ARHAI Scotland

Antimicrobial Resistance and Healthcare Associated Infection

NHS National Services Scotland

Evidence table – SICPs - literature identified January – March 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
Gloves	Phalen RN, Patterson J, Olave JC, Mansfield SA, Shless JS, et al. (2022) Evaluation of the effects of repeated disinfection on medical exam gloves: Part 2. Changes in mechanical properties. *Journal of Occupational and Environmental Hygiene* 19(2): 111-121, 2022	In this in vitro observational study the integrity of 6 different types of gloves after repeated applications of ethanol-based hand rub (ABHR), dilute bleach, and soap and water. Three types of latex gloves (SurgiGloves Powdered, SurgiGloves Powder-free, and Polymed Powder-free) and 3 types of nitrile gloves (GlovePak Europa Powder-free, SemperSure Powder-free, and SurgiGloves Powder-free) were tested against six and ten treatments of the different disinfection methods. For ABHR treatment, Purell Advanced Gel Hand Sanitizer (70% ethanol) was used. One pump (approx. 1.5mL) was dispensed and rubbed into gloved hands to evenly coat both with ABHR, until the alcohol evaporated (approx. 20s). An additional 20s evaporation time was included before each repeated treatment. For the bleach treatment, one-part Clorox Disinfecting Bleach (6% sodium hypochlorite) was added to 16 parts water. Gloves were donned by a researcher (with protective glove underneath) and submerged in the diluted bleach for 1 minute. Once removed from the dilute bleach, the gloves were	The findings of this study may impact upon the recommendation - What are the healthcare-associated infection risks of using alcohol-based hand rub on gloves, rather than changing gloves? However, a single study would not be sufficient evidence to change current recommendations.

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		drip-dried in open air for 5s. The remaining bleach was then rinsed from the gloves and they were patted dry using a paper towel. For the soap and water treatment, Dial Basics Hypoallergenic liquid hand soap was used. One pump (approx. 2mL) was dispensed onto one palm while the other gloved hand was wetted with tap water. The soap was rubbed between the hands for 40s, following WHO and CDC hand washing protocol. After the treatment, the soap was rinsed from the gloved hands and patted dry using a paper towel. Samples for testing were taken from the palm of each glove, using a 1cm by 6cm die cutter and in accordance with ASTM Method D6287. Tensile testing was performed using a Mark-10 ESM303 tensiometer test stand with Series 5 force gauge. Testing was in accordance with ASTM Method D882 and elastic modulus was used as the primary measure. A change in elastic modulus greater than 40% was used as criteria for significant degradation of glove material. Testing was performed no later than 1h after completion of treatments. Controls for each glove type were used as baseline measures. After 6 treatments with ABHR, none of the six tested gloves had a percentage change in elastic modulus greater than 40%. The Polymed Powder-free latex gloves had a 29.9% decrease in elastic modulus (control = 0.77±0.11 vs six treatments = 0.54±0.10) and the SurgiGloves Powder-free nitrile glove had a 30.6% decrease (1.60±0.21 vs 1.11±0.35). After 10 treatments with ABHR, only the SurgiGloves Powder-free latex gloves had a change	

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		in elastic modulus greater than 40%, with an increase of 44.2% reported (0.86±0.14 vs 1.24±0.34). The SemperSure Powder-free and GlovePak Europa Powder-free nitrile gloves had elastic modulus reductions of 22.9% (1.79±0.18 vs 1.38±0.24) and 19.9% (2.36±0.30 vs 1.89±0.20), respectively. The Polymed Powder-free latex glove also had an elastic modulus reduction of 15.0% (0.80±0.16 vs 0.68±0.11). The elastic modulus changes in all but the SurgiGloves Powder-free latex gloves (>40%) were reported as being within the acceptable range (<40%). Due to the scope of the NIPCM Gloves literature review, the results of disinfection with ABHR was the sole focus of ARHAI quarterly review within this specific assessment. Note: Part 1 of this series is may also be relevant, however full text was not available for assessment in the time frame of the quarterly evidence updates.	

Evidence table – TBPs - literature identified

Literature review	Papers identified	Summary of scientific findings	Impact on recommendations
Aerosol generating procedures (AGPs)	Are aerosols generated during lung function testing in patients and healthy volunteers? Results from the AERATOR study Sheikh S, Hamilton FW, Nava GW, et al Thorax 2022;77:292-294.	The AEROTOR study investigated aerosol generation during lung function tests carried out in UK ultra-clean, laminar flow operating theatres to assess risk of aerosolised transmission of SARS-CoV-2 in UK healthcare settings. The aerosol number concentration of participants were measured using aerodynamic particle sampler and optical particle sizer. These measurements were then compared to breathing, speaking and voluntary cough. Participants included 33 healthy volunteers and 10 patients with lung disease (asthma n=5; bronchiectasis n=4; allergic bronchopulmonary aspergillosis n=1; asthma/copd n=1), undergoing standardised spirometry (Vynctus spirometer Vyaire), peak flow and fractional exhaled nitric oxide concentration (FE_{NO}, Aerocrine) assessments. The aerosol number concentration was highest in coughs (1.45-1.61 particles/cm^3), followed by unfiltered peak flow (w (0.37– 0.76 particles/cm^3), adding viral filter to peak flow reduced emission factor by 10. Filtered spirometry produced little aerosol (0.11 particles/cm3 in volunteers and 0.10 particles/cm3 in patients); no aerosol transmission was produced from FE_{NO} device. Salbutamol nebulisation does not induce higher aerosol transmission during testing. Authors concluded that spirometry performed with standard filter and FE_{NO} does not generate significant aerosol concentrations compared with coughs in healthy volunteers and patients with lung disease. Peak flow generates aerosols but a viral filter reduces this > 10 fold.	None.
Patient Placement,	Impact of transition from open bay to single room design neonatal intensive care unit on	This retrospective cohort study examined the effect of a neonatal care unit's (NICU, Leiden Medical Center, Netherlands) transformation from traditional	None.

Literature review	Papers identified	Summary of scientific findings	Impact on recommendations
Isolation and Cohorting	multidrug-resistant organism colonization rates. van der Hoeven et al Journal of Hospital Infection, Volume 120, 2022, 90-97,	open bay units (OBUs; 3 open bays with 25 beds and 1 single room) to single rooms (SRUs, 17 single rooms and 4 twin rooms) in May 2017 on acquisition of multidrug-resistant organisms (MDROs) and third-generation cephalosporin-resistant bacteria (3G-CRB). All infants admitted to the NICU 2 years prior to and 2 years follow the transition from OBU to SRU were included; infants were screened (throat and rectum sampling) weekly for gram-negative MDRO carriership by culture. Incidence of colonisation with MDRs and 3G-CRB were compared between OBU and SRU periods (% of infants and incidence density/1000 patient-days). 2511 infants were admitted to the NICU during the study period of which 1433 and 1293 infants were included in the infection and colonisation analyses respectively. Of the 1293 infants, 3.2% were MDRO carriers (2.5% OBU vs 4.0% SRU, p=0.16 not significant) including 2.3% extended-spectrum β-lactamase-producing Enterobacterales carriers and 18.6% 3G-CRB carriers (17% OBU vs 20% SRU, p=0.12). Findings indicate that transition from OBUs to SRUs was not associated with a reduction in colonisation rates with MDROs or 3G-CRB in this hospital. However percentage of MDRO carriership in this NICU is low and a large number of infants are required to detect a small decline. Further research is needed to determine optimal ward design.	

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

Literature review	Papers identified	Summary of scientific findings	Impact on Recommendations
	No literature identified		