



Clostridium difficile outbreak in a convalescent hospital

Infection control forum

19 August, 2011

- 2 clusters of patients with *Clostridium difficile* associated diseases observed in 4A2 and 5A2 on 21 June and 24 June respectively

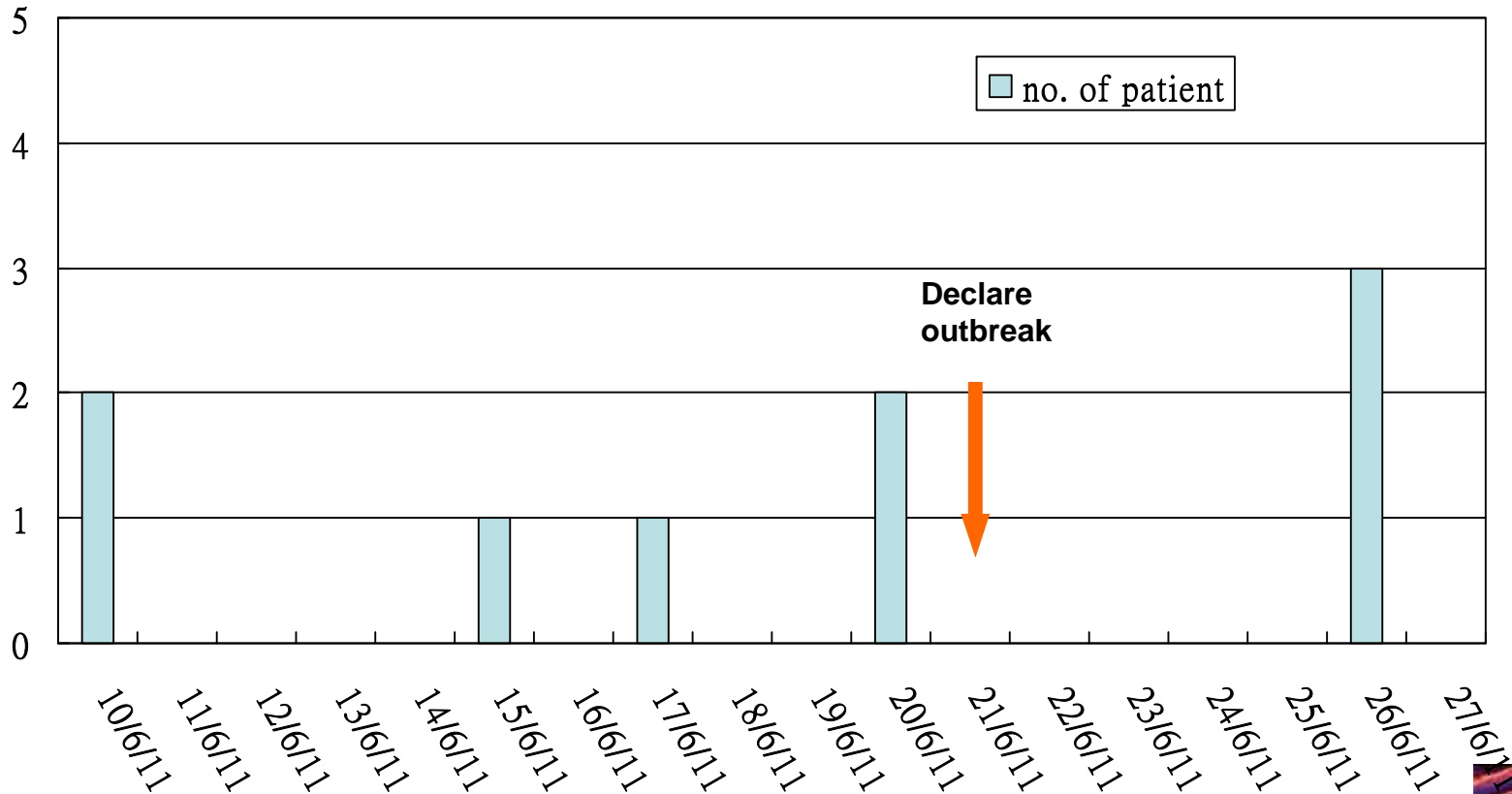


Case definition

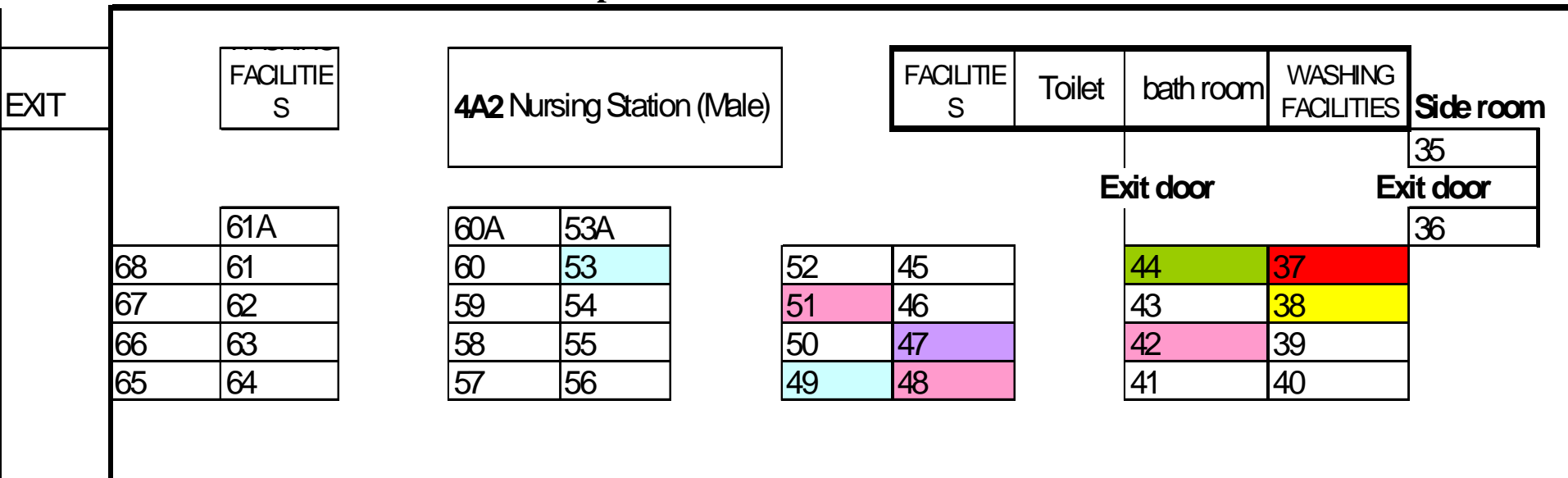
- Any patient(s) or staff presented one episode of diarrhoea, defined as stool loose enough to take the shape of a container used to sample it, that is not attributable to any other cause, including medicines, and that occurs at the same time as a positive toxin assay and /or endoscopic and /or histological evidence of pseudomembranous colitis on or after Date at ward .









