



Public Health  
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# Quarterly Epidemiological Commentary: Mandatory MRSA, MSSA and *E. coli* bacteraemia, and *C. difficile* infection data (up to April-June 2015)

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**September 10, 2015**

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Sources of data and definitions used for these analyses.

Note: All references to quarterly data are based on calendar year definitions, and NOT financial year definitions (eg Q1 2009 refers to January-March 2009 and NOT to April-June 2009).

#### Citation

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## Section 1: Epidemiological analyses of *Staphylococcus aureus* bacteraemia data

### MRSA Bacteraemia

Since April 2013 all NHS organisations reporting positive cases of MRSA bacteraemia have been required to complete a Post Infection Review (PIR)<sup>1</sup>. Subsequent to this, all MRSA bacteraemia cases are published by PIR assignment rather than by apportionment. In April 2014, NHS England introduced a further category for the PIR assignment of MRSA bacteraemia cases, acknowledging the increasingly complex nature of MRSA bacteraemia now being reported. Assignment to a 'Third Party' through the arbitration process can now be made for cases with a specimen date post 1st April 2014.

Since January-March 2012 there has been a 21.3% decrease (1.97 to 1.55 reports per 100,000 population) in the rates of total MRSA bacteraemia reports when compared to the current quarter (April-June 2015). This is part of an overall decreasing trend beginning from April 2007.

However more recently, there has been a 16.0% increase in both counts and rates of all reported MRSA bacteraemia between April-June 2014 and April-June 2015 (from 181 to 210 reports and from 1.34 to 1.55 reports per 100,000 population respectively).

During this time period (April-June 2014 to April-June 2015), both counts and rates of CCG assigned MRSA bacteraemia reports have increased by 7.7% (from 91 to 98 reports and from 0.67 to 0.72 reports per 100,000 population) (Table 1b).

Similarly, the counts and rates of Trust assigned MRSA bacteraemia reports in the current quarter have both increased by 17.8% (from 73 to 86 reports and from 0.85 to 1.00 per 100,000 bed-days respectively) when compared to the same quarter in the previous year (April-June 2014) (Table 1b).

These increases in Trust and CCG assigned reports and rates represent the first year-on-year inter-quarter increase since the PIR process was initiated (April 2013).

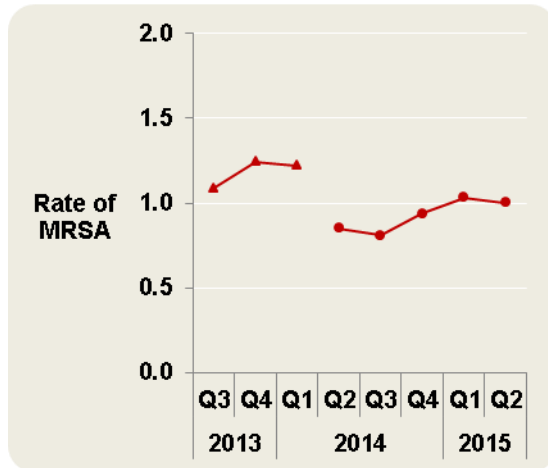
Both counts and rates of Third Party assigned MRSA bacteraemia reports have also increase by 52.9%, from 17 to 26 reports and 0.13 to 0.19 reports per 100,000 population respectively (Table 1b).

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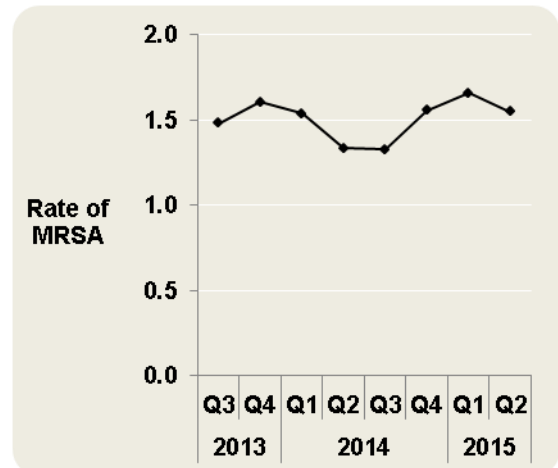
<sup>1</sup> Please refer to <https://www.gov.uk/government/collections/staphylococcus-aureus-guidance-data-and-analysis> for more information.

