

***Pseudomonas aeruginosa* routine water sampling in augmented care areas for NHSScotland**

This guidance applies to the following high risk areas:

- Bone Marrow Transplant Units, Haemato-Oncology and Neonatal Units, and any other care areas where patients are severely immunosuppressed through disease or treatment.
- Critical and intensive care units (neonatal, paediatric and adult), renal units, and respiratory units (including Cystic Fibrosis patient care units). Burns units and other care areas where patients have extensive breaches in their dermal integrity.

Routine water testing in NHSScotland should be specific for *Pseudomonas aeruginosa* in augmented care areas. Water testing for *Pseudomonas* species is not advised as not all *Pseudomonas* are clinically relevant.

Note: If *Pseudomonas aeruginosa* is detected in the water supply the local Water Safety Group (WSG) must assess the risk of continuing to use the tap water in that clinical area. The Infection Control Committee should be informed.

Frequency of Water Sampling

Routine water sampling for *Pseudomonas aeruginosa* should be undertaken at least six-monthly using a pre-flush sample. This routine testing aims to support timely review of all the component parts of the water system to determine whether there is a 'niche' (area) in the system capable of supporting a *P. aeruginosa* containing biofilm; if there are 'niches' in the water system biofilm is likely to occur rapidly; (correspondence to HPS from HIS water group).

The frequency of testing should increase if any of the criteria in **Table 1** is met.

Table 1: Criteria for increased testing

1	There is an increase in clinical isolates within the care area and water borne pathogens are indicative of a source of infection/colonisation.
2	There have been changes made to the water distribution and delivery system components or water system configuration.
3	Pre-flush trend analysis demonstrates increasing cfu/100mls.

Pre- flush Classification of Results and actions

A pre-flush sample should be obtained following [Appendix 2](#)¹.

- 1. Not detected:** No further action required; re-sample six-monthly (earlier if any of the criteria in Table 1 is met).
- 2. Detected: Counts 1-10 cfu/100mls:** Re-test outlet using pre- and post-flush sampling until three consecutive negative samples (each subsequent sample being taken on receipt of previous sample result). Following three consecutive negative results samples should be taken weekly for four weeks; after four weeks, if the outlet remains negative commence quarterly routine sampling.
- 3. Detected: Counts >10cfu/100mls:** Retest the outlet and risk assess the need to remove the outlet from service; retest using pre and post-flush sampling as explained in point 2.

Actions: Re-sampling results (pre-flush and post-flush)

Comparison of counts from pre- and post- samples can help derive the source of the *Pseudomonas aeruginosa*.

Detected: the WSG must review results and produce a risk reduction action plan considering the following thresholds for action:

- 1. Result: High pre-flush >10cfu + low post-flush counts <10 cfu/100mls:** These results are indicative of a local water outlet problem; investigate cause and ensure controls are in place. The following must be considered:

¹ Guidance for neonatal units (NNUs) (levels 1, 2 & 3), adult and paediatric intensive care units (ICUs) in Scotland to minimise the risk of *Pseudomonas aeruginosa* infection from water

- Removing the outlet from use.
- Implement extended flushing time at the outlet.
- Remove and replace contaminated outlets and Thermostatic Mixer Valve (TMV) pipe-work back to the supply junction.
- Disinfect any new components and fittings before re-installation.
- Re-assess system component requirements to reduce risk i.e. no inserts. Where possible hard plumb all pipe-work.
- Installation of Point of Use (POU) filters (this should be considered a short-term control measure).
- Installation of outlets that are demountable and, auto-clavable, part of planned maintenance and compatible with POU filters.

2. Result: High Pre- flush + post flush counts > 10 cfu/100mls: These results are indicative of a wider problem within the water supply; investigate cause and ensure controls are in place. The following must be considered:

- Removing the outlet from use.
- Installation of Point of Use (POU) filters (this should be considered a short-term control measure). Requesting an engineering survey of the water system to review, to guide remedial actions alongside the water sampling results.
- A review of the hospital water delivery system materials and the compatibility with water; BS 6920-1 sets out requirements for non-metallic materials that should not enhance microbial growth. The review should include:
 - Identifying substances that may be present in rubber compounds, and are also occasionally associated with non-metallic materials such as plasticised (softened) plastics, which can provide nutrients for *Pseudomonas aeruginosa* growth.
 - Identifying materials such as ethylene propylene diene monomer (EPDM) rubber may be susceptible to microbial colonisation often used in flexi hoses.

