ARHAI Scotland
Antimicrobial Resistance and Healthcare Associated Infection

NHS National Services Scotland

Evidence table – SICPs - literature identified October - December 2019

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	Abstract	Summary of scientific findings
Hand Hygiene – Products	Evaluation of a benzalkonium chloride hand sanitiser in reducing transient Staphylococcus aureus bacterial skin contamination in health care workers. Bondurant S, McKinney T, Bondurant L, Fitzpatrick L. *American Journal of Infection Control*. Corrected proof. 2019.	In this non-clinical experimental study, 24 volunteers participated in the comparison of the residual antibacterial activity of 2 hand sanitiser products, DAB hand sanitiser (benzalkonium chloride) and standard ethanol-based hand sanitiser. Samples were taken from participant's hands 1, 2, and 4h after application of the product (only 1 and 4 for standard hand sanitiser). Mean log10 values for the DAB sanitiser were 4.12 after 1h, 4.16 after 2h, and 3.70 after 4h. For the standard sanitiser the mean log10 were 0.70 after 1h and 0.32 after 4h. The differences in efficacy at 1 and 4h was significant ($P < 0.001$). The authors conclude that there is significant improvement in the persistent efficacy of DAB hand sanitiser (benzalkonium chloride) when compared to standard ethanol-based hand sanitiser.	Currently under review for inclusion in update of Hand Hygiene – Products.
PPE – Gowns and Gloves	Transmission of resistant Gram-negative bacteria to healthcare personnel gowns and gloves during care of residents in community-	This prospective observational study was carried out in 13 community-based nursing facilities in Maryland and Michigan to estimate the risk of transmission of	None.

Literature review	Papers identified	Abstract	Summary of scientific findings
	based nursing facilities. Blanco N., Johnson J.K., Sorkin J.D., Lydecker A.D., Levy L., Mody L., Roghmann M.C. *Infection Control and Hospital Epidemiology* 39(12), pp.1425-1430. 2018.	antibiotic-resistant Gram-negative bacteria (RGNB) to gowns and gloves worn by healthcare personnel (HCP). Perianal swabs, along with samples from HCP gowns and gloves, were collected from residents and cultured to detect RGNB. Showering the resident, hygiene or toilet assistance, and wound dressing changes were associated with a high risk of transmission. Glucose monitoring and assistance with feeding or medication were associated with a low risk of transmission. Residents with a pressure ulcer were 3 times more likely to transmit RGNB than residents without one. The authors conclude that gown and glove use in community nursing facilities should be prioritized for certain residents and care interactions that are deemed a high risk for transmission.	
PPE – Aprons/Gowns	Contamination rate of the surgical gowns during total hip arthroplasty. Klaber I, Ruiz P, Schweltzer D, Lira MJ, Botello E, Wozniak A. *Orthopaedic and Trauma Surgery*. 139:1015-1019. 2019.	This study investigated the contamination of surgical gowns during clean wound orthopaedic surgeries with an expected duration ≥ 90min. Swab samples were taken from the forearms and chest-abdomen of the primary and assisting surgeon's gowns before and after the surgery took place. Samples were taken	None.

Literature review	Papers identified	Abstract	Summary of scientific findings
		from 140 gowns, during 70 surgeries, resulting in 12% being positive for bacterial contamination. 4.1% of gowns used during total hip arthroplasty (THA) surgeries were positive, and 21.67% were positive from knee and spinal surgeries. No THA surgery that lasted less than 2 hours resulted in a contaminated gown. The authors concluded that in longer surgeries, especially those that were non-arthroplasty, there was a higher rate of contamination. Furthermore, it was recommended that it should be the aim to keep THA surgeries under 120min and gowns should be changed if contamination is suspected.	
PPE – Gloves	How to apply and remove medical gloves. Ford C., and Park L. *British Journal of Nursing*. 28(1): 26-28. 2019.	This article outlines when gloves should be worn in a healthcare setting, which gloves are available, and how to properly don and doff gloves to ensure hand hygiene and restrict contamination. The authors highlight assessing hand health and conducting hand hygiene before donning gloves.	None. Adds to Evidence Base.
PPE – Headwear	Mandatory change from surgical skull caps to bouffant caps among operating room personnel does not	This study reports on the rates of surgical site infections for over 15,000 Class I (clean) surgical procedures at a single 25	None.

