ARHAI Scotland

Antimicrobial Resistance and Healthcare Associated Infection

NHS National Services Scotland

Evidence table – SICPs - literature identified October – December 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 Findings	Impact on Recommendations
Hand Hygiene - Skincare	How irritant are n-propanol and isopropanol? - A systematic review. Tasar R, Wiegand C, Elsner P. Contact Dermatitis 84; 1-14, 2020	A systematic review conducted on PubMed regarding potential irritation caused by n-propanol and its structural isomer isopropanol. 20 papers were retrieved and included in meta-analysis. The included papers assessed the potential irritation when using a number of application methods including patch testing, wash testing, and repeated open exposure tests. 6 studies assessed the effect of n-propanol alone and found low irritation potential. When 60% n-propanol was tested in vivo, there was evidence of barrier damage in both healthy and atopic skin. 5 studies assessed the irritation potential of n-	None.

Literature review	Papers identified	Summary of Findings	Impact on Recommendations
		propanol when used in combination with sodium lauryl sulphate (SLS). It was found that when SLS was used prior to alcohol based hand rub (ABHR) irritation could occur for several minutes up to several hours. However, one paper did highlight that the irritative effect of SLS was reduced after tandem application with propanol solution of hand rub. As a whole, a combination of n-propanol or isopropanol with detergents, caused a greater irritation response than when these substances were used alone. It was concluded that, while evidence was presented indicating skin irritation when using n-propanol or isopropanol, this was to a lesser extent than that seen after frequent handwashing with detergents. This is supported by previous evidence proving the tolerability of alcohol based hand rubs.	
Occupational Exposure	Needle Stick and Sharp Injuries Among Healthcare Workers: A retrospective six-year study.	Retrospective study reporting the incidence of healthcare worker needle stick and sharps injuries (NSSI) occurring at the King Hussein Medical Centre (KHMC), Amman, Jordan, between 2013 and 2018. All reported NSSI were assessed and the	None.

Literature review	Papers identified	Summary of Findings	Impact on Recommendations
	Saadeh R, Khairallah K, Aozeid H, Al Rashdan L, Alfaqih M, Alkhatatbeh O. Sultan Qaboos University Medical Journal 20(1); e54-62, 2020	proportion of injuries were stratified according to age, gender, job title, site of injury, and procedure being undertaken when NSSI occurred. Associations between these variables were assessed statistically. 393 NSSI were included in this study, of which 55.5% were reported by men, and 66.4% were aged between 20-30 years old. 39.7% of injuries were reported by nurses and 36.6% by cleaning staff. 46.1% of injuries occurred in hospital wards and 38.2% of injuries occurred when undertaking medical waste collection. Additionally, injuries occurring on either hand were more common than other areas of the body (48.9% left hand; 42.2% right hand). Significant associations were found between all variables. However, this may indicate that the study is underpowered and further research is required to confirm these findings. Furthermore, all data was self-reported by individuals familiar with NSSI and so may be impacted by this. The authors conclude that, despite limitations, their findings provide insight into the	

Literature review	Papers identified	Summary of Findings	Impact on Recommendations
		incidence of NSSI in Jordan, which may be applicable to other settings.	

Evidence table – TBPs - literature identified October – December 2020

Literature review	Papers identified	Abstract	Summary of scientific findings
Patient Placement, Isolation, and Cohorting	Private patient rooms and hospital-acquired methicillin-resistant Staphylococcus aureus: A hospital-level analysis of administrative data from the United States. Park SH. et al PLoS ONE [Electronic Resource] 15(7):e0235754, 2020.	This retrospective study using US hospital-level data investigated whether private patient rooms (PPRs) were associated with fewer hospital-acquired methicillin-resistant *Staphylococcus aureus* (HA-MRSA) infections. Data from 340 hospitals and 2,670,855 discharges between September 2015 and August 2016 were analysed to estimate association between the proportion of PPRs within a hospital and the number of discharges with HA-MRSA infections. Results show HA-MRSA incidence within these hospitals was 386 per 100,000 discharges (95%CI: 379-393) and on average, 62.73% (95%CI: 58.99-66.46) of rooms were PPRs. PPRs were significantly associated with fewer HA-MRSA infections (unadjusted IRR = 0.973, 95%CI: 0.968-0.979; adjusted IRR = 0.992, 95% CI: 0.991, 0.994; p<0.001 for both) at hospital level; as percentage of PPRs increased, rates of HA-MRSA infection decreased. An 0.8% fewer HA-MRSA infections for each 1% increase in PPRs as a proportion of all rooms were observed	None.

