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Editorial

Infection prevention and antimicrobial stewardship: important in all settings

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Abstract. The application of epidemiologic and scientific principles together with statistical analysis to prevent or reduce the rates of infection defines infection control and has been shown to be cost-effective. However, infection control in acute hospitals is only the very beginning. In order to effectively prevent infection, infection control programs need to expand to other settings. This themed edition of *Healthcare Infection* highlights issues relevant to infection control and antimicrobial stewardship (AMS) outside of the acute hospital setting.

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The application of epidemiologic and scientific principles together with statistical analysis to prevent or reduce the rates of infection defines infection control and has been shown to be cost-effective.[1] Infection control in acute hospitals is, however, only the very beginning. In order to effectively prevent infection, infection control programs need to expand to other settings. This themed edition of *Healthcare Infection* highlights issues relevant to infection control and antimicrobial stewardship (AMS) outside of the acute hospital setting.

Sia and Levy describe the problem posed by the not infrequent and illicit practice of tattooing in prisons.[2,3] Tattooing with makeshift equipment has been shown to pose a risk for bloodborne virus transmission and bloodstream infection[4,5] and has been linked to injecting drug use within the prison system.[6] As highlighted by the authors, harm reduction strategies in prisons, which include elements such as bloodborne virus testing and condom provision, do require expansion to incorporate infection control standards for regulated and safer tattooing practices.[2,7]

Also in this edition, Stuart and her colleagues present the results of a pilot study of nurse-led antimicrobial stewardship (AMS) within residential aged care facilities (RACFs).[8] High rates of antibiotic use in RACFs promote colonisation and infection with multidrug-resistant (MDR) organisms, and as a result these facilities serve as an important reservoir for resistant bacteria.[9–12] This pilot study is very timely as the widespread and inappropriate use of antibiotics in RACFs has been reported in Australia,[13–15] and international guidelines for infection control and prevention have strongly recommended the initiation of AMS programs in the RACF setting.[16]

The intervention described by Stuart *et al*. utilised an infection control clinical nurse consultant and comprised education, monitoring of pathology results, discussions between general practitioners and an infectious diseases specialist and twice-weekly ward rounds.[8] The educational program placed special emphasis on avoiding treatment of asymptomatic bacteriuria, which has been highlighted as a key area to be targeted by AMS in RACFs.[17] This pilot study demonstrated a significant reduction in total days of antimicrobials prescribed, especially for urinary tract infection (UTI) and skin and soft tissue infection.[8] While the authors do not elaborate on the costs of such a nurse-led AMS program, it is likely that this type of AMS in RACFs is broadly applicable to the Australian setting. Furthermore, nursing staff may be in the best position to champion AMS programs in RACFs as they have the most consistent presence and can act as intermediaries between specialist clinicians, GPs and nurses.[8,18]

Also in this themed edition of *Healthcare Infection*, Pasay and others describe the prominent themes that emerged through a focus group project with pharmacists on AMS policies and resources.[19] These Canadian researchers found that there were many challenges and barriers to AMS, including the need to establish AMS teams, provide education about prescribing and disseminate the content of AMS policies. In this focus group, pharmacists saw AMS as an additional duty in which their ability to influence antimicrobial utilisation was dependent on relationships with prescribers. Consistent with other AMS experts, focus group members were especially concerned about antimicrobial utilisation in the outpatient setting, in surgery[20,21] and in treatment for UTI.[8,17]

Another important aspect of infection prevention is environmental cleaning and disinfection,[1] but monitoring of cleaning effectiveness by visual inspection does not provide a reliable assessment of either the level of contamination or infection risk for patients.[22] ATP (ATP) is an enzyme present in all living cells, and ATP bioluminescence assay has been validated as an effective tool for monitoring the cleanliness of hospital surfaces.[23,24] Colbert and colleagues have studied the use of the ATP bioluminescence assay in confirming surface disinfection with vaporised hydrogen peroxide (VHP).[25] This study of VHP disinfection against experimental contamination with *Acinetobacter baumannii*, MRSA and *Klebsiella pneumoniae* illustrated multiple log-reductions in these bacteria using standard culture, however ATP bioluminescence failed to demonstrate a large difference between control and experimental conditions.[25] The authors conclude that the action of VHP leaves ATP intact, which likely explains the inferior performance of the studied assay.[25] A role likely remains for ATP swabs in the monitoring of environmental cleaning using methods other than VHP, as a positive correlation has been found between ATP measurements and quantitative culture for multiple bacterial pathogens.[23]

