Evidence table – SICPs - literature identified July - September 2022

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.

Literature review	Papers identified	Summary of Findings	Impact on Recommendations
Safe Management of the Care Environment (Environmental Decontamination)	Kuczewski E, Henaff L, Regard A, Argaud L, Lukaszewicz A-C, Rimmele T, Cassier P, Fredenucci I, Loeffert-Fremiot S, Khanafer N, Vanhems P. Bacterial Cross-Transmission between Inanimate Surfaces and Patients in Intensive Care Units under Real-World Conditions: A Repeated Cross-Sectional Study. *International Journal of Environmental Research and Public Health* 19(15): 9401, 2022.	This repeated cross-sectional study evaluated the microbial contamination of inanimate surfaces of 2 ICU rooms at Edouard Herriot Hospital, France from Jan 2020 – Dec 2021. Five environmental samples from one random room in each ICU were sampled irrespective of occupancy using sterile wipes once monthly for 14 months and included patients' (bedrails, bedside table, room-dedicated stethoscope) and healthcare workers' high touch surfaces distant from patients (computer, worktop/nurse cart, washbasin, hydro-alcoholic solution/soap dispenser). Surfaces were disinfected with didecyldimethylammonium chloride. Environmental bacterial species were compared to isolated cultures of the patients hospitalised in the sampled rooms over a period of ± 10 days from sampling. Total of 137 samples were collected: 90.7% of samples close to patients and 87.9% distant to patients were positive with	Adds to evidence base on the following objective(s): • "What is the risk of healthcare associated infection (HAI) from the care environment?" where it provides evidence that sites close to patient and frequently touched surfaces have been identified as areas of increased contamination.

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		overall 223 bacteria mainly: *Enterococcus faecalis* (15.7%), *Pantoea agglomerans* (8.1%), *Enterobacter cloacae/asburiae* (6.3%), *Bacillus cereus* and other *Bacillus* spp (6.3%), *Enterococcusfaecium* (5.8%), *Stenotrophomonas maltophilia* (5.4%), and *Acinetobacter baumannii* (4.9%). Sites with most contamination were bedrails (100% of positive samples), computer keyboard and mouse (93% of positive samples) and bedside table (93% of positive samples). 142 patients were included during the study period of which 67 (47%) were infected/colonised by at least 1 bacteria and in 14 cases the same bacterial species were found in both patient and environmental samples. Cross-contamination was suspected between patient-environment (n=10) and environment-patient (n=4). Findings from this study indicated high level of bacterial contamination on ICU rooms surfaces and showed several cases of possible cross-contamination between the environment and patients.	
Safe Management of the Care Environment (Environmental Decontamination)	Cadnum JL, Pearlmutter BS, Jencson AL, Haydar H, Hecker MT, Ray AJ, Tomas ME, Saade EA, Donskey CJ. Microbial bioburden of inpatient and outpatient areas beyond patient hospital rooms.	This paper investigated the frequency of environmental contamination in areas outside hospital patient rooms and in outpatient facilities. Three point-prevalence surveys were conducted across 4 Cleveland area hospitals (USA), 4 outpatient clinics and 1 surgery centre for methicillin-resistant *Staphylococcus aureus*, vancomycin-	Adds to evidence base on the following objective(s): • "What is the risk of healthcare associated infection (HAI) from the care

Literature review	Papers identified	Summary of Findings	Impact on Recommendations
	Infection Control & Hospital Epidemiology 2022; 43: 1017-1021, 2021.DOI: 10.1017/ice.2021.309.	resistant enterococci, *Clostridioides difficile*, *Candida* spp, and gram-negative bacilli including Enterobacteriaceae, *Pseudomonas aeruginosa*, *Acinetobacter baumanii*, and *Stenotrophomonas maltophilia* with at least 1 month between each culture collection. High-touch surfaces were sampled from radiology, physical therapy, and portable equipment and in emergency departments, waiting rooms, clinics and endoscopy facilities while in outpatient facilities surfaces were sampled from exam rooms, patient bathrooms, waiting rooms and portable equipment. For all facilities, samples were also collected from the floor and sink in patient care areas. Findings show that in hospitals, 9.4% (110 of 1195) sites were positive for 1 or more bacterial pathogens and 5.9% (70/1195) were positive for *Candida* spp. While in outpatient facilities, 6.4% (31 of 485) were positive for 1 or more bacterial pathogens and 10.3% (50/485) were positive for *Candida* spp. *Pseudomonas aeruginosa* and other *Pseudomonas* spp were recovered from 62 (66%) of the total 90 sinks cultured. Study findings suggest surfaces outside hospital patient rooms and in outpatient facilities are frequently contaminated with healthcare-associated pathogens.	environment?" where it provides evidence that frequently touched surfaces such as sinks have been identified as areas of increased contamination.

