Public Health England

Quarterly Epidemiological Commentary: Mandatory MRSA, MSSA and *E. coli* bacteraemia, and *C. difficile* infection data (up to July-September 2014)

11th December 2014

INSIDE

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

Citation

Public Health England. Quarterly Analyses: Mandatory MRSA, MSSA and *E. coli* Bacteraemia and CDI in England (up to July-September 2014). London: Public Health England, December 2014.

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)[1]. MRSA bacteraemia cases since April 2013 have been published by PIR assignment rather than by apportionment.

- As of April 2014, NHS England introduced a new category for the PIR assignment of MRSA bacteraemia cases, acknowledging the increasingly complex nature of the MRSA bacteraemia 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.

- In the current quarter (July-September 2014), the total number of MRSA bacteraemia reports has decreased by 9.4 % compared to the same quarter in the previous year, decreasing from 201 to 182 (Table 1a), reflecting the decline in MRSA reports over the last 8 years.

- Since July-September 2013 there has been a 20.7% decrease in the total number of Trust assigned MRSA bacteraemias (from 92 to 73 reports) and a 17.4% decrease in CCG assigned bacteraemias (from 109 to 90 reports) (Table 1b). However, it is important to note that since April 2014 there has been a “third party” option for PIR assignment, and 10.4% of MRSA bacteraemias were assigned using this method during the current quarter.

- There is a corresponding decrease in Trust assigned rates this quarter (July-September 2014) compared to the same quarter in the previous year, from 1.09 to 0.86 per 100,000 bed days. Similarly, the CCG assigned rate has decreased from 0.80 to 0.66 per 100,000 population over the same time period. In addition, the all reports rate has decreased by 9.5% from 1.48 to 1.34 per 100,000 population (Table 1b).

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

Table 1a: MRSA bacteraemia counts and rates by quarter, April 2011 - September 2014

Year and quarter		Trust apportioned reports	Trust apportioned rates (per 100,000 bed-days)	All reports	All reports rates (per 100,000 population)
2011	Q2	148	1.71	319	2.41
	Q3	103	1.21	266	1.99
	Q4	105	1.21	269	2.01
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	N/A	N/A	237	1.76
	Q3	N/A	N/A	201	1.48
	Q4	N/A	N/A	218	1.61
2014	Q1	N/A	N/A	206	1.55
	Q2	N/A	N/A	181	1.35
	Q3	N/A	N/A	182	1.34

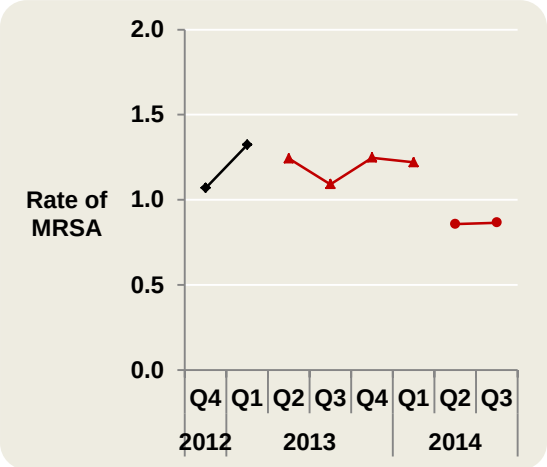
Table 1b: MRSA bacteraemia counts and rates by PIR assignment*, April 2013-September 2014

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	0.86	91	0.68	17	0.13
	Q3	73	0.87	90	0.66	19	0.14

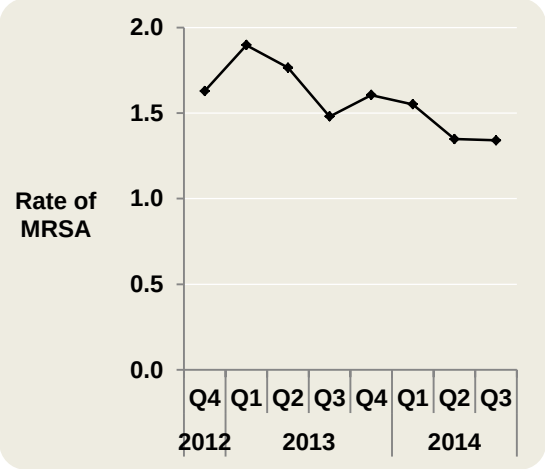
***Note:** Not all PIRs were finalised (5%, n=9) at time of data extraction, for these cases the provisional assignments have been used.*

