Mattress Screening using Polywipes and Chromogenic *Clostridium difficile* agar

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Key Words:
Environmental screening, Mattress audit, Polywipes, *Clostridium difficile* and Chromogenic agar

Abstract: 13
IBMS Congress 2011

1. Introduction

The Infection Prevention and Control (IPC) Team at Newcastle Upon Tyne Hospitals NHS Foundation Trust (NuTH) regularly use environmental screening as an adjuvant to outbreak investigations. Resultant information has proved invaluable and such screening is now recognised as an effective tool in local action plans to reduce healthcare associated infections (HCAI). As *C. difficile* is known to readily contaminate the immediate environment of symptomatic patients, the Department of Health recommends that chlorine based decontamination agents are used to minimise cross infection.[1,2] Quality assurance of cleaning regimes can be established by culturing environmental samples although this is not recommended as routine practice.[3]

In this study the Microbiology IPC laboratory at NuTH assessed the presence of *C. difficile* on mattress surfaces as an integral aspect of a trust wide mattress audit performed for a different English trust (Trust B). Recovery rate on conventional *C. difficile* agar (CCEY, Bio-connections) was compared with that on a newly developed chromogenic medium (chromID *C. difficile*, bioMérieux). This evaluation also consolidated collaborative working between two NHS foundation trusts.

2. Method

Since 2009 environmental samples at NuTH have been solely collected using Polywipes (Medical Wire and Equipment). These are sterile pre-moistened thin flexible sponges that can be used to take microbiology samples from a wide range of surfaces; even those with intricate surface detail.[4] Prior to using Polywipes NuTH failed to recover *C. difficile* from the environment.

During the mattress audit at Trust B, 130 surfaces samples from 13 wards were collected in duplicate (designated A & B) using standard laminated templates (15cm x 25cm). The samples were consistently taken from the central aspect of the mattress (fig.1), and all templates were cleaned with 1000ppm chlorine solution between use. Direct impression cultures (fig.2) of the Polywipes were performed on both conventional and chromogenic agars. The duplicate samples were alternately processed to ensure that A and B sites were inoculated onto each of the media in a non-biased manner. Plates were examined for the presence of *C. difficile* following anaerobic incubation for 48 hours.

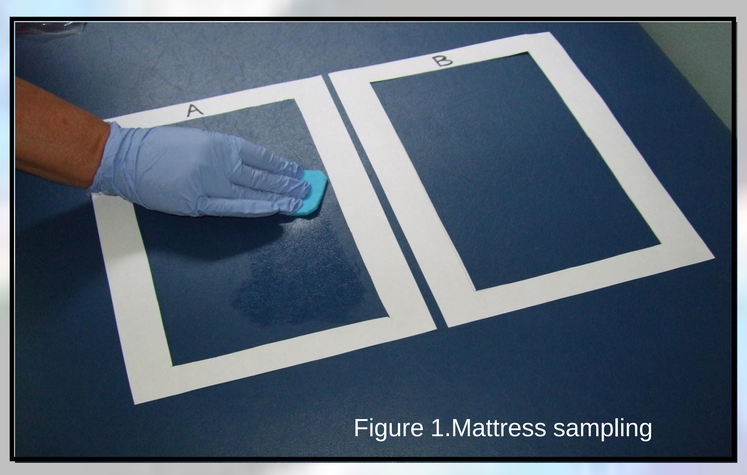


Figure 1.Mattress sampling

3. Results

C. difficile was detected on three mattress surfaces; along with another four mattresses yielding non-*difficile* clostridia species (Table 1). Identity of all isolates was confirmed using Maldi-TOF mass spectrometry (Bruker Daltonics, Germany).[5] Both the conventional and chromogenic medium recovered the positive isolates; with one sample the number of colony forming units (cfu) was substantially greater on the chromID plates. All the non-*difficile* clostridia species were recovered from the chromogenic medium only.

