

Outbreak of Norovirus and Influenza A/H3 in a Long-Term Care Facility – Sedgwick County, December 2012



Background

On December 31, 2012 at 1:30 p.m., the Sedgwick County Health Department (SCHD) notified the Kansas Department of Health and Environment's Bureau of Epidemiology and Public Health Informatics (KDHE-BEPHI) of a report received from a long-term care facility (LTCF) administrator of gastrointestinal illnesses in 19 residents. There were approximately 54 residents and had 80 staff members at the LTCF at the time of the report. Within the next 24 hours, two staff members and three residents exhibiting gastrointestinal symptoms tested positive for influenza A. The LTCF was asked to evaluate residents and staff for respiratory symptoms in addition to gastrointestinal symptoms. SCHD and KDHE-BEPHI began an outbreak investigation to determine the causes of illness and to recommend prevention and control measures.

Methods

Epidemiological Investigation

SCHD requested clinical information for each ill individual. The LTCF conducted a chart review and surveyed its staff members to determine clinical histories. Clinical information was shared with SCHD and KDHE-BEPHI in a case listing format and was analyzed using Microsoft Excel.

Cases were defined as follows:

- Confirmed Influenza Case: Any staff or resident of the nursing home experiencing gastrointestinal and/or respiratory symptoms since December 22, 2012 who tested positive for influenza.
- Suspect Influenza Case: Any staff or resident of the nursing home experiencing 1) influenza-like illness defined as fever and/or chills with a cough and/or sore throat or 2) vomiting and/or diarrhea with a fever and/or chills since December 22, 2012

- Confirmed Norovirus Case: Any staff or resident of the nursing home experiencing diarrhea and/or vomiting since December 27, 2012 who tested positive for norovirus.
- Suspect Norovirus Case: Any staff or resident of the nursing home with an onset of diarrhea and/or vomiting since December 27, 2012, without fever, chills or other respiratory symptoms.

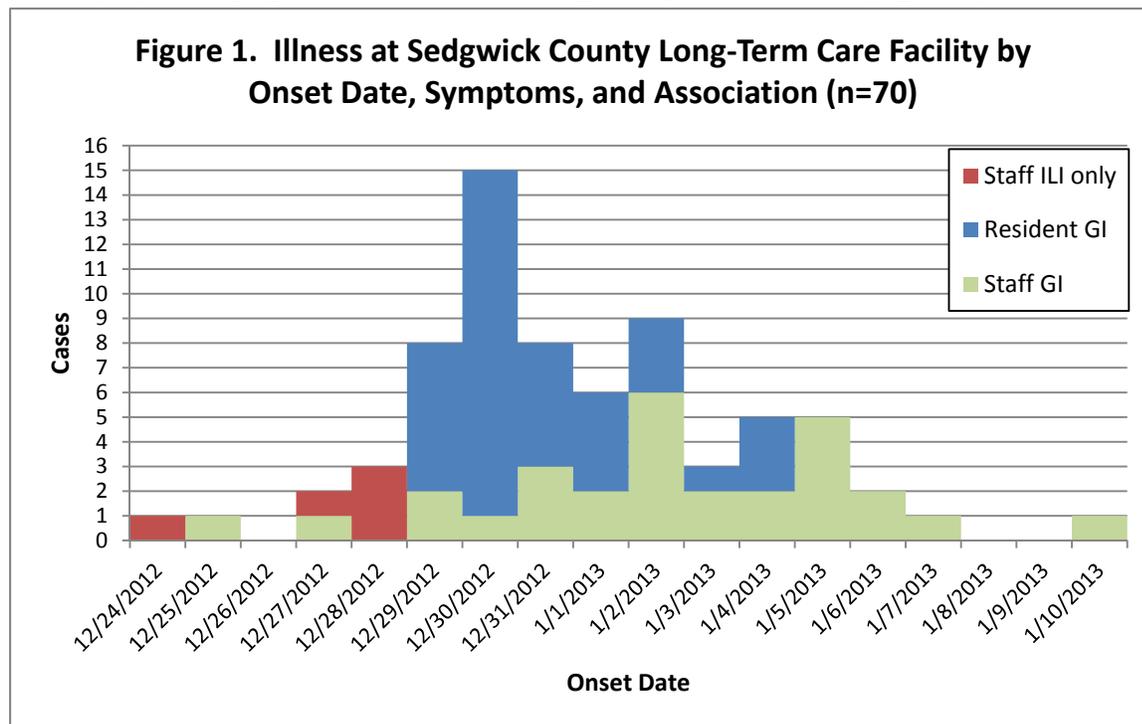
Laboratory Analysis

SCHD provided stool specimen collection kits for any newly ill staff or resident who exhibited gastrointestinal symptoms for testing at the Kansas Health and Environmental Laboratory (KHEL). Five stool specimens were collected. Three were tested at KHEL and two were tested at private laboratories.