This themed edition of *Healthcare Infection* highlights several issues relevant to infection control and AMS in multiple settings. The enormous extent of the scope of practice for infection control practitioners has been highlighted by Hall and others, and serves as a cautionary tale about the potential difficulties with further role expansion in implementing national policy with current staffing levels.[26] The core principles of infection prevention and optimal treatment are important in both non-hospital healthcare settings and within acute care hospitals, and resources and commitment to the application of these principles in all settings is urgently needed.

Conflicts of interest

None declared.

References

1. Friedman ND, Sexton DJ. General Principles of Infection Control. In: UpToDate. Rose, BD (ed), UpToDate. Waltham, MA; 2007.
2. Sia HJ, Levy M. What have you heard about tattooing in prison? The clandestine role of hearing aids in the risk of bloodborne virus transmission. *Healthc Infect* 2015; 20: 36–37. doi:10.1071/HI14032
3. Australian Institute of Health and Welfare. The Health of Australian Prisoners 2012. Canberra: AIHW; 2013. Available from: http://www.aihw.gov.au/WorkArea/DownloadAsset.aspx?id=60129543945 [Verified January 2015]
4. Elegino-Steffens DU, Layman C, Bacomo F, Hsue G. A case of severe septicemia following traditional Samoan tattooing. *Hawaii J Med Public Health* 2013; 72: 5–9.
5. Hellard ME, Hocking JS, Crofts N. The prevalence and the risk behaviours associated with the transmission of hepatitis C virus in Australian correctional facilities. *Epidemiol Infect* 2004; 132: 409–15. doi:10.1017/S0950268803001882
6. Hellard ME, Aitken CK, Hocking JS. Tattooing in prisons–not such a pretty picture. *Am J Infect Control* 2007; 35: 477–80. doi:10.1016/j.ajic.2006.08.002
7. Rodas A, Bode A, Dolan, K. Supply, demand and harm reduction strategies in Australian prisons an update. Sydney: Australian National Council on Drugs; 2011.
8. Stuart RL, Orr E, Kotsanas D, Gillespie EE. A nurse-led antimicrobial stewardship intervention in two residential aged care facilities. *Healthc Infect* 2015; 20: 4–6. doi:10.1071/HI14016
9. March A, Aschbacher R, Dhanji H, Livermore DM, Böttcher A, Sleghel F, Maggi S, Noale M, Larcher C, Woodford N. Colonization of residents and staff of a long-term-care facility and adjacent acute-care hospital geriatric unit by multiresistant bacteria. *Clin Microbiol Infect* 2010; 16: 934–44. doi:10.1111/j.1469-0691.2009.03024.x
10. Pop-Vicas AE, Mitchell SL, Kandel R, Schreiber R, D'Agata EM. Multidrug-resistant Gram-negative bacteria in a long-term care facility: prevalence and risk factors. *J Am Geriatr Soc* 2008; 56: 1276–80. doi:10.1111/j.1532-5415.2008.01787.x
11. Loeb MB, Craven S, McGeer AJ, Simor AE, Bradley SF, Low DE, Armstrong-Evans M, Moss LA, Walter SD. Risk factors for resistance to antimicrobial agents among nursing home residents. *Am J Epidemiol* 2003; 157: 40–7. doi:10.1093/aje/kwf173
12. Tinelli M, Cataldo M, Mantengoli E, Cadeddu C, Cunietti E, Luzzaro F, Rossolini GM, Tacconelli E. Epidemiology and genetic characteristics of extended-spectrum beta-lactamase-producing Gram-negative bacteria causing urinary tract infections in long-term care facilities. *J Antimicrob Chemother* 2012; 67: 2982–7. doi:10.1093/jac/dks300
13. Lim CJ, McLellan SC, Cheng AC, Culton JM, Parikh SN, Peleg AY, Kong DC. Surveillance of infection burden in residential aged care facilities. *Med J Aust* 2012; 196: 327–31. doi:10.5694/mja12.10085
14. Smith M, Atkins S, Worth L, Richards M, Bennett N. Infections and antimicrobial use in Australian residential aged care facilities: a comparison between local and international prevalence and practices. *Aust Health Rev* 2013; 37: 529–34. doi:10.1071/AH12007
15. Stuart RL, Wilson J, Bellaard-Smith E, Brown R, Wright L, Vandergraaf S, Gillespie EE. Antibiotic use and misuse in residential aged care facilities. *Intern Med J* 2012; 42: 1145–9. doi:10.1111/j.1445-5994.2012.02796.x
16. Smith PW, Bennett G, Bradley S, Drinka P, Lautenbach E, Marx J, Mody L, Nicolle L, Stevenson K; SHEA; APIC. SHEA/APIC guideline: infection prevention and control in the long-term care facility. *Infect Control Hosp Epidemiol* 2008; 29: 785–814. doi:10.1086/592416
17. Lim CJ, Kong DCM, Stuart RL. Reducing inappropriate antibiotic prescribing in the residential care setting: current perspectives. *Clin Interv Aging* 2014; 9: 165–77.
18. Friedman ND. Antimicrobial Stewardship: The Need to Cover All Bases. Antibiotics 2013. *Antibiotics* 2013; 2: 400–18. doi:10.3390/antibiotics2030400
19. Pasay DK, Chow SJS, Bresee LC, Guirguis M, Slobodan J. Assessment of current antimicrobial stewardship policies and resources: a focus group project. *Healthc Infect* 2015; 20: 7–15. doi:10.1071/HI14025
20. Harbarth S, Albrich W, Brun-Buisson C. Outpatient antibiotic use and prevalence of antibiotic-resistant pneumococci in France and Germany: a sociocultural perspective. *Emerg Infect Dis* 2002; 8: 1460–7. doi:10.3201/eid0812.010533
21. Bratzler DW, Patchen Dellinger E, Olsen KM, Perl TM, Auwaerter PG, Bolon MK, Fish DN, Napolitano LM, Sawyer RG, Slain D, Steinberg JP, Weinstein RA; American Society of Health-System Pharmacists; Infectious Disease Society of America; Surgical Infection Society; Society for Healthcare Epidemiology of America. Clinical Practice Guidelines for Antimicrobial Prophylaxis in Surgery. *Am J Health Syst Pharm* 2013; 70: 195–283. doi:10.2146/ajhp120568

22. Dancer SJ. Hospital cleaning in the 21st century. *Eur J Clin Microbiol Infect Dis* 2011; 30: 1473–81. doi:10.1007/s10096-011-1250-x
23. Gibbs SG, Sayles H, Chaika O, Hewlett A, Colbert EM, Smith PW. Evaluation of the relationship between ATP bioluminescence assay and the presence of organisms associated with healthcare-associated infections. *Healthc Infect* 2014; 19: 101–7. doi:10.1071/HI14010
24. Sciortino CV, Giles RA. Validation and comparison of three adenosine triphosphate luminometers for monitoring hospital surface sanitization: a Rosetta Stone for adenosine triphosphate testing. *Am J Infect Control* 2012; 40: e233–9. doi:10.1016/j.ajic.2012.04.318
25. Colbert EM, Gibbs SG, Schmid KK, High R, Lowe JJ, Chaika O, Smith PW. Evaluation of adenosine triphosphate (ATP) bioluminescence assay to confirm surface disinfection of biological indicators with vaporised hydrogen peroxide (VHP). *Healthc Infect* 2015; 20: 16–22. doi:10.1071/HI14022
26. Hall L, Halton K, Macbeth D, Gardner A, Mitchell B. Roles, responsibilities and scope of practice: Describing the 'state of play' for infection control professionals in Australia and New Zealand. *Healthc Infect* 2015; 20: doi:10.1071/HI14037