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Investigation of *Clostridium difficile* Infection (CDI) and Prevention Measures to Prevent Transmission

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Background

In June 2008, the Centers for Disease Control (CDC) published new surveillance definitions for CDI.

After classifying 34 cases in FY08 and calculating a rate by patient days, a multidisciplinary team was formed to address an increase in healthcare acquired CDI, especially on one nursing unit. A medical record review of CDI cases was conducted and infection control measures implemented. Measures included special room decontamination with a dri-mist system deploying a quaternary ammonium disinfectant (QD) and use of germicidal bleach wipes to prevent further transmission. CDI patients were also left on contact precautions for the entire hospitalization.

Objective

To analyze cases of CDI diagnosed in 2008, the nursing units where they occurred, patient risk factors and prevention and control measures on the healthcare acquired CDI rate by patient days.

Materials and Methods

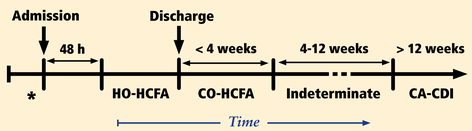
The team included representatives from infection control, nursing, microbiology laboratory, gastroenterology, surgery and environmental services.

A CDI case is defined as a case of diarrhea or toxic megacolon without other known etiology that meets or more of the following criteria:

1. The stool sample yields a positive result of a laboratory assay for C. difficile toxin A and/or B, or a toxin-producing C. difficile organism is detected in the stool sample by culture or other means;
2. Pseudomembranous colitis is seen on endoscopic examination or surgery;
3. Pseudo- membranous colitis is seen on histopathological.

CDC Surveillance Classification for CDI

Differentiating Healthcare–associated From Community associated *C. difficile* Infection



HO: Hospital (Healthcare) onset
CO-HA: Community Onset Healthcare-associated
CA: Community associated

* depending upon whether patient was discharged within previous 4 weeks, CO-HA vs. CA

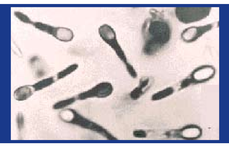
In August the hospital contracted with a company that uses a room decontamination dri-mist system deploying a quaternary ammonium disinfectant (QD). It has EPA approval for C. difficile spore efficacy. Nineteen rooms on the affected nursing unit were decontaminated over a 3 day period. In addition, environmental services instituted the use of germicidal bleach wipes for all precaution isolation rooms, a new policy required patients be transferred on stretchers or wheelchairs (and not beds) and all CDI cases were on precautions for the length of hospitalization. The team developed a data collection tool and reviewed 32 medical records and classified them according to the new CDC definitions and analyzed risk factors in the infected patients. (Two records were not available for review).

How it Works?

ZIMEK is a Room and Vehicle Decontamination System Dri-Mist® Micro-Particle Generator that breaks down disinfectant solution into microscopic, negatively charged ion particulates.

These particulates are so small (smaller than one micron in diameter) that they can access ALL surfaces of a room.

Because these particulates are negatively charged, they stick to positively charged contaminants and kills them.



Information on *Clostridium difficile*

Most reports of increases in the incidence and severity of CDI have been associated with the BI/NAP1/027 strain of C. difficile.This strain produces more toxins A and B in vitro than do many other strains of C. difficile, produces a third toxin (binary toxin), and is highly resistant to fluoroquinolones.

C. difficile on a gloved hand

C. difficile spores can survive up to 70 days in the environment and can be transported on the hands of health care personnel who have direct contact with infected patients. The spores also contaminate environmental surfaces (floors, bedpans, toilets, stretchers, electronic thermometers, etc.)

Results

Month	Hosp Onset	Community Onset - HAI	Indetermi-nate	Community acquired	TOTAL
Oct	1	2	1	1	5
Nov	3		1	3	7
Dec	1	2	0		3
Jan	1		0		1
Feb				2	2
Mar	1	1	1		3
Apr					0
May					0
Jun	1	1			2
Jul	2				2
Aug	1	1		1	4
Sep	2			3	5
TOTAL	13	8	3	10	34

Results

In FY2008, There were 34 CDI infections in 28,914 patient days (1.17). 21 (62%) were healthcare associated with a rate of 0.7/patient days. 13 of the 21 (62%) occurred during hospitalization and 8 (38%) occurred within four weeks of discharge. The remaining 13 cases were community onset. One nursing unit cared for 17 of the 34 CDI patients and 12 were healthcare acquired (71%). Therefore a thorough decontamination of that unit was completed over a 3 day period.

Risk factors in the CDI patients

- Proton pump inhibitors 13 (67%)
- Cancer 12 (35%)
- Fluorquinolones use 9 (26%)
- Obesity 9 (26%)
- CT Scan before onset 6 (18%)
- MRSA Colonization 5 (15%)
- VRE Colonization 3 (9%)
- Diabetes 3 (9%)

Follow-up after infection control measures

During the first eleven months of FY2009, there were 21 CDI with a rate of 0.8/26081 patient days. 14 were healthcare associated (67%) and only 4 (28%) occurred on the original nursing unit under investigation.

CDI Rate by Patient Days and Patient Admissions

#CDI	RATE/PATIENT DAYS		RATE/ADMISSIONS
FY08	34	28,914 (1.17)	7152 (0.5%)
FY09(Aug)	21	26,081 (0.80)	6471 (0.3%)

Conclusions

Over a six month period, we have achieved a sustained control of a CDI outbreak after implementing prevention and control measures. We incorporated the use of a room decontamination dri-mist system, cleaning environmental surfaces and equipment with germicidal bleach wipes, and heightened education. This suggests that patient-to-patient and environmental spread may be a more important cause of increased CDI rates.

References

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