In addition, nine nasopharyngeal swabs were collected. All were tested by rapid influenza diagnostic tests (RIDT) at a private lab. KDHE-BEPHI coordinated with this private lab to acquire the nasopharyngeal swab specimens from LTCF residents and staff that had tested positive for influenza by RIDT. The swab specimens were shipped to KHEL for influenza subtyping.

Results

During the course of the outbreak, 65 residents and staff reported gastrointestinal (GI) symptoms of vomiting and/or diarrhea, and five staff members reported only influenza-like illness (ILI) with symptoms of fever with cough and/or sore throat (Figure 1).



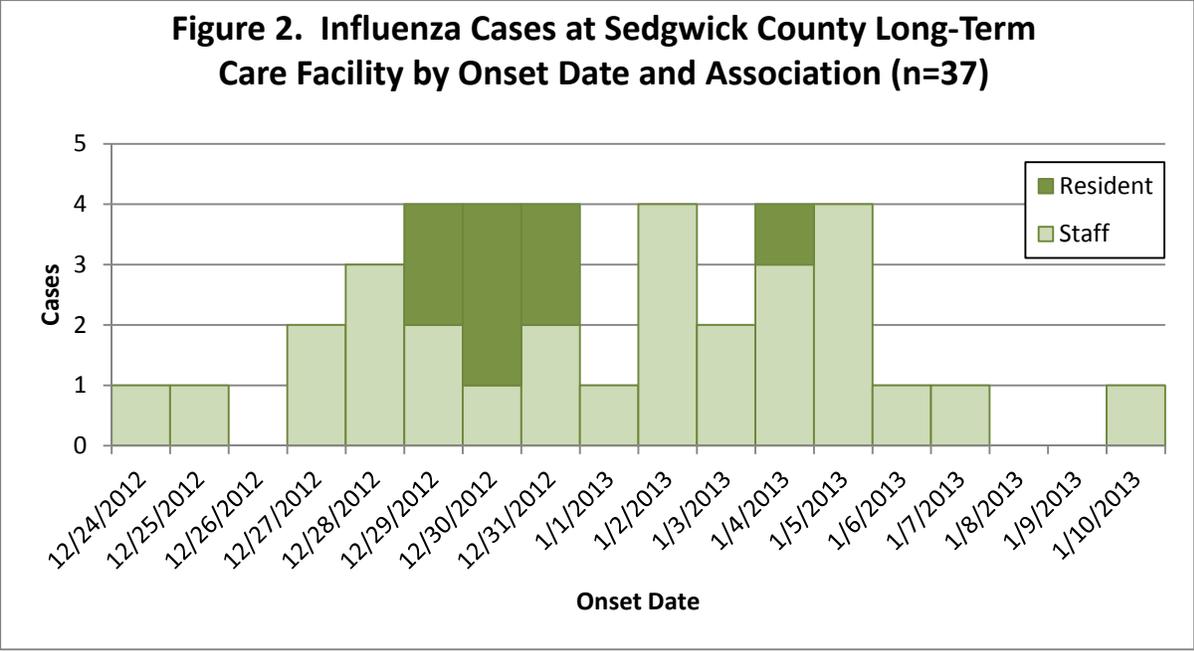
Influenza Epidemiological Analysis

Thirty-seven cases, 29 staff and eight residents, met one of the influenza case definitions. Thirty-four (92%) of the cases were female, and ages of cases ranged from 16 to 88 years with a median of 40 years. The median age of influenza cases was 83 years (range: 76-88 years) for residents, and 39 years (range: 16-55 years) for staff. Fever was the most frequently reported symptom (Table 1).

