

Clostridium Difficile

What is Clostridium difficile (C-diff)

- A spore forming, Gram-positive anaerobic bacillus
- Produces two exotoxins: toxin A & toxin B
- Common cause of antibiotic-associated diarrhea
- Accounts for 15-25% of all episodes of antibiotic-associated diarrhea

C-diff Facts

- CDI increases hospital length of stay by 2.8-5.5 days¹
- Costs of inpatient CDI in 2008 dollars have been estimated at \$3,006-\$15,297 per episode¹
- Patients are twice as likely to be discharged to a long-term care facility¹
- Mortality is estimated to be 5-10% leading to an estimated 14,000-20,000 deaths each year¹

1. Strategies to Prevent Clostridium difficile Infections in Acute Care Hospitals: 2014 Update. The Society for Healthcare Epidemiology of America, 35, 628-645.

What are the differences between C-diff colonization & C-diff Infection?

Colonization

- Patient exhibits **NO** clinical symptoms
- Patient tests positive for Clostridium difficile organism or its toxin
- More common than C-diff infection
- Very common in babies and children < one year of age

Infection

- Patient exhibits clinical symptoms
- Patient tests positive for Clostridium difficile organism or its toxin

Symptoms of C-diff

- Watery diarrhea
- Nausea
- Vomiting
- Abdominal pain/tenderness
- Fever
- Severe infection

C-Diff Pathogenesis

- Exposure to antibiotics disrupts normal microbiota of intestinal tract
- Ingestion of C-difficile spores occurs
 - Usually transmitted from other patients
- Incubation < 7 days-3 months after antibiotic therapy
 - Median time 2-3 days
 - Some cases develop with only one dose of an antibiotic

Transmission

- Spores persist in environment for months
 - Studies show 5 months on hard surfaces
 - Contamination of patient environment
 - Contamination of shared equipment
- HCP hands
- HCP cellular phones
 - studies implicate as reservoir

Transmission

- Fecal-oral route
 - Any activity that results in movement of organism into mouth
 - Activities implicated
 - Meals
 - Oral care/oral suctioning
 - Administration of feedings or meds

Transmission

- Other activities implicated
 - Emergency procedures (i.e. intubation)
- Poor hand hygiene practices
- Sharing of patient care items without appropriate disinfection
- Ineffective environmental cleaning

Sources of C-diff Organism

- Infected humans
 - Symptomatic
 - Asymptomatic carriers
 - Newborns
 - Children less than one year old
 - Estimated 3% of healthy, symptom-free adults
 - Colonization in hospital inpatients ranges from 7-26% (longer the stay, more likely colonization becomes)
 - Long-term care: 5-7% of patients colonized
- Inanimate objects previously contaminated with *Clostridium difficile*
 - Hard or soft surfaces
 - Shared equipment
- Environmental contamination increases with increasing severity of disease

Risk Factors

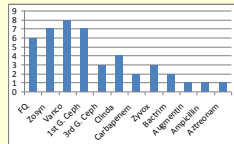
- Antibiotic exposure
- Multi class & longer course
- Most commonly
 - Clindamycin
 - 3rd generation Cephalosporins
 - Fluoroquinolones
- Exposure to single dose of antibiotic for pre-op prophylaxis has been associated with CDI
- Hospitalization: longer length
- Advanced age
- Gastric suppression (PPIs)
 - Feb2012 FDA communication: Important role in patients with minimal or no ATB exposure
- GI surgery/manipulation
- NG tube
- Gastric suppression
- Immunocompromised
- Steroid use

FY'13-'14 Hospital Acquired C. Diff. Infections – Audit Summary

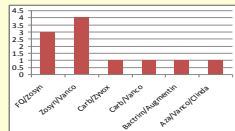
- 23 HAI to date
- Average age = 74
- Average length of stay prior to c. diff + test = 18 days
- 56% on PPI at home, 81% on PPI at GSH
- 100% had prior antibiotic exposure
- 2 patients had only one pre-op dose to prevent SSI

FY'13-'14 Hospital Acquired C. Diff. Infections – Audit Summary

Class exposure varies



Antibiotic Combinations



Diagnosis

- Test patients with 3 or more diarrhea stools within 24 hour period
- Some recommend testing diarrhea of >12 hour duration

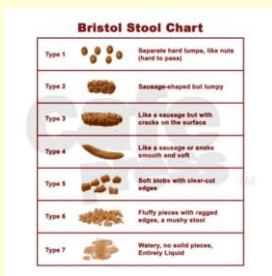
Lab testing

- PCR technology used at GSH (highly sensitive and specific for presence of toxin producing *Clostridium difficile* organism)
- Only test loose, watery stools
- Do not test for cure
- Routine repeat testing discouraged: do not repeat within 7 days of initial test
- Lab will auto reject if test ordered < 7 days after initial test.