Literature review	Papers identified	Abstract	Summary of scientific findings
		suggesting that private rooms provide protection from HA-MRSA.	
Safe Management of Linen	The role of textiles as fomites in the healthcare environment: A review of the infection control risk. Owen L., Laird K. PeerJ. 8 (no pagination), 2020. Article Number: e9790.	This non-systematic review investigated the evidence for the role of textiles in the transmission of infection, outlined current process procedures for laundering of textiles and reviewed studies relating to decontamination efficacy of domestic and industrial laundering. Literature search was carried out on PubMed, Google Scholar and Web of Science and included studies published on or before May 2020. A number of studies have shown that microorganisms can survive on textiles for extended periods of time and other pathogens survive the laundering process which can transfer to skin or other surfaces suggesting possibility of transmission of healthcare associated infections (HAIs) via contact with contaminated textiles. Small outbreaks have also been linked to inadequate laundering or infection control processes around healthcare laundry. There were no large-scale epidemiological studies demonstrating a direct link between HAIs and contaminated textiles. The authors favoured the industrial laundering	None.

Literature review	Papers identified	Abstract	Summary of scientific findings
		of healthcare worker uniforms due to the ability to monitor laundering parameters in contrast to the lack of control and monitoring of decontamination during domestic laundering.	
Surgical Masks	Contamination of surgical mask during aerosol-producing dental treatments. Gund M. et al Clinical oral investigations. (no pagination), 2020	This study investigated the microbial contamination of surgical masks during dental treatment and the transfer of microorganisms from the mask to the hands. 5 dental treatment modalities were studied: carious cavity preparation (P-caries, n=10), tooth substance preparation (P-tooth, n=10), trepanation and root canal treatment (P-endo, n=10), supragingival ultrasonic application (US-supra, n=10) and subgingival periodontal ultrasonic instrumentation (US-sub, n=10). Contamination of mask and gloves worn during treatment were tested by imprinting on agar plates and identified by MALDI TOF mass spectrometry; colony forming units (CFU) were scored: 0 = 0CFU; 1 = $<10^2$ CFU; 2 = > 10^2 CFU; 3 = dense growth. Findings show that all masks and gloves used during treatment had bacterial contamination (sample scores 0/1/2/3: masks 0/46/3/1 and gloves 0/31/10/9).	Adds to evidence base.

Literature review	Papers identified	Abstract	Summary of scientific findings
		After touching masks with new sterile gloves, microorganisms were recovered with contamination scores of: P-caries: 4/6/0/0; P-tooth: 2/8/0/0; P-endo: 7/3/0/0; US-supra: 0/9/1/0 and US-sub: 2/8/0/0. There no statistically significant differences between the treatment modalities. The most frequent oral and cutaneous flora identified were *Streptococci* spp. and *Staphylococci* spp. Findings suggest that surgical masks are contaminated after aerosol-producing dental treatment procedures and are potential sources of bacterial contamination of hands.	
Aerosol Generating Procedures (AGPs)	A quantitative evaluation of aerosol generation during tracheal intubation and extubation. Brown J. et al Anaesthesia. (no pagination), 2020.	This study carried out a real-time, high-resolution environmental monitoring in ultraclean ventilation operating theatres during tracheal intubation and extubation sequences to quantitatively determine the number and size of airborne particles produced during aerosol-generating procedures (AGPs) over a 3-week period during operating lists for orthopaedic and neurosurgical emergencies. Continuous sampling using optical particle sizer measured aerosol generation within the zone between the patient and anaesthetist.	None.

Literature review	Papers identified	Abstract	Summary of scientific findings
		Aerosol monitoring showed very low background particle count (0.4 particles l^{-1}) when theatre was empty and 3.4 l^{-1} when in use but no AGPs were in progress. Tracheal intubation including facemask ventilation produced very low quantities of aerosolised particles (average concentration, 1.4 (1.4) particles.l^{-1} , n = 14, p < 0.0001 vs. cough [reference control cough ave concentration 732 (SD 418) particles l^{-1}, n=38]. Tracheal extubation, particularly when patient coughed, produced more detectable aerosol (21 (18) l^{-1}, n=10), a 15-fold increase than intubation (p=0.0004) but 35-fold less than a volitional cough (p<0.0001). The authors state that based on their findings, the study does not support the designation of elective tracheal intubation as an AGP and while extubation generates more detectable aerosols, it falls below current criterion for high-risk AGP. Study limited by small sample size, reference coughs from 1 single subject only, use of pragmatic design without control over specific anaesthetic administered or grade of practitioner and sampling aerosol from	

Literature review	Papers identified	Abstract	Summary of scientific findings
		limited arc encompassed by funnel, results may not be generalisable to intubations in other healthcare settings e.g. critical care/emergency. Large controlled studies are required to further confirm findings.	
	Aerosolisation during tracheal intubation and extubation in an operating theatre setting. Dhillon R.S. et al Anaesthesia. (no pagination), 2020. Date of Publication: 12 Oct 2020.	This observational study aimed to determine whether facemask ventilation, tracheal intubation and extubation generate aerosols in clinical practice and characterise any aerosols produced in patients undergoing elective endonasal pituitary surgery without COVID-19 symptoms. Airway management including tracheal intubation and extubation were carried out in a standard positive pressure operating room with aerosols detected using laser-based particle image velocimetry to detect larger particles and continuous sampling with spectrometry to detect smaller particles. A total of 482,960 data points were assessed from 3 patients with completed procedures. Facemask ventilation, tracheal tube insertion and cuff inflation generated small particles 30-300 times above background noise that remained suspended in airflows and spread from the patient's facial region	None

Literature review	Papers identified	Abstract	Summary of scientific findings
		throughout the confines of the operating theatre. Data from this study suggest that tracheal intubation and extubation are aerosol-generating procedures, specifically positive pressure bag and mask ventilation with high flow oxygen and patient coughing into a Hudson mask produced large signal spikes. Limitations in this study include very small sample size (3 patients), study does not assess whether aerosols generated were biologically active and associated limitations with aerosol measurement techniques used. Larger studies are required to validate results. Although data adds evidence to existing recommendations it is severely limited by small sample size and may not be generalisable to other healthcare settings	
	Classification of aerosol-generating procedures: a rapid systematic review. Jackson T. et al BMJ open respiratory research. 7(1), 2020 10. VI 1	This rapid review investigated how official guidance documents and academic publications have classified procedures in terms of whether or not they are aerosol-generating. This study was conducted in line with Cochrane Interim Guidance for Rapid Reviews and according to PRISMA where appropriate. Literature published in English or French were searched in 2	None.

Literature review	Papers identified	Abstract	Summary of scientific findings
		databases (Medline, Cochrane central) and Google in March and April 2020. Data on how each procedures was classified by each source were extracted and level of agreement determined. 128 documents met inclusion criteria containing 1248 mentions of procedures categorised by the review into 39 procedure groups. Procedures classified as aerosol-generating or possibly aerosol generating by ≥90% of documents included autopsy, surgery/post-mortem procedures with high-speed devices, intubation and extubation procedures, bronchoscopy, sputum induction, manual ventilation, airway suctioning, cardiopulmonary resuscitation, tracheostomy and tracheostomy procedures, non-invasive ventilation, high-flow oxygen therapy, breaking closed ventilation systems, nebulised or aerosol therapy and high frequency oscillatory ventilation. There were disagreements on some procedures group including oral and dental procedures, upper gastrointestinal endoscopy, thoracic surgery and procedures and nasopharyngeal and oropharyngeal swabbing. Some clinical	

Literature review	Papers identified	Abstract	Summary of scientific findings
		relevant procedures (e.g. colonoscopy) received little mention in source documents. The authors recommend that clinicians define procedures more clearly and researchers undertake further studies of aerosolisation during these procedures and bodies involved in guidance and policy address a wider range of procedures. Limitations of this study include working from secondary sources and lack of resource to appraise primary evidence. No formal risk of bias assessment were carried out in the review and the list in table 3 of the review is not exhaustive.	
	Should chest compressions be considered an aerosol-generating procedure? A literature review in response to recent guidelines on personal protective equipment for patients with suspected COVID-19. Brown E; Chan LM. Clinical Medicine. 20(5):e154-e159, 2020 09.	This review sought to explore the topic of chest compressions for patients with suspected COVID-19 and whether they are considered to be airborne-generating procedure (AGP) thus requiring airborne prevention PPE to prevent transmission of COVID-19 to healthcare workers. A literature search found 8 relevant studies; all observational with low patient numbers and multiple confounding factors but describe cases of acute respiratory infection transmission following chest compressions. One systematic review	None.

Literature review	Papers identified	Abstract	Summary of scientific findings
		concluded that chest compressions were not an AGP while 2 simulated studies (released as preprints) demonstrate potential aerosol generation. The authors concluded that a precautionary approach with appropriate PPE is necessary to protect HCWs from contracting infections.	
Respiratory Protective Equipment (RPE)/Surgical Masks/Eye and Face Protection	The effectiveness and efficacy of respiratory protective equipment (RPE) in dentistry and other health care settings: a systematic review. Samaranayake LP et al Acta Odontologica Scandinavica. 78(8):626-639, 2020 Nov. VI 1	This systematic review examined data on the effectiveness and efficacy of facemasks and respirators including protective eyewear, with particular emphasis on dental healthcare following PRISMA approach. PubMed, Medline, Embase and Cochrane Library databases were searched between 1 January 1990 and 15 May 2020. Data were extracted and evaluated by 3 reviewers. 2 investigators independently performed quality assessment of eligible studies. 310 studies were identified and 21 met the eligibility criteria. Findings suggest that in clinical terms, wearing layered, face-fitting masks/respirators and protective-eyewear can limit the spread of infection among healthcare workers. Combined interventions such as face mask and face shield better resist bio-aerosol inhalation	None.

Literature review	Papers identified	Abstract	Summary of scientific findings
		than either alone. The prolonged and over-extended use of surgical masks compromise their effectiveness. The authors concluded that generally, RPE is effective as a barrier protection against aerosolised microbes in healthcare settings but their filtration efficacy is compromised by inhalant particle size, airflow dynamics, mask-fit factor, period of wear, 'wetness' of masks and their fabrication quality.	
Surgical Masks/Respiratory Protective Equipment (RPE)	Physical interventions to interrupt or reduce the spread of respiratory viruses. Jefferson T. et al Cochrane Database of Systematic Reviews. 11:CD006207, 2020 11 20.	This updated Cochrane review (published in 2007, 2009, 2010 and 2011) assessed the effectiveness of physical interventions to interrupt or reduce the spread of acute respiratory viruses. CENTRAL, PubMed, Embase, CINAHL and ClinicalTrials.gov were searched on 16 March and 1 April 2020 and a backwards and forwards citation analysis was carried out on newly included studies. Only RCTs and cluster RCTs of trials investigating physical interventions (screening at entry ports, isolation, quarantine, physical distancing, personal protection, hand hygiene, face masks and gargling) to prevent respiratory virus transmission were included as the number of studies with these design was	None.

Literature review	Papers identified	Abstract	Summary of scientific findings
		sufficient to meet study aims. Cochrane methodological procedures were used; certainty of evidence was assessed by GRADE; data was independently extracted by 3 pairs of review authors. 44 new RCTs and cluster-RCTs were included in this update bringing total number of randomised trials to 67. Studies identified were conducted during non-epidemic influenza periods, 2009 global H1N1 influenza pandemic, epidemic influenza seasons up to 2019 but there were no included studies conducted during the COVID-19 pandemic. With regards to N95/P2 respirators compared with medical/surgical masks, trials from 4 healthcare settings and 1 household setting were pooled. There is uncertainty over the effects of N95/P2 respirators when compared with medical/surgical masks on outcomes of clinical respiratory illness (RR 0.70; 95% CI 0.45 – 1.10; very low-certainly evidence; 5 trials; 8407 participants). The evidence is limited by imprecision and heterogeneity of subjective outcomes. Findings suggest that use of N95/P2 respirator compared to	

Literature review	Papers identified	Abstract	Summary of scientific findings
		medical/surgical mask makes little or no difference for the objective and more precise outcome of laboratory-confirmed influenza infection (RR 1.10; 95% CI 0.90-1.34; moderate-certainty evidence; 5 trials, 8407 participants). When restricting pooled analysis to healthcare workers there was no difference to overall findings. Harms were poorly reported and measured however discomfort wearing medical/surgical masks or N95/P2 respirators was mentioned in several studies. The authors of this Cochrane review concluded that drawing firm conclusions and generalising findings to current COVID-19 pandemic were hampered by several factors such as high risk of bias, variation in outcome measurement and relatively low compliance with interventions during the studies. Pooled results did not show a clear reduction in respiratory viral infection with the use of medical/surgical masks during seasonal influenza. There were no clear differences between the use of medical/surgical masks compared with N95/P2 respirators in healthcare workers	

