Clostridium difficile (CD) is an important cause of antibiotic-associated diarrhoea, colitis and pseudomembranous colitis, particularly in hospitalized elderly patients with underlying disease. CD infection typically presents during or after treatment with broad-spectrum antibiotics which disturb the normal intestinal flora thus providing optimal conditions for CD to multiply and produce pathogenic toxins. CD infection may also be community-acquired (no hospital admission within the previous three months).

Cases of community-acquired infection are often younger than hospital-acquired cases and are not as frequently triggered by previous antibiotic treatment.

**Hypervirulent CD including CD027**

In recent years, several countries, including Denmark, have seen a particularly virulent CD variant called CD027 (Clostridium difficile PCR ribotype 027). This variant has caused disease outbreaks at hospitals, particularly in the Capital Region of Denmark and in Region Zealand, EPI-NEWS 13/09. A distinctive feature of CD027 is that, apart from toxin A and toxin B, it can also produce binary toxin. CD027 is resistant to recent generations of fluoroquinolones, e.g. moxifloxacin. The binary toxin is associated with a higher mortality in hospitalized patients than infection caused by CD which only contains genes for toxin A and toxin B. It is therefore probable that all CD types with binary toxin should be regarded hypervirulent, not only CD027.

**National monitoring**

Departments of clinical microbiology (DCM) continuously report CD findings to the SSI. Furthermore, as from 2009, the DCMs have submitted bacterium isolates for further typing at the SSI on the basis of one of the following four criteria: 1) suspicion of outbreak, 2) serious disease pattern, 3) bacterium resistant to recent fluoroquinolones or 4) detection of the toxins A, B and binary toxin. CD027 is that, apart from toxin A and toxin B, it can also produce binary toxin and should therefore be considered hypervirulent.

**Precautions**

In case of sporadic CD infection, local guidelines from the hygiene organisation/DCM should be used. National Danish guidelines covering infection with the hypervirulent variants have been prepared: For details, see www.ssi.dk (Danish language). For severe diarrhoea of unknown aetiology, infection with a hypervirulent CD variant (including 027) and clustered cases, the following recommendations apply in addition to the general infection hygiene guidelines:

- Isolation in single-bed rooms with separate bathroom and toilet. Cohort isolation may be considered in case of outbreak at a ward or department; this should be conferred with the local hygiene organisation.
- Hand hygiene consisting of hand disinfection after every exposure and when leaving the room. Patients and visitors are instructed in hand hygiene organisation.
- Gloves are used for all direct contact and after going to the lavatory.
- Disposable lab coats are worn when contact with the patient, devices, and inventory is needed.
- Disposable or patient-dedicated devices/inventory are used where possible. In case of reuse, all devices/inventory should be cleaned and disinfected after every use. If shared equipment must be used, it shall be possible to clean/disinfect this after use.
- Disinfection of contact points, e.g. handles, guard rails, toilet seats, taps etc., daily or more often using a chlorine-based disinfectant, min. 1,000 ppm. The cleaning staff must use the same personal protection gear as the nursing staff.
- Isolation measures maintained for a minimum period of 48 hours after symptom cessation.
- For final cleaning, a chlorine-based disinfectant is used, min. 1,000 ppm; alternatively, hydrogen peroxide nebulization by robot may be performed.
- CD infection is mainly a problem at hospitals. In case of outbreaks at nursing homes, the local hygiene organisation/DCM is contacted.

**Commentary**

The first Danish cases of CD027 infection were described in 2006, EPI-NEWS 26/07. The issue received much attention in the autumn of 2008 due to outbreaks at hospitals, primarily in North Zealand, with subsequent spreading to other hospitals in the Capital Region of Denmark and later to the rest of Zealand. CD is a hygiene challenge due to the bacterium’s ability to form resistant spores. It is probable that the spread to the Capital and Zealand was mainly due to patient transfers between hospitals. CD infections, particularly those comprising the highly virulent types, are associated with an increased disease burden in otherwise debilitated patients, and it is therefore important to focus on this issue.

In this context, the small decrease in the number of infections observed in the Capital Region of Denmark is a positive sign. Developments are tracked continuously at www.ssi.dk (Danish language).

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22 February 2012

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Table 1. Clostridium difficile cases caused by PCR ribotype 027, 2009-2011

<table>
<thead>
<tr>
<th>Region</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capital</td>
<td>492</td>
<td>703</td>
<td>657</td>
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<tr>
<td>Zealand</td>
<td>98</td>
<td>132</td>
<td>339</td>
</tr>
<tr>
<td>South DK</td>
<td>4</td>
<td>1</td>
<td>9</td>
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<tr>
<td>Central</td>
<td>3</td>
<td>7</td>
<td>12</td>
</tr>
<tr>
<td>Jutland</td>
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<td>3</td>
<td>42</td>
</tr>
<tr>
<td>Total</td>
<td>598</td>
<td>866</td>
<td>1059</td>
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