

# Infection Prevention and Control

## RESEARCH REVIEW™

Making Education Easy

Issue 11 – 2021

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#### Abbreviations used in this issue

**COVID-19** = coronavirus disease 2019

**HCP** = healthcare professional

**IPC** = infection prevention and control

**MDR** = multi-drug resistant

**SARS-CoV-2** = severe acute respiratory syndrome coronavirus-2



## Welcome to the latest issue of Infection Prevention and Control.

Three selections in this issue deal with COVID-19 in NZ including SARS-CoV-2 transmission patterns and dynamics, the epidemiology of the national response, and the psychological price of nationwide lockdown. Other selections report on the effect of ePrescribing on the quality of antimicrobial prescribing, use of point prevalence surveys for assessing the appropriateness of antimicrobial prescribing, and infusion pumps and their regular alarms being a potential IPC issue.

We hope that this issue of **Infection Prevention and Control** is informative and of value in your daily practice. Your feedback is appreciated so please keep sending us your comments and suggestions.

Best regards,

Dr Chris Tofield

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### Shedding of multidrug-resistant gram-negative bacilli by colonized patients during procedures and patient care activities

**Authors:** Alhmidi H et al.

**Summary:** This cohort study of hospitalised patients under contact precautions for carriage of extended-spectrum beta-lactamase-producing gram-negative bacilli (n=38) or carbapenem-resistant gram-negative bacilli (n=22) was conducted to determine the frequency of environmental shedding during medical procedures and patient care activities. Thirty-four of the 60 patients enrolled (57%) had positive perirectal and/or skin or wound cultures. For these 34 patients, 15 (44%) shed their colonising organism to surfaces during one or more procedures. Environmental shedding occurred significantly ( $p < 0.01$ ) more frequently during procedures and care activities (21/117 [18%]) than in the absence of a procedure (1/61 [2%]). Six of 56 (10%) portable devices used for procedures became contaminated.

**Comment (MB):** This was a small study based on environmental cultures, so can only really be considered hypothesis generating. It was conducted in Cleveland, USA, in a Veterans Affairs (VA) hospital and aged care facility. All patients were already under contact precautions. They found a significant frequency of environmental contamination in patients colonised with gram-negative MDR organisms who had undergone procedures or patient care activities versus almost none in those that had not. Interestingly, assistance with meals had the highest frequency of contamination within 0.9 metres of the patient, and ostomy change had the highest >0.9 metres from the patient. Contamination with urinary catheter care and wound care were also common. Wound care trolleys and linen carts became contaminated in 10% of patients, despite local policy stating that linen carts should not be touched by contaminated hands. They did not report on organism type, which I think is unfortunate, as it would have been nice to know the proportion of *Escherichia coli* versus *Klebsiella* spp., for example. The takeaway points from this for me are that assistance with meals appears to frequently contaminate the patient's near environment (I had not appreciated this previously, although perhaps this just demonstrates that men are messy eaters; the VA population is mostly male), and environmental contamination is common with procedures. This very much highlights the importance of the five moments, and not taking potential fomites between patients.

**Reference:** *Am J Infect Control.* 2020;48(11):1336–1340

[Abstract](#)

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### Independent commentary by Max Bloomfield

Max is an Infectious Diseases Physician and Clinical Microbiologist working at Capital & Coast DHB and Wellington Southern Community Laboratories. He has an interest in antimicrobial resistance, diagnostic stewardship and the microbial composition of sourdough bread. He trained at University College Hospital London and Wellington Hospital, gaining fellowship with the RACP and the RCPA. He has higher degrees from the University of Cambridge and Queen Mary University of London.





## The intersection of hand hygiene, infusion pump contamination, and high alarm volume in the healthcare environment

**Authors:** Nas MY et al.

**Summary:** These researchers conducted audits on hospital healthcare worker hand hygiene to determine adherence and cultures obtained from infusion pumps to assess environmental contamination in the context of infusion pump alarm frequency. Hand hygiene adherence ranged from 50% to 87%. Cultures revealed that pump contamination ranged from 20% to 70% per unit. Infusion pump alarms sounded a total of 116,872 times during the 35-day measurement period.

