
Calicivirus Outbreaks in Long-Term Care Facilities

Lore Elizabeth Lee, RN, MPH

Clinical Epidemiologist

Acute and Communicable Disease Prevention

Oregon
Health
Authority

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?



The Historical Norovirus

Norwalk, Ohio: the Outbreak



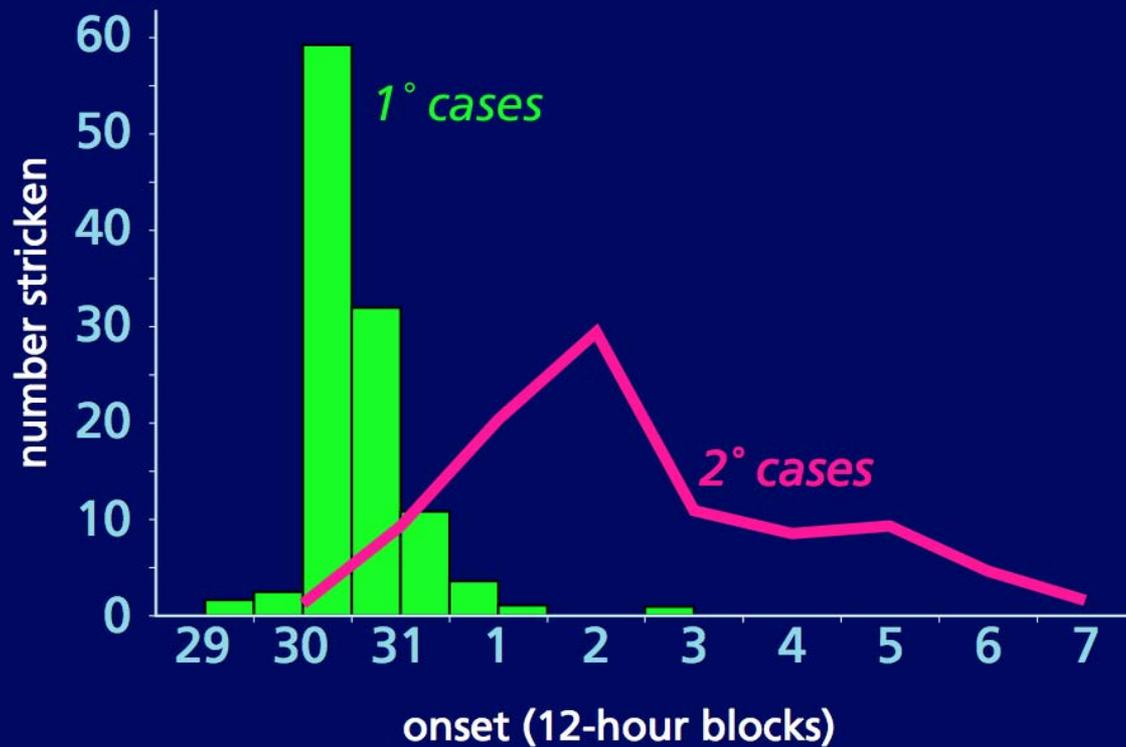
The Historical Norovirus

Bronson-Norwalk Township School

- Halloween 1968
- 116 of 223 students and teachers sickened



The Historical Norovirus *Bronson-Norwalk School Outbreak*

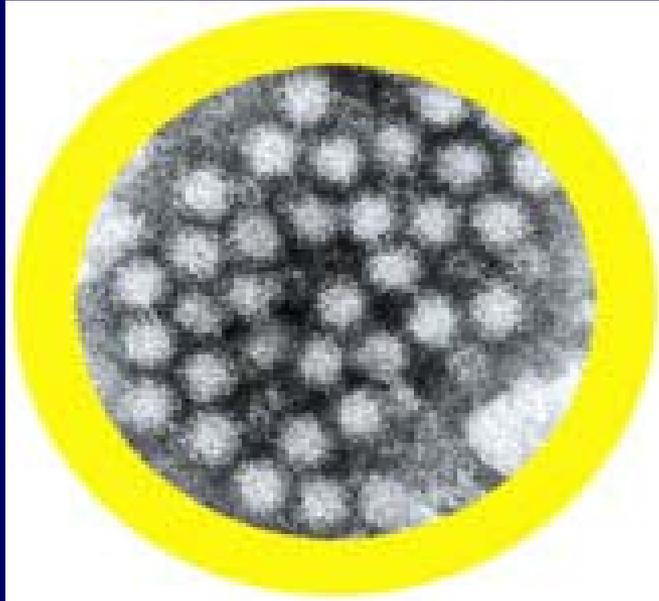


The Historical Norovirus

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



Transmission electron
micrograph



Artist's rendering