Literature review	Papers identified	Abstract	Summary of scientific findings
		when used in routine care to reduce respiratory viral infection. Large, well-designed RCTs are needed that addresses the effectiveness of these interventions in multiple settings and populations.	
Transmission Based Precautions (TBPs) Definitions	Effect of contact precautions on *Staphylococcus* aureus and clinical outcomes of colonized patients in the neonatal intensive care unit. Shahbaz S. et al Pediatric Infectious Disease Journal. (pp 1045-1049), 2020.	This retrospective observational cohort study assessed the incidence of both methicillin-resistant *S. aureus* (MRSA) and methicillin-susceptible *S. aureus* (MSSA) colonisation as well as invasive *S. aureus* infections during and after utilisation of contact precautions as well as clinical outcomes of colonised vs non-colonised infants. All infants who screened positive for either MRSA or MSSA from August 2014 to November 2018 at 2 neonatal intensive care units (NICU) at the University of California, LA, USA were included. A total of 234 patients were included in the study: 83 colonised and 151 non-colonised. There was a fourfold higher incidence of MSSA colonisation versus MRSA (P <0.001). There was higher incidence of positive surveillance cultures after contact precautions were discontinued (P = 0.01) but this did not correlate with higher incidence of invasive	Adds to evidence base.

Literature review	Papers identified	Abstract	Summary of scientific findings
		cultures (P = 0.475). There were twice as many MSSA invasive cultures than MRSA, but a higher rate of invasion with MRSA (P < 0.05). Colonized patients were more likely to develop an invasive infection than non-colonised (P = 0.003 MRSA; P = 0.004 MSSA). Controlling for gestational age and surgical interventions, colonisation was more likely to be associated with skin and soft tissue infections (P < 0.001) and a longer length of stay (mean 27.8 days, P < 0.0001). Findings suggest that contact precautions resulted in lower incidence of colonisation without a difference in invasive cultures in this study's NICUs	
	Effect of speech volume on respiratory emission of oral bacteria as a potential indicator of pathogen transmissibility risk. Patel R.K. et al The Journal of the Acoustical Society of America. 148 (4) (pp 2322), 2020.	This study assessed the effect of speech volume on respiratory emission of oral bacteria as an indicator of potential pathogen transmission risk. Respiratory emission of oral bacteria during speech was assessed by culturing samples using agar plate culture and liquid culture. Agar plate and liquid culture samples were placed at height of approximately 0.5 ft below speaker who then read the Rainbow Passage out loud for approximately 20 s. Sound pressures levels were measured	None.

Literature review	Papers identified	Abstract	Summary of scientific findings
		using Sound Meter app. After speech experiment was carried out, agar plates were incubated for 48 h at 37°C while liquid culture samples were transferred to culture tubes, incubated for 24 h at 37°C; cultures were observed for growth of bacterial colonies. Findings shows that loud speech (average 83 dBA, peak 94 dBA) caused significantly higher emission of oral bacteria compared to no speech within 1 ft from the speaker (P=0.004). No bacteria colonies were observed when speaker wore a cloth mask or N99 respiratory mask, or in negative control group (no speech). This study demonstrate that loud speech without face coverings increases the levels of respiratory droplets emitted that carry oral bacteria and may also transmit pathogens.	
	SARS-CoV-2 and health care worker protection in low-risk settings: A review of modes of transmission and a novel Airborne model involving inhalable particles. Zhang X.S.; Duchaine C.	This review aimed to identify and appraise the available evidence, shed light on concepts and necessary conditions for airborne transmission. The authors found that, except for aerosol-generating procedures, overall data supporting traditional definition of airborne transmission (long-distance and respirable	None.

Literature review	Papers identified	Abstract	Summary of scientific findings
	Clinical Microbiology Reviews. 34 (1) (pp 1-29), 2020. Article Number: e00184-20.	aerosols) are weak, based predominantly on indirect and experimental rather than from epidemiological or clinical evidence. The authors propose a broader definition of "airborne" that involves short-range inhalable particles rather than current droplet and aerosol dichotomy. This new model is able to explain clinical observations and data in the SARS-CoV-2 literature as well as implications for PPE and environmental controls including ventilation in healthcare settings. The authors however concluded that further studies such as clinical trials are needed to further current understanding of SARS-CoV-2 transmission routes.	
	Severe neonatal legionellosis associated with use of home humidifiers – A case report. Mitting R. et al Clinical Infection in Practice. (no pagination), 2020. Article Number: 100050.	This case report presents the case of a 5-day old infant with severe neonatal legionellosis who was exposed to 2 cold mist humidifiers in the home filled with domestic water supply contaminated with legionella. *Legionella pneumophila* was isolated from the domestic water samples collected from the family bathroom and both humidifiers. The environmental investigation concluded that the domestic water and humidifiers were plausible	Adds to evidence base.

