



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 April-June 2016)

September 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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We are always striving to ensure that routine outputs meet user need as much as possible. If you have any suggestions for changes and/or additions please email mandatory-surveillance@phe.gov.uk

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Data included in the quarterly epidemiological commentary

This document contains quarterly, national-level epidemiological commentaries for MRSA, MSSA and *E. coli* bacteraemias and *C. difficile* infections. This includes analysis on:

- counts and rates of all cases of *E. coli* bacteraemia (*E. coli* bacteraemias are not subject to apportionment).
- counts and rates of all cases and trust-apportioned cases of MRSA¹ and MSSA bacteraemia and *C. difficile* infection.
- counts and rates of MRSA cases published by post infection review (PIR) assignment. This includes three categories – trust-assigned, clinical commissioning group (CCG) assigned or third party-assigned cases

This commentary includes analysis of counts and rates of MRSA, MSSA and *E. coli* bacteraemias and *C. difficile* infections for the 14 most recent quarters.

Revisions to data included are covered by a data-specific [revisions and correction policy](#).

Further Information

This publication forms part of the range of National Statistics outputs routinely published by PHE which include monthly and annual reports on the mandatory surveillance of MRSA, MSSA and *E. coli* bacteraemias and *C. difficile* infections (CDI).

Annual report output

Further epidemiological analyses by financial year can be found in PHE's [annual epidemiological commentary](#).

Monthly report outputs

The following reports are produced by PHE on a monthly basis:

MRSA bacteraemia:

- [monthly MRSA PIR-assigned counts by acute trust](#)
- [monthly MRSA PIR-assigned counts by CCG](#)
- [monthly MRSA counts by CCG](#)

MSSA bacteraemia:

- [monthly MSSA counts by acute trust; trust-apportioned cases only](#)
- [monthly MSSA counts by CCG](#)

E. coli bacteraemia (data are not apportioned):

- [total monthly counts of *E. coli* bacteraemia by trust](#)
- [monthly counts of *E. coli* bacteraemia by CCG](#)

CDI:

- [monthly CDI counts by acute trust in patients aged two years and over; trust-apportioned cases only](#)

¹ Since April 2013, MRSA cases have been reported by PIR assignment. This is presented for historical purposes only.

- monthly CDI counts by CCG in patients aged two years and over

Data for this report was extracted from PHE's healthcare associated infections data capture system (HCAI DCS) on 19 July 2016.

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)². 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 the January-March 2013 quarter there has been a 19.9% decrease (1.9 to 1.5 cases per 100,000 population) in the rate of total MRSA bacteraemia cases when compared with the current quarter (April-June 2016). This is part of a general decreasing trend which began in April 2007. However, between April-June 2015 and April-June 2016 the rate of all reported MRSA bacteraemia remained stable at 1.5 cases per 100,000 population (from 209 to 207 cases).

During this period (April-June 2015 to April-June 2016) the count and rate of MRSA bacteraemia assigned to a CCG increased by 14.6% and 14.9%, respectively (from 82 to 94 reported cases and from 0.6 to 0.7 cases per 100,000 population, Table 1b). Conversely, the counts and rates of MRSA bacteraemia assigned to a trust both decreased by 21.7% (from 83 to 65 reported cases and from 1.0 to 0.8 per 100,000 bed-days, respectively) during this period (Table 1b). In addition, the counts and rates of third party-assigned MRSA bacteraemia cases increased slightly by 9.1% and 9.4% respectively between April-June 2015 and April-June 2016 (from 44 to 48 cases and from 0.3 to 0.4 cases per population, Table 1b).

² Please refer to www.gov.uk/government/collections/staphylococcus-aureus-guidance-data-and-analysis for more information.