Table 1: Clinical Information for Influenza Cases (n=37)

<i>Symptoms</i>	<i># Cases reporting</i>	<i># Cases with information available</i>	<i>Percentage</i>
Fever	32	35	91%
Nausea	27	28	96%
Vomiting	26	33	79%
Diarrhea	25	32	78%
Chills	25	26	96%
Headache	24	26	92%
Cough	20	27	74%
Abdominal Cramps	20	24	83%
Sore Throat	12	21	57%
Difficulty Breathing	10	23	44%
ER Visits	3	28	11%
Hospitalizations	1	28	4%
Deaths	1	37	3%

The first case's reported onset was December 24, 2012; the last case's reported onset was January 10, 2013 (Figure 2). The duration of illness was available for 23 individuals and ranged from two to 14.5 days with a median of four days. Three staff reported visiting the emergency room because of their illness. One resident was hospitalized. The resident later died; the death certificate indicated pneumonia and influenza as the primary causes of death. On January 4, 2013, the LTCF medical staff began to provide influenza antiviral treatment to roommates of individuals with suspected influenza.



Norovirus Epidemiological Analysis

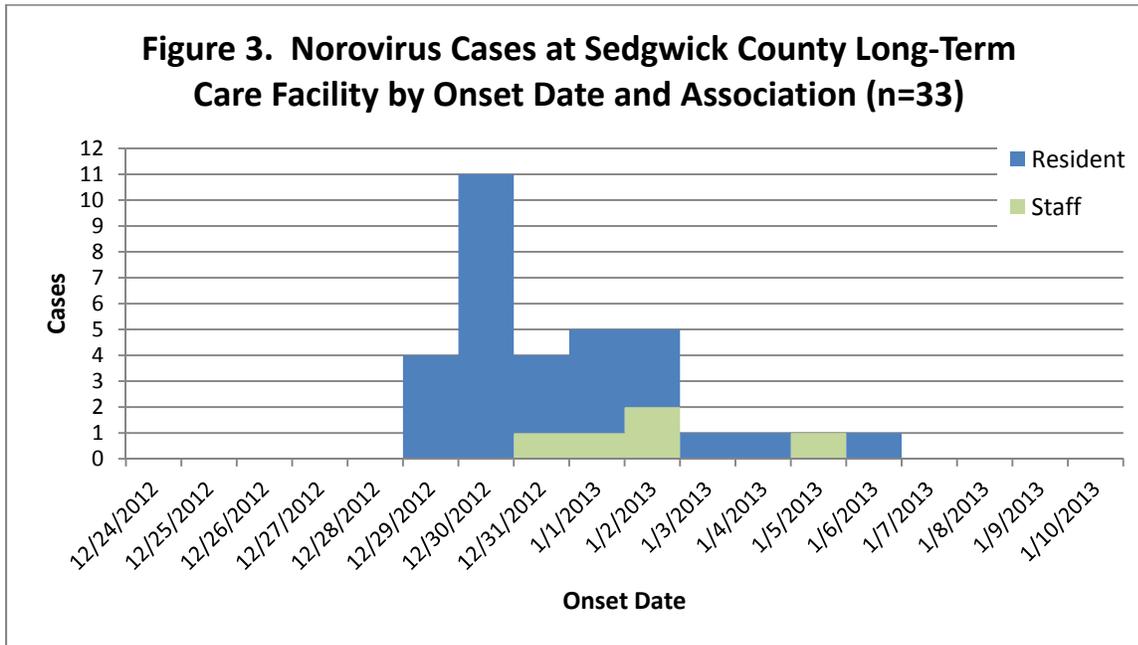
Thirty-three cases, five staff and 28 residents, met one of the norovirus case definitions. Thirty (91%) of the cases were female, and ages of cases ranged from 30 to 101 years with a median of 82 years. The median age for norovirus cases was 85 years (range: 60-101 years) for residents and 37 years (range: 30-57 years) for staff. Diarrhea was the most frequently reported symptom (Table 1).

Table 2: Clinical Information for Norovirus Cases (n=33)

Symptoms	# Cases reporting	# Cases with information available	Percentage
Diarrhea	29	32	91%
Vomiting	17	32	53%
Nausea	7	7	100%
Abdominal Cramps	3	3	100%
Headache	3	3	100%
ER Visits	0	29	0%
Hospitalizations	0	29	0%
Deaths	0	33	0%

No one reported seeking medical care for their illness. The onset of illness ranged from December 29, 2012 to January 6, 2013 (Figure 3). The duration of illness was available for 29

individuals and ranged from less than one day to five days, with a median of one day. No emergency room, hospital visits or deaths were reported.