Literature review	Papers identified	Summary of Findings	Impact on Recommendations
Safe Management of Linen	Tarrant J, Owen L, Jenkins R, Smith LJ, Lair K. Survival of *Clostridioides difficile* spores in thermal and chemo-thermal laundering processes and influence of the exosporium on their adherence to cotton bed sheets. *Letters in Applied Microbiology*, 2022. https://doi.org/10.1111/lam.13811.	This paper compared the survival of *Clostridioides difficile* spores to various heat/thermal and detergent parameters, with and without soiling and investigated adherence to cotton. *C. difficile* spores in suspension were subjected in vitro to 71°C (5 $\log_{10}$ CFU per ml) or 90°C (6 $\log_{10}$ CFU per ml) for 3, 5, 10 and 20 min. Viable *C. difficile* spores were incubated and enumerated. *C. difficile* spores in suspension were exposed to domestic and industrial detergents: Reference detergent A (ECE non-phosphate, SDS, Holmfirth, UK) at 25, 71 and 90°C for 3, 5, 10 or 20 min; Industrial detergent followed by bleach additive treatment at 71 and 60°C, respectively, or at 25°C (Washing Systems, Ltd, Warrington, UK). The test mixtures were incubated and surviving spores enumerated. Adherence of *C. difficile* to cotton after 0 and 24 h air drying was determined with the exosporium (outer layer) partially or fully removed. Findings show that *C. difficile* spores were stable at 71°C for 20 min (decrease from 5·1 $\log_{10}$ CFU per ml to 4·73 $\log_{10}$ CFU per ml, ≤0·37 $\log_{10}$ reduction, $P \leq 0.05$) while 90°C was sporicidal (decrease from 6 $\log_{10}$ CFU per ml to 3.39 and 2.69 $\log_{10}$ CFU per ml at 5min and 10min respectively; ~3 $\log_{10}$ reduction; $P \leq 0.05$); no reduction in viable spores was observed in the presence of soiling. Domestic reference agent was	Findings from this study could impact upon the recommendations under the objective: • "What is the available evidence/guidance on temperature requirements for laundering linen?" however the evidence in this paper is specific to contamination with *C. difficile* spores and was carried out under controlled and limited laboratory condition. It should be noted that the findings of a single study would not cause changes in a recommendation alone.

Literature review	Papers identified	Summary of Findings	Impact on Recommendations
		sporicidal at 90°C at 3 min and 20 min (3·06 and 4·27 log_{10} CFU per ml reductions respectively) but not at 25°C or 71°C (0·27 and 1.43 log_{10} CFU per ml reduction respectively). Industrial detergent was more effective at 71°C compared to 25°C (2·81 vs 0·84 log_{10} reductions). Both domestic and industrial detergents failed to meet BS EN 13704:2018 standard threshold of >3 log_{10} reduction. *C. difficile* spores' adherence to cotton increased over time with 49% adherence after 24h. Adherence increased by 19-23% when exosporium was removed compared to untreated spores. Findings from this in vitro study suggest that *C. difficile* spores are resistant to thermal disinfection temperatures recommended for UK healthcare laundry (65–71°C). Further studies set in real-life conditions are required to investigate optimisation of temperature, disinfectant and mechanism of adherence to cotton in order to increase efficacy of laundering processes against *C. difficile* spores.	
Personal Protective Equipment (PPE): Gloves	Zwaans JJM, Raven W, Rosendaal AV, Van Lieshout EMM, Van Worden G, Patka P, Haagsma JA, Rood PPM. Non-sterile gloves and dressing versus sterile gloves, dressings and drapes for suturing of traumatic wounds in the emergency department: a non-inferiority	This multicentre single-blinded randomised controlled trial (RCT) tested the hypothesis that non-sterile-gloves and dressings would be non-inferior to sterile gloves, dressings and drapes for suturing of uncomplicated traumatic wounds in 3 emergency departments (ED) in The Netherlands: 1 university medical centre and 2 regional hospitals. Patients ≥ 18 years of age were	Adds to evidence base on the following objective(s): • "When/where should gloves be worn?" where it provides evidence that gloves should be based on

