Surveillance of Clostridium difficile

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CDI in the news

Edinburgh's Royal Infirmary probes C. difficile cluster

C. diff superbug kills one patient in British hospitals every hour

MRSA and C. diff deaths fall again

The number of deaths from two hospital infections, MRSA and Clostridium difficile, have continued their long-term downward trend, according to figures for England and Wales.
Voluntary CDI reports, England 1990-2014

Number of reports

Specimen year

Ministerial Action

SGSS data

Surveillance of Clostridium difficile
CDI Outbreaks

North Manchester outbreak 1991/2,
  • 175 cases, 17 deaths
  • Ribotype 001

Stoke Mandeville,
  • 1st outbreak 2003/04, 174 cases, 19 deaths
  • 2nd outbreak 2004/05, 160 cases, 19 deaths
  • Ribotype 027

Maidstone & Tunbridge Wells 2005/06
  • >500 cases, 60 deaths
  • Ribotype 027

Vale of Leven 2007/8
  • 143 cases, 34 deaths
  • Ribotype 027
Clostridium difficile Ribotyping Network (CDRN)

Prevalence of *C. difficile* ribotypes in England by quarter (April 2007-March 2013)

- Decline of ribotype 027
- Emergence of 078
- Other emergent ribotypes
  - 002
  - 005
  - 014/020
  - 015

Clostridium difficile Ribotyping Network (CDRN) for England and Northern Ireland 2011-13 Report
Summary of developments since 2001:

<table>
<thead>
<tr>
<th>Condition</th>
<th>Years</th>
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<tbody>
<tr>
<td><em>S. aureus</em> bacteraemia (aggregate counts)</td>
<td>2001-2014</td>
</tr>
<tr>
<td>MRSA bacteraemia (enhanced, real-time)</td>
<td>2001-2010</td>
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<td><em>S. aureus</em> bacteraemia (enhanced, real-time)</td>
<td>2001-2010</td>
</tr>
<tr>
<td>Post Infection Review (PIR) for MRSA bacteraemia</td>
<td>2001-2014</td>
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<tr>
<td><em>C. difficile</em> infection over 65s (quarterly aggregate)</td>
<td>2001-2014</td>
</tr>
<tr>
<td><em>C. difficile</em> infection over 2s (enhanced, real-time)</td>
<td>2001-2014</td>
</tr>
<tr>
<td>GRE bacteraemia (quarterly aggregate counts)</td>
<td>2001-2014</td>
</tr>
<tr>
<td>Surgical site infection (orthopaedics)</td>
<td>2001-2014</td>
</tr>
<tr>
<td><em>E. coli</em> bacteraemia (enhanced, real-time)</td>
<td>2001-2014</td>
</tr>
<tr>
<td><em>E. coli</em> bacteraemia sentinel scheme</td>
<td>2001-2014</td>
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Current routine voluntary surveillance cannot, on its own, identify HCAIs.
Case Definition

Any of the following defines a *C. difficile* infection case in patients aged 2 years and above and must be reported to PHE:

1. Diarrhoeal stools (Bristol Stool types 5-7) where the specimen is *C. difficile* toxin positive.
2. Toxic megacolon or ileostomy where the specimen is *C. difficile* toxin positive.
3. Pseudomembranous colitis revealed by lower gastro-intestinal endoscopy or Computed Tomography.
4. Colonic histopathology characteristic of *C. difficile* infection (with or without diarrhoea or toxin detection) on a specimen obtained during endoscopy or colectomy.
5. Faecal specimens collected post-mortem where the specimen is *C. difficile* toxin positive or tissue specimens collected post-mortem where pseudomembranous colitis is revealed or colonic histopathology is characteristic of *C. difficile* infection.
Variable sensitivity / specificity of tests

2012 - DH published new guidance on testing

2 stage testing algorithm:

- GDH EIA (or NAAT) to screen
- followed by sensitive toxin EIA for positive GDH samples
- Report patients positive for both tests to PHE

Still assumes appropriate sampling of patients

From: Updated Guidance on the Diagnosis and Reporting of Clostridium difficile; DH 2012. Gateway reference: 17215
Clarification on which CDI cases to report:

1. Should Trusts only report a) clinically significant cases or b) all laboratory confirmed cases? \( \text{b} \)

2. Do positive cases of CDI which have not been treated for CDI need to be reported? \( \text{Yes} \)

3. Report asymptomatic patients tested in error? \( \text{Yes} \)
Current Public Reporting of Mandatory HCAI Data

Key outputs for CDI classified as Official Statistics

NHS data

- Annual financial year data publication
  - Counts and rates by Trust and CCG
- Monthly count by Trust, CCG
- Quarterly Epidemiological Commentary
  - Trends in counts and rates over the past 9 quarters

(Weekly data publication of hospital level MRSA and CDI ran from 2010-2012)
Age and Sex Distribution

C. difficile infections in England by age & gender, 2014

- Age (years): 2 to 14, 15 to 44, 45 to 64, 65 to 74, 75 to 84, 85+
- Count of C. difficile infections

Rate of C. difficile infections in England by age & gender, 2014

- Age (years): 2 to 14, 15 to 44, 45 to 64, 65 to 74, 75 to 84, 85+
- Rate of C. difficile infections (per 100,000 population)

- Males
- Females
Counts of Trust and non-Trust apportioned *C. difficile* infections, 2008-2014

- **2008**: Trust apportioned: 25,000, Non-Trust apportioned: 15,000
- **2009**: Trust apportioned: 15,000, Non-Trust apportioned: 10,000
- **2010**: Trust apportioned: 10,000, Non-Trust apportioned: 8,000
- **2011**: Trust apportioned: 8,000, Non-Trust apportioned: 6,000
- **2012**: Trust apportioned: 6,000, Non-Trust apportioned: 5,000
- **2013**: Trust apportioned: 5,000, Non-Trust apportioned: 4,000
- **2014**: Trust apportioned: 4,000, Non-Trust apportioned: 3,000

*Count*: 0, 5,000, 10,000, 15,000, 20,000, 25,000

*Calendar Year*: 2008-2014

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**Surveillance of Clostridium difficile**
Trust vs. Non-Trust Apportioned

Trends in percentage of Trust vs. non-Trust apportioned C. difficile infections, 2008-2014

Calendar Year

<table>
<thead>
<tr>
<th>Year</th>
<th>Non-Trust</th>
<th>Trust</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td>40,705</td>
<td>23,215</td>
</tr>
<tr>
<td>2009</td>
<td>27,620</td>
<td>19,144</td>
</tr>
<tr>
<td>2010</td>
<td>23,215</td>
<td>14,993</td>
</tr>
<tr>
<td>2011</td>
<td>19,144</td>
<td>13,767</td>
</tr>
<tr>
<td>2012</td>
<td>14,993</td>
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Timing of Detection

Time to onset among inpatients with *C. difficile* infection, 2008 – 2014

Calendar Year

- <3 days
- 3-6 days
- 7+ days

Percentage of total annual *C. difficile* infections
Prior Healthcare Exposure

Timeline for definitions of CDI exposures (Kuijper et al., 2006)

- **Admission**
  - 48 h
- **Discharge**
  - 4 weeks
  - 8 weeks
- Symptom onset

- HO-HCFA: Hospital-onset health care facility associated CDI
- CO-HCFA: Community-onset health care facility associated CDI
- indeterminate
- CA-CDI: Community associated CDI
Thirty-Day All-Cause Case Fatality Rate

Surveillance of Clostridium difficile
Case Fatality Rate: Age & Sex

Patient age (years) and Gender

Case fatality rate

2-64F  2-64M  65-74F  65-74M  75-84F  75-84M  85+F  85+M
Case Fatality Rate: Age & Sex

Case fatality rate

Age group (years) and gender
- 85+M
- 85+F
- 75-84M
- 75-84F
- 65-74M
- 65-74F
- 2-64M
- 2-64F

Public Health England

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Case Fatality Rate: Trust Apportioned vs. Non-Trust Apportioned

Surveillance of Clostridium difficile
Excess Length of Stay (LOS) and Mortality due to CDI

Kleef et al., JHI, 2014

- HA-CDI reduced discharge rate by ¼
- Increased in-hospital mortality by 75%
- HA-CDI patient mean excess LOS 7 days
  - In severe cases excess LOS was c. 12 days
Conclusions

- Steady increases through 90s and early 00s
- Big decreases post 2008
- Community onset increasingly important
- Reductions in case fatality rate
- Ribotype distribution changing
Acknowledgments

- NHS (Microbiologists, Infection Control staff, Acute Trusts, CCGs, Area Teams)
- DsPH and LA teams
- PHE (FES and PHECs)
- Department of Health
- PHE mandatory surveillance team