Figure 1: Quarterly rates of MRSA bacteraemia, July 2014-June 2016

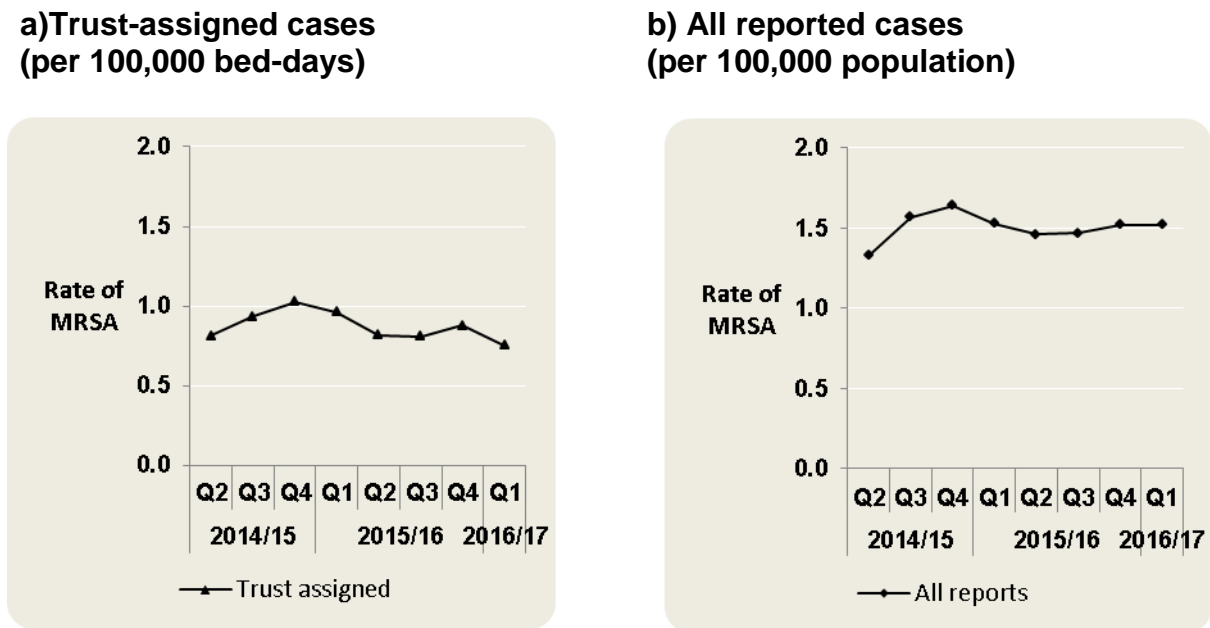


Table 1a: Trust-apportioned³ MRSA bacteraemia counts and rates by quarter, January 2013-June 2016

Financial year and quarter	Trust-apportioned cases	Trust-apportioned rates (per 100,000 bed-days)	All reported cases	All reported case rates (per 100,000 population)
2012/13 Q4	116	1.3	252	1.9
2013/14 Q1	96	1.1	237	1.8
2013/14 Q2	82	1.0	201	1.5
2013/14 Q3	98	1.1	218	1.6
2013/14 Q4	88	1.0	206	1.5
2014/15 Q1	67	0.8	181	1.3
2014/15 Q2	62	0.7	182	1.3
2014/15 Q3	75	0.9	215	1.6
2014/15 Q4	81	0.9	222	1.6
2015/16 Q1	77	0.9	209	1.5
2015/16 Q2	72	0.9	202	1.5
2015/16 Q3	77	0.9	203	1.5
2015/16 Q4	72	0.8	207	1.5
2016/17 Q1	69	0.8	207	1.5

Table 1b: MRSA bacteraemia counts and rates by PIR assignment*, April 2013-June 2016

³ Since April 2013, MRSA cases have been reported by PIR assignment. This table is presented for historical purposes only.

Financial year and quarter	Trust-assigned cases	Trust-assigned rates (per 100,000 bed-days)	CCG-assigned cases	CCG-assigned rates (per 100,000 population)	Third Party cases	Third Party-assigned rates (per 100,000 population)
2013/14	Q1	107	1.2	130	1.0	N/A
	Q2	92	1.1	109	0.8	N/A
	Q3	107	1.2	111	0.8	N/A
	Q4	106	1.2	100	0.7	N/A
2014/15	Q1	73	0.9	91	0.7	17
	Q2	69	0.8	86	0.6	27
	Q3	82	0.9	103	0.8	30
	Q4	91	1.0	90	0.7	41
2015/16	Q1	83	1.0	82	0.6	44
	Q2	69	0.8	66	0.5	67
	Q3	70	0.8	67	0.5	66
	Q4	78	0.9	64	0.5	65
2016/17	Q1	65	0.8	94	0.7	48

***Note:** Not all PIRs were finalised at the time of data extraction. 19.8% of cases from Q1 2016/17 were not finalised (n=41/207). For these cases the provisional assignments have been used.

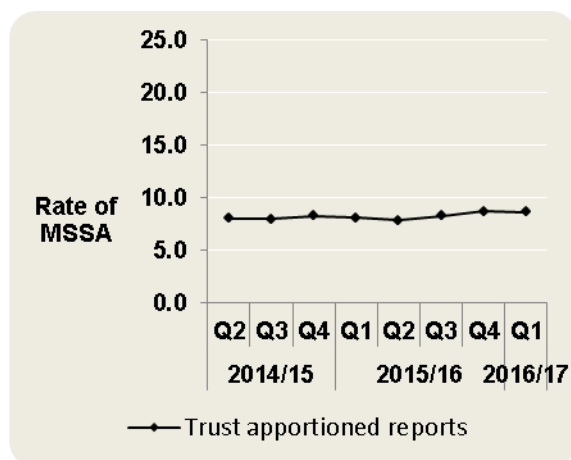
MSSA bacteraemia

There has been a general trend of increasing counts and rates for MSSA bacteraemia, with an overall increase in rates of all reported MSSA bacteraemia by 21.1% (from 17.0 to 20.6 cases per 100,000 population) between January-March 2013 and April-June 2016. Similarly, the rate of trust-apportioned MSSA bacteraemia has also increased by 23.0% (from 7.7 to 9.5 cases per 100,000 bed-days) within the same period.

The current quarter observed the highest rate of all reported MSSA bacteraemia (20.6 cases per 100,000 population) as well as trust-apportioned MSSA bacteraemia (9.5 cases per 100,000 bed days) since the mandatory reporting of MSSA bacteraemia cases was initiated in January 2011. This increase was also observed in the counts and rates of all reported MSSA bacteraemia when compared with the same quarter from the previous year (April-June 2015 to April-June 2016) – an increase of 9.2% and 9.5%, respectively (from 2,568 and 2,803 cases and 18.8 and 20.6 cases per 100,000 population). Similarly, within the same period, the counts and rates of trust-apportioned MSSA bacteraemia have both increased by 20.3% (from 680 to 818 cases and from 7.9 to 9.5 cases per 100,000 bed days).

Figure 2: Quarterly rates of MSSA bacteraemia, July 2014-June 2016

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



b) All reported cases
(per 100,000 population)

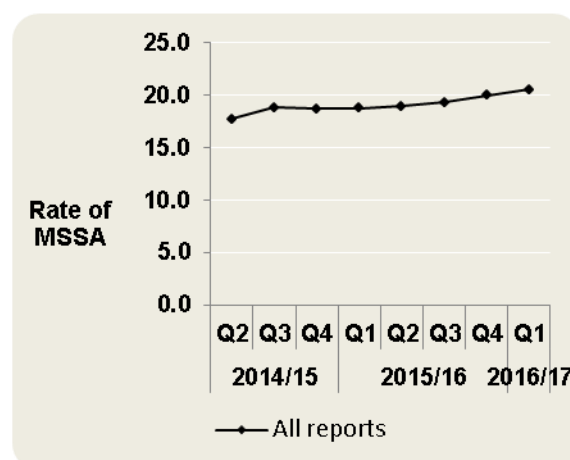


Table 2: MSSA bacteraemia counts and rates by quarter, January 2013-June 2016

Financial year and quarter	Trust-apportioned cases	Trust-apportioned rates (per 100,000 bed days)	All reported cases	All reported case rates (per 100,000 population)
2012/13 Q4	678	7.7	2,257	17.0
2013/14	Q1	711	2,329	17.3
	Q2	700	2,344	17.3
	Q3	596	2,213	16.3
	Q4	689	2,404	17.9
2014/15	Q1	683	2,317	17.1
	Q2	678	2,427	17.7
	Q3	728	2,582	18.9
	Q4	716	2,527	18.7
2015/16	Q1	680	2,568	18.8
	Q2	701	2,623	19.0
	Q3	756	2,672	19.3
	Q4	776	2,729	20.0
2016/17 Q1	818	9.5	2,803	20.6

Epidemiological analyses of *Escherichia coli* bacteraemia data

The counts and rates of reported *E. coli* bacteraemia have increased by 29.0% (from 7,602 to 9,808 cases) and 25.8% (from 57.2 to 72.0 cases per 100,000 population) overall, between January-March 2013 and the current quarter (April-June 2016), with seasonal peaks generally reported between July and September each year (Figure 3). While these seasonal fluctuations are present, each quarter of each year is higher than the same quarter in the preceding year, implying an overall increase over the time period. Similarly between April-June 2015 and April-June 2016 there was a 7.2% increase (from 67.2 to 72.0 cases per 100,000 population) in the rate of all reported *E. coli* bacteraemias.

