ARHAI Scotland

Antimicrobial Resistance and Healthcare Associated Infection

NHS National Services Scotland

Evidence table – SICPs - literature identified

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
Patient Placement	Bouzid et al (2021) Added value of rapid syndromic testing at point of care versus central laboratory testing: a controlled clinical trial *Journal of Antimicrobial Chemotherapy* 76(Suppl 3): iii20-iii27	**Study design**: Quasi-randomised controlled trial **Study period**: 19 Nov 2019 to 9 Mar 2020 **Setting**: Emergency department at 850 bed Bichat-Claude Bernard University hospital in Paris, France **Methods**: The study comprised of two arms/periods: (i) point of care testing (POCT) weeks (A weeks), and (ii) central laboratory weeks (B weeks). The two periods were alternated weekly, with POCT randomly chosen to start the study period. Included patients were all over the age of 181, presenting symptoms compatible with respiratory infection as per the ECDC definition of influenza-like illness (ILI). The rapid multiplex PRC assay, QIAstat-Dx Respiratory Panel V2 was used in both testing methods, with sample collection via nasopharyngeal swabs. POCT was analysed by trained ED physicians. This method of testing was available 24 hours a day, 7 days a week and results were expected around 1h after sampling. Laboratory	Adds to evidence base informing recommendations under the objectives; - How should patients be assessed for infection risk upon admission/arrival at the care area? - Under what circumstances should a patient be placed in a single-bed room? - Under what circumstances should

Literature review	Papers identified	Summary of Findings	Impact on Recommendations
		testing was analysed by a laboratory technician at the hospital's central virology laboratory. This method of testing was available 8am to 5pm on weekdays and 8am to 1pm on Saturday. It was not available overnight. The primary outcome was length of stay (LOS) at hospital. Secondary outcomes were proportion of ED lengths of stay <1day, antibiotic prescriptions, and assignment of patients to a single-bed room. Additionally, disease severity and type of admission (hospital ward or ICU) were also recorded. **Results**: 525 patients were included, and after exclusions 474 patients were analysed. 275 were analysed as part of the POCT arm (9 weeks) and 199 for the central laboratory testing arm (8 weeks). There were no statistically significant differences in initial presentation between the two arms of the study. When adjusted for age and sex, the mean difference in LOS was 0.3 days (95% CI -1.2-2.8, p=0.66). Median LOS was 7 days for both POCT and central laboratory testing arems (IQR 3-14 and 2-13, respectively). Over the study period, 214 patients were admitted to single rooms. Patients in the POCT arm were more often assigned to a single room after admission, on testing positive via PCR for influenza, RSV, and metapneumovirus pathogens. 74% in POCT arm vs 50% in central testing arm (95% CI 1.3-6.7, p=0.012). This association was confirmed by multivariate analyses (OR 2.9, 95% CI 1.3-6.8,p=0.014). No further statistically significant differences were reported in this study. **Limitations**:	a patient be placed in a cohort area? Further evidence would be required to inform changes made to recommendations.

Literature review	Papers identified	Summary of Findings	Impact on Recommendations
		- Method of randomisation may cause bias – winter respiratory virus epidemiology can change from week to week. - The study ended early due to the COVID-19 pandemic - Single centre study - French healthcare setting - Impact on further nosocomial transmission of infections not assessed	
Hand Hygiene – Hand washing, hand rubbing and indications for hand hygiene **AND** **Hand Hygiene – Products** **AND** **Hand Hygiene – Surgical Hand Antisepsis**	Martin-Villa et al (2021) Comparing rubbing and scrubbing surgical hand antisepsis with propan-1-ol 60% in accordance with European regulation UNE-EN 12791:2016+A1:2018 *Infection Control & Hospital Epidemiology* 42(11): 1382-1384	**Study design**: Crossover trial **Study period**: Sept 2019 to Jan 2020 **Setting**: Complutense University of Madrid, Spain **Methods**: 2 hand antisepsis methods were investigated when using propan-1-ol 60% (P-1). Participants were randomly assigned to one of two groups to undertake one of the methods of hand antisepsis. One week after testing for one method, the groups switched and used the other. Hand-rub method = 3mL of P-1, poured into cupped hands and rubbed vigorously to ensure total coverage of hands. Additional P-1 was applied in order to keep hands wet for 3 minutes. Hand-scrub method = Using P-1, fingernails were scrubbed with a sterile brush and hands and forearms were washed over a period of 3 minutes. Hands were sampled before (after regular hand washing) and after rubbing or scrubbing by the same method. Participants rubbed fingertips onto perti dished containing 10mL tryptone soy broth for one minute. Plates were incubated for 20-24 hours at 37±1˚C and colony forming units were calculated. Before hand antisepsis (reference/control values), both hands were sampled and after, only the right hand was sampled (immediate effect).	Adds to the evidence base for recommendations under the objectives: **Hand washing, hand rubbing and indications for hand hygiene** - What is the correct process and technique when using alcohol based hand rub for hand hygiene? **Products** - How effective is alcohol based hand rub (ABHR) at removing/killing microorganisms? - When should alcohol based hand rub (ABHR) be used for

