

An evaluation of a toolkit for the early detection, management and control of carbapenemase-producing Enterobacteriaceae: A cross-sectional survey of NHS acute trusts in England

Caroline M. Coope^{1,2,3}, Neville Verlander², Annegret Schneider^{1,4}, Susan Hopkins², William Welfare², Alan Johnson², Bharat Patel², Isabel Oliver^{1,2,3}
¹NIHR Health Protection Research Unit in Evaluation of Interventions at University of Bristol, ²Public Health England, ³University of Bristol, ⁴University College London

INTRODUCTION

Over the past decade there have been large increases in Carbapenemase-producing Enterobacteriaceae (CPE) infections globally.^{1,2} Numerous outbreaks have been reported in Europe and between 2008 to 2013 the UK saw large increases in the number of CPE positive isolates.^{3,4}

Most known CPE transmission in England occurs in hospital settings and a key risk factor for CPE acquisition is previous hospitalisation, particularly abroad.

In March 2014, as part of the response to a small number of CPE outbreaks in hospitals in England, Public Health England (PHE) launched a CPE toolkit to promote the early detection, management and control of CPE colonisations and infections in acute care settings.



AIM

This evaluation survey aimed to examine awareness, uptake, implementation and usefulness of the PHE CPE toolkit and to identify potential barriers and facilitators to the adoption of the toolkit.

METHODS

A cross-sectional survey was conducted in May 2016 targeting senior infection prevention and control leads in National Health Service (NHS) acute trusts in England. The questionnaire design and analysis was informed by the behaviour change wheel framework which characterises target behaviours (B) within the domains capability, opportunity and motivation (COM) (Figure 1).⁵ Descriptive analysis and multivariable regression models were conducted to identify factors associated with awareness, uptake, implementation and usefulness of the CPE toolkit. Narrative responses were analysed thematically to identify potential barriers and facilitators to implementation of the toolkit.

COM-B component	Theoretical Domain	
CAPABILITY	Psychological	Knowledge
		Skills
	Memory, Attention and Decision Processes	
Physical	Skills	
	Behavioural Regulation	
OPPORTUNITY	Social	Social Influences
	Physical	Environmental Context and Resources
MOTIVATION	Reflective	Social/Professional Role & Identity
		Beliefs about Capabilities
		Optimism
	Automatic	Beliefs about Consequences
		Intentions
	Goals	
	Social/Professional Role & Identity	
Optimism		
Reinforcement		
Emotion		

Figure 1. COM-B to Theoretical Domains Framework (TDF)

RESULTS

There was a good response rate to the survey (99/151, 66%). The majority of NHS acute trusts had a written plan for CPE prevention and management (92%) although the timing of implementation of a plan varied with 50% adopting a plan within 9 months of the toolkit launch and 25% more than 10 months afterwards (Figure 2).

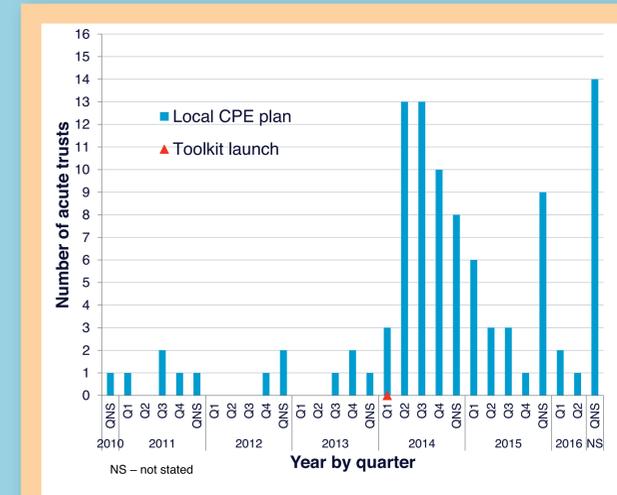


Figure 2. Timing of implementation of a CPE plan in NHS acute trusts in England

All trusts with a CPE plan had used the CPE toolkit either as provided (32%), or to inform (65%) their trusts CPE plan, yet 80% of respondents did not believe that following the CPE toolkit was an effective means to prevent CPE, and 58% felt the CPE toolkit was not practical to follow and did not meet the specific needs of their trust.

Having sufficient numbers of isolation rooms with ensuite was associated with both an earlier adoption of a CPE plan (Table 1) and a more negative view of the CPE toolkit (Table 2).

