Infection Prevention and Control RESEARCH REVIEW™

Making Education Easy

Issue 12 – 2021

In this issue:

CLICK HERE

to read previous issues of Infection Prevention and Control Research Review

Welcome to the latest issue of Infection Prevention and Control.

This issue features research on the effect of measures taken to contain carbapenemase-producing Enterobacterales, the role of whole-genome sequencing in the investigation of infectious disease outbreaks, and barriers to implementing a conditional reflex to urine culture policy. Also included in this issue are three literature reviews that respectively consider the use of face masks against COVID-19, mandatory influenza vaccination policies for healthcare workers, and the role of nurses in antimicrobial stewardship.

We hope that you enjoy reading this issue of **Infection Prevention and Control**. We value your feedback so please keep sending us your comments and suggestions.

Best regards,

Dr Chris Tofield
Medical Advisor, Research Review
christofield@researchreview.co.nz

Initial impact of a national programme to contain the spread of carbapenemase-producing Enterobacterales in Ireland

Authors: Vellinga A et al.

Summary: These researchers evaluated the impact of measures taken to control carbapenemase-producing Enterobacterales (CPE) after a National Public Health Emergency on CPE was declared in Ireland. All acute Health Service Executive hospitals were required to report performance indicators related to CPE control (number of CPE tests and number of newly detected CPE). Monthly incidences were calculated using the overall number of bed-days used (BDU) per hospital. Over the two-year study period, the average incidence of CPE cases per 10,000 BDU increased from 1.3 (±0.5) for year 1 to 1.7 (±0.4) for year 2, while the incidence of CPE cases per 1000 screens fell from 3.2 (±0.7) in year 1 to 2.3 (±0.6) in year 2. According to genetic detection, the OXA-48 gene was most common (72%) followed by KPC (13%) and NDM (7%).

Comment (MA): This is an interesting paper in so much as Ireland is a similar sized country to NZ, so it gives us some insight into their current situation with CPE and how it compares to ours. The study period is quite short (2 years) and, because of this, one should be very wary of drawing too many conclusions on the impact of enhanced CPE screening and reporting policies from this paper. The CPE yield per 1,000 screening swabs decreased in the second year but total number of CPEs detected continued to increase, which makes one wonder if the cohort of patients screened in the second year of the study were inherently at lower risk of CPE . . . Another few years of data would certainly help draw firmer conclusions. NZ is still in a relatively good position with regards to CPE due its geographical isolation; however, the CPE rates continue to increase year-on-year. The closed borders due to COVID have probably bought us a bit of time. We do have CPE guidelines but it is unclear how well they have been adopted. Anecdotally, I suspect screening for CPE across NZ is still very patchy. Maybe now is a good time to review and focus on our CPE policies before the borders re-open . . .

Reference: J Hosp Infect. 2021;109:107–114

Abstract

This Research Review has been endorsed by The Royal New Zealand College of General Practitioners (RNZCGP) and has been approved for up to 1 CME credit for the General Practice Educational Programme (GPEP) and Continuing Professional Development (CPD) purposes. You can record your CME credits in your **RNZCGP Dashboard**

Time spent reading this publication has been approved for CNE by The College of Nurses Aotearoa (NZ) for RNs and NPs. For more information on how to claim CNE hours please **CLICK HERE**.

Independent commentary by Michael Addidle

Michael Addidle is a UK trained Clinical microbiologist now working at both Pathlab and ESR laboratories in New Zealand. He holds fellowships in general medicine and clinical microbiology. He is involved in infection control in both public and private hospitals throughout the Bay of Plenty and Waikato regions. Michael has a keen interest in the pivotal role of the diagnostic laboratory in good diagnostic and antimicrobial stewardship.

An evidence review of face masks against COVID-19

Authors: Howard J et al.

