Unintended Consequences

Clostridium Difficile Infection

The enclosed material was prepared and assembled by DFWHC Foundation Hospital Engagement Network, under contract with the Centers for Medicare and Medicaid Services (CMS), an agency of the U.S. Department of Health and Human Services, Partnership for Patients Initiative. Contract #HHSM-500-2012-0025 Hospital Engagement Network
Everything I needed to know, I learned in Kindergarten.
What are we talking about?

Clostridium difficile

• 1935 Bacillus difficilis – difficult to grow in culture
• 1970 Clostridium difficile – from the Greek word “Kloster” to spindle and difficult to grow in culture

• Getting technical
  • Gram-positive rod
  • Spore forming
  • Pathogenic strains forming toxins
  • Strict anaerobic bacillus
Clostridium difficile, it’s all around us

Solid animal waste:
- Cows
- Pigs
- Cats
- Dogs
- Rodents

Environment:
- Sand
- Soil
- Hay
The Healthcare Environment
Colonization in Human Populations

- Birth to 1 month – 37%
- 1 month to 6 months – 30%
- Healthy Adults – 2 to 5%
- Hospitalized Adults – 20%
MRSA (Methicillin-resistant *Staphylococcus aureus*) was bad enough

MRSA killed by hospital approved cleaning products and alcohol based hand gel

MRSA does not make spores

MRSA (Methicillin-resistant *Staphylococcus aureus*) has been surpassed by *Clostridium difficile* as the most common HCAI in the USA
Clostridium Difficile Infection Close to Home

Texas Hospital Discharges
- 5.19 / 1000 patient discharges (2000 – 2009 combined)
- 6.36 / 1000 patient discharges (2009)

Texas by County
- Tarrant 5.30 / 1000
- Dallas 5.02 / 1000
So What?

Estimated attributable mortality from CDI (Clostridium Difficile Infection) 5 to 10%

United States Deaths / Year
- 14,000 to 20,000

Texas Deaths Increasing
- 1999 – 50
- 2005 – 274
Not my Facility
(Texas cases/1000 discharges)

General Acute Care 6.05
Teaching 5.13
Long term acute care 65.27
Rehabilitation 14.48
Children’s 3.93
We all Pay

Clostridium Difficile Infections cost approximately $10,000/case
CDI cost the US Healthcare system $1.0 – 4.9 billion dollars each year
Increases hospital length of stay from 2.8 – 5.5 days
Risk Factors for Clostridium Difficile Infection

Primary

Age
• Over 65
• Under one-year with comorbidity or underlying condition

Gender
• Male

Prolonged Hospital Stay

Exposure to antibiotics
• 2013 meta-analysis demonstrated an increased odds ratio with clindamycin, fluoroquinolones, cephalosporins, monobactams, and carbapenems use
Risk Factors for Clostridium Difficile Infection Secondary to Comorbidity or underlying conditions including:

- Inflammatory bowel disease
- Immunodeficiency and HIV
- Malnutrition
- Serum albumin <2.5g/dl
- Neoplastic disease
- Cystic fibrosis
- Diabetes
Clostridium Difficile Spores
Spore Formation

- Free endospore
- Vegetative cell
- Spore coat
- Mother cell
- Developing spore coat

ASM Digital Image Collection, Merkel
CDI Diagnosis & Public Reporting

(Timing is everything)

Community-Onset Healthcare Facility-Associated Infection (CO-HCFA CDI): Specimen collected as an inpatient < 3 days after admission to the facility (i.e., days 1, 2, or 3 of admission) and who was discharged from the facility < 4 weeks prior to date stool specimen collected.

Healthcare Facility-Onset Healthcare Facility Associated CDI (HCFO-HCFA CDI): Specimen collected and onset of symptoms > 3 days after admission to the facility (i.e., on or after day 4).