Literature review	Papers identified	Summary of Findings	Impact on Recommendations
		Additionally, after hand antisepsis and sampling, sterile gloves were donned by participants and not removed until 3 hours later. Bacterial sampling was repeated at this time for only the left hand (effect at 3h). **Results**: 24 participants were included in this study, split into 2 groups of 12. Significant reductions in CFU/mL of bacteria were seen immediately after both rubbing and scrubbing methods. From 3.52±0.84 CFU/mL to 1.81±0.97 CFU/mL ($p<0.001$) for rubbing, and from 3.91±0.86 CFU/mL to 3.07±0.96 CFU/mL ($p<0.001$) for scrubbing. Reduction effects seen by the hand rubbing method were significantly greater than that of the hand scrubbing method (1.69±0.95 CFU/mL vs 0.84±0.59 CFU/mL, $p=0.004$). After 3h, a significant reduction in CFU/mL of bacteria was seen for the hand rubbing method. From 3.52±0.88 CFU/mL to 2.00±0.90 CFU/mL ($p<0.001$). No significant reduction was seen for the hand scrubbing method. From 3.94±0.70 CFU/mL to 3.50±0.99 CFU/mL ($p=0.094$). The reduction effects after 3h seen by the hand rubbing method were significantly greater than those seen after hand scrubbing (1.52±1.08 CFU/mL vs 0.44±1.05 CFU/mL, $p=0.004$). **Limitations**: - small sample size - details and training of participants not reported - Hand scrubbing method not clear	hand hygiene in health and care settings? **Surgical Hand Antisepsis** - Which products are suitable for surgical scrubbing/surgical rubbing?

Evidence table – TBPs - literature identified

Literature review	Papers identified	Summary of scientific findings	Impact on recommendations
Aerosol Generating Procedures (AGPs)	Quantification of Aerosol Particle Concentrations During Endoscopic Sinonasal Surgery in the Operating Room. Murr et al. Am J Rhinol Allergy. 2021 Jul;35(4):426-431. doi: 10.1177/1945892420962335	This study investigated possible SARS-CoV-2 exposure by measuring aerosol concentrations during live-patient endoscopic endonasal and skull base surgeries in standard operating rooms (ORs) using an optical particle sizer (Extech VPC300 Particle Counter). Measurements (n=133 total) were taken throughout the procedure at 6 time points: before patient entry to OR; before pre-incision timeout during OR setup; during cold instrumentation with suction; during microdebrider use; during drill use and; at the end of the case before extubation and at 3 different OR positions: surgeon, circulating nurse and anaesthetist. Findings show significant increases in airborne particle concentration at surgeon position (mean increase of 2445 particles/ft^3 [95%CI: 881-3955; p=0.001]) with both microdebrider (p=0.001) and drill (p=0.001) but not for cold instrumentation suction (p=0.40) and not at anaesthesia position or circulator position with any form of instrumentation. Study results suggest drilling and microdebrider during endonasal surgery is associated with significant increase in airborne particle concentrations localised to operating surgeon area.	Adds to evidence base on 'Which procedures are considered to be aerosol generating?'
	A quantitative evaluation of aerosol generation during supraglottic airway insertion and removal. Shrimpton AJ, *et al*. Anaesthesia. 2022 Feb;77(2):230-231. doi: 10.1111/anae.15572. Epub 2021 Aug 25.	This prospective observational environmental monitoring study measured in real time airborne particle emission (0.3-10 µm diameter) with an optical particle sizer (TSI Incorporated, model 3330) during insertion and removal of supraglottic airways (i-gel®, Intersurgical, UK) in working ultraclean operating theatres in a UK hospital (North Bristol NHS Trust) and compared levels to those generated by volitional cough and patient's own breathing. Findings show very low background particle concentrations (median IQR[range]) 1.6	None.