3. Result: High pre-flush + post flush counts >100 cfu/100ml: Single outlet contamination is indicated by high counts. If other nearby outlets have no or low counts, investigate cause and ensure controls are in place. The following must be considered:

- Removing the outlet from clinical use and continue daily flushing.

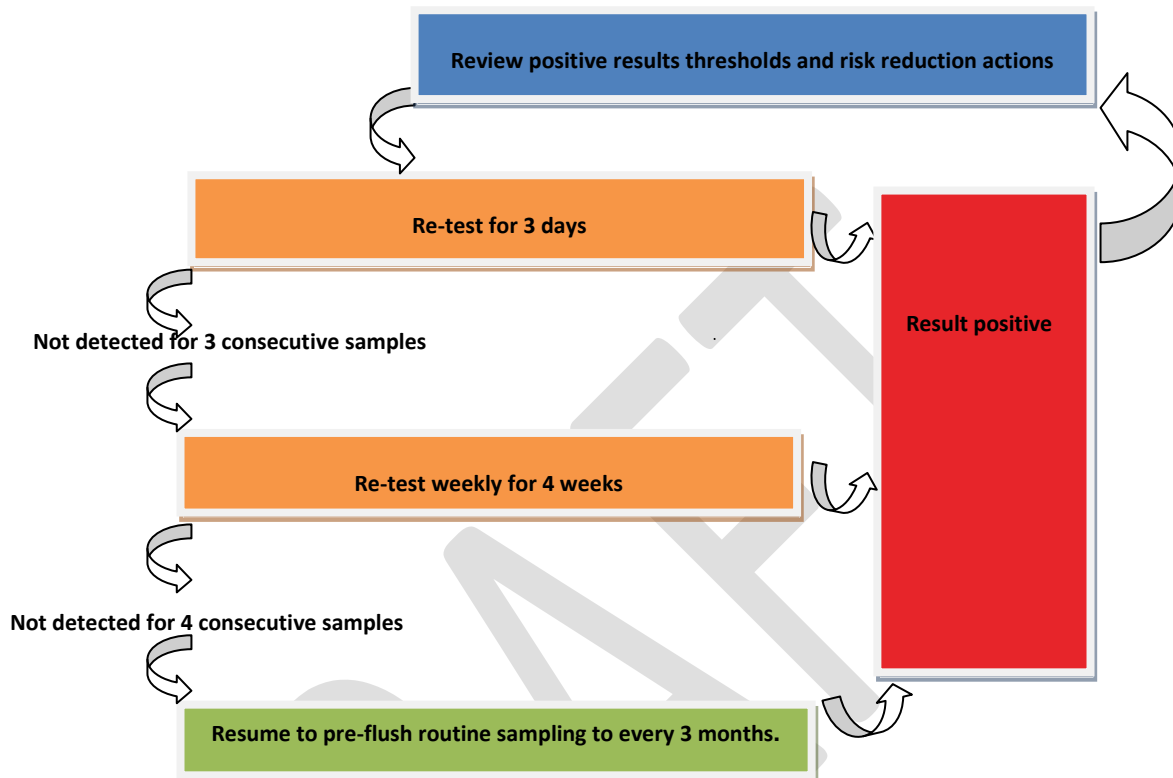
- Explore further testing dilutions (seek advice from WSG) of pre and post-flush water samples from the outlet or use an extended 5 minute flush prior to post-flush sampling.
- Alternatively, disinfect outlet and re-sample post-flush.
- Removal of flow straighteners; if not feasible clean and/or disinfect the straighteners according to the manufacturer's instructions or replace with new. Straightener replacement frequency should be confirmed via sampling results.
- Assess splash risk from the outlet; if confirmed, investigate the following:
 - Check compatibility of tap design flow profile with the clinical hand wash basin (CWHB);
 - Height compatibility between tap outlet and surface of basin;
 - Excess water pressure; and
 - Blocked or malfunctioning flow straightener(s).

4. Result: Not detected

See Figure 1 below for retesting frequencies and period of negative results required prior to re-instatement of outlets removed from use.

Figure 1

***Pseudomonas aeruginosa* positive result re-sampling frequencies (pre-flush and post-flush) and actions**



Outlets taken out of use:

Re-samples must remain not detected for 2 weeks prior to re-instatement of outlet.