Literature review	Papers identified	Summary of Findings	Impact on Recommendations
	multicentre randomised controlled trial. *Emergency Medicine Journal* 39(9): 650-654, 2022.	eligible for study inclusion from 25 July 2012 – 31 December 2016 when presenting to ED with traumatic wound for which sutures were required; patients were excluded if wound was complicated (accompanied by bone, vascular, tendon, nerve or cartilage injury). Eligible and consenting patients were randomised 1:1 without stratification to a sterile or non-sterile protocol using electronic programme. The outcome was wound infection identified during follow-up in the treating ED at 5-14 days after the procedure (wound abscess, cellulitis >10mm, purulent fluid, wound dehiscence seen or physician found wound treatment necessary at follow up e.g. antibiotics or opening and flushing the wound). Results: Out of 2468 eligible patients, 1480 were randomised in the sterile (n=747) or non-sterile (n=733) protocol; patient baseline characteristics were similar in both arms (mean age in sterile vs non-sterile group was 39.2 and 39.5 years). The rate of wound infection in the non-sterile group was 5.7% (95% CI 4.0% to 7.5%) vs 6.8% (95% CI 5.1% to 8.8%) in the sterile group. The mean difference of wound infection rate between the two groups was -1.1% (95% CI −3.7% to 1.5%). This RCT stopped early (mainly due to primary care integration into EDs in The Netherlands during the study period) and was	assessment of the risk of contact with blood, body fluids, non-intact skin, mucous membranes, lesions and/or vesicles, hazardous drugs and chemicals, e.g. cleaning agents: Where such a risk exists, gloves should be worn to protect the healthcare worker and/or the patient.

Literature review	Papers identified	Summary of Findings	Impact on Recommendations
		underpowered (only >2/3 number of patients included during study period) therefore findings should be interpreted with caution. Findings from this study suggest that there is unlikely to be a large difference between the non-sterile gloves and dressings for suturing of traumatic wounds and sterile gloves, dressings and drapes for suturing of traumatic wounds in the ED.	

Evidence table – TBPs - literature identified July – September 2022

Literature review	Papers identified	Summary of scientific findings	Impact on recommendations
Transmission Based Precautions (TBP) Definitions	Nörz D, Pfefferle S, Brehm TT, Franke G, Grewe I, Knobling B, Aepfelbacher M, Huber S, Klupp EM, Jordan S, Addo MM, Wiesch JSZ, Schmiedel S, Lutgehetmann M, Knobloch JK. Evidence of surface contamination in hospital rooms occupied by patients infected with monkeypox, Germany, June 2022. *Euro Surveillance* 27(26): 2200477, 2022. doi:https://doi.org/10.2807/1560-7917.ES.2022.27.26.2200477.	This paper examined and sampled the surfaces of 2 isolated hospital rooms occupied by 2 Monkeypox patients and adjacent anterooms used for donning and doffing personal protective equipment (PPE) for Monkeypox virus contamination using RT-PCR. Infectivity and virus isolation were also determined on cell culture using Vero 76 cells and checked for cytopathic effect (CPE). Environmental sampling was carried out on June 2022 by swabbing entire surfaces including fabrics/linen in patients' rooms and anterooms on day 4 of their respective hospital stay. Samples of lesions or from the throat were also obtained. Both patients were men in their 30's: patient 1 presented with skin lesions in perineum/perianal region and isolated lesions on legs, trunk and buccal mucosal; in patient 2 lesions were only present in perineum and perianal region. Highest viral loads were observed in lesional swabs (max $2.7x10^8$ and $4.4x10^8$ cp for patients 1 and 2 respectively). Viral contamination was found on all surfaces directly touched by patient's hands with highest loads in both bathrooms ($2.4x10^5$ and $4.7x10^4$ cp/cm^2 for tap level of wash basin and lever of soap dispenser respectively). High viral loads were also observed on toilet seats ($1.3x10^5$ and	Adds to the evidence base for recommendations under the objective(s): • "When should TBPs be applied?" where it provides evidence that TBP precautions should be applied when caring for patients with active (known) infections such as Monkeypox.

