

# Decontamination of the hospital 'front-end' using hydrogen peroxide vapour is an effective method to reduce Clostridium difficile infection rates within the hospital

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## Introduction

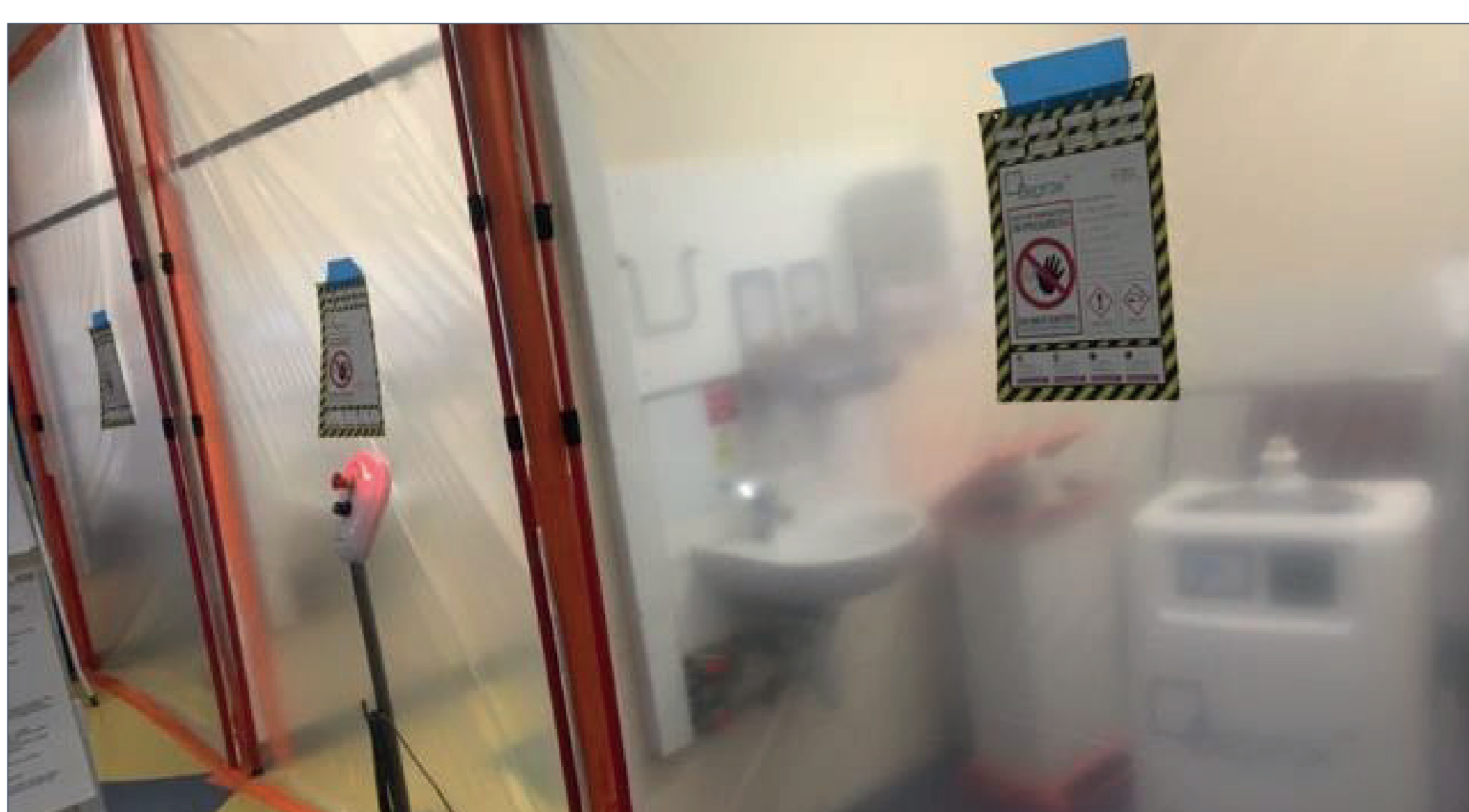
- Clostridium difficile is a spore forming Gram-positive bacterium
- Patients with an extended length of in-patient stay are at a higher risk for healthcare associated infections (HCAs) with C. difficile being the most common, especially in patients who are exposed to antibiotics [1]
- C. difficile is responsible for 15-25% of antibiotic-associated diarrhoea
- C. difficile spores are resistant to heat, disinfectants and antibiotics with an ability to survive in hospital environments for several months
- The transmission of C. difficile occurs via healthcare workers' hands, the environment, medical devices and patient equipment [1]
- Hydrogen peroxide vapour (HPV) has been shown to be effective in eliminating C. difficile spores and thus creating a safer environment [2]
- Identification of a common entry point of patients and increased rates of C. difficile are useful in implementing a deep-clean programme using HPV