Summary: The authors of this narrative review synthesized the relevant literature on the use of face masks against COVID-19 in the context of population impact, transmission characteristics, source control, wearer protection, sociological considerations, and implementation considerations. The evidence indicates that mask wearing reduces transmissibility by reducing transmission of infected respiratory particles in both laboratory and clinical settings and that public mask wearing is most effective at reducing spread of the virus when adherence is high. Based on their findings, the authors recommend that public officials and governments should strongly encourage the use of widespread face masks in public, including the use of appropriate regulation.

Comment (MA): I included this paper, and then after reading it in detail, was sorry I did . . . as it focuses more on mask wearing in public as opposed to what I was really interested in, that is, mask wearing in healthcare settings. Nevertheless, it does offer supporting evidence for our current policy of mandatory facemask wearing on public transport. Disappointingly, the paper does not focus on the difference in efficacy of N95 masks compared with surgical masks against COVID-19. This for me is a key question for NZ as there is increasing evidence internationally that aerosols play a role in COVID-19 transmission. N95-type masks are currently recommended for any aerosol-generating procedures but there may well also be a role for them in the more general care of patients with confirmed or suspected COVID-19. I suspect there are better reviews of facemasks out there than this one. I will just need to look for them.

Reference: Proc Natl Acad Sci U S A. 2021;118(4):e2014564118
Abstract

Healthcare workers' perceptions and acceptance of an electronic reminder system for hand hygiene

Authors: Blomgren P-O et al.

Summary: To evaluate healthcare workers' perceptions of infection prevention at a university hospital and their perceptions and acceptance of an electronic reminder system that encourages good hand hygiene, these researchers conducted eight focus group interviews with assistant nurses, nurses, and physicians (n=38). Content analysis was applied and data were related to the Theory of Planned Behaviour. In general, there was positive acceptance of the electronic reminder system and respondents perceived it as having the ability to alter behaviour. However, respondents believed that the electronic reminder system should not register data at an individual level since it could be used as an instrument for control by the management that could be stressful for staff.

Comment (MA): I got confused about the title on this one. It really should have been titled "Healthcare workers' perceptions and acceptance of an electronic system for monitoring of hand hygiene compliance." Something got lost in the translation here! Once I got past this it was actually quite a good paper, focusing on how people perceive electronic monitoring of hand hygiene. For this particular system, staff wore radio-frequency identification badges so results could be individualised. Understandably there were concerns as to how individualised data would be used and by whom the results would be seen. There were also comments on the frequency and ease of access of individual feedback data. However, overall acceptance of the system was positive. I do not believe that the traditional manually-based hand hygiene monitoring by direct observation has a long-term future. I look forward to trialling an automated system such as the one described in this paper in NZ in the near future, so I can see the pros and cons for myself!

Reference: J Hosp Infect. 2021;108:197–204
Abstract

Clinical outcomes after faecal microbiota transplant by retention enema in both immunocompetent and immunocompromised patients with recurrent *Clostridioides difficile* infections at an academic medical centre

Authors: Navalkele BD et al.

Summary: These investigators performed a retrospective review of patients who underwent faecal microbiota transplantation (FMT), which is considered a definitive treatment option for recurrent *Clostridioides difficile* infection (CDI). Fifty charts were reviewed, of which 47 cases comprising 17 immunocompromised patients treated with FMT via retention enema were included in the study. Most of the patients (62%) had ≥3 recurrent CDIs. Nine (19%) patients failed to respond to the first FMT and five underwent repeat FMT within four to 12 weeks. The cure rate was 81% (38/47) after the first FMT and 91% (43/47) after the second FMT treatment. Serious adverse events occurred in 2% of patients and all-cause mortality was 2% at 90-day follow up.

Comment (MA): I included this well written paper in order to try and "normalise" FMT in our hospitals. The scientific evidence is increasing and *C. difficile* management guidelines now routinely include this as a treatment modality, and not only as a "last resort" when all else has failed. One interesting point in the study is that the donor stool was obtained (frozen) from a commercial company that organised the donor screening and stool analysis. I suspect NZ is not quite big enough to have a similar venture, but certainly worth considering. The other strong point of the paper was that it successfully validated retention enemas as an efficacious way of performing FMT, thus negating the need for invasive endoscopies or, dare I say it, gastroenterologists or surgeons! This, therefore, allows infectious disease specialists and specialist infection prevention nurses to be more autonomous in the management of this infection.