Laboratory Analysis

Nine nasopharyngeal specimens were collected. Of these, five were positive by PCR for Influenza A/H3; four were tested at the KHEL and one was tested at a private lab. One nasopharyngeal specimen was positive for Influenza A by RIDT at private lab but was negative by PCR at KHEL. Three nasopharyngeal specimens tested negative for influenza A and B by RIDT at a private lab. These specimens were from patients later defined as norovirus cases based on symptoms reported.

Five stool specimens were collected. Of these, two were positive and one was negative for norovirus by PCR at the KHEL; two were negative for norovirus by PCR at a private laboratory.

Influenza Vaccination Status Analysis

Staff and residents were considered vaccinated if they received influenza vaccine prior to December 10, 2012. Influenza vaccination status was known for 56 individuals—36 residents and 20 staff.

Eleven of 15 (73%) unvaccinated individuals met the influenza case definition, compared to 15 of 41 (36%) vaccinated individuals ($\chi^2 = 5.96, p < 0.02$).

Of the 26 influenza cases reporting influenza vaccination status, seven of eight residents (87.5%) and eight of 18 (44.4%) staff were vaccinated. Twenty-five of the cases had received FluViron®, and one case's influenza vaccine type was not recorded.

Environmental Recommendations

SCHD recommended the LTCF isolate suspect norovirus cases in their rooms until they were symptom-free for 24 hours, increase the frequency of cleaning of environmental surfaces, and encourage good hand hygiene.

Conclusions

This gastrointestinal outbreak was caused by two different agents: norovirus and influenza A/H3. Both agents were most likely transmitted person-to-person.

Norovirus is a highly contagious pathogen with a very low infectious dose, estimated to be between 10-100 viral particles.¹ Transmitted primarily through fecal-oral route, norovirus particles may be spread through direct contact or through consuming fecally-contaminated food or water. Spread via aerosolized vomitus is also possible. Norovirus typically causes vomiting, diarrhea, nausea, and abdominal cramps. Low-grade fever and body aches may also occur. Symptoms typically persist for one to three days, but may last longer in young children or elderly individuals. In the United States, norovirus outbreaks most commonly occur in long-term care facilities.²

Influenza is a respiratory disease that typically causes fever, cough, sore throat, muscle aches, and fatigue. Diarrhea and vomiting are usually absent; these symptoms are more commonly seen in children than adults.³ The duration of illness is typically five to seven days.

While the influenza vaccine that was administered prior to the 2012-2013 influenza season contained an A/H3 component that was well-matched to the circulating A/H3 viruses detected in the United States, the vaccine effectiveness at preventing influenza-associated medical visits was estimated to be 60%.⁴ Twenty-six of 41 (63%) vaccinated individuals identified during this outbreak investigation did not meet the case definition for influenza.

¹ Teunis PFM, Moe CL, Liu P, et al. Norwalk virus: how infectious is it? J Med Virol 2008; 80:1468-76.

² Centers for Disease Control and Prevention. Updated Norovirus Outbreak Management and Disease Prevention Guidelines. MMWR 2011 60(RR03);1-15.

³ Heymann DL. Control of Communicable Diseases Manual. 19th ed. Washington DC:APHA, 2008: 315-322.

⁴ Centers for Disease Control and Prevention. Early Estimates of Seasonal Influenza Vaccine Effectiveness — United States, January 2013. MMWR 2013;62(02):32-35.

While a yearly influenza vaccine is recommended for everyone, the Centers for Disease Control and Prevention (CDC) stresses the importance of flu shots among health care personnel, including LTCF staff and residents. LTCF residents are at higher risk of developing complications due to influenza.⁵ While the vaccine is more effective in preventing illness among younger populations compared to those older than age 65, studies have found the flu shot may be 50%-60% effective in preventing hospitalization among LTCF residents, and 80% effective in preventing flu-related death.⁶

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⁵ Centers for Disease Control and Prevention. Prevention and Control of Influenza with Vaccines: Recommendations of the Advisory Committee on Immunization Practices (ACIP), 2010. MMWR 2010;59:1-62

⁶ Ibid.