Journal Watch

Journal Watch presents a brief description of articles recently published in other journals and thought to be of relevance or interest to the AIC *readership. Readers are encouraged to refer to the full article for complete information.*

Risk factors for antimicrobial resistance among nursing home residents

Risk factors for the acquisition of antimicrobial resistant bacteria among residents in long term care facilities (LTCFs), in the non outbreak setting, have not been well defined.

Loeb *et al.* report a study that prospectively collected data on exposure to antimicrobial agents and susceptibility patterns of bacteria taken from 9,156 residents in 50 nursing homes in Canada and the United States from 1998 to 1999. The researchers compared antibiotic exposure among nursing home residents from whom antimicrobial resistant bacteria were isolated, with the exposure among residents from whom susceptible cultures were obtained. These effects were adjusted for infection control and staffing covariates using multiple logistic regression.

The study revealed that increased registered nurse staffing levels per 100 resident days (OR=0.79; CI=0.72, 0.87) and use of antimicrobial soap (OR=0.40; CI=0.18, 0.90) protected residents against the acquisition of MRSA. An increased number of hand washing sinks per 100 residents was found to reduce the risk of trimethoprim-sulfamethoxazole (TMP/SMX) resistant Enterobacteriaceae (OR=0.94, CI=0.90, 0.98). However, exposure to TMP/SMX and fluoroquinolones were independent risk factors for TMP/SMX resistant Enterobacteriaceae (OR=1.14, CI=1.06, 1.22) and fluoroquinolone resistant Enterobacteriaceae (OR=1.08, CI=1.04, 1.11) respectively.

The authors acknowledge the lack of risk factors examined in the study including the residents' underlying illness, decubitus ulcers, indwelling urinary catheters or feeding tubes. Secondly, the study was conducted in nursing homes with 100 or more beds therefore the findings cannot be generalised to all facilities. The study concludes that increased staffing, more hand washing sinks, and use of an antimicrobial soap may reduce resistance to antimicrobial agents in LTCFs.

Loeb MB, Craven S, McGeer AJ et al. Risk factors for resistance to antimicrobial agents among nursing home residents. American Journal of Epidemiology 2003; 157:40-47.

Antimicrobial IV catheters: a meta-analysis

Central venous catheter (CVC) related bacteraemia is a major cause of health care associated bloodstream infections (BSIs) resulting in increased patient morbidity, mortality and additional health care costs.

Walder, Pittet & Tramer conducted a systematic review of randomised control trials comparing antiseptic or antimicrobial coated or cuffed CVCs with similar uncoated or uncuffed (control) CVCs. The aim of the study was to determine if the risk of infection related to CVCs is decreased by an anti-infective coating or cuffing.

All relevant literature in all languages using MEDLINE was searched to January 2000. This produced 23 randomised control trials that met the study criteria. The trials were conducted between 1988 and 1999 resulting in analysis of data on 4,660 catheters (2,319 anti-infective and 2,341 control).

The results indicate that antibiotic and chlorhexidine-silver sulfadiazine coatings on CVCs decreased the risk of BSI for short (approximately 1 week) insertion times. For longer insertion times there is no data on antibiotic coating and there is evidence of a lack of effect for chlorhexidine-silver sulfadiazine coating. For silver impregnated collagen cuffs there is lack of an effect for both long and short term insertion.

The authors conclude that this technology should only be used as an adjunct to good infection control practice and that the stringent application of guidelines to prevent BSI is recognised as highly efficient in critically ill patients. They recommend further research to define the most effective method and optimal time for device replacement and the identification of patient subgroups that would benefit from these measures.

Walder B, Pittet D & Tramer MR. Prevention of bloodstream infections with central venous catheters treated with anti-infective agents depends on catheter type and insertion time: evidence from a meta-analysis. Infection Control & Hospital Epidemiology 2002; 23(12): 748-756.

Risk of MRSA infection

Much is known about the risk factors for methicillin-resistant *Staphylococcus aureus* (MRSA) colonisation and infection in the hospital setting, but few studies have extended the follow-up beyond hospital discharge.

Huang & Platt determined the risk of MRSA infection in 209 previously colonised patients during 18 months of follow-up using retrospective review of infection control and patient medical records at a 700 bed hospital in Boston, Massachusetts. Sixty of the 209 patients (29%) developed a subsequent MRSA infection. On average, infections occurred 102 days (median 29 days) after the initial MRSA-positive culture. Notably, 49% of new infections first became manifest after discharge from hospital.

Risk of infection differed according to the source of the initial MRSA isolate, a higher risk being associated with bone, joint fluid or the nose compared to respiratory and soft tissue sources. Many infections were severe and involved bacteraemia in 28% of infections, and pneumonia, soft tissue, osteomyelitis or septic arthritis in 56%. Pre-discharge infections were more likely to be related to the presence of a vascular catheter (OR >7; P<0.01).

The authors conclude that previous studies have underestimated the morbidity associated with MRSA acquisition, although they acknowledged that they did not conduct molecular typing to determine whether infection was with the original colonising strain, or represented a new acquisition. They also noted that their data collection method did not include infections that may have been treated at another clinical facility, and thus may have underestimated the true burden of disease.

Huang S & Platt R. Risk of Methicillin-Resistant Staphylococcus aureus infection after previous infection or colonization. Clinical Infectious Diseases 2003; 36:281-5.

Respiratory viral infections in hospitalised children

Nosocomial respiratory viral infections can cause significant morbidity and mortality among hospitalised children, particularly those with underlying cardiorespiratory disease or immunodeficiencies. Hospitalised children with certain clinical syndromes may not always be considered to be a source of nosocomial viral infection. This cross-sectional study undertaken at the University of Maryland Medical Center estimated the respiratory virus infection rates associated with the admission diagnoses of asthma, pneumonia, bronchiolitis, fever, apnoea, croup or respiratory distress.

Naso-pharyngeal aspirates were collected from 243 of 401 children who met the diagnostic criteria, aged <1 to 19 years, admitted during the period October 1993 to April 1994. Seventy one (29%) had a respiratory virus detected, including 19 of 123 (15%) with asthma, four of 12 (33%) with pneumonia, 27 of 47 (57%) with bronchiolitis, 13 of 41 (32%) with fever, four of nine (44%) with apnoea, two of three (67%) with croup, and two of eight (25%) with unspecified respiratory distress. Respiratory viruses were therefore detected in approximately 10% of the 703 admissions during this period. The most frequently detected virus was RSV (21% of samples), confirming its role as a significant pathogen associated with paediatric hospitalisation.

Following this study, infection control procedures were modified to include cohorting of patients with similar diagnoses, without expensive viral testing, which was then reserved for more specific diagnostic use.

Lichenstein R, King JC, Lovchik J & Keane V. Respiratory viral infections in hospitalised children: implications for infection control. Southern Medical Journal 2002; 95(9):1022-25.

Dedicated stethoscopes as a source of cross-infection

Set in a 524 bed tertiary care university hospital, the objective of this study was to determine whether ear tips of dedicated stethoscopes that were used on patients prescribed contact precautions for methicillin-resistant *Staphylococcus aureus* (MRSA), vancomycin-resistant *Enterococcus faecium*, or multiple antibiotic-resistant *Acinetobacter baumannii* became contaminated with these organisms.

The ear tips of 78 dedicated stethoscopes from 69 patients were cultured directly onto agar plates. Growth of more than 10 colonies from the two ear tips collectively was decided to be indicative of contamination. Ear tips from 13 (17%) of the dedicated stethoscopes were contaminated with potentially pathogenic bacteria: two with *Staphylococcus aureus* (one MRSA), one with *Enterococcus faecalis*, seven with *Acinetobacter* species, two with *Pseudomonas* species, one with *Escherichia coli*, and one with *Moraxella* species. None of the stethoscope ear tips were contaminated with the same pathogen for which the patient was prescribed contact precautions (95% CI, 0-3.8%).

The authors conclude that although the ear tips of dedicated stethoscopes from patients who were prescribed contact precautions for multi-resistant organisms were not contaminated with the indicated nosocomial pathogen, 94% of the evaluable ear tips were contaminated with potential pathogens, including with MRSA (1.3%) and *Acinetobacter* (11%). Therefore they suggest that regular disinfection of ear tips of dedicated stethoscopes between users should be considered.

Guinto CH, Bottone EJ, Raffalli JT, Montecalvo MA & Wormser GP. Evaluation of dedicated stethoscopes as a potential source of nosocomial pathogens. American Journal of Infection Control 2002; 30(8):499-502.

Device-related bacteraemia in English Hospitals – PHLS report

Between 1997 and 2001, 17 teaching and 56 non-teaching acute English hospitals conducted hospital wide surveillance

of hospital acquired bacteraemia (HAB) using a standard protocol drawn up by the Nosocomial Infection National Surveillance Scheme (NINSS). The sources of organisms, the incidence of device-related HAB, and the distribution of HABs from individual device-related sources by specialty and type of hospital were determined for 6956 HABs in order to identify where resources should best be targeted to reduce these infections.

