Annual commentary on MRSA, MSSA and Gram-negative bacteraemia and *Clostridioides difficile* infections from Independent Sector healthcare organisations in England

April 2018 to March 2019

Experimental statistics
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Published October 2019
PHE publications
gateway number: GW-781

PHE supports the UN
Sustainable Development Goals
Annual commentary on MRSA, MSSA and Gram-negative bacteraemia and *Clostridioides difficile* infections from Independent Sector healthcare organisations in England: April 2018 to March 2019

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Annual commentary on MRSA, MSSA and Gram-negative bacteraemia and *Clostridioides difficile* infections from Independent Sector healthcare organisations in England: April 2018 to March 2019

**Executive summary**

Between 1 April 2018 and 31 March 2019, 8 cases of MRSA bacteraemia, 29 cases of MSSA bacteraemia, 160 cases of *E. coli* bacteraemia, 72 cases of *Klebsiella* spp. bacteraemia, 49 cases of *P. aeruginosa* bacteraemia and 60 cases of *Clostridioides difficile* infections (CDI) were reported by Independent Sector (IS) healthcare providers.

Six of 26 IS healthcare organisations had occupancy data. Among IS providers with occupancy data, the highest incidence rate was in *E. coli* bacteraemia (4.5 per 100,000 bed days plus discharges, n = 53), while the lowest rate was in MRSA bacteraemia (0.2, n= 2). Incidence rates for the other infections were; CDI (1.7, n= 20), *P. aeruginosa* bacteraemia (1.4, n= 17), *Klebsiella* spp. bacteraemia (1.4, n= 16) and MSSA bacteraemia (0.8, n= 9).

These figures include all cases reported by the IS and do not take into account whether or not the infection was thought to be associated with the Independent Sector organisation. This document summarises the data and discusses key caveats. Below is a summary of key differences between the NHS and IS which should be considered (Table 1).

**Table 1: Summary of key differences between the NHS and IS**

<table>
<thead>
<tr>
<th>Independent Sector Organisations</th>
<th>NHS acute trusts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data are not classified based on onset of the bacteraemia of infection.</td>
<td>Data are categorised into “Hospital-onset” and “Community-onset” cases. “Hospital-onset” cases are those thought to have been associated with a given NHS Trust during a given hospital admission.</td>
</tr>
<tr>
<td>Primarily elective patient-mix</td>
<td>Broad patient-mix including emergency-based treatments</td>
</tr>
<tr>
<td>Constantly changing facility list</td>
<td>Mainly static list of providers</td>
</tr>
<tr>
<td>Large number of specialist facilities</td>
<td>Mainly general acute facilities</td>
</tr>
<tr>
<td>Organisations may comprise geographically diverse hospitals</td>
<td>Mainly local clusters of hospitals</td>
</tr>
<tr>
<td>Rates calculated using bed-days plus discharges due to the high proportion of day cases compared to the NHS</td>
<td>Rates calculated using bed-days (occupied beds at midnight)</td>
</tr>
</tbody>
</table>

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1 Inpatient bed-days figures are available here: https://www.england.nhs.uk/statistics/statistical-work-areas/bed-availability-and-occupancy/bed-data-overnight
Introduction

This report is the latest in a series of publications of HCAI surveillance data on MRSA, MSSA and Gram-negative (E. coli, Klebsiella spp. and P. aeruginosa) bacteraemia and Clostridioides difficile (CDI) reported by IS healthcare organisations to PHE. IS healthcare organisations providing regulated activities undertake surveillance on HCAIs and report identified cases to PHE as specified in the Code of Practice. Patient level data is provided to PHE via the secure Data Capture System (DCS) and the data for this publication was extracted on 27 August 2019.

Presentation of data

Counts and rates (per 100,000; calculated using bed days and discharges) of MRSA, MSSA, E. coli, Klebsiella spp. and P. aeruginosa bacteraemia and CDI are presented by IS organisation for the 12-month period 1 April 2018 and 31 March 2019.

The modified IS denominator (bed days plus discharges) is provided for the most recent financial year available (April 2018 to March 2019) as an indication of the size of each facility.

The hospital type (large hospital, small hospital, NHS treatment centre, diagnostic centre seeing mainly day case patients and women’s health) is listed for the hospital(s) within a group; this indicates the type of service(s) provided. This is correct as at 27 August 2019 as supplied to PHE.

Additional information can be found in the accompanying OpenDocument Spreadsheet. Some IS organisations included in the data tables may have not been reporting for the entire period. Such hospitals are included in Appendix 2. Cases amongst renal patients have been excluded pending a separate publication.

Interpreting the data

The data shows that:

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4 An IS organisation can comprise a group of hospitals owned by one company or a single hospital. It is possible to identify a group versus a hospital using the "number of hospitals in organisation" field
5 Large hospital: >49 beds, small hospital: <50 beds
6 Where a group comprises more than one hospital type, all types are listed
counts and rates of all reported cases of MRSA bacteraemia by Independent Sector Healthcare Organisation; April 2018 to March 2019 (Table T1)

counts and rates of all reported cases of MSSA bacteraemia by Independent Sector Healthcare Organisation; April 2018 to March 2019 (Table T2)

counts and rates of all reported cases of *E. coli* bacteraemia by Independent Sector Healthcare Organisation; April 2018 to March 2019 (Table T3)

counts and rates of all reported cases of *Klebsiella* spp. bacteraemia by Independent Sector Healthcare Organisation; April 2018 to March 2019 (Table T4)

counts and rates of all reported cases of *P. aeruginosa* bacteraemia by Independent Sector Healthcare Organisation; April 2018 to March 2019 (Table T5)

counts and rates of all reported cases of CDI by Independent Sector Healthcare Organisation; April 2018 to March 2019 (Table T6)

The data does not provide:

- a basis for comparisons between different IS organisations due to their variable size and range (case mix) of patients seen
- a basis for reliable comparison of these infections between the NHS and IS organisations

A full discussion of these issues is presented elsewhere.\(^7\)

**Specific data caveats**

Below is a list of specific caveats to be considered in relation to the published data.

**Data quality**

Not all IS organisations have signed off their data or submitted data for the reporting period. Data for such organisations may not yet be finalised and therefore may not be accurate. IS organisations that have not signed off their data for the time period are highlighted in the accompanying OpenDocument Spreadsheet.

**Duplicate entries**

Data entered onto the DCS by the NHS and IS are collected in 2 parallel systems. This means that data on a single case may be entered by either an NHS trust or an IS organisation or both. Data has only been de-duplicated against the NHS dataset for cases reported via the DCS. If a case is reported by an IS provider and an NHS acute trust, the IS case is excluded as a duplicate entry in the following scenario:

\(^7\) The reasons behind this are discussed in Commentary on Reporting of *C. difficile* infections and MRSA bacteraemia from the Independent Sector, published 2009
• if the NHS case was reported with a patient location of “NHS acute trust”, and the IS case was reported with a patient location that is not “IS provider”
• if the NHS case was reported with a patient location of “NHS acute trust”, and the IS case was reported with a patient location of “IS provider” but has a specimen date within 14 days (28 days for CDI) prior to the NHS case

Cases are only de-duplicated if they are reported by both IS providers and NHS acute trusts, and are within the same episode length; 14 days for bacteraemia and 28 days for CDI. Multiple cases reported by one IS provider or by multiple IS providers only are not de-duplicated. Additionally, NHS number, which is one of the variables used to de-duplicate records, is not always known for patients treated in the IS, so potential duplicate records entered onto the DCS may not be identified.

Organisational changes

Some IS organisations included in the data tables may have not been open for the entire reporting period, whilst others may have closed over this time. This may reduce the count of these infections in such IS organisations, compared to those that were open for the whole period. However, this will also be reflected in their occupancy data, so any rate calculated still has validity over the shorter period. Such organisations are listed in Appendix 2.
Results

26 organisations are included in this report, 11 of which are groups of more than one hospital and the remaining 15 are single hospitals. Occupancy data\(^8\) was available for 6 organisations. Individual rates for these organisations are included in the accompanying OpenDocument Spreadsheet

**MRSA bacteraemia (Table T1)**

A total of 8 cases were reported from April 2018 to March 2019 by the following organisations; HCA International [5 cases]; BMI Healthcare (GHG), Nuffield Health and Spire Healthcare [1 case each].

Among IS providers that provided their modified inpatient bed-days, the incidence rate of MRSA bacteraemia for April 2018 to March 2019 was 0.2 cases (n=2) per 100,000 bed days plus discharges.

**MSSA bacteraemia (Table T2)**

29 cases were reported from April 2018 to March 2019 by the following organisations; HCA International [14 cases]; Aspen Healthcare, BUPA Cromwell Hospital, Nuffield Health, Ramsay Health Care UK, Spire Healthcare and The London Clinic [2 cases each]; BMI Healthcare (GHG), The Hospital of St John & St Elizabeth and The New Victoria Hospital Ltd [1 case each].

Among IS providers that provided their modified inpatient bed-days, the incidence rate of MSSA bacteraemia for April 2018 to March 2019 was 0.8 cases (n=9) per 100,000 bed days plus discharges.

**E. coli bacteraemia (Table T3)**

160 cases were reported from April 2018 to March 2019 by the following organisations; HCA International [85 cases]; The London Clinic [19 cases]; BMI Healthcare (GHG) and BUPA Cromwell Hospital [11 cases each]; Ramsay Health Care UK [8 cases]; Nuffield Health [7 cases]; Aspen Healthcare [6 cases]; Spire Healthcare [4 cases]; The Hospital of St John & St Elizabeth [3 cases]; King Edward VII Sister Agnes and The Royal Buckinghamshire Hospital Ltd [2 cases each]; Royal Hospital for Neuro-disability and The New Victoria Hospital Ltd [1 case each].

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\(^8\) Inpatient bed-days plus discharges. See Appendix 2 for further details
Among IS providers that submitted their modified inpatient bed-days data, the incidence rate of *E. coli* bacteraemia for April 2018 to March 2019 was 4.5 cases (n=53) per 100,000 bed days plus discharges.

**Klebsiella spp. bacteraemia (Table T4)**

72 cases were reported from April 2018 to March 2019 by the following organisations; HCA International [46 cases]; BMI Healthcare (GHG) and The London Clinic [7 cases each]; BUPA Cromwell Hospital [4 cases]; Spire Healthcare [3 cases]; The Hospital of St John & St Elizabeth [2 cases]; Aspen Healthcare, Nuffield Health and The Royal Buckinghamshire Hospital Ltd [1 case each].

Among IS providers that provided their modified inpatient bed-days, the incidence rate of *Klebsiella* spp. bacteraemia for April 2018 to March 2019 was 1.4 cases (n=16) per 100,000 bed days plus discharges.

**Pseudomonas aeruginosa bacteraemia (Table T5)**

49 cases were reported from April 2018 to March 2019 by the following organisations; HCA International [26 cases]; The London Clinic [8 cases]; BMI Healthcare (GHG) [6 cases]; BUPA Cromwell Hospital [3 cases]; Aspen Healthcare [2 cases]; Nuffield Health, Spire Healthcare and The Royal Buckinghamshire Hospital Ltd [1 case each].

Among IS providers that provided their modified inpatient bed-days, the incidence rate of *P. aeruginosa* bacteraemia for April 2018 to March 2019 was 1.4 cases (n=17) per 100,000 bed days plus discharges.

**CDI (Table T6)**

60 cases were reported from April 2018 to March 2019 by the following organisations; HCA International [29 cases]; Nuffield Health [12 cases]; Spire Healthcare, The Hospital of St John & St Elizabeth and The London Clinic [4 cases each]; BMI Healthcare (GHG) and The Royal Buckinghamshire Hospital Ltd [2 cases each]; King Edward VII Sister Agnes, Ramsay Health Care UK and Royal Hospital for Neuro-disability [1 case each].

Among IS providers that provided their modified inpatient bed-days, the incidence rate of CDI for April 2018 to March 2019 was 1.7 cases (n=20) per 100,000 bed days plus discharges.
Appendix

Appendix 1: How to calculate bed-day plus discharge denominator

The denominator we intend to use, which is more appropriate for shorter stay hospitals is

\[ \text{Bed-days in year} + \text{discharges in year} \]

Instead of counting the number of midnights the patient was resident for, this counts the number of different days on which they were in the hospital. A day case will count 1, a one night stay in the year will count 2.

The methodology for calculating the 2 components are listed below. These are then summed to create the denominator.

**Bed-days in the financial year April 2018 to March 2019**

This is the sum of the number of occupants in a bed each midnight during the year:

- Number in a bed at midnight at the end of the day 1 April 2018 + … +
- Number in a bed at midnight at the end of the day 31 March 2018.

If it is being derived from admission dates and discharge dates, you work out the contribution that each patient makes to the year’s bed-days by a formula.

The only patients who can contribute a bed-day to that financial year are those who are admitted **strictly before 1 April 2019** and discharged **strictly on or after 1 April 2018**. That is, the latest date they could have been admitted was 31 March 2019 and the earliest date they could have been discharged was 1 April 2018.

For these we work out

\[ \text{Discharge date or 1 April 2019 (whichever is earlier)} \]
\[ \text{MINUS} \]
\[ \text{Admission date or 1 April 2018 (whichever is later)} \]

then add up over all the patients.

This counts the number of bed-days the patient contributes to the year.

If the patient is still in hospital and does not yet have a discharge date then the first expression should be taken as 1 April 2019.
Discharges in the financial year April 2018 to March 2019

This is the number of patients with a discharge date between 1 April 2018 and 31 March 2019 i.e.

- Number of patients discharged on 1 April 2018 + … +
- Number discharged on 31 March 2019

It should include any day cases that took place during the year.

Examples of bed-day and discharge calculations

**Scenario 1**
If a patient was admitted on 17 March 2018 and discharged on 1 April 2018 they will contribute
- Bed-days in April 2018 to March 2019: 0
- Discharges in April 2018 to March 2019: 1

**Scenario 2**
If a patient was admitted on 17 March 2018 and discharged on 2 April 2018 they will contribute
- Bed-days in April 2018 to March 2019: 1
- Discharges in April 2018 to March 2019: 1

**Scenario 3**
If a patient was admitted on 1 April 2018 and discharged on 1 April 2018 they will contribute
- Bed-days in April 2018 to March 2019: 0
- Discharges in April 2018 to March 2019: 1

**Scenario 4**
If a patient was admitted on 1 April 2018 and discharged on 3 April 2018 they will contribute
- Bed-days in April 2018 to March 2019: 2
- Discharges in April 2018 to March 2019: 1

**Scenario 5**
If a patient was admitted on 17 March 2018 and discharged on 1 April 2019 they will contribute
- Bed-days in April 2018 to March 2019: 365
- Discharges in April 2018 to March 2019: 0

**Scenario 6**
If a patient was admitted on 1 April 2018 and discharged on 23 April 2019 they will contribute
- Bed-days in April 2018 to March 2019: 365
Discharges in April 2018 to March 2019: 0

**Scenario 7**
If a patient was admitted on 31 March 2019 and discharged on 23 April 2019 they will contribute
- Bed-days in April 2018 to March 2019: 1
- Discharges in April 2018 to March 2019: 0

**Scenario 8**
If a patient was admitted on 23 April 2019 and discharged on 23 April 2019 they will contribute
- Bed-days in April 2018 to March 2019: 0
- Discharges in April 2018 to March 2019: 0

**Scenario 9**
If a patient was admitted on 1 March 2019 and discharged on 19 June 2019 they will contribute
Bed-days =
- Minimum of (discharge date, 1 April 2019) - maximum of (admission date, 1 April 2018)
- = 1 April 2019 - maximum (1 March 2019, 1 April 2018)
- = 1 April 2019 - 1 March 2019
- = 31 days
- Discharges = 0

Figures provided should be aggregated for each organisation (where an organisation owns more than hospital or facility) or for the individual hospital if an organisation comprises one hospital or facility.

**Appendix 2: Organisational changes among IS providers during the reporting period; April 2018 to March 2019**

**Table 2: Hospitals that closed, opened, changed ownership or ceased during the reporting; April 2018 to March 2019**

<table>
<thead>
<tr>
<th>IS Provider Name</th>
<th>Site Name</th>
<th>Status</th>
<th>Month</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ramsay Health Care UK</td>
<td>Ramsay Exeter Medical</td>
<td>Opened</td>
<td>October 2018</td>
</tr>
</tbody>
</table>

9 Correct as at 27 August 2019 and as supplied to PHE