Literature review	Papers identified	Abstract	Summary of scientific findings
	reduce surgical site infections in Class I surgical cases: A single-centre experience with more than 15000 patients. Shallwani H, Shakir HJ, Aldridge AM, Donovan MT, Levy EI, Gibbons KJ. *Neurosurgery* 82(4), pp.548-554. 2018.	operating room site, before and after surgical skull caps were banned. Monthly and cumulative infection rates for 13 months before (7513 patients) and 13 months after (8446 patients) the policy implementation were collected and analysed for the groups, respectively. There was an increasing in SSI infections in all class I operating rooms and for all spinal procedures, however, these increases were not significant. Cumulative rate of SSI in craniotomy/craniectomy cases decreased, but was not significant. The authors conclude that their findings indicate that banning surgical skull caps did not reduce infection rates.	
	Bouffant vs Skull Cap and Impact on Surgical Site Infection: Does Operating Room Headwear Really Matter? Kothari S.N., Anderson M.J., Borget A.J., Kallies K.J., Kowalski T.J. *Journal of the American College of Surgeons*. 227(2), pp.198-202. 2018.	This study analysed data from a previously published prospective randomized trial on the impact of hair clipping on surgical site infections (SSIs). This study analysed data from a previously published prospective randomized trial on the impact of hair clipping on surgical site infections (SSIs). 1,543 patients were included in the trial, grouped by the attending surgeon's preferred cap choice, either bouffant (39%) or skull cap (61%). When adjusting for the type of operation, no significant differences	None.

Literature review	Papers identified	Abstract	Summary of scientific findings
		in SSI rates were observed for skull caps vs bouffant caps. The authors conclude that cap choice did not significantly impact SSI rates after accounting for surgical procedure type.	
PPE – Surgical Face Masks	Septic arthritis due to oral streptococci following intra-articular injection: A case series. Cain SM., Enfield KB., Giannetta ET., Sifri CD., and Lewis JD. American *Journal of Infection Control*. 46(11): 1301-1303. 2018.	This retrospective cohort study consists of a database review of possible septic arthritis cases caused by oral streptococci following an intra-articular injection procedure. 4 possible cases were found from records between January 2007 and December 2015. However, only in one case was it confirmed that the healthcare worker administering the injection was not wearing a mask. The authors acknowledge the limitations of the study, but due to APIC recommendations they still advise the routine use of face masks when performing an intra-articular injection.	May add an additional situation when surgical face masks should be worn.
	Surgical Masks and Exposure Protection in the Perioperative Setting. Joyce, C. *AORN*. 107(2): 253-256. 2018.	This educational article from AORN highlights the importance for perioperative staff to select a properly fitted surgical mask with the barrier performance rating best suited for the anticipated exposure (eg, smoke plume, vapors, aerosols, biologics).	None. Adds to Evidence Base.

Literature review	Papers identified	Abstract	Summary of scientific findings
Management of Care Equipment	Disinfection of Blood Pressure Cuffs and Electrocardiographic Telemetry Leads With 0.5% Hydrogen Peroxide Wipes. Risteen R., Cohen S., Mooney L., Giovanniello E., Miley GB., and Hollenbeck BI. *American Journal of Critical Care*. 27(4): 322-327. 2018.	This study investigated the effectiveness of 0.5% hydrogen peroxide wipes in disinfecting the intricate surfaces of cardiac telemetry leads and Velcro fasteners on blood pressure cuffs. Smooth, hard frequently touched surfaces (patient trays and call buttons) were used as a control, and effectiveness of the disinfection was measured by presence of a UV indicator and microbial culture samples. Blood pressure cuffs and call buttons were found to be significantly cleaner than telemetry leads and patient trays. These findings suggest that 0.5% hydrogen peroxide wipes effectively disinfect blood pressure cuffs, but are less effective for cleaning telemetry leads.	None.
	Efficacy of an Ethanol-Based Hand Sanitiser for the Disinfection of Blood Pressure Cuffs. Perez LG, Ramanantsoa C, Beaudron A, Delchet CH, Penn P, Comacle P. *International Journal of Environmental Research and Public Health*. 16(22):4342. 2019.	This study investigated the efficacy of ethanol-based hand sanitisers in removing MRSA and VRE when used to clean nylon blood pressure cuffs. Half of the BP cuff was disinfected with 2ml of regular detergent and the other half was disinfected with 2ml of EBHS. BP cuffs were sampled before disinfection and 10 min after disinfection. CFU counts were used to compare before and after values for both groups. For both products, the	None.