Figure 1: Quarterly rates of MRSA bacteraemia, October 2012- September 2014

a) Trust apportioned/assigned* rate (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. This is reflected in Figure 1a where Trust assigned rates (per 100,000 bed days) are presented as red triangles from April-June 2013 to July-September 2014, while Trust apportioned rates are presented as black diamonds (October-December 2012 to January-March 2013). From April-June 2014, PIR assignment of MRSA cases have had an additional option for assignment (third party cases). Trust assigned rates (per 100,000 bed days) from April 2014 are presented as red circles. Please refer to Table 1b for Trust assigned, CCG assigned and Third Party assigned cases and rates.*

MSSA Bacteraemia

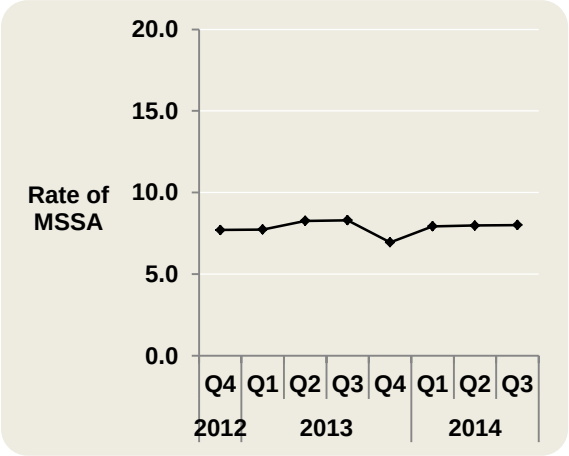
- There have been slight quarterly fluctuations in the number of reported MSSA bacteraemias, with an increase of 73 reports (3.1%) in the current quarter (July-September, 2014), compared to the same quarter in the previous year (Table 2). Similarly, there have been small quarterly variations in Trust apportioned cases of MSSA, with a 3.6% reduction between the current quarter and the same quarter last year (n=25 cases) (Table 2).

- The highest all reports rate was seen in the first quarter of 2014, (18.10 per 100,000 population) while the lowest all reports rate was in July-September 2012 (15.85 per 100,000 population). Overall, there has been a 7.1% increase in the all reports rate between July-September 2011 and July-September 2014, however over the same time period there has been a 6.2% decrease in the rate of Trust apportioned reports (from 8.54 to 8.01 per 100,000 bed days).

- Trust apportioned rates have remained relatively consistent (ranging from 7.7-8.3) between October-December 2012 and July-September 2014. The exception to this was October-December 2013 where the rate dipped to 7.0 per 100,000 bed days, 15.3% lower than the most recent quarter (Figure 2). Therefore the increase seen in overall reports was not due to increases in Trust apportioned reports.

Figure 2: Quarterly rates of MSSA bacteraemia, October 2012- September 2014

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



b) All reports (per 100,000 population)

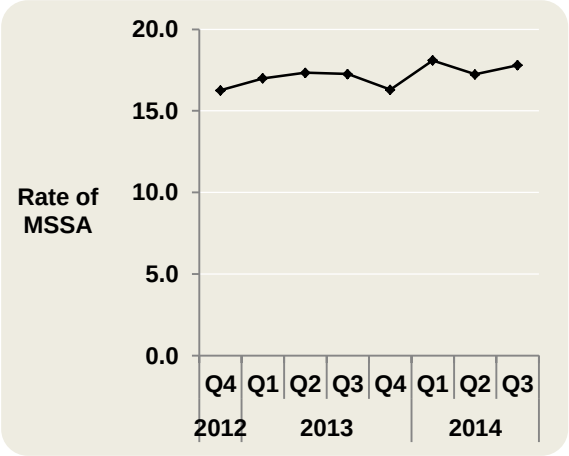


Table 2: MSSA bacteraemia counts and rates by quarter, April 2011- September 2014

Year and quarter		Trust apportioned reports	Trust apportioned rates (per 100,000 bed-days)	All reports	All reports rates (per 100,000 population)
2011	**Q2**	698	8.07	2,191	16.55
	Q3	725	8.54	2,226	16.63
	Q4	703	8.12	2,167	16.19
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	8.26	2,329	17.34
	Q3	700	8.30	2,344	17.26
	Q4	596	6.95	2,213	16.30
2014	**Q1**	689	7.93	2,404	18.10
	Q2	680	7.98	2,315	17.24
	Q3	675	8.01	2,417	17.80

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

- Mandatory *E. coli* bacteraemia surveillance commenced in June 2011. Since July 2011, the total number of reported *E.coli* bacteraemias has increased steadily, with seasonal peaks between July-September each year (Figure 3).

