Summary of literature identified for the National Policy Guidance & Evidence (NPGE) literature reviews – January to March 2023

Titles and abstracts are reviewed for subject relevance. Additional exclusion criteria are also applied.

Literature review	Papers identified	Summary of Findings	Impact on Recommendations
Patient Placement, Isolation and cohorting	Chang, E., Im, D., Lee, H. Y., Lee, M., Lee, C. M., Kang, C. K., et al. Impact of discontinuing isolation in a private room for patients infected or colonized with vancomycin-resistant enterococci (VRE) on the incidence of healthcare-associated VRE bacteraemia in a hospital with a predominantly shared-room setting. The Journal of hospital infection, 2023. 132, 1–7.	This study evaluated the effect of a relaxed isolation policy for vancomycin-resistant enterococci (VRE) infected or colonised patients on the number of healthcare-associated VRE bacteraemia in an acute care hospital with a predominantly shared-room setting in the Seoul National University Hospital between October 2014 and June 2022. VRE bacteraemia incidence was compared across 3 time periods: private isolation (October 2014-Setember 2017); cohort isolation (October 2017-June 2020); and no isolation (July 2020-June 2022). There was no significant difference in the incidences of VRE bacteraemia between the period of private isolation and cohort isolation (relative risk: 1.01; 95% CI: 0.52-	Adds to the evidence base for the following objective: “Under which circumstances should a patient be placed in a single-bed room?” by providing evidence for the effect of cohorting and no isolation, as opposed to private isolation, on VRE bacteraemia incidence. No change to current recommendations.

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		1.98; p = 0.977). There was also no significant difference between cohort isolation and no isolation (relative risk: 0.99; 95% CI 0.77-1.26; p = 0.903). The incidence of VRE bacteraemia did not significantly increase between any time periods. A limitation of this study was that the no isolation period ran across the COVID-19 pandemic and so infection control procedures are likely to have changed during this time therefore potentially skewing results regarding infection rate with VRE bacteraemia. Applicability to Scottish health and care settings are limited as guidance indicates that Scottish health and care settings should aim to maximise the provision of single-bed rooms.	
Patient Placement, isolation and cohorting	Gehasi, I., Livshiz-Riven, I., Michael, T., Borer, A., & Saidel-Odes, L. Comparing the impact of two contact isolation modes for hospitalised patients with	This retrospective cohort study investigated the comparative outcomes of two types of contact isolation in patients with *Clostridiodes difficile* infection (CDI) at Soroka University Medical Center in southern Israel between January 2015 and December 2018.	Adds to the evidence base for recommendations under the following objectives: “Under which circumstances should a patient be placed in a

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	Clostridioides difficile infection on the quality of care. Journal of clinical nursing, 2023. 32(5-6), 872–878.	178 patients (aged >18 years) with CDI were placed either in contact isolation in a multi-patient room without a dedicated nursing team (n = 78) or contact isolation in a permanent cohort isolation unit with a dedicated nursing team (n = 100). Patient information was collected including: demographics, clinical characteristics, risk-assessment scores, clinical quality measures (number of blood tests per day and number of radiological tests per day), length of stay and mortality. The STROBE checklist for reporting observational studies was followed. No difference was found in all clinical quality process measures and in all outcome measures. Multivariate logistic regression analysis showed that nursing home residence was associated with in-hospital mortality [OR, 2.5; CI, 1.29-4.97; p = 0.007]; the mode of hospitalisation was found not to be associated. In this study, cohorting as part of an enhanced infection control strategy had no impact on patient outcomes. Limitations of the study included the two modes of isolation not occurring during the same	cohort area?" and "What is cohort nursing and under which circumstanced should it be implemented?" This study provides details of comparative care outcomes for two types of contact isolation modes: contact isolation in a multi-patient room and contact isolation in a permanent cohort isolation unit. No change to current recommendations.

