ARHAI Scotland
Antimicrobial Resistance and Healthcare Associated Infection

NHS National Services Scotland

Evidence table – SICPs - literature identified July-September 2020

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 scientific findings	Impact recommendations
Hand hygiene - Products	Demonstrating the persistent antibacterial efficacy of a hand sanitizer containing benzalkonium chloride on human skin at 1, 2, and 4 hours after application. Bondurant SW; Duley CM; Harbell JW. American Journal of Infection Control. 47(8):928-932, 2019 08. VI 1	This study measured the persistence of antimicrobial activity of non-alcohol based formulation using benzalkonium chloride (BK, 0.12%) and ethanol-based formulation (comparator, 63%) against *Staphylococcus aureus* using technique prescribed in protocol E2752-10 at up to 4hours after application. The study was performed on 24 subjects (19-63 years old) with healthy skin (16 men, 8 women). Results show the test product BK produced reduction in colony-forming units at each of the 3 time points tested (3.75-4.16-$\log_{10}$ reductions) whereas the ethanol based product produced less than 1-$\log_{10}$ reduction over the same time ($P<0.001$). Findings demonstrated improved and persistent antibacterial activity for the BK formulation compared to 63% ethanol-based formulation. Further clinical studies comparing BK to 70% ethanol would be beneficial.	None.
Hand Hygiene – Skincare	Glycerol content within the WHO ethanol-based handrub formulation: balancing tolerability with antimicrobial efficacy.	This cluster-randomized double-blind crossover trial evaluated the tolerance of healthcare workers (HCWs) to the World Health Organization (WHO) ethanol-based handrub (EBHR) formulation using different	None.

Literature review	Papers identified	Summary of scientific findings	Impact recommendations
	Menegueti MG; Laus AM; Ciol MA; Auxiliadora-Martins M; Basile-Filho A; Gir E; Pires D; Pittet D; Bellissimo-Rodrigues F Antimicrobial Resistance & Infection Control. 8:109, 2019.	concentrations of glycerol in healthcare setting. 40 HCWs from an intensive care unit of a tertiary-care hospital in Brazil took part in the study from June 1 – September 30, 2017. WHO EBHR original formulation containing 1.45% glycerol were tested against three other concentrations (0, 0.5 and 0.75%). HCWs used one formulation (order of the products used was randomised) at a time for 7 working days during their routine practice; their hands were evaluated by external observer using the WHO scale for visual inspection. Both rater and HCWs were blinded to concentration used in each study phase. Results show that participants had 2.4 times (95% CI 1.12-5.15) more chance of having a skin condition rated good when they used the 0.5% compared to 1.45% glycerol concentration. HCWs were likely to have a worst evaluation (OR: 0.23, 95% CI 0.11-0.49) when they used formulation without glycerol compared to WHO standard formulation of 1.45%; there were no differences between the other formulations used. Findings suggest that EBHR formulation containing 0.5% glycerol led to better ratings of skin tolerance compared to original formulation among HCWs tested offering best balance between skin antimicrobial activity and skin tolerance.	

Literature review	Papers identified	Summary of scientific findings	Impact recommendations
Hand Hygiene – Surgical Hand Antisepsis	Surgical hand hygiene and febrile urinary tract infections in endourological surgery: A single-center prospective cohort study Unno R, Taguchi K, Fujii Y, Unno N, Hamamoto S, Ando R, Nakane A, Okada A, Kamiya H, Yasui T. *Journal of Urology* 203(Suppl 4):e679-e680, 2020	Single-centre prospective cohort study to evaluate the influence of surgical hand antisepsis on febrile urinary tract infections (f-UTIs) during endourological surgery. The study was run between April 2016 and July 2020, and assessed surgeries where surgical hand antisepsis and double gloving were used compared to surgeries using regular hand hygiene and double gloving. 477 patients were included in this study with 259 in the group where surgical hand antisepsis was performed and 218 patients where regular hand hygiene was performed, all before double gloving. No significant differences were found in the onset of f-UTI between the two groups (OR 0.87, p=0.74). This finding suggests that, when double gloving is used, regular hand hygiene is sufficient to prevent f-UTIs during endourological surgeries.	None.
	Evaluation of World Health Organization-Recommended Hand Hygiene Formulations Suchomel M.; Eggers M.; Maier S.; Kramer A.; Dancer S.J.; Pittet D. *Emerging infectious diseases*. 26 (9) (no pagination), 2020. Date of Publication: 27 May 2020.	Due to scarcity of commercial hand hygiene products due to coronavirus disease, World Health Organization (WHO) alcohol-based hand rub formulations containing ethanol (80% vol/vol) or isopropanolol (75% vol/vol) are being produced for hospitals worldwide. Neither WHO formulation meets European Norm 12791 and 1500, the basis for approval as a surgical hand preparation and hygienic	None.

