Infection Prevention in Practice 1 (2019) 100003

Available online at www.sciencedirect.com

Infection Prevention in Practice

journal homepage: www.elsevier.com/locate/ipip

Debates in Infection Prevention

Screening of carbapenemase-producing Enterobacteriaceae contacts discharged to the community - Argument for the motion

J. Vasant*

Royal United Hospital Bath NHS Foundation Trust, Bath, UK

ARTICLE INFO

Article history:
Received 5 February 2019
Accepted 12 February 2019
Available online 27 February 2019

As a district general hospital with low prevalence of carbapenemase-producing Enterobacteriaceae (CPE), when an outbreak of OXA-48 *Klebsiella pneumoniae* occurred we were in uncharted territory. Among the uncertainties was whether case-contacts already discharged to the community should be screened for CPE carriage. Public Health England guidelines are vague and there appears to be little national consensus [1]. After multi-disciplinary discussion, including representatives from the acute trust, public health and care commissioning groups, we elected to screen discharged patients. The following is an account of our reasoning behind this.

First, screening discharged case-contacts of CPE outbreaks for carriage has clear benefits for patients. For those identified as colonized, this knowledge allows better future infection management with respect to empirical antimicrobial choices and infection control precautions. Conversely for those who screen negative for CPE it is extremely reassuring and provides piece of mind. Deferring screening to upon readmission is an alternative; however, this only works if risk factors for CPE colonization can be accurately identified. As is the case in many hospitals, in our trust risk assessment for CPE carriage is often done inconsistently, and our IT system is unable to electronically 'flag' case-contacts, making this screening unreliable. It also means that infection control resources may be wasted on CPE-negative patients for several days pending results.

Second, screening discharged patients facilitates optimal ongoing outbreak control. In our locality, as is the case nationally, increasing numbers of patients are discharged to high-risk settings such as nursing homes or have ongoing healthcare contact in the community.

This increases both the risk and consequence of onward transmission of CPE. In fact, long-term care facilities may act as a reservoir for CPE. In Israel, control of CPE in acute care could not be achieved without screening and managing patients in long-term care, demonstrating the increasingly blurred divisions between acute care and the community [2]. Worryingly the risk of transmission is not just within nursing homes; in India pure community-acquired CPE infection has been described and New Delhi metallo-β-lactamase (NDM)-harbouring isolates have even been found in public water supplies [3,4]. It is clear that community CPE transmission can be significant and that screening discharged case-contacts for carriage is therefore a key intervention to prevent spread back into acute care.

It may be argued that screening discharged patients for CPE in areas where local prevalence of invasive cases is low is a waste of resources. This is not the case. We know from the experiences in Italy and Greece, where *Klebsiella pneumoniae* carbapenemases (KPC) are endemic, that the prevalence of CPE can escalate rapidly. In a single-centre study in Greece, prior to 2008, no KPC producers were found [5]. From 2008 onwards, the prevalence of KPC producers increased and by 2014 the majority of *K. pneumoniae* isolates carried a bla_{KPC} gene [6]. We also know that once CPE has become endemic, its

DOI of original article: https://doi.org/10.1016/j.infpip.2019.02.002.
* Address: Royal United Hospitals Bath NHS Foundation Trust, Microbiology, Combe Park, Bath BA1 3NG, UK. Tel.: +44 0 7957 180623.
E-mail address: j.vasant@nhs.net.

https://doi.org/10.1016/j.infpip.2019.02.003

control becomes increasingly difficult. In Israel, it was not until a national task force with statutory authority was developed that endemic CPE was finally brought under control, with no doubt avoidable associated morbidity and mortality and a huge amount of resource investment [2]. It makes sense therefore to act early and comprehensively, while the prevalence of CPE is still low, rather than to wait until the problem is out of control with a 'search and prevent' approach.

Finally, screening all case-contacts during CPE outbreaks is also essential to understand the epidemiology of transmission and risk factors for acquisition. In our outbreak more than 50% of case-contacts were already discharged at the time of discovering the outbreak. The only way to determine the true transmissibility of the isolate and risk posed was to screen all contacts, including those who had been discharged.