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		timeframe therefore other factors regarding a change in hospital policy or staff training may have impacted results.	
Aerosol Generating Procedures (AGPs)	Shrimpton, A. J., O'Farrell, G., Howes, H. M., Craven, R., Duffen, A. R., Cook, et al. A quantitative evaluation of aerosol generation during awake tracheal intubation. Anaesthesia, 2023. *78*(5), 587–597. https://doi.org/10.1111/anae.15968	This clinical monitoring study investigated the risk of aerosol generation during awake tracheal intubation and nasendoscopy, compared with natural respiratory activities and baseline. Twelve volunteers (anaesthetic trainees) performed and received awake tracheal intubation and nasendoscopy during an awake tracheal intubation training course in Bristol. Sampling was conducted in an operating theatre with ultraclean ventilation system in standby, this contributed to a low background aerosol concentration. Particles were sampled using a particle sizer, and a 3D printed funnel was placed 20cm from participants' mouths. Samples were collected before the procedure to obtain a background aerosol concentration, as well as for natural respiratory activities. Airway preparation was carried out followed by nasendoscopy, administering lidocaine 4% when required. Following bronchoscope removal, the awake tracheal intubation was carried out. In-circuit	Adds to the evidence base for recommendations under the following objective: "Which procedures are considered to be aerosol generating?" by providing evidence of aerosol generation from conducting awake upper airway endoscopies. No change to current recommendations.

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		aerosol sampling was also carried out following intubation to record exhaled aerosol from an awake intubated patient. After extubation, the sampling funnel was positioned 20cm in front of the participant's mouth for sampling four more nasendoscopies. Sampling was conducted on one day and was continuous throughout procedures. During awake tracheal intubation, participants coughed when lidocaine was sprayed on their vocal cords, producing significantly higher aerosol concentration than volitional coughs ($p < 0.001$; 62-fold increase), 91,700 particles.l-1 (41,907-166,774 [390-557,817]). The bronchoscope being passed through the vocal cords before tracheal tube insertion produced peak aerosol of 1020 particles.l-1 (645-1245 [120-48,948]). This was significantly higher than background ($p < 0.001$), but not significantly different when compared with volitional coughs or forced vital capacity breathing ($p = 0.266$ and $p = 0.301$). This study demonstrated that specific risks may be associated with lidocaine spray of	

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		the larynx, instrumentation of the vocal cords, procedural coughing and deep breaths. Airborne infection control precautions are therefore appropriate when conducting awake upper airway endoscopies. Limitations of this study include the small sample size (n=12); possible inter-participant variation due to the wide confidence intervals; and there was no measure taken of the infectious particles.	
Aerosol Generating Procedures (AGPs)	Thuresson, S., Fraenkel, C. J., Sasinovich, S., Soldemyr, J., Widell, A., Medstrand, P., et al. Airborne Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) in Hospitals: Effects of Aerosol-Generating Procedures, HEPA-Filtration Units, Patient Viral Load, and Physical Distance *Clinical Infectious Diseases*, Volume 75, Issue 1, 1 July 2022, Pages e89-e96, https://doi.org/10.1093/cid/ciac161	This exploratory observational study identified potential AGPs associated with airborne SARS-CoV-2 RNA. Air samples were collected from wards from two hospitals in southern Sweden between March 2020 and April 2021 where patients with COVID-19 were treated. Samples were linked to patient data and analysed for the presence of SARS-CoV-2 RNA by RT-qPCR. A total of 310 air samples were collected; 8% were positive for SARS-CoV-2. Positive air samples were associated with a low patient Ct value [OR, 5.0 for Ct <25 vs >25; p = 0.01; 95% CI: 1.18-29.5] and a shorter	Adds to the evidence base on the following objective: “Which procedures are considered to be aerosol generating?” where this study adds to the body of low quality observational air sampling study evidence. No change to current recommendations.

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		physical distance to the patient [OR, 2.0 for every metre closer to the patient; p = 0.05; 95% CI: 1.0-3.8]. A mobile HEPA filtration unit in the ward rooms decreased the proportion of positive samples [OR, 0.3; p = 0.02; 95% CI: 0.12-0.98]. No association was observed between SARS-CoV-2 positive air samples and mechanical ventilation, high-flow nasal cannula, nebuliser treatment, or non-invasive ventilation. An association was found with positive expiratory pressure training (p = 0.01) and a trend towards an association for airway manipulation including bronchoscopies, intubations and extubations. Viability of the collected virus was not able to be determined due to the low virus concentrations and there were fewer air samples collected from settings carrying out airway manipulation and nebuliser treatment.	
Hand hygiene products	Uttlová, P., & Urban, J. Hand disinfectants and their activity against clinical isolates of Bordetella pertussis.	This experimental study investigated the bactericidal activity of ethanol-based, propanol-based, and quaternary ammonium compound-based (QAC) hand products on the hands of volunteers	Adds to the evidence base for recommendations under the following objective:

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	Central European journal of public health, 2022. 30(4), 230–234.	contaminated with *Bordetella pertussis* strains. The method used in this study followed the hygienic hand rub method and standards set out in BS EN 1500. The study concluded that the ethanol and propanol-based hand products were effective against clinical isolates of *B. pertussis* as they reached the minimum bactericidal activity required by the EN 1500 standard. However, the QAC-based product did not comply with the requirements of EN 1500. Although the sample size complied with the method set out in EN 1500 it was still very small. Description of the products tested is given however it remains unclear whether the product is a solution, ABHR, or hand wash. A strength of this study is that EN 13727 protocol was followed as a precursory test to assess the effectiveness of the products in vitro before assessing their effectiveness in volunteers.	"How effective is antimicrobial soap at removing/killing microorganisms?" by providing evidence of the bactericidal activity of both alcohol-based hand wash products and antimicrobial hand wash products on *B. pertussis* hand contamination. No change to current recommendations.
Hand Hygiene: Products	Roshan, N. K., Kumar, P., & Vishwas. K.,	This observational study compared the efficacy of conventional hand wash with Isopropyl alcohol hand rub in reducing	Adds to the evidence base for the following objectives:

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	Comparison of Conventional Hand Wash and Isopropyl Alcohol Hand Rub among Healthcare Workers and Doctors Working in Gastromedicine ICU: An Observational Study International Journal of Pharmaceutical Sciences Review and Research, 2022	transient bacterial flora on the hands of healthcare workers (HCWs). A total of 46 HCWS took part in the study between January and March 2022; 250 samples were taken to measure the residual bacterial flora on fingers. The HCWs then used either conventional hand wash or isopropyl alcohol hand rub and residual bacterial flora was resampled. *E. coli, Klebsiella* spp., non-lactose fermenting Gram-negative bacilli, staphylococci and streptococci made up the transient bacterial flora on hands. Conventional hand wash reduced transient bacterial flora in 55% of cases whereas isopropyl alcohol hand rub reduced transient bacterial flora in 97% of the samples. As well as being more effective than conventional hand wash at reducing transient bacterial flora, the alcohol hand rub was also more convenient and time effective for HCWs to apply. No significance testing was carried out to form the results of this study and the method of the study did not adhere to British	"How effective is non-antimicrobial soap at removing/killing microorganisms?" and "How effective is alcohol based hand rub (ABHR) at removing/killing microorganisms?" by providing evidence of the comparable effectiveness of conventional hand wash and ABHR on transient bacterial flora on hands; however the study's method did not comply with the British Standards for Hand Hygiene Products. No change to current recommendations.

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		standards for measuring the effectiveness of hand hygiene products in healthcare facilities.	
Surgical hand antisepsis in the clinical setting	Nolan, B., Petrucci, S., Van Staalduinen, B., Moretti, M., Cabbad, M., & Lakhi, N. A. The glitz and glamour randomized trial: the effect of fingernail polish on post-caesarean surgical site infection. Journal of obstetrics and gynaecology: the journal of the Institute of Obstetrics and Gynaecology, 2022. 42(7), 2758–2763	This experimental study investigated whether there was an effect on the incidence of SSI after caesarean section when surgical staff wore nail polish. The study design was a calendar block-randomised clinical trial whereby surgical staff were assigned to wear nail polish (n = 372) or to have unpainted nails (n = 465) for alternating two week periods. The primary outcome was SSI within 6 weeks of caesarean delivery. All staff performed a standard 3min surgical scrub prior to the index surgery using a 4% chlorohexidine handwash solution. A power calculation was conducted to determine sample size. This study found that the rate of SSIs was not significantly different between the nail polish arm and the unpainted arm (1.3% vs 2.8% p = 0.155); the study concluded that the rate of SSI following caesarean delivery is not significantly affected by surgical staff wearing fingernail polish.	Adds to the evidence base for the following objective: “What is the recommendation relating to finger nails to enable effective surgical hand antisepsis?” by providing evidence as to the effect of nail polish on incidence of SSI. To be considered as primary evidence when creating the recommendation regarding wearing of nail polish. Current recommendation indicates no nail polish should be worn; however, this is based on very limited primary evidence.

