Public Services Delivery
Scotland

NHS SCOTLAND

Summary of literature identified for the National Policy Guidance & Evidence (NPGE) and Infection Control in the Built Environment and Decontamination (ICBED) literature reviews

January to March 2026

Titles and abstracts are reviewed for subject relevance. Additional exclusion criteria are also applied, for instance exclusion of laboratory focussed studies such as molecular typing etc.

Antimicrobial Resistance & Healthcare Associated Infection (ARHAI) Scotland
An NHS Scotland Assure Service, part of Public Services Delivery Scotland

Evidence Table – National Policy Guidance and Evidence (NPGE) - literature identified

Literature review	Papers identified	Summary of Findings and Impact on ARHAI Recommendations
Hand Hygiene Indications and Techniques	Roesch KM, Gebel J, Bolten A, et al. Evaluation of 15-second alcohol-based hand rub efficacy: A multi-laboratory study using a modified EN 1500 protocol. Journal of Hospital Infection. 2026 Feb 19. doi: 10.1016/j.jhin.2026.01.027	This experimental study evaluated the efficacy of a 15-second alcohol-based hand rub (ABHR) application compared to the standard 30-second application, using a modified EN 1500 protocol across multiple laboratories. This study adds to the evidence base of the research question **"What is the correct process and technique when using hand rub, hand wipe and alternative products to ensure effective hand hygiene?"**. The multi-laboratory study tested the 15-second rub-in time against the reference 30-second protocol using *E. coli*-contaminated hands of healthy volunteers. The findings demonstrated that the 15-second application met the efficacy requirements of the EN 1500 standard, showing non-inferior microbial reduction compared to the 30-second reference procedure across all participating laboratories. However, findings should be interpreted with caution as this was an experimental study, which may not fully reflect clinical practice in Scottish health and care settings where patient interactions and hand contamination levels may

Literature review	Papers identified	Summary of Findings and Impact on ARHAI Recommendations
		differ. Moreover, the study protocol only accessed the 15-second method once while the 30 second was accessed twice. No change to current recommendations.
Transmission Based Precautions (TBPs) Definitions	Nava GW, Szczepanska A, Ng L et al. Determinants of respiratory tract aerosol generation in a diverse clinical population: an observational study. BMJ Open Respir. Res. 2025;12:e003494. doi:10.1136/bmjresp-2025-003494.	This English simulation study assessed the proportion of particles (0.3 to 20µm in diameter) generated from 'healthy' patients and patients with chronic disease, or acute respiratory tract illness. Measurements were taken during "tidal breathing, deep breathing, speaking, performing a forced spirometry manoeuvre and coughing". This study adds to the evidence base for the NIPCM Transmission Based Precautions (TBP) Definitions literature review. The study adds to the research question **"How are infectious agents released into the air of the health and care environment from the respiratory tract with consideration of particle size, distance and clearance/fallout time?"** by demonstrating that increased exhalation force may increase the concentrations of emitted aerosols. When all participants were assessed together, there was a strong positive correlation between airflow and particle counts during both tidal breathing and forced spirometry (r=0.93). Authors further stated that their data did not provide "compelling evidence" of associations between patient

Literature review	Papers identified	Summary of Findings and Impact on ARHAI Recommendations
		demographic factors or clinical status and generation of aerosols, as significant findings were not across all simulated actions. Linear regression demonstrated a weak positive correlation between BMI and particle concentration during voluntary coughing only ($p = 0.02$). Moreover, acute respiratory illness was significantly associated with increased particle counts during tidal breathing ($p<0.001$) and normal speech ($p<0.001$) although linear regression did not explore this association further. Limitations of this study include the potential of respiratory illness stage to confound particle count results. Moreover, the study was conducted in a real-world setting which may increase generalisability but limits the ability to control the clinical setting and subsequent background concentrations, ambient temperature and humidity. Finally, ventilation and airflow measurements were taken at a different time from particle counts, so whether their values represent those during particle count measurements is unclear.
Hand hygiene - Skincare	Iqbal S, Khan MA, Liquat Z et al. Frequency of contact dermatitis and its occupational risk factors among healthcare workers in Pakistan.	This Pakistani cross-sectional study aimed to quantify the incidence of self-reported occupational contact dermatitis, and determine its risk factors, among a sample of workers at a dermatology department. This study adds to the evidence base for the NIPCM Hand Hygiene - Skincare literature review. This study adds to the

