Journal Watch

Neil Wigglesworth¹ and Deborah Xuereb²

Journal of Infection Prevention
2015, Vol. 16(6) 273–276
DOI: 10.1177/1757177415611221
© The Author(s) 2015
Reprints and permissions:
sagepub.co.uk/journalsPermissions.nav
jip.sagepub.com

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.

November 18th is European Antibiotic Awareness Day (EAAD; <http://ecdc.europa.eu/en/EAAD/Pages/Home.aspx>) and this issue of Journal Watch has a mini-theme of antimicrobial resistance and antimicrobial stewardship to reflect this. Of course all infection prevention and control (IPC) practice is important in preventing the seemingly inexorable rise of antimicrobial resistance, but to begin with, a wide-ranging and thought-provoking paper from the *Journal of Antimicrobial Chemotherapy (JAC)*.

Davey P. (2015) The 2015 Garrod Lecture: Why is improvement difficult? *Journal of Antimicrobial Chemotherapy*; DOI: 10.1093/jac/dkv214.

Professor Peter Davey could be referring to any aspect of healthcare, including any aspect of IPC in his title, but in this case he's talking about improvement in antimicrobial stewardship. Having said that, even if the subject isn't your core interest, I recommend you read this paper. Prof. Davey has long been 'ahead of the curve' when it comes to improvement in healthcare and if you are interested in an introduction to improvement work, complexity theory and human factors/ergonomics, it's all here. This is a long article (14 pages including references) and very wide-ranging so I can only give you a flavour of it; luckily it's open access so you can read the full version easily. In the introduction, we are reminded of the failure to date, to stem the rise of antibiotic resistance, despite recognising the problem four decades ago. In addition, a useful definition of stewardship is given, that reinforces that stewardship is as much about effective treatment as it is about 'minimising collateral damage from antimicrobial use'. The rest of the paper looks at systems thinking in the widest sense and how it can be applied to stewardship. Such thinking is the

opposite of traditional approaches; the author cites Atul Gawande's description of those methods as either 'primitive' (write a guideline) or 'medieval' (targets with rewards and penalties) – hear hear! Prof. Davey is leading the revision of the Cochrane review of stewardship, which, through the application of the Behaviour Change Techniques (BCT) Taxonomy is showing (not yet published) that attempts to improve prescribing are still failing to identify *why* prescribers don't follow guidance. The paper uses examples from dentistry and critical care to highlight effective and ineffective approaches; importantly, these highlight the importance of context. Thus the same apparent intervention can succeed and fail in two different contexts. For an illustration of this I recommend highly the section on 'cargo-culture thinking' (you'll have to read the paper for the detail). As other authors have pointed out, the differences in culture within an organisation can be greater than those between organisations; so context is both specific and dynamic. Prof. Davey then explores how human factors/ergonomics (HFE; personally, I disagree with his use of 'and' between these two terms as they are synonyms) can help us to understand context. There isn't room here to go over the definitions and scope of HFE but the article uses the example of the Systems Engineering Initiative for Patient Safety (SEIPS) to illustrate how HFE can be applied to healthcare systems, which are described as 'person-centred sociotechnical systems'. As the author says, SEIPS provides an opportunity to 'move beyond statements that "culture is important", to explanatory models that define what elements of context, under what circumstances, are important for human performance'. The article continues with a discussion of how to introduce this thinking into the education of healthcare workers; including such concepts as sociomaterial theories and complexity science into this wide-ranging paper. Peter Davey writes about very complex theory and complicated issues with great clarity and I

¹Infection Prevention and Control, Guy's and St Thomas' NHS Foundation Trust, UK

²Infection Control Unit, Mater Dei Hospital, Malta

Corresponding author:

Neil Wigglesworth, Deputy Director, Infection Prevention and Control, Guy's and St Thomas' NHS Foundation Trust, Westminster Bridge Road, London SE1 7EH, UK.
Email: neil.wigglesworth@gstt.nhs.uk

can't do it full justice in this short review; read it, you won't be disappointed.

Articles about the impact of socioeconomic status and deprivation on infection phenomena are like buses it seems; you don't see one for years then two come along together. In the previous issue of *Journal Watch*, we reviewed a paper that looked at the impact on healthcare-associated infections (Wigglesworth and Xuereb, 2015). In this issue we have a short paper, also from the *Journal of Antimicrobial Chemotherapy* about the impact on antimicrobial resistance.

Nomamiukor BO, Horner C, Kirby A et al. (2015) Living conditions are associated with increased antibiotic resistance in community isolates of *Escherichia coli*. *Journal of Antimicrobial Chemotherapy*; DOI: 10.1093/jac/dkv229.