Ward 4A2 : 9 affected cases



Location Map of 4A2 Ward

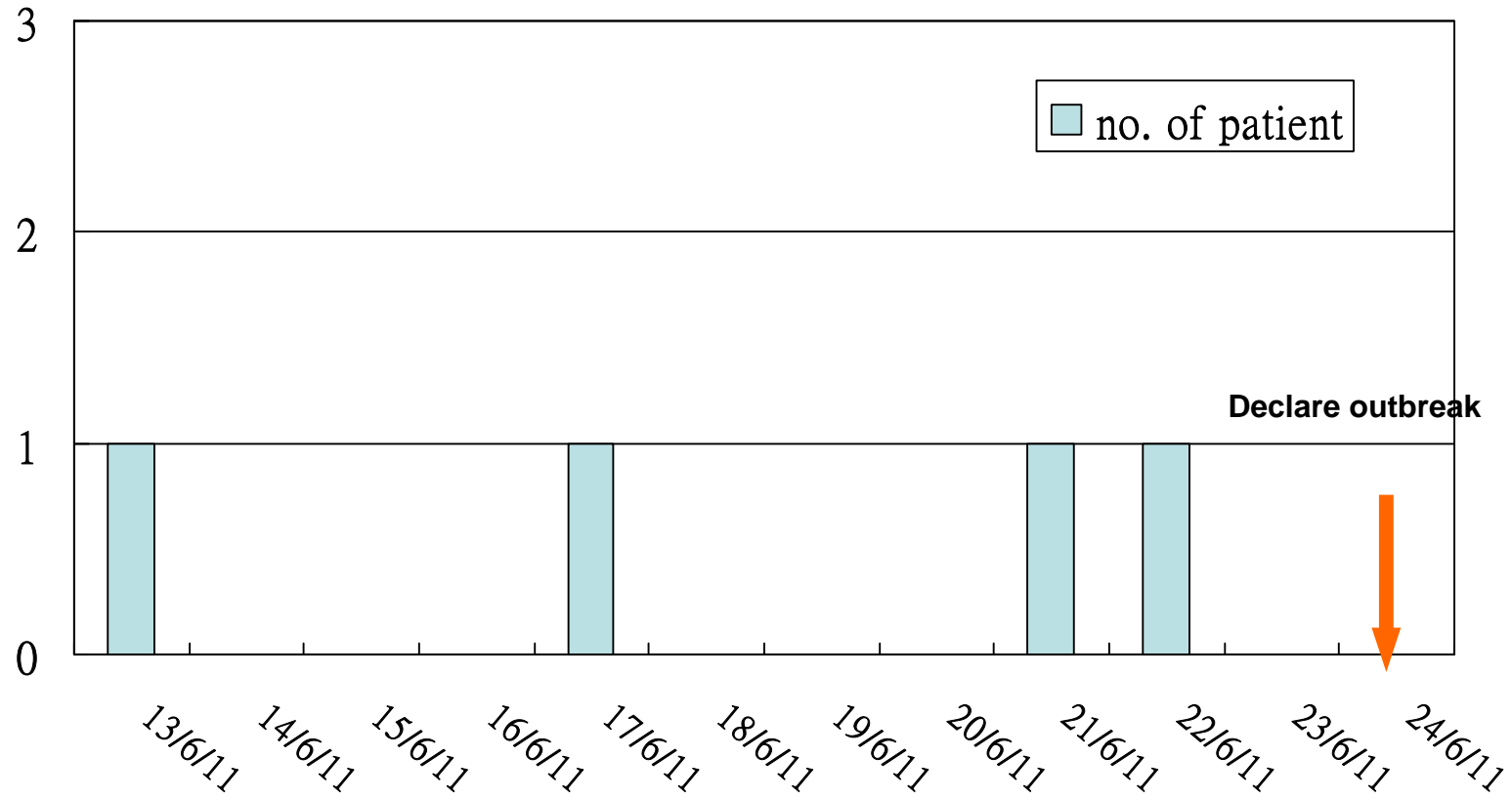


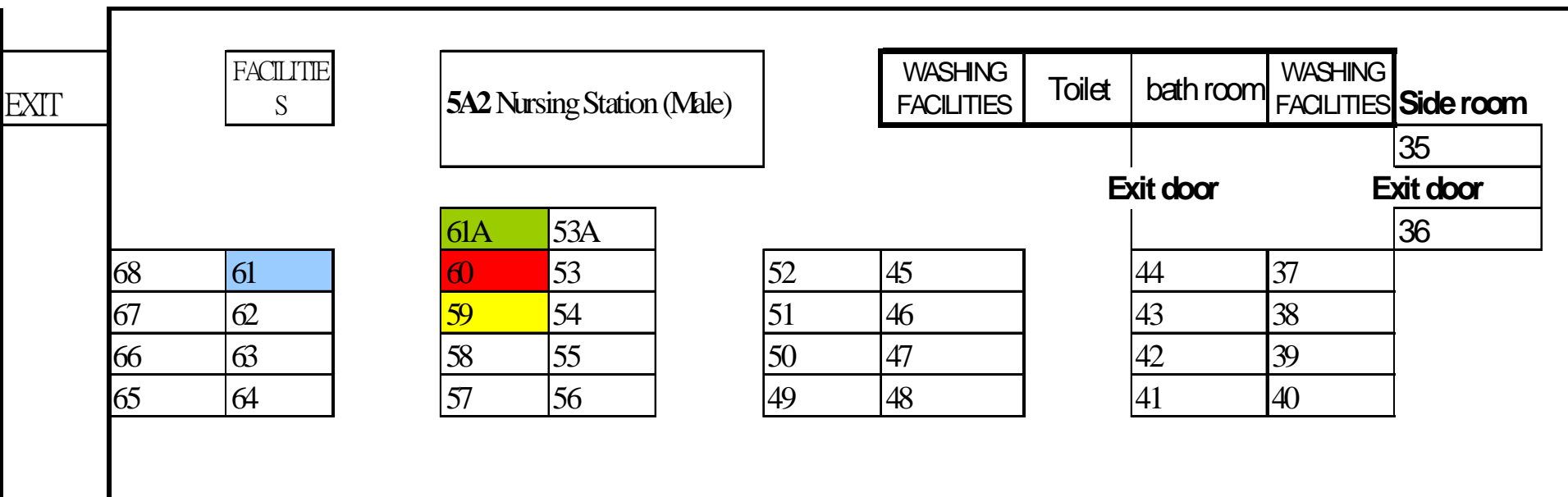
onset date

	10/6/2011
	10/6/2011
	15/6/2011
	17/6/2011
	20/6/2011
	22/6/2011

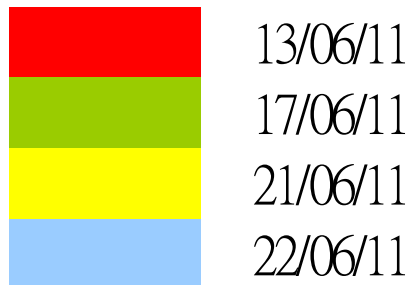


Ward 5A2 : 4 affected cases





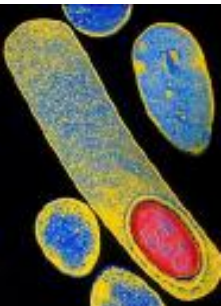
onset date



Affected patients (N =13)

Ward nature	Medical rehab
Sex	All Male
Age range	73 - 99
Dependency	100% (9)
Enteric feeding	89% (8)
Antibiotics	100% (9)
Napkin	100% (9)





Control measures

Patients

- Isolate or cohort the affected cases
- Exposed in-patients should be put under medical surveillance for 21 days i.e. 3 weeks from the date of isolation of the last case
- The ward could resume normal function if no more cases occurred 7 days after the date of isolation of the last case
- New admission / transfer in patients should be separated from exposed cases.
- For patients remained at the ward, colleagues of the hospital to conduct medical surveillance
- If no more cases occurred during the surveillance period, the outbreak is declared over
- For patients discharged to home, colleagues of the hospital to advice them to go to nearby AED if developed GI symptoms during the surveillance period and tell the attending AED doctor about the exposure
