

## A Non-Systematic Review on Healthcare Associated Infections: Risks and Outbreaks Associated with Water Systems

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**Background:** Water distribution systems can act as reservoirs for waterborne pathogens in healthcare settings. Microorganisms such as *Pseudomonas aeruginosa* are often found within water systems, but do not usually infect healthy individuals. However, these organisms may pose a risk to susceptible patients, such as those who are immunocompromised. Indeed, Health Protection Scotland (HPS) has recently received an increasing number of enquiries from NHSScotland boards requesting expert advice on the risk of healthcare associated infection (HAI) in relation to water systems, for patients within healthcare settings.

**Aim:** The aim of this literature review was to gather evidence on outbreaks associated with healthcare water systems to inform infection prevention and control (IPC) guidelines.

**Methods:** Academic databases (EMBASE, Medline, CINAHL and Cochrane Reviews) were searched for academic literature on risk of HAIs and outbreaks associated with healthcare water systems published between 1998 and 2018. Only studies that were written in English and involved humans were included in the literature review. Guidance documents were also identified. Superseded guidance documents were excluded.

**Results:** The literature search identified 832 articles. After screening 132 academic articles were included, comprised of outbreak reports, case-control studies, pseudo-outbreak reports, and intervention studies both in outbreak and endemic situations linked to water systems. Additionally, eight guidance documents were retrieved: five Scottish and three UK wide documents.

### Conclusions:

The overall conclusions derived from the rapid review, indicate that:

- Most waterborne outbreaks were caused by Gram negative organisms.
- Augmented care settings, e.g. haematology and oncology units, were most frequently affected with waterborne outbreaks.
- Water distribution systems, associated fixtures and fitting, and water-based machines were the most common source of waterborne outbreaks.
- Health boards should ensure that water stagnation is prevented in new water system installations prior to handover and use, as this can contribute to microbial colonization of the system.
- There is a lack of standardised infection control measures to be used during outbreak situations where water systems have been implicated.

The information derived from this study was used to develop a new programme of work within HPS to inform IPC aspects of healthcare water systems.