CDI Management in Post-Acute Care: Part 1

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Speaker Disclosures

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The opinions presented herein are my own and do not represent those of the Veterans Affairs system or the federal government.
Outline

...some people poop more than others...

- Pathophysiology
- Risk Factors
- Diagnosis & Treatment
- Infection Control & Prevention
Pathophysiology
Clinical Disease

C. difficile Infection
- Non-severe
- Severe
- Severe, Complicated

Slide courtesy of Dubert Guerrero
Clinical Disease

C. difficile Infection
- Non-severe
- Severe
- Severe, Complicated

Asymptomatic Carrier

No C. difficile

Slide courtesy of Dubert Guerrero
Clinical Disease

C. difficile Infection
- Non-severe
- Severe
- Severe, Complicated

Asymptomatic Carrier

No C. difficile

Slide courtesy of Dubert Guerrero
Clinical Disease

Recurrent Disease

C. difficile Infection
- Non-severe
- Severe
- Severe, Complicated

Asymptomatic Carrier

No C. difficile

Slide courtesy of Dubert Guerrero
Clinical Disease

Recurrent Disease

C. difficile Infection
- Non-severe
- Severe
- Severe, Complicated

Asymptomatic Carrier

No C. difficile
Colonization Resistance

normal microbiome
Loss of Colonization Resistance

normal microbiome  systemic antibiotic
C. difficile Infection (CDI)

normal microbiome systemic antibiotic ingest spores
C. difficile Infection (CDI)

normal microbiome
systemic antibiotic
ingest spores
toxin production
Risk Factors
Antibiotics are the most important risk factor for developing *C. difficile* infection.
Facility Antibiotic Use Promotes Transmission

- 4-year retrospective cohort study
- Examined patient-level and ward-level risk factors

<table>
<thead>
<tr>
<th>Risk Factor</th>
<th>Relative Risk (95%CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antibiotic Exposure Rate (per 10% increase)</td>
<td>1.34 (1.16 – 1.57)</td>
</tr>
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</table>

- Antibiotics put the entire population at risk, even those that do not receive antibiotics

More Antibiotics Means More Risk of *C. difficile* infection

- ~400,000 adults admitted to 14 hospitals in 2011-2012
- ~2,600 with CDI (0.7%)

Antibiotic Classes

<table>
<thead>
<tr>
<th>Antibiotic Classes</th>
<th>Relative Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 vs. 0</td>
<td></td>
</tr>
<tr>
<td>2 vs. 0</td>
<td></td>
</tr>
<tr>
<td>≥3 vs. 0</td>
<td></td>
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*Tartof et al.* Infection Control & Hospital Epidemiology 2015; 36 (12): 1409
Steps You Can Take: Antibiotics
### Steps You Can Take: Antibiotics

**Avoid antibiotics when possible**

- **careful observation**
- Promote watchful waiting

**When you must use antibiotics...**

- Use shorter courses (≤ 7 days)
- Choose narrow spectrum agents
- Choose agents with less excretion into the GI tract
Advanced Age is the second most important risk factor for developing C. difficile infection.
Epidemic *C. difficile* Strain

Age-Related Vulnerability

- In 2010, >90% of deaths due to CDI were in people > 65 years.
- Aging leads to immune senescence.
- A poor antibody response to *C. difficile* correlates with infection.
- Older adults have a less diverse and less resilient gut microbiome.

Kelly Clin Microbiol Infect 2012; 18 Suppl 6:21-7
Biagi et al. PLoS ONE 2010; 5: e10667;
Steps You Can Take:

Advanced Age
Steps You Can Take:
Advanced Age

Fountain
Youth
Other Risk Factors

- Previous hospitalization
- Resident at a long-term care facility
- Underlying disease severity
- Albumin ≤ 3.5 g/dL
- Gastric acid suppression

McDonald et al. MMWR 2012; 61(9):157-62
Dial et al. JAMA 2005; 294: 2989-2995
Kyne et al. Age & Ageing 1999; 28: 107-113
Risk Factors for Recurrent Disease

<table>
<thead>
<tr>
<th>Predictor</th>
<th>Adjusted Hazard Ration</th>
</tr>
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<tbody>
<tr>
<td>Age &gt; 75 years</td>
<td>1.5 (1.1 – 2.0)</td>
</tr>
<tr>
<td>PPI* Use</td>
<td>1.5 (1.1 – 2.0)</td>
</tr>
<tr>
<td>Antibiotic reexposure</td>
<td>1.3 (0.9 – 1.7)</td>
</tr>
<tr>
<td>Length of Stay, per day</td>
<td>1.003 (1.002 – 1.004)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Indication for PPI Use</th>
<th>No. (%) (n = 191)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No indication</td>
<td>101 (53%)</td>
</tr>
<tr>
<td>Age &gt; 60 y w/ 2 other risk factors</td>
<td>39 (20%)</td>
</tr>
<tr>
<td>Upper GI bleeding</td>
<td>17 (9%)</td>
</tr>
<tr>
<td>GERD in previous 90 days</td>
<td>15 (8%)</td>
</tr>
</tbody>
</table>

*PPI = proton pump inhibitor
McDonald et al. JAMA Internal Med 2015; (online 3/2/15)
Steps You Can Take: Other Risk Factors

<table>
<thead>
<tr>
<th>Steps</th>
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</thead>
<tbody>
<tr>
<td>Stop PPIs unless truly needed</td>
</tr>
<tr>
<td>Avoid antibiotic re-exposure</td>
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<table>
<thead>
<tr>
<th>Worst Offenders</th>
</tr>
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<tbody>
<tr>
<td>Clindamycin</td>
</tr>
<tr>
<td>Fluoroquinolones</td>
</tr>
<tr>
<td>3\textsuperscript{rd}/4\textsuperscript{th} generation Cephalosporins</td>
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Take Home Messages

• Antibiotic exposure is the main risk factor for \textit{C. difficile} infection.

• Antibiotics disrupt the gut microbiome, an important and overlooked form of host defense.

• Proton pump inhibitors appear to increase the risk of recurrent \textit{C. difficile} infection.
Together, we can wipe out \textit{C. diff}

Let's doo it!

Thank you!

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