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Wales

<b>The Epidemiology of <i>Staphylococcus aureus</i> bacteraemia in Wales</b>	
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# 1. *S. aureus* bacteraemia incidence

## 1.1 Incidence in 2012/13

A total of 889 cases of *S. aureus* bacteraemia were identified in Wales in the 2012/13 financial year; 18% of the *S. aureus* blood cultures were resistant to meticillin (MRSA).

The rate of MRSA bacteraemia per 1000 admissions in Wales for the 2012/13 financial year was 0.37/1000 admissions; this compares with a rate of 0.44/1000 in the previous financial year. For MSSA bacteraemia, the 2012/13 rate was 1.66, compared to a rate of 1.43 for the 2011/12 financial year.

Rates of MRSA and MSSA bacteraemia by health board for 2012/13 are provided in Table 1. The rates of MRSA bacteraemia for 2012/13 were lower than for 2011/12 for five of the six major health boards. Of the six major health boards in Wales, the MRSA bacteraemia rate was highest in Betsi Cadwaladr University Health Board and lowest in Hywel Dda Health Board.

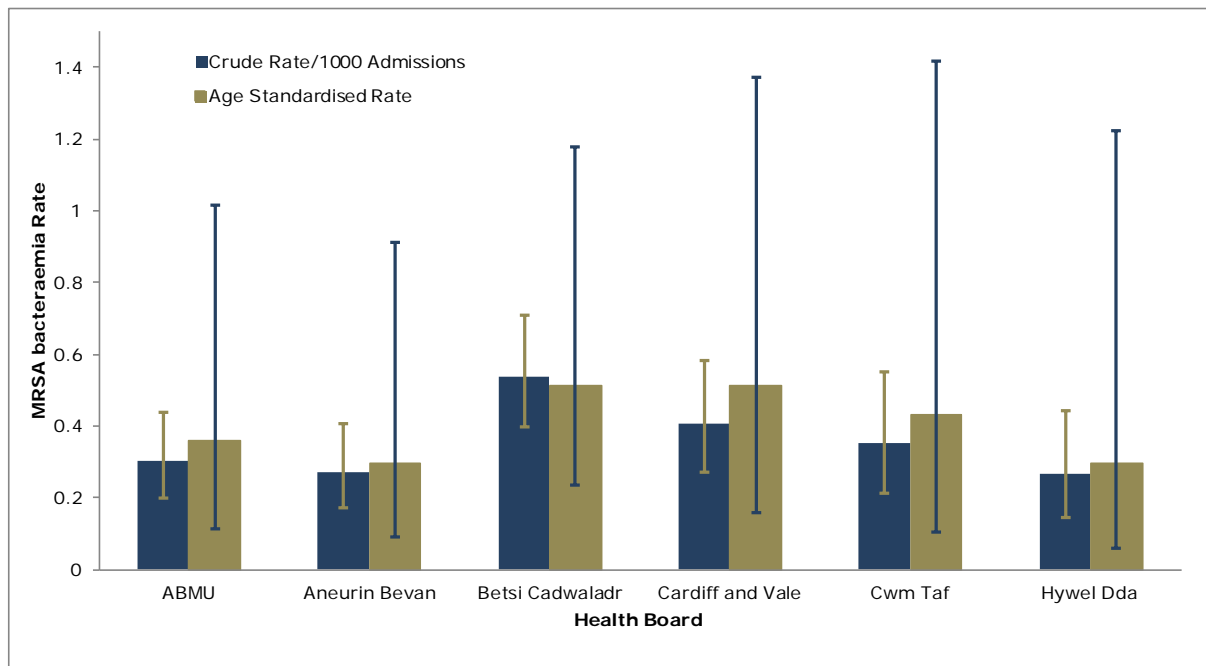
The rates of MSSA bacteraemia for 2012/13 were higher than for 2011/12 for five of the six major health boards. In 2012/13, the MSSA bacteraemia rate was highest in Cardiff & Vale Health Board and lowest in Cwm Taf Health Board.