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		A possible limitation of this study is that the nail polish arm contained wearers of regular, gel and 'unreported' nail polish types therefore the effect seen may be due to a specific type of nail polish and not attributable to 'general' nail polish.	
Surgical Face Masks	Loeb, M., Bartholomew, A., Hashmi, M., Tarhuni, W., Hassany, M., Youngster, I., et al. Medical Masks Versus N95 Respirators for Preventing COVID-19 Among Health Care Workers: A Randomized Trial. Annals of internal medicine, 2022; 175(12), 1629–1638	This experimental study compared the level of protection against COVID-19 conferred to healthcare workers (HCWs) from medical masks and N95 respirators. Data was collected from 1009 HCWs providing direct care to patients with suspected or confirmed COVID-19 across 29 health care facilities in Canada, Israel, Pakistan and Egypt, from 4 May 2020 to 29 March 2022. HCWs wore either medical masks or fit-tested N95 respirators for 10 weeks. The primary outcome was whether the HCW had a confirmed case of COVID-19 tested using RT-PCR. RT-PCR confirmed COVID-19 occurred in 10.46% participants in medical mask group compared to 9.27% in the N95 respirator group [hazard ratio 1.14 [95% CI, 0.77-1.69].	Adds to the evidence base for the following objective: "What type of surgical mask is recommended for use for TBPs in health and care settings?" by providing evidence as to the level of protection against COVID-19 conferred to the mask wearer through the wearing of a medical mask or an N95 respirator. No change to current recommendations.

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		The study concluded that among HCWs providing care to patients with COVID-19 the overall estimates rule out a doubling in hazard of RT-PCR confirmed COVID-19 for medical masks when compared with N95 respirators. This study did not take into account HCWs contracting COVID-19 through community transmission, heterogeneity between countries or the difference in vaccination rates between countries.	
Safe management of the care environment (environmental decontamination) **Management of care equipment**	Hu Y, Zhang H, Wei L, et al. Competitive Transmission of Carbapenem-Resistant Klebsiella pneumoniae in a Newly Opened Intensive Care Unit. mSystems. 2022;7(6):e0079922. doi:10.1128/msystems.00799-22	This prospective outbreak study investigated the epidemiology of carbapenem-resistant Klebsiella pneumoniae (CRKP) in a newly opened neurological intensive care unit (ICU) in a tertiary care hospital in China from 28 June 2020 to 31 December 2020. Rectal swabs were taken from patients three days within admission, and weekly thereafter during their stay, but healthcare workers were not screened for carriage of CRKP. Environmental samples were taken every two weeks from patient rooms and common areas, so transmission beyond the ICU cannot be deduced. Whole	Adds to evidence base on the following objective(s): “What is the risk of Healthcare Associated Infection (HAI) from the care environment?” “What is the risk of healthcare associated infection (HAI) from non-invasive reusable, communal care equipment?” No change to current recommendations.

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		genome sequencing was carried out on patients' first positive CRKP isolates. Of the 348 patients included, CRKP carriage rate on admission was 3.5% (n=11). Of the 147 patients who were screened weekly during their ICU stay (86.0% of those admitted), CRKP acquisition rate was 16.3% (n=24). CRKP was not isolated during environmental sampling until week 9 of the study. 2,989 environmental samples were taken, for which there was a 3.3% positivity rate (n=98), most of which were from patients' immediate surroundings (n=55), with hanging towers exhibiting the highest positivity rate (5.5%) followed by bed rails (4.1%). For shared areas in patients' rooms (n=17), light switches and sink drains had the highest positivity rate (3.6%). For common areas outside patient rooms (n=24), samples with the highest positivity rate included drains (16.7%) and top surfaces (14.6%). Sequencing suggested that ST11 clones were introduced into the ICU on different occasions and indicated transmission within and out-with patient rooms. It also indicated that two clones	