**Comment (MB):** Sticking with the environmental contamination theme, it was interesting to consider infusion pumps and their regular alarms as a potential IPC issue. 'Alarm fatigue' is a recognised phenomenon, particularly in augmented care units, and this may impact on appropriate hand hygiene and potential contamination of pump units. These investigators sampled from around the silence (my favourite button) and pause buttons on pump units and found frequent contamination with bacteria. They also surveyed hand hygiene and found variable adherence and a high frequency of alarms during the study period. The bacteria they grew from the units were all skin organisms of low pathogenicity, and no significant hospital pathogens were found. I have to say I did not take too much from this study, other than highlighting the fact that pumps can become contaminated and that the manner in which they are used tends to mean hand hygiene often is not performed between touching the unit and the patient.

**Reference:** *Am J Infect Control.* 2020;48(11):1311–1314

[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](#).

## Shining a light on the pathogenicity of health care providers' mobile phones: use of a novel ultraviolet-C wave disinfection device

**Authors:** Malhotra S et al.

**Summary:** This study assessed whether an ultraviolet-C (UV-C) device can provide effective disinfection of HCP's personal mobile phones and surveyed HCPs about infection risk. Four cultures were obtained per phone: before and after the UV-C device's 30-second disinfecting cycle, at the beginning and end of a 12-hour shift. Surveys were administered pre- and post-study. Total bacterial colony-forming units (CFUs) were reduced by 90.5% ( $p=0.006$ ) and 99.9% ( $p=0.004$ ) after one and two UV-C disinfection cycles, respectively. Total pathogenic bacterial CFUs were decreased by 98.2% ( $p=0.038$ ) and >99.99% ( $p=0.037$ ) after one and two disinfection cycles, respectively. All survey respondents were willing to use the UV-C device daily to weekly.

**Comment (MB):** I wanted to review this paper because it involved use of an interesting sounding gadget. Again, this was a paper based on environmental cultures, rather than clinical outcomes, but they did manage to demonstrate significant reductions in pathogenic bacteria on phones with the use of the device. I was slightly confused as to their handling of 'outlier' results, which appeared to show high bacterial counts after disinfection, and it would have been nice to have further explanation of this. They also only cultured from the screen of the phone, rather than the more hard-to-reach places, like around the buttons etc., where I would have thought the UV-C may have struggled to penetrate. There have been numerous studies showing that healthcare workers' phones are contaminated with hospital organisms; however, the relationship with clinical outcomes has not been demonstrated. So, I was pleased to read in the discussion that studies examining whether phone decontamination can reduce infection incidence are underway. Of note, the investigators did receive some financial assistance from the manufacturers of the device.

**Reference:** *Am J Infect Control.* 2020;48(11):1370–1374

[Abstract](#)

[CLICK HERE](#)

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# Taking action on Sepsis

With partners across New Zealand, the Sepsis Trust has been working hard to create a National Sepsis Action Plan, for our health sector, our institutions, and our communities.

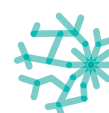
The plan aims to reduce preventable deaths as a result of sepsis – a disease that affects up to **1:100** Kiwis annually, and globally kills one person every **4 seconds**.

The plan proposes the establishment of a National Sepsis Network (NSN) which will provide national leadership and create a shared sense of purpose and greater awareness of sepsis.

### We want your feedback

The plan is open for consultation until March 2021 and will be presented in full at the National Sepsis Conference in November.

To read the National Sepsis Action Plan and contribute your ideas and feedback visit [www.sepsis.org.nz/action/](http://www.sepsis.org.nz/action/)



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## Genomic epidemiology reveals transmission patterns and dynamics of SARS-CoV-2 in Aotearoa New Zealand

**Authors:** Geoghegan JL et al.

**Summary:** These researchers generated 649 SARS-CoV-2 genome sequences from infected patients in NZ with samples collected during the 'first wave'. Imported viruses represented nearly all the genomic diversity sequenced from the global virus population. The data helped to quantify the effectiveness of public health interventions in NZ: the reproductive number ( $R_t$ ) of the country's largest cluster decreased from 7 to 0.2 within the first week of lockdown and only 19% of virus introductions resulted in ongoing transmission of more than one additional case.