Literature review	Papers identified	Summary of scientific findings	Impact on recommendations
		(0.3-1[0-4.0] particles.l^{-1}) compared with patient's tidal breathing at a higher concentration of aerosol (4.0 (1.3–11.0 [0–44]) particles.l^{-1},p=0.048). There were no significant differences between the average aerosol concentration detected during supgralottic airway insertion 1.3 (1.0–4.2 [0–6.2]) particles.l^{-1},n=11), and removal (2.1 (0–17.5 [0–26.2]) particles.l^{-1}, n=12) compared to tidal breathing (p=0.34 and p=0.84 respectively). When compared with a volitional cough (04 (66–169[33–326]), n=27), supraglottic airway insertion/removal sequences produced <4% of the aerosol compared with a single cough (p<0.001). Results showed that the insertion/removal of i-gel supraglottic airways generates no more bioaerosols than breathing and considerably less than a cough. The authors concluded that supgraglottic airway insertion and removal should not be considered an aerosol-generating procedure.	
TBP Definitions	Cough-independent production of viable *Mycobacterium tuberculosis* in bioaerosol. Patterson B, *et al.* Tuberculosis (Edinb). 2021 Jan;126:102038. doi: 10.1016/j.tube.2020.102038. Epub 2020 Dec 8. PMID: 33316737.	This sampling study using a modified Respiratory Sampling Chamber performed indirect and direct capture of exhaled viable *Mycobacterium tuberculosis (Mtb)* during respiratory activities including cough and bronchiole-burst manoeuvres (BBM) in 38 individuals aged ≥ 18 years old newly diagnosed with pulmonary tuberculosis (PTB) and before initiation of TB chemotherapy (South Africa). Indirect sampling involved continuous bioaerosol sampling of exhaled air from participants sitting within the chamber for 60 mins and performing passive respiratory activity. While direct sampling involved bioaerosol collection during a series of 10 repetitions each of cough and BBM (2 deep breaths separated by full exhalations). Collected particles were counted via Aerodynamic Particle Sizer. *Mtb* was detected using DMN-trehalose viability probe and fluorescence microscopy. Findings show that indirect sampling identified viable *Mtb* in 92.1% (35 of 38) of PTB patients during 60-min relaxed	None.

Literature review	Papers identified	Summary of scientific findings	Impact on recommendations
		breathing, median bacillary count 7.5 (IQR: 3.25-19). Direct sampling for 10-min identified *Mtb* in 97.4% (37 of 38) of PTB patients with higher bacilli counts ($p<0.001$), median 24.5 (IQR 11.25-37.5). A shorter 5-min sampling regimen of 10 coughs or 10 BBM yielded median of 11 (IQR: 4-17) and 11 (IQR: 7-17.5) *Mtb* bacilli respectively ($p=0.53$). Findings show that bioaerosols released through deep exhalations alone contain viable *Mtb* suggesting possibility of non-cough PTB transmission.	
Safe Management of the Care Environment (Environmental Decontamination)	Risk of environmental transmission of norovirus infection from prior room occupants Fraenkel, C-J. *et al*. Journal of Hospital Infection, Volume 117, 74 - 80	This retrospective cohort study investigated whether a patient admitted to a room with a prior occupant (discharged from room within past 7 days) with Norovirus (NoV) or having a roommate (shared a room for >3 h) with a recent NoV infection increased the risk of acquiring NoV. Data on 33,788 room stays were collected from 5 infectious diseases wards in Southern Sweden from 2013-2018 and the risk of acquiring NoV infection after admission to an exposed or non-exposed room was analysed. Cleaning and room disinfection were performed daily using detergents while a peroxygen containing product (Virkon 1%) was used after discharge/discontinuation of isolation at the toilet, floor and all near-patient surfaces including furniture. Results show 5 of 1106 patients exposed to a room with prior occupant with NoV infection and 49 in the non-exposed group acquired NoV infection. A significant association was found between NoV acquisition (OR 3.3, $p=0.01$) but not after adjusting for potential confounders for age, colonisation pressure and roommate with ongoing NoV infection (OR 1.9, $P=0.2$). Two of the five exposed patients with acquired NoV were infected by identical strains as the prior room occupant inferring a room transmission risk of 0.2% (95%CI: 0.05-0.78%). None of the 52 patients who shared a room with an asymptomatic roommate with recent NoV infection	Adds to evidence base on “What is the risk of healthcare associated infection (HAI) from the care environment?”

Literature review	Papers identified	Summary of scientific findings	Impact on recommendations
		(resolved for ≥ 48h) acquired NoV. Findings from this study suggest the risk of room transmission of NoV is low.	

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		