- For patients discharged to RCHE, colleagues of the hospital to tell staff of the RCHE to inform SEB (Tel: 2125 2352) if the patient developed GI symptoms during the surveillance period



Staff

- Keep vigilance on new case and inform ICT
- Reinforce contact precautions and vigilance on hand hygiene
- Staff who develop GE symptoms should refrain from duty and seek medical advice in staff clinic or AED
- Separate staff was arranged for caring exposed patients and new admitted patients.



Visitors

- Limit the visiting hour and no.of visitor
- Warning sign is hoisted at entrance
- Follow instructions of using PPE
- Reinforce hand hygiene before entering and leaving the ward



Patient care procedures

1. Enteric feeding

- Disposable feeding bag
- Reinforce the hand hygiene during preparation

2. Napkin round

- Avoid pre-wet cotton wool (No left-over)
- Designated cleansing items for each patient
- Change PPE and perform hand hygiene in between patients



Hand washing

- Keep vigilant to hand wash with **soap and water** after caring for or contacting patients with CD
- ICN perform ward patrolling during peak hours to monitor staff's compliance of hand hygiene.



Environment

- Intensive environmental cleansing was performed after the removal of affected patients
- Increased environmental cleansing thrice daily, focusing on frequently touched surfaces.
- 1:49 (1000 ppm) sodium hypochlorite and disposable wipes were reinforced for environmental disinfection.