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		hand rub respectively. This study evaluated the efficacy of 2 modified formulations: (1) ethanol 80% wt/wt, hydrogen peroxide 0.125% vol/vol and glycerol 0.5% vol/vol and (2) isopropranol 75% wt/wt, hydrogen peroxide 0.125% vol/vol and glycerol 0.5% vol/vol. 60% (vol.vol) N-propanol without additions was used a reference alcohol of EN12791. 24 volunteers with healthy skin (no skin breaks on hands) participated in the study. Results demonstrated that both modified formulations met standard requirements for 3-minute surgical hand preparation when alcohol concentrations of 80% wt/wt ethanol or 75% wt/wt isopropanol with reduced glycerol concentration (0.5%) were used.	
Routine Cleaning of the Environment	*Acinetobacter baumannii* can be transferred from contaminated nitrile examination gloves to polypropylene plastic surfaces Takoi H, Fujita K, Hyodo H, Matsumoto M, Otani S, Gorai M, Mano Y, Saito Y, Seike M, Furuya N, Gemma A. American Journal of Infection Control 47(10): 1171-1175, 2019	In vitro experiment assessing the risk of bacterial contamination from the gloves of healthcare workers to environmental surfaces. Drug-resistant and drug-sensitive strains of *A. baumannii, E. coli, Klebsiella pneumonia, Enterobacter cloacae*, and *Pseudomonas aeruginosa* were used during this study. Transfer from gloves was simulated by inoculating the middle and fore finger of a gloved hand and, once dry (approx. 3 mins), pressing onto a polypropylene plastic coupon acting as a fomite for 10 seconds. The glove and	None.

Literature review	Papers identified	Summary of scientific findings	Impact recommendations
		coupon were swabbed immediately after inoculation, after 30 seconds, and 3 minutes. Samples were plated and assessed for bacterial growth after being incubated at 37˚C overnight. It was found that once bacteria was dry (3 minutes after inoculation) all strains of *A. baumannii* were transferred onto the plastic coupon. This finding suggests that bacterial contamination can transfer from healthcare workers gloves to environmental surfaces, highlighting the need for regular cleaning.	
PPE **Management of Care Equipment**	Respiratory viruses on personal protective equipment and bodies of healthcare workers. Phan LT; Sweeney D; Maita D; Moritz DC; Bleasdale SC; Jones RM; CDC Prevention Epicenters Program. Infection Control & Hospital Epidemiology. 40(12):1356-1360, 2019 12. VI 1	This prospective observational study aimed to characterize the magnitude of virus contamination on personal protective equipment (PPE), skin and clothing of healthcare workers (HWCs) who provided care to patients with viral infections. 59 HCWs took part in the study and their PPE (glove, face mask, gown and personal stethoscope) were swabbed. HCW hands, face and scrubs were also swabbed after doffing PPE. Quantitative polymerase chain reaction (qPCR) were used to quantify viral RNA copies in the samples. Results show overall that 31% of glove samples, 21% gown samples and 12% face mask samples were positive for virus and among body/clothing sites, 21% bare hand samples, 11% of scrub samples and 7% of face samples were positive for virus.	None.

Literature review	Papers identified	Summary of scientific findings	Impact recommendations
		There was no statistically significant difference between virus concentrations on PPE compared to virus concentrations on skin and clothing under PPE. Virus concentrations on personal stethoscopes & gowns were positively correlated with number of torso contacts (P<.05) while virus concentrations on face masks were positively correlated with number of face mask contacts and patient contacts (P<.05). Findings suggest HCWs are routinely contaminated with respiratory viruses after patient care highlighting need for hand hygiene and modifying self-contact behaviours to decrease potential virus transmission.	

Evidence table – TBPs - literature identified July-September 2020

Literature review	Papers identified	Summary of scientific findings	Impact recommendations
Patient Placement, Isolation and Cohorting	Contact precautions in single-bed or multiple-bed rooms for patients with extended-spectrum beta-lactamase-producing Enterobacteriaceae in Dutch hospitals: a cluster-randomised, crossover, non-inferiority study Kluytmans-van den Bergh M, Bruijning-Verhagen PCJ, Vandenbroucke-Grauls CMJE, de Brauwer EIGB, Buiting AGM, Diederen BM, van Elzakker EPM, Friedrich AW, Hopman J, al Naiemi N, Rossen JWA, Ruijs GJHM, Savelkoul PHM, Verhulst C, Vos MC, Voss A, Bonten MJM, Kluytmans JAJ. The Lancet Infectious Diseases 19(10): 1069-1079, 2019	Analysis of the efficacy of contact precautions in single-bed and multiple-bed rooms for the prevention of ESBL-producing Enterobacteriaceae transmission. Contact precautions were implemented across two consecutive study periods in single-bed rooms and multiple-bed rooms on medical and surgical wards of 16 Dutch hospitals. Hospitals were randomly assigned one of the two isolation strategies in the first study period and then completed the other during the consecutive period. The primary outcome of the study was transmission of ESBL-producing Enterobacteriacea. Between the 24th April 2011 and 27th February 2014, 693 index patients and 9527 ward mates were enrolled. Transmission of ESBL-producing Enterobacteriaceae to at least one wardmate was found for 11 (4%) of 275 index patients during the single-bed room strategy period and for 14 (7%) of 188 index patients during the multiple-bed room strategy period (crude risk difference 3·4%, 90% CI −0·3 to 7·1). These findings suggest that contact precautions in multiple-bed rooms are non-	None.

