



Public Health
England

Protecting and improving the nation's health

Quarterly Epidemiological Commentary: Mandatory MRSA, MSSA and *E. coli* bacteraemia, and *C. difficile* infection data (up to October-December 2015)

10 March 2016

About Public Health England

Public Health England exists to protect and improve the nation's health and wellbeing, and reduce health inequalities. It does this through world-class science, knowledge and intelligence, advocacy, partnerships and the delivery of specialist public health services. PHE is an operationally autonomous executive agency of the Department of Health.

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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)¹. Subsequent to this, all MRSA bacteraemia cases have been 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 1 April 2014.

Since July-September 2012 there has been a 13.4% decrease (1.7 to 1.5 reports per 100,000 population) in the rate of total MRSA bacteraemia reports when compared to the current quarter (October-December 2015). This is part of an general decreasing trend beginning from April 2007.

Furthermore there has been a 6.0% decrease in both counts and rates of all reported MRSA bacteraemia between October-December 2014 and October-December 2015 (from 215 to 202 reports and from 1.6 to 1.5 reports per 100,000 population, respectively).

During this time period (October-December 2014 to October-December 2015) both counts and rates of CCG assigned MRSA bacteraemia reports have decreased by 12.6% (from 103 to 90 reports and from 0.8 to 0.7 reports per 100,000 population) (Table 1b).

Similarly, the counts and rates of Trust assigned MRSA bacteraemia reports in the current quarter have both decreased by 14.5% (from 83 to 71 reports and from 0.9 to 0.8 per 100,000 bed-days respectively) when compared to the same quarter in the previous year (October-December 2014) (Table 1b).

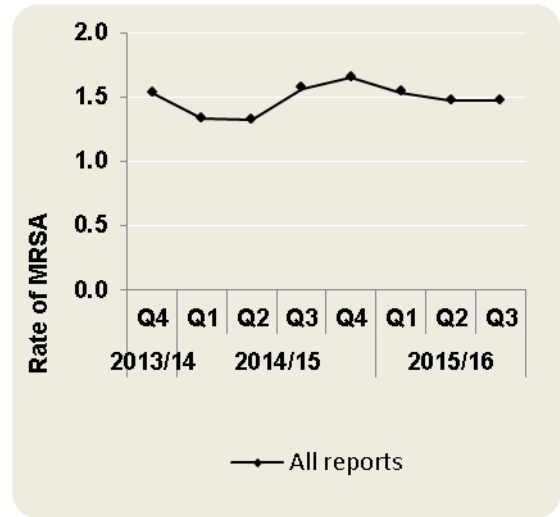
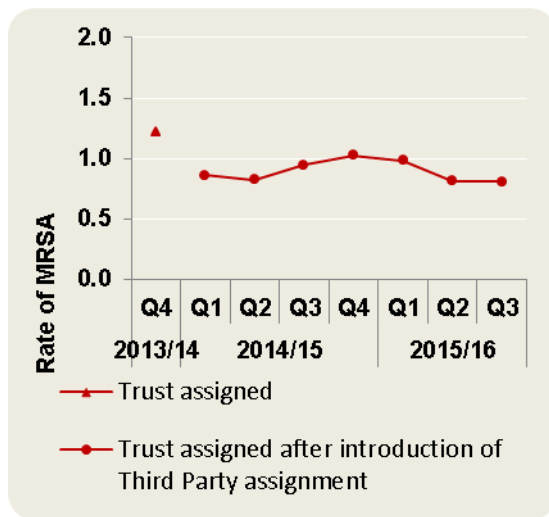
These decreases in assigned counts and rates represent the seventh consecutive decrease between the same quarters in consecutive years in CCG assigned reports since the PIR process was initiated (April 2013).

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

In addition, the number of third party assigned MRSA bacteraemia reports have increased by 41.4% in both counts and rates, from 29 to 41 reports and from 0.2 to 0.3 reports per population (Table 1b).