Investigation

- Attack rate
 - 4A2: 27.3% (9/33)
 - 5A2: 11.4% (4/35)
- Active surveillance screening for 4A2 exposed patients (N=27)
 - 37% (10/27) positive, all asymptomatic
 - 3 of them developed symptoms in later days



Hand hygiene compliance audit at peak hour during outbreak

	4A2	5A2
Period of observation	21 Jun- 18Jul	23Jun- 15Jul
Total observations	134	104
Compliance rate	89.6%	85.6%
Before outbreak (Q1)	52%	49%



PCR ribotyping results

Affected patients

- PCR ribotype 002 which is predominant in Hong Kong



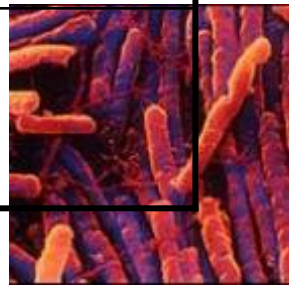
Active surveillance screening for newly admission

- Objectives
 - To observe for the prevalence of *C. difficile* colonizer upon admission
 - To act as a guide for the future management
- Period
 - 2 weeks (19 July – 31 July 2011)
- Study area
 - A medical rehab ward (4A ward)
- Laboratory Test
 - Stool specimen
 - For cytotoxin B detection
 - Real time PCR test for *C. difficile* detection & 18- bp deletion



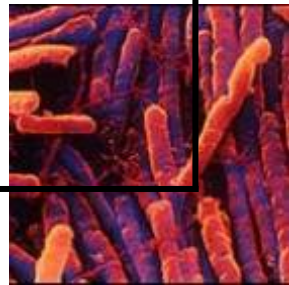
Results (N =28)

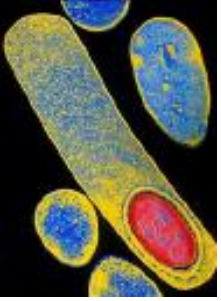
Sex	Male (18) female (10)
Mean Age	85
Dependency	86% (24)
Enteric feeding	46% (13)
Antibiotics w/i 3mths	82% (23)
No. of admission w/i 3mths (mean)	3 times
Duration of hospitalization before transfer (mean)	7 days



Positive cases (N=6)

Sex	Male (2) female (4)
Mean Age	86
Dependency	83% (5)
Enteric feeding	17% (1)
Antibiotics w/i 3mths	83% (5)
No. of admission w/i 3mths (mean)	4 times
Duration of hospitalization before transfer (mean)	8.5 days





Discussion

Sodium hypochlorite

- Use dilute solutions of 5.25%–6.15% sodium hypochlorite (1 : 9 dilution of household bleach) for routine environmental disinfection
 - High rates of endemic *Clostridium difficile* infection or in an outbreak setting,.
 - Patient-care areas where surveillance and epidemiology indicate ongoing transmission of *Clostridium difficile*

- Guideline for Disinfection and Sterilization in Healthcare Facilities, CDC, 2008
- Guideline for Disinfection and Sterilization in Healthcare Facilities, 2008 (p. 86)
- Strategies to prevent *Clostridium difficile* infections in acute care hospitals (p. 4)
- Clinical Practice Guidelines for *Clostridium difficile* Infection in Adults: 2010 Update by the Society for Healthcare Epidemiology of America (SHEA) and the Infectious Diseases Society of America (IDSA) (p. 443)



Activity of selected oxidizing microbicides against the spores of *Clostridium difficile*: relevance to environmental control

