

Sampling of households for *Legionella* species

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1 Applicable to

Detection of *Legionella* species in the water systems of dwellings (single houses and residential blocks) when investigating cases of Legionnaires' disease.

2 Safety Note

Individuals carrying out sampling should have received training in risk assessment and control of legionella. During the course of an investigation, sampling staff may be exposed to potentially infectious aerosols. Precautions should therefore be taken during sampling to minimise the production of and avoid exposure to aerosols. Taps should be run gently to reduce the amount of splashing. Individuals who are in any of the high-risk groups (immunosuppression, transplant recipients and heavy smokers) should not be involved in sampling.

Samplers should also be trained in safe use of ladders and take appropriate safety precautions to prevent falling through ceilings when entering loft spaces. Individuals should wear personal protective equipment to avoid contact with or inhalation of insulation materials. Individuals should be trained in the recognition of asbestos and specialist advice should be sought if asbestos is present.

3 Equipment and Materials

Step ladder

Torch and batteries

Sterile 1 litre sample containers or new plastic containers. These should contain 180 -

200mg sodium thiosulphate to neutralise any chlorine or other oxidising biocides.

NB. Some laboratories may require larger samples.

Plastic bags - food grade, new

Scissors

Sterile disposable dip samplers or sterile reusable metal dip sampler or sterile syphoning sampling device for sampling tanks.

Assorted spanners and screwdrivers

Stop-watch

Electronic thermometer – calibrated and measuring from about 10°C to 100°C

Rubber bands

Cool box

Disposable paper tissues or towel

Discard bags

Plastic squeeze/wash bottle or suitable alternative containing a disinfectant solution of 1:10 dilution of sodium hypochlorite solution (bleach) or 75% ethyl or isopropyl alcohol

Alcohol wipes

Disposable latex or equivalent gloves

Disposable overalls and other personal protective equipment

Sample request forms

4 Method

Samplers should be aware that samples may need to be divided so as to provide duplicate sub-samples for legal purposes. If this is the case, a minimum of 2 litre samples should be collected.

4.1 *Layout of hot and cold water system*

On entering the property carry out a preliminary survey to establish the layout of the hot and cold water system. Make a schematic diagram of the system that can be used later to clearly indicate where samples were collected. Establish the position of the header tank (if any) and water heater and all hot water outlets (taps, shower heads, etc.) on the system supplied by the hot water heater. Note the materials used for the piping and outlets (copper, galvanised steel,

polybutylene, PVC etc). Determine which outlet is the nearest to the water heater (has the shortest length of pipe joining it to the water heater) and which is the furthest from the water heater (has the longest length of pipe joining it to the water heater). In large systems determine if any particular outlets were used by the patient.

In blocks of flats the cold water may come from a communal cold water tank in which case this should also be investigated. Occasionally communal hot water systems that serve many flats may be encountered. These should be investigated and are akin to investigating systems in hotels or hospitals.

4.2 *Water heater*

Inspect the water heater. Note the type of heater i.e. electrical immersion; indirect from the central heating hot water; indirect with electrical immersion heater back-up etc. Note the construction materials and insulation. Record the temperature setting on the thermostat and for how long each day the heater is switched on. Follow the piping as much as possible and note where the nearest tap to the water heater is situated and the location of the furthest.

4.3 *Hot outlet nearest to water heater*

4.3.1 *Immediate hot water sample*

Record where the outlet is and its type (single tap, mixer tap, shower etc). If it is a shower follow the procedure described in paragraph 4.5 below. If it is a combination mixer tap with a shower outlet collect the following samples from the shower first using the sampling method described in paragraph 4.5 below. Label a sample container indicating the site etc and that this is the immediate sample. Record if the tap has any defects (dripping, leaking glands etc.). Collect 1 litre of water and reseal the container. Run the tap for one minute and note the temperature. Precautions should be taken to minimize aerosol or spray production.

4.3.2 *Post flush hot water sample*

This sample is taken to obtain a sample representative of the pipe work and hot water cylinder rather than the colonisation of the outlet. It is preferable to

collect such a sample from a simple tap rather than a mixer tap. If the tap used to collect the sample above was not a simple tap select an alternative if one is available. Clean the outside of the tap with an alcohol wipe or hypochlorite solution and, if the tap has not already been sampled, run the tap for about one minute. Disinfect the inside of the tap by squirting the disinfectant solution up inside the orifice of the tap. Wait for two minutes, turn the tap on and allow it to run for a further minute and then collect the sample without adjusting the flow of the water. Label it "post flush sample" in addition to noting its source etc.