Reference: J Hosp Infect. 2020;106(4):643–648
Abstract

Barriers associated with mandatory influenza vaccination policies for healthcare workers: an integrative review

Authors: Short E et al.

Summary: This integrative review of the literature was conducted to identify the perceived and reported barriers to the implementation of a mandatory influenza vaccination policy for healthcare workers. Of 68 papers identified from the database search, seven papers were relevant for inclusion. The quality scores of these papers were in the range of 15–20 (utilising the Standard Quality Assessment Criteria for Evaluating Primary Research papers for a Variety of Fields, which consisted of 10 questions with a possible total score of 20). Barriers reported to prevent the effective implementation of mandatory influenza vaccination policies included ethical and legal considerations, logistics, healthcare burden, leadership and management, and human factors such as healthcare workers' perspectives.

Comment (MA): Mandatory influenza vaccination policy is a poisoned chalice! A few have dabbled in this area within NZ healthcare settings over the past few years, with limited success. This paper tries to extract an evidence base as to the barriers for mandatory influenza vaccination policy, and it is certainly worthwhile being aware of this paper should your institution be looking along similar lines. Translating this approach over to COVID-19, a lot of workplaces and healthcare institutions are now looking closely at vaccination rollouts for their employees and whether there are any employee cohorts where COVID-19 vaccination should be pre-requisite. I try to look at mandatory vaccination policy from a medico-legal angle: is there an increased risk of infection to the employee, or their patients, directly as a result of performing their work duties, over and above what might be expected in everyday life? And can this risk be mitigated at minimal risk by vaccination? If the answers to these questions are yes, then there is a strong argument for employers making the vaccination mandatory as opposed to voluntary. Of course, any mandatory vaccination is much easier to instigate pre-employment (as a condition of employment) than peri-employment when legal opinions generally need to be sought if there is disagreement from the employee. A can of worms indeed!

Reference: J Infect Prev. 2020;21(6):212–220
Abstract

Clinical impact of early reinsertion of a central venous catheter after catheter removal in patients with catheter-related bloodstream infections

Authors: Lee Y-M et al.

Summary: To evaluate the clinical impact of early central venous catheter (CVC) reinsertion after catheter removal in patients with catheter-related bloodstream infection (CRBSIs), these researchers conducted a retrospective chart review of adult patients with confirmed CRBSIs in two tertiary-care hospitals over a 7-year period. A total of 316 patients with CRBSIs underwent CVC removal to treat their infections. Of these patients, 130 (41.1%) underwent early CVC reinsertion (≤3 days after CVC removal), 39 (12.4%) underwent delayed reinsertion (>3 days), and 147 (46.5%) did not undergo CVC reinsertion. The rate of persistent CRBSI in the early CVC reinsertion group was significantly higher than that in the no CVC reinsertion group (22.3% vs 7.5%; p=0.002) but was similar to that in the delayed CVC reinsertion group (17.9%; p>0.99). After controlling for several confounding factors, early CVC reinsertion was not significantly associated with persistent CRBSI (OR 1.59; p=0.35) or 30-day mortality compared with delayed CVC reinsertion (OR 0.81; p=0.68).

Comment (MB): Infectious disease physicians are often asked whether it is safe to insert new central venous access in a patient who is possibly still bacteraemic. This study attempts to provide guidance in the situation where the bacteraemia is due to line infection itself. They were limited a bit by small numbers in various groups, and I suspect there was some residual confounding despite multivariate analysis (e.g., sicker patients getting their lines replaced earlier). Their overall conclusions were that early replacement appears to be safe compared with delayed (>3 days) replacement. There did appear to be a signal that this may not be the case with candidaemia, but their numbers were too low to reach statistical significance. I have generally been in the early replacement camp myself, so am pleased to see the results of this study! I would however be more cautious in the setting of candidaemia.

