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

There is a strong theme of environmental sources of infection in this issue: from building works to water systems and highly specialised equipment. We also discuss infections in children in Europe and ask “whatever happened to the ORION Statement?” To begin with; water, nosocomial infections and Legionnaire’s Disease.

Rosendahl Madsen AM, Holm A, Jensen TG et al. (2017) Whole Genome Sequencing for identification of the source in hospital-acquired Legionnaire’s Disease. *Journal of Hospital Infection*; DOI: 10.1016/j.jhin.2017.04.020.

This is a useful quick reference on Legionnaire’s Disease as well as a starting guide as to what to do if you get an ostensibly ‘hospital-acquired’ case. Speaking from personal experience there are occasional cases of Legionnaire’s Disease which appear to be nosocomial, based on length of in-patient stay, but for which no obvious source is located, though these are very rare. The main point of this paper is the value of Whole Genome Sequencing (WGS) in discriminating between otherwise similar isolates of *Legionella pneumophila* and the authors make the point well. The technicalities of the specimen preparation and processing are beyond my ability to adequately explain but importantly, the authors used, as they put it, “publicly available, easy to use tools for the data analysis”. They also provide links to all the tools and databases they used and assert that this is feasible in labs without particular skills in bioinformatics. The paper describes the use of WGS to compare isolates of *L. pneumophila* found in patients and the hospital water supply; the technique supported their epidemiological findings and they were able to ascribe the source of a case of nosocomial Legionnaire’s Disease to a water

source that the patient was known to have used. There were only two single nucleotide variations between the patient isolate and the water supply one. The full results and phylogenetic trees they constructed are worth accessing the full article to see. There is no doubt that WGS is the way forward in using molecular epidemiology to support investigations of healthcare associated infection. One thing which struck me about the paper (which is from Denmark) was the comment that 5 to 10% of all lab confirmed cases of Legionnaire’s Disease are “registered as nosocomial”. That seems high and raises the question about Legionella control in their healthcare settings.

Continuing the theme of infections whose source is the physical environment, the next paper, also from *JHI*, considers the risk of invasive aspergillosis related to building works.

Combariza JF, Toro LF and Orozco JJ (2017) Effectiveness of environmental control measures to decrease the risk of invasive aspergillosis in acute leukaemia patients during hospital building work. *Journal of Hospital Infection*; DOI:10.1016/j.jhin.2017.04.022.

For infection prevention teams and practitioners who have clinical haematology and especially bone marrow transplant (BMT) on their ‘patch’, invasive aspergillosis (IA) is a major concern. As the authors of this paper point out, it’s a major cause of morbidity and mortality in haematology patients, especially those with a prolonged and profound neutropenia (more of that later). This paper is interesting as there are relatively few studies demonstrating the effectiveness of the precautions we put in place to reduce this risk during nearby building works or refurbishment. So, any information should be welcomed. The authors describe the study as a ‘retrospective cohort study’ but, in truth, it could

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be argued that this is an outbreak report (and more of that later too). Nevertheless it's an interesting piece of work in which the team, based in a Columbian hospital, retrospectively identified cases of IA from an outbreak situation, related to ongoing and extensive building works and from a subsequent cohort of patients for whom additional protective measures were applied. The measures included ones which readers will recognise; physical dust barriers, enhanced cleaning, use of positive pressure HEPA filtered rooms (thought these were in short supply) and anti-fungal prophylaxis. The good news is that the measures appeared to work, cases of IA were significantly fewer in the 'protected' cohort. There were some differences between the 2 groups which may explain some of the effect, e.g. length of neutropaenia. This is important as length of neutropaenia was very important as a risk factor, with neutropaenia of > 7 days a significant increased risk for IA. Not surprisingly the use of a HEPA filtered positive pressure room and anti-fungal prophylaxis were the most effective measures in preventing AI, but there was an overall protective effect from the combined measures. Because this analysis was done retrospectively, the authors note they don't have any air sampling data, although there is limited guidance as to how much airborne aspergillus is too much anyway!

Continuing the theme of the environment, albeit more specifically, and water as a source of infection, an important update on an international outbreak of infection:

Walker J, Moore G, Collins S, Parks S, et al. (2017) A review of the microbiological problems and biofilms associated with *Mycobacterium chimaera* in heater cooler units used for cardiopulmonary bypass. *Journal of Hospital Infection*; DOI:10.1016/j.jhin.2017.04.014.