Literature review	Papers identified	Abstract	Summary of scientific findings
		reductions in cfu from the before disinfection value was significant. However, the difference in reduction between the 2 products was not significant. The authors conclude that ENHS could be an effective product to disinfect BP cuffs but further study is required to validate the results of this study.	
Linen	From ward to washer: The survival of Clostridium difficile spores on hospital bed sheets through a commercial UK NHS healthcare laundry process. Tarrant J, Jenkins RO and Laird KT. *Infection Control & Hospital Epidemiology* 39(12): 1406-1411, 2018.	This study aimed to quantify the survival of Clostridium difficile spores on hospital bed sheets through the United Kingdom National Health System (UK NHS) healthcare laundry process (Health Technical Memorandum (HTM) 01-04). Clostridium difficile spores were inoculated onto cotton sheets and laundered through a simulated washer extractor cycle using an industrial bleach detergent with sodium hypochlorite 15% and peracetic acid sour 14. Spore survival on hospital sheets naturally contaminated with C. difficile was also assessed using a washer extractor plus drying and finishing cycles at a commercial laundry. Before and after washing, the C. difficile strain was identified as ribotype 001/072. Both the simulated and in-situ laundering processes failed the microbiological standards of no	None.

Literature review	Papers identified	Abstract	Summary of scientific findings
		pathogenic bacteria remaining. The authors conclude that Clostridium difficile spores are able to survive laundering through a commercial washer extractor and may be contributing to sporadic outbreaks of CDI.	
Occupational Exposure	Infectious risk for healthcare workers: evaluation and prevention. Triassi M., and Pennino F. *Annali di igiene: medicina preventive e di communita*. 30(Suppl. 1): 48-51. 2018.	This review of literature outlines Italian legislation and guidelines in place to prevent transmission of blood borne viruses via needle-stick injuries, including the penalties in place for non-compliance. The review mentions a SIROH study which found that the introduction of needle-stick prevention devices within Italy cut exposure rates by this means of transmission by 75%.	None. Adds to Evidence Base.
	Needlestick prevention devices: data from hospital surveillance in Piedmont,Italy – comprehensive analysis on needlestick injuries between healthcare workers after the introduction of safety devices. Ottino MC, Argentero A, Argentero PA, Garzaro G, Zotti CM. *BMJ Open*. 9:e030576. 2019.	The aim of this study was to investigate the impact of the accidents related to the use of Safety-Engineered Devices (SEDs) between hospital operators and examining the rates and dynamics of accidents involving SEDs in hospitals in the Piedmont region of Italy. Data was collected from Sharps surveillance systems and information on occupational accidents were collected from standardised notification forms. From this, conventional and safety	None.

Literature review	Papers identified	Abstract	Summary of scientific findings
		devices were compared and accident rates per 100,000 needles were used to calculate the relative risk between devices. It was found that total sharps accident rates were lower with use of SEDs for all needle types. Only 18% of observed sharps accidents were related to SEDs, and 45% of SEDs related injuries occurred during the disposal of the device, which was linked to manual activation methods. The authors concluded that while SEDs reduced the rates of sharps accidents, the type of activation mechanism should be considered before introducing them into healthcare settings.	

Evidence table –TBPs - literature identified October – December 2019

Literature review	Papers identified	Summary of scientific findings	Impact on recommendations
RPE	N95 Respirators vs Medical Masks for Preventing Influenza Among Health Care Personnel: A Randomized Clinical Trial. Radonovich LJ Jr, Simberkoff MS, Bessesen MT, Brown AC, Cummings DAT, Gaydos CA, Los JG, Krosche AE, Gibert CL, Gorse GJ, Nyquist AC, Reich NG, Rodriguez-Barradas MC, Price CS, Perl TM and ResPECT investigators. *JAMA* 322(9): 824-833, 2019.	This cluster randomized pragmatic effectiveness study was conducted at 137 outpatient study sites at 7 US medical centres between September 2011 and May 2015, with final follow-up in June 2016. Each year for 4 years, during the 12-week period of peak viral respiratory illness, pairs of outpatient sites (clusters) within each centre were matched and randomly assigned to the N95 respirator or medical mask groups. The primary outcome was the incidence of laboratory-confirmed influenza. Secondary outcomes included incidence of acute respiratory illness, laboratory-detected respiratory infections, laboratory-confirmed respiratory illness, and influenza-like illness. Among 2862 randomized, 2371 completed the study and accounted for 5180 HCP-seasons. Among outpatient health care personnel, N95 respirators vs medical masks as worn by participants in this trial resulted in no significant difference in the incidence of laboratory-confirmed influenza.	None. Note: Study conducted using N95 respirators which are equivalent to FFP2, not FFP3.