## Aim

**To reduce C. difficile transmission at Stoke Mandeville Hospital (SMH) by identifying a common entry point and performing automated decontamination using Deprox HPV system**

## Methodology

- Stoke Mandeville Hospital (516 beds) has had increased rates of C.difficile from April to May 2018
- Data analysis identified C. difficile patients' common entry point as the Emergency Department (ED), Acute Medical Unit (AMU) and Stoke Mandeville Ward 10 (SMW 10) - these 3 areas were categorised as the 'front-end'
- Between 21/05/2018 and 03/06/2018, clinical areas were isolated and Deprox HPV system (Inivos) was used to decontaminate the environment and equipment when able to, after a full manual and steam cleaning
- Additional infection prevention and control measures were increased, such as hand hygiene awareness, antimicrobial stewardship and effective manual cleaning



## Results

- In-depth planning with the key clinical and operational staff was performed prior to clean, to maintain patient safety and ensure minimal disruptions to patient flow
- Stoke Mandeville Hospital's data identified 3am to 10am as the period of reduced activity and optimal time to complete this deep-clean programme using HPV

Table 1: Decontaminated department breakdown

| Department                         | Areas                      |
|------------------------------------|----------------------------|
| ED Entrance                        | 4x clinical areas          |
|                                    | 2x WC areas                |
|                                    | 7x closed clinical areas   |
| ED Majors                          | 5x open bays               |
|                                    | 4x ancillary room          |
| ED Minors                          | 3x closed clinical areas   |
| Emergency Observation Unit (EOU)   | 6 bed open area            |
|                                    | 5x ancillary areas         |
| Resus                              | 5 bed open area            |
| Rapid Assessment & Treatment (RAT) | 5 bed open area            |
|                                    | 2x ancillary area          |
|                                    | 12 bed open space (male)   |
| AMU                                | 1x side room (male)        |
|                                    | 1x Sluice                  |
|                                    | 1x Utility                 |
|                                    | 12 bed open space (female) |
|                                    | 1x side room (female)      |
|                                    | 1x Store room              |
|                                    | 6x ancillary areas         |
| SMW 10                             | 4x side rooms              |
|                                    | 1x3 bed bay with ensuite   |
|                                    | 5x ancillary areas         |
|                                    | 3x6 bed bays with ensuite  |
| Day Procedure Unit                 | 12 bed open space          |

- During the 1<sup>st</sup> week, the decontamination engineer was on the site between 3am and 10am, Monday to Friday
- Deprox HPV system was used to decontaminate cubicles in ED Majors, Minors, EOU, RAT and Resus areas as they became available
- During the 1<sup>st</sup> weekend, AMU male side was decontaminated on Saturday and female side on Sunday; SMW 10 on Monday (May Bank Holiday)
- During the 2<sup>nd</sup> week, the same procedure was performed as on 1<sup>st</sup> week
- During the 2<sup>nd</sup> weekend, the 2<sup>nd</sup> section of SMW 10 was decontaminated on the Saturday, followed by decontamination of Day Procedures Unit on the Sunday
- Upon completion of the 'front-end' deep-clean programme with HPV, the number of C. difficile cases recorded during the following 4 month period had reduced (Table 2)

Table 2: Comparison of C. difficile rates per month before and after intervention

|                               | PRE-INTERVENTION<br>April 2017 to May 2018 (14 months period) | POST-INTERVENTION<br>June 2018 to September 2018 (4 months period) |
|-------------------------------|---|--|
| Total                         | 4.07  | 3  |
| SMH Associated                | 2.86  | 1.5  |
| Wycombe Hospital Associated   | 0.43  | 0.5  |
| Community Hospital Associated | 0.21  | 0.5  |
| Relapse                       | 0.57  | 0.5  |

## Conclusions

- Identification of a common entry point such as the ED/'front end' is essential in order to understand a pathogen's transmission route
- Implementation of a targeted HPV automated decontamination haben been proven to be effective in reducing C. difficile rates
- After the 'front-end' deep clean programme with HPV, the rate of SMH associated C. difficile cases reduced during the 1<sup>st</sup> four months, post intervention
- In future, a deep clean programme using HPV should be performed on a regular basis (every 6 to 12 months) in order to help prevent transmission of C.difficile, thus maintaining a safer hospital environment

References: [1] Macleod-Glover N, Cgp P, Sadowski C. Clinical Review Efficacy of cleaning products for C difficile n.d.;56. [2] Best EL, Parnell P, Thirkell G, Verity P, Copland M, Else P, et al. Effectiveness of deep cleaning followed by hydrogen peroxide decontamination during high Clostridium difficile infection incidence. J Hosp Infect 2014;87:25-33. doi:10.1016/j.jhin.2014.02.005.

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