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		inferior to contact precautions in single-bed rooms. This could impact the isolation procedures in hospitals when working to prevent ESBL-producing Enterobacteriaceae transmission.	
	Hemodialysis with Cohort Isolation to Prevent Secondary Transmission during a COVID-19 Outbreak in Korea Jang-Hee Cho, Seok Hui Kang, Hayne Cho Park, Dong Ki Kim, Sang-Ho Lee, Jun Young Do, Jong Won Park, Seong Nam Kim, Myeong Seong Kim, Kyubok Jin, Gun Woo Kang, Sun-Hee Park, Yong-Lim Kim, Young-Ki Lee, on behalf of the Korean Society of Nephrology COVID-19 Task Force Team *JASN* Jul 2020, 31 (7) 1398-1408; DOI: 10.1681/ASN.2020040461	This multicentre cohort study investigated the effect of a strategy of haemodialysis (HD) with cohort-isolation-separate dialysis sessions for close contacts of patients with confirmed COVID-19 on preventing secondary transmission of SARS-CoV-2. The study enrolled close contacts of patients with rRT-PCR confirmed COVID-19 including patients on HD and healthcare workers (HCW) in HD units (Korea); close contacts were identified by epidemiologic investigation and tested negative on immediate screening test for SARS-CoV-2. 11 HD patients and 7 HCWs from 11 HD centres were diagnosed as having COVID-19 as of March 14, 2020 with immediate screening performed in 306 individuals and among them, 302 close contacts with negative results were enrolled. HD with cohort isolation was carried out among all close contacts for median of 14 days. During cohort isolation, 9 patients showed symptoms but tested negative for SARS-CoV-2. 2 HCWs (0.66% of total group) were diagnosed at the termination test for SARS-CoV-2 (13 days after last exposure). Findings demonstrated low secondary	None. Adds to evidence base.

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		transmission rate in HD facilities within this cohort concluding that transmission of COVID-19 could be controlled through early rapid rRT-PCR testing and continuous infection control measures.	
	A novel cohorting and isolation strategy for suspected COVID-19 cases during a pandemic. Patterson B. et al Journal of Hospital Infection. 105(4):632-637, 2020 Aug.	This paper describes the implementation of a triage tool aimed at minimizing nosocomial COVID-19 in patients at risk of severe disease. Patients presenting at the University College London Hospital (UCLH) were triaged according to likelihood of COVID-19 and risk of poor outcome. Category A (low likelihood; high risk), B (high likelihood; high risk), C (high likelihood; low risk) and D (low likelihood; low risk). These categories determined the order of priority for isolation in single-occupancy rooms with Category A the highest. Patients in other groups were cohorted when isolation capacity was limited with additional interventions to reduce transmission. 93 patients were evaluated and given a triage category with 79 (85%) receiving COVID-19 diagnosis during their admission. Patients without COVID-19 diagnosis were initially triaged to: Category A (n=10), B (n=0), C (n=1) and D (n=4). All high risk patients requiring isolation were admitted to single-occupancy rooms, 28 (30%) suspected for COVID-19 were evaluated to be low risk (groups C & D) and cohorted. No	None.

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		symptomatic nosocomial COVID-19 infections were detected in cohorted patients.	
	Contact isolation versus standard precautions to decrease acquisition of extended-spectrum beta-lactamase-producing Enterobacterales in non-critical care wards: a cluster-randomised crossover trial. Maechler F. et al The Lancet Infectious Diseases. 20(5):575-584, 2020 05.	This cluster-randomised crossover trial study aimed to establish the benefits of contact isolation over standard precautions for reducing the incidence density (acquisition rate per 1000 patient-days) of extended-spectrum beta-lactamase-producing *Enterobacterales* (ESBL-E) colonisation and infection in adult wards with an active surveillance culture programme. Adult medical, surgical or combined medical-surgical wards without critical care from four European university hospitals were randomised to continue standard precautions alone or implement contact isolation alongside standard precautions for 12 months, followed by 1-month washout period and 12 months of alternate strategy. 20 wards were enrolled (Germany 8; Netherlands 4; Spain 4; Switzerland 4); 38,357 patients were admitted to these wards between Jan 6 2014 and Aug 31, 2016. The incidence density of ward-acquired ESBL-E was 6.0 events per 1000 patient-days at risk (95%CI: 5.4-6.7) during periods of contact isolation and 6.1 (5.5-67) during standard precautions (P=0.9710). Multivariable analysis adjusted for length of stay, percentage of patients screened and	None.