**Table 1. Rates of MRSA and MSSA bacteraemia per 1000 admissions by health board in Wales for 2012/13 and 2011/12 financial years**

Health Board	MRSA Bacteraemia Rate		MSSA Bacteraemia Rate	
	2012/13	2011/12	2012/13	2011/12
ABMU	0.31	0.36	1.95	1.71
Aneurin Bevan	0.28	0.32	1.35	1.28
Betsi Cadwaladr University	0.54	0.63	1.31	1.36
Cardiff and Vale University	0.41	0.54	2.22	1.93
Cwm Taf	0.37	0.28	1.21	0.81
Hywel Dda	0.27	0.46	1.93	1.30
Powys	0.00	0.00	0.49	0.50
Velindre NHS Trust	0.00	0.47	3.41	1.88

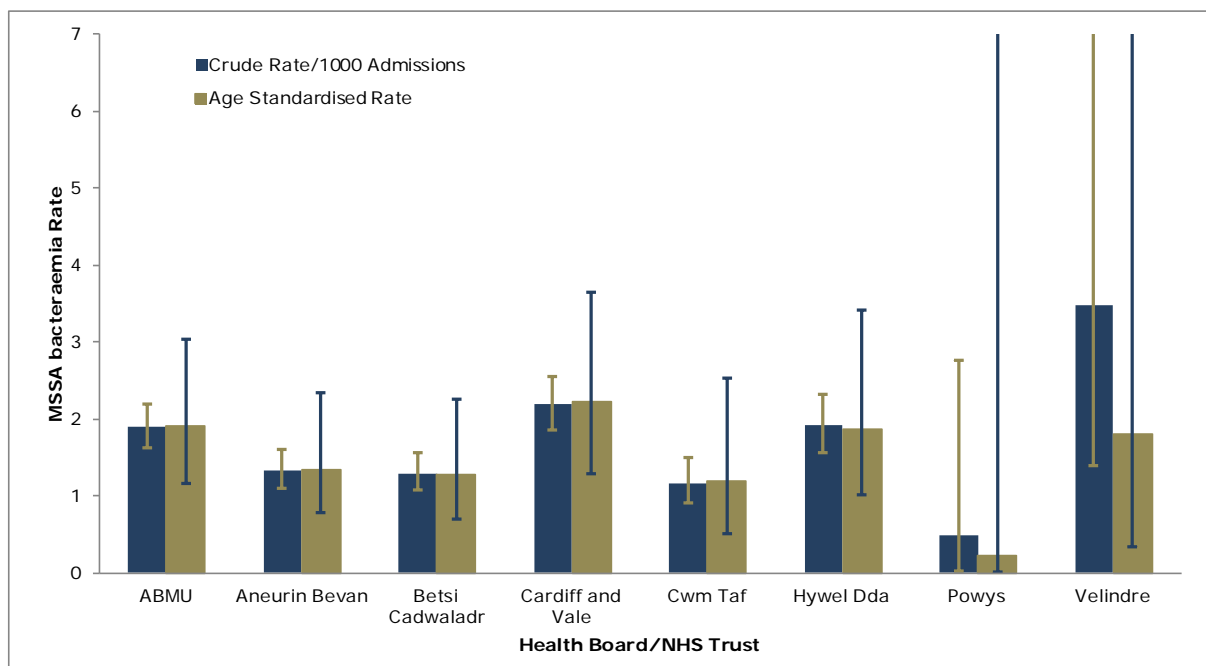
Different age structures of the populations in health boards may influence the number of cases. Figures 1 and 2 compare crude and age-standardised rates of MRSA and MSSA bacteraemia in Wales in 2012/13. Age standardisation for the MRSA bacteraemia rates resulted in a lower rate for Betsi Cadwaladr University Health Board and a higher rate for Cardiff & Vale University Health Board, with those two then having the highest age standardised rates of the major health boards. Age standardisation did not have a major effect on the rates of MSSA bacteraemia, other than for Powys and Velindre.