The importance of antibiotic and antimicrobial resistance and the importance of context have been discussed in detail in the preceding article. This relatively short paper is prompted by the former and is an illustration of the latter phenomenon. Context, of course, includes the patient population and their living conditions. The authors of this study begin by describing the inter- and intra-country variations in antibiotic resistance and antibiotic consumption. They note that increased antibiotic consumption is associated with increasing socioeconomic deprivation but conversely, in some studies, with increases in per capita income. In my view this apparently contrary position may be explainable; perhaps poor people get sicker, while richer people demand more antibiotics. The authors used analysis of secondary data to compare resistance to a range of antibiotics in community urine samples growing *E. coli*, with indices of deprivation. The comparison used patient postcodes linked to Lower Super Output Areas (LSOAs); these are populations based on geography with about 1500 people per area. This was a retrospective analysis using complex logistic regression modelling methods that are beyond my ability to critique, so I take the results at face value. Unsurprisingly resistance was associated with increasing patient age, being male was also a risk for some of the antibiotics studied. Interestingly, increasing population density was associated with increased resistance and the authors suggest that this could relate to increased opportunities for transmission of resistant strains; conversely rural versus urban location seemed to make no significant difference. On the key question of deprivation the results were mixed. The authors looked at a range of deprivation indicators and two of them were significant after adjustment for all other factors in their multivariable model; 'living conditions' and 'education, skills and training'. Interestingly 'health and disability', 'income' and 'barriers to housing and services' were not significantly associated with resistance. The meaning of these results isn't completely clear but it does indicate a relationship between socioeconomic status and the risk of

acquiring antibiotic resistant bacteria. This relationship adds evidence to the view that, in general, inequality in a society is harmful to its wellbeing (Wilkinson and Pickett, 2009).

The next study takes us firmly back to clinical IPC and the prevention of healthcare associated infections (HCAI; in this case, surgical site infection); but of course, preventing HCAI is hugely important in reducing antibiotic use and thus antibiotic resistance.

Lefebvre A, Saliou P, Lucet JC, et al. (2015) Preoperative hair removal and surgical site infections: network meta-analysis of randomized controlled trials. *Journal of Hospital Infection* 91: 100–108.

This paper revisits the issue of preoperative hair removal and its impact on surgical site infection (SSI). Although it has long been studied and an accumulation of evidence is available, this French study group sought to update the meta-analysis of published randomised control trials (RCTs) by conducting a network meta-analysis. Network meta-analysis is a technique that allows comparison of different treatments, which have not been investigated head to head in RCTs by using statistical inference. For this reason this technique is gaining popularity amongst clinicians as it provides more information especially when there are few studies comparing two interventions.

Hair removal before surgery is still very widely practised to prevent hair from interfering with the incision site or to allow for easy drape or dressing adherence. This meta-analysis reviewed 19 original RCTs on the effect of skin depilation on SSI development. The write-up gives good detail of how the studies were selected, assessed for quality and heterogeneity, and statistical tests performed on the cumulative data.

The authors confirm that there is no benefit in removing hair for surgery in relation to SSI development and also that shaving is significantly associated with more frequent SSIs when compared with clipping, chemical depilation or no hair removal. Although the risk of SSI was higher when hair was removed on the day before surgery than when it was done on the day of surgery, this difference was not statistically significant.

By using the network meta-analysis technique, chemical depilation and hair clipping were compared indirectly for the first time. No significant difference on the rate of SSI was found for either method. It is possible that the meta-analysis compared studies which were not adequately similar and thus this conclusion could be erroneous. Direct comparison based on well-designed trials would be needed to confirm the equivalence of these two depilatory methods without bias. Still the authors argue that it is highly unlikely that further high quality trials on hair removal will be carried out, as they are costly. In practice this finding shows that chemical depilation is comparable to hair clipping and thus a suitable alternative for patients undergoing day surgery if they need to remove their own hair at home.

This column returns often to the controversial issue of the efficacy of a range of isolation precautions, because it's important. As the next paper from *The American Journal of Infection Control* reminds us, these processes aren't necessarily benign and often lack a clear evidence base.

Kullar R, Vassallo A, Turkel S, et al. (2015) Degowning the controversies of contact precautions for methicillin-resistant *Staphylococcus aureus*: A review. *American Journal of Infection Control*; DOI: 10.1016/j.ajic.2015.08.003.

