UCM has had an aggressive Legionella prevention and control program since 1988. Control measures have included periodic cultures of the domestic water and investigation of possible Legionella infection have been investigated with 1 case in 1993 that was linked to low chlorine levels but resulted in no positive environmental cultures. In February 2013, a confirmed case of healthcare acquired Legionella was identified in an Oncology patient. Control measures have included periodic cultures of the domestic water system.

Methods

- One liter hot water samples were obtained from the patient’s shower and sink. After positive results were identified, additional samples were collected from the same unit and other units supplied by the same water distribution system to determine the source of Legionella.
- To determine the source of Legionella, showerheads were removed and, if present, residual water left in the shower hose was collected. The shower valve was turned on and the first 200 mls of water was collected. The valve was turned to maximum temperature and water was collected from the shower pipe after 3 minutes. Chlorine levels and water temperature were recorded for each sample. Sodium thiosulfate was added to water samples immediately after collection to inactivate residual chlorine. O-rings fitted between shower head and pipe were collected in sterile conical tubes.
- To identify additional positive locations, 87 additional patient showers were sampled by collecting water after 3 minutes through the existing showerhead.
- To determine if findings were specific to 14 collected handheld showers, 95 O-rings were retrieved from old showerheads after replacement.
- Water samples were concentrated by filtration through a 0.2µm-pore-size filters. Filters and O-rings were vortexed in 10 ml sterile water for 90 seconds and 100 µL (0.1 ml) samples were plated onto Buffered Charcoal Yeast Extract (BCYE) and a BCYE with polymyxin B, anisomycin and vancomycin (PAV) agar using a spread plate technique. Plates were incubated at 35°C in humidified CO2 for up to 14 days. Suspicious colonies were sub-cultured to chocolate agar and BCYE, isolates that grew on BCYE but not on chocolate were further identified via Matrix-assisted laser desorption/ionisation-time of flight mass spectrometry (MALDI-TOF). When additional positive water samples were identified, showerheads in all occupied areas were replaced with a single type and repeat water samples were obtained.
- Water samples after 3 minutes to ensure exposure of showerheads to 1-3 PPM chlorine.
- Chlorine levels had been monitored daily at the hot water return only. Prior to the case, chlorine levels were <100 cfu/ml Legionella pneumophila with free chlorine of 1.1 ppm.

Results

- Initial Follow-Up: Water samples from the patient’s shower yielded <100 cfu/ml Legionella pneumophila with free chlorine of 1.1 ppm.
- Legionella was cultured from O-rings (3 of 14) and residual water left in the shower hose (post O-ring) (5 of 18) (9 cfu to Too Numerous To Count). All other samples were negative.
- Chlorine levels in water the first 200 mls ranged 0.2 – 3.0 ppm and in hot water after 3 minutes from 0.8 to 2.9 ppm.
- Maximum water temperature in all samples was 51.5°C (124.7°F).

Interventions

- Prior to the case, chlorine levels had been monitored daily at the hot water return only.
- Immediately following the positive result the chlorine level was elevated to 3 PPM for 24 hours and staff was instructed to run the water in all showers for at least 3 minutes.
- Sampling at the unit was requested.
- Environmental staff were asked to run the showers on full hot water for at least 3 minutes to ensure exposure of showerheads to 1-3 PPM chlorine.
- Plant Department staff were asked to run the water in unoccupied areas at least weekly.

Conclusions

- Approaches to culturing domestic hot water systems must take into account the terminal source as well as the main system.
- Legionella control measures may include routine replacement of showerheads.
- Routine replacement of showerheads may be a cost effective solution adjunct to a Legionella suppression program when main water supply has no detectable Legionella.