There are few drawbacks to screening discharged case-contacts. Screening for CPE carriage using rectal swabs is of minimal patient risk and can be undertaken by any suitably trained healthcare professional using strict standard infection control precautions. The work-up is relatively simple and inexpensive from a laboratory point of view. Regarding positive results, guidelines for management of patients in the non-acute setting already exist, including information leaflets for patients [7].

The main perceived barriers for screening discharged case-contacts are practicability, resources, and training. From our experience, these issues can be overcome with good collaboration between the acute trust and the community. In our outbreak we used a bespoke process for each patient ranging from screening by district nurses during routine visits, general practitioners, or at planned outpatient attendances to make it as convenient as possible. We successfully screened 10 out of 11 case-contacts weekly over four weeks without significant extra resources. Admittedly, we did encounter some initial resistance from a minority of community colleagues manifesting as lack of 'buy-in' in the process. However, this was largely due to lack of understanding about CPE in general rather than to objections to the screening *per se*, and was easily overcome by targeted education. The process turned out to be a fruitful opportunity to increase the awareness of CPE in general in the community.

In larger outbreaks, screening discharged patients may be more complicated and better led by public health bodies for unified oversight and organizational responsibility. This may also make the process more acceptable to those general practitioners who felt uncomfortable with carrying out screening in the community. However, very large or protracted outbreaks are most likely to occur in trusts with much higher CPE prevalence where, as previously stated, a 'search and prevent' approach may be less effective.

Our experience demonstrates that screening discharged case-contacts of CPE outbreaks in acute care can be done, and with few drawbacks. If we have learned anything from the UK experience with meticillin-resistant *Staphylococcus aureus* in the early 2000s it is that early pre-emptive strategies in infection prevention and control are much better than waiting until problems escalate out of control, when drastic strategies such as national targets and penalties are required and when patient safety is already compromised.

Conflict of interest statement

None declared.

Funding sources

None.

References

[1] Department of Health. *Carbapenemase-producing Enterobacteriaceae: early detection, management and control toolkit for acute trust*. 2014. Available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/329227/Acute_trust_toolkit_for_the_early_detection.pdf. [Accessed December 2018].

[2] Schwaber MJ, Carmeli Y. An ongoing national intervention to contain the spread of carbapenem-resistant Enterobacteriaceae. *Clin Infect Dis* 2014;**58**:697—703.

[3] Borah VV, Saikia KK, Chandra P, Hazarika NK, Chakravarty R. New Delhi metallo-beta-lactamase and extended spectrum beta-lactamases co-producing isolates are high in community-acquired urinary infections in Assam as detected by a novel multiplex polymerase chain reaction assay. *Indian J Med Microbiol* 2016;**34**:173—82.

[4] Walsh TR, Weeks J, Livermore DM, Toleman MA. Dissemination of NDM-1 positive bacteria in the New Delhi environment and its implications for human health: an environmental point prevalence study. *Lancet Infect Dis* 2011;**11**:355—62.

[5] Albiger B, Glasner C, Struelens MJ, Grundmann H, Monnet DJ. Carbapenemase-producing Enterobacteriaceae in Europe: assessment by national experts from 38 countries. *Euro Surveill* 2015;**20**:30062.

[6] Spyropoulou A, Papadimitriou-Olivgeris M, Bartzavali C, Vamvakopoulou S, Marangos M, Spiliopoulou S, et al. A ten-year surveillance study of carbapenemase-producing *Klebsiella pneumoniae* in a tertiary care Greek university hospital: predominance of KPC- over VIM- or NDM-producing isolates. *J Med Microbiol* 2016;**65**:240—6.

[7] Department of Health. *Toolkit for managing carbapenemase producing Enterobacteriaceae in nonacute and community settings*. 2015. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/769414/CPE-Non-AcuteToolkit_CORE.pdf [last accessed January 2019].