

Objectives

The environment plays a key role in transmission of *Clostridium difficile* spores from patient to patient and improved room disinfection with sporicidal agent has led to decrease rates of *C. difficile* infection (CDI). There is a need for safe, rapid, and highly effective procedure to daily disinfect rooms of patients with CDI. We evaluated the sporicidal activity of a new detergent-disinfectant based on peracetic acid (Oxy'Floor, Anios) using a 3-stage protocol, as described by Siani *et al.* (AJIC 2011, 37, 212-219)

Methods

The protocol measured the ability of a wipe soaked in disinfectants (peracetic acid or hypochlorite 0.5%) to remove spores from surfaces artificially contaminated with a suspension of *C. difficile* spores (~10⁷ CFU/ml) after 10 seconds of contact. In a second step, the protocol evaluated the propensity of the wipes to release and transfer spores to other surfaces. In a third step, sporicidal activity was measured by direct inoculation of a spore suspension (~10⁷ CFU/ml) on to wipes soaked in disinfectants (Fig. 1).

Three different *C. difficile* strains (PCR ribotypes 027, 078 and 014) were tested on three different surfaces (steel, laminate, and vinyl polychloride) with or without Bovine Serum Albumin (BSA 0.03%). The neutralizing solution used to quench the residual activity of disinfectant was 30% polysorbate 80, 1% histidine, 3% egg lecithin and 0.5% thiosulfate sodium solution (DNP solution, AES Laboratoires). All the experiments were done in triplicates. For each experiment, the activity of hypochlorite and Oxy'Floor were compared. Activity was expressed as the log₁₀ spore reduction of initial contamination and was compared using the paired t-test (Prism4, GraphPad software). Significance was set at p<0.05.

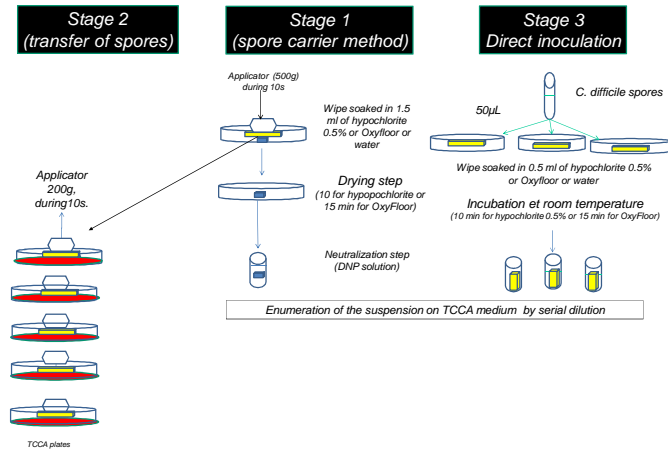


Figure 1 : Description of the 3-stage protocol to study the effect of disinfectant on *C. difficile* spores

Conclusions

The activity of Oxy'Floor was at least as effective as the activity of hypochlorite on spores of *C. difficile*, irrespective of the presence of interferent substances. Oxy'Floor might be a valuable option to control the burden of spores in the environment. It combines a cleaning and a sporicidal agent in one step.

Results

The overall ability of the wipes soaked in hypochlorite or Oxy'Floor to remove spores of *C. difficile* from inanimate surfaces was 4.53 ± 0.7 log₁₀ and 4.8 ± 0.57 log₁₀, respectively. (p= 0.013) (Fig. 2). The efficacy was significantly better for Oxy'Floor when assays were performed on laminate (irrespective of the strains) or with the 078 (irrespective of the spore-carrier material). In presence of interferent substances (BSA 0.03%), the ability to remove spores slightly decreased and was not significantly different between Hypochlorite and Oxy'Floor (4.05 ± 0.52 log₁₀ and 4.20 ± 0.52 log₁₀, respectively, p= 0.31) (Fig. 3). The number of spores transferred by the wipes on other surfaces after a 10 second-contact with the disinfectant was significantly higher with Oxy'Floor than Hypochlorite (p=0.039) (Table 1). The sporicidal activity measured by direct inoculation was 4.53 ± 0.74 log₁₀ and 4.69 ± 0.62 log₁₀ with hypochlorite and Oxy'Floor, respectively (p=0.13) (Fig. 4).

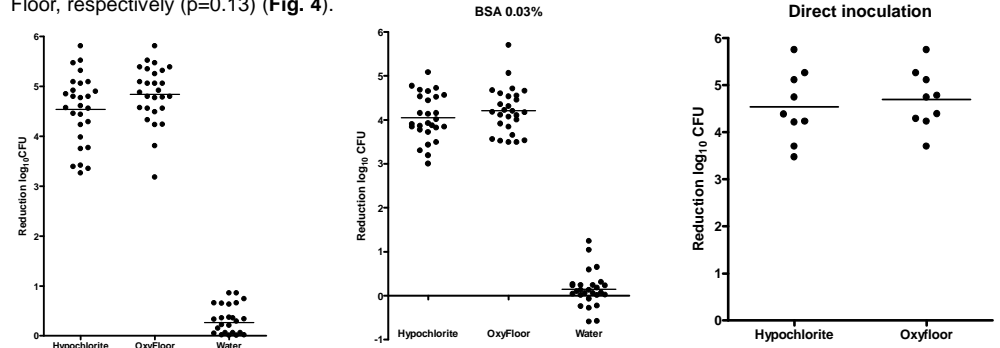


Figure 2 : Reduction (log₁₀ CFU) of initial contamination

Figure 3 : Reduction (log₁₀ CFU) of initial contamination with interferent substances (Bovine serum albumin 0.03%)

Figure 4 : Reduction (log₁₀ CFU) of initial contamination (by direct inoculation of wipes soaked in disinfectant).

A

Spore carrier	Strain	No of spores transferred	
		Hypochlorite	Oxy'Floor
Steel	K027	116	732
	K014	29	261
	K078	523	1299
PVC	K027	102	158
	K014	40	290
	K078	41	55
Laminate	K027	40	72
	K014	9	40
	K078	7	54
Mean		100.78	329.00
SD		162.73	424.11
Median		40	158

B

Spore carrier	Strain	No of spores transferred	
		Hypochlorite	Oxy'Floor
Steel	K027	45	55
	K014	36	54
	K078	17	155
PVC	K027	4	500
	K014	3	51
	K078	1	194
Laminate	K027	6	134
	K014	3	0
	K078	2	17
Mean		13.00	128.89
SD		16.45	153.68
Median		4	55

Table 1: Propensity of the wipes to transfer spores to other surfaces (A-without interferent substances B-with BSA 0.03%)

References

Siani H. *et al.* AJIC 2011; 59; 212-8.
 Cadnum JL *et al.*, ICHE 2013, 34441-42.