Summary of literature identified for the National Policy Guidance and Evidence (NPGE) and Infection Control in the Built Environment and Decontamination (ICBED) literature reviews – July to September 2024

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

Evidence Table: National Policy Guidance and Evidence (NPGE) literature reviews

Literature review	Papers identified	Summary of Research and Impact on ARHAI Recommendations
Infection Prevention and Control During Care of the Deceased	Panda B, Singh N, Singh G. et al. RT-PCR Result of SARS-CoV-2 Viral RNA in Cadavers and Viral Transmission Risk to Handlers. Indian J Crit Care Med 2024;28(6):614–616.	This cross-sectional study sampled 54 cadavers of COVID-19 patients who died in an Indian COVID-ICU during 2021–2022 and handlers gloves to investigate the virus transmission risk from cadavers within one hour of death. This study adds to the evidence base for the NIPCM Infection Prevention and Control During Care of the Deceased literature review within the research question **"What evidence is there that pathogenic transmission from recently deceased individuals can occur?"**. Using RT-PCR, the detected SARS-CoV-2 positivity in cadavers, and handlers gloves

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		samples, was 42.59% and 7% respectfully (p-value: 0.000024) after an hour of death. However, the findings of this study must be interpreted with caution because the viral RNA detected in cadavers does not equate disease transmission as these could be non-viable RNA or virion particles, hence, the result only gives an indication of the potential risk of transmission. Moreover, it is a relatively small scale and single centre study, and may have limited applicability to Scottish health and care settings. No change to current recommendations.
Safe Disposal of Waste	Lee M, Park SW, Bang J, Lee E. Impact of medical waste bin on contamination of patient's environment: An experimental study. Am J Infect Control. 2024 Aug;52(8):958-963. doi: 10.1016/j.ajic.2024.03.015.	This experimental simulation study assessed differences in contamination of waste receptacles, surrounding floor and nearby equipment trolleys. Contamination was assessed between empty and partially full receptacles, and receptacles with or without lids using a “fluorescent lotion” during a simulated activity where waste was generated. This paper adds to the evidence base for the NIPCM Safe Disposal of Waste literature review within the research question **“How should waste be handled in health and care settings?”**. This experimental simulation suggests that outer surfaces of receptacles may become contaminated when waste receptacles are already two-thirds full, and when receptacles were not lidded. This study also demonstrates that nearby equipment trolleys may become contaminated when lidded receptacles are used which require handling.

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		Findings should be interpreted with caution as activities were simulated thus may not be generalisable to clinical practice. No change to current recommendations.
Hand Hygiene Products	Ashraf MA, Irfan S. Microbiological Evaluation of Commercial Hand Sanitisers Available in Pakistan Using European Standard and Membrane Filtration Method. J Coll Physicians Surg Pak. 2024;34(6):667-671. doi:10.29271/jcpsp.2024.06.667	This cross-sectional lab-based study, carried out in Pakistan, evaluated antibacterial efficacy of 14 commercially available alcohol-based hand sanitisers (ABHS) against a non-pathogenic strain of *Escherichia coli* using the EN 1500 standard. The study adds to the evidence base for the NIPCM Hand Hygiene Products literature review within the research question **"What are the minimum requirements for microbiological efficacy of hand hygiene products for health and care settings?"**. The study identified one ABHS comprised of ethanol (80%) alone was ineffective when tested using the EN 1500 standard, the remaining 13 ABHS had combination of ethanol (ranging 70-80%) with other compounds including propylene glycol, triclosan, chlorhexidine, aloe barbadensis, and hydrogen peroxide and were deemed effective. This study may be limited by its generalisability as it was carried out in Pakistan and therefore the tested hand sanitisers may not be commonly used in Scottish health and care settings. Additionally, this in vitro study tested against a non-pathogenic strain of *Escherichia coli* inoculum only, and therefore is specific to this type of bacteria. No change to current recommendations.

