Journal Watch

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The Journal Watch feature is provided as a service to our readers. The intention is to highlight new research and other developments in infection prevention and control and related fields, published elsewhere. A brief description of each article and its main findings are given here; readers are encouraged to refer to the full published article for the details of the work. The editorial management group would welcome feedback and recommendations for articles to feature in this column; for comments and recommendations please contact the editor: editor@ips.uk.net

Two things prompted the choice of content for this Journal Watch. The first is that it was written on 5 May 2014 and infection prevention and control practitioners and their colleagues worldwide are showcasing their efforts to control antimicrobial resistance through hand hygiene. The second reason is more obscure; a reflection on being reminded, when helping to organise a conference for what was then ICNA, to 'include something about the bugs'. So, hand hygiene, antimicrobial resistance and something 'about the bugs'...

Ward MA, Schweizer ML, Polgreen PM, et al. (2014) Automated and electronically assisted hand hygiene monitoring systems: a systematic review. *American Journal of Infection Control* 42: 472–8.

There has been and continues to be a lot of interest in technology to support, and sometimes to 'police', hand hygiene compliance. The authors of this systematic review describe the evidence to date for the effectiveness of these technological approaches. The review considers the literature from 2000 to early 2013 and identifies four categories of technological intervention. The first is simply the replacement of the traditional clipboard and pen with mobile handheld devices; the idea being that these are less obtrusive and support covert observation. Interestingly, there is little discussion as to whether covert or participatory observation has the most potential for improvement. The authors report little outcome data other than increased observations and time stamped observations, which they state allowed for corrections for bias (Hawthorne effect). They report one such application as being freely available for iOS devices; 'iScrub lite'. The authors also looked at video monitoring of hand hygiene; these studies show some significant increases in compliance with this intervention. Not surprisingly there were some concerns about patient confidentiality as some of these systems could inadvertently 'see' patients. The third group of interventions were electronic dispenser counters, both fixed

and personal. These have the obvious disadvantage of not monitoring the appropriateness of use (i.e. whether hand hygiene was indicated), but studies suggest they report compliance more accurately than direct observation, including changes in compliance following interventions. Finally the review considers the most technically advanced solutions – those that monitor and feedback based on sensors and various prompts (e.g. vibrating). The results are mixed and the detail is worth reading in full, but in summary, some of them clearly increased compliance but could only assess World Health Organization (WHO) moments 1 and 4 (or 5), but in some cases 'numerous hand hygiene prompts were ignored'. Of interest is a comment that research is being conducted to map nursing activity biomechanics to WHO moments 2 and 3, in an attempt to develop sensors that can identify these activities.

The second article is a brief commentary that issues a call for action on carbapenem-resistant enterobacteriaceae (CRE).

Palmore TN and Henderson DK. (2014) Carbapenem-resistant enterobacteriaceae: a call for cultural change. *Annals of Internal Medicine* 160(8): 567–9.

This is only a brief commentary but I've included it for a number of reasons. It demonstrates that the increasing concern about CRE is a worldwide phenomenon. This commentary is not from one of the 'usual suspect' specialist journals but from a more generalist medical/healthcare publication with a wide circulation and a high impact factor. This is as it should be – the threat of these highly resistant organisms needs to be recognised beyond infection prevention and microbiology/epidemiology. The authors reflect briefly on their own experience of controlling an outbreak of CRE in a highly vulnerable population that led to seven deaths and a mortality of over 50%. From this experience they call for six changes that they call a 'cultural revolution'. Some of these are familiar – better antimicrobial stewardship and molecular diagnostic techniques as well as the development of new antimicrobial agents and resources for infection prevention even in times of restricted budgets. Another reason for including this article is that it adds to the growing interest in genomics; specifically whole genome sequencing, which the authors describe as [providing] 'definitive insight into a web of silent transmission that would have been almost impossible to elucidate by any other technique.' The report is also interesting for descriptions of the fear engendered by the outbreak being referred to. The authors describe phone calls asking if it was safe

to drive past their facility, and the cancellation of nearby events. It seems the balance between necessary concern and irrational panic is hard to find. I was disappointed with the authors' first point in which they allude to high reliability organisations such as air-traffic control and nuclear power, but talk about vigilance, discipline and 'around the clock observation[of healthcare workers as] the only way to assure adherence.' I don't believe those are the approaches of high reliability organisations in safety-critical settings.

Continuing the theme of controlling the threat from antimicrobial-resistant organisms the next article describes measures to control vancomycin resistant enterococci (VRE).

De Angelis G, Cataldo MA, De Waure C, et al. (2014) Infection control and prevention measures to reduce the spread of vancomycin-resistant enterococci in hospitalised patients: a systematic review and meta-analysis. *Journal of Antimicrobial Chemotherapy* 69: 1185–92.