Literature review	Papers identified	Summary of Findings and Impact on ARHAI Recommendations
	Bull. Env. Pharmacol. Life Sci. 2026;15(2):32-36.	research question **"What factors related to hand hygiene increase the likelihood of developing contact dermatitis?"** by demonstrating that occupational contact dermatitis was significantly more prevalent in healthcare workers who were female (p=0.009), performed over 15 hand washes a day (p<0.001), or used gloves for over six hours a day (p=0.002). Key limitations of this study include the use of self-reported data which may be biased, and limited consideration of other lifestyle factors outside of work which may impact the risk of dermatitis. No change to current recommendations.
Healthcare infection incidents and outbreaks literature review	Işık MT, Cezaroğlu Y, Tomakin FA, et al. Outbreak of *Enterobacter kobei* Infections Linked with a Collagen-Based Adhesion Barrier Following Lumbar Disc Surgery: An Epidemiological and Molecular Study. Journal of Hospital Infection. 2025 Nov 11. doi: 10.1016/j.jhin.2025.10.030	This study reports on an outbreak of *Enterobacter kobei* infections, following lumbar disc herniation (LDH) procedure at the Unye State Hospital, Turkey. This study adds to the evidence base of the research question **"How can healthcare infection incidents/outbreaks be recognised/detected?"**. A patient who underwent an LDH procedure in May 2023 presented to the emergency room with fever and low back pain 6 days after surgery. Other patients who underwent the same procedure were subsequently hospitalized with similar complaints. Outbreak investigation was initiated due

Literature review	Papers identified	Summary of Findings and Impact on ARHAI Recommendations
		to an unexpected increase in the number of cases of SSI (10 patients) following LDH procedures. This study adds to the evidence for the research question **"How should healthcare infection incidents/outbreaks be investigated and managed?"**. The outbreak was investigated and managed by a multidisciplinary outbreak investigation team who conducted literature reviews, reviewed practices of personnels working in the area, examined operating rooms, conducted on-site examinations in the neurosurgical ward, collected samples from the operating room, neurosurgical service and the CSU for microbiological analysis, and closed the operating room until all cultures were finalised. No *Enterobacter kobei* growth was observed in the initial environmental cultures. Further investigation found that a nurse had brought 5-ml vials of adhesion barrier (containing bovine collagen) into the operating room. When cultured, this product batch revealed the presence of *E. cloacae* with similar sensitivity profile to patient samples, and was confirmed as *E. kobei*, a member of *E. cloacae* complex, by MALDI-TOF. The isolates were further investigated using PFGE, confirming two different groups which are clonally related to each other.

Literature review	Papers identified	Summary of Findings and Impact on ARHAI Recommendations
		The outbreak was controlled by withdrawing the product from the market urgently and collecting those in the hospital within a short time. The findings of this study should be interpreted with limitations as product use and procedure may differ from Scottish health and care settings. No change to current recommendations.
Healthcare infection incidents and outbreaks literature review	Doran J, Foster C, Saunders M, et al. Two concurrent nationwide healthcare-associated outbreaks of *Burkholderia cepacia* complex linked to product contamination, UK and Ireland, 2010–2023. Infection Control & Hospital Epidemiology. 2025;46(10):1006-1012. doi: 10.1017/ice.2025.10232.	This study reports on two concurrent and protracted national outbreaks of *Burkholderia cepacia* complex (Bcc) infections, associated with contaminated non-medicinal product in healthcare settings across the UK and Ireland from 2010 to 2023. This study adds to the evidence base of the research question **"How can healthcare infection incidents/outbreaks be recognised/detected?"**. Detection was challenging due to the protracted, low-incidence nature of the outbreaks spanning over a decade. Cases were initially identified through routine surveillance and laboratory reporting, with an unusual increase in Bcc infections in non-cystic fibrosis patients eventually prompting national investigations. This study adds to the evidence for the research question **"How should healthcare infection incidents/outbreaks**

Literature review	Papers identified	Summary of Findings and Impact on ARHAI Recommendations
		be investigated and managed?". The outbreaks were investigated and managed by a national incident management team, with representation from all four nations of the UK. Whole-genome sequencing (WGS) was conducted on isolates from patients and a range of suspected products and environmental samples to identify the point of contamination. Investigations revealed two distinct clusters linked to two widely used, internationally sourced products: ultrasound gel and disinfectant wipes. An association between patient infections and ultrasound gel product contaminated with *B. cepacia* was identified in 9 different hospitals, WGS showed that isolates belonged to ST767 but differed by 1–31 SNPs. Further testing of disinfectant wipes by the product manufacturer revealed contamination with Bcc and the outbreak strain of *B. contaminans* was isolated from an opened pack of disinfectant wipes from several hospitals. WGS of 15 *B. contaminans* isolates, each from a different patient, from ten hospitals showed that these isolates all belonged to ST1891 and had 0–4 SNP differences between them. The outbreak was controlled by issuing a national product safety alert, suspension of central procurement of implicated products and the manufacturer's voluntary removal of the product from the market.