Bristol Stool Chart

- Standardized documentation tool for charting stool consistency
- Accurately describes stool consistency
- Nursing should chart stools of any patient with diarrhea using Bristol Stool chart (currently documented in Shift Summary)
- Lab will test only Type 6 and Type 7 stools

Bristol Stool Chart



Stool Documentation

Stool Output

Last BM:

Output last 12 hours

of Stools:

Stool Amt:

Stool Volume:

Rectal Tube:

>3 BMs today:

Pt reports bowel patterns are normal for them: ☐

Bristol Stool Chart:

Stool Description:

Color:

- Implemented new stool documentation screen in the Fall of 2014
- Screen contains prompts for staff to question patient's bowel patterns
- Area to document Bristol Stool Chart

Treatment

- DC causative antibiotic
- Metronidazole (Flagyl)
 - Metronidazole (Flagyl) 500mg po every 8 hours for 10 days
 - Secreted into colon, not just "passing through" GI tract: 6-15% of dose secreted into bowel
- Vancomycin (oral or rectal)
 - 125mg po every 6 hours for 10 days
 - Results in colon levels of 63-760mcg/g on day 2 & 152-880 mcg/g on day 4
 - Retention enema dose 500mg in 100ml normal saline as retention enema every 6 hours
 - Flexiseal: instill & clamp off for period of time
 - Use caution if distended colon: risk of perforation
- Fidaxomicin
 - 200mg po bid for 10 days
- Do not give antimotility agents

C-Diff Order Set

C-DIFF (Clostridium Difficile) ORDER SET

Good Samaritan Hospital
Beverly Hills, CA 90212

1. Patient Information

MRN: _____
 Name: _____
 DOB: _____
 Sex: _____
 Race: _____
 Ethnicity: _____
 Address: _____
 City: _____ State: _____ Zip: _____
 Phone: _____
 Email: _____

2. History

Chief Complaint: _____
 History of Present Illness: _____
 Past Medical History: _____
 Past Surgical History: _____
 Allergies: _____
 Current Medications: _____
 Social History: _____
 Family History: _____

3. Physical Examination

General: _____
 Vital Signs: _____
 HEENT: _____
 Chest: _____
 Abdomen: _____
 Rectal Exam: _____
 Extremities: _____
 Neurological: _____
 Skin: _____

4. Laboratory Tests

Complete Blood Count (CBC) _____
 Comprehensive Metabolic Panel (CMP) _____
 Stool Culture _____
 Stool for Clostridium Difficile Toxin (CDT) _____
 Stool for Clostridium Difficile Toxin (CDT) _____
 Stool for Clostridium Difficile Toxin (CDT) _____

5. Orders

Metronidazole (Flagyl) 500mg PO every 8 hours for 10 days

Vancomycin 125mg PO every 6 hours for 10 days

Fidaxomicin (Dificol) 200mg PO bid for 10 days

6. Patient Education

7. Discharge Instructions

8. Follow-up

9. Other

10. Signature

Physician Signature: _____
 Date: _____

Severity-Based Treatment*

- Initial episode, mild or moderate disease (fever, leukocytosis < 15,000 and serum creatinine < 1.5 times baseline)
 - Metronidazole (Flagyl) 500mg PO every 8 hours for 10 days
- Initial episode, severe (fever, leukocytosis > 15,000 or serum creatinine > 1.5 times baseline) or moderate with comorbid illness
 - Vancomycin 125 mg PO every 6 hours for 10 days OR 250 mg PO every 6 hours for 10 days
- Initial episode, severe complicated (hypotension or shock and/or known or suspected ileus or toxic megacolon)
 - Consider Infectious Disease consult or Surgical consult.
 - Vancomycin 500mg PO every 6 hours for 14 days and Metronidazole (Flagyl) 500mg IVPB every 8 hours. Change to oral route when tolerated.
- Recurrent episode (re-appearance of CDI within two months of previous episode)
 - Utilize same antibiotic used for initial episode or Fidaxomicin (Dificol) 200mg PO twice daily for 10 days

* Taken from C-Diff Order Set

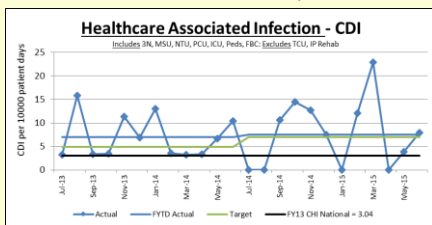
What complications result from C-diff infection?

- Pseudomembranous colitis
- Toxic megacolon
- Perforations of the colon
- Sepsis
- Death

Surveillance

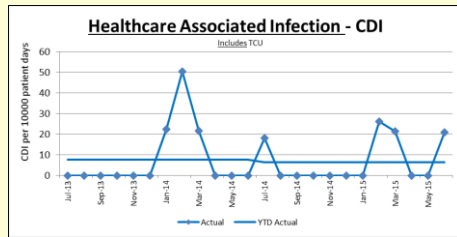
- Identify patients with diarrhea
- Implement contact precautions for all patients with diarrhea until C-diff testing completed & C-diff ruled out

GSH C-diff rates, Acute



		Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	
FY14	CDI	3	5	1	1	3	2	4	1	1	1	2	3	25
	Patient Days	3134	3162	2892	2898	2649	2912	3081	2825	1092	3038	3013	2882	35678
	CDI Rate	3.2	15.8	3.3	3.5	11.3	6.9	13.0	3.5	3.2	3.3	6.6	10.4	7.01
FY15	CDI	0	0	3	4	3	2	0	3	6	0	1	2	24
	Patient Days	2958	2949	2817	2760	2357	2670	2692	2490	2622	2548	2596	2530	31989
	CDI Rate	0.0	0.0	10.6	14.5	12.7	7.5	0.0	12.0	22.9	0.0	3.9	7.9	7.50

GSH C-diff rates - TCU



	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
FY14												
CDI	0	0	0	0	0	0	1	2	1	0	0	4
Patient Days	472	414	441	429	421	433	447	397	460	459	421	5304
CDI Rate	0.0	0.0	0.0	0.0	0.0	0.0	22.4	50.4	21.7	0.0	0.0	7.54
FY15												
CDI	1	0	0	0	0	0	1	1	0	0	1	4
Patient Days	549	540	630	606	544	551	458	381	469	440	468	479
CDI Rate	18.2	0.0	0.0	0.0	0.0	0.0	26.1	21.3	0.0	0.0	20.9	6.53

Infection Control Practices

- Initially isolate all patients with diarrhea until stool specimen obtained & CDI ruled out
- Contact precautions
 - gown & gloves
- Hand hygiene
 - Use soap & water to mechanically remove spores
 - Place Stop Sign over alcohol hand foam dispenser
 - Note: Spores are not killed by soap & water; MUST mechanically remove them by friction.
 - Do not short change time & friction when washing

Infection Control Practices

- Room cleaning with bleach
- Discontinuation of isolation after 48 hours of formed stools
 - Must have Infection Control approval
 - Patient showers and is moved immediately to clean room
 - Isolation not discontinued if clean room not available

Prevention: Pharmacy

- Restriction of certain antibiotic classes
- Formulary changes to promote use of narrow spectrum antibiotics
- Ensure appropriate antibiotic use
- Monitor for narrowing, de-escalation & appropriate duration of therapy
- Provide feedback on adherence to guidelines
- Antimicrobial Stewardship

Cleaning & Disinfection

- 1:10 dilution of bleach solution daily & on discharge
- Focus on high touch surfaces
- Frequency & intensity of cleaning based on patients level of hygiene & degree of environmental contamination (incontinence)
 - Nursing should notify EVS of incontinence
- Heaviest contamination bathrooms & floors
- Privacy curtains: are always changed on terminal clean of C-diff room

Cleaning & Disinfection

- Clean/disinfect all patient care equipment
 - Leave equipment in CDI room
 - Note: if unable to leave equipment in room MUST disinfect with bleach wipes
- Reusable equipment cleaned between uses with bleach wipes
- EVS: Monitors cleaning process & samples cleanliness in all CDI rooms

Adequacy of EVS Cleaning

- Dazo routinely used on patient rooms to spot check adequacy of cleaning
- ATP utilized to verify adequacy of cleaning
- Pass if less than 250
- Initial samples done before cleaning with repeat after housekeeper cleaned room

Initial ATP Testing

- 4/1/2014: initial room test: before cleaning
 - Bedrail: 162
 - Pillow: 42
 - Floor: 1,071
- After cleaning:
 - Sharps - 32
 - RR door knob - 59
 - Toilet flush - 27
 - Call light - 48
 - Bed rail - 22
 - Door knob room - 63
 - Phone - 40
 - Bed controls at foot of bed - 24
 - Light switch - 27
 - RR grab bar - 91
 - Floor - 89

Repeat ATP Testing

4/4/2014 Room 3225

- Bathroom door knob: 16
- Toilet flush handle: 16
- Nurse call light: 23
- Bedrail: 98
- Door knob (inside room): 27
- Phone: 42
- Bed control (foot of bed): 3537
- Bed control (left side of bed): 81
- Light switch: 51
- Grab bar (bathroom): 18
- Sharps container: 52

4/4/2014 Room 6203

- Bathroom door knob: 24
- Toilet flush handle: 46
- Nurse call light: 46
- Bedrail: 37
- Door knob (inside room): NA
- Phone: NA
- Bed brake pedal: 8356
- Bed control (left side of bed): 36
- Light switch: 38
- Grab bar (bathroom): NA
- Sharps container: 51



EVS Summary

- On initial testing areas that showed elevated numbers: foot of bed, brake pedal & floor
 - Processes intensified with no touch points failing
- 