- The lowest rate of *E. coli* since the surveillance programme commenced was observed in the first quarter of 2013 (57.24 per 100,000 population) while the highest rate was in the most recent quarter (July-September 2014), with a rate of 69.77 per 100,000 population (Table 3); which equates to an increase of 4.3% compared to the same quarter last year.

Figure 3: Quarterly rates of *E. coli* bacteraemia reports per 100,000 population, July 2012- September 2014

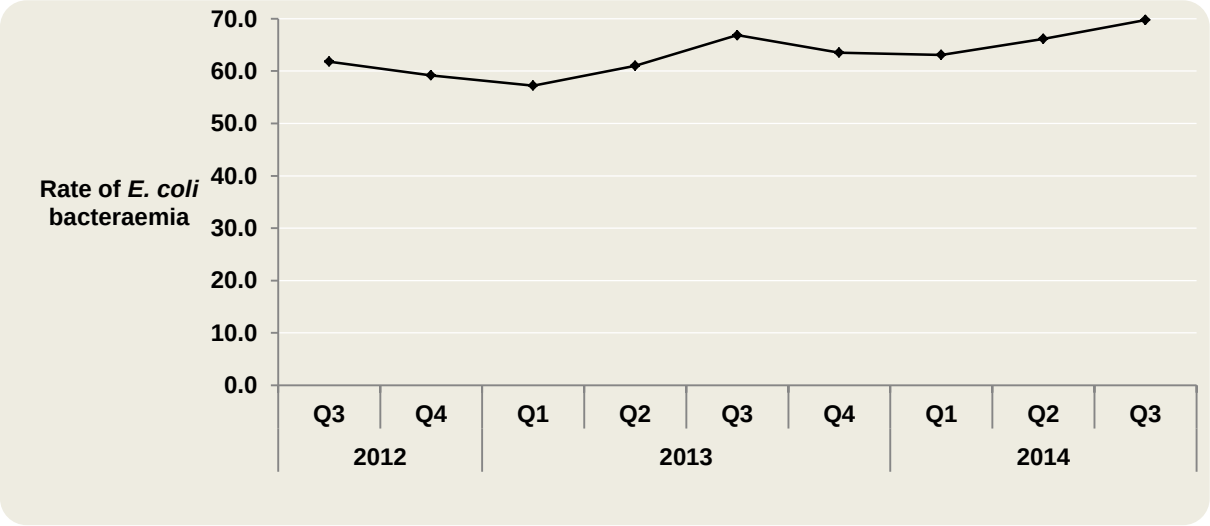


Table 3: Quarterly counts and rates of all *E. coli* bacteraemia reports by quarter, July 2011- September 2014

Year and quarter		Total *E. coli* bacteraemia reports	Rate (per 100,000 population)
2011	**Q3**	8,275	61.82
	Q4	8,098	60.50
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	63.09
	Q2	8,886	66.17
	Q3	9,473	69.77

Section 3: Epidemiological analyses of *Clostridium difficile* data

- January to March 2014 had the lowest number of *Clostridium difficile* infections (CDI) since mandatory reporting began in 2007 (n=3,006).

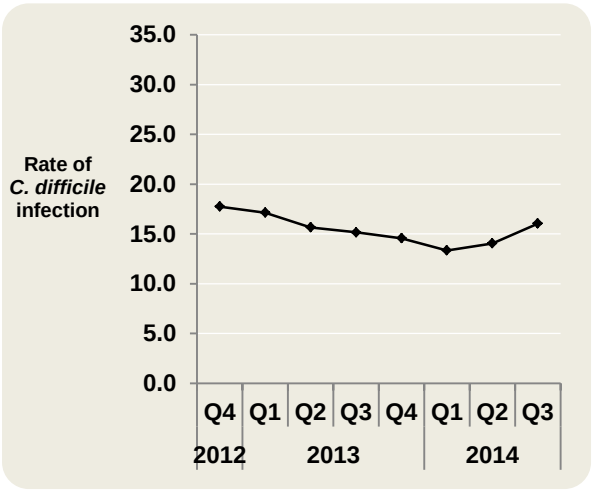
- The total number of CDI has increased 32.2% during calendar year 2014 from 3,006 in January-March to 3,973 in July-September. The total number of CDI for the current quarter (July-September 2014) has increased by 302 reports (8.2%) compared to the same quarter in the previous year (Table 4) and accounts for the highest number of cases reported in a quarter since October-December 2011. This increase is also observed in the all reports rate per 100,000 population (Figure 4).