**Figure 1. Crude and age standardised rates of MRSA bacteraemia by health board in Wales 2012/13**



NB: Powys Health Board and Velindre NHS Trust have not been included in the graph because there were no cases in 2012/13.

**Figure 2. Crude and age standardised rates of MSSA bacteraemia by health board/NHS Trust in Wales 2012/13**

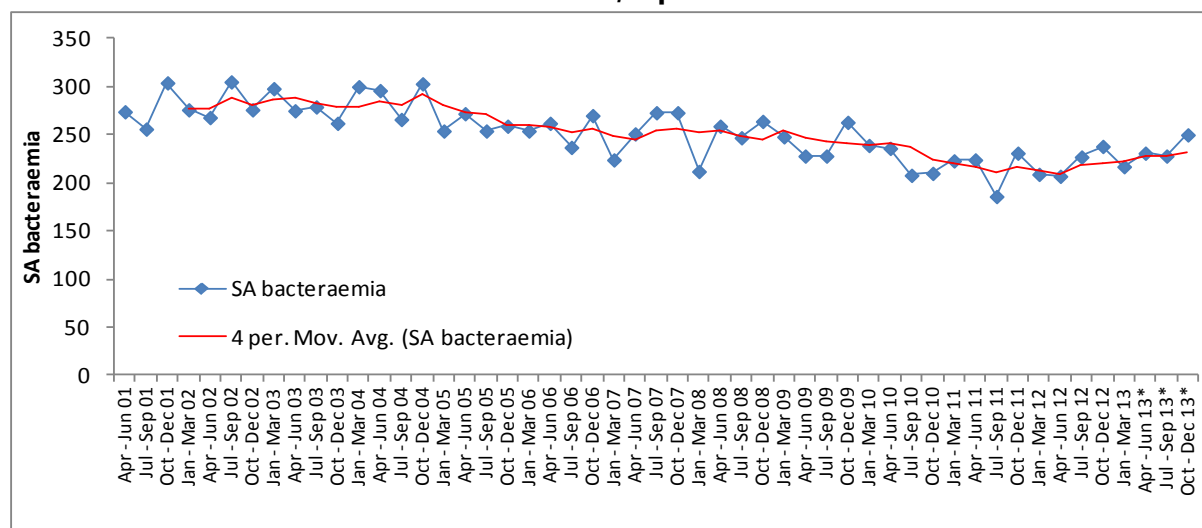


NB: The error margins for Powys or Velindre cannot be contained within the limits of this chart due to the small numbers of MSSA cases and admission numbers in these organisations.

## 1.2 Trends in incidence in Wales, 2001 - 2013

Surveillance of *S. aureus* bacteraemia in Wales has been carried out since April 2001. In general there has been a gradually decreasing trend in numbers of total *S. aureus* bacteraemia. This decreasing trend stopped in 2012 and there have been small increases in cases since then (Fig 3). Peak numbers of *S. aureus* bacteraemia cases occurred in 2002/03 (1147); this had reduced by 26% (850) by the 2011/12 financial year. Current estimates for 2013/14 are for 945 cases.

**Figure 3. Quarterly numbers and 4-quarter moving average numbers of total *S. aureus* bacteraemia in Wales, Apr 2001 – Dec 2013**



\*Data for 2013/14 is provisional

The proportion of *S. aureus* bacteraemia that are MRSA has decreased over time; this has arisen as a result of a decrease in the number of MRSA bacteraemias and an increase in the number of MSSA bacteraemias reported in Wales (Table 2).

**Table 2. Annual counts of *S. aureus* and MRSA bacteraemia reported in Wales, Apr 2001 to Dec 2013**

Financial Year	Total <i>S. aureus</i> