



Enfermedades Infecciosas y Microbiología Clínica

www.elsevier.es/eimc



Editorial

Early outbreak identification and multifaceted, bundled interventions for outbreak control: Paths of victory



Identificación temprana del brote e intervenciones con un paquete de medidas polifacéticas para el control del brote: vías de éxito

José Ramón Paño-Pardo^{a,b}

^a Division of Infectious Diseases, Hospital Clínico Universitario "Lozano Blesa", Zaragoza, Spain

^b Instituto de Investigación Sanitaria Aragón (IIS Aragón), Zaragoza, Spain

Antimicrobial resistance has been recognized as one of the main public health problems worldwide and demands prompt actions from healthcare institutions and policymakers.¹ The core strategies in the battle against antimicrobial resistance are (1) to discover new antibiotics that can be safely and efficaciously used in clinical practice, (2) to optimize the use of currently available antimicrobials and (3) to limit the transmission of antibiotic-resistant microorganisms.² As this is a complex, global and multifaceted problem it is critical that all core strategies are applied with a "One Health" perspective, considering human and animal health as well as environmental issues.

Enterococcus faecium is the first of the microorganisms included in the ESKAPE acronym, which contains six of the most priority pathogens for which antimicrobial resistance represents a clinically-relevant problem.³ Fortunately, the rate of vancomycin resistance among *E. faecium* isolates in Spain remains below 5% and outbreaks have seldom been reported.⁴ Nevertheless, vancomycin-resistant *E. faecium* (VREF) has a considerable potential to spread in healthcare institutions and, therefore, to cause outbreaks and become endemic. Acquainting the epidemiology of VREF is critical to control its spread. The gastrointestinal (GI) tract of infected and/or colonized patients is the main reservoir of VREF. The number of patients colonized by VREF significantly exceeds the number of infected patients since estimated infection:colonization ratio is 10:1.⁵ GI colonization can be prolonged, with a model-estimated median duration of 26 weeks.⁶ Importantly, enterococci are capable to persist in hospital environment. The main risk factors for VRE acquisition are prior antimicrobial use, colonization pressure and exposure to other patients, devices, other invasive procedures and contaminated surfaces. Consequently, although infection-control interventions have to be adapted to the epidemiological setting, frequently a combination of hand hygiene, contact precautions, active surveillance, enhanced environmental cleaning and antimicrobial stewardship are necessary to control VRE outbreaks.⁵

In this issue, Herrera et al. report how a clonal outbreak of VREF in a renal transplant unit at an academic medical center in Spain was successfully controlled after stringent infection control measures focusing on patients, healthcare personnel and environmental issues were applied.⁷ The outbreak report is well structured, following recommendations endorsed by the ORION statement and provides input on both, clinical and molecular epidemiology.⁸ As soon as the outbreak was detected, basic infection control measures were implemented. Soon after, when active patient and environmental surveillance showed that VREF was widespread among patients and the environment, the intervention was significantly escalated. Room cleaning, which was specifically monitored, and device cleaning were reinforced. For instance, increased environmental cleaning staff was allocated to the unit. A strict visit restriction policy was implemented and, importantly, the ward was closed to new admissions during a non-specified period. Following the implementation of these high-intensity measures only three new VREF cases were detected. No further VREF cases were identified beyond the third month after the onset of the outbreak.

This report by Herrera et al. underscores several facts that, although not unknown, should be emphasized. First, infections are not *conditio sine qua non* for an outbreak to be identified. Indeed, infections caused by multi-drug resistant microorganisms (MDRO) are frequently said to be just the tip of the iceberg of the epidemiological burden to which colonized patients may contribute to a greater extent. If asymptotically colonized patients are not taken into account, it will be more difficult, if even possible, to control outbreaks.⁹ This might be difficult to understand by hospital managers, especially when high-impact measures, such as unit closure or increased staffing have to be implemented, as they have had in this outbreak. This reinforces the need of solid, multidisciplinary infection control teams led by competent, well-respected physicians capable of implementing high-impact interventions when needed, sometimes before clinical events have occurred. "The earlier the better" is another key principle of infection control as spread of MDRO is time-dependent. Therefore active surveillance in high-risk patients or units, and molecular

E-mail address: jrpanno@salud.aragon.es

epidemiology typing is critical to early outbreak identification and characterization.⁹

Despite environmental cleaning and its monitoring are of paramount relevance to control the spread of MDRO this is perhaps one of the largest blind spots in infection control and needs to be addressed urgently.¹⁰ Although further research in this field is definitely needed, there is certainly room for improvement in the implementation of what we already know it works. Educating cleaning staff and monitoring environmental cleaning should be among the competencies of infection control teams, or at least under their direct supervision, something that is not so straightforward, especially when this service has been outsourced. Last but not least, the report by Herrera et al. underscores the need to implement bundled interventions for outbreak control.

Although examples of successful outbreak control, such as the report by Herrera et al., are encouraging for all professionals involved in the war against the spread of antimicrobial resistance, it should not be forgotten that the need for outbreak control is the expression of the failure of transmission prevention. Therefore, proactive prevention of the emergence and spread of resistance through horizontal implementation of righteous, universal infection control measures and proper antimicrobial use, are the straightest paths to victory and, thus, they should be prioritized.

References

1. Political declaration of the high-level meeting of the United Nations General Assembly on antimicrobial resistance. New York; 2016, September.
2. O'Neill J, editor. Tackling drug-resistant infections globally: final report and recommendations. 2016, May. p. 1–84. Available from: http://amr-review.org/sites/default/files/160525_Final%20paper_with%20cover.pdf
3. Boucher HW, Talbot GH, Bradley JS, Edwards JE, Gilbert D, Rice LB, et al. Bad bugs, no drugs: no ESKAPE! An update from the Infectious Diseases Society of America. *Clin Infect Dis.* 2009;48:1–12.
4. ECDC Antimicrobial Resistance and Healthcare-Associated Infections Programme, editor. Surveillance atlas of infectious diseases [Internet]. ECDC. Available from: <http://atlas.ecdc.europa.eu/public/index.aspx?Instance=GeneralAtlas> [cited 4.12.16].
5. Reyes K, Bardossy AC, Zervos M. Vancomycin-resistant enterococci: epidemiology, infection prevention, and control. *Infect Dis Clin North Am.* 2016;30:953–65.
6. Shenoy ES, Paras ML, Noubary F, Walensky RP, Hooper DC. Natural history of colonization with methicillin-resistant *Staphylococcus aureus* (MRSA) and vancomycin-resistant *Enterococcus* (VRE): a systematic review. *BMC Infect Dis.* 2014;14:177.
7. Herrera S, Sorlí L, Pérez-Sáez MJ, Ruiz-Garbajosa P, Barrios C, Plasencia V, et al. Characterization and rapid control of a vancomycin-resistant *Enterococcus faecium* (VREF) outbreak in a renal transplant unit in Spain: the environment matters. *Enferm Infecc Microbiol Clin.* 2017;25:4–10.
8. Stone SP, Cooper BS, Kibbler CC, Cookson BD, Roberts JA, Medley GF, et al. The ORION statement: guidelines for transparent reporting of outbreak reports and intervention studies of nosocomial infection. *J Antimicrob Chemother.* 2007;59:833–40.
9. Reingold AL. Outbreak investigations – a perspective. *Emerg Infect Dis.* 1998;4:21–7.
10. Leas BF, Sullivan N, Han JH, Pegues DA, Kaczmarek JL, Umscheid CA. Environmental cleaning for the prevention of healthcare-associated infections. Rockville, MD: Agency for Healthcare Research and Quality (US); 2015, August.