Literature review	Papers identified	Abstract	Summary of scientific findings
		sources of the infant's infection. The humidifiers containing contaminated water possibly generated aerosols exposing the infant to aerosolised *Legionella pneumophila*. The infant was treated with oxygenation (ECMO) and had normal neurodevelopmental follow-up.	
	Sources of airborne norovirus in hospital outbreaks. Alsved M. et al Clinical Infectious Diseases. 70 (10) (pp 2023-2028), 2020.	This study investigated the association between symptoms of gastroenteritis and presence of airborne norovirus and to determine the size of norovirus-carrying particles. Repeated air sampling was performed close to 26 patients with norovirus infections and analysed for norovirus RNA by RT-PCR. The times since each patient's last episodes of vomiting and diarrhoea were recorded. Findings show that norovirus RNA was found in 21 (24%) of 86 air samples from 10 different patients. Only air samples during outbreaks or before a succeeding outbreak tested positive for norovirus RNA. Airborne norovirus RNA was associated with shorter time period since last vomiting episode (odds ratio 8.1, P=.04 within 3 hours since last vomiting episode). Airborne norovirus concentrations ranged	Adds to evidence base.

Literature review	Papers identified	Abstract	Summary of scientific findings
		from 5-215 copies/m and detectable norovirus RNA were found in particles <0.95 µm and <4.51 µm. Findings suggest that recent vomiting is a major source of airborne norovirus and has possible connection between airborne norovirus and outbreaks.	
	COVID-19: Effects of Environmental Conditions on the Propagation of Respiratory Droplets. Zhao L. et al Nano letters. 20 (10) (pp 7744-7750), 2020.	This study investigated the movement of respiratory droplets and aerosol particles generated by speech under a range of temperatures (0-40 °C) and relative humidity (0-92%) conditions. Findings show that droplets can travel three times farther in low-temperature and high-humidity environment while the number of aerosol particles increases in high-temperature and low-humidity environments. This highlights the importance of proper ventilation as droplets and aerosols can spread farther in airstreams.	None.

Evidence table – Healthcare Infection Incidents, Outbreaks and Data Exceedance - literature identified October – December 2020

Literature review	Papers identified	Abstract	Summary of scientific findings
Management of incidents and outbreaks in a neonatal unit (NNU).	Response Measures to Infection Outbreaks During the Second Year of Sustenance Phase of Infection Control Quality Improvement. Balachander B, Rajesh D, Pinhero CL, Paul S, Stevens S, Rao S. The Indian Journal of Pediatrics 87(5); 333-338, 2020	An outbreak investigation analysing the outbreaks, control measures and outbreak outcomes in a 30 bedded tertiary care NICU over the course of a year. Three outbreaks were reported during the study period. In May 2018 an outbreak of multi-drug resistant gram negative bacilli (MDR GNB), affecting 9 neonates. This outbreak was controlled using aseptic non-touch technique for fortification of milk and using distilled water to clean the changing area. Patients were also cohorted while environmental cleaning and hand hygiene were heightened. It was noted that cause and effect of the control measures limiting infections could not be proven. All patients were reported to be discharged from NICU after recovery. In August an outbreak of MRSA affecting 6 patients was reported. Two healthcare workers and one mother was also found to be colonised, however, it cannot be	None.

Literature review	Papers identified	Abstract	Summary of scientific findings
		confirmed if the healthcare worker cases were as a result of colonised neonates or from out with the ward. It was concluded that the source of this outbreak was the Lower segment caesarean section wound of a mother. This outbreak was controlled by implementing strengthened hand hygiene and environmental cleaning practices, cohorting and bio scrub of affected neonates. Additionally, healthcare personnel were screened for colonisation. All affected neonates were reported to have been discharged after recovery. In October an outbreak of Acinetobacter, affecting 5 neonates, was reported. 3 neonates were probable cases and 2 were confirmed by blood culture. It was identified that spread of infection was due to poor hand hygiene and lack of bundle care, reported to be due to staff shortages. Affected neonates were cohorted and cleaning policies were strengthened, along with education on CLABSI for healthcare workers. An increase in the nurse-neonate ratio was also implemented. 4 of the affected neonates were reported to have	

Literature review	Papers identified	Abstract	Summary of scientific findings
		died, while the final neonate was discharged after recovery. It was concluded that a robust surveillance and action plan is required to ensure outbreaks are successfully controlled.	