Community Associated CDI (CA-CDI): Specimen collected < 3 days after admission (i.e., days 1, 2, or 3 of admission) and who was not at the facility in the last 4 weeks.
Confused yet?
# Hospital Compare Data
(6 random acute care hospitals)

<table>
<thead>
<tr>
<th>Clostridium difficile (C.diff.) Laboratory-identified Events (Intestinal Infections)</th>
<th>Worse than the U.S. National Benchmark</th>
<th>Not AvailablefootNote(^{13})</th>
<th>No Different than U.S. National Benchmark</th>
</tr>
</thead>
<tbody>
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<td>Clostridium difficile (C.diff.) Laboratory-identified Events (Intestinal Infections)</td>
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<td>Better than the U.S. National Benchmark</td>
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</tbody>
</table>
Changing Epidemiology
(We didn’t know what we didn’t know)

Community-acquired Clostridium Difficile Infection
• 20% – 27% of all CDI cases
• 20 – 30 per 100,000 population
Risks for Community Acquired CDI

Exposure to antibiotics
- 78% versus 94%
- 27% more exposure for community acquired CDI than healthy controls

Gender
- Female versus male

Younger
- Median age 50 versus 72

Emerging Novel Risk factors
- Increased use of outpatient antibiotics & acid-suppressing medications
- Increased proportion of asymptomatic carriers
- Food and water contamination
- Epidemic (high toxin forming) Clostridium difficile strains
- Higher clinical awareness and testing
Signs and Symptoms
Clostridium Difficile Infection

- Watery diarrhea 3 or more in a 24 hour period
- Fever
- Loss of appetite
- Nausea
- Belly pain and tenderness
- Presence of blood or mucus in stool
Mild

A low-grade fever,
Mild diarrhea (5-10 watery stools a day),
Mild abdominal cramps and tenderness.
More often community acquired
Moderate to Severe Clostridium Difficile Infection

A high fever (temperature of 102 F to 104 F),
Severe diarrhea (more than 10 watery stools a day) with blood, and
Severe abdominal pain and tenderness.
Dehydration
Rupture of the colon
Peritonitis
Sepsis
Toxic Megacolon

- Leukocytosis (white blood cell count >20×10^9/L)
- Plasma albumin level <30 g/L
- Creatinine level >50% of baseline
- Hypotension (systolic blood pressure <100 mmHg)
- Fever (temperature >38°C)
- Abdominal pain and distension
- Radiological evidence of colonic dilation, ascites or ileus
Signs and Symptoms

R/T

Toxin A  B  Binary

Breaches the intestinal barrier
Causes inflammatory response
Damage intestinal mucosa
Results in disease state
Prevention
(an ounce of prevention is worth a pound of cure)

CORE Prevention Strategies
(every time every day)
- Early recognition of patients with CDI
- Isolation precautions
- Environmental cleaning and disinfection
- Antimicrobial stewardship

ENHANCED Prevention Strategies
(Core consistently performed, and/or)
- There is evidence of ongoing transmission of C. difficile
- There is evidence that CDI rates are not decreasing
- There is evidence of change in CDI pathogenesis (e.g. increased morbidity/mortality among CDI patients).
We all have a role in Prevention of CDI

Follow employers guidelines for staying home with communicable diseases, such as those involving diarrhea
Take antibiotics as directed and only when necessary
Perform hand hygiene as directed by facility policy and/or WHO-CDC guidelines
Speak up: Remind co-workers to perform hand hygiene when appropriate
Physicians (prescribers)

Antimicrobial Stewardship

Use gown and gloves when caring for suspected or known Clostridium difficile infected patients

Hand hygiene

Increase knowledge and awareness of CDI prevalence in your practice area

Routinely assess whether patients have had previous CDI
Clinical Care Staff & Support

Clinical Care Staff

- Place suspected or known CDI patients in contact precautions
- Communicate
- Model hand hygiene practices
- Educate patient / family / visitors

Pharmacist – Microbiology

- Share knowledge of antibiogram for facility and area
- Encourage narrowed antibiotic prescribing practices
- Provide prescribers with resources to focus antibiotic use
Environmental Services

Know don’t rush cleaning of high touch areas

If you don’t know ask: Is this a C. diff patient?

• When performing daily clean – Use cleaning product that kills C. diff spores (ex. bleach wipes/solution) for high touch areas
• Upon patient discharge – Clean room with product that kills C. diff spores
Community Awareness
DFWHC Foundation

Clostridium difficile infection public awareness campaign

Goal- Decrease CDI both in the DFW communities and hospitals
Promote overall positive health practices including hand hygiene and avoidance of unnecessary antibiotics
Resources

CDC.gov
Hospitalcompare.gov
C.diff prevention tool kit
www.stopcdiffnow.org
CDI Treatment Horizons

Vaccine to prevent CDI
Anti-toxin medications
GI microbial sparing medications
Currently in use – Focused antibiotic
  • fidaximicin
References


References


References


Everybody Scrub in Prevent CDI