Norovirus

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

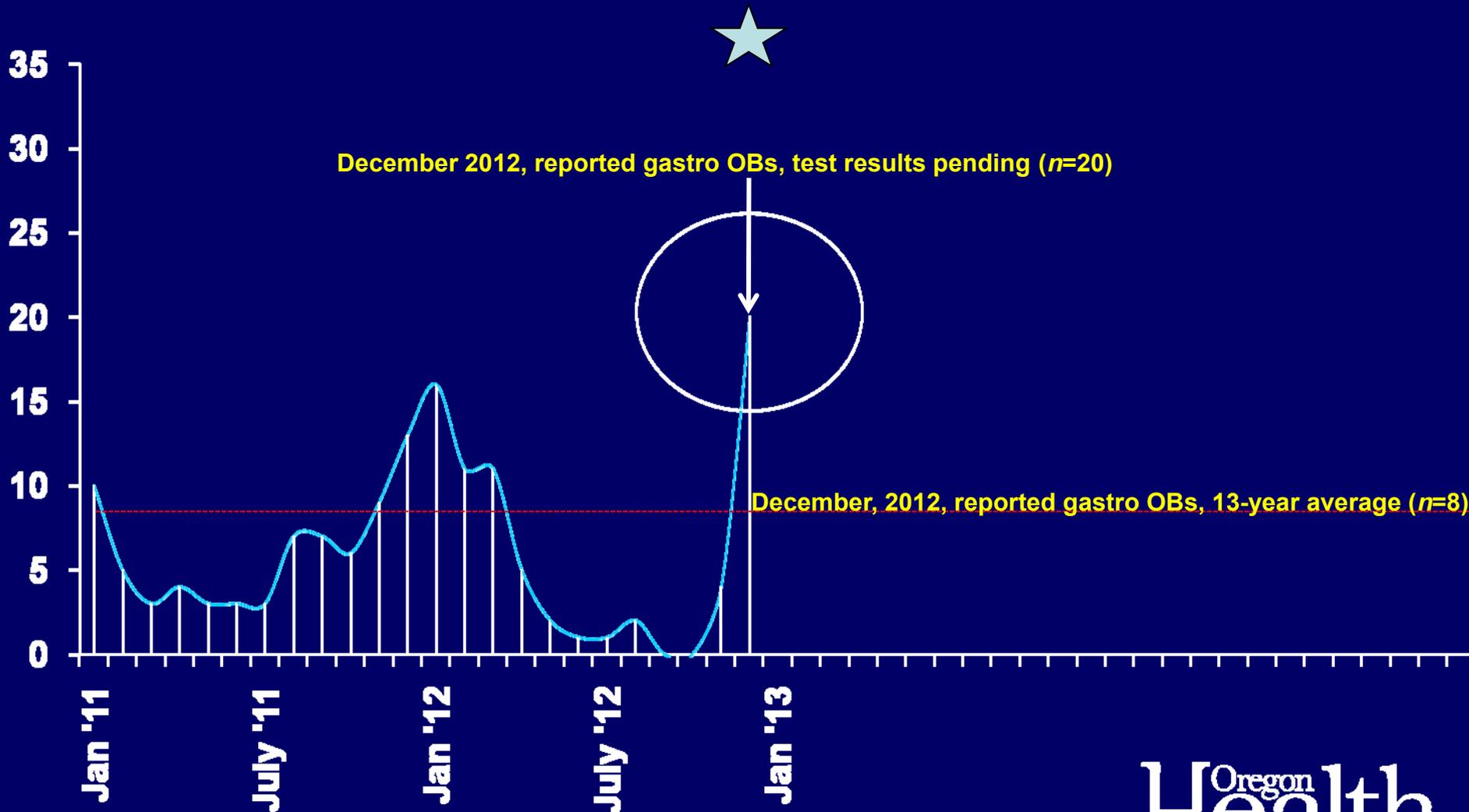
Variant	Years of Circulation	Pandemic Season	Other Names
95/96-US	1995–2002	1995–1996	Grimsby
Farmington Hills	2002–2005	2002–2003	2002
Hunter	2003–2006	None	2004
Yerseke	2006–2008	2006–2007	Laurens, Nijmegen, 2006a
Den Haag	2006–present	2006–2007	Minerva, 2006b
New Orleans	2009–present	None*	

*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

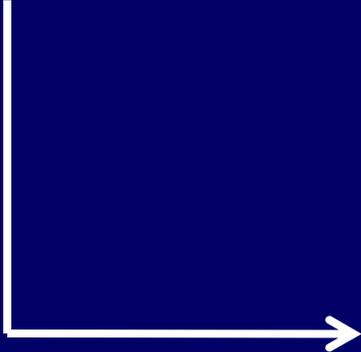
Norovirus outbreaks* in Oregon nursing homes, 2011-2013



* ≥ 2 norovirus-positive stool samples

Caliciviruses: Norovirus & Sapovirus

Why are we suddenly having so many gastro outbreaks?



