

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

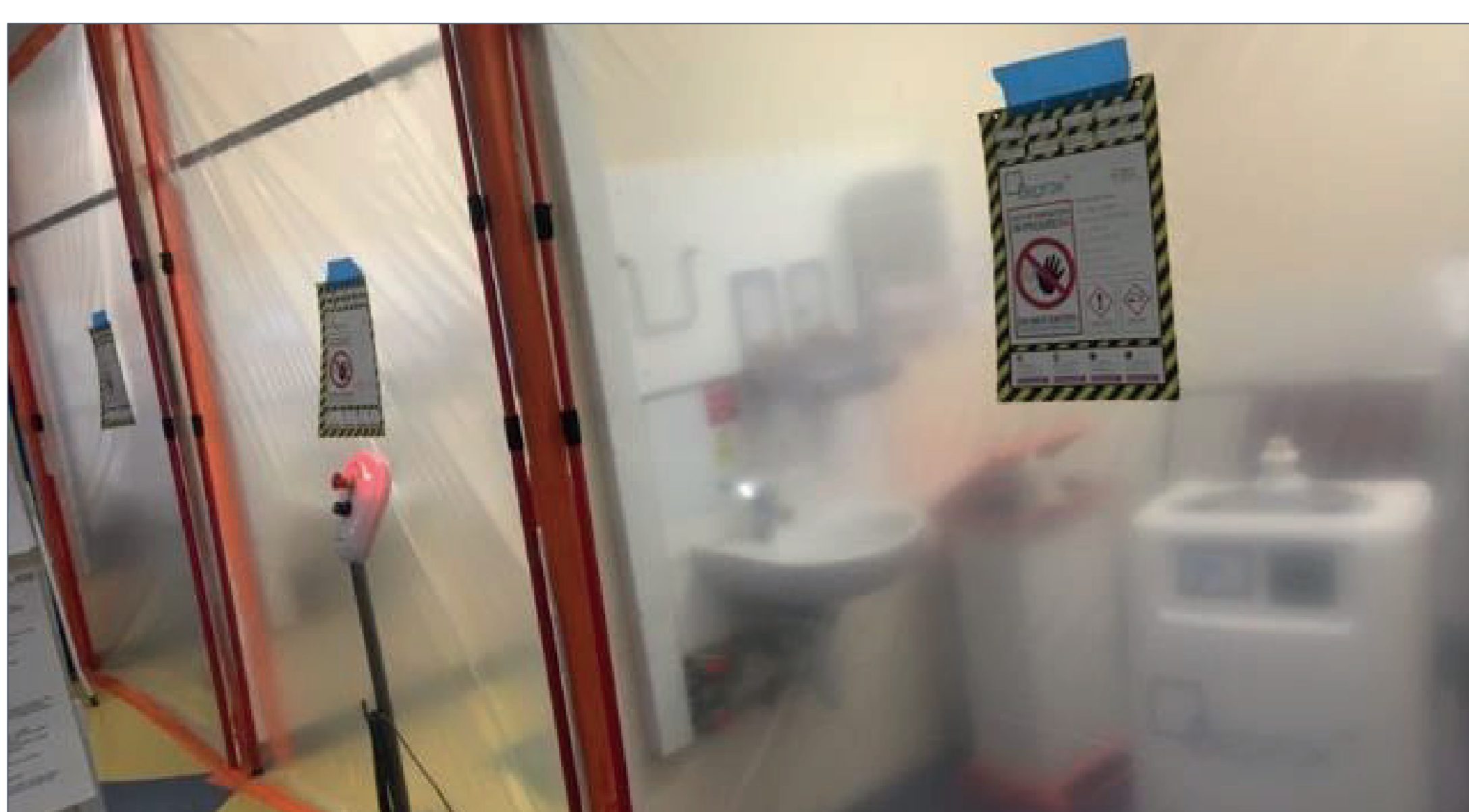
- Clostridium difficile is a spore forming Gram-positive bacterium
- Patients with an extended length of in-patient stay are at a higher risk for healthcare associated infections (HCAs) with C. difficile being the most common, especially in patients who are exposed to antibiotics [1]
- C. difficile is 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 ProXcide 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 ProXcide 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



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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 1st week, the decontamination engineer was on the site between 3am and 10am, Monday to Friday
- ProXcide HPV system was used to decontaminate cubicles in ED Majors, Minors, EOU, RAT and Resus areas as they became available
- During the 1st weekend, AMU male side was decontaminated on Saturday and female side on Sunday; SMW 10 on Monday (May Bank Holiday)
- During the 2nd week, the same procedure was performed as on 1st week
- During the 2nd weekend, the 2nd 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 April 2017 to May 2018 (14 months period)	POST-INTERVENTION 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 has 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 1st 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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