What lies beneath: impact of an expanded screening program to control spread of carbapenemase-producing Enterobacteriaceae

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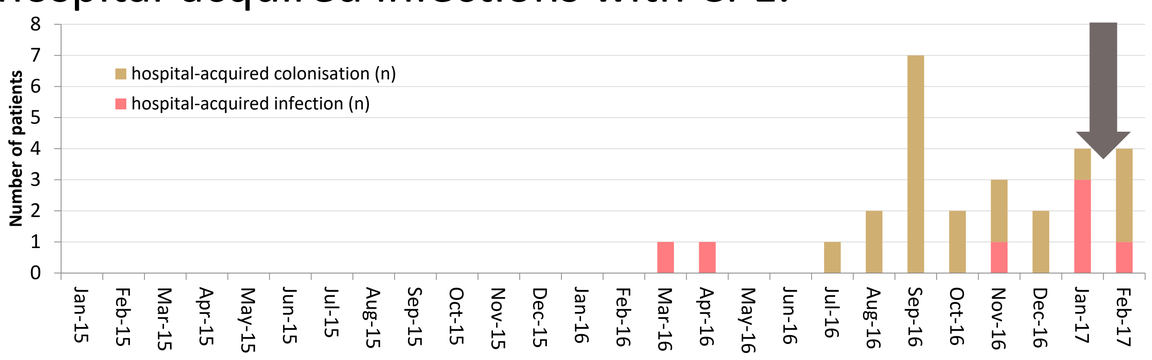
INTRODUCTION

Control of carbapenemase-producing Enterobacteriaceae (CPE) is one of the most important infection control issues facing healthcare organisations today. In early 2017, our 1000 bed hospital noted an increase in hospital-acquired infections with CPE.



This presentation describes the interventions carried out and the consequent impact on infections.

METHODS

Screening program: An existing CPE screening program was in place at that time. An expanded CPE screening program was instituted in March 2017. During both periods, contact screening of patients detected with CPE carriage was always performed.

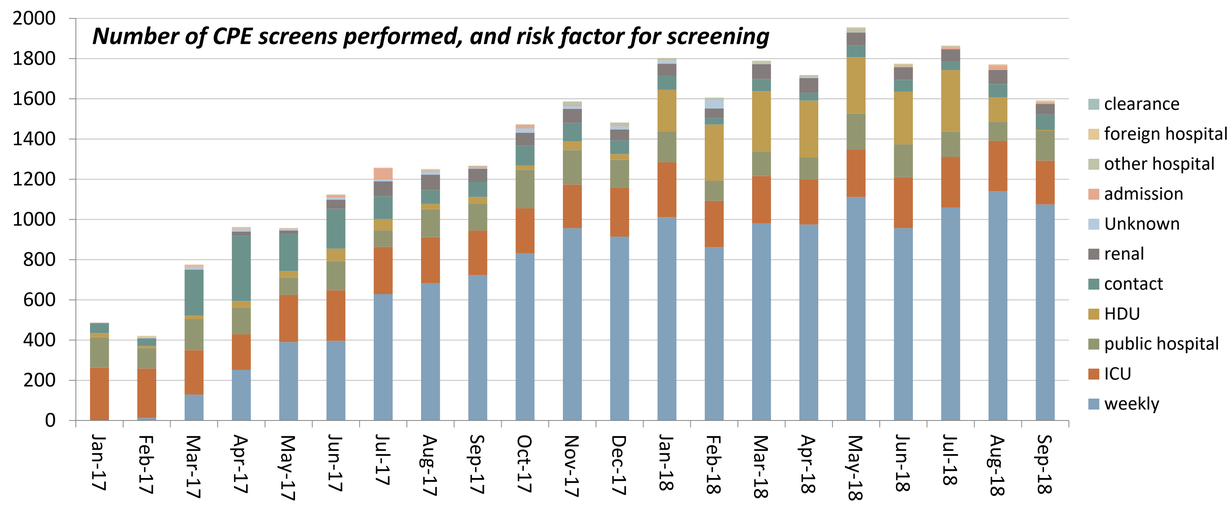
Existing screening criteria (prior March 2017)	Expanded screening criteria (after March 2017)
history of foreign healthcare	history of foreign healthcare
recent admission (< 6months) admission to other healthcare institutions	recent admission (< 6months) admission to other healthcare institutions
	renal dialysis
	admission to intensive care unit
	admission to high dependency unit
	weekly screen if inpatient in multi-bedded ward

Laboratory testing: Perianal screening swabs were cultured on chromogenic screening agar (CHROMID™ Carba Smart, bioMerieux, France), with the addition of a selective enrichment step. Characterisation of carbapenemase genes was performed by in-house real-time PCR. Culture results were available 2-3 days after specimen receipt.