Literature review	Papers identified	Summary of Findings and Impact on ARHAI Recommendations
		No change to current recommendations.
Healthcare infection incidents and outbreaks literature review	Song X, Sun Z, Ding B, et al. Investigation and control of a suspected outbreak of carbapenem-resistant *Acinetobacter baumannii* nosocomial infections in the cardiovascular surgical ICU based on whole-genome sequencing. Frontiers in Public Health. 2025;13:1730647. doi: 10.3389/fpubh.2025.1730647	This study reports on an outbreak of carbapenem-resistant *Acinetobacter baumannii* (CRAB) infections in the cardiovascular surgical intensive care unit (CSICU) of a hospital in China. This study adds to the evidence base of the research question **"How can healthcare infection incidents/outbreaks be recognised/detected?"**. The outbreak was detected through routine infection surveillance, which identified an unexpected increase in CRAB cases among patients in the CSICU, prompting an epidemiological investigation which identified six cases in total. This study adds to the evidence for the research question **"How should healthcare infection incidents/outbreaks be investigated and managed?"**. The outbreak was investigated by reviewing clinical data and conducting epidemiological investigations, including extensive sampling of environmental and equipment surfaces, hand surfaces, and staff oropharyngeal and nasopharyngeal swabs. Whole-genome sequencing (WGS) was performed on CRAB isolates from patients and the environment to establish clonal relatedness and confirm the outbreak.

Literature review	Papers identified	Summary of Findings and Impact on ARHAI Recommendations
		Multilocus sequence typing (MLST) revealed that all isolates belonged to sequence type ST2. The outbreak was successfully controlled by the implementing a bundle of interventions, including increased hand hygiene and disinfection practices, and IPC training for staff, replacing ICU sink faucets with touch-free ones, and strengthening pipeline disinfection. The findings of this study should be interpreted with caution as clinical practices and ICU protocols may differ from those in Scottish health and care settings. No change to current recommendations.

Evidence Table – Infection Control in the Built Environment and Decontamination (ICBED) - literature identified

Literature review	Papers identified	Summary of scientific findings and Impact on ARHAI Recommendations
Infection prevention and control (IPC) for safe healthcare water Systems review	Johnson C, Wood MG, Graham MB, et al. Use of Whole Genome Sequencing in a Bronchoscopy-related Pseudo-Outbreak of *Mycobacterium mucogenicum* Linked to Ice Machines. American Journal of Infection Control. 2026 Jan 14. doi: 10.1016/j.ajic.2026.01.004.	This study reports on a pseudo-outbreak of *Mycobacterium mucogenicum* group isolated from bronchoalveolar lavage (BAL) samples following bronchoscopy procedures at a tertiary hospital in Wisconsin, USA. This study adds to the evidence base of the research question **"Which organisms associated with healthcare water systems are responsible for colonisation/infection of patients? and What types of infection can healthcare water system-associated organisms cause?"**. The pseudo-outbreak was detected through routine laboratory surveillance which observed an unexpected increase (30 patients) in the isolation of *M. mucogenicum* from BAL specimens between January and October 2022. This study adds to the evidence for the research question **"How and by whom should water-associated incidents be investigated?"**. The outbreak was investigated by a multidisciplinary team including Infection Prevention & Control, the Clinical Microbiology Laboratory, and the Wisconsin State Laboratory of Hygiene. The investigation included

Literature review	Papers identified	Summary of scientific findings and Impact on ARHAI Recommendations
		epidemiological analysis and extensive environmental sampling of procedure room sinks, sterile processing sinks, bronchoscopes, and ice machines. Whole-genome sequencing (WGS) of nine patient isolates and five environmental isolates revealed a clonal relationship (0-5 single nucleotide polymorphisms) between patient isolates and isolates from the ice machine's potable water, even though multiple strains of *M. mucogenicum* were present in the environment. The source was identified as ice used to cool saline syringes, which were then used to vasoconstrict biopsy sites during bronchoscopy. The pseudo-outbreak was controlled by implementing modified processes for saline handling, equipment reprocessing, and preventing contamination of supplies from potable water sources. The findings of this study should be interpreted with limitations as clinical practices, water system infrastructures, and equipment reprocessing protocols may differ from Scottish health and care settings. No change to current recommendations.