Personal Protective Equipment for High Consequence Infectious Diseases	Assessing Viral Transfer during doffing of Ebola-Level Personal Protective Equipment in a Biocontainment Unit. Casanova LM, Erukunuakapor K, Kraft CS, Mumma JM, Durson FT, Ferguson AN, Gipson CL, Walsh VL, Zimring C, DuBose J and Jacob JT. *Clinical Infectious Diseases* 66(6): 945-949, 2018	This study assessed contamination of skin, gloves, and scrubs after doffing Ebola-level PPE contaminated with surrogate viruses: bacteriophages MS2 and F6. This study assessed contamination of skin, gloves, and scrubs after doffing Ebola-level PPE contaminated with surrogate viruses: bacteriophages MS2 and F6. 10 experienced HCWs donned PPE, which was purposefully contaminated with surrogate viruses and fluorescent marker in 4 locations, performed simulated patient care tasks, then doffed PPE. Donning and doffing protocol incorporated guidance from a trained observer and alcohol-based hand rub. Among 10 HCWs there was no F6 transfer to inner gloves, hands, or face; 1 participant had F6 on scrubs at low levels. MS2 transfer was observed to scrubs (n = 2), hands (n = 1), and inner gloves (n = 7), where it was highest. Environmental samples with visible fluorescent marker (n = 21) were negative. Among experienced HCWs, structured, observed doffing using ABHR protected against hand contamination with enveloped virus. Non-enveloped virus was infrequent on hands and scrubs but common on inner gloves, suggesting	Currently under review for inclusion in update of Personal Protective Equipment for High Consequence Infectious Disease review.

		that inner gloves, but not necessarily ABHR, protect against hand contamination.	
	Self-contamination during doffing of personal protective equipment by healthcare workers to prevent Ebola transmission. Suen LKP, Guo YP, Tong DWK, Leung PHM, Lung D, Ng MSP, Lai TKH, Lo KYK, Au-Yeung CH and Yu W. *Antimicrobial Resistance and Infection Control* 7(1), 2018.	This study aimed to compare the efficacy of three Personal Protective Equipment (PPE) ensembles, namely, Hospital Authority (HA) Standard Ebola PPE set (PPE1), Dupont Tyvek Model, style 1422A (PPE2), and HA isolation gown for routine patient care and performing aerosol-generating procedures (PPE3) to prevent EVD transmission by measuring the degree of contamination of healthcare workers (HCWs) and the environment. 59 participants took part in the trial which consisted of PPE donning, application of fluorescent solution on the PPE surface, and PPE doffing, before degree of contamination was estimated by number of fluorescent stains on clothes and environment. PPE2 and PPE3 presented higher contamination risks than PPE1, and environmental contaminations were recorded from rubbish bin covers, chairs, faucets and sinks. Authors note that, while PPE1 presented a lower contamination risk than PPE2 and PPE3, the design could still be further improved.	Currently under review for inclusion in update of Personal Protective Equipment for High Consequence Infectious Disease review.

	A unified personal protective equipment ensemble for clinical response to possible high consequence infectious diseases: A consensus document on behalf of the HCID programme. Poller B, Tunbridge A, Hall S, Beadsworth M, Jacobs M, Peters E, Schmid ML, Sykes A, Poran V, Gent N, Evans C, Crook B and High Consequence Infectious Diseases Project Working Group. *Journal of Infection* 77(6): 496-502.	This consensus document discusses a unified PPE ensemble for high consequence infectious diseases. A systematic review identified national standardisation of PPE protocols as a priority, but recognised that a lack of safety data limited the ability to mandate any one protocol. A simulation-based exercise was developed, using a mannequin and synthetic bodily fluids containing coloured fluorescent tracers, to assess the safety of PPE ensembles in use within the UK during first assessment of a patient with possible HCID. The simulation testing identified significant HCW contamination events after doffing, related to protocol failure or complications in PPE doffing, providing conclusive evidence that improvements could be made. An expert stakeholder group examined data from this exercise and agreed on a unified PPE ensemble. This ensemble was then tested in the same simulation exercise and no evidence of any HCW contamination was seen after doffing. Following further review by the working group, a consensus agreement has been reached and a unified 'HCID assessment PPE' ensemble, with accompanying donning and doffing protocols.	Currently under review for inclusion in update of Personal Protective Equipment for High Consequence Infectious Disease review.