

OREGON PUBLIC HEALTH DIVISION • OREGON HEALTH AUTHORITY

**NOROVIRUS: NOTORIOUS — AND A NEW STRAIN**

**D**o you feel like you're seeing more vomiting and diarrhea this season? You probably are, because the infamous "winter vomiting disease," a.k.a. "cruise ship disease," a.k.a. "stomach flu," has a new strain.

Noroviruses may be the Rodney Dangerfields of communicable diseases, but they are the most common cause of acute gastroenteritis (both sporadic cases and outbreaks) in the United States.<sup>1,2</sup> Each year, noroviruses cause a guesstimated 21 million illnesses and contribute to perhaps 70,000 hospitalizations and 800 deaths, mostly among young children and the elderly.<sup>2-4</sup> In Oregon, that equates to about 260,000 illnesses, 900 hospitalizations and 10 deaths annually. The bottom line is that noroviruses cause significant morbidity and mortality. Case in point: a Secretary of State recently suffered from a "stomach virus," followed by dehydration-induced syncope and fall that caused a concussion, with recuperation complicated by transverse sinus thrombosis. And a month of missed work.

**THE VIRUS**

Noroviruses are named after the first-identified strain, after it caused an outbreak of gastroenteritis in a school in Norwalk, Ohio in 1968.<sup>5,6</sup> Norovirus is a genus within the *Caliciviridae* family, and it includes three human genogroups with 26 genotypes. Since 2002, variants of norovirus genogroup II, genotype 4 (GII.4) have been the most common worldwide.

Since virologists have been able to track it, norovirus "strain replacement" — the arrival of a new strain to which no one is immune — has occurred roughly every four years. On November 26, 2012, the Centers for Disease Control and Prevention announced that a new strain, dubbed "GII.4 Sydney," was identi-

fied in Australia and had reached U.S. shores. Sydney was confirmed in Oregon by the Oregon State Public Health Laboratory (OSPHL) on December 10. Outbreaks of norovirus infection in Oregon (Figure) reflect the cyclical epidemics that accompany the emergence of new strains of GI.4; the introduction of GI.4 Sydney may account for our recent uptick in outbreaks.

**TRANSMISSION**

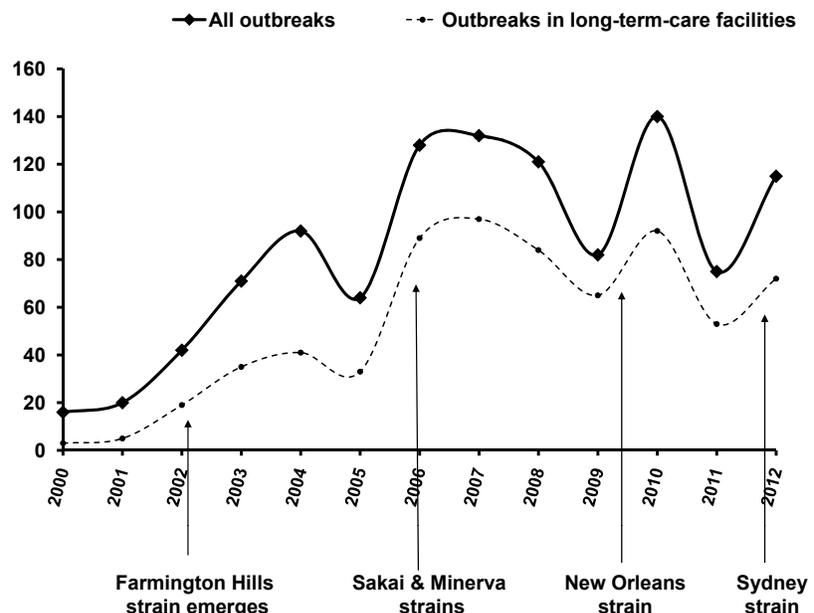
You can get norovirus illness at any time of year, but for unknown reasons it is most common in winter. Transmission is primarily fecal-oral, and it occurs directly from person to person or via contaminated food, water or fomites, and apparently even aerosolized vomitus. Noroviruses are remarkably contagious: an infected person sheds *billions* of norovirus particles in stool or vomitus, and it takes as few as 18 of them to infect another person.<sup>7</sup> It is possible for an infected person to shed norovirus *before* they have symptoms, though shedding is thought to be maximal