In the 14 most recent quarters, the highest rate of *E. coli* bacteraemia (73.6 cases per 100,000 population) was observed in the quarter July-September 2015, while the second highest rate of 72 cases per 100,000 population was observed in the current quarter.

Figure 3: Quarterly rates of *E. coli* bacteraemia cases per 100,000 population, July 2014-June 2016

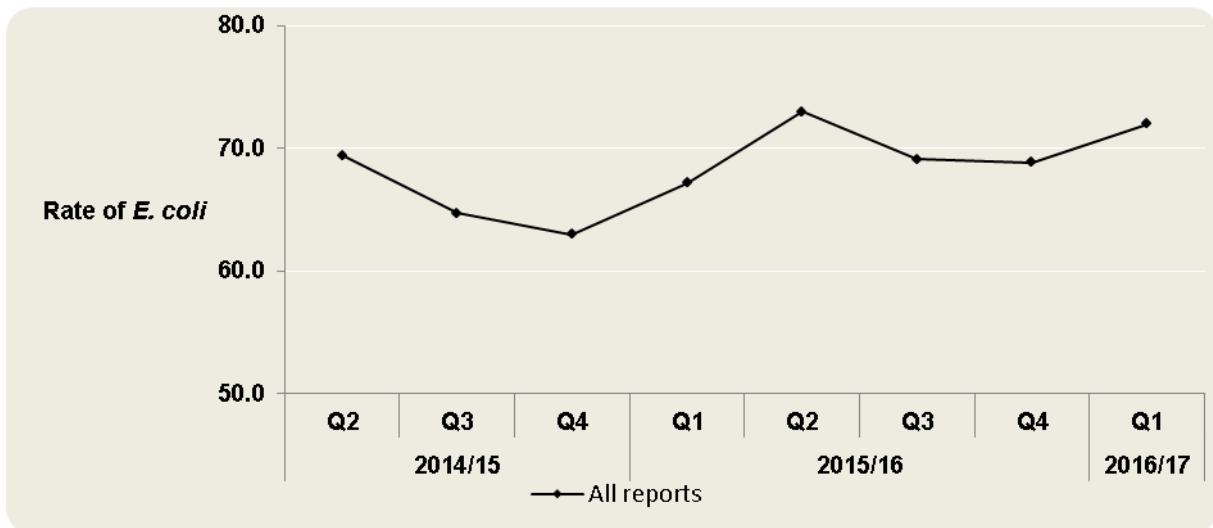


Table 3: Quarterly counts and rates of all *E. coli* bacteraemia cases by quarter, January 2013-June 2016⁴

Financial year and quarter		All reported cases	All reported case rates (per 100,000 population)
2012/13	Q4	7,602	57.2
2013/14	Q1	8,193	61.0
	Q2	9,079	66.9
	Q3	8,623	63.5
	Q4	8,391	62.7
2014/15	Q1	8,901	65.7
	Q2	9,507	69.4
	Q3	8,860	64.7
	Q4	8,511	63.0
2015/16	Q1	9,175	67.2
	Q2	10,082	73.0
	Q3	9,542	69.1
	Q4	9,378	68.8
2016/17	Q1	9,808	72.0

⁴ Wirral University Teaching Hospital NHS Trust did not submit *E. coli* bacteraemia data between February 2014 and November 2015, as a result data published for the period between Q4 2013/14 and Q3 2014/15 do not include all NHS acute trusts in England.

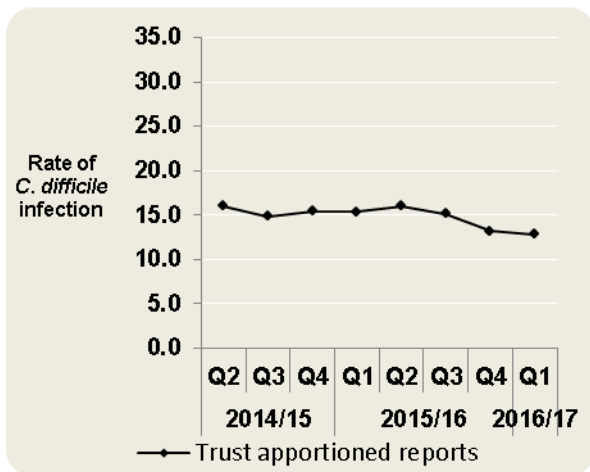
Epidemiological analyses of *Clostridium difficile* infection data

There has been an overall decrease in the total number of reported *C. difficile* infection (CDI) cases between April-June 2007 and April-June 2016 with seasonal peaks between July-September of each year. Between January-March 2013 and the current quarter (April-June 2016) the rates of all reported CDI decreased by 12.4% from 25.7 to 22.5 cases per 100,000 population.