Literature review	Papers identified	Summary of scientific findings	Impact on recommendations
		1.3x10^3 cp/cm^2 for bathrooms of patients 1 and 2 respectively). Fabrics/linen extensively used by patients also had viral contamination up to 10^5 cp/cm^2. Cross-contamination occurred on investigator's gloved hand immediately after handing linen in both patient's rooms (2.7×10^2 and 7.9×10^3 cp/cm^2). Virus was successfully cultured in Vero 76 cells for 3 samples relative to patient 2 and included investigator's glove, soap dispenser lever and towel on patient's bed which had more than 10^6 copies per sample (>10^3 cp/cm^2). All hand-contact points yielded positive PCR results in the anteroom however only traces of viral DNA (max 3cp/cm^2) were detected on door handle. Findings from this study show contamination of the healthcare environment including fabric/linen. Contaminated surfaces with high viral loads could potentially be infectious and possibly result in transmission. The authors highlight the importance of strict adherence to recommended protection measures for Monkeypox.	
Respiratory Protective Equipment	Gasparini G, Castioni D, Spina G, Familiari F, Galasso O, Mercurio M. The use of a surgical helmet system with a high-efficiency particulate air filter as possible protection equipment during the coronavirus disease 2019 pandemic: a double-blinded randomised control study.	Study design: Randomised control trial Methods: This study assessed the efficacy of the ViVi sterile surgical helmet system (SSHS) equipped with a HFD hood. This hood is classified as a class II protection system, consisting of a helmet and a visor. The visor is made up of three parts; a clear polycarbonate lens, a light blue-coloured	The findings of this study add to the evidence base for recommendations under the objectives: • 'What types of powered respirator are recommended for use in health

Literature review	Papers identified	Summary of scientific findings	Impact on recommendations
	International Orthopaedics 46: 1233-1240, 2022	trilaminate made from polypropylene and a breathable film, and a white spunbond-metldown-spunbond point bond material. The hood was equipped with two-inflow and outflow-powered fans. Participants were sequentially randomised using a computer-generated random allocation. 21 participants were assigned to the placebo group (using saline solution) and 19 were assigned to the test group (using saccharine solution). There were no significant differences between the characteristics of the two groups. All participants were fit tested to the SSHS prior to a retest following the same methods. Both participants and examiners were blinded to the solution used. Efficacy was assessed using a saccharin taste sensitivity test. Prior to efficacy testing, saccharin sensitivity testing was undertaken to categorise participants into groups sensitive after (1) between 1 and 10 puffs, (2) between 11 and 20 puffs, and (3) between 21 and 30 puffs. Efficacy testing involved administering puffs of a sodium saccharin solution over a maximum of 17 minutes. Solution was nebulised 10-15cm from the hood inflow filter system, initially using 10 puffs for group 1, 20 for group 2 and 30 for group 3. Half of this number of puffs were administered every 30 seconds for the remained of the test period. The test was	and care settings?' where details of the efficacy of the assessed SSHS was reported.

Literature review	Papers identified	Summary of scientific findings	Impact on recommendations
		ended after 17 minutes or when a sweet taste was reported by participants indicating a failure in the SSHS. Results: During the fit test 4.8% and 26.3% of participants reported a positive saccharin taste test in the placebo and test groups, respectively. There were no statistically significant differences between the placebo and test groups during the fit test period. During the retest, 9.5% and 10.5% of participants reported a positive saccharin taste test in the placebo and test groups, respectively. There were no statistically significant differences between the placebo and test groups during the retest period. Limitations: - Small sample size - Test methodology may not be applicable to wear in clinical settings e.g. timespan of respirator use	

Evidence table – Healthcare Infection Incidents, Outbreaks and Data Exceedance - literature identified July – September 2022