Literature review	Papers identified	Summary of Research and Impact on ARHAI Recommendations
Transmission Based Precautions	Patterson B, Dinkele R, Gessner S, et al. Aerosolization of viable Mycobacterium tuberculosis bacilli by tuberculosis clinic attendees independent of sputum-Xpert Ultra status. Proc Natl Acad Sci U S A. 2024;121(12):e2314813121. doi:10.1073/pnas.2314813121	This observational air sampling study, carried out in South Africa, sampled Tuberculosis (TB) clinic attendees to investigate if viable *Mtb* is released by patients with laboratory-confirmed TB, sputum-Xpret Ultra-negative TB, and those not diagnosed with TB. Participants performed the following respiratory manoeuvres into a cone sampler: forced vital capacity (FVC), tidal breathing, and voluntary cough. This study adds to the evidence base for the NIPCM Definitions of Transmission Based Precautions literature review within the research question **"Which infectious agents are transmissible by the airborne route?"**. Five viable *Mtb* samples were identified, two from patients with laboratory-confirmed TB patients and three from sputum-Xpert Ultra-negative patients. This study is limited by it's in-vitro nature which may not represent real-life scenarios. Additionally, the risk of transmission from the presence of viable organisms in air samples is unknown. This study is carried out in South Africa and therefore may not be generalisable to Scotland. No change to current recommendations.

Evidence Table: Healthcare Infection Incidents, Outbreaks and Data Exceedance literature reviews

Literature review	Papers identified	Summary of Research and Impact on ARHAI Recommendations
Healthcare Infection Incidents and Outbreaks	Hanczvikkel A, Tóth Á, Németh IAK, et al. Nosocomial outbreak caused by disinfectant-resistant Serratia marcescens in an adult intensive care unit, Hungary, February to March 2022. Euro surveillance/Eurosurveillance. 2024;29(26). Doi: https://doi.org/10.2807/1560-7917.es.2024.29.26.230049	This retrospective case–control study reports on the investigation and control of a *Serratia marcescens* outbreak, which occurred in an adult intensive care unit (ICU) in Hungary. This study adds to the evidence base for the NIPCM Healthcare Infection Incidents and Outbreaks literature review within the research question **"How should healthcare infection incidents/outbreaks be investigated and managed?"**. The study provides detailed methods to investigate and control an outbreak, including initial control measures, environmental and patient sampling, microbiological and molecular analyses, and enhanced infection control measures. However, the findings of this study must be interpreted with caution because it is a relatively small scale and single centre study, bundled measures were applied to control the outbreak, and due to its limited applicability to Scottish health and care settings. Moreover, environmental samples were not taken during the active phase of the outbreak and the ones taken later were suboptimal. Hands of HCWs were also not sampled during the active phase of the outbreak to collect evidence about possible transmission routes. No change to current recommendations.

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Healthcare Infection Incidents and Outbreaks	Lee KH, Kim J, Lee JA, et al. Carbapenem-resistant Acinetobacter baumannii Outbreak in a COVID-19 Isolation Ward and Successful Outbreak Control with Infection Control Measures. Infection & Chemotherapy. 2024;56. Doi: 10.3947/ic.2023.0091.	This study reports on the investigation and control of a Carbapenem-resistant *Acinetobacter baumannii* (CRAB) outbreak, which occurred in a COVID-19 isolation ward, of a medical centre in Seoul, Korea, between October and November 2021. This study adds to the evidence base for the NIPCM Healthcare Infection Incidents and Outbreaks literature review within the research question **"How should healthcare infection incidents/outbreaks be investigated and managed?"**. The study provides detailed methods of investigating an outbreak, including epidemiological and environmental investigation, microbiological analyses, whole genome sequencing (WGS) to match isolates, and enhanced infection control measures to stop the outbreak. However, the findings of this study must be interpreted with caution because it is a relatively small scale and single centre study, bundled measures were applied to control the outbreak, and due to its limited applicability to Scottish health and care settings. Moreover, although isolates were matched by WGS, a definitive transmission route could not be established because staff which could have transmitted the infection were not sampled. No change to current recommendations.
Management of Incidents and	Arora S, Myat Oo A, Shaik Ismail B, et al.	This study describes two Serratia marcescens outbreaks that occurred consecutively in a neonatal unit in a tertiary care

