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 authors and the editorial management group would welcome feedback and recommendations for articles to feature in this column; for comments and recommendations please contact neil.wigglesworth@gmail.com or editor@ips.uk.net.

This issue of *Journal of Infection Prevention* is so chock full of excellent content that Journal Watch has given way a little of space, so is a little shorter than usual. Having said that, we hope it is still an eclectic collection of up to the minute infection prevention and control (IPC) art and science. We have a nod to the hand hygiene theme, surgical site infections and a mini-theme around critical care issues.

For the May issue, in which *JIP* has a hand hygiene theme, we're starting with a study on hand hygiene and workload that's interesting for a number of reasons.

Scheithauer S, Batzer B, Dangel M et al. (2017) Workload impacts hand hygiene even in a highly trained and well staffed setting: a prospective 365/7/24 observational study. *Journal of Hospital Infection*; DOI: 10.1016/j.jhin.2017.02.013.

As stated above, there are a number of reasons to be interested in this study. The authors conducted a year long study comparing electronically measured hand hygiene compliance with electronically measured nursing workload. Both these measures are interesting in themselves. Hand hygiene was calculated by activations of the alcohol dispensers as the numerator and a calculation of hand hygiene opportunities, that isn't easy to understand, but seems to rely on documented care activity, as the denominator. The study was conducted in Switzerland and they state that in their country and Germany, systems to measure care activity are well established. The workload similarly relies on these activity data as well as staffing data. As described, these measures sound quite robust; additionally, they conducted some 1800 hours of direct observation of hand hygiene opportunities and measured alcohol hand rub usage using procurement data. The primary results are not surprising but

support previous work that (mostly) says that as workload goes up, hand hygiene compliance goes down, although the association was relatively weak (Spearman's Rho, $R = -0.411$) but statistically significant. The weak association is not surprising, hand hygiene compliance is multi-factorial. Equally interesting are the other findings from this study; overall compliance as measured electronically was circa 40%, a figure that recurs frequently in hand hygiene studies. The results from direct observation however were the typical 95% compliance that we see in most UK settings. We have to ask if this is another 'nail in the coffin' for direct observation as the gold standard for hand hygiene measurement. Interestingly, compliance was lower at weekends compared with weekdays, though no explanation for this was found. The authors also noted that procurement data were a poor surrogate for hand hygiene compliance. Some limitations are noted by the researchers; this study was done in a single, quite small and highly specialised unit, so the results may not apply widely. Two final things struck me as worthy of mention. The authors state that 'Alcoholic hand disinfection was the only HH activity (no wash)' – I find that hard to believe, and finally the study was completed in 2013 so has taken four years to get to publication; surely too long?

Staying with the *Journal of Hospital Infection*, the next paper is a systematic review of the economic and quality of life impact of surgical site infection (SSI) in Europe.

Badia JM, Casey AL, Petrosillo N et al. (2017) The impact of surgical site infection on healthcare costs and patient outcomes: A systematic review of the economic and quality of life burden associated with surgical site infections in six European countries. *Journal of Hospital Infection*; DOI: 10.1016/j.jhin.2017.03.004.

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If you're writing your business case for expanding your SSI surveillance and improvement programme (and you should be), this is a helpful paper. This is another example of a well conducted systematic review, using the PRISMA framework and PICO structure that we've alluded to a number of times previously. In this case, the authors have expanded PICO to PICOS to add 'study design', which is rational for a systematic review. In contrast to the previous paper, this work was completed within the last year or so and has come to publication quickly; we'll come back to a possible factor in that at the end. The review is restricted to specific European countries, namely what the authors describe as 'the big five': Germany, France, Italy, Spain and the UK, plus The Netherlands. Why they chose to restrict the research to these countries isn't clear, except that they report the results by country and may have wanted, for pragmatic reasons to keep the number of countries down. The results are largely unexpected, but more power to the elbow of those wanting to justify investment in preventing SSI. The review identified just 26 studies suitable for inclusion, and of these, two were abstracts only (presumably from conference proceedings, as these were included). It's important to be cautious of conference abstracts when conducting a review, as these have not been subject to the same rigorous review as published articles and often contain very limited information by which to judge their quality. Of the 26 papers, 16 were published in the UK, which suggests that the UK is ahead of the game in this respect. Across the countries, the results were similar; SSIs cost money; two to three times as much as when no infection occurs. The main costs are associated with increased length of stay; as the authors point out, this is largely an opportunity cost. Patients with SSI also had multiple returns to theatre for extra procedures and re-operations. There's a lot of detail about different countries and different surgical specialties for which you'll need to read the full paper. Only one study measured health-related quality of life (HRQoL) and again, unsurprisingly, noted a reduction in quality of life scores secondary to SSI. The authors rightly point out the need for more high quality studies on this issue. It's worth noting that there seems to be very little post-discharge surveillance included in these findings, which may mean the outcomes are underestimated. Finally, back to the speed of publication, this paper is commercially sponsored but also involved the services of professional medical writers (as well as a professional systematic review service). All properly declared of course, is this the way of the future?

The following two publications focus on infection prevention within intensive care units infamous for their inherent high risk for healthcare-associated infections (HCAIs).

Bradley C, Wilkinson MAC and Garvey MI. (2017) The effect of universal decolonization with screening in critical care to reduce MRSA across an entire hospital. *Infect Control Hosp Epidemiology* 38: 430–435.

Intensive care units (ICUs) can be described as infection hotspots. Critically ill patients are at a higher risk of developing HCAs, due to several factors which impact on the immune system: nature of underlying illness, multiple invasive devices, exposure to broad spectrum antibiotics, invasive ventilation, etc. Patients are often transferred to other units/wards once their condition improves thereby increasing risk of HCAI spread across the hospital. This study describes the impact of a change in the management of MRSA carriage in ICU patients in one of the largest ICUs in the world, housed within University Hospitals NHS trust in Birmingham. With an impressive 100 beds located on this unit, it caters for several specialties including burns, plastics, neurosciences and oncology patients. The authors (who are well known to IPS members) assessed the impact of universal MRSA screening and decolonisation on MRSA bacteraemias across the whole hospital. They describe how, prior to 2014, all patients admitted to ICU received universal MRSA decolonisation therapy using mupirocin and 4% chlorhexidine regardless of their MRSA status. This, however, was discontinued following UK based reports highlighting the limited utility and cost-effectiveness of this policy. As a result, for a period of one year and four months, only ICU patients who were identified as MRSA carriers on admission were decolonised after which universal decolonisation of ICU patients was reintroduced. Using the break-point time series analysis model and regression analysis the authors made interesting observations: during the period where only MRSA-colonised ICU patients received decolonisation treatment there was a significant increase in both MRSA acquisition (from 13.8 to 32.8 per 100,000 bed days) and bacteraemia rates (1 to 2.8 per 100,000 bed days) across the hospital. As a result, the study concludes that universal MRSA decolonisation of all ICU patients in large ICUs may be an effective strategy to reduce spread and incidence of MRSA across the whole hospital. The results reported are impressive and serve to highlight the potential impact of effective ICU-based infection prevention strategies on the rest of the hospital. This impact was possibly observed due to the large number of ICU patients, which in turn would have a significant effect on the MRSA colonisation pressure across the hospital. (It would have been useful to know the rate of MRSA carriers on admission.) One should not, however, underestimate the risk of mupirocin resistance as a result of universal decolonisation especially in settings where antimicrobial resistance is already an issue.

To continue on the topic of infection prevention in ICUs we review a study from Brussels which looked at sinks as a potential, often overlooked source of CPE. It has been published in an open access journal.

De Geyter D, Blommaert L, Verbraeken N, Sevenois M, Huyghens L, Martini H, Covens L, Piérard D and Ingrid Wybo I. (2017) The sink as a potential source of

transmission of carbapenemase-producing Enterobacteriaceae in the intensive care unit. *Antimicrobial Resistance and Infection Control* 6; 24.

The role of hand-washing sinks as a potential source of ESBLs within the ICU setting has been reported in recent years (Roux et al., 2013). Gram negatives tend to easily contaminate the environment, which then acts as a reservoir. The investigation leading to this publication was set off as a result of ICU-acquired CPE in five patients who were nursed in the same room over an eight-month period. Since the time period between the patients was relatively short and the strains belonged to different species with different antibiograms and mechanisms of resistance, the hypothesis was that the environment could be a possible source of transmission. The study looked at whether the sink could be a possible source of transmission and whether these transmissions could be avoided by improving infection control measures and replacing the sinks by new ones. The researchers swabbed the sink plugholes, high-touch surfaces and also equipment in the room. Air sampling was also performed 10 cm above the sinks while tap water was running over 10 min and compared with results without running tap water. Almost all sinks tested positive for CPE of varying species and types. PFGE analysis showed that the strains cultured from the patients involved in the outbreak and sinks were related. The sinks were not only used for hand hygiene but also for cleaning of medical devices and disposal of dialysate fluids containing antibiotics and

microorganisms, which promotes biofilm formation and selection of resistant bacteria. In spite of changing the siphons (U bend) in the isolation rooms, 28% of the sinks still cultured CPE in subsequent months. As a result, all sink units were changed, including the siphons. The new ones incorporated an open inlet, which allowed for easier cleaning and reduced biofilm formation. Aerosolisation of CPE was not detected, although other gram negatives such as *Pseudomonas aeruginosa* were cultured from the air above the sink. The authors reported that the outbreak was resolved; however, they could still culture gram-negative bacteria from sinks. This study highlights that sinks are ideal reservoirs for gram-negative bacteria to survive and could be an eye opener for other hospitals/facilities experiencing difficulties in controlling CPE outbreaks. The authors also mention having tested a self-disinfecting siphon which prevents biofilm formation in the sink but acknowledge that further testing is required.

We started and ended on hand-wash stations, albeit for very different reasons. This serves to remind us of the importance of the inanimate environment and the facilities within it.

Reference

- Roux D, Aubier B, Cochard H, Quentin R and van der Mee-Marquet N. (2013) Contaminated sinks in intensive care units: an underestimated source of extended-spectrum beta-lactamase-producing Enterobacteriaceae in the patient environment. *Journal of Hospital Infection* 85(2): 106–111.