Literature review	Papers identified	Summary of scientific findings	Impact on Recommendations
Management of Incidents and Outbreaks in Neonatal Units (NNUs).	Hernandez-Alonso E, Bourgeois-Nicolaos N, Lepainteur M, Derouin V, Barreault S, Waalkes A, Augusto LA, Gera S, Gleizes O, Tissieres P, Salipante SJ, de Luca D, Doucet-Populaire F. Contaminated Incubators: Source of a Multispecies *Enterobacter* Outbreak of Neonatal Sepsis. *Microbiology Spectrum* 10(4): e00964-e00922, 2022.	This outbreak study described the investigation and management of *Enterobacter* outbreak in a French NICU over 3-year period (2016-2018) and included 20 neonates with bacteraemia. An outbreak alert was emitted in May 2016 following 3 cases of *Enterobacter* sepsis in NICU where rate of invasive infections rose from 0.7% in 2015 to 2.14 in 2016. Outbreak investigation and management was initiated which included collecting clinical and microbiological data, environmental sampling and whole genome sequencing (WGS) on bacteraemia isolates. Infection prevention control (IPC) measures included dividing the NICU in 2 sectors with dedicated healthcare workers (HCWs): one with infected/colonised babies and one *Enterobacter*-free. HCWs adherence to IPC measures and cleaning practices of equipment and environment were assessed. 100 NICU environmental samples from surfaces, shared devices, water, and drains were collected but all cultures were negative. Initial containment strategies had no success however subsequent outbreak investigation	Adds to evidence base on the following objective(s): • "How should NNU incidents/outbreaks be investigated and managed?" where it provides evidence that microbiological sampling of environmental locations and equipment may be considered as part of the epidemiological investigation during an outbreak • "What are the key measures to control incidents/outbreaks in NNUs and how should these

Literature review	Papers identified	Summary of scientific findings	Impact on Recommendations
		pinpointed neonatal incubators as primary reservoir and source of contamination in this outbreak. *Enterobacter* was found in 26.0% (5/19) in "off" condition versus 77.0% (20/26) in "on" conditions and typing of 20 strains showed same profile clusters as isolates from blood cultures. Replacing these incubators contained the outbreak. The authors concluded that the NICU healthcare environment represents a significant reservoir for *Enterobacter* transmission and infection and recommended the new strategy of microbiological screening of incubators during the "on" active condition.	be implemented in NHS Scotland?" where it provides evidence on the immediate review of SICPs practice to identify areas for improvement and any potential sources of infection or transmission routes.
Management of Incidents and Outbreaks in Neonatal Units (NNUs).	Quan KA, Sater MRA, Uy C, Clifton-Koeppel R, Dickey LL, Wilson W, Patton P, Chang W, Samuelsn P, Lagoudas GK, Allen T, Merchant L, Gannotta R, Bittencourt CE, Soto JC, Evans KD, Blainey PC, Murray J, Shelton D, Lee HS, Zhan M, Wolfe J, Madey K, Yim J, Gohil SK, Grad YH, Huang SS. Epidemiology and genomics of a slow outbreak of methicillin-resistant *Staphyloccus aureus* (MRSA) in a neonatal intensive care unit: Successful chronic decolonization of MRSA-positive healthcare personnel. *Infection Control & Hospital Epidemiology* 1-8, 2022	This outbreak report described the genomic analysis and epidemiologic response to a slow and prolonged methicillin-resistant *Staphyloccus aureus* (MRSA) outbreak in NICU (University of California Irvine Health, UCI, USA) involving 15 neonates and 6 healthcare workers. 12 cases occurred slowly over a 1-year period (mean 30.7 days apart) followed by 3 additional cases 7 months later. All NICU babies and mothers of inborn patients underwent MRSA screening from bilateral nares routinely. Multiple progressive infection prevention interventions were implemented including contact precautions and cohorting of MRSA-positive babies, decolonisation of carriers with nasal mupirocin, hand hygiene	Adds to evidence base on the following objective(s): • "How should NNU incidents/outbreaks be investigated and managed?" where it provides evidence that implementing 'reactive' microbiological screening of all babies in the unit and implementing testing at regular intervals e.g.

Literature review	Papers identified	Summary of scientific findings	Impact on Recommendations
		monitoring, epidemiologic review for common staff, room, equipment, increased high touch cleaning to twice daily, unit wide weekly MRSA screening, isolates sent for pulse-field gel electrophoresis (PFGE), HCW screening and decolonisation, deep clean of select areas and cleaning of unit with hydrogen vapour. Only decolonisation of HCW found to be persistent MRSA carriers were successful in stopping transmission and ending the outbreak. WGS analyses identified bidirectional transmission of MRSA between the neonates and HCWs during the outbreak. Findings from this report show repeated decolonisation regimen of HCWs who were persistent carriers was successful in ending the outbreak.	weekly, where appropriate. Additionally, the IMT may decide that staff screening is necessary to identify carriage or infection among staff groups. • "What are the key measures to control incidents/outbreaks in NNUs and how should these be implemented in NHS Scotland?" where it provides evidence on the immediate review of SICPs practice to identify areas for improvement and any potential sources of infection or transmission routes, infected or colonised infants should be prioritised for isolation or