Reference: Infect Control Hosp Epidemiol. 2021;42(2):162–168
Abstract

Clinical perspectives in integrating whole-genome sequencing into the investigation of healthcare and public health outbreaks – hype or help?

Authors: Parcell BJ et al.

Summary: Whole-genome sequencing (WGS) has emerged as the definitive genotyping tool. However, it has not yet fully transitioned from research method to routine clinical diagnostic microbiological technique. This article describes the authors' experiences following the establishment of a clinical WGS service as part of the Scottish Healthcare Associated Infection Prevention Institute to confirm or refute outbreaks in hospital settings from across Scotland. The authors provide new insights into practical aspects of the use of WGS to investigate healthcare and public health outbreaks and propose solutions to overcome barriers to implementation of this technology in a clinical environment.

Comment (MB): WGS investigation of outbreaks has become much more well-known in COVID times and will be used more and more in the future. The high degree of discriminatory power means that WGS can demonstrate transmission events that would not have been detected epidemiologically, but also exclude others from an outbreak with confidence. I would recommend this paper as an overview of where it can fit in; however, a bit of prior knowledge would be helpful, otherwise this could be a heavy read. Figure 3 in particular provides a nice summary of how it can be used in different ways. We have had some local experience recently where WGS was very useful at defining who was and was not part of a small cluster of MRSA on one of our augmented care units, which was a nice demonstration of how powerful it is as an infection prevention control tool.

Reference: J Hosp Infect. 2021;109:1–9
Abstract

Independent commentary by Max Bloomfield

Max is an Infectious Diseases Physician and Clinical Microbiologist working at Capital & Coast DHB and Wellington Southern Community Laboratories. **For full bio CLICK HERE.**

Conditional reflex to urine culture: evaluation of a diagnostic stewardship intervention within the Veterans' Affairs and Centers for Disease Control and Prevention Practice-Based Research Network

Authors: Claeys KC et al.

Summary: This retrospective, quasi-experimental, non-randomised study examined rates of urine cultures before and after implementation of a conditional urine reflex culture policy. The study included six acute-care hospitals within the Veterans' Health Administration (VA) across the US: three intervention sites were compared with three control sites. At the intervention sites, urine cultures were performed if a preceding urinalysis met prespecified criteria whereas no such restrictions occurred at the control sites. A total of 224,573 urine cultures from 50,901 admissions in 24,759 unique patients were included in the study. Among the intervention sites, the overall average number of urine cultures performed (primary outcome) did not significantly decrease relative to the pre-intervention period (5.9% decrease) but did significantly decrease (by 21%) relative to control sites ($p<0.01$). No significant difference in the rates of gram-negative bloodstream infection (primary safety outcome) among intervention or control sites was detected.

Comment (MB): I was interested to review this paper, as it examines a practise that is already commonplace in NZ laboratories, whereby urine samples sent to the lab are not cultured unless white cells are present. With all the limitations associated with observational, time-series data, they demonstrated significant decreases in urine culturing compared with control hospitals. The assumption here is that this leads to less inappropriate antibiotic prescribing. The novel aspect of this study was that they showed no increase in Gram-negative bloodstream infections in the restrictive urine culture hospitals, meaning this restrictive approach does not appear to compromise patient safety through missed infections. As with any VA-based study, it is worth remembering that very few women were included, so this does raise some questions relating to generalisability of results.

Reference: Infect Control Hosp Epidemiol. 2021;42(2):176–181
Abstract

Knowledge, perceptions and experiences of nurses in antimicrobial optimization or stewardship in the intensive care unit

Authors: Padigos J et al.

Summary: This systematic review identified and critically evaluated primary studies that examined knowledge, perspectives, and experiences of nurses involved with antimicrobial use and optimisation in intensive care units (ICUs). Of 898 studies screened, 26 were included in the review. Eighteen studies were quantitative and the six qualitative studies included were of high methodological quality. Studies where interventions were used (n=10) identified significant potential for ICU nurses to reduce antimicrobial use, time-to-antibiotic administration, and error rates. Barriers to nursing engagement included knowledge deficits in antimicrobial use, interprofessional dissonance, and the culture of deference to physicians. Perceived enablers to strengthen the role of nurses in optimising antimicrobial use were enhancing education, technology utilisation, strong nursing leadership, and robust organizational structures that support nurses.