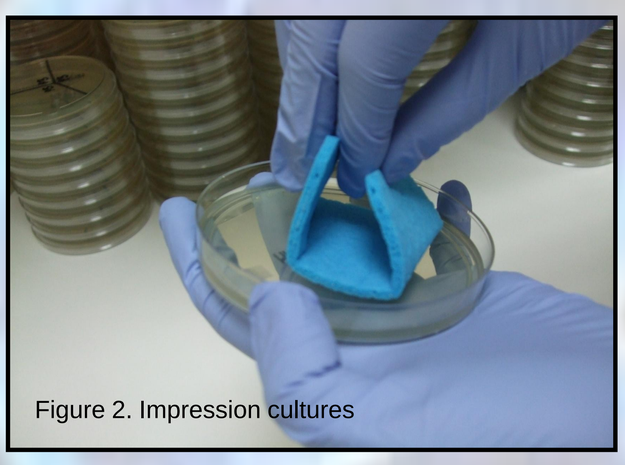
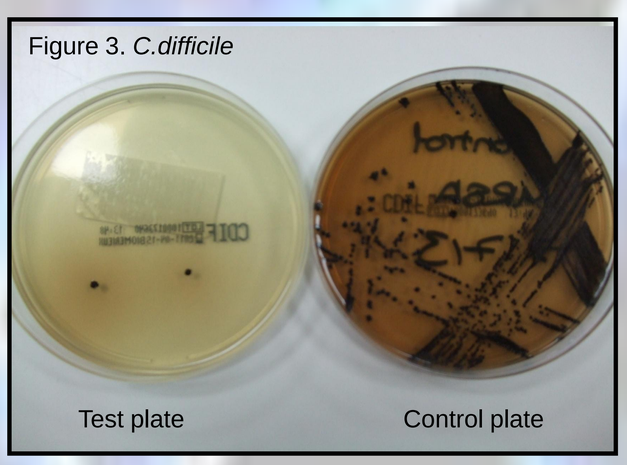


Figure 2. Impression cultures

Figure 3. *C.difficile*


Test plate Control plate

4. Key Findings

- Low prevalence of *C. difficile* on mattress surfaces
- CCEY and chromID performed with equal sensitivity
- CCEY was more specific than chromID
- Polywipes were easy to use and are an effective sampling tool

Table 1. Quantitative Polywipe Culture Results

Clostridium difficile			
Sample ID number	Anonymised Ward ID	CCEY (cfu)	chromID (cfu)
6	1	2	3
43	7	4	58
63	5	1	1
Non-*difficile* clostridia species			
Sample ID number	Anonymised Ward ID	CCEY (cfu)	chromID (cfu)
34	8	0	2
58	5	0	12
77	4	0	25
129	1	0	1

5. Discussion & Conclusions

Point prevalence assessment indicated that mattress contamination with *C. difficile* was low with a rate 2.3%. Local protocol at Trust B institutes that mattress surfaces are decontaminated between patients; although chlorine based solutions are only used for known *C. difficile* toxin positive patients. In this evaluation none of the patients actively using the mattresses were toxin positive. Our study suggests that **all** healthcare environmental cleaning should be performed with chlorine at 1000ppm to effectively reduced the risk of HCAI with *C. difficile*.

Due to the low recovery rate of the organism it was difficult to fully compare conventional *C. difficile* agar with the newly developed chromogenic medium. Nonetheless both exhibited equivalent sensitivity, however CCEY was found to be slightly more specific than chromID. Other studies have indicated that chromID *C. difficile* agar is superior than conventional medium for isolation within 24hrs but in this evaluation rapid recovery was not imperative as the mattresses had been decommissioned for other reasons.[6]

Further environmental investigations continued at Trust B after the initial study period; with the IPC laboratory at NuTH maintaining an effective service provision. Due to versatility and established efficacy in the recovery of organisms Polywipes have now been introduced as the method of choice for environmental sample collection by the IPC team at Trust B..

6. References

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7. Acknowledgments

We are grateful to Medical Wire and Equipment, UK, for providing the Polywipes to support this study and Dr J Perry for provision of the media. We are also grateful to our colleagues in other trusts for the opportunity to develop research partnerships.

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