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		prevalence in first screening cultures gave incidence ratio of 0.99 (95%CI: 0.80-1.22; P=0.9177) for care under contact isolation compared with standard precautions. Findings suggest contact isolation showed no benefit when added to standard precautions for reducing spread of ESBL-E on non-critical care wards with extensive surveillance screening. Results of study limited by incomplete and imbalanced randomisation, possible missed ESBL-E carriers and other possible transmission route for ESBL-E.	
Respiratory Protective Equipment	A rapid systematic review of the efficacy of face masks and respirators against coronaviruses and other respiratory transmissible viruses for the community, healthcare workers and sick patients. MacIntyre CR, Chughtai AA International Journal of Nursing Studies 108:103629, 2020	This rapid systematic review investigated the evidence around the efficacy of masks and respirators for healthcare workers (HCWs), sick patients and general public. A systematic search of the literature on Embase and Medline of randomized controlled trials (RCTs) (clinical) on use of respiratory protection by HCWs, sick patients and community members was conducted between 1 March to 17 April, 2020. A total of 19 RCTs (18 community settings, 6 healthcare settings & 5 as source control) were identified with most RCTs using different interventions and outcome measures. RCTs in healthcare workers showed that respirators compared to medical masks were effective if worn continually during a shift but not if worn intermittently. Medical masks are more	None.

Literature review	Papers identified	Summary of scientific findings	Impact recommendations
		protective than cloth masks and depending on fabric and design some cloth masks may not be safe for HCWs. The use of masks by sick patients is likely protective. In the community, masks appear to be effective with and without hand hygiene and both together are more protective. This paper did not carry out any statistical analysis to quantify risk reduction for all three indications for respiratory protection – community, HCWs and sick patients (source control. Further research is required to validate overall findings.	
	Evidence for decontamination of single-use filtering facepiece respirators. [Review] Polkinghorne A; Branley J. Journal of Hospital Infection 105(4):663-669, 2020.	This review summarised previous and current research into decontamination methods and assessment of N95 respirators for contamination and/or filter performance in light of the COVID-19 pandemic. Medline database was searched for relevant published studies on FFR decontamination. Identified studies focused on 2 parameters: changes to filter performance and/or reduction in microbial burden following decontamination. The methods identified by the review include decontamination of FFRs by: steam and/or moist heat, dry heat, irradiation (ultraviolet germicidal irradiation, UVGI), chemical methods (vaporised hydrogen peroxide [VHP], ethylene oxide, physical cleaning (with wipes) or submersion in liquid chemicals i.e. disinfectants (bleach,	None.

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		hydrogen peroxide, alcohol). Of the methods, steam, UVGI and VHP hold the most potential and appear to be effective at biological decontamination of FFRs contaminated with bacteria and viruses. Important issues need to be considered such as FFR integrity and performance following decontamination as this will be model specific, exploration of other FFR factors aside from particle penetration and willingness of healthcare workers and administrators to adopt FRR decontamination and re-use. In the UK, PPE supply has improved and UK Government guidance regarding reuse of single use respirators has been withdrawn on 16 September 2020.	

Evidence table – Incidents and Outbreaks in NNUs - literature identified July-September 2020

Literature review	Papers identified	Summary of scientific findings	Impact recommendations
Incidents and Outbreaks in NNUs	Nurse Practitioner Led Emergency Clinic for Nosocomial Tuberculosis Exposure in a Level 3 NICU Persad VC *Neonatal Network* 39(4): 222-226, 2020	Outbreak report regarding a possible nosocomial TB exposure and the nurse practitioner-led response to this in a level 3 NICU in Toronto, Canada. 26 neonates were identified as being at risk and emergency clinics were set up to diagnose infection, prescribe prophylaxis, and monitor adverse reactions. Nurse practitioners were chosen to lead the response due to skills in diagnosing, leadership, and therapeutic management. 100% follow up was achieved for babies identified at risk from initial assessment through to negative tuberculin skin test after completion of window prophylaxis. The author highlights the benefits of utilising the skills of nurse practitioners throughout this process. Only abstract available, data limited.	None.