**Comment (MA):** Whole genome sequencing (WGS) technology has been a powerful tool in the response to the COVID-19 pandemic, and allows various functionalities as outlined in the paper. In addition, and more recently, WGS has been utilised in the NZ setting for ascertaining whether border incursions are linked to known clusters, as well identifying international SARS-CoV-2 variants of concern in incoming travellers. There is no limit to the value of WGS! In the early stages of the pandemic there were some issues in getting positive samples referred from diagnostic labs to the reference lab for WGS. However, as the pandemic has progressed and the value of WGS is increasingly appreciated, this really should no longer be the case. There may be a role in future for diagnostic microbiology labs to perform the sequencing in-house, with the bioinformatic analysis being done elsewhere, in order to optimise turnaround times.

**Reference:** *Nat Commun.* 2020;11(1):6351

[Abstract](#)

## COVID-19 in New Zealand and the impact of the national response: a descriptive epidemiological study

**Authors:** Jefferies S et al.

**Summary:** These researchers investigated the effects of national COVID-19 suppression measures implemented in NZ on the epidemiology of the first wave of COVID-19 and response performance measures. A total of 1,503 cases of SARS-CoV-2 infection were detected, which included 95 (6.3%) hospital admissions and 22 (1.5%) COVID-19 deaths. Case infection rate per million people per day peaked at 8.5 (95% CI: 7.6–9.4) during the 10-day period of rapid response escalation before declining to 3.2 (2.8–3.7) during the start of lockdown and progressively thereafter. Severe outcomes were associated with locally-acquired infection (OR 2.32 [95% CI: 1.40–3.82] vs imported), older age (OR ranging from 2.72 [1.40–5.30] for 50- to 64-year-olds to 8.25 [2.59–6.31] for those aged ≥80 years vs 20- to 34-year olds), aged residential care residency (OR 3.86 [1.59–9.35]), and Pacific peoples (OR 2.76 [1.14–6.68]) and Asian ethnicities (2.15 [1.10–4.20]) relative to European or other.

**Comment (MA):** It is great to see NZ work published in leading journals such as The Lancet, along with the ensuing media coverage and publicity. The study essentially demonstrates and documents the effectiveness of a "hard and early" lockdown in interrupting SARS-CoV-2 transmission. This virus does not sit around waiting whilst politicians debate potential lockdown measures for a few weeks in parliament! As Mike Ryan from the WHO eloquently stated "[speed trumps perfection](#)". With regards to the actual statistics presented in the paper, NZ has to some extent been a victim of its own success, as the low number of positive cases has made some of the epidemiological data presented in the paper relatively weak, particularly when looking at age, ethnicity, and socio-economic status sub-groups. One must also be cognisant of the fact that the COVID-19 situation is rapidly evolving. New variants are emerging, the NZ population has "done its lockdown", and what worked several months ago, may not necessarily work now, for both biological and psychosocial reasons . . .

**Reference:** *Lancet Public Health.* 2020;5(11):e612–e623

[Abstract](#)

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## Point prevalence surveys of antimicrobial use in adult inpatients at Canterbury District Health Board hospitals

**Authors:** Gardiner SJ et al.

**Summary:** In this study, multidisciplinary teams collected and assessed clinical details for all adult inpatients on antimicrobial therapy at three Canterbury DHB facilities (≈1,100 beds) to determine the nature and appropriateness of antimicrobial prescribing. Antimicrobial therapy was prescribed to 42% of inpatients (322/760), predominantly to treat infections [377/480 prescriptions (79%)]. Of assessable prescriptions, 74% (205/278) adhered to guidelines, 98% (469/480) adhered to funding criteria, and 83% (375/451) were clinically appropriate. Prescriptions for the most common indications (surgical prophylaxis 66/480 [14%] and community-acquired pneumonia 56/480 [12%]) were often non-adherent with guidelines (32% and 41%, respectively) and inappropriate (18% and 21%, respectively).

**Comment (MA):** Several hospitals in NZ are now performing point prevalence studies of antimicrobial use, mainly utilising the NAPS audit tool. However, it is great to see such audits being published in a medical journal. One would hope that publications such as this can then be utilised as evidence to back up potential business cases for antimicrobial stewardship (AMS) teams, and more specifically antimicrobial pharmacists within the hospital setting. The complementary skills of antimicrobial pharmacists, infectious disease physicians, and clinical microbiologists can then be combined to make a very effective AMS team. With regard to the results of the audit itself, the results were consistent with other similar audits I have been involved with. There is still clearly much work to be done in improving clinician adherence to antibiotic guidelines in the chronic obstructive pulmonary disease/community-acquired pneumonia domain.