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		from sequence type ST11 contributed to contamination of five patient rooms, persisting longer than ten weeks, associated with patients carrying CRKP during a long stay in ICU (more than six weeks). Most other isolated clones were only detected temporarily. The findings support risk of HAI from patient zones and frequently touched surfaces in this neurological ICU ward. However, cleaning protocols were not described. Further, the role of healthcare worker and transmission in other areas of the hospital was not considered.	
Safe management of the care environment (environmental decontamination) **Management of care equipment**	Salmanov A, Shchehlov D, Artyomenko V, et al. Nosocomial transmission of multi-drug-resistant organisms in Ukrainian hospitals: results of a multi-centre study (2019-2021). J Hosp Infect. 2023;132:104-115. doi:10.1016/j.jhin.2022.12.008	This multi-centre prospective observational cohort study monitored the epidemiology of multi-drug resistant organism transmission across 17 adult tertiary care hospitals in the Ukraine from 01 January 2019 to 31 December 2021. Environmental cleaning was performed daily and patient equipment was cleaned and disinfected upon discharge. An infection was defined as healthcare acquired if it was detected >48 hours following admission. Quality of cleaning and disinfection was monitored using various methods, including checking	Adds to evidence base on the following objective(s): “What is the risk of healthcare associated infection (HAI) from the care environment?” “What is the risk of healthcare associated infection (HAI) from non-invasive reusable,

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		for removal of fluorescent ink by infection control practitioners. When HAI cases were detected, research assistants collected swab samples from surfaces in the patient area while the patient was present. Healthcare worker hands were sampled before entering patient room, with gloves and gowns checked upon finishing patient treatment. Nasal samples were taken from patients on admission and healthcare workers, the regularity of which was not clear. For patients detected with HAIs who had stayed in their room for >24 hours (n=6,218), there were 64,042 surface samples taken, with 67% of these surfaces being contaminated [95% CIs: 66.8 to 67.2%], p<.001. Evaluation of the quality of cleaning revealed improper cleaning most of the time, with complete removal of the fluorescent ink mark only occurring 40.9% of the time [95% CIs: 40.6 to 41.2%], p<.001. The most contaminated sampling sites were the sink fitting (99.0%), infusion stand (98.2%), multi-module monitor touch screen (95.4%), bed rails (90.6%), room light switch (87.7%), gloves of healthcare	communal care equipment?" No change to current recommendations.

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		workers (85.3%), hands of healthcare workers (84.4%), room inner doorknob (72.2%), with the rest of the sampled sites less than 70% positive samples. The most detected HAIs from patients (n=8,764), environmental sampling (n=35,915) and healthcare worker hands and clothes (n=6,977) were *E. coli* (24.4%), *K. pneumoniae* (12.4%) and *Enterobacter* species (11.5%). For patients with Gram-positive bacteria, the same strain was detected on environmental surfaces for 27.9% of samples. PCR testing on 20,913 isolates indicated that 1,960 (51.9%, [95% CIs: 51.5 to 52.3], p<.001) of the 20,913 isolates had an identical antimicrobial resistant profile to those in a clinical culture, environmental sample and healthcare worker's hands. These findings are indicative of high prevalence of multidrug resistant organisms on hospital surfaces in the absence of adherence to thorough cleaning protocols.	

Evidence table – Healthcare Infection Incidents, Outbreaks and Data Exceedance - literature identified

Literature review	Papers identified	Summary of scientific findings	Impact on Recommendations
Management of incidents and outbreaks in a neonatal unit (NNU)	Pop, R., Kaelin, M. B., Kuster, S. P., Sax, H., Rampini, S. K., Zbinden, R., et al. Low secondary attack rate after prolonged exposure to sputum smear positive miliary tuberculosis in a neonatal unit. Antimicrobial resistance and infection control, 2022. 11(1), 148.	This outbreak report investigated incident tuberculosis (TB) infection in a NICU after prolonged exposure to sputum positive miliary TB by an infant's mother. The study aimed to report an investigation and management strategy and to evaluate the viability of interferon gamma release assay (IGRA) in infants and its concordance to the tuberculin skin test due to lack of data regarding the reliability of IGRA being used as a screening test for infant TB infection. Of the exposed infants that were investigated at baseline (80% of the total 90 exposed infants) no infant showed a positive tuberculin skin test or T-Spot at baseline. All but one blood sample collected from infants responded to phytohemagglutinin (PHA), this was used as a positive control of the T-spot and showed that cells are viable and react upon stimulation. One of 149 HCWs tested positive for latent TB infection and 5 of 92 (5.5%) exposed primary contacts tested	Adds to the evidence base on the following objective: "How should NNU incidents/outbreaks be investigated and managed?" by providing evidence for a management strategy for an infant TB outbreak. No change to current recommendations.