With ever-increasing pressures for isolation rooms due to increasing multidrug resistance, this review questions the efficacy of contact precautions as a measure to curb cross-transmission in acute settings. This literature review focuses solely on MRSA and looks at 20 years of published studies conducted in the United States, within acute care settings. It looks at the effectiveness of contact precautions (CP) as a way to prevent MRSA transmission and also discusses the unintended consequences of CP on patients, mainly outcomes, quality of care and psychological implications.

This paper argues that CP are most effective in reducing MRSA transmission in outbreak situations but have limited effect in preventing transmission in non-outbreak situations. A major influence on this conclusion is healthcare professionals' compliance with CP and hand hygiene, which varied in the studies reviewed. It also reports that as a result of CP, patients are actually receiving a lower quality of care, mostly as a consequence of isolation. Patients in isolation had less healthcare professional contact. Also patients in isolation as part of CP had much higher chances of depression than patients not in isolation. The authors suggest therefore, that patients requiring CP should receive some form of explanation about why they are being put in isolation to help alleviate their anxiety.

This review asserts that blanket application of CP may indeed be futile in endemic situations, implying that costs and infection prevention (IP) efforts could well be invested elsewhere. It is possible that when a large number of patients are placed under CP, that there is an increased likelihood of non-compliance with CP by healthcare professionals. Thus it may well be more beneficial to invest in strengthening healthcare professionals' compliance with hand hygiene and standard precautions and recommending CP only for situations of high risk of transmission.

The main limitation of this publication is that it excluded literature published outside the United States; cultural and system differences in other countries could influence results and this largely limits generalisability of the conclusions from this review. It would be interesting to see whether a similar literature review or even a systematic analysis, reviewing literature published internationally, would achieve the same conclusions. Overall this review highlights need for more research in this area, possibly incorporating other important organisms.

An important feature of contact precautions for epidemiologically important organisms is patient placement in single rooms. A number of papers have suggested that such placement places subsequent occupants of those rooms at increasing risk of acquiring the same organism. The final paper in this issue looks at a systematic review and meta-analysis of those papers.

Mitchell BG, Dancer SJ, Anderson M, et al. (2015) Risk of organism acquisition from prior room occupants: a systematic review and meta-analysis. *Journal of Hospital Infection*; DOI: 10.1016/j.jhin.2015.08.005.

The authors of this review should be congratulated; it needed doing and raises a number of interesting questions. As already noted, the phenomenon of increased risk to subsequent room occupants following identification of an epidemiologically important organism has been reported a number of times. The authors of this review have systematically identified all of these previous studies and present the current state of knowledge on the issue. The systematic review and meta-analysis has been conducted to published standards and any limitations are acknowledged, e.g. the heterogeneity and weaknesses of the studies that they have used. The search identified only seven studies, covering a range of organisms, all bacterial and both Gram-positive and negative. Six of the studies were suitable for meta-analysis and the authors give full details of these studies, including their assessment of the likelihood of any bias in them, using a recognised tool. The organisms most commonly studied are Methicillin-resistant *Staphylococcus aureus* (MRSA) and Vancomycin-resistant enterococci (VRE) but others are represented, including acinetobacter and *Clostridium difficile*. The overall results support the view that subsequent occupants are at increased risk (odds ratio, 2.14; 95% confidence intervals, 1.65–2.77). There are differences between organisms and classes. The risk was higher for Gram-negative than for Gram-positive organisms (still true when *A. baumannii* and *C. difficile* were excluded respectively). I think these results need to be interpreted with some caution, despite their compelling appearance, for reasons the authors state and some they've omitted. The small number of diverse and heterogeneous studies makes meta-analysis risky, which the authors acknowledge in their results, although all are significant in their own right. In addition I can find no analysis of the likelihood of publication bias, perhaps there are negative studies out there? Finally the spread over time is quite long and there is no commentary on the terminal cleaning strategies and fidelity to said strategies. It's possible that newer terminal cleaning methods (e.g. vaporised hydrogen peroxide) plus increased fidelity to procedures could negate some of this effect.

IPC, antimicrobial stewardship and antimicrobial resistance are inextricably linked together as part of a complex web of interactions within the complex sociotechnical systems of health and social care. Being aware of these links

and working together across the wider health and social care workforce will be increasingly vital if we are to put the brakes on the resistance juggernaut. Innovation and sharing are key elements; if you see examples in the literature, share them with us and we'll publicise them here.

Declaration of conflicting interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

References

- Wigglesworth N and Xuereb D. (2015) Journal Watch. *Journal of Infection Prevention* 16(5): 233–235.
- Wilkinson R and Pickett K. (2009) *The Spirit Level; Why More Equal Societies Almost Always do Better*. London: Allen Lane (Penguin).