**Reference:** *N Z Med J.* 2020;133(1525):18–33

[Abstract](#)

## Highly effective prophylaxis with ertapenem for transrectal ultrasound-guided prostate biopsy: effects on overall antibiotic use and inpatient hospital exposure

**Authors:** Bloomfield MG et al.

**Summary:** To assess the effects of ertapenem prophylaxis for transrectal ultrasound-guided (TRUS) prostate biopsy on overall antibiotic consumption and exposure to the hospital environment the records of men presenting within 30 days of biopsy were searched to determine whether post-biopsy infection (PBI) occurred, antibiotic usage, and duration of hospitalisation. Based on the records from a total of 4,020 men, ertapenem prophylaxis was highly effective in reducing PBI and PBI-related bacteraemia and resulted in marked reductions in overall antibiotic consumption and inpatient bed-days.

**Comment (MA):** Using carbapenems as prophylaxis is anathema to our gut instincts as antimicrobial stewards! Nevertheless, the results of this nicely written study are really quite compelling, both in terms of efficacy and antimicrobial stewardship. Even with standard prophylaxis TRUS biopsies continue to be a significant cause of morbidity, and occasionally mortality. I think this paper demonstrates that when antibiotics are used in a controlled fashion in a selected cohort as a one-off dose for prophylaxis, "collateral damage" is minimal, if not completely avoided. I am currently trying to prove the same thing for the use of mupirocin nasal ointment for staphylococcal decolonisation prior to joint replacement surgery. This paper will definitely make me think about changing my ideas/practice when it comes to pre-TRUS prophylaxis. However, when it comes to my turn in due course, I will still be pushing for a trans-perineal prostatic biopsy!

**Reference:** *J Hosp Infect.* 2020;106(3):483–489

[Abstract](#)

## 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.





## Quality of antimicrobial prescribing improved by the introduction of ePrescribing at Auckland City Hospital

**Authors:** Bowers TR et al.

**Summary:** The aim of this retrospective study was to determine whether the introduction of ePrescribing improved prescribing quality at Auckland City Hospital. Patient records for inpatients on four rehabilitation wards, two using ePrescribing and two using the National Medication Chart (NMC), were reviewed to identify all antimicrobial prescriptions and their quality. Documentation of indication was significantly better on ePrescribing wards (45/46, 98%) compared with wards using the NMC (47/59, 80%). No significant differences were noted for adherence to guidelines (32/46, 70% vs 33/59, 56%), appropriateness of therapy (42/46, 91% vs 50/59, 85%) and documentation of duration, stop or review dates (35/46, 76% vs 38/59, 64%).

**Comment (MA):** ePrescribing is slowly being established in NZ hospitals, with quite a few DHBs having already implemented it, and other DHBs desperately trying to get the funding together to do likewise. It is great to see a paper focusing on the potential benefits of e-prescribing on antimicrobial use. This is exactly the sort of evidence that planning and funding executives need to see! With specific regard to the paper findings, it was a little surprising that documentation of duration, stop or review dates did not improve with e-prescribing, as one would have thought that such parameters could simply be mandated within the e-prescribing process. A key factor that was not mentioned in the paper was how much easier audits of antimicrobial usage are to carry out, utilising e-prescribing software, compared with the traditional and rather painful method of trawling through paper-based clinical case notes and prescription charts!

**Reference:** *Health Informatics J.* 2020;26(4):2375–2382

[Abstract](#)

## Psychological distress, anxiety, family violence, suicidality, and wellbeing in New Zealand during the COVID-19 lockdown: a cross-sectional study

**Authors:** Every-Palmer S et al.

**Summary:** These researchers assessed the psychological wellbeing of NZers during the COVID-19 nationwide lockdown by conducting an online panel survey of a demographically-representative sample of 2,010 adults in April 2020. Moderate-to-severe psychological distress was reported by 32% of respondents, moderate-to-high levels of anxiety by 16%, and low wellbeing by 39%. Worse outcomes were noted in young people and those who had lost jobs or had less work, those with poor health status, and who had past diagnoses of mental illness. Suicidal ideation was reported by 6% of respondents, with 2% planning for suicide and 2% attempting suicide. Some form of family harm over the lockdown period was experienced by almost 10% of respondents. Sixty-two percent of respondents reported 'silver linings', including enjoying working from home, more time with family, and environmental benefits.