Figure 1: Quarterly rates of MRSA bacteraemia, October 2013-December 2015

a) Trust assigned* reports (per 100,000 bed-days) **b) All reports (per 100,000 population)**



***Note:** From April-June 2014 an additional option for assignment (third party) was added. This is reflected in Figure 1a with two time series; one for January-March 2014 (rates (per 100,000 bed-days) presented as a red triangle) when there were only two assignment options and the other from April-June 2014 to October-December 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: Trust apportioned² MRSA bacteraemia counts and rates by quarter, July 2012-December 2015

Financial year and quarter	Trust apportioned reports	Trust apportioned rates (per 100,000 bed-days)	All reports	All reports rates (per 100,000 population)	
2012/13	Q2	96	1.1	229	1.7
	Q3	92	1.1	219	1.6
	Q4	116	1.3	252	1.9
2013/14	Q1	96	1.1	237	1.8
	Q2	82	1.0	201	1.5
	Q3	98	1.1	218	1.6
	Q4	88	1.0	206	1.5
2014/15	Q1	67	0.8	181	1.3
	Q2	62	0.7	182	1.3
	Q3	75	0.9	215	1.6
	Q4	81	0.9	222	1.7
2015/16	Q1	77	0.9	209	1.5
	Q2	72	0.8	202	1.5
	Q3	76	0.9	202	1.5

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

Financial 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)	
2013/14	Q1	107	1.2	130	1.0	N/A	N/A
	Q2	92	1.1	109	0.8	N/A	N/A
	Q3	107	1.2	111	0.8	N/A	N/A
	Q4	106	1.2	100	0.7	N/A	N/A
2014/15	Q1	73	0.9	91	0.7	17	0.1
	Q2	70	0.8	86	0.6	26	0.2
	Q3	83	0.9	103	0.8	29	0.2
	Q4	91	1.0	90	0.7	41	0.3
2015/16	Q1	85	1.0	82	0.6	42	0.3
	Q2	69	0.8	68	0.5	65	0.5
	Q3	71	0.8	90	0.7	41	0.3

*Note: Not all PIRs were finalised at time of data extraction (14.9%, n=30/202 from Q3 2015/16). For these cases the provisional assignments have been used.

² Since April 2013, MRSA cases have been reported by PIR assignment. This table is presented for historical purposes only.

MSSA bacteraemia

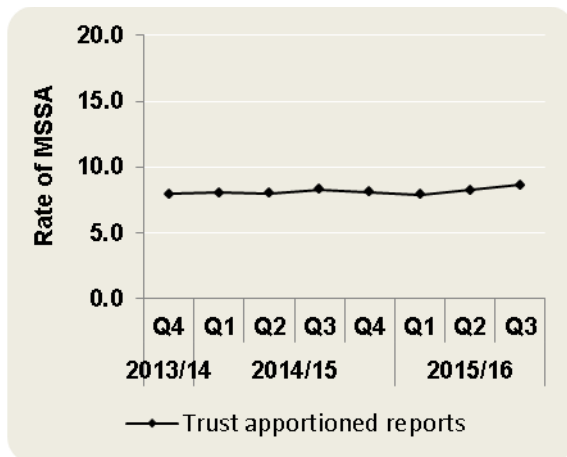
There has been a general increasing trend in the MSSA bacteraemia all reports rates, with an overall increase of 22.9%, from 15.8 to 19.5 reports per 100,000 population from July-September 2012 to the current quarter (October-December 2015). The current quarter had the highest rate of 19.5 reports per 100,000 population since the mandatory reporting of MSSA bacteraemia cases was initiated in January 2011. Similarly, within the same time period the rates of Trust apportioned reports has increased by 12.7% from 7.6 to 8.6 reports per 100,000 population.

Between the current quarter (October-December 2015) and the same quarter from the previous year (October-December 2014), both counts and rates of all reported MSSA bacteraemias increased by 3.3% from 2,581 to 2,667 reports and 18.9 to 19.5 reports per 100,000 population respectively.

Similarly, in both the counts and rates of Trust apportioned MSSA bacteraemia reports, there has been a 3.8% increase from 728 to 756 reports and 8.3 to 8.6 per 100,000 bed-days, respectively, within the same time period.