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Outbreaks in neonatal units	Rapid management of Serratia marcescens outbreak in neonatology unit in Singapore: Risk factors and infection control measures. Am J Infect Control. 2024;52(9):1084-1090. doi:10.1016/j.ajic.2024.05.006	hospital in Singapore between 12 March to 20 July 2022 and 02 November 2022 to 06 March 2023. This study adds to the evidence base for the NIPCM Management of Incidents and Outbreaks in Neonatal Units literature review within the research questions "**How should NNU incidents/outbreaks be investigated and managed?**" and "**What are the key measures to control incidents/outbreaks in NNUs and how should these be implemented in NHS Scotland?**". Outbreak investigations and control measures described included microbiological screening of neonates, water management, revised milk preparation, sampling of care equipment and the environment, increased environmental cleaning, compliance monitoring, case and contact isolation, and unit closure to admissions. The authors attributed the closure of the second outbreak to infection prevention and control measures implemented because of lessons learned from the first outbreak. Although these measures were implemented sequentially, details of this are not provided. WGS indicated genetic relatedness of neonate cases with sink samples in the first outbreak but did not indicate an environmental source for the second outbreak. These findings should be interpreted with caution as staff and patient screening were not carried out, samples sizes were small and applicability to Scottish health and care settings may be limited. No change to current recommendations.

Evidence Table: Infection Control in the Built Environment and Decontamination (ICBED) literature reviews[1]

Literature review	Papers identified	Summary of Research and Impact on ARHAI Recommendations
Infection Prevention and Control (IPC) for Safe Healthcare Water Systems	Cabal A, Hörtenhuber A, Salaheddin Y, et al. Three prolonged outbreaks of metallo-β-lactamase-producing Pseudomonas aeruginosa in an Upper Austrian hospital, 2017-2023. Microbiol Spectr. Published online August 20, 2024. doi:10.1128/spectrum.00740-24	This paper reports on an outbreak of metallo-β-lactamase-producing *Pseudomonas aeruginosa* (MBL-Pa) at a 620-bed hospital in upper Austria. This paper reports on *P. aeruginosa* isolates from two other hospitals that clustered with isolates from their hospital (labelled Hospital A), however due to an absence of information regarding IPC measures and a lack of epidemiological links between the isolates with Hospital A, findings related to these hospitals are not considered within this summary. This paper adds to the evidence base for the NIPCM Infection prevention and control (IPC) for safe healthcare water systems literature review. This paper adds to the following research questions within this review: • **"Which organisms associated with healthcare water systems are responsible for colonisation/infection of patients?"** By providing evidence using WGS which linked MBL- *P. aeruginosa* identified in healthcare water system samples to patient isolates. The direction of transmission from water to patient could not be confirmed. The paper also states probable acquisition sources were likely both community and nosocomial (as patients were not screened on admission). However, this

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		paper demonstrates a risk of transmission from environmental sources. • **"What are the causes/sources of environmental contamination with healthcare water system-associated organisms?"** By providing evidence using WGS which genetically linked MBL- *P. aeruginosa* present in samples collected from sinks and basins, the patients' bathroom and the washroom with MBL- *P. aeruginosa* identified in patient isolates. This demonstrates risk of acquisition from these environmental sources. • **"What actions can be undertaken to reduce the risk of infection/colonisation associated with direct water usage?"** By providing evidence to suggest the following control measures: gowning, patient isolation, screening, and daily disinfection, prevented further MBL- *P. aeruginosa* cases. Conclusions regarding reducing the risk of infection/colonisation cannot be fully relied upon due to the bundled nature of outbreak studies, and therefore only adds to the mixed evidence base. No change to current recommendations.

[1] This summary of identified literature is based on evidence identified from 1 August 2024 to 31 August 2024 only, this is due to the recent publication of the Infection prevention and control (IPC) for safe healthcare water systems literature review.