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 neil.wigglesworth@wales.nhs.uk or editor@ips.uk.net

This Journal Watch is a departure from the norm. With the exception of the occasional suggested article, the choice of papers reviewed is usually mine, based on what I consider interesting and/or useful. This issue has a guest co-author who has been involved in selecting and reviewing the articles and writing the final column. Anyone interested in contributing to Journal Watch please get in touch. There are two crude themes in this issue; reviews and surgical site infection (SSI). Four of the articles are reviews (both systematic and narrative) and two of the papers are about SSI. The first of the reviews looks at quality improvement strategies in healthcare associated infections (HCAI).

Mauger B, Marbella A, Pines E, et al. (2014) Implementing quality improvement strategies to reduce healthcare-associated infections: a systematic review. *American Journal of Infection Control* 42: 5274–5283.

The authors of this review should be commended for their attempt to identify rigour in quality improvement reports without falling into the trap of only looking for randomised trials. This study is a follow up to a previous report on the same subject by the United States (US) 'Agency for Healthcare Research and Quality (AHRQ)' in 2007 (Ranji et al., 2007) so consequently covers literature published between 2006 and 2012. The methodology is well described and, in particular, the criteria for evaluating study quality are very useful. These included control for confounders in the analysis and adequate length of follow up, both very important in before and after and interrupted time series study designs. The authors considered two sets of

outcomes: adherence to the intervention and impact on infections. Interestingly the authors only included studies in which the intervention is supported by high quality evidence (as judged by extant guidance); this makes sense when looking at implementation studies but may be a bit restrictive given the paucity of the infection prevention evidence base. The results are given as groups of strategies and I will summarise (more detail is in the paper and even more in a separate report to AHRQ) (Mauger et al., 2012). Each group of interventions includes what the authors have termed 'base strategies', i.e. 'organisational change and provider education.' The authors considered there to be a moderate strength of evidence for audit and feedback with provider reminder systems and audit and feedback alone (both in combination with the 'base strategies'). There was only a low strength of evidence for provider reminder systems alone or in combination with 'base strategies' and for 'base strategies' alone they consider the evidence to be insufficient to demonstrate any effect on the outcomes. The tables in the review list all of the included studies and the detail is worth reading but beyond the scope of this short column. The main criticisms of this work are that there is no mention of any quality improvement methodology or methods, there is no description of the meaning of 'organisational change' and the authors make the semantic mistake of mixing up a narrative summary with what they call 'qualitative analysis' (it isn't).

The first of the two articles about SSI is from the *Journal of Hospital Infection* and looks at 'forced air warming' systems:

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Wood AM, Moss C, Keenan A, Reed MR, Leaper DJ (2014) Infection control hazards associated with the use of forced-air warming in operating theatres. *Journal of Hospital Infection* [in press] 1-9. [www.journalofhospitalinfection.com/article/S0195-6701\(14\)00245-X/fulltext](http://www.journalofhospitalinfection.com/article/S0195-6701(14)00245-X/fulltext)

Although not a systematic review, this paper provides a good summary of the published evidence on the infection risks created by the interaction between forced air warming (FAW) blanket systems and ultra-clean ventilation (UCV) in orthopaedic operating theatres. The clinical benefits of peri-operative patient warming have been well demonstrated; indeed the NICE guidelines on management of inadvertent perioperative hypothermia state that patients undergoing surgery lasting longer than 30 minutes should be warmed using active warming systems (NICE, 2008). This literature review, led by the SSI guru Professor David Leaper, starts by giving a detailed but interesting summary on UCV systems and how different active warming methods work. It goes on to discuss how the unidirectional laminar air flow underneath UCV can actually be significantly disrupted by thermal currents created by temperature gradient from FAW blankets. It also points to the significant increase in the particle count over the operating site when using FAW blowers, which can actually be the source of bacterial growth of common pathogens found in infected joint replacements. Although this review could not conclude that the use of FAW blankets during orthopaedic implant surgery actually leads to an increase in SSI rate, it does suggest, perhaps a little prematurely, considering the use of alternative patient warming devices during hip and knee implant surgery. Most importantly, this review raises several important and not fully answered questions on the safety of FAW blankets and its relation to air contamination during orthopaedic implant surgery. I agree with the authors that this review highlights the need for more good quality research on the use of FAW and other warming systems during implant surgery and the effect on SSI rates.

The second paper in this mini SSI theme looks at another emerging technology, antiseptic impregnated sutures:

Diener MK, Knebel P, Kieser M et al. (2014) Effectiveness of triclosan-coated PDS Plus versus uncoated PDSII sutures for prevention of surgical site infection after abdominal wall closure: the randomised controlled PROUD trial. *The Lancet* 384: 142–152.

One of the latest trends in attempting to reduce SSI is the use of antiseptic impregnated sutures to close surgical sites. This paper reports the methods and outcomes of a two year, multi-centre randomised controlled trial in Germany; PROUD (PREvention of abdominal wOUNd infection). This trial aimed to see whether a clinically relevant reduction in SSI can be achieved when suturing the abdominal

wall following laparotomy with triclosan-coated sutures, compared with non-coated ones. The study also looked at wound dehiscence since it was reported elsewhere that antiseptic-impregnated sutures could actually increase this. This study has several methodological strengths (randomisation, blinding, balanced study groups and power analysis). The primary outcomes were well defined and based on standard Centers for Disease Control and Prevention SSI definitions. It was interesting how photographs of wounds were used postoperatively to allow for assessment, diagnosis and classification of SSI by a committee of three surgeons who were also blinded to the sutures used at this point. Funding for this study was provided by the suture manufacturers but the authors spell out (as they should) that this was an investigator-initiated trial and there was no influence by the sponsor at any stage of the study. One would have hoped that this large multi-centre randomised controlled trial enrolling 24 German hospitals and 1,224 patients, would have reached a conclusion on the question of using antiseptic coated sutures as a prophylactic measure against SSIs. Yet, the SSI rate within 30 days of operation was not significantly different between the two groups. However, when the authors also carried out a meta-analysis incorporating results from their own study with those of another four trials, the overall result showed a significant reduction of SSI using triclosan coated sutures. It should be noted, however, that the impact of adding this large well designed and arguably, adequately powered trial, to the meta-analysis, was to move the combined estimate towards the line of no effect. These conflicting results demonstrate that the debate on the effectiveness of such sutures continues and suggest the need for a further, larger, multi-centre randomised trial.

The threat of greater and greater antibiotic resistance is causing worldwide concern, and the recent European Antibiotic Awareness Day (EAAD) in November 2014 was probably the most widely publicised yet. What can we do to improve prescribing? The next systematic review gives us some pointers.

Wagner B, Filice GA, Drekonja D, et al. (2014) Antimicrobial stewardship programs in inpatient hospital settings: a systematic review. *Infection Control and Hospital Epidemiology* 35(10): 1209–1228.

This is another well conducted systematic review of the literature, published between 2000 and late 2013, although only MEDLINE was searched, which may have limited the scope a little. In addition papers were excluded if they were in 'settings or populations not relevant to the US' – it's unlikely that this would affect applicability to the UK as, for example, it excluded settings where antibiotics are available without a prescription. The authors used rigorous methods and recognised tools for study selection, data abstraction and synthesis and quality assessment/rating of the strength of the evidence, let down only by their misuse

of the term ‘qualitative synthesis’ to mean a narrative synthesis, similar to Mauger and colleagues above. The results are mixed; overall the authors note that there is very limited evidence of impact on patient outcomes. This isn’t that surprising and is perhaps something of a red herring; the authors do report impacts on what is perhaps the only directly relevant patient outcome – *Clostridium difficile* infections (CDI). It seems unlikely that any of the other outcomes (e.g. mortality, length of stay) would be positively impacted upon by better stewardship. It is worth noting that the authors found no evidence of negative impact on these outcomes. This suggests that good stewardship doesn’t mean delayed or undertreated infections. The news is better when it comes to process outcomes. Although mixed, there was evidence of improvement in both overall antibiotic use and in adherence to guidance (right drug, right route, right duration). In addition some studies showed reductions in local resistance in some bug/drug combinations, but this was mixed. Overall there was some evidence for a range of interventions including: audit and feedback, formulary restriction and preauthorisation, guideline implementation, computerised decision support and protocol-led prescribing. This is a long report with a lot of detail and again tables of all the included studies. I can only give a flavour of it but if you’re looking for an overview of the evidence for antimicrobial stewardship programmes, this is an excellent place to start. Finally the authors make the point that the impact on overall antimicrobial resistance is ‘not testable within the time frame of nearly all studies on the impacts of [stewardship programmes].’

The final review of this Journal Watch reminds us that there’s more to waterborne HCAI than *Pseudomonas aeruginosa* in augmented care.

Ferranti G, Marchesi I, Favale M et al. (2014) Aetiology, source and prevention of waterborne healthcare-associated infections: a review. *Journal of Medical Microbiology* 63: 1247–1259.

UK readers in particular will be all too familiar with the issues around *Pseudomonas aeruginosa* in ‘augmented care’ units and particularly neonatal units. This review takes an international perspective and is a timely reminder of the scope and variety of waterborne sources of potential HCAI. The authors don’t describe this review as systematic but they have described their methods and have covered the period 1990 to 2012 in PubMed, supplemented by other appropriate sources. In addition they have systematically extracted information using a ‘check list’ from each article they have retrieved, to inform their narrative review. Again this review has detailed tables, including a full listing of 125 articles that describe waterborne HCAI, within the time-frame of the review, broken down by organism and hospital setting. The three main genera responsible for HCAI were, not surprisingly, *Legionellaceae*, *Pseudomonadaceae* and

Burkholderiaceae, although species of *Mycobacteria* get an honourable mention. The results of the review include a description of diagnostic investigations and typing methods which I won’t describe in detail here, but also the settings involved, mainly those housing immune compromised patients and the critically ill (ICUs, oncology/haematology, transplant and dialysis units). The review also describes the sources of infection, with both potable and hot water systems implicated (the latter particularly in *Legionella* infections). Point of use outlets were more often implicated than whole systems, though the latter did occur when chlorination was inadequate or absent and tap water was also implicated in a range of contamination issues including of medical equipment and detergent/disinfectant solutions. Distilled and bottled water also get a mention and there is a long list of unusual sources including leeches from a contaminated aquarium! The key message from this review is that the main risk factor is the susceptibility of the patient population and that more than engineering controls may be needed to protect the most vulnerable. Some patients may need protection from all contact with mains water. This review is also a good reminder of all the possible sources to consider when setting out to investigate a cluster of isolates or infections that may be related to a water source.

If there’s a theme to the articles in this issue it’s perhaps that we need both better quality studies of infection prevention interventions to guide our practice and we need high quality reviews to synthesise those studies for busy practitioners. If there’s a review you think should be featured in this column, please let me know.

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References

- Mauger Rothenberg B, Marbella A, Pines E, Chopra R, Black ER and Aronson N (2012) Prevention of healthcare-associated infections, closing the quality gap revisiting the state of the science. Evidence report/technology assessment no. 208. *AHRQ Publication no. 12(13)-E012-EF*, Rockville, MD: Agency of Healthcare Research and Quality. www.effectivehealthcare.ahrq.gov/search-for-guides-reviews-and-reports/?pageaction=displayproduct&productid=1335 (accessed 27 October 2014).
- National Institute for Health and Clinical Excellence (2008) *Clinical guideline 65. Inadvertent perioperative hypothermia. The management of inadvertent perioperative hypothermia in adults*. NICE: London. <https://www.nice.org.uk/guidance/cg65>
- Ranji SR, Shetty K, Posley KA, Lewis R, Sundaram V, Galvin CM and Winston LG (2007) *Closing the Quality Gap: A Critical Analysis of Quality Improvement Strategies* (vol. 6: Prevention of Healthcare-associated Infections). AHRQ Publications: Rockville, MD. No. 04(07)-0051-6.