From: HAN.OREGON@Oregonhealthnetwork.org [mailto:HAN.OREGON@Oregonhealthnetwork.org]
Sent: Friday, December 21, 2012 1:44 PM
To: lore.e.lee@state.or.us
Subject: Norovirus Strain Replacement, Oregon 2012 [id: 481002]
Importance: Low

Sensitive: No
Acknowledge: No
Event Status: Actual

December 21, 2012

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 26, 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 GI.4 Sydney, was confirmed in Oregon by the Oregon State Public Health Laboratory on December 10, 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).

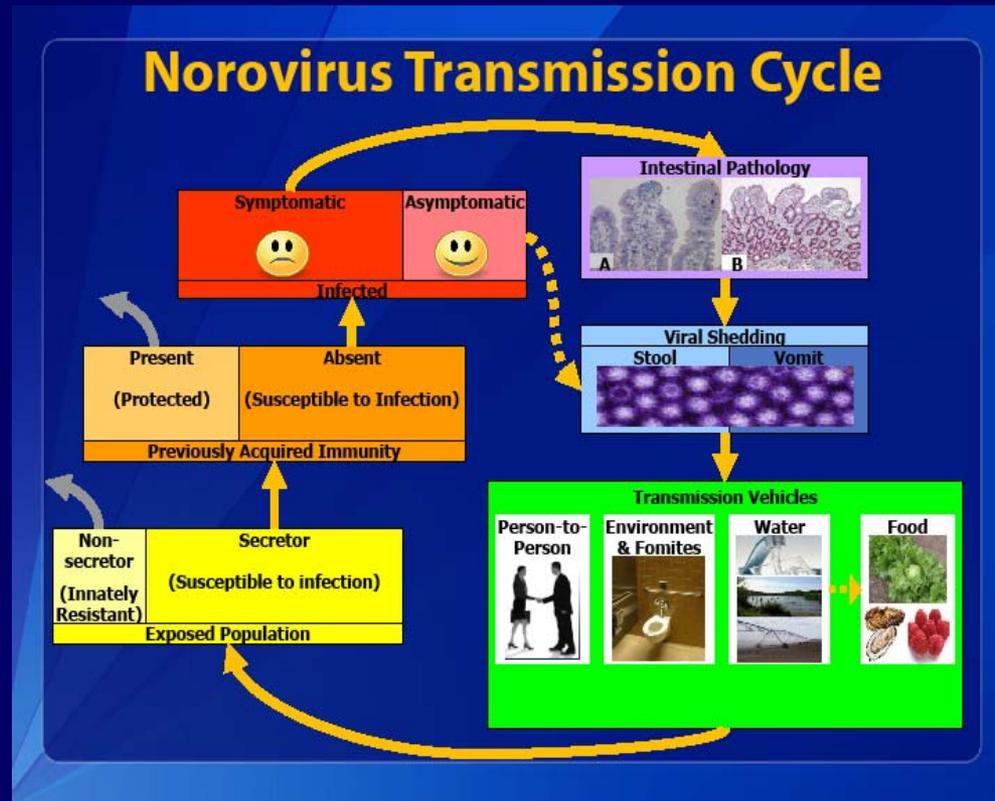
Norovirus strain replacement
GII.4 Sydney

Caliciviruses: Norovirus & Sapovirus

Aggravating characteristics of caliciviruses:

- ✓ **very low infectious doses**
- ✓ **high percentage of “vomitters”**
- ✓ **widespread environmental contamination**
- ✓ **easy transmission from person-to-person**

Caliciviruses: Norovirus & Sapovirus



Caliciviruses: Norovirus & Sapovirus

Classic profile of signs and symptoms

Signs (residents and staff, 03-12)

Diarrhea	86%	
Vomiting	72%	} pathognomonic
Fever	16%	

Symptoms (staff only, 2003 data only)

Cramps	67%
Nausea	78%
Myalgia	42%
Fatigue	80%

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

NOROVIRUS & SAPOVIRUS OUTBREAK CONTROL MEASURES



HEALTHCARE SETTINGS

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 (symptomatic or not) from outbreak-affected to unaffected 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 *contact 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 (cohorting).