- Overall, Trust apportioned CDI decreased by 854 (38.7%) between April-June 2011 and the current quarter (2,206 to 1,352, respectively), although the number of Trust apportioned CDI have increased in the two most recent quarters, by 11.1% and 5.8% compared to their respective quarters in the previous calendar year (Table 4). Of note, the percentage increase in non-Trust apportioned reports between July-September 2013 and July-September 2014 is sharper, with nearly double the percentage increase compared to Trust apportioned reports (9.5% vs. 5.8%, respectively).

- Trust apportioned rates have also increased in the current quarter compared to the same quarter in the previous year, by 5.8% from 15.16 (July-September 2013) to 16.04 (July-September 2014) per 100,000 bed days and the most recent quarter demonstrated the highest rate of Trust apportioned CDI since January-March 2013 (Figure 4).

Figure 4: Quarterly rates of *C. difficile* infection in patients aged 2 years and over, October 2012- September 2014

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



b) All reports (per 100,000 population)

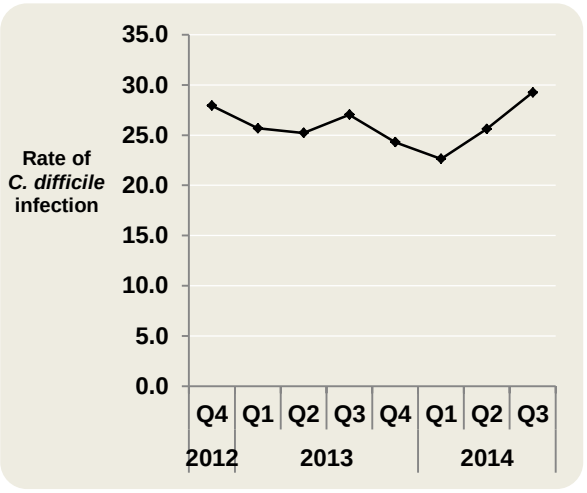


Table 4: *C. difficile* infection counts and rates in patients aged 2 years and over by quarter, April 2011- September 2014

Year and quarter		Trust apportioned reports	Trust apportioned rates (per 100,000 bed-days)	All reports	All reports rates (per 100,000 population)
2011	**Q2**	2,206	25.51	4,967	37.51
	Q3	2,046	24.10	4,994	37.31
	Q4	1,824	21.07	4,350	32.50
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	17.14	3,412	25.69
	Q2	1,347	15.65	3,386	25.21
	Q3	1,278	15.16	3,671	27.04
	Q4	1,249	14.56	3,298	24.29
2014	**Q1**	1,159	13.34	3,006	22.63
	Q2	1,197	14.05	3,440	25.62
	Q3	1,352	16.04	3,973	29.26

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. Financial year (FY) bed-day data was used as a denominator for all the quarters in that financial year i.e. FY bed-day data was converted into quarterly data for 2010/11 and used as the denominator (FY2010/11 bed-day data was used for the Q1 2011 surveillance data numerators). As of Q2 2011, bed- day data has been available on a quarterly basis and has been used as such for Q2 2011 to Q2 2014. These data are available at: http://www.england.nhs.uk/statistics/statistical-work-areas/bed-availability-and-occupancy/bed-data-overnight/

Q3 2014 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 2013) were used for surveillance data for this quarter. Data for Q2 2014 for one acute Trust (RWD) were >20% higher than both the previous quarter (Q1 2014) and the same quarter in the previous year (Q2 2013), therefore data for the previous quarter (Q1 2014) were used for that Trust. Data for Q2 2014 for one acute Trust (RQW) were missing, therefore data for same quarter the previous year (Q2 2013) were used for that Trust.

Population data

National incidence rates are calculated using 2011, 2012 and 2013 mid-year resident population estimates which are based on the 2011 census for England (2014 estimates are based on 2013 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 1st of April 2013 to 31st 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 1st 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 1st April 2014 are now assigned to an acute Trust, a CCG or a third party through the PIR process. With a specimen date post 1st April 2014. 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 a specimen taken at an acute Trust or not known; AND (iii) specimen is 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 a specimen taken at an acute Trust or not known; AND (iii) specimen is 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* (# 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*[# episodes/ (average KH03 occupied beds per? day * # days in surveillance quarter)]

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