Prevalence and characteristics of *Clostridioides difficile* infection in Bangladesh

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**RESULTS**

**Background:** Epidemiology of *C. difficile* infection (CDI) in Bangladesh is unknown. We assessed the prevalence of CDI and hospital environmental contamination of toxigenic *C. difficile* in Bangladesh.

**Methods:** This was a prospective observational cohort study at 2 large tertiary care centers in Dhaka, Bangladesh, conducted from 01/2017 to 12/2017. Stool samples were collected from hospitalized adults with diarrhea and antimicrobial exposure within the past 30 days. Hospital environmental samples were collected by swabbing surfaces of common areas in the hospital. All samples underwent toxigenic culture.

**Results:** Of 208 stool samples, 18 (8.7%) were positive for toxigenic *C. difficile*, the proportion of which was similar between the two hospitals (8.5% vs 9.3%). Of 400 environmental samples, 45 (11%) were positive for toxigenic *C. difficile*, which was more common in patient care versus non-patient care areas (13% vs 7%, p = 0.053). Restrooms and surfaces proximal to patient beds were more likely to be contaminated with toxigenic *C. difficile* than surfaces not proximal to patient beds (p<0.001). Ribotypes present in ≥10% of stool isolates were 017 (38%), 053-163 (13%), and a novel ribotype not present in the library (FP435 [13%]). Common ribotypes in environmental isolates were 017 (22%), 053-163 (11%), and 106 (24%).

**Conclusions:** For the first time, we report the prevalence of CDI and ribotypes in at risk patients in Bangladesh. Rates and ribotypes are similar to other resource-rich and resource-limited countries.

**OBJECTIVE**

Assess the prevalence of CDI in at risk hospitalized patients and assess the hospital environment for contamination with toxigenic *C. difficile* in Bangladesh.

**METHODS**

**Study design and setting**
- 12-month (Jan-Dec 2017) prospective observational cohort study
- Bangabandhu Sheikh Mujib Medical University (BSMMU) & Dhaka Medical College and Hospital (DMCH) in Dhaka, Bangladesh

**Clinical stool sample collection**
- Inclusion: hospitalized adults with ≥3 loose stools in a 24-hour period and antimicrobial exposure within the past 30 days
- Patient screening performed by study physicians who assessed eligibility based on medical records and/or patient interview

**Hospital environmental sample collection**
- Swabbed areas commonly used by the public
- Surfaces swabbed using pre-sterilized cotton gauze lightly soaked with 0.85% NaCl
- Samples collected in a 50 ml pre-sterilized tube
- Categories of surface samples
  - Patient care vs non-patient care
  - Proximal vs not proximal to patient beds
  - Restrooms

**Microbiologic procedures**

- Stool samples initially tested for CDI using the *C. diff* Quick Check Complete at icddr,b and leftover stool samples stored at -80°C
- All stool and environmental samples sent to a central laboratory at University of Houston College of Pharmacy, Houston, TX for toxigenic culture, toxin PCR, and ribotyping

**Statistical analysis (SPSS version 25.0 for Windows)**
- Fisher’s exact test or χ² test for categorical data
- Mann-Whitney U for continuous data

**RESULTS**

**Table 1. Demographic data for all stool samples on day of sample collection**

<table>
<thead>
<tr>
<th>Variable</th>
<th>No toxigenic C. difficile (n=150)</th>
<th>Toxigenic C. difficile (n=18)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female sex, n (%)</td>
<td>77 (41)</td>
<td>10 (57)</td>
<td>0.217</td>
</tr>
<tr>
<td>Age, years, median (IQR)</td>
<td>45 (32-58)</td>
<td>39 (25-51)</td>
<td>0.222</td>
</tr>
<tr>
<td>Hospital</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BSMMU, n (%)</td>
<td>151 (79.5)</td>
<td>14 (78)</td>
<td>0.770</td>
</tr>
<tr>
<td>DMOI, n (%)</td>
<td>39 (20.5)</td>
<td>4 (22)</td>
<td></td>
</tr>
<tr>
<td>Length of prior hospital stay, median (IQR)</td>
<td>13 (7-23)</td>
<td>13 (7-26)</td>
<td>0.990</td>
</tr>
<tr>
<td>Duration of diarrhea, days, median (IQR)</td>
<td>2 (2-3)</td>
<td>3 (2-3)</td>
<td>0.704</td>
</tr>
<tr>
<td>Duration of previous antibiotics, days, median (IQR)</td>
<td>10 (7-17)</td>
<td>11 (5-20)</td>
<td>0.837</td>
</tr>
<tr>
<td>Number of patients in the same room, median (IQR)</td>
<td>13 (7-19)</td>
<td>19 (10-20)</td>
<td>0.063</td>
</tr>
<tr>
<td>Patient was receiving metronidazole, n (%)</td>
<td>52 (27)</td>
<td>4 (22)</td>
<td>0.785</td>
</tr>
</tbody>
</table>

**Figure 1A. Hospital environmental contamination of toxigenic C. difficile**

- Non-patient care area (n=131)
- Patient care area (n=269)

- p = 0.053
- 13%

**Figure 1B. Hospital environmental contamination of toxigenic C. difficile**

- Not proximal to patient bed (n=181)
- Proximal to patient bed (n=171)
- Restroom (n=48)

- p < 0.001
- 23%

**CONCLUSIONS**

- Prevalence of CDI in at risk hospitalized patients in Bangladesh is similar to prevalence of CDI in resource-rich and other resource-limited countries
- Increased awareness of CDI in resource-limited settings is needed to increase clinical suspicion, optimize infection control measures within local context, and regulate antimicrobial access and use.

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