More recently, when compared to the same quarter from the previous year (April-June 2015 to April-June 2016) there was a 16.1% and 15.9% decrease (from 3,652 to 3,064 cases and from 26.7 to 22.5 cases per 100,000 population) in the counts and rates of all reported CDI respectively. Similarly, the counts and rates of trust-apportioned CDI cases both decreased by 16.4% (from 1,322 to 1,105 cases and from 15.4 to 12.8 cases per 100,000 bed-days respectively, see Table 4) over the same time period (April-June 2015 to April-June 2016).

Figure 4: Quarterly rates of *C. difficile* infection in patients aged two years and over, July 2014-June 2016

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



b) All reported cases (per 100,000 population)

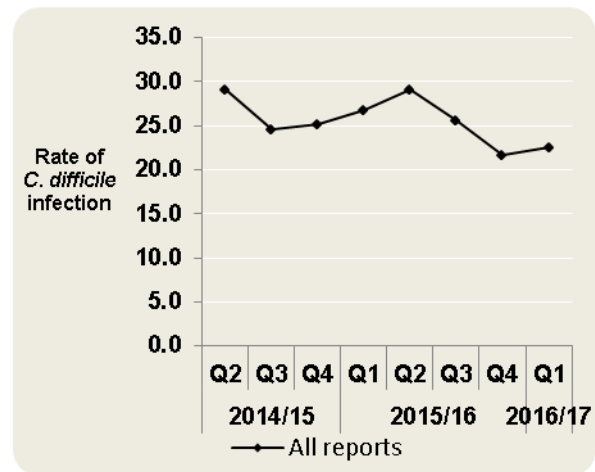


Table 4: *C. difficile* infection counts and rates in patients aged two years and over by quarter, January 2013-June 2016

Financial year and quarter		Trust-appportioned cases	Trust-appportioned rates (per 100,000 bed days)	All reported cases	All reported case rates (per 100,000 population)
2012/13	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	3,450	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	25.2
2015/16	Q1	1,322	15.4	3,652	26.7
	Q2	1,356	16.0	4,011	29.0
	Q3	1,307	15.1	3,533	25.6
	Q4	1,177	13.2	2,944	21.6
2016/17	Q1	1,105	12.8	3,064	22.5

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 2011/12 to Q3 2015/16. This data is available at:

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: Q1 2016/17 bed day data was not available at the time of writing this report; therefore, bed-day data for the same quarter of the previous year (Q1 2015/16) was used as a proxy for this quarter.

In Quarterly Epidemiological Commentaries published prior to 1 December 2015, April-June 2014 to October-December 2014 quarterly KH03 figures for one acute trust (RWD) had a percentage change of more than 20% compared with 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 to October-December 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: Replaced with April-June 2013 to October-December 2013 KH03 figures, respectively.
- Ipswich Hospital NHS Trust (RGQ) January-March 2016 KH03 figure: Replaced with January-March 2015 figures

The KH03 data used for this report was published on 19 May 2016. This includes revisions of previously published KH03 data and so these data may differ from those used in earlier reports.

Population data

National incidence rates are calculated using 2011, 2012, 2013, 2014 and 2015 mid-year resident population estimates which are based on the 2011 census for England (2016 estimates are based on 2015 mid-year estimates). These are available at:

www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates/datasets/populationestimatesforukenglandandwalesscotlandandnorthernireland

Definitions

Apportioning and assignment of cases:

MRSA bacteraemia PIR-assigned cases:

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 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: www.england.nhs.uk/patientsafety/zero-tolerance/

MSSA bacteraemia trust-apportioned cases:

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 three of the admission (admission date is considered day 'one').

CDI trust-apportioned cases:

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 four of the admission (admission date is considered day 'one').

Total reported cases:

This is the total count of infections for each organism as of the date of extraction. Please note that for *C. difficile*, this count excludes those from patients less than two 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 'one'.

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

$$= 100,000 \times \frac{\text{n episodes}}{\text{mid-year population for England}} \times \text{days in quarter}$$

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:

$$= 100,000 \times \frac{\text{n episodes}}{\text{average KH03 occupied beds per day} \times \text{n days in quarter}}$$

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 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