AHCA/NCAL Clinical Scenarios

Scenario: Outbreak

St. Mary's Nursing home has been in operation for several decades. Aside from regular maintenance efforts, St. Mary's has not undergone major renovations or updates since it was built. The building appears old, evident from its extensive brick exterior and the presence of a gravel parking lot. The interior layout is reflective of older building standards; older plumbing fixtures, such as sinks, toilets, and showers are visibly dated in style and design.

Space is limited at this facility. Hoyer lifts and wheelchairs line the hallways, causing staff to reach between equipment to grab medical disinfectant wipes. On the other hand, smiles and laughter are abundant in this facility. Many current residents, families, and staff have fond memories of past holiday parties or friendly, competitive banter while playing board games and an overall positive impression of the care provided there.

One hot Monday, during the morning meeting, Craig, the building and grounds supervisor, reported to Brian, the nursing home administrator, two issues: 1) irregular water flow from one of the kitchen sinks and 2) a foul smell coming from a shower head in the bathing room. This reminded Brian that Craig had previously reported inconsistent water temperatures throughout the facility last summer.

The morning meeting ended after the Assistant Director of Nursing (ADON) reported three residents who exhibited symptoms of a cough, fever, and difficulty breathing, suggestive of pneumonia had been transferred to the nearby community hospital within the previous 24 hours. There were also a few other residents now with similar symptoms who were being monitored in the facility but were not sick enough to need hospitalization.

Shortly after, the ADON received a call from the ICU physician asking additional questions about the three residents who were recently transferred to the hospital for pneumonia. All three were being treated empirically for a lower respiratory infection but had not responded to the initial regime and deteriorated landing them in the ICU. Brian called Craig, the Director of Nursing, and ADON into his office, and they considered the three residents who were transferred to a higher level of care for fever and respiratory symptoms. The questions the ICU physician posed were discussed, including the possibility they could all be related in some way. After listing presenting signs and symptoms, diagnostics, and unit-level commonalities, the plan was to regroup later that afternoon with possible theories. A few minutes later, the head ER doctor's phone call was transferred to Brian's office. A long discussion about the residents' confirmed Legionnaires' disease resulted in theorizing a possible outbreak and additional testing needed for confirmation. Brian immediately called the group back in the office after the call to develop a timeline and outline the next steps to be taken.

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Scenario Review

- The description of the nursing home's aging infrastructure, including outdated plumbing fixtures, structural wear and tear, and signs of water damage, indicates potential vulnerabilities in the facility's water systems. Another concern is reports of irregular water flow and inconsistent water temperatures, as noted by the building and grounds supervisor, which questions the integrity of the facility's water distribution system. These conditions may create opportunities for Legionella bacteria to proliferate, increasing the risk of contamination and potential outbreaks.[1]
- The limited space within the facility, coupled with the congestion of medical equipment such as Hoyer lifts and wheelchairs in the hallways, presents challenges for staff navigation and infection control practices. The crowded environment may impede effective cleaning and disinfection procedures.[2]
- There are gaps in clinical assessment and surveillance practices within the facility. evidenced by delayed recognition of symptoms suggestive of pneumonia in multiple residents and/or delayed action. Also, the facility's reactive approach to the situation, as demonstrated by the ad-hoc discussion and planning sessions called together after receiving calls from the ER doctor, suggests a lack of preparedness for managing infectious disease outbreaks.[3] If a water management plan exists, it is either not being followed or needs further review.
- This clinical scenario highlights the importance of addressing infrastructure deficiencies, enhancing clinical surveillance capabilities, improving communication protocols, and implementing proactive measures to prevent and respond to a Legionella outbreak. By implementing water management strategies, steps can be taken to minimize the risk of Legionella contamination in a healthcare facility's water system.

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Questions

1. How is Legionella bacteria primarily transmitted in a healthcare setting?

a) Direct contact with an infected person

b) Ingestion of contaminated food or water

c) Inhalation of airborne droplets containing the bacteria

d) Contact with contaminated surfaces or objects

In a healthcare setting, Legionella bacteria are primarily transmitted through the inhalation of aerosolized water droplets containing the bacteria. This transmission occurs when individuals inhale small droplets of water contaminated with Legionella bacteria, typically generated by devices such as showers, faucets, respiratory therapy equipment, and cooling towers.

