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 is 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

This *Journal Watch* contains a mixture of original studies and reviews; in addition, the reviews are a mixture of narrative and systematic. What you take from each of these publication types will be different. An argument can be made that changes in practice (or reinforcement of current practice) will often only follow a systematic review of the literature; however seminal studies do emerge occasionally. The first article in this issue is a full systematic review:

Kocks R, Becker K, Cookson B et al. (2014) Systematic literature analysis and review of targeted preventive measures to limit healthcare-associated infections by meticillin-resistant *Staphylococcus aureus*. *Eurosurveillance*; 19(29): pii=20860.

This systematic review is something of a weighty tome, arguably one of the advantages of online-only publication. The authors have systematically reviewed the literature from 2000 onwards in three areas: screening, decolonisation and isolation of meticillin-resistant *Staphylococcus aureus* (MRSA). The review has been conducted in accordance with a recognised framework, that of the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA), and the description of the methods and approach demonstrates a robust process. Having said that, this paper doesn't fall into the "trap" of only accepting the very highest quality studies (and consequently finding no evidence). The authors do note that they haven't formally assessed the quality of the studies and couldn't perform a meta-analysis or assess publication bias. However, if you are looking for all the recent relevant literature for these three interventions, this is a "onestop shop". The outcomes will not be a surprise to most readers of *JIP*. There are still question marks about the efficacy of each of these interventions to a greater or lesser extent. Evidence for screening is probably the strongest of the three and the authors conclude that it "can help decrease MRSA infection rates in hospitals". This conclusion is cautious and reasonably so, as the few randomised controlled trials that have been conducted, haven't shown any significant reductions in MRSA infections. Interestingly, there is still a paucity of evidence showing that rapid testing methods decrease

MRSA infection or acquisition rates, although all studies show quicker turnaround times for results. For decolonisation the evidence remains mixed, despite the strong theoretical rationale. What evidence there is supports its selective use as "suppression" and in specific patient populations, for example, cardiac surgical and orthopaedic. Unfortunately very little progress has been made on the evidence for single-room isolation as a strategy to reduce MRSA infections, both on receipt of a result or pre-emptively. I have to concur with the authors that this is an area that needs further high-quality research.

The authors of this second narrative review have summarised the evidence to date for an alternative environmental decontamination technology; the use of 405 nm wavelength visible spectrum light technology.

Maclean M, McKenzie K, Anderson JG et al (2014) 405 nm light technology for the inactivation of pathogens and its potential role for environmental disinfection and infection control. *Journal of Hospital Infection*: 88: 1–11.

The advantages and disadvantages of the available environmental disinfection technologies are well known; the need to take the clinical area out of service for a period of time and the necessary health and safety precautions are among the most well known disadvantages. This review presents a technology that appears to have none of these concerns. This review is quite technical but very informative on the whole subject of light-based decontamination, including but not limited to 405 nm violet-blue light. To start with, the authors reprise the information about ultra-violet (UV) light decontamination. UV light has significant antimicrobial properties but is hazardous to human health, having mutagenic, carcinogenic and skin-damaging effects. These effects mean that UV light, like vapour technologies, is only suitable for disinfection of unoccupied rooms. However, 405 nm light is in the visible light spectrum (at the violet-blue end) and is suitable, according to this review of the literature, for continuous use in occupied care environments. The question is whether this technology is an effective one for environmental disinfection. This review cites laboratory studies that demonstrate antimicrobial activity against a wide range of relevant organisms, including *S. aureus*, *Acinetobacter baumannii*, *E. coli* and Mycobacteria. Overall the activity tends to be higher against Gram-positive species. The authors of this review note that there is limited evidence of efficacy against two important organisms, *Clostridium difficile* (specifically the spores) and viruses in general, which would include Norovirus. Moving on to *in vivo* studies the review identifies a number of hospital-based studies in varying specialties, both in- and out-patient, all with fairly consistent results. The technology is ceiling mounted and used

continuously during daylight hours (as the light is visible). The studies cited show levels of reduction of bacterial surface contamination between 50 and 90%, with recontamination evident if the device is subsequently removed. Importantly, there are no studies as yet that have used clinical infection as an outcome. The authors of this review point out that, although this technology is less potent than UV- or vapour-based systems, the potential for long-term use could act as a balancing factor in its favour. Overall, this is an interesting new technology that remains unproven but has potential to be used on a continuous basis in occupied patient areas.

Recent concerns with Middle East Respiratory Syndrome (MERS) and Ebola virus have reminded the infection prevention and control community about the importance of protecting healthcare workers from infection hazards. A study in *Epidemiology and Infection* has explored the risk of respiratory infection in healthcare workers:

Macintyre CR, Seale H, Yang P et al (2014) Quantifying the risk of respiratory infection in healthcare workers performing high-risk procedures. *Epidemiology and Infection*: 142; 1802–8.

