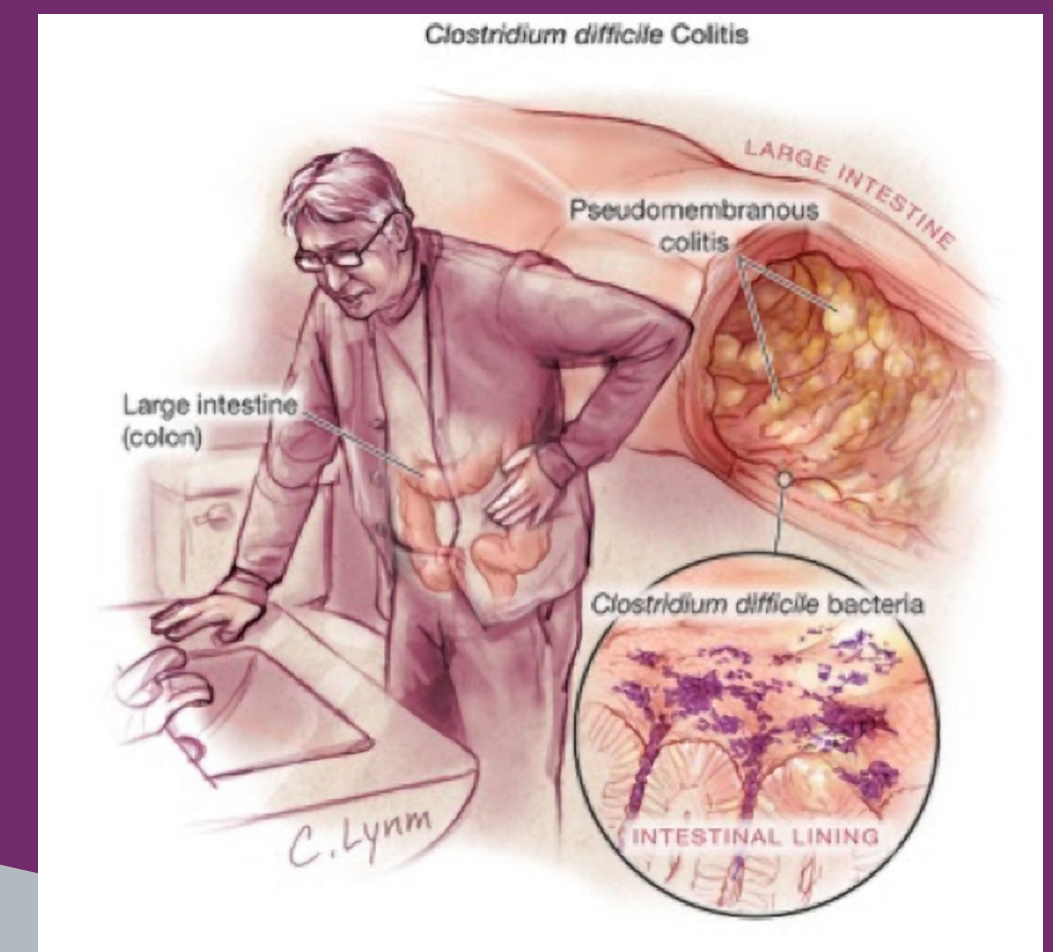


EXPANDING THE *C. difficile* INFECTION PREVENTION BUNDLE TO INCLUDE PATIENT HAND HYGIENE

UNIVERSITY OF PITTSBURGH MEDICAL CENTER
UPMC SHADYSIDE HOSPITAL • PITTSBURGH, PA

• J. Feigel • M. Pokrywka • B. Douglas • A. Hensler • S. Grossberger



ABSTRACT

Issue: Clostridium difficile (CD) is one of the most prevalent, virulent and costly pathogens of the last decade. CD infections have contributed to increased length of stay, adverse outcomes including colectomy and ICU transfer, an attributable mortality rate of 6.9% at 30 days after diagnosis (16.7% at 1 year) as well as an estimated healthcare cost of 3.2 billion dollars per year. Prevention strategies for Clostridium difficile (CD) infection prevention in hospitals have addressed barrier precautions, environmental disinfection, and healthcare worker hand hygiene (HH). When applied as a "bundle" this approach is a widely utilized, evidenced-based strategy to prevent CD infection. Despite utilization of the bundle, infection rates for CD remain high in many institutions.

THE PROJECT

The University of Pittsburgh Medical Center (UPMC) Shadyside Hospital is a 520 bed tertiary care and teaching facility with a specialty in oncology and stem cell transplant and a history of proactive initiatives to prevent hospital acquired infections. Strategies to control CD began in 2007 with interventions grouped into an "evidence-based bundle". Interventions included early detection of CD cases by toxin testing of any patient with onset of unexplained diarrhea, electronic alerts on positive toxin results to initiate barrier precautions with glove and gown use, staff HH with soap and water as opposed to alcohol sanitizer, extended duration of isolation for entire hospital stay, staff and patient education and cleaning of all patient rooms with an approved cleaning product followed by sodium hypochlorite (bleach) to sanitize all high touch surfaces. In 2009 the hospital expanded this bundle to include a patient HH intervention that provided opportunities for handwashing prior to meals and throughout the day. Incidence of CD infection was followed for FY10 (July 2009 to June 2010) after full implementation of the patient HH intervention.

BACKGROUND

Clostridium difficile (CD) is the most common cause of acute care hospital-acquired diarrhea, accounting for about 15-30% of all cases of antibiotic-associated diarrhea and more than 300,000 cases per year occurring nationally. The incidence has been reported to vary from 1 to 30 cases per 10,000 patient discharges. CD antibiotic associated disease is directly linked to healthcare antibiotic exposure and fecal oral transmission of CD spores to the patient from the hospital environment. Severe disease has been reported to occur in about 3% of infected patients and is associated with adverse events including toxic megacolon, perforation, colectomy, and death. A recent study of the cost of CD infection in hospitalized patients demonstrated a 41% increase in hospital cost when comparing non-CDAD hospitalizations to CDAD hospitalizations.

A multidisciplinary team including infection prevention/control, clinical nursing, pharmacy, housekeeping, microbiology laboratory, nursing administration and infectious disease was responsible for the implementation of a CD prevention bundle. The CD bundle included early identification of toxin positive patients, electronic alerts, isolation precautions, housekeeping procedures, bleach cleaning, and staff hand hygiene. In early 2009 the CD Prevention Team began to discuss ideas to enhance the prevention bundle. Those ideas included the following:

- Emphasis on interrupting fecal oral transmission with patient hand hygiene (HH) as a new prevention intervention
- Patient HH focus for all inpatient units including HH assistance for patients unable to get out of bed to get to a sink
- Use of disinfectant wipes (hand wipes) on the dietary tray to encourage HH for patients before meals
- Cooperative effort with Dietary to teach the dietary techs to encourage before meal HH
- Promoting awareness of CD issues at the unit level by providing unit-based CD feedback and education

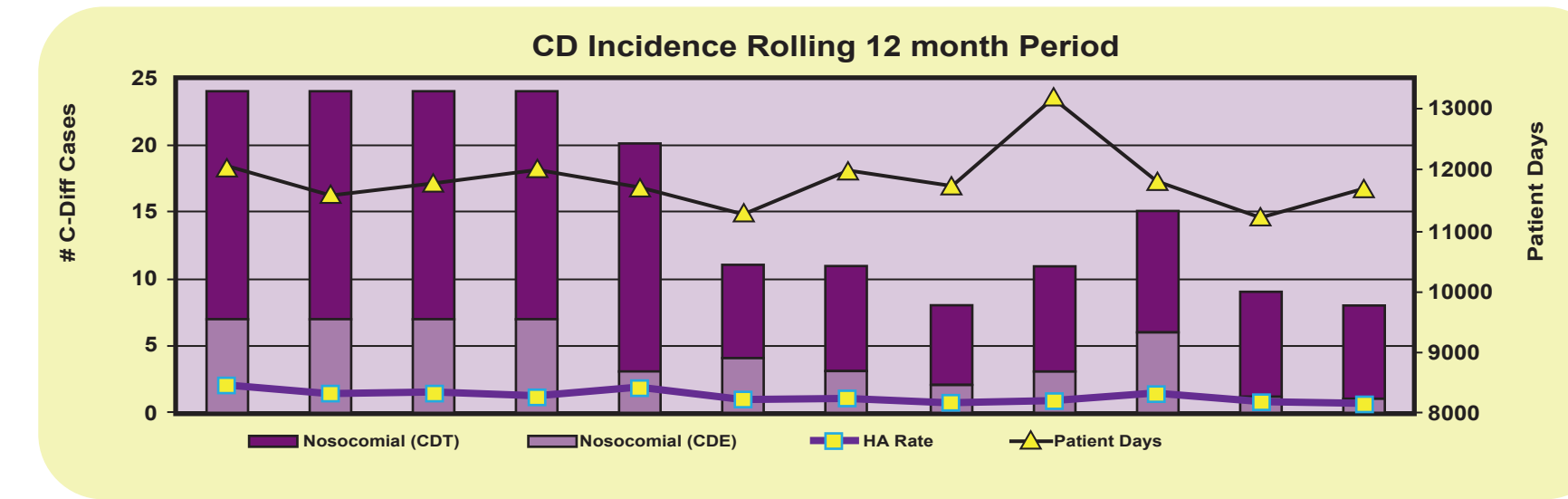


PURPOSE

- To decrease the incidence of *C. difficile* (CD) disease in the UPMC Shadyside patient population in FY2010
- To interrupt fecal oral transmission of *C. difficile* spores from the hospital environment to the susceptible patient by adding patient hand hygiene to the prevention bundle



BASELINE DATA



CD Monitoring Data	Jul 08	Aug 08	Sep 08	Oct 08	Nov 08	Dec 08	Jan 09	Feb 09	Mar 09	Apr 09	May 09	Jun 09	FY08	FY09
Hospital Acquired (CDE)	7	3	1	1	3	4	3	2	3	6	1	1	46	35
Hospital Acquired (CDT)	17	13	16	13	17	7	8	6	8	9	8	7	138	129
Incidence	24	16	17	14	20	11	11	8	11	15	9	8	184	164
Patient Days	12054	11582	11787	11985	11717	11289	11981	11753	13189	11806	11235	11682	143372	142060
Incidence CDE and CDT/pt days x 10,000	19.9	13.8	14.4	11.7	17.1	9.7	9.2	6.8	8.3	12.7	8.0	6.8	13.0	11.5

Incidence of CD infection had decreased slightly in FY09 but further improvement was needed to prevent disease and adverse outcomes in patients.

METHODS

- Use multidisciplinary team to study factors affecting fecal oral transmission of CD in the hospital and identify interventions to prevent CD infection
- Obtain baseline data on FY09 CD incidence including number of cases meeting the traditional CD case definition (CDT) and an expanded case definition (CDE) including patients who had prior admission within 3 months
- Introduce new interventions as outlined by the CD multidisciplinary Prevention Team
- Monitor monthly CD incidence and react to any increased rates with education and reminders
- Compare FY10 CD incidence to FY09 incidence • Apply Chi Square test for statistical significance

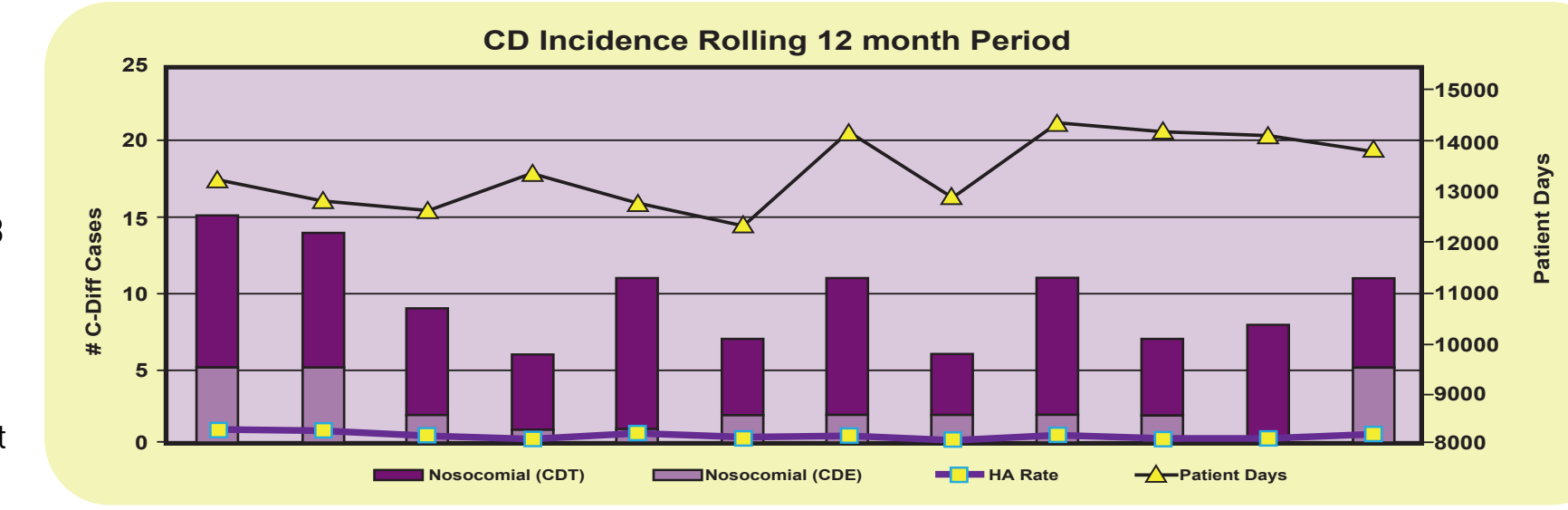
INTERVENTIONS IDENTIFIED TO TARGET FECAL ORAL TRANSMISSION

- Utilize multi-disciplinary approach for planning strategies to address CD prevention
- Expand the CD infection bundle to include patient HH
- Maximize patient hand hygiene on clinical units using unit staff, Elder Care Program, volunteers and family members
- Introduce larger hand wipes with alcohol for patient hand hygiene before meals for physical removal of spores and bacterial killing
- Develop Patient Unit -based ideas to enhance patient HH



OUTCOME RESULTS

The CD infection rate during the intervention period was 6.95 per 10,000 patient days (116 cases/ 166,838 patient days) in comparison to the FY09 rate of 10.45 (164 cases /156,956 patient days). Application of a Chi-square test was significant at p=0.0009. The expanded bundle resulted in a statistically significant decrease in the CD infection rate.



CD Monitoring Data	Jul 09	Aug 09	Sep 09	Oct 09	Nov 09	Dec 09	Jan 10	Feb 10	Mar 10	Apr 10	May 10	Jun 10	Jul 10	FY09	FY10
Hospital Acquired (CDE)	5	5	2	1	1	2	2	2	2	2	0	1	7	35	29
Hospital Acquired (CDT)	10	9	7	5	10	5	9	4	9	5	8	6	2	129	87
Incidence	15	14	9	6	11	7	11	6	11	7	8	11	9	164	116
Patient Days	13246	12829	12655	13364	12765	12372	14166	12892	14359	14198	14102	13848	13368	142060	160799
Incidence CDE and CDT/pt days x 10,000	11.3	10.9	7.1	4.5	8.6	5.7	7.8	4.7	7.7	4.9	5.7	7.9	6.7	11.5	7.2

From FY09 to FY10 the CD incidence rate decreased from 11.5 to 7.2 with 48 fewer cases of CD over the 12 month period or a decrease of 29% in CD occurrence despite high patient census.

We would like to extend a special thanks to the members of the CD Prevention Team and Dr. Weber for their ongoing support!

INTERVENTION TIMELINE

- JAN - JUNE 2009 (preliminary work)**
- Multidisciplinary Team meets monthly for planning and decides to focus on patient HH measures for FY2010
 - Pilot project on patient HH on 4Main and discussion of enforcing HH before meals discussed at Team meetings
 - Changing antimicrobial towelette on dietary tray to larger towel with higher alcohol content to facilitate physical removal of spores from patient hands
 - Student nurses carry out patient HH activity as school project on 7 West
 - Signage designed for patient HH on 7 Main rooms for additional cues to patients and staff for expanding the prevention bundle

- JULY 2009**
- Volunteer Services and Elder Care Program receive education and begin assistance with patient HH during their daily visits

- SEPT 2009**
- H1N1 pandemic helps to encourage HH throughout the hospital

- OCT 2009 - MAY 2010**
- Monitoring and reporting results on a monthly basis at Team meetings

- JUN 2010**
- Wrapping up and analyzing results of interventions
 - Planning for next year and thinking about future interventions

CONCLUSIONS AND LESSONS LEARNED

- Interrupting routes of transmission of infectious conditions is key to infection control in hospitals. CD transmission can be interrupted at the bedside with mechanisms that prevent the fecal oral route of transmission.
- Applying the CD bundle and expanding the interventions to include patient HH can contribute to the reduction of CD infection in hospitalized patients.
- Patients confined to bed do not often have the opportunity to wash their hands in the hospital especially before meals. Patients need assistance, education, and verbal reminders, along with the encouragement of the nurse and other healthcare workers to perform HH and help to prevent transmission of CD spores in the hospital environment.
- It is difficult to ascribe success of a CD control program to any one intervention; however the expanded bundle that included patient HH significantly contributed to the decreased incidence of CD infection in our hospital.
- Applying the CD bundle and expanding the interventions to include patient HH can contribute to the reduction of CD infection in hospitalized patients. Patients confined to bed do not often have the opportunity to wash their hands in the hospital. Patients need assistance, education, and verbal reminders, along with the encouragement of the nurse to perform HH and help to prevent transmission of CD spores in the hospital environment. It is difficult to ascribe success of a CD control program to any one intervention; however the expanded bundle that included patient HH significantly contributed to the decreased incidence of CD infection in our hospital.

BARRIERS TO SUCCESS

- Dietary not placing alcohol wipes on the patient trays and losing the opportunity for patients to perform HH before meals.
- Dietary techs not taking the time to explain to the patient the use of the towelette for "before meal" hand cleansing
- Patients unable to open the towelette without assistance from the dietary tech or their nurse
- Patients unable to perform soap and water HH on their own and require assistance to complete task when staff may be busy with other activities

SUSTAINABILITY

- FY11 infection rate was maintained at 6.7 per 10,000 pt days
- FY12 rate is still being monitored. Rate as of April 2012 was 5.9 per 10,000 pt days



REFERENCES

- McDonald LC et al. Emerg Infect Dis. 2006; 12(3):409-151.
- Muto C et al Infect Control Hosp Epid 2005; 26:273-280.
- Dubberke ER et al Clin Infect Dis 2008; 46(4):497-504
- APIC Guide of the Elimination of *C. difficile* in Healthcare Settings, 2008
- Title page image citation: Illustrator Lynn C; Torpy J, et al. JAMA 2009; 301(9): 988.