Table 1 Factors associated with timing of implementation of acute trust CPE plan

	N	UPTAKE: TIMING OF IMPLEMENTATION OF A CPE PLAN ^a	
		Pre-CPE toolkit plan versus early plan	Late plan versus early plan
		RRR	95% CI
Have sufficient isolation rooms with ensuite			
Disagree/ Neither	56	1.00	1.00
Agree	42	0.29	0.07, 1.22
		RRR	95% CI
		0.30	0.10, 0.90*

*p<0.05
^a Adjusted for: Number of CPE colonisations

Awareness of the CPE toolkit among respondents was high (99%). However, fewer (75%) were very or extremely familiar with the toolkits content. Trusts that believed CPE infections are rare in England had a significantly higher odds of being less familiar with the CPE toolkit contents (Table 2).

Two-thirds of trusts reported a high level of compliance among frontline staff with screening and isolation of CPE risk patients. Low levels of compliance with screening by frontline staff were associated with a lack of strong management support for CPE prevention and staff not having enough time to conduct risk assessments and screening.

Having sufficient isolation rooms was associated with a lower odds of agreeing that the CPE toolkit is an effective means to prevent CPE and a higher odds of agreeing the toolkit is not practical to use. This effect was stronger in trusts with higher numbers of CPE cases.

The behaviour change wheel domains of opportunity and motivation were key determinants in the implementation of the guidelines. Physical opportunity factors related to the CPE context, the screening approach of taking 3 rectal swabs 48 hours apart and a lack of resources were highlighted as challenges to implementing the CPE toolkit.

Table 2. Factors associated with awareness, implementation and usefulness of the CPE acute trust toolkit

AWARENESS: FAMILIARITY WITH CONTENT OF CPE TOOLKIT (slightly/moderately versus very/extremely)			
	N	OR	95% CI
CPE infections are rare in England			
Disagree	60	1.00	
Agree / Neither	33	2.57	1.00, 6.62*
IMPLEMENTATION: DO FRONTLINE STAFF SCREEN FOR CPE? ^a (rarely/sometimes versus often/always)			
	N	OR	95% CI
Staff have enough time to risk assessment and screen			
Disagree	60	1.00	
Agree / Neither	39	4.12	1.34, 12.67**
Strong senior management support- id and screening			
Agree	75	1.00	
Disagree/ Neither	22	4.02	1.08, 15.07*
USEFULNESS: TOOLKIT AN EFFECTIVE MEANS TO PREVENT CPE ^b (agree/neither versus disagree)			
	N	OR	95% CI
Have sufficient isolation rooms with ensuite			
Disagree/ Neither	56	1.00	
Agree	42	0.15	0.03, 0.80**
USEFULNESS: TOOLKIT IS NOT PRACTICAL TO FOLLOW ^c (agree versus neither/disagree)			
	N	OR	95% CI
Staff have enough time to risk assessment and screen			
Disagree	60	1.00	
Agree / Neither	39	0.06	0.02, 0.25***
CPE colonisations 0 to 10 cases			
Have sufficient isolation rooms with ensuite			
Disagree/ Neither	56	1.00	
Agree	42	1.40	0.37, 5.35*
CPE colonisations ≥11 cases			
Have sufficient isolation rooms with ensuite			
Disagree/ Neither	56	0.16	0.03, 0.85*
Agree	42	2.76	0.38, 20.24*

*p<0.05 ** p<0.01 *** p<0.001
^a Adjusted for: CPE prevention high priority in our acute trust, Commissioning Region, No. of CPE colonisation
^b Adjusted for: Cost of identifying & screening outweigh the benefits, Professional discipline, Commissioning Region
^c Adjusted for: most hospitals in England have id and screening policy, Commissioning Region, Size/type of trust

STRENGTHS / LIMITATIONS

There was a good response to the survey amounting to a response rate of 66%.

The results represent the views of senior IPC leads within NHS acute trust in England and are representative of trusts by commissioning region, size and type of trust as well as by the level of engagement in CPE assessed by local PHE AMR leads.

The survey was completed two years after the launch of the toolkit and therefore the initial response to the toolkit is not captured.

The views of frontline staff are not represented in these survey results but are key to successful implementation of the guidelines.

CONCLUSIONS / RECOMMENDATIONS

- ☑ There was a high level of awareness and utilization of the CPE toolkit among respondent trusts.
- ☑ The majority of NHS acute trusts have a CPE plan.
- ☑ Confidence in the guidelines is crucial to facilitate successful implementation, however 80% of respondents did not have confidence in the CPE toolkit as an effective means to prevent CPE and.
- ☑ Lower levels of implementation at the frontline may be partly due to a lack of physical opportunity defined as having low levels of CPE hence frontline staff may not deem CPE preventive measures a priority or even necessary.
- ☑ Support from senior management is needed for CPE preventive activities to be implemented consistently by frontline staff.
- ☑ The context in which an intervention is introduced is an important consideration and respondents felt that context was a key challenge to implementation in respect to low levels of CPE and limited resources.
- ☑ Updated guidance on the prevention and management of CPE is needed for acute trusts that engenders confidence.
- ☑ Future guidance should incorporate participation and feedback systems from acute trust staff.

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