In some ways, from a United Kingdom perspective, this is a study in missed opportunities, which I'll explain at the end. This was a prospective study, carried out in China, of 481 healthcare workers (roughly 50/50 doctors and nurses/others). Essentially a natural experiment in that each participant monitored their own performance of "high-risk" procedures over a two-month period. At the same time the participants were monitored for symptoms of respiratory illness, during the study period and for 31 days afterwards. Other data collected included use of personal protective equipment (PPE), hand hygiene adherence and contact with patients with influenza-like illness. Participants with any reported symptoms had samples taken for viral and bacterial identification. The results are interesting and perhaps useful in reminding healthcare workers why we take their protection seriously; healthcare workers who performed high-risk procedures were statistically more likely to develop clinical respiratory infection and laboratory confirmed respiratory infection. This association remained significant when all other variables were controlled for in a regression model. Overall, performing high-risk procedures led to a threefold increase in risk of respiratory illness. There are some caveats and this is where the missed opportunities come in. The study defined "high-risk procedures" but didn't limit them to aerosol-generating procedures as otherwise defined, so included nebulisation for example. This matters, as the possibility of better defining what procedures are aerosol-generating was missed and, presumably because of the size of the study, all the "high risk" procedures were reported together; thus the impact of individual procedures is unknown. Also the study was set in China and the available PPE was limited and didn't include respirators (either N95 or FFP types), as far as can be ascertained from the report. Finally, the rate of healthcare worker vaccination for influenza was woeful, at under 20%. Despite these caveats this study is a cautionary tale of the risks to healthcare workers from patients with respiratory illness and the need to ensure the use of appropriate PPE where we are fortunate enough to have a plentiful supply.

The Bristol Stool Chart is ubiquitous; the next study is an interesting attempt to identify its association with *C. difficile* infection:

Caroff DA, Edelstein PH, Hamilton K et al (2014) The Bristol Stool Scale and its relationship to *Clostridium difficile* infection. *Journal of Clinical Microbiology* 52(9): 3437–9.

This study from the US is a fairly short and simple paper but nevertheless interesting. Laboratory staff assessed submitted stool samples according to the Bristol Stool Chart. Samples assessed as Bristol Stool

Chart ≤ 4 were rejected and those ≥ 5 were analysed. Tests were done using a two-stage test (GDH and Toxin A/B using EIA) with a further nucleic acid amplification test for equivocal toxin-positive tests on EIA. Other data were collected to identify onset and *C. difficile* infection severity markers. From just over 3000 specimens submitted in a 10-month period, about 10% were positive for *C. difficile*. Contrary to what might be expected, the proportion of positive results was higher in type 5 and 6 specimens than in type 7 ($p=0.03$ / X^2 test for trend). The authors attributed this to a higher likelihood of specimens being submitted from patients with type 7 stools. There was no significant difference in disease severity as measured between specimens of types 5 to 7 on the Bristol Stool Chart. The authors note that inter-rater reliability for the assessment of the stool type was only moderate (Kappa score 0.675) and I would go slightly further as, to me, it's unclear how easy it is to assess the Bristol Stool type from a submitted specimen, rather than in a clinical setting. Also worthy of note is the proportion of cases deemed to be severe (64%), as the study used different criteria than would be used in the UK.

Finally in this issue, an unusual paper and one that links with the IPS focus on the use of social media over the last year or so. The authors have explored the impact of Twitter on spreading the word about antibiotic resistance:

Dyar OJ, Castro-Sanchez E and Holmes AH (2014) What makes people talk about antibiotics on social media? A retrospective analysis of Twitter use. *Journal of Antimicrobial Chemotherapy* 69: 2568–72.

This paper would serve as a nice supplement to a workshop on social media in relation to infection prevention and related specialties, as it starts with an overview of what Twitter is and how it works. This explanation is supplemented by a figure which, for the absolute beginner, gives a very simple explanation of how messages spread across the medium. It is slightly strange to see such a dynamic and uncontrolled process reduced to a simple flow diagram. The authors go on to discuss briefly the use of Twitter in healthcare and public health and note that healthcare organisations are, on the whole, still struggling to take full advantage of the potential of Twitter. IPS has been at the forefront of using Twitter to spread messages about infection prevention (or #infectionprevention for Twitter users). The study itself is a simple one; a retrospective analysis of a year on Twitter, looking for the use of the word "antibiotic". There are a number of tools available to analyse Twitter content; for this study they used "Topsy" (www.topsy.com). This tool allowed the researchers to identify the daily number of times the word antibiotic is used in any tweet, broken down by tweet or retweet (for an explanation of terms see the paper). The results are very interesting; there were 243,000 uses of the word antibiotic in tweets in one year, 16% of which were retweets. This seems a lot though it's only 0.00002% of the 135 billion tweets posted in the year. It was very likely dwarfed by the number of tweets mentioning say, Justin Bieber... More interestingly there were clear "peaks" of Twitter activity around antibiotics. These were centred around high-profile news events related to antibiotics; in the UK, the Chief Medical Officer's recommendation to include antimicrobial resistance on the UK government risk register and her annual report with a focus on antimicrobial resistance. The authors note some fairly obvious limitations, English language only and only one search term, though they checked "antimicrobial" and this was largely absent from Twitter. I think JAC have missed a trick by not making this article open access in the spirit of social media.

I hope this last article encourages readers to explore the power of social media, if you are a Twitter or Facebook user, you should "follow" or "like" IPS (@IPS_infection on Twitter) and you can tweet about interesting articles for this column; include #JIP and @IPS_infection in your tweet or tweet me on @neilwigg