This is a normal, and the "empty" kits are mailed the next day. (This is a normal, and the "empty" kits are mailed the next day. (This is a normal, and the "empty" kits are mailed.”)

You must tell donors how to get the specimen back to you. Again, this will depend on the situation. You may be picking them up from their home, school, or work site, or you may have asked them to drop them off at the health department. Whatever route you choose, write your instructions on the box at

County health department provides “It Kits”

Good idea to stock up before you have a gastro outbreak

Collect five stool samples ASAP

Confirming norovirus lends strength to your control measures

Oregon Health Authority
Calicivirus outbreak control

What to do? Collect patient data

County health provides “GI Case Log”

Fax to county health every day until the outbreak is over
Calicivirus outbreak control

Typical epidemic curve & symptom profile

Implementing control measures vigorously & immediately is known to reduce attack rates and duration of gastro outbreaks.
Resources

• **Up-to-date info about calicivirus outbreaks in Oregon**
  

• **Investigative guidelines for county health**
  
  https://public.health.oregon.gov/DISEASESCONDITIONS/COMMUNICABLEDISEASES/OUTBREAKS/Pages/gastro.aspx

• **CDC norovirus page**
  
  http://www.cdc.gov/norovirus/index.html
Caliciviruses: Norovirus & Sapovirus

Questions?

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  971-673-1063, lore.e.lee@state.or.us

- County Health Department Contact information at: