Hospital-wide Evaluation of Probiotic Administration as Primary Prevention of *Clostridium difficile* infection (CDI) in a Tertiary Care Hospital

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**INTRODUCTION**

- In randomized controlled trials and meta-analyses, probiotics as primary prevention of CDI for antibiotic recipients have been effective
- A preparation containing three *Lactobacillus* spp. (*acidophilus*, *casei*, *rhamnosus*) has been evaluated in three prior RCTs and during a before-after quality improvement evaluation
- We performed a before-after evaluation of a quality improvement project and evaluated whether there was a reduction in CDI

**METHODS**

- Study Hospital: 694-bed teaching hospital
- Exclusions
  - Facility: neonatal, pediatric, and oncology units
  - Patient: leukopenia, pancreatitis, post-transplant, > 12 hrs. after initial antibiotic receipt
  - Time period: 12 month baseline (10/12- 9/13); 12 month intervention (11/13-10/14)
  - Probiotic
    - During antibiotic course and for five after last antibiotic course
  - 100 billion cfu *Lactobacillus* spp. *acidophilus*, *casei*, *rhamnosus* – per day given by capsule; slurry to patients with a feeding tube
  - *C. difficile* detection: PCR during baseline and intervention periods
  - CDI defined by infection surveillance definition
  - Compared incidence between time periods for study units
  - Considered as a quality improvement project

**RESULTS**

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<thead>
<tr>
<th></th>
<th>Baseline</th>
<th>Intervention</th>
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<tbody>
<tr>
<td>Patient days</td>
<td>177,184</td>
<td>182,832</td>
</tr>
<tr>
<td>Tests performed</td>
<td>210</td>
<td>186</td>
</tr>
<tr>
<td>CDI episodes</td>
<td>123</td>
<td>128</td>
</tr>
<tr>
<td>CDI incidence</td>
<td>6.9</td>
<td>7.0</td>
</tr>
<tr>
<td>Testing intensity</td>
<td>19%</td>
<td>20%</td>
</tr>
</tbody>
</table>

**Probiotic Administration**

- Overall, 83% of eligible patients received probiotic
- Administration stable over time

**Categorization of CDI cases (n=128) from intervention period**

<table>
<thead>
<tr>
<th>Received probiotic per protocol</th>
<th>28%</th>
<th>AMONG CASE PATIENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eligible, but no BioK given</td>
<td>28%</td>
<td>- Only 67% of cases eligible for probiotic</td>
</tr>
<tr>
<td>Received probiotic, late or missed doses</td>
<td>11%</td>
<td>- 28% of probiotic courses late or missed doses</td>
</tr>
<tr>
<td>Prophylactic antibiotics</td>
<td>16%</td>
<td></td>
</tr>
<tr>
<td>No antibiotic receipt</td>
<td>12%</td>
<td></td>
</tr>
<tr>
<td>Ineligible by clinical criteria</td>
<td>5%</td>
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</table>

**LIMITATIONS**

- Since center, before-after evaluation
- A large percentage of cases were ineligible for probiotic receipt or received the doses late or missed doses, potentially minimizing the impact on ecologic rates.
- Incomplete data on community onset events
- Comparison of rates of CDI on and off probiotics complicated by differences in patient populations

**CONCLUSIONS**

- Trend toward a lower incidence of CDI
  - Apparent during final 6 months of the intervention
  - Delayed impact may be due to environmental risk factors.
- In a busy, large teaching hospital, difficult to achieve complete penetration of probiotic to antibiotic recipients, and hard to achieve fidelity to dosing regimen.
- Probiotic receipt appeared to reduce the risk of CDI among recipients; however, the populations were different.

**REFERENCES**

- Rate ratio, 95% CI
  - Risk ratio = 0.6; 95% CI, 0.4 to 0.9
  - Testing intensity: *# of tests positive / total number of tests*