Comment (NG): Historically, nurses may have questioned their role in antimicrobial stewardship (AMS) and some even thought it was outside their scope of practice. This study involved reviewing the role of nurses in antimicrobial optimisation or stewardship in ICUs. A systematic review included 18 quantitative studies, six qualitative studies, and two studies used mixed methods. Opportunities for nurses to advocate AMS for their patients included promoting appropriate culturing techniques, questioning the need for urine cultures, checking culture results, advocating renal dose adjustment when needed, early/timely cessation, IV to oral antibiotic switch, and sepsis recognition, among others. Workplace culture and individual knowledge around antimicrobial use by ICU nurses correlates with the confidence level that nurses have and their willingness to initiate discussions with doctors about AMS. Communication, practice protocol development and addressing a culture of deference will also advance nursing roles in AMS so interprofessional collaborative practice can be achieved. It is important for AMS to be viewed as a multidisciplinary team responsibility to optimise patient care and reduce global antimicrobial resistance.

Reference: J Hosp Infect. 2021;109:10–28
Abstract

Implementation of the infection prevention and control core components at the national level: a global situational analysis

Authors: Tartari E et al.

Summary: The aim of this multi-country, cross-sectional study was to evaluate national infection prevention and control (IPC) programmes worldwide according to the World Health Organization (WHO) IPC core components. Relevant data was obtained by conducting semi-structured interviews with national IPC focal points of countries that pledged to the WHO 'Clean Care is Safer Care' challenge. Eighty-eight of 103 (85.4%) eligible countries participated. Of these countries, 22.7% were low-income, 19.3% lower-middle-income, 23.9% upper-middle-income, and 34.1% high-income economies. Although a national IPC programme existed in 62.5% of countries, only 26.1% had a dedicated budget. National guidelines were available in 67.0% of countries but only 36.4% had an implementation strategy and only 21.6% measured adherence with guidelines. IPC education and training at undergraduate, in-service, and postgraduate levels were reported by 35.2%, 54.5%, and 42% of countries, respectively. Healthcare-associated infection surveillance was reported by 46.6% of countries, with significant ($p<0.001$) differences ranging from 83.3% (high-income) to zero (low-income). Only 12.5% of countries reported having all core components in place.

Comment (NG): The WHO IPC core components have been around for five years as evidence-based and expert consensus-based recommendations on effective IPC strategies. The aim of the WHO core components is to support capacity-building to prevent healthcare-associated infections and antimicrobial resistance at national and facility levels. Unlike the self-assessment surveys that were promoted by WHO a couple of years ago, this study included interviews and the ability to discuss with national IPC representatives and to agree the most appropriate answers. A national IPC programme existed in 62.5% but only 26.1% had a dedicated budget. The Western Pacific region, which NZ is part of, had the highest overall scores for national IPC programmes, national IPC guidelines, and multimodal implementation strategies compared with other regions. As we know, national guidelines are not sufficient without a national implementation plan. The Western Pacific region scored second highest in surveillance programmes and monitoring and feedback of IPC indicators. All regions had considerable gaps in the education and training core component. Education and training of IPC principles and practices are key elements of IPC programmes and should be a focus during undergraduate and postgraduate training and in medical school and the workplace. Educational bodies should standardise IPC curricula for nursing, medical, and other healthcare professional-related programmes.

Reference: J Hosp Infect. 2021;108:94–103
Abstract

Independent commentary by Nikki Grae

Nikki Grae has been the senior advisor for the infection prevention and control programme at the Health Quality & Safety Commission since 2016. She has 12 years of infection prevention, quality, and patient safety experience in the healthcare sector. Prior to working at the Commission, she managed and led the infection prevention and patient safety programmes for a health system in the U.S. **For full bio CLICK HERE**