Figure 1: Quarterly rates of MRSA bacteraemia, July 2013 - June 2015

a) Trust assigned\* rates  
(per 100,000 bed-days)



b) All reports (per 100,000 population)



*\*Note: From April-June 2013, MRSA cases have been reported by assignment rather than apportionment and from April-June 2014 an additional option for assignment (Third Party) was added. This is reflected in Figure 1a with two time series; one from July-September 2013 to April-June 2014 (rates (per 100,000 bed-days) presented as red triangles) when there were only 2 assignment options and the other from April-June 2014 to April-June 2015 (rates (per 100,000 bed-days) presented as red circles) when there were 3 assignment options. Please refer to Table 1b for Trust assigned, CCG assigned and Third Party assigned cases and rates.*

Table 1a: MRSA bacteraemia counts and rates by quarter, January 2012 - June 2015

Year and quarter		Trust apportioned reports	Trust apportioned rates (per 100,000 bed-days)	All reports	All reports rates (per 100,000 population)
2012	Q1	117	1.32	262	1.97
	Q2	94	1.10	224	1.68
	Q3	96	1.13	229	1.70
	Q4	92	1.07	219	1.63
2013	Q1	116	1.32	252	1.90
	Q2	96	1.11	237	1.76
	Q3	82	0.97	201	1.48
	Q4	98	1.14	218	1.61
2014	Q1	88	1.01	206	1.54
	Q2	67	0.78	181	1.34
	Q3	62	0.73	182	1.33
	Q4	75	0.86	213	1.56
2015	Q1	81	0.92	222	1.66
	Q2	77	0.90	210	1.55

**Table 1b: MRSA bacteraemia counts and rates by PIR assignment\*, April 2013 - June 2015**

Year and quarter		Trust assigned reports	Trust assigned rates (per 100,000 bed-days)	CCG assigned reports	CCG assigned rates (per 100,000 population)	Third Party reports	Third Party assigned rates (per 100,000 population)
2013	Q2	107	1.24	130	0.97	N/A	N/A
	Q3	92	1.09	109	0.80	N/A	N/A
	Q4	107	1.25	111	0.82	N/A	N/A
2014	Q1	106	1.22	100	0.75	N/A	N/A
	Q2	73	0.85	91	0.67	17	0.13
	Q3	69	0.81	86	0.63	27	0.20
	Q4	82	0.94	101	0.74	30	0.22
2015	Q1	91	1.03	90	0.67	41	0.31
	Q2	86	1.00	98	0.72	26	0.19

*\*Note: Not all PIRs were finalised at time of data extraction (10.5%, n=22/210 from Q2 2015). For these cases the provisional assignments have been used.*

### MSSA Bacteraemia

There has been a general increasing trend in the MSSA bacteraemia all reports rates, with an overall increase of 15.4%, from 16.41 to 18.93 reports per 100,000 population from January-March 2012 to the current quarter (April-June 2015), with the current quarter having the highest rate of 18.93 reports per 100,000 population since the reporting of MSSA bacteraemia cases was initiated in January 2011.

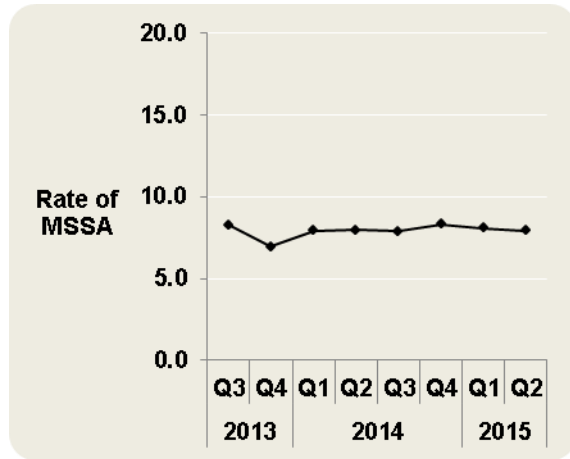
Between the current quarter (April-June 2015) and the same quarter from the previous year (April-June 2014), both counts and rates of all reported MSSA bacteraemias increased by 10.8% from 2,315 to 2,564 reports and 17.10 to 18.93 reports per 100,000 population respectively.

Conversely, there has been little change in either the counts or rates of Trust apportioned MSSA bacteraemia reports within the same time period, with a 0.4% decrease in both counts and rates from 682 to 679 reports and 7.96 to 7.93 per 100,000 bed-days respectively within the same time period.

Of note, the percentage of the total number of MSSA bacteraemia reports that are Trust apportioned has decreased by approximately 20%, from 33.4% in January-March 2012 to 26.5% in the current quarter, implying that non-Trust apportioned MSSA bacteraemia cases are increasing whilst Trust apportioned MSSA bacteraemia cases are reducing.

Figure 2: Quarterly rates of MSSA bacteraemia, July 2013 - June 2015

a) Trust apportioned rate  
(per 100,000 bed-days)



b) All reports (per 100,000 population)

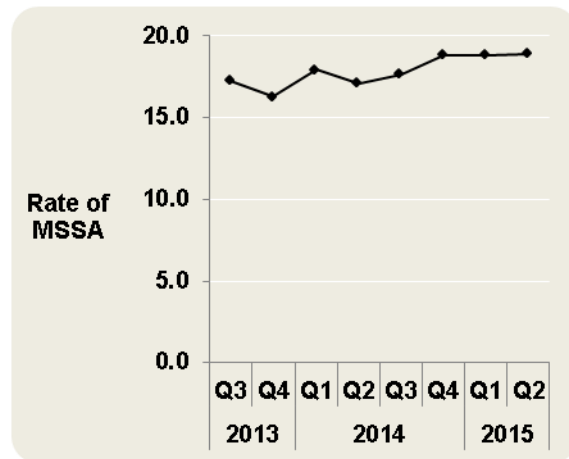


Table 2: MSSA bacteraemia counts and rates by quarter, January 2012- June 2015

Year and quarter		Trust apportioned reports	Trust apportioned rates (per 100,000 bed-days)	All reports	All reports rates (per 100,000 population)
2012	Q1	728	8.20	2,183	16.41
	Q2	711	8.29	2,238	16.83
	Q3	648	7.64	2,131	15.85
	Q4	663	7.70	2,186	16.26
2013	Q1	678	7.73	2,257	16.99
	Q2	711	8.25	2,329	17.34
	Q3	700	8.30	2,344	17.26
	Q4	596	6.94	2,213	16.30
2014	Q1	689	7.93	2,404	17.95
	Q2	682	7.96	2,315	17.10
	Q3	674	7.89	2,417	17.65
	Q4	728	8.32	2,581	18.85
2015	Q1	715	8.10	2,524	18.85
	Q2	679	7.93	2,564	18.93

## Section 2: Epidemiological analyses of *Escherichia coli* bacteraemia data

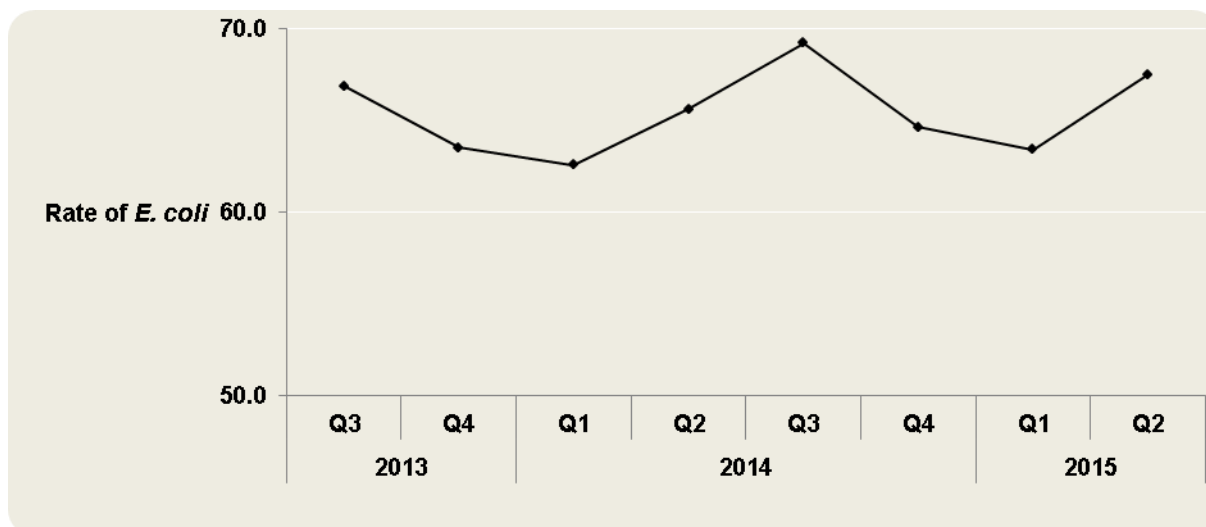
A steadily increasing trend has been seen in both the counts and rates of *E. coli* bacteraemia since January 2012, with seasonal peaks generally seen between July-September (Figure 3).

A 2.9% increase (from 65.62 to 67.49 reports per 100,000 population) has been observed in the rate of *E. coli* bacteraemia reports when comparing the current quarter (April-June 2015) with the same quarter of the previous year (April-June 2014), with an overall increase of 16.6% (from 57.88 to 67.49 reports per 100,000 population since January-March 2012).

The current quarter (April-June 2015) has the second highest rate of 67.49 reports per 100,000 population during the last 14 quarters, whilst within the same period, the highest rate of 69.21 reports per 100,000 population was observed in July-September 2014.

The increase in *E. coli* bacteraemia reports and rates between April-June 2014 and April-June 2015 represent the ninth consecutive increase since April-June 2013 between a quarter and the same quarter in the previous year.

**Figure 3: Quarterly rates of *E. coli* bacteraemia reports per 100,000 population, July 2013 - June 2015**



**Table 3: Quarterly counts and rates of all *E. coli* bacteraemia reports by quarter, January 2012- June 2015**

Year and quarter		Total <i>E. coli</i> bacteraemia reports	Rate (per 100,000 population)
2012	Q1	7,698	57.88
	Q2	8,074	60.71
	Q3	8,676	64.52
	Q4	7,957	59.18
2013	Q1	7,602	57.24
	Q2	8,193	61.01
	Q3	9,079	66.87
	Q4	8,623	63.51
2014	Q1	8,380	62.57
	Q2	8,886	65.62
	Q3	9,476	69.21
	Q4	8,847	64.62
2015	Q1	8,491	63.40
	Q2	9,140	67.49

### Section 3: Epidemiological analyses of *Clostridium difficile* infection data

There has been an overall decrease of 1.5% in the total number of CDI cases reported between January-March 2012 and April-June 2015. However this overall reduction has a strongly seasonal trend which peaks at Q3 of each calendar year with consecutive increases (1.7%, 8.2%, 2.1%, 13.0% and 6.2%) in the 5 most recent quarters (from April-June 2014 to April-March 2015 respectively) when compared with the same quarter in the previous year.

A similar trend has been seen in number of Trust apportioned CDI cases reported with consecutive increases (5.9%, 4.6%, 17.5% and 9.9%) in the 4 most recent quarters (from July-September 2014 to April-March 2015 respectively) when compared with the same quarter in the previous year.

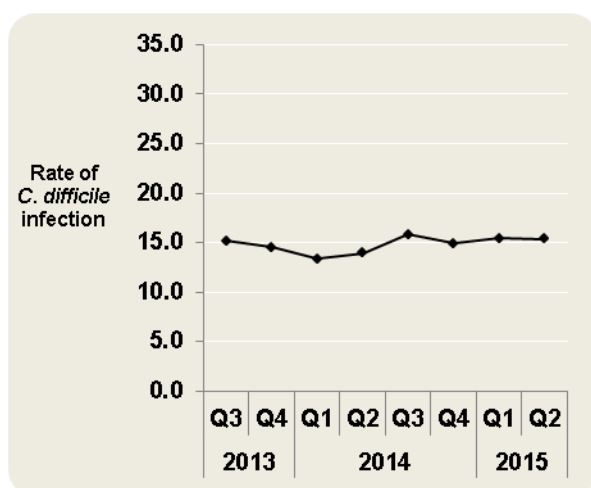
The counts and rates of the total number of CDI reported in the current quarter (April-June 2015) have both increased 6.2% (from 3,442 to 3,654 reports and 25.42 to 26.98 reports per 100,000 population respectively) when compared to the same quarter from the previous year (April-June 2014).

Similarly the counts and rates of the Trust apportioned CDI reported in the current quarter (April-June 2015) have both increased 9.9% (from 1,197 to 1,316 reports and 13.97 to 15.36 reports per 100,000 bed-days) when compared to the same quarter from the previous year (April-June 2014).



Figure 4: Quarterly rates of *C. difficile* infection in patients aged 2 years and over, July 2013 - June 2015

a) Trust apportioned reports  
(per 100,000 bed-days)



b) All reports (per 100,000 population)

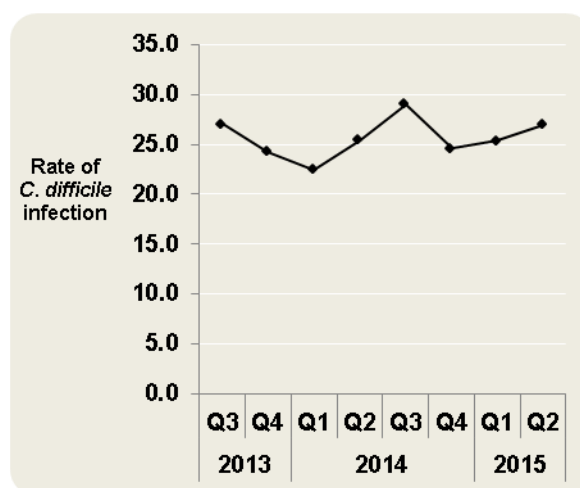


Table 4: *C. difficile* infection counts and rates in patients aged 2 years and over by quarter, January 2012- June 2015

Year and quarter		Trust apportioned reports	Trust apportioned rates (per 100,000 bed-days)	All reports	All reports rates (per 100,000 population)
2012	Q1	1,613	18.18	3,711	27.90
	Q2	1,517	17.68	3,656	27.49
	Q3	1,433	16.91	3,870	28.78
	Q4	1,527	17.74	3,756	27.93
2013	Q1	1,503	17.13	3,412	25.69
	Q2	1,347	15.63	3,386	25.21
	Q3	1,278	15.15	3,671	27.04
	Q4	1,249	14.54	3,298	24.29
2014	Q1	1,160	13.36	3,007	22.45
	Q2	1,197	13.97	3,442	25.42
	Q3	1,353	15.84	3,971	29.00
	Q4	1,306	14.92	3,368	24.60
2015	Q1	1,363	15.45	3,398	25.37
	Q2	1,316	15.36	3,654	26.98

## Appendix

### Bed-day data

For *S. aureus* (MRSA and MSSA) bacteraemia and CDI, the average bed-day activity reported by acute Trusts via KH03 returns is used to derive the bed-day denominator for acute Trust incidence rates (assigned and apportioned). Financial year (FY) bed-day data was used as a denominator for all the quarters in that financial year ie FY bed-day data was converted into quarterly data for 2010/11 and used as the denominator for the Q1 2011 surveillance data. As of Q2 2011, bed-day data has been available on a quarterly basis and has been used as such for Q2 2011 to Q1 2015. These data are available at:

<http://www.england.nhs.uk/statistics/statistical-work-areas/bed-availability-and-occupancy/bed-data-overnight/>

Amendments to the published figures on KH03 included the following: Q2 2015 bed-day data were not available at the time of writing this report; therefore, bed-day data for the same quarter of the previous year (Q2 2014) were used as a proxy for this quarter. Data for Q2 2014 to Q1 2015 for one acute Trust (RWD) were >20% higher than the same quarters in the previous year (Q2 2013 to Q1 2014); therefore, data for the same quarters in the previous year were used in place of published KH03 figures for Q2-Q4 2014. In addition, data for Q2 and Q4 2014 for one acute Trust (RQW) were missing; therefore, data for same quarter from the previous year (Q2 and Q4 2013) were used for that Trust.

The KH03 data used for this report are those as published on 21st May. This includes revisions of previously published KH03 data and so these data will differ from those used in earlier reports.

### Population data

National incidence rates are calculated using 2011, 2012, 2013 and 2014 mid-year resident population estimates which are based on the 2011 census for England (2015 estimates are based on 2014 mid-year estimates). These are available at:

<http://www.ons.gov.uk/ons/taxonomy/search/index.html?pageSize=50&sortBy=none&sortDirection=none&newquery=mid-year+population+estimates&nscl=Population>

### Definitions

#### Apportioning and assignment of reports:

- **MRSA bacteraemia PIR assigned reports:**

From the 1<sup>st</sup> of April 2013 to 31<sup>st</sup> March 2014, all MRSA bacteraemia cases reported via the HCAI Data Capture System (DCS) were assigned to either an acute Trust or a CCG through the completion of a Post Infection Review (PIR). A case is deemed to be Trust assigned where the completed PIR indicates that an acute Trust is the organisation best placed to ensure that any lessons learned are actioned. As of 1<sup>st</sup> April 2014, NHS England introduced a new category for the PIR assignment of MRSA bacteraemia cases; assignment to a 'Third Party' through the arbitration process. Therefore, MRSA bacteraemias with a specimen date post 1<sup>st</sup> April 2014 are now assigned to an acute Trust, a CCG or a Third-party through the PIR process. Further information on the PIR process can be found on the following webpage:

<http://www.england.nhs.uk/ourwork/patientsafety/zero-tolerance/>

- **MSSA bacteraemia Trust apportioned reports:**

Include patients who are (i) in-patients, day-patients, emergency assessment patients or not known; AND (ii) have had their specimen taken at an acute Trust or not known; AND (iii) specimen was taken on or after day 3 of the admission (admission date is considered day '1').

- **CDI Trust apportioned reports:**

Include patients who are (i) in-patients, day-patients, emergency assessment patients or not known; AND (ii) have had their specimen taken at an acute Trust or not known; AND (iii) specimen was taken on or after day 4 of the admission (admission date is considered day '1').

- **Total reports:**

These are all the cases reported by an acute Trust. They consist of both Trust apportioned reports and reports NOT apportioned to the acute Trust.

**Episode duration:**

The length of an infection episode is defined as 14 days for MRSA, MSSA and *E. coli* bacteraemia and 28 days for CDI, with the date of specimen being considered day '1'.

**Incidence calculations:**

- **MRSA, MSSA and *E. coli* bacteraemia, and CDI population incidence (episodes per 100,000 population):**

This incidence is calculated on an annualised basis to allow comparisons with the PHE's annually published data and is calculated as follows:

$$=100,000 * (\# \text{ episodes/mid-year England population}) * (\# \text{ days in year/\# days in quarter}).$$

- **MRSA and MSSA bacteraemia and CDI Trust apportioned incidence:**

This incidence is calculated using KH03 average bed-day activity (see *bed-day data* above) and is calculated as follows:

$$=100,000 * [\# \text{ episodes/ (average KH03 occupied beds per day * \# days in surveillance quarter)}]$$

- **Percentage change calculation:**

Please note that percentage changes in rate have been calculated using raw rates figures while those presented in the tables have been rounded up to two decimal places.

**Quarters:**

Q1= January-March; Q2=April-June; Q3=July-September; Q4=October-December