- 5000ppm is proved to be reliable to should freshly prepare inactivate spore

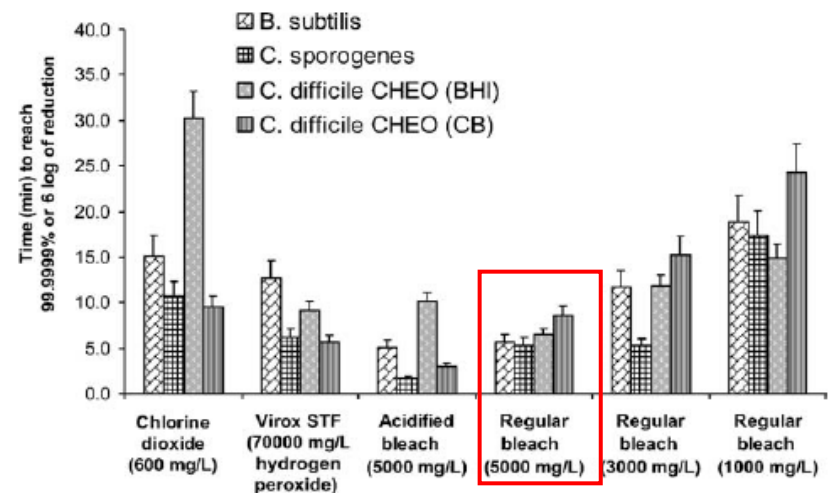


Fig 1. Times required for the microbicides to inactivate $\geq 6 \log_{10}$ (99.9999%) of the spores tested.



Sodium hypochlorite

- Relatively inexpensive, fast acting, broad-spectrum microbicides
- Should freshly prepare
- Corrosiveness
- Require greater care in handling- chlorine gas releases during acidification



Manual cleaning is not reliable

- “In practice, manual cleaning of complex environments containing beds, furniture, medical equipment and soft furnishing is difficult.”¹
- “ Routine manual cleaning and disinfection does not reliably remove environment *C.difficile*.”²

1. J Hosp Infect 2004;57:31-37
2. J Hosp Infect 2008;70:136-141



Hydrogen Peroxide vapor

- It is a broad spectrum, dry, rapid antimicrobial. It has been shown against a wide range of microorganisms, including bacteria, viruses, fungi, bacterial spores, and more recently parasite eggs
 - It is safer than other disinfectant gases (eg. Formaldehyde and ethylene oxide) and decomposes to water and oxygen
-
- J Hosp Infect 2004;57:31-37
 - J Hosp Infect 2008;70:136-141



Impact of hydrogen peroxide vapor room decontamination on *Clostridium difficile* environmental contamination and transmission in healthcare settings

- HPV decontamination is able to reduce *C. difficile* environmental contamination and transmission in a healthcare setting.

Infect Control Hosp Epidemiol 2008;
29:723-729

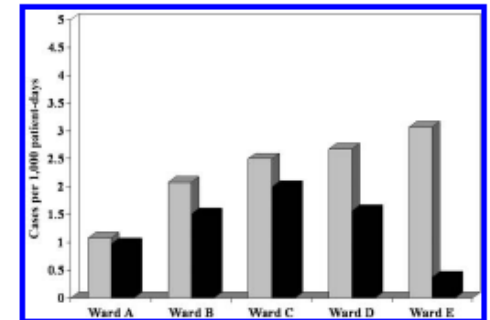


FIGURE 2. Incidence of nosocomial *Clostridium difficile*-associated disease on 5 wards (A–E) that underwent intensive hydrogen peroxide vapor decontamination, during the preintervention period (gray bars; June 2004 through March 2005) and the intervention period (black bars; June 2005 through March 2006).

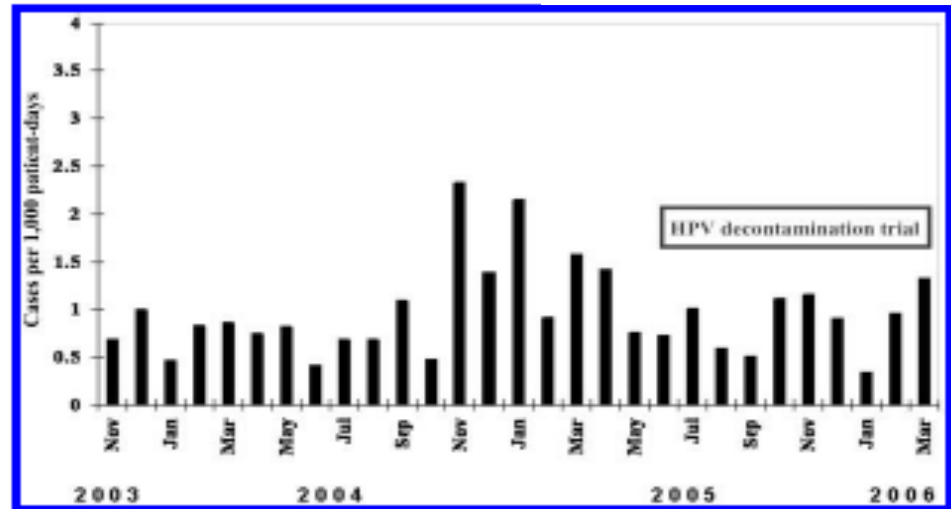
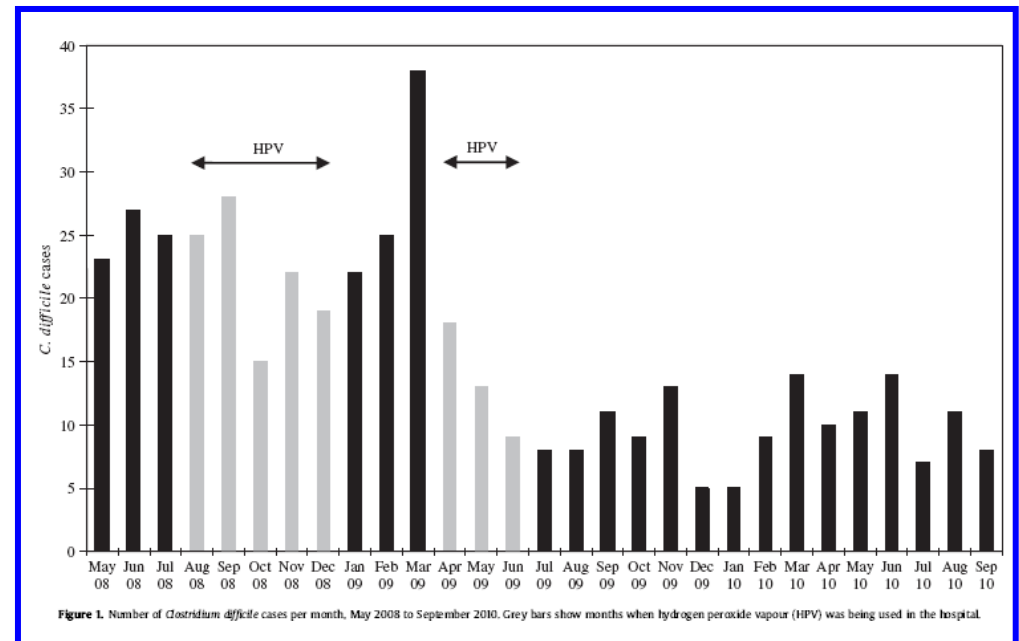


Figure 1: Hospital-wide incidence of nosocomial *Clostridium difficile*-associated disease, November 2003 through March 2006. HPV, hydrogen peroxide vapor



Impact of environmental decontamination using hydrogen peroxide vapour on the incidence of *Clostridium difficile* infection in one hospital trust

- An increase in the no. of *C. difficile* cases was noted after HPV environmental decontamination. The reintroduction of HPV contributed to returning the monthly no. of cases of CDI to below the pre-outbreak baseline.
- Recommend use HPV during outbreak of CDI / after discharge of a patient with CDI



Hydrogen Peroxide vapor

Advantage	Limitation
<ul style="list-style-type: none">•Efficient in environmental decontamination•Furniture and equipment (computer and other electrical equipment) that is difficult to clean manually ^{1,2,4}	<ul style="list-style-type: none">•Rooms should be vacant ^{1,5}•Free from dust ⁵•Soft furnishings (eg.curtain) should be removed ⁵•Surfaces should be cleaned prior to HPV decotamination as biological soiling reduces the efficacy of HPV ²•The need for well-trained personnel and special equipment ³•Higher costs comparatively ³

1. J Hosp Infect 2004;57:31-37 (1)
2. J Hosp Infect 2006;62:384 –392 (2)
3. Infect Control Hosp Epidemiol 2008; 29:723-729 (3)
4. J Hosp Infect 2006;62:384 –392 (6)
5. J Hosp Infect 2008;70:136-141 (8)





Thank you