Control Measures for Staff

- Use plain soap & water to **WASH YOUR HANDS, WASH YOUR HANDS, WASH YOUR HANDS.**
- Use ethanol-based hand sanitizers (60-95%) **ONLY AFTER** washing hands with plain soap and water.
- Keep the same staff to patient assignments (cohort nursing).
- Stop "floating" staff from outbreak-affected to unaffected units.
- Immediately send home staff who are sick at work; furlough sick staff until symptom-free for 48 hours.
- Exclude 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 (1/3 cup household [5.25%] bleach to 1 gallon water) or other disinfectants EPA-registered for norovirus disinfection for routine cleaning during a norovirus outbreak; bleach solutions must be freshly made within 24 hours of use and mop heads changed between batches of bleach.

Revised: 01 December 2012

Source: MacCannell T, et al. *Guideline for the prevention and control of norovirus gastroenteritis outbreaks in healthcare settings. Infection Control and Hospital Epidemiology* 2011;32:939-6.

Oregon Public Health Division, Acute and Communicable Disease Prevention Program 800 NE Oregon St., Portland, OR 97232. Phone: 971-673-1111 Fax: 971-673-1100

CLEANING UP VOMIT AND OTHER UNPLEASANT TASKS

Staff who clean up vomit and diarrhea should use the following precautions to reduce their risk of infection



General Principles

- Handle with care anything contaminated with vomit or diarrhea:
 - wear protective gear (gloves, masks & gowns)
 - soak up vomit & diarrhea with disposable cloths or absorbents like cat litter
 - do not shake contaminated linen & other materials
 - remove contaminated linen & other materials in impervious bags
- Clean & disinfect contaminated areas and surrounding areas:
 - remove every bit of vomit or diarrhea from all surfaces
 - clean with detergent & hot water
 - THEN
 - use 5000 ppm hypochlorite (bleach) solution—1½ cups household (5.25%) bleach to one gallon of water—left in place for at least 5 minutes & followed by a hot water rinse; bleach solution must be freshly made within 24 hours
 - OR
 - use an EPA-registered norovirus disinfectant

Specific Situations

Cleaning specific things

Bed linens, curtains, pillows & non-disposable mop heads: do not mix contaminated materials with other materials; launder with water temperature 140°-160°F; disinfect pillows with impermeable covers with 0.5% bleach solution

Carpets and upholstery: carefully remove vomit and diarrhea; clean contaminated carpet or upholstery w/ detergent and hot water; steam clean at 158°F for 5 minutes or 212°F for 1 minute; do not vacuum

Furniture, floors, and other vertical & horizontal hard, non-porous surfaces (in the vicinity of the contaminated area): carefully remove vomit and diarrhea; clean contaminated furniture and other hard surfaces w/ detergent and hot water; disinfect with 0.5% bleach solution

Fixtures and fittings in toilet areas: carefully remove vomit and diarrhea; clean contaminated fixtures and fittings w/ detergent and hot water; disinfect with 0.5% bleach solution

Cleaning up vomit in the kitchen

Work restrictions: kitchen staff must not be allowed to work if they are vomiting or have diarrhea, furlough anyone with vomiting or diarrhea until symptom-free for 48 hours

If a vomiting or diarrhea accident occurs in the kitchen:

- carefully remove the vomit and diarrhea and disinfect the area surrounding the accident w/ 0.5% bleach solution as described above
- if the contaminated area is a food contact surface, decontamination must be followed by a clear-water rinse and a final wipe down with 200ppm sanitizing bleach solution

Food: destroy any exposed food, food that may have been contaminated, and food that was handled by the worker who had the accident

Revised: 7 April 2009, 01 December 2012

Source: MacCannell T, et al. *Guideline for the prevention and control of norovirus gastroenteritis outbreaks in healthcare settings. Infection Control and Hospital Epidemiology* 2011;32:939-6

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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 people 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 the kits, collect them when they've been used, process the specimens back at the health department, and send the specimens to the OSPHL by courier.

Stocking the Stool Sample Kit

Kits can be ordered directly from the OSPHL on the Stockroom Order Request Form (#71-54). Most counties should try to keep ~5 kits on hand—maybe a few more in the biggest counties.