Literature review	Papers identified	Summary of scientific findings	Impact on Recommendations
			cohorted in a designated area of the NNU.
Management of Incidents and Outbreaks in Neonatal Units (NNUs).	Manandhar S, Nguyen Q, Pham DT, Amatya P, Rabaa M, Dongol S, Basnyat B, Dixit SM, Baker S, Karkey A. A fatal outbreak of neonatal sepsis caused by *mcr-10*-carrying *Enterobacter kobei* in a tertiary care hospital in Nepal. *Journal of Hospital Infection* 125: 60-66, 2022	This outbreak paper described the confirmation of the outbreak, identification of environmental sources of infection and genetic determinant of antimicrobial resistance and virulence of *mcr-10*-carrying *Enterobacter kobei* in a level 3-NICU of Patan Hospital, Nepal 2016-2017. An abrupt increase in the number of neonatal sepsis caused by *Enterobacter* spp was observed between Jul-Sep 2016 infecting 11 out of 23 admitted neonates 5 of whom died of exacerbated sepsis. Whole genome sequencing (WGS) of 18 isolated *Enterobacter* spp showed all 14 phenotypically identical *Enterobacter* spp belonged to *E. kobei* spp. Infection control measures were commenced including increase from fortnightly environmental screening and sampling of high-touch surfaces to weekly, IPC protocol reviewed and reinforced, hand hygiene measures reinforced to all NICU staff and parents/guardians of neonates, aseptic preparation of IV fluid/medication using sterile gloves, disinfection of vial surface before and after drawing, using separate bottles of each patient, avoiding pooling antibiotics, aseptic invasive procedure was practiced including use of maximum aseptic barrier, cohorting of culture-positive	Adds to evidence base on the following objective(s): • "How should NNU incidents/outbreaks be investigated and managed?" where it provides evidence that as part of the epidemiological investigation during an outbreak, microbiological sampling of environmental locations and equipment may be considered where there is epidemiological information linking transmission to an environmental source. • "What are the key measures to

Literature review	Papers identified	Summary of scientific findings	Impact on Recommendations
		neonates and environmental cleaning with 200 ppm chlorine, 1000ppm chlorine fortnightly and fumigation after suspected outbreak. Findings from the genomic analysis showed 10 out of 11 *E. kobei* isolated from neonatal blood cultures were clonal, confirming the outbreak. No *Enterobacter* spp. were isolated from environmental sampling. The authors concluded that multiple IPC measures such as reinforcement of aseptic protocols, hand hygiene, environmental decontamination, fumigation and cohorting of neonates successfully stopped the outbreak.	control incidents/outbreaks in NNUs and how should these be implemented in NHS Scotland?" where it provides evidence that an immediate review of SICPs practice should be considered to identify areas for improvement and any potential sources of infection or transmission routes.
Management of Incidents and Outbreaks in Neonatal Units (NNUs).	Tsai A-L, Hsieh Y-C, Chen C-J, Huang K-Y, Chiu C-H, Kuo C-Y, Lin T-Y, Lai M-Y, Chaing M-C, Huang Y-C. Investigation of a cluster of *Bacillus cereus* bacteremia in neonatal care units. *Journal of Microbiology, Immunology and Infection* 55(3): 494-502, 2022.	This paper described the investigation and infection control measures carried out during an outbreak of a cluster of *Bacillus cereus* bacteremia in a neonatal care unit in Chang Gung Memorial Hospital, Northern Taiwan. Four preterm infants developed late-onset *B. cereus* bacteraemia in this unit between Aug-Nov 2019. No *B. cereus*-associated bacteraemia have occurred in these units in the previous 3 years therefore an outbreak was suspected. An investigation was carried out including sampling of environment and milk supply room. A total	Adds to evidence base on the following objective(s): • "How should NNU incidents/outbreaks be investigated and managed?" where it provides evidence that microbiological sampling of environmental locations and equipment should