Literature review	Papers identified	Summary of scientific findings	Impact on Recommendations
		positive. These contacts all came from countries with high TB incidences. The secondary attack rate (including paediatric and adult contacts) was 0.29%. The study demonstrated concordance between T-Spot and tuberculin skin test; however no secondary cases were detected therefore the study could not demonstrate that the T-spot was capable of identifying positive results. A limitation of this study was that not all infants or exposed health care workers were followed up for testing despite a thorough list of contacts, contact definitions and investigation periods being available to the study coordinators.	
Management of incidents and outbreaks in a neonatal unit (NNU)	Hatcher, J., Godambe, S., Lyall, H., Tyszczuk, L., Stubbs, F., Cummings, N., et al. Healthcare-worker-associated outbreak of Panton-Valentine-leukocidin-producing meticillin-sensitive Staphylococcus aureus in a large neonatal unit in London: successful targeted suppression	This study reported on a healthcare-worker-associated outbreak of Panton-Valentine-leukocidin-producing methicillin-sensitive *Staphylococcus aureus* (PVL-MSSA) across two neonatal ICUs within Imperial College Healthcare NHS Trust. The outbreak was identified in January 2017 and a multi-disciplinary outbreak control investigation was carried out. This involved: undertaking a 'look-back'	Adds to the evidence base for the following objective: "How should NNU incidents/outbreaks be investigated and managed?" by providing evidence of a multi-disciplinary outbreak control investigation used

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	therapy following failure of mass suppression therapy. The Journal of hospital infection, 2022. 122, 148–156.	exercise reviewing all positive blood cultures for a year, and a review of all *S. aureus* isolates over a 6-month period. Bacterial isolate *spa* typing confirmed similarity between two patients and an outbreak control team was formed. A case definition was established whereby any inpatient with a positive microbiological culture was classified as a case until typing results were returned. Over 16 months, seven neonates tested positive for PVL-MSSA, these isolates were identified in blood cultures, nasopharyngeal aspirate and rectal screening swabs. Isolates were referred to the *Staphylococcus* Reference Laboratory at Public Health England for *spa* typing and WGS. Epidemiological and WGS data suggested a long-term carrier as the most likely source. Staff went through two rounds of mass suppression therapy (using chlorhexidine initially followed by octenidine-based regimens) however positive cases continued to be identified. Staff screening identified one healthcare worker who tested positive with the outbreak strain of PVL-MSSA. The	to contain the spread of a PVL-MSSA outbreak at a NICU in London. No change to current recommendations.

Literature review	Papers identified	Summary of scientific findings	Impact on Recommendations
		member of staff underwent enhanced screening and further suppression therapy, and no further cases were identified.	
Healthcare Incidents and Outbreaks in Scotland	Hadjadj, L., Cassir, N., Saïdani, N., Hoffman, C., Brouqui, P., Astoul, P., et al. Outbreak of carbapenem-resistant enterobacteria in a thoracic-oncology unit through clonal and plasmid-mediated transmission of the *bla*$_{OXA-48}$ gene in Southern France. Frontiers in cellular and infection microbiology, 2022. 12, 1048516.	This report investigates an outbreak of Carbapenemase-producing *Enterobacteriaceae* (CPE) in a thoracic-oncology unit in Marseille, France between December 2016 and October 2017. Whole genome sequencing (WGS) was undertaken; isolates were identified, and antimicrobial susceptibility tests were performed. Nucleotide variations between plasmids and similarity within the same species were investigated. Four *Citrobacter freundii*, one *Enterobacter cloacae* and four *E. hormaechei* OXA-48 carbapenemase producers were isolated in eight patients hospitalised the same year. WGS determined that the *bla*$_{OXA-48}$ gene was present; all *C. freundii* strains belonged to the same ST22 and had a very high degree of similarity between them. Two strains of *E. hormaechei* ST1007 were almost identical. No single source was identified and faecal microbiota	Adds to the evidence base on the following objective: "How should healthcare infection incidents/outbreaks be investigated and managed?" by detailing a WGS investigation for a CPE outbreak within healthcare settings. Also highlights the limitation of outbreak reports where environmental sampling is not undertaken. No change to current recommendations