when the patient has diarrhea. Although noroviral sequences are detectable in patients' feces for at least two weeks after symptom onset, it is not known whether they are still contagious, as the virus has defied attempts at culture.<sup>8</sup> Not everyone who is exposed to norovirus will get infected; as many as 30% of infections may be asymptomatic. It is possible to develop immunity to specific norovirus types, but because there are so many, one can get infected many times over a lifetime. It is not known how long immunity lasts.

**OUTBREAKS**

The outbreaks identified most commonly in Oregon are those spread from person to person in long-term-care facilities, schools, daycare centers, and even outpatient clinics (you know who you are). Nearly two-thirds of Oregon's norovirus outbreaks have been in long-term-care facilities (Figure). Foodborne outbreaks have also occurred in schools, restaurants, banquet halls, and dining rooms in the home — in short, any place where people eat food handled or prepared by others.

Figure. Norovirus outbreaks in Oregon, 2000–2012





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## CLINICAL PRESENTATION

Symptoms of gastroenteritis usually ensue 24–48 (median ~33) hours after exposure to norovirus. Illness is characterized by nausea, vomiting, non-bloody diarrhea and abdominal cramps. Myalgia, malaise, and headache are also common. Low-grade fever is present in about half of cases. The misery typically lasts 24–72 hours. Most persons afflicted recover completely without any serious long-term problems. But norovirus illness can be serious, especially for young children, older adults, and people with compromised immune systems; it can lead to severe dehydration, hospitalization, and death.

## DIAGNOSIS & TREATMENT

Most clinical laboratories do not test for noroviruses. Norovirus reverse transcriptase-polymerase chain reaction (RT-PCR) testing of stool (courtesy of OSPHL) is typically employed when an outbreak is reported to public health officials. In epidemiologic investigations, genetic characterization of norovirus strains found in stool and environmental samples has been useful in linking cases to each other, thereby suggesting a common source.

## WHAT'S A DOC TO DO?

First, report all *outbreaks* of acute gastroenteritis, including suspected outbreaks of norovirus, to the local health department.\*

Second, patient education is generally the only way to prevent secondary cases:

- **Encourage proper hand hygiene.** Washing hands carefully (and often) with *soap and water* is key. Regret-

tably, alcohol-based hand sanitizers are unlikely to inactivate the non-enveloped calicivirus.<sup>9</sup>

- **Tell sick persons to stay home.** Dedicated employees never want to call in sick, so read them the riot act: 18 viral particles can generate company for the misery of norovirus infection.
- **Remind sick persons not to prepare food or to care for others** for at least two days after recovery. This also applies to sick workers in congregate settings like schools and child-care centers.
- **Encourage bathroom segregation when possible.** If ill persons can use a bathroom separate from that used by well family members, more prevention to them.
- **Counsel to wash contaminated laundry thoroughly.** Patients and caregivers should handle soiled items carefully: wear rubber gloves, wash items with detergent at the maximum cycle length, and machine dry them.
- **Promote environmental disinfection.** Noroviruses are relatively hardy: they can survive on surfaces and infect people after days or even weeks.<sup>10</sup> Contaminated surfaces should be disinfected using a chlorine bleach solution with a concentration of 1000–5000 ppm (5–25 tablespoons of household bleach [5.25%] per gallon of water).<sup>11</sup> Some other disinfectants are also endorsed as effective against noroviruses by the Environmental Protection Agency (see [http://epa.gov/oppad001/list\\_g\\_norovirus.pdf](http://epa.gov/oppad001/list_g_norovirus.pdf))
- **Protect diners.** Oregon's food code requires that food handlers and preparers with diagnosed or presumptive norovirus infection be restricted from such work until at

least 48 hours after their symptoms resolve.

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\* Individual cases are not “reportable” in Oregon.