The kit can be stored fully assembled, or—if storage space is at a premium—you can stack the paper bowls and the specimen containers separately. Without those items, the It-Kit (contents shown in the photo) lies reasonably flat in its large manila envelope—but don't forget to add them back before you send the kits out!

In addition to the Stool Sample Kits, which are for patients, you'll need the materials to use for processing the specimens that will start flooding in. 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 this on hand you can order as needed (which won't be very often). You'll need sterile swabs to inoculate some of the raw stool into the Cary-Blair or parasite specimen containers, some absorbent pads that you can work on to facilitate clean-up, and the official OSPHL specimen submission forms with the bar code stickers.



The kit is shelf-stable indefinitely, although the alcohol pads may dry out a bit after years. Cary-Blair media can be stored at room temperature and have a pretty long shelf life, but they do outdate—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 stack at a school, office, or camp; or they may be handed to restaurant staff. You can take them to someone's home, or you may 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. The postage (\$2.29 in May 2012) may look like a bargain next to the gas and staff time needed to drop it off. (N.B. Used kits cannot be returned in the mail!)

You must tell donors how to get the specimens 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 in your instructions in the box at

19 July 2012

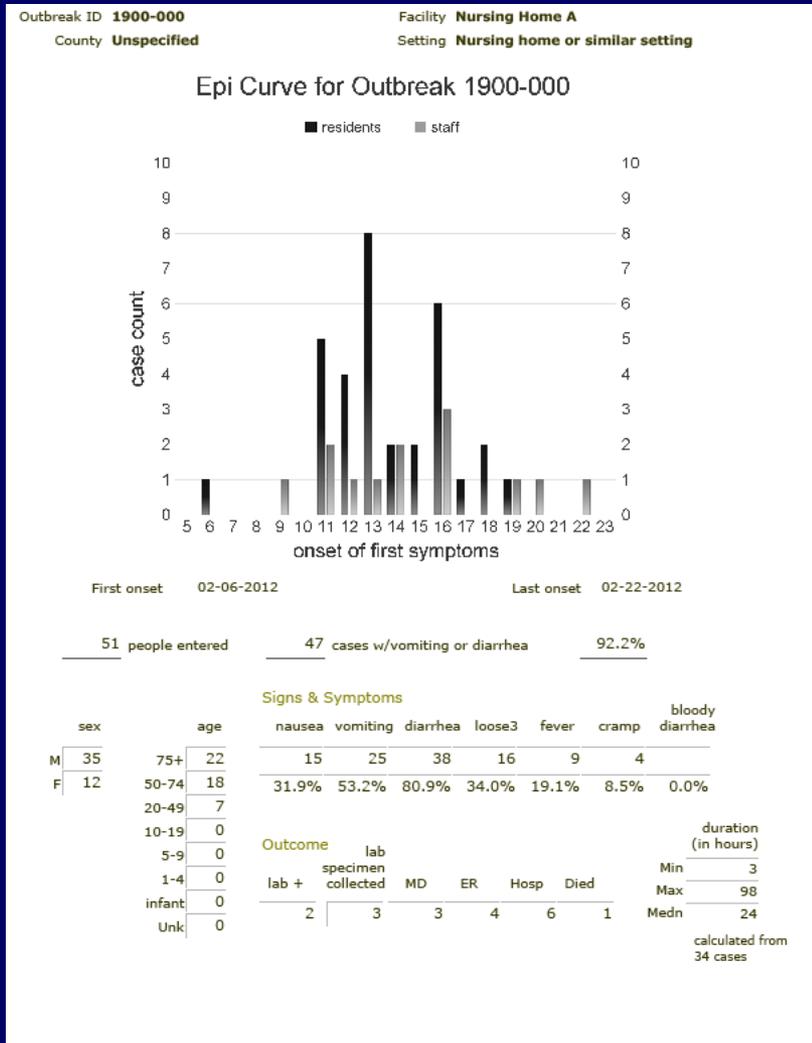
County health department provides
"It Kits"

Good idea to stock up before
you have a gastro outbreak

Collect five stool samples ASAP

Confirming norovirus lends strength
to your control measures

Calicivirus outbreak control



Typical epidemic curve & symptom profile

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

Resources

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

<https://public.health.oregon.gov/DiseasesConditions/DiseasesAZ/Pages/disease.aspx?did=110>

- **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



<http://www.giantmicrobes.com/us/products/norovirus.html>

Questions?

- Lore Elizabeth Lee RN, MPH
971-673-1063, lore.e.lee@state.or.us
- County Health Department Contact information at:
<http://www.oregon.gov/DHS/ph/lhd/lhd.shtml>