2. What type of environment is conducive to the growth of Legionella bacteria?

a) Low humidity and dry conditions

b) Highly chlorinated water

c) Stagnant water and warm temperatures

d) High altitude and cold climates

Healthcare facilities with complex water systems, such as long-term care facilities, are susceptible to Legionella contamination due to the presence of various water sources and the potential for stagnant water to accumulate in pipes and fixtures. Inadequate maintenance of water systems, improper temperature control, and biofilm buildup can create conditions conducive to Legionella growth and transmission, increasing the risk of healthcare-associated Legionnaires' disease outbreaks.[1]

3. There's suspicion that the water system in the facility might be contaminated with Legionella bacteria. What is the most appropriate immediate action upon suspecting Legionella contamination in the water system of a nursing home?

a Inform the residents and staff about the potential risk

b) Work with your local health department to investigate and test the water for Legionella

c) Shut down the water system to prevent further exposure

d) Resume normal operations

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There is a high likelihood, given the three residents hospitalized with confirmed Legionella, that you have an outbreak. Even with one case of Legionella your index of suspicion should be high. As the likely source is the water system, the most appropriate immediate action is to investigate to confirm Legionella bacteria's presence and to work with your local health department to assist with the investigation. This may involve collecting water samples for laboratory testing, assessing potential sources of contamination, and collaborating with public health authorities to determine the extent of the problem. Informing residents and staff about the potential risk are important steps, but confirming the presence of Legionella is the priority before taking further action. Shutting down the water system may be considered only as a last resort under specific circumstances and should be done with guidance from local or state public health authorities. Resuming normal operations without confirming the contamination would pose a risk to residents and staff.[3]

4. What diagnostic test is recommended by the CDC to confirm Legionnaires' disease?

a) Blood culture and urine culture

b) Lower respiratory culture and Urine antigen test

c) Sputum culture and Chest X-ray

d) Throat swab and urine culture

Best practice is to obtain both a lower respiratory (sputum or bronchial lavage) culture and a urinary antigen test (UAT) concurrently to confirm Legionnaires' disease. The most used laboratory test for diagnosis of Legionnaires' disease is the UAT. The urine test is a rapid and sensitive diagnostic test. *Legionella spp* can be difficult to grow in the laboratory, so also obtaining a urine antigen test is recommended.[4,5] Chest Xray is useful for identifying pulmonary infiltrates characteristic of Legionnaires' disease, but it is not a specific diagnostic test for the disease. Throat swabs are not commonly used for diagnosing Legionnaires' disease.

5. In this scenario, what strategy should have been used to help prevent Legionella contamination in the nursing home's water system?

a) Implementing a comprehensive water management plan (WMP)

b) Using only cold water for all purposes

c) Draining the water system regularly

d) Ignoring the issue as Legionella bacteria cannot be eradicated

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A WMP is an effective strategy to prevent Legionella bacterial growth in a nursing home. This program involves routine water monitoring, maintaining water temperatures outside ranges based on nationally accepted standards, regular flushing of stagnant water and periodic disinfection of water systems, minimize aerosolization of water droplets by maintaining appropriate water pressure, providing training and education to facility staff about Legionella prevention measures, including proper water management practices, early recognition of symptoms, and appropriate response protocols in case of suspected contamination.[4]

6. What measures can be taken as part of a WMP to prevent Legionella contamination in water systems?

a) Increasing water temperature to above 51°C (124°F)

b) Adding chlorine to the water system

c) Flushing stagnant water regularly

d) All of the above

All these measures, along with others, can form part of a WMP aimed at preventing Legionella contamination in water systems. Maintain hot water temperature at the return of the highest temperature allowable by state regulations or codes, preferably ≥124°F (≥51), and maintain cold temperature at <68°F (<20°C). Make sure to record these temperatures so they can be monitored over time to help improve management of legionella control processes in place.[4] Adding chlorine to the water system is a common method for disinfecting water and can help in killing Legionella bacteria. Flushing stagnant water regularly can help prevent the buildup of bacteria, including Legionella, by ensuring that water does not remain stagnant for extended periods where bacteria can proliferate.[4]

7. Reflecting on the scenario where Legionella was overlooked, what factors do you think contributed to this oversight?

Potential oversights in this scenario, which prevented consideration of a Legionella outbreak include, failure to promptly recognize and report clusters of respiratory illnesses, inadequate communication may have hindered case information sharing, failing to follow-up with water temperature concerns, and overlooking potential risk factors contributing to Legionella transmission.[3]

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8. As the Infection Preventionist at this facility, what would you incorporate in long-term planning once the Legionella outbreak is managed?

Relevant to preventive measures and long-term planning, the Infection Preventionist should implement preventive measures to reduce the risk of future Legionella contamination. This may involve developing and implementing a comprehensive WMP, conducting regular monitoring and maintenance of water systems, and educating staff and patients about Legionella prevention strategies.[4]

See document *Tips for Meeting Legionella Requirements in Skilled Nursing Facilities* for more information.

References

1. CDC *Legionella* (Legionnaires' Disease and Pontiac Fever)
2. CDC Best Practices for Environmental Cleaning in Healthcare Facilities: in Resource-Limited Settings. 2019.
3. CDC Waterborne Disease and Outbreak Surveillance Reporting. Last reviewed May 22, 2024.
4. CDC Controlling *Legionella*
5. CDC Laboratory Testing for *Legionella*. Last reviewed January 28, 2024.
6. CDC Toolkit: Controlling *Legionella* in Common Sources of Exposure. Last reviewed March 15, 2024.