4.4 *Hot water tap furthest from hot water cylinder*

Also collect an immediate sample from the hot water tap furthest from the hot water cylinder. This will normally be the kitchen tap.

4.5 *Sampling showers*

Inspect the shower noting its type (mixer connected to hot and cold tap on bath, separate pumped shower, instantaneous electrically heated shower etc) if it has a flexible hose or not and if it has any faults including dripping, scaling and mould growth or other deterioration of the hose, and whether the cold water is supplied to the mains directly. If connected to the hot water system set the temperature to maximum. For instantaneous showers leave the setting at its lowest temperature setting with the heater on (i.e. not on the cold setting where the electrical heater does not operate at all). Label a bottle and remove its cap storing it in a clean new plastic bag. Cut the end or a corner off a new food grade plastic bag. Insert the shower head into the plastic bag and hold the bag closed around the shower hose behind the shower head. Insert the other end of the bag into the open sample container. Keeping the bag closed behind the shower head (a rubber band may be used to facilitate this), carefully turn on the water flow so that a gentle flow is created and the water flows into the container. Alternatively remove the shower head, being careful not to lose any water that may be in the shower head, and collect the sample from the shower hose. Collect one litre of water and note the temperature after allowing it to flow for one minute as before.

4.6 Header tank

4.6.1 In order not to disturb sludge or biofilm prior to taking the samples as described above, the header tank should be inspected and sampled last.

4.6.2 Inspect the header tank for the domestic hot water system. Be careful you do not confuse it with the central heating header tank. If you are not sure, leave a hot water tap running. The ball valve in the tank feeding the hot water system will eventually operate to let in fresh water. Note how well the tank is insulated, whether it is covered, the materials of construction, and the volume of water stored. Remove or push aside the cover so that the end furthest away from the inlet is uncovered. Take care not to allow dirt to enter the tank. Inspect the inside, noting if it is corroded, dirty etc.

4.6.3 Collect a sample of water from the tank using a sterile dip sampler or syphoning device or simply by dipping the sample bottle into the water. In the latter case particular care should be taken to avoid a cross contamination of samples. Wear a new pair of disposable gloves, disinfect the outside of the bottle with an alcohol wipe and allow the alcohol to evaporate away before collecting the sample. Seal the bottle. Dry the outside of the bottle with a fresh towel and discard the towel. Wipe the outside of the bottle with an alcohol wipe. Note the temperature of the water in the tank. Disinfect the thermometer after each use with an alcohol wipe. Change gloves before collecting the next sample.

4.6.4 Recover the tank making sure not to allow dirt to enter it.

4.7 Cold water

4.7.1. Bathroom cold tap

Collect an immediate sample of cold water from a bathroom cold tap noting if it is supplied from the cold water header tank or directly from the main. An indication of this can be obtained from the water pressure, which should be

high if it is off the main. Measure the water temperature after the water has flowed for two minutes.

4.7.2. Incoming mains water

The kitchen tap should be connected to the main water supply. Use this to collect a sample representative of the incoming water. Run the tap for a minute and clean and disinfect it as in paragraph 4.4.2 above and collect a post flush sample.

4.7.3. Water closets

Water closet cisterns can become heavily colonised in areas with high ambient temperatures and should not be overlooked as potential sources. Collect a dip sample from the cistern.

4.8 Other hot and cold water samples

If there are several bathrooms or wash hand basins be sure to collect samples representative of the whole system and those outlets most likely to have been used by the patient. In any case be sure to collect, at the very least, a sample from the outlets nearest to and furthest from the hot water cylinder.

5 Other Potential Sources

Survey the property for other potential sources and collect samples from them. These might include:

- the central heating system particularly if the patient had worked on it in the two weeks prior to the onset of symptoms
- Spray bottles used to spray plants etc.
- Greenhouse humidification systems
- Indoor fountains
- Potting compost
- Spa pools

6 Storage and transport of samples

Store samples in the dark in an insulated container (cool box) at ambient temperature. Transport samples to the laboratory as soon as possible so that they can be processed within 24h of collection.

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