Literature review	Papers identified	Summary of scientific findings	Impact on Recommendations
		of 48 specimens were collected with sterile swabs: baby linen, cabinet for linen, bedside cabinet, incubators, new diapers, pacifier and container, bed rails, sonography probe and jelly, milk-warming instruments, formula milk, tap water handle of refrigerator, barcode machine, hand-washing soap fluids, alcohols and surfaces of computer devices. Skin and umbilicus swabs of case 4 were also collected. Molecular methods included pulsed-field gel electrophoresis (PFGE) and multilocus sequence typing (MLST). All four infants were treated with vancomycin and all four survived. Twenty six of 48 (54%) of environmental specimens were positive for *B. cereus* with one major clone (sequence type 365) accounting for 73%). Bacterial growth was found to be relatively higher from specimens of linen and cabinets for linens. Several infection control measures were performed including extensive cleaning of all objects in the neonatal units and milk supply room with detergents and disinfectants and sending all unused linens to the laundry department for washing. A review of the linen cleaning process found that sterilization process was cancelled since May 2019 and this was resumed again in Dec 2019. No more *B. cereus* sepsis occurred in this unit in the following 14 months. The authors concluded that the outbreak might be associated with	be considered where there is epidemiological information linking transmission to an environmental source. • "What are the key measures to control incidents/outbreaks in NNUs and how should these be implemented in NHS Scotland?" where it provides evidence to consider an immediate review of the management of equipment, the environment e.g. linen and linen cabinets should be considered.

Literature review	Papers identified	Summary of scientific findings	Impact on Recommendations
		cessation of linen sterilisation procedure and was successfully controlled when this procedure was reinstated.	
Management of Incidents and Outbreaks in Neonatal Units (NNUs).	Bechmann L, Böttger R, Baier C, Tersteegen A, Bauer K, Kaasch AJ, Geginat G. *Serratia marcescens* outbreak in a neonatal intensive care unit associated with contaminated donor milk. *Infection Control & Hospital Epidemiology* 1-7, 2022.DOI: 10.1017/ice.2022.187.	This study described an outbreak of *Serratia marcescens* in a neonatal intensive care unit at the University Hospital of Magdeburg, Germany and included 4 *S. marcescens*-positive and 19 *S. marcescens*-negative neonates treated between 1-26 February 2019. Neonates underwent weekly screening for methicillin-resistant *Staphylococcus aureus*, multidrug-resistant gram-negative bacteria and other bacteria with high risk of nosocomial infection outbreaks. Human milk donors were also screened weekly for multidrug-resistant bacteria while donated milk portions were tested for pathogenic bacteria before use. A retrospective case-control design was performed to identify the source of the outbreak and included pulsed-field gel electrophoresis (PFGE) and next-generation sequencing. The first 2 neonates with *S. marcescens* were detected on 19 Jan and 5 Feb 2019 respectively but an epidemiological link could not be determined. 3 more cases were identified by 20 Mar and an outbreak with possible association with raw donor milk was recognised. An infection control team was established to coordinate actions. Screening for *S. marcescens* of all inpatients 3 times per week was initiated.	Adds to evidence base on the following objective(s): • "How should NNU incidents/outbreaks be investigated and managed?" where it provides evidence that as part of the epidemiological investigation, a retrospective review e.g. case-control study may be carried out in order to identify further cases. • "What are the key measures to prevent incidents/outbreaks in NNUs and how should these be implemented in NHS Scotland?" where it provides evidence that full

Literature review	Papers identified	Summary of scientific findings	Impact on Recommendations
		Environmental sampling (surfaces and equipment in patient rooms and human milk bank room and milk preparation room) was carried out. In a case-control analysis, 4 *S. marcescens*-positive neonates (cases 2-5) and 19 *S. marcescens*-negative neonates (controls) were compared which showed a significant correlation (P<0.0001) between *c* infection or colonisation and consumption of donor milk that tested negative for pathogenic bacteria from a single breast milk donor. PFGE and molecular sequencing confirmed an *S. marcescens* strain from the breast milk of this donor as possible source of outbreak. The outbreak was controlled by employment of infection control bundle which included cessation of further use of raw donor milk, temporary nutrition of neonates with formula and/or their mothers' own milk, repeated screening of all inpatients, stringent PPE use, process observation, retraining of hand hygiene and monitoring of environmental decontamination procedures. Findings from this study suggest that low-level (<100 cfu/ml) milk contamination of *S. marcescens* can result in colonisation and severe infection of neonates. Authors recommend using more sensitive culture methods to test unpasteurised donor milk.	traceability of expressed milk should be in place in care settings.