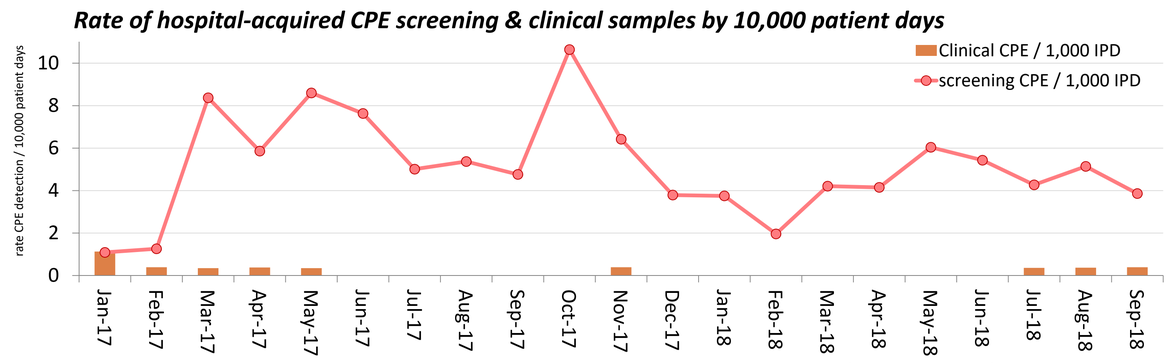
Infection control measures: Patients with CPE carriage were placed into single room or cohort ward isolation within one day of a positive CPE result. Screening of contacts of CPE patients was performed using culture (x1 sample) and PCR (Cepheid, USA) (x1 sample).

RESULTS

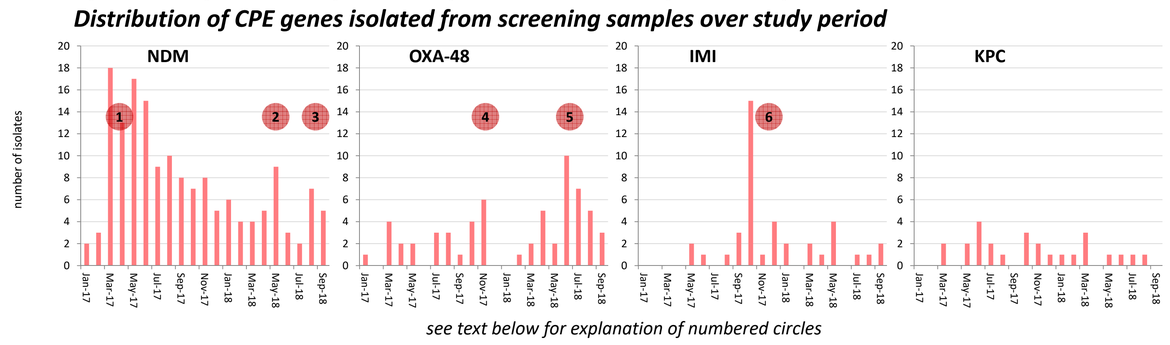
The number of monthly CPE screens rose from 488 tests in Jan 2017 to a maximum of 1,956 tests in May 2018.



The rate of detected CPE carriage was 1.09/10,000 inpatient days in Jan 2017, abruptly rose to 8.37 following implementation of the expanded screening criteria and reached a maximum of 10.64 in Oct 2017, before eventually stabilising at ~4.0 in 2018.
The rate of hospital-acquired CPE in clinical samples peaked at 1.13/10,000 inpatient days in Jan 2017, but fell in 2018.



The predominant CPE genes were NDM (n=160), OXA-48-like (n=61), IMI (n=40) and KPC (n=26).



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The expanded screening program showed multiple cross-transmission episodes, with the initial outbreak caused by NDM[1], and subsequent low-level transmission[2][3]. OXA-48 accounted for two episodes[4][5], while an episode of IMI increased acquisition was detected[6]. KPC was present at low levels throughout the study period.

CONCLUSION

An expanded screening program following a rise in clinical infections identified an initial large circulating pool of occult carriers. Continuation of the screening program detected multiple episodes of silent CPE transmission, which allowed investigation and identification of transmission sources and implementation of control measures. However, nursing and laboratory workload was significantly increased. Reduction in CPE acquisition and carriage was slow, but eventually translated to a reduction in CPE infections. Control of CPE transmission is difficult in a hospital with multi-bed units, and a horizontal infection control strategy is likely to fail.

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