**Comment (NG):** The restrictive lockdowns that occurred in NZ and across the world in 2020 were the first of their kind in modern history. The COVID-19 pandemic necessitated the restrictive movement of people to limit transmission of the SARS-CoV-2 virus. The aggressive restrictions in NZ ensured the healthcare system did not become overwhelmed and lead to unwarranted loss of life experienced in other countries.

While the results from this study determined significantly higher rates of psychological distress and poor wellbeing, the comparison to pre-pandemic baseline data was problematic as the different methodologies used may account for some of the differences. A comparison of the survey administered in April would have been valuable to rerun for the Auckland region during the August restrictions. This second survey might have illustrated the perspective of NZers to restrictions that were not brand new to them (unlike the April survey) and determine if there were any differences in the ability to cope with these restrictions. Regardless, the findings from this study should be utilised to incorporate additional psychological support and services in advance of and during future restrictions.

The 'silver linings' highlighted in this paper should also be used for improving the life of NZers, such as enabling working from home (when warranted), spending more time with family, and a quieter, less polluted environment.

**Reference:** *PLoS One.* 2020 Nov 4;15(11):e0241658

[Abstract](#)

## Health professional education and practice in preventing and controlling infections in New Zealand: a review to inform strategies for enhancing practitioner competencies and patient safety

**Authors:** Gulliver L et al.

**Summary:** These investigators employed a multifaceted approach to review HCP education and practice in IPC. Medical curricula contained twice the total IPC-related theory compared with nursing (80 vs 41.5 hours). Junior nursing students were thoroughly instructed (16 hours) and assessed (3 hours) in practical IPC competencies. In contrast, junior medical students received little practical instruction (2.5 hours) and no formal assessment. Although senior medical and nursing students were expected to be IPC-proficient, they were not formally assessed. Peer review generally revealed satisfactory practice; however, lapses with hand hygiene, asepsis, and incorrect donning, removal and use of personal protective equipment (PPE) were apparent among both medical and nursing professions. Clinician confidence in providing and being peer-reviewed for best IPC practice, and patients' confidence in receiving best IPC care, was positively correlated with clinician experience. The exception was trainee interns, whose confidence in IPC practice was not matched by senior colleagues' desire for monitoring/feedback.

**Comment (NG):** This study involved reviewing infection prevention and control education during medical and nursing schools in addition to observation and evaluation of practice once employed in a New Zealand health care organisation. This study also incorporated the patient's perspective on clinician IPC practice through patient feedback. While this study is small, it provides some valuable information that can lead to further studies and ultimately the improvement of IPC preparedness for both medical and nursing professionals.

Theoretical and practical IPC education is critical to the understanding and applying of IPC principles while providing patient care. During medical and nursing schools, there is a need to explain the 'why' (e.g., germ theory) through theoretical education and reinforce the application of IPC principles during practical education. The practical assessment that medical and nursing students receive will assist in the building of IPC practice habits. It is difficult to expect IPC principles to be consistently applied by doctors when they receive minimal theoretical assessment and no practical assessment in the first two years of medical school. Nursing students receive a total of only a few hours of assessment related to IPC theory and practice. During advanced years of medical and nursing training, IPC competence is 'expected'; however, the lack of assessment prevents reinforcement of the important IPC principles. There is need for a national, standardised curriculum because students are geographically spread across NZ in various health care settings.

The variation of self-evaluations with younger and more senior nurses and doctors is not surprising as it most likely correlates with their confidence level throughout their professional career. Knowledge does not always result in practical application as reality does not always align with perception. Non-compliance of IPC practices such as hand hygiene, PPE donning/doffing, and aseptic technique identified by peer expert review may be reduced by having standardised and focused training and regular audits of clinical staff.

Patient feedback on clinician IPC practice aligned with clinician self-evaluations and confidence levels. This study also highlights the need to improve patient and whānau comfort level with speaking up as their own advocate in health care.

**Reference:** *Integrated Healthcare Journal* 2020;2:e000034

[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. Nikki has also worked as a research scientist in cancer biology and microbiology. She has a Master of Science degree in microbiology. Nikki relocated to New Zealand to enjoy the friendly people and spectacular scenery while continuing her career in infection prevention and control.



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