Figure 2: Quarterly rates of MSSA bacteraemia, October 2013-December 2015

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



b) All reports (per 100,000 population)

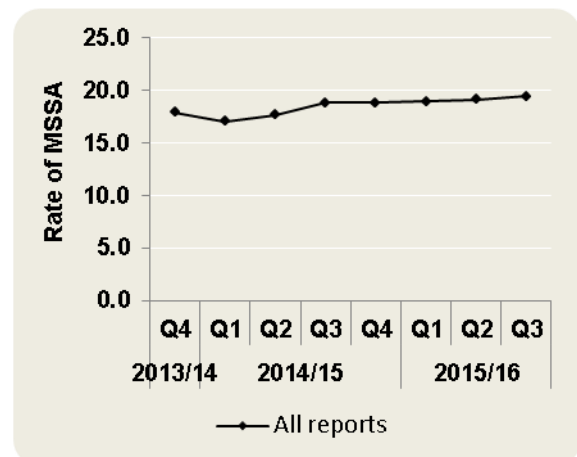


Table 2: MSSA bacteraemia counts and rates by quarter, July 2012-December 2015

Financial year and quarter		Trust apportioned reports	Trust apportioned rates (per 100,000 bed-days)	All reports	All reports rates (per 100,000 population)
2012/13	Q2	648	7.6	2,131	15.8
	Q3	663	7.7	2,186	16.3
	Q4	678	7.7	2,257	17.0
2013/14	Q1	711	8.2	2,329	17.3
	Q2	700	8.3	2,344	17.3
	Q3	596	6.9	2,213	16.3
2014/15	Q4	689	7.9	2,404	17.9
	Q1	683	8.1	2,317	17.1
	Q2	677	8.0	2,421	17.7
2015/16	Q3	728	8.3	2,581	18.9
	Q4	716	8.1	2,526	18.9
	Q1	679	7.9	2,567	19.0
2015/16	Q2	701	8.3	2,620	19.1
	Q3	756	8.6	2,667	19.5

Epidemiological analyses of *Escherichia coli* bacteraemia data

An overall increasing trend has been seen in both the counts and rates of *E. coli* bacteraemia since July 2012, with seasonal peaks generally reported between July and September each year (Figure 3).

A 7.3% increase (from 64.7 to 69.4 reports per 100,000 population) has been observed in the rate of all reported *E. coli* bacteraemias when comparing the current quarter (October-December 2015) with the same quarter of the previous year (October-December 2014). There has been an overall increase of 7.6% in the rate of bacteraemia from 64.5 to 69.4 reports per 100,000 population since July-September 2012.

The current quarter (October-December 2015) has the second highest rate of *E. coli* bacteraemia at 69.4 reports per 100,000 population during the last 14 quarters, with the highest rate observed in July-September 2015 (73.6 reports per 100,000 population).