The overall incidence of HAB was higher in teaching than in non-teaching hospitals: 5.39 and 2.83 HABs per 1000 patients at risk, respectively (P<0.001). Device-related sources were responsible for 52.4 and 43.2% of all HABs in teaching and non-teaching hospitals, respectively (P<0.001), and central lines were the commonest source, causing 38.3% of HABs in teaching versus 22.3% in non-teaching hospitals (P<0.001).

In teaching hospitals, general intensive care units (ICUs), haematology, special care baby units (SCBUs), nephrology, and oncology accounted for only 6.1% of the population surveyed, but had the highest incidence of HAB, and contributed 47.8% of 2091 HABs and 56.9% of 1095 device-related bacteraemias. Of 623 device-related bacteraemias in these high-risk specialties, 554 (88.9%) were from central lines. Thus, in teaching hospitals, resources should be targeted primarily at the prevention of central line-related bacteraemia in these five high-risk specialties, and the surveillance should include data on central line use.

In non-teaching hospitals, nearly two thirds (63.3%) of 4865 HABs and 60.7% of 2103 device-related bacteraemias were from a few specialties with a low incidence of bacteraemia, but large numbers of patients, namely general medicine, general surgery, geriatric medicine and urology. These specialties accounted for 50.5% of the population surveyed. Central lines were the most common source of bacteraemia in general medicine and surgery; however, in geriatric medicine and urology, central line sources were infrequent. On the other hand, bacteraemia from catheter-associated UTI were common in all these four specialties accounting for 20.9% of all device-related bacteraemias. Thus, in non-teaching hospitals, resources should be targeted primarily at these low-risk specialties and surveillance should include, at least, bacteraemia from central lines and from catheter-associated UTI. Further benefit can be obtained by including central line-related bacteraemias from general ICU and haematology patients, as they contributed 17.0% of all device-related bacteraemias in non-teaching hospitals.

Coello R, Charlett A, Ward A, Wilson J, Pearson A, Sedgwick J & Borriello P. Device-related sources of bacteraemia in English hospitals-opportunities for the prevention of hospital-acquired bacteraemia. Journal of Hospital Infection 2003; 53:46-57.

Consultation paper: definitions of Multi Resistant Organisms (MROs)

The Australian Infection Control Association (AICA) asked the Australian Group on Antimicrobial Resistance (AGAR) to define, for the purposes of surveillance, definitions of certain multi resistant bacteria that are also associated with cross infections in our hospitals.

These definitions are 'simple' to allow these MROs to be easily identified from pathology reports by those doing surveillance (e.g. infection control practitioners). If you would like to provide feedback to AGAR on the practicality of these definitions please do so via the AICA Secretariat: Australian Infection Control Association, PO Box 4442, Eight Mile Plains, Qld 4113. The final document, after consultation, will be uploaded onto the AICA website.

'Simple' definitions for four important organisms

Peter Collignon Chair AGAR

1. MRSA (Methicillin resistant *Staphylococcus aureus):* Any *Staphylococcus aureus* isolate that is resistant to methicillin (or oxacillin if this is the antibiotic tested in the laboratory – oxacillin or methicllin MIC >2 mg/L).
2. *Klebsiella* spp. (resistant to 3rd generation cephalosporins/ESBL): An organism identified as a *Klebsiella* spp. and in which resistance to third generation cephalosporins (e.g. cefotaxime, ceftriaxone, ceftazidime) has also been detected in the laboratory. Most of these bacteria will also have been identified as extended spectrum beta-lactamase producers (ESBL).
3. VRE (Vancomycin resistant Enterococcus): Any Enterococcus species where the *isolate* which has high-level vancomycin resistance (MIC>4mg/L). It would be preferable if these isolates are also checked to see if they contain either the vanA or vanB gene, but this is not essential.
4. *Acinetobacter* spp. (Multi resistant): Any isolate that is resistant to the carbapenem class of antibiotics (i.e. imipenem or meropenem).

These definitions mean that some strains of multi resistant organisms e.g. MRSA that are acquired in the community will fall under these definitions. However, the same bacteria do cause cross infections within hospitals (especially community strains of MRSA in Western Australia) and therefore are included in the overall MRSA definitions. When information is collected for surveillance purposes, epidemiological information as to whether the isolate was community acquired or hospital acquired or outpatient health care acquired will need to be obtained. Only hospital or health care acquired infections will be counted in hospital surveillance data.