This is an essential read for anyone wishing for a complete, updated review on the microbiology issues relating to the recently reported, ongoing international outbreak of *Mycobacterium chimaera*, linked to heater cooler units (HCU) used during cardiac bypass surgery. It summarises what is known about the issue so far and gives an overview of the challenges faced by infection preventionists when trying to reduce risks associated with this problem. The review starts with a short background on the burden and history of non-tuberculosis mycobacteria and describes how in 2002 a publication had already highlighted the issues regarding HCU contamination – this was published in a journal which targets perfusionists, thus must have been missed by microbiology/IP sphere. The review gives a clear description of how heater coolers work and how contamination of the HCU through biofilm formation leads to transmission to surgical sites via aerosolisation of contaminated water through the fans within the HCU. Although to date all *M. chimaera* infections have been linked to a specific HCU model (Sorin 3T), contamination with other bacteria is not limited to this make only. Interestingly,

M. chimaera was recovered not only from in-use 3T but also from new unused ones and from water samples obtained at the manufacturing plant, indicating probable contamination problems at the latter. Decontamination of the HCU within hospitals was inadequate prior to this outbreak and the review delves into current decontamination recommendations and assessment of decontamination efficacy through microbiological testing. It also describes the various containment and relocation strategies for the HCU taken in different hospitals across Europe. Clearly this is an issue which provides several challenges, no straightforward answers and requires further monitoring and follow-up.

From environmental sources to infections in children, a welcome source of data on healthcare associated infections in paediatrics and neonatology:

Zingg W, Hopkins S, Gayet-Ageron A, et al., for the ECDC study group (2017). Health-care-associated infections in neonates, children and adolescents: an analysis of paediatric data from the European Centre for Disease Prevention and Control point-prevalence survey. *Lancet Infect Dis* 17: 381–389.

This publication in *The Lancet Infectious Diseases* reports that in the paediatric population in European countries infants younger than 12 months are most at risk for health-care associated infections (HCAIs), particularly bloodstream infections. This article publishes results from the ECDC point prevalence study (PPS) carried out in 2011–2012 and includes data from 618 hospitals across 29 European countries. This is an important publication because few studies have focused on HCAIs in children and neonates. Indeed, the authors state that only one previously published multinational PPS reported paediatric data. The PPS draws on a vast amount of data from 17,273 children and points out several interesting conclusions, which are significant to the infection prevention sphere. Bloodstream infections (BSIs) were the most common types of observed HCAI (44.6%) followed by lower respiratory tract infections (22.2%) and GI infections (8.3%). Children older than 11 months were less likely to develop a HCAI however lower respiratory tract infections and surgical site infections were more frequent in older age groups. The authors also point out that the distribution of HCAIs in children older than 5 years followed a similar pattern to HCAIs in adults. The PPS draws conclusions already known to many of us: poor prognosis, presence of invasive devices and length of stay were independent risk factors for HCAIs in children. The most common organisms causing HCAIs amongst paediatric populations were *Enterobacteriaceae*, followed by CoNS and *Staphylococcus aureus* with a range of resistance profiles reported. In addition, results from this PPS suggest that neonates and infants requiring intensive care are at high risk of HCAIs. Although the gold standard for estimating the hospital-wide burden

of HCAs is incidence surveillance, logistically it is difficult to carry out within a reasonable budget. A PPS is a good alternative to incidence surveillance and allows estimation of burden of HCAs at a local, national or international level. This study suggests that age adapted strategies are needed in infection prevention and control in paediatric settings with focus on prevention of BSIs.

The final publication for this issue is somewhat unusual, in that it's just a letter rather than a full study; however it does tell an important story, albeit in brief:

Wieland K, Chhatwal P and Vonberg R (2017) Outbreak reporting a decade after ORION: where do we stand? *Lancet Infectious Diseases*; 17: 476.

This correspondence has an important message for the IPC community. The ORION framework for reporting outbreaks and intervention studies was published ten years ago in 2007 by Sheldon Stone and colleagues (2007) and was a praiseworthy attempt to add some vigour to the quality of outbreak reporting. The authors of this letter have analysed outbreak reports comparing the completeness of said reports, based on the ORION criteria, for two periods; before and after the ORION

publication. The authors chose outbreaks of *Pseudomonas aeruginosa* and *Acinetobacter baumannii* (they don't say why); the results are disappointing. The full results and the background data are available on the online version of the publication at [http://www.thelancet.com/journals/laninf/article/PIIS1473-3099\(17\)30183-4/fulltext](http://www.thelancet.com/journals/laninf/article/PIIS1473-3099(17)30183-4/fulltext) (open access) but make rather dismal reading. The reports of outbreaks in the 'post ORION' period are not an improvement on the 'pre-ORION' era, at least for these organisms. Why is this? It appears that the ORION statement hasn't penetrated the consciousness of the IPC community in the way that other publication guidance has other researchers, e.g. PRISMA for systematic reviews with meta-analysis. The IPC community needs to either grasp the nettle of writing to the ORION standard or, decide the standard is not fit for purpose and replace it with something that is. Your views on this would be welcome; contact the editor or the authors of this column and let's start a debate!

Reference

Stone SP, Cooper BS, Kibbler CC, et al. The ORION statement: guidelines for transparent reporting of outbreak reports and intervention studies of nosocomial infection. *Lancet Infect Dis*. 2007; 7: 282–288.