Hospital outbreaks are reported more often in the medical literature than occurrences in the long-term care (LTC) or behavioral health setting. By studying and learning from outbreaks in the LTC or behavioral health setting, the infection preventionist (IP) will glean additional knowledge and apply this information to hopefully prevent future infections, and infection clusters, in their facility. This quarterly column will assist the IP in heightening awareness of appropriate interventions to preventing an outbreak.

Koene et al. report an outbreak of atypical pneumonia that occurred in inpatients, staff, and visitors, in a long-term psychiatric institution housing 127 patients. This type of pneumonia is not caused by the traditional pathogens that are responsible for typical pneumonia. Sources of atypical pneumonia infection include bacteria, viruses, fungi, and protozoa. Initially, three residents developed symptoms of high fever, headache, cough, and chills, resulting in hospitalization. Influenza and Legionella were ruled out from this investigation. A total of 45 persons were considered suspect cases, with 28 persons having confirmed disease.

Based on your education and training, you suspect the following pathogen for being the illness source:
1. Streptococcus pneumoniae
2. Staphylococcus aureus
3. Mycobacterium tuberculosis
4. Coxiella burnetii

Throat swabs and sputum specimens were polymerase chain reaction (PCR) positive for Coxiella burnetii, a Gram-negative bacterium. This pathogen is responsible for Q fever, a zoonosis, which is an infection that is transmissible from animals to humans, and humans to animals. Q fever, first recognized as a human disease in 1935, was associated with workers who butcher animals. The “Q” stands for “query,” due to the causative organism being unknown.
at the time. This organism is primarily found in sheep, goats, and cattle who are usually asymptomatic when infected. A high bacterial load of *Coxiella burnetii* is found in the birth products of infected animals within the amniotic fluid and placenta. The organism is transmitted to humans through contaminated dust and aerosols containing dried placental material, birth fluids, and infected animal excreta, with a one-to-six week incubation period. About 50 percent of those who become infected develop clinical illness. Fatal infections are rare.

An epidemiological investigation was initiated to determine the infection source and to prevent additional transmission. Two main hypotheses were developed:

- A flock of six sheep lived in a meadow on the premises. Five lambs were born prior to the outbreak and were considered the most likely source. One lamb was abandoned by its mother, and was taken into the institution where the residents bottle-fed and cuddled the animal. The ill patients could have become infected by inhaling contaminated aerosols after close contact with the pregnant or newborn animals.
- A large flock of sheep lived in a large meadow directly near the institution’s entrance. Two shepherds were ill with Q fever. It was speculated that windborne spread may be responsible for causing illness at the institution.

Animal cultures were obtained from rabbits at the psychiatric institution, the sheep and lambs on the premises, and the flock of sheep living near the institution. Positive *Coxiella burnetii* samples were found in the sheep and the abandoned lamb living on the institution grounds. Investigators concluded that the mother rejecting the lamb led to intensive and frequent patient contact with the adopted animal. Additionally, transmission may have occurred through inhaling dust from the manure or birth products.

*Coxiella burnetii* is a very hardy organism and resistant to heat, drying, and many types of disinfectants. Besides inhalation, additional means of transmission include tick bites, ingesting unpasteurized dairy products, and human-to-human transmission. Humans are very susceptible to the disease, and very few organisms are required to cause illness. This organism has been developed for use in biological warfare. Q fever can cause acute or chronic illness. Most infected persons go on to recover; others may develop more complicated infected infections and develop pneumonia, myocarditis, hepatitis, and central nervous system complications, including meningitis. Infection during pregnancy may result in a miscarriage or pre-term delivery. Chronic Q fever may appear as endocarditis, aortic aneurysms, and infections of the bone, liver, and reproductive organs.

While most patients completely recover, a post Q fever fatigue syndrome has been reported in 10 to 25 percent of patients, resulting in chronic fatigue, night sweats, severe headaches, photophobia, myalgia, mood changes, and difficulty sleeping. The wide variety of symptoms may initially make diagnosis difficult. Diagnostic antibody tests may initially be negative. A sample of whole blood can be polymerase chain reaction tested. A recent travel history to an agricultural area where infected livestock were present will assist with the diagnosis. Doxycycline is the first line treatment for all adults and children with severe illness and should be initiated immediately.

Treatment should not be withheld while awaiting laboratory test results or an initial negative test finding. There is no prophylaxis after a known exposure.

In the United States, Q fever cases are most frequently reported from Western and Plains states, where ranching and cattle rearing are common. There may be an increased disease incidence in other areas, where sheep, goat, and cattle ranching are locally practiced. In 2014, there were 168 reported cases in the United States, but the infection is not reportable in all states.

To prevent future transmission, the authors recommended having a heightened awareness with the health risks of lambing sheep and reducing personnel contact. Institutions maintaining flocks of sheep should take hygienic measures during the delivery of sheep and handling their birth products.

Steven J. Schweon, RN, MPH, MSN, CIC, HEM, FSHEA, is an infection prevention consultant with a specialized interest in behavioral health/lumbulatory care infection challenges, including outbreaks.

References


Take-home messages for the behavioral health and LTC IP:

1. Have a heightened awareness of the dangers of animal birth products and limit patient and staff exposure.

2. Use only pasteurized dairy products.

3. A Q fever vaccine is available in Australia but is not commercially available in the United States.

4. Use standard precautions when caring for ill individuals.

5. The CDC offers Q fever patient education information at www.bt.cdc.gov/agent/qfever/clinicians/patient.asp.