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

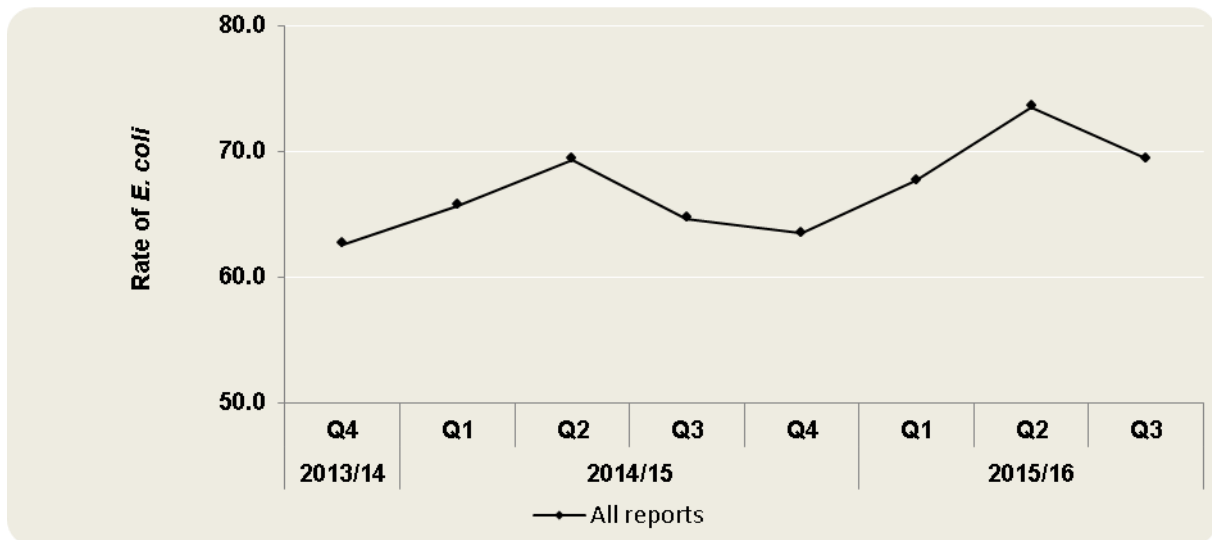


Table 3: Quarterly counts and rates of all *E. coli* bacteraemia reports by quarter, July 2012-December 2015³

Financial year and quarter		Total <i>E. coli</i> bacteraemia reports	Rate (per 100,000 population)
2012/13	Q2	8,676	64.5
	Q3	7,957	59.2
	Q4	7,602	57.2
2013/14	Q1	8,193	61.0
	Q2	9,079	66.9
	Q3	8,623	63.5
2014/15	Q4	8,391	62.7
	Q1	8,899	65.7
	Q2	9,502	69.4
2015/16	Q3	8,854	64.7
	Q4	8,506	63.5
	Q1	9,168	67.7
2015/16	Q2	10,071	73.6
	Q3	9,504	69.4

³ Wirral University Teaching Hospital NHS Trust have not submitted *E. coli* bacteraemia data since February 2014, as a result data published for January-March 2014 onwards do not include all NHS Acute Trusts in England.

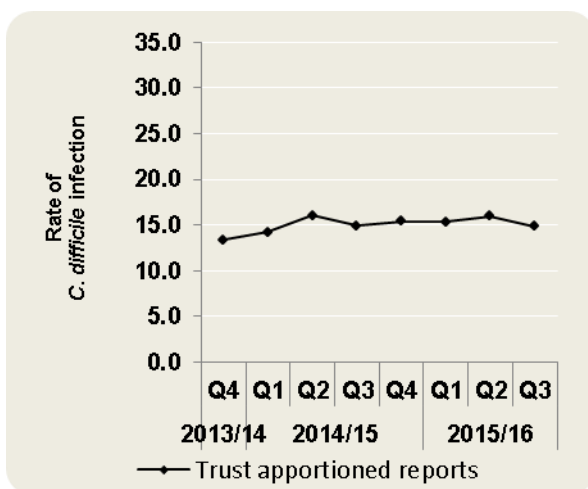
Epidemiological analyses of *Clostridium difficile* infection data

There has been an overall decrease in the total number of reported CDI cases between April-June 2007 and October-December 2015.

Between October-December 2014 and the current quarter (October-December 2015), there has been an increase of 4.9% in both counts and rates of all reported CDI cases (from 3,366 to 3,530 reports and from 24.6 to 25.8 reports per 100,000 population), while the Trust apportioned CDI counts and rates have both remained steady over the same time period (from 1,306 to 1,305 reports, respectively and 14.9 reports per 100,000 bed-days for both quarters, see Table 4).

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

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



b) All reports (per 100,000 population)

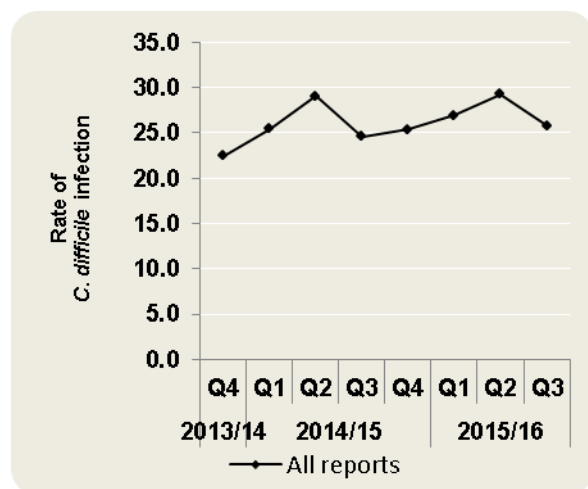


Table 4: *C. difficile* infection counts and rates in patients aged 2 years and over by quarter, July 2012-December 2015

Financial year and quarter		Trust apportioned reports	Trust apportioned rates (per 100,000 bed-days)	All reports	All reports rates (per 100,000 population)
2012/13	Q2	1,433	16.9	3,870	28.8
	Q3	1,527	17.7	3,756	27.9
	Q4	1,503	17.1	3,412	25.7
2013/14	Q1	1,347	15.6	3,386	25.2
	Q2	1,278	15.2	3,671	27.0
	Q3	1,249	14.5	3,298	24.3
	Q4	1,160	13.4	3,007	22.5
2014/15	Q1	1,204	14.2	3,449	25.5
	Q2	1,359	16.0	3,979	29.1
	Q3	1,306	14.9	3,366	24.6
	Q4	1,364	15.4	3,398	25.4
2015/16	Q1	1,321	15.3	3,652	27.0
	Q2	1,356	16.0	4,012	29.3
	Q3	1,305	14.9	3,530	25.8

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). As of Q1 2011/12, bed-day data has been available on a quarterly basis and has been used as such for Q2 2012/13 to Q3 2015/16. 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: Q3 2015/16 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 (Q3 2014/15) were used as a proxy for this quarter.

In Quarterly Epidemiological Commentaries published prior to 1 December 2015, April-June 2014 quarterly KH03 figures for one acute Trusts (RWD) had a percentage change of more than 20% compared to the previous quarter and the same quarter in the previous year. As a result it was replaced with the KH03 data of the same quarter in the previous year (April-June 2013).

However, PHE has reviewed its policy for processing KH03 data. All data irregularities identified are now flagged with colleagues at NHS England (data owners of the KH03 dataset). Until we receive confirmation that any identified change in the occupied overnight bed-days for an acute Trust is anomalous, PHE will use the data as published in the KH03 dataset. This affects all reports published since 1 December 2015. In order for the KH03 data used to calculate rates included in this report to be consistent over the full time period, previously amended KH03 data for Trust RWD for FY 2014/2015 has been altered to reflect that published in the KH03 dataset. Please note that this could lead to slight differences in Trust apportioned/assigned rates when compared with publications prior to 1 December 2015.

Missing data for acute Trusts in the KH03 return will continue to be processed as before, where the KH03 return for the same quarter from the previous year will be used as a proxy. The following acute Trusts were thus affected:

- The Princess Alexandra Hospital NHS Trust (RQW) April-June 2014 and October-December 2014 KH03 figures: Replace with April-June 2013 to October-December 2013 KH03 figures.

The KH03 data used for this report are those as published on 19th November. 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 1 April 2013 to 30 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 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 since 1 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:

This is the total count of infections for each organism as extracted from the HCAI DCS on 20 October 2015. Please note that for *C. difficile*, this count excludes those from patients less than 2 years old.

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):

This incidence is calculated using the mid-year England population and is

=100,000* (# episodes/mid-year England population) * (# 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:

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

Percentage change calculation:

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

Quarters:

In publications prior to March 2016, all references to quarterly data are based on calendar year definitions, and NOT financial year

definitions. ie:-

Q1 2014= January-March 2014

Q2 2014= April-June 2014

Q3 2014= July-September 2014

Q4 2014= October-December 2014

However, for all subsequent publications, including this one, all references to quarterly data are based on financial year definitions, and NOT calendar year

definitions. ie:-

Q1 2014/15= April-June 2014

Q2 2014/15= July-September 2014

Q3 2014/15= October-December 2014

Q4 2014/15= January-March 2015