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		transplantation (FMT) resulted in decolonisation in 66% of patients. WGS demonstrated the dissemination of the *bla*$_{OXA-48}$ gene by both clonal (*C. freundii* ST22 and *E. hormaechei* ST1007) and plasmid spread (pOXA-48 IncL/M). The origin of the outbreak was not confirmed as environmental sampling was not undertaken.	
Healthcare Incidents and outbreaks in Scotland	Aranas, D. R., Demot, B. A., & Cajulao, T. P. T. Outbreak of *Ralstonia* bacteraemia among chronic kidney disease patients in a haemodialysis unit in the Philippines. Western Pacific surveillance and response journal: WPSAR, 2022. 13(4), 1–6.	This case series describes three cases of *Ralstonia insidiosa* infection in a haemodialysis unit in Baguio City in the Philippines between December 2020 and January 2022. Case 1 was a male (age 70) experiencing chills during two concurrent dialysis sessions; case 2 was a female (age 32) also experiencing chills and dizziness during a dialysis session; and case 3 was a female (age 62) with comorbidities (hypertension and diabetes) who was brought to the emergency department hypotensive and with disorientation. All three cases had blood cultures positive for *R. insidiosa*.	Adds to the evidence base for the following objective: “How should healthcare infection incidents/outbreaks be investigated and managed?” by providing evidence for environmental sampling being integral to the successful source of the outbreak being identified. No change to current recommendations.

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		Drug and device tracing were conducted and environmental samples were collected, this led to the likely source of the outbreak being identified as the tap of the reprocessing machine in the haemodialysis unit (a positive sample of *Ralstonia spp.* was found), however molecular typing was not conducted to confirm a match with patient cases. Extensive contamination was identified at multiple locations, many of which associated with water. Following this, control measures were implemented and the haemodialysis unit was thoroughly cleaned (cleaning measures pre and post outbreak were not detailed, but it is implied that cleaning was below par). Consequently, no further cases were reported and active surveillance continued until January 2022. The study concluded that environmental locations including taps can be contaminated with *Ralstonia spp.* and the early identification of cases and the source of the infection is paramount to preventing large outbreaks among immunocompromised patients.	

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		The findings of this study may not be generalisable to Scottish healthcare settings due to its setting and country.	
Healthcare Incidents and Outbreaks in Scotland	Li, L., Wang, R., Qiao, D., Zhou, M., & Jin, P. Tracking the Outbreak of Carbapenem-Resistant *Klebsiella pneumoniae* in an Emergency Intensive Care Unit by Whole Genome Sequencing. Infection and drug resistance, 2022. 15, 6215–6224	This retrospective outbreak report identified the origin and transmission route of a carbapenem-resistant *Klebsiella pneumoniae* (CRKP) outbreak in an ICU at Shanghai Ruijin hospital north, with the aim of providing prevention and control strategies for future CRKP outbreaks. This report covered the period between March and June 2018; 10 CRKP isolates from 5 patients within the ICU were collected. Modified carbapenem inactivation method (mCIM) and whole genome sequencing (WGS) were performed on all isolates. A putative transmission map was created by integrating the genomic and epidemiological data of the isolates alongside 9 other isolates from an outbreak in a different hospital. All 10 isolates were carbapenemase positive in mCIM and belonged to sequence type 11 (ST11) clone. They also carried a set of resistance, and virulence	Adds to the evidence base for recommendations under the following objective: “How should healthcare infection incidents/outbreaks be investigated and managed?” by using WGS to show linkage of resistance genes across locations. No change to current recommendations.

Literature review	Papers identified	Summary of scientific findings	Impact on Recommendations
		genes. A phylogenetic tree of the isolates linking two outbreaks showed that one of the isolates belonged to a branch of isolates from another hospital. The evolution of this isolate caused the outbreak in the ICU. The combination and integration of genomic and epidemiological data enabled a transmission map of this CRKP outbreak to be created. As this report was retrospective it was unable to provide real time assistance in the management of the outbreak; the WGS was based on short-read sequencing so plasmid information was not taken in to account and therefore further tests were required to identify the CRKP strains. Multiple samples were taken from each patient, however potential differences in WGS characters of these samples were not able to be analysed, it is possible that one patient could have been infected by multiple isolates.	
Healthcare Incidents and Outbreaks in Scotland	Odih, E. E., Irek, E. O., Obadare, T. O., Oaikhena, A. O., Afolayan, A. O., Underwood, A., et al.	This report investigated an outbreak of carbapenem-resistant *Acinetobacter baumanniii* (CRAB) in an ICU of a hospital in Southwest Nigeria.	Adds to the evidence base for recommendations under the following objective:

Literature review	Papers identified	Summary of scientific findings	Impact on Recommendations
	Rectal Colonization and Nosocomial Transmission of Carbapenem-Resistant *Acinetobacter baumannii* in an Intensive Care Unit, Southwest Nigeria. Frontiers in medicine, 2022. 9, 846051	Swabs were taken from all patients admitted to the ICU between August 2017 and June 2018; *Acinetobacter* species were isolated from rectal swabs and verified phenotypically. Whole genome sequencing (WGS) was performed according to Global Health Research Unit protocol. SNP phylogeny analysis was conducted to determine evolutionary relationships among the isolates. The acquisition rate was 8.3% (8/96), while 12 (11.1%) patients were positive for CRAB within 48 h of admission. Patients that acquired CRAB had seven times the odds of subsequent bloodstream infection (OR = 7.41; 95% CI 2.39–22.92) Isolates had two or less SNP differences and identical antimicrobial resistance and virulence genes. The outbreak experienced in the ICU was due to the IC2 *A. baumannii* clone. This study highlights the risk of patient introduction of *A. baumannii* and the benefit of rapid identification as a means of reducing the risk of onwards transmission. It is stated that no CRAB was detected in	"How should healthcare infection incidents/outbreaks be investigated and managed?" by highlighting the benefit of active screening on admission. No change to current recommendations.

Literature review	Papers identified	Summary of scientific findings	Impact on Recommendations
		swab samples collected from the ICU environment during the study period, however specific details are not provided. The findings of the study may not be generalisable to Scottish healthcare settings due to its setting and country.	
Healthcare Incidents and Outbreaks in Scotland	Piezzi, V., Wassilew, N., Atkinson, A., D'Incau, S., Kaspar, T., Seth-Smith, H. M., et al. Nosocomial outbreak of vancomycin-resistant *Enterococcus faecium* (VRE) ST796, Switzerland, 2017 to 2020. Euro surveillance: bulletin Europeen sur les maladies transmissibles = European communicable disease bulletin, 2022. 27(48), 2200285.	This report retrospectively described a vancomycin-resistant *Enterococcus faecium* (VRE) outbreak occurring between December 2017 and July 2020 in the Bern hospital group in Switzerland. The outbreak was first identified with two associated cases of VRE bloodstream infection on the oncology ward. In total, 518 patients out of the total 1,300 beds available in the hospital group were identified as *vanB* VRE carriers; 3.5% of patients developed an invasive infection, seven of which had bacteraemia. Isolates were analysed by whole genome sequencing (WGS), 95% of isolates were identified as sequence type (ST) 796. Initial infection prevention measures were put in place focusing on the affected wards however as the outbreak intensified the IPC measures became hospital-wide. Initial	Adds to the evidence base for recommendations under the following objective: "How should healthcare infection incidents/outbreaks be investigated and managed?" through detailing a bundle of infection prevention and control measures used to manage the outbreak. No change to current recommendations

Literature review	Papers identified	Summary of scientific findings	Impact on Recommendations
		IPC measures included: designation of an internal task force; a temporary admission stop implemented for the affected wards; zoning occurred on the affected wards with staff cohorted according to these zones where possible; contact isolation precautions for those VRE-positive patients; and VRE screening. Environmental screening and daily disinfection of rooms also took place. Hospital wide IPC measures included daily disinfection of all patients' rooms; additional terminal room cleaning procedure with UV-C light in VRE-positive patient rooms; and additional hand rub dispensers were installed. The report described the importance of WGS in identifying the sequence type of an isolate and determining relationships between isolates. It also concluded that a multimodal infection control approach across the whole hospital was successful in controlling the outbreak. The study followed the Outbreak Reports and Intervention Studies of Nosocomial infection (ORION) guidelines for outbreak reporting. The study is applicable to	

Literature review	Papers identified	Summary of scientific findings	Impact on Recommendations
		Scottish health care settings however there was no record of compliance to the single bedded rooms within wards in the IPC approach.	