Readers will be aware that I frequently include systematic reviews with or without meta-analysis in this column. For good reason, they often drive changes in practice and provide practitioners with the evidence needed to support their work. However they can be a double edged sword; rigorous reviews can often highlight the paucity of evidence in our field and leave us with little to back up our assertions. This is, in part, an example of the latter. The authors considered 134 studies that were, at face value, relevant to the subject area. Of these only nine met their inclusion criteria (which were not the most restrictive). The studies that were excluded included 44 where the study design was too limited, e.g. uncontrolled before and after studies (the authors included properly conducted and reported interrupted time series studies). The authors considered hand hygiene, contact precautions, environmental cleaning, antibiotic formulary interventions and screening cultures. Of these, meta-analysis was only possible for hand hygiene and contact precautions. The good news is more evidence for the impact of hand hygiene interventions, with a significant protective effect against VRE acquisition (relative risk 0.53, 95% confidence intervals 0.39 to 0.73). The results for contact precautions are very different with no discernible impact on either acquisition or length of hospital stay. Although meta-analysis wasn't possible the authors describe some positive impact on both VRE acquisition and surgical site infection from changes to antibiotic formularies; however there was little evidence for environmental cleaning or screening from the limited studies available. The review is limited as most of the included studies were set in intensive care units and may not be generalisable beyond that setting. There has been limited interest in VRE in the UK in recent years, but we ignore it at our peril and this review is a timely reminder that it hasn't gone away.

Conversely and quite rightly there's been a lot of interest in both *Clostridium difficile* and hydrogen peroxide vapour (HPV) technology. This study from the *Journal of Hospital Infection* tells us something about the persistent and differential effect of this intervention.

Best EL, Parnell P, Thirkell G, et al. (2014) Effectiveness of deep cleaning followed by hydrogen peroxide decontamination during high *Clostridium difficile* infection incidence. *Journal of Hospital Infection*; <http://dx.doi.org/10.1016/j.jhin.2014.02.005>.

This study is interesting and useful for a number of reasons. For those who are working to convince their organisations to invest in HPV technology it adds more weight to their arguments (though these are largely made already). This paper looks at both the differential effect of

HPV over and above an intensive deep clean and also over time. The research team have extensive experience in research that involves sampling of the inanimate experience and have used that experience to design a detailed examination in this case. Briefly the study involved extensive environmental sampling of a decanted ward; at baseline, after a through deep clean using a chlorine-based product, after a subsequent HPV decontamination and then follow-up of the re-occupied ward. The follow-up was done at 19 days and 20 weeks after the HPV decontamination. Each 'round' of sampling involved 342 sampling sites and the results speak for themselves. Before cleaning *Clostridium difficile* was recovered from approximately 11% of sites, after cleaning and HPV the results were 6% and 1% respectively and at follow-up 0% and 3.5%. Typing showed that the environmental isolates found after 20 weeks were the same as the isolate from the first patient with *C. difficile* infection on the ward after re-occupation. There is a lot of detail in the paper about the nature of the sites sampled and the methods used which will interest those wanting to look at environmental contamination and I'd recommend reading the report in full. For me the study suggests that to maintain an environment that doesn't contribute to the risk of *C. difficile* infection, a programme of regular HPV decontamination may be needed. The authors call for a consideration of the long-term cost-effectiveness of this approach. Finally, the paper describes the specific HPV technology used in this case and its putative advantages over other delivery methods. It would be interesting to see an investigation comparing the different systems.

Finally, in this issue of Journal Watch, I'm taking the opportunity to highlight a methodology that may be less familiar to readers and to support another call for collaboration.

Leslie M, Paradis E, Gropper MA, et al. (2014) Applying ethnography to the study of context in healthcare quality and safety. *BMJ Quality & Safety* 23: 99–105.

This final paper isn't specific to infection prevention and control, though it does get a passing mention. The authors describe their approach to adapting ethnographic research methods to exploring the context of quality and safety interventions. Context in this case includes professional, organisational, cultural and structural factors that affect these interventions. Ethnography, they argue, is an effective research approach to identifying these factors. The paper gives an overview of ethnography as a process of observation and interpretation, of people, their actions and their interactions with each other and with their environment. As with other qualitative approaches that start from a constructivist approach, ethnography assumes that people 'create their own realities' and that the researcher, trained in both technique and theory, is reflexive and aware of their own 'social biases' and reports these transparently as part of a rigorous approach. The elements of such a rigorous approach are outlined, including transparency of method, triangulation and validation. The paper makes two very important points; firstly, that ethnographies in healthcare settings don't always meet these criteria for rigour (the authors cite studies in intensive care unit settings). Second, there needs to be a collaboration. Healthcare experts, including those in infection prevention and control, need to work with expert ethnographers, and vice versa. The authors of this paper compare and contrast ethnography in general with their own approach, specific to quality and safety in health care; arguing that effective ethnography can be done over a shorter period of time, done in more settings (be 'scaled up') and can involve feedback and interaction with a focus on change, rather than just observation. Having previously called for collaboration with Human Factors specialists, I would support this call for the infection prevention and control community to 'call in the experts' and see what ethnography can contribute to our understanding of 'context'.

Qualitative and quantitative, technical and general, we need to draw on the research and literature as widely as possible to further our specialty. Hopefully Journal Watch supports that aspiration. If you are aware of papers from beyond infection and control that you think should be shared, please get in touch.

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