



Clostridium difficile (CD) Hospital Acquired Infection (HAI) Rates Unaffected by Switch from Bleach (B) to Hydrogen Peroxide (H₂O₂)



University of Pittsburgh

and Peracetic Acid (PA) Based Disinfectants – *The New Smell of Clean*

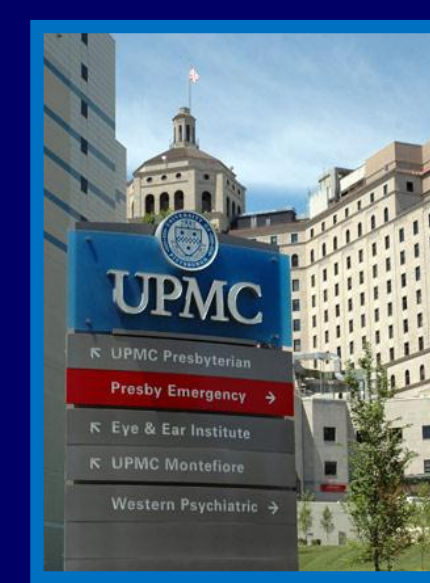
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Setting



The University of Pittsburgh Medical Center (UPMC) Presbyterian is a 766-bed tertiary care facility affiliated with the University of Pittsburgh Schools of the Health Sciences.

Background

General:

- Present in soil and environment
- Leading cause of antibiotic-associated diarrhea/colitis
- Hospitals major reservoirs
 - ~ 20% to 40% of hospitalized patients become colonized
 - Increasing Incidence
 - 2ndary diagnosis in 67% of US hospital stays (AHRQ, 2012)
- Transmitted by fecal-oral route
- Spread primarily on the hands on HCW



Reservoir:

- Humans
- Inanimate objects/common contaminant

C diff spores have been recovered from:

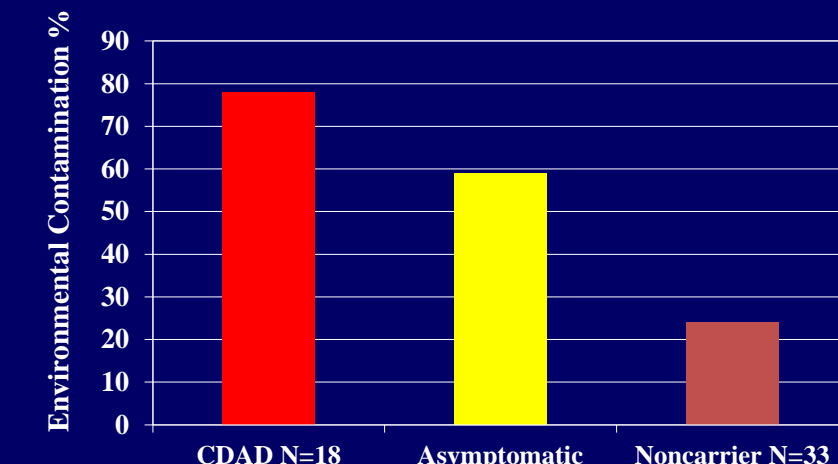
hospital toilets/commodes	metal bedpans
floors	thermometers

Spores can exist on surfaces for months



Environment:

- CD spores
 - Critical source of contamination plays a significant role in CD spread
 - In one study, spores were found in 78% of the rooms occupied by patients with CDI, 59% of carriers, and 24% of CD culture negative patients
- Sporicidal Options
 - Sodium hypochlorite/bleach (B) – 5500 ppm
 - Caustic to the environment as well as
 - Furniture, mattresses, equipment, etc.
 - Leaves a salt precipitate upon evaporation
 - H₂O₂ +/- Peracetic/Peroxyacetic acid (PA)
 - EPA approval for use in healthcare settings
 - Decreased disinfectant contact time with addition of PA - ≤ 5 minutes
 - Disrupts cell wall permeability
 - H₂O₂/PA use has been limited because of its vinegar odor.



Sodium Hypochlorite (B) vs H₂O₂/PAA

	Sporicidal	Contact Time	Precipitate	Smell	Multi – step cleaning	Cost per wipe
Sodium Hypochlorite (B)	Yes	10min	Salt left on surfaces	Bleach	Yes	~\$0.18
H ₂ O ₂ /PA	Yes	5min	None	Vinegar	No	~\$0.10

Objective

To determine if H₂O₂/PA was an acceptable sporicide for use in healthcare and determine if the CD HAI rate was affected by the disinfectant change.

Methods

- B and H₂O₂/PA disinfectants were utilized over time across the same patient care areas.
 - Period 1 (B) = 1/06 – 11/12 (71 months)
 - Washout (W) = 12/12 – 7/13 (8 months) - both products used.
 - Period 2 (H₂O₂/PA) = 8/13 - 4/14 (9months)
- CD HAI rates were compared in all time periods
- Environmental Service (EVS) Surveys were conducted in P2



H₂O₂/PA Implementation

- Education
 - Content
 - Efficacy
 - Safety
 - Vinegar smell
 - “The new smell of clean”
 - Audience
 - EVS
 - Nursing/Point of Care Staff
- Engagement
 - Clinical Administration
 - Medical Administration
 - Clinicians
 - Support staff
- Promotion
 - Infection Preventionists (IPs)
 - Environmental Service (EVS)
- Encouraged feedback



Administration

- Developed the team to evaluate sporicidal products that are less damaging to the environment.
- Facilitated
 - product purchase
 - implementation
- IP communications
 - Screen Savers
 - Meetings

Infection Prevention

- Rounded on the units and spoke to the Environmental Support Services staff
- Wore “New Smell of Clean” shirts to leadership meetings
- Email communicated to unit staff about the launch of new product
- In-service Environmental Support staff biannually about high touch areas

Product Company

- Dispenser Installation
- In-services
- Train the Trainer
- All Supervisors trained

Environmental Support Services

- Monitored use
- Monitored environment
- Surveyed for likability and usability
- Education
 - Contact time
 - Precautions
 - Smell

Results

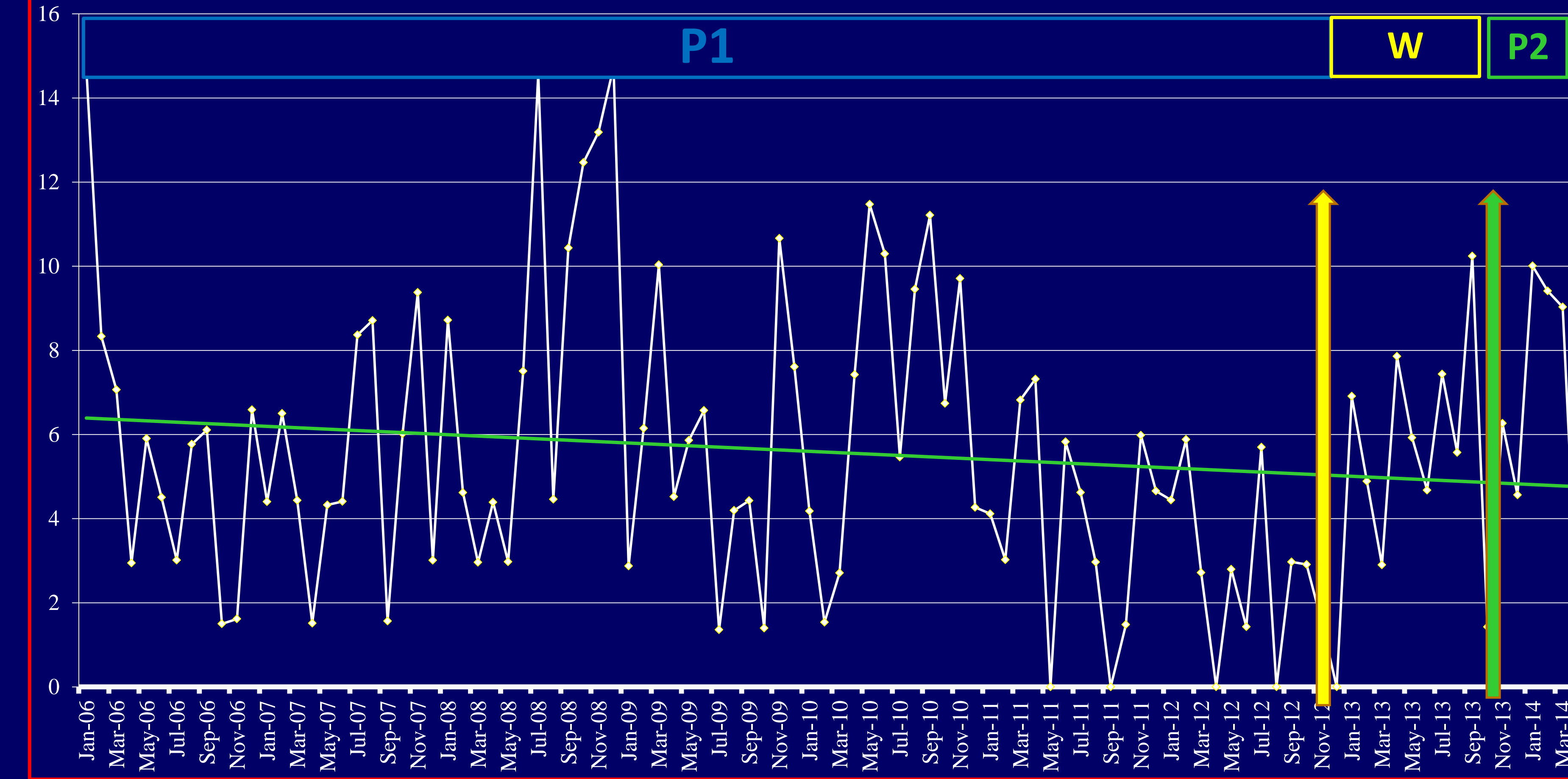
- P2 Survey results
- Overall perception of less damage to the environment
- Odor appreciated but diffused quickly
- Environment appeared cleaner

Period	Disinfectant	Dates	# CD HAIs	Patient Days	CD HAI Rate	Slope (m)	Y intercept (b)
1	B	1/06-11/12	313	565,571	5.5	-0.0001	+5.1
2	B+H ₂ O ₂ /P	12/12-7/13	28	59,712	4.7	0.0021	+87.8
	H ₂ O ₂ /PA	8/13-4/14	39	60,768	6.4	-0.000002	+0.7

- HA CDI rates (based on NHSN surveillance definitions) were not significantly different after switching to H₂O₂/PA products (OR=0.86, CI,0.61-1.2, p=0.43).
- WP CD HAI rate was similar to P1 and P2.



Hospital Acquired C diff Rate Per 10,000 Patient Days



Conclusions

- H₂O₂/PA products were **not** associated with a significant increase in CD HAIs.
- IPs, EVS and Administration were instrumental in promoting the “NEW SMELL OF CLEAN.”
- To date there has been no damage to furniture or equipment, there is no precipitate to remove and the patient care area appears cleaner.
- Staff were particularly fond of the 1 step cleaning
- Despite the change in smell, staff were accepting of the H₂O₂/PA product.

THE NEW SMELL OF CLEAN!

Hydrogen Peroxide and Peroxyacetic acid based cleaner
Breaks down into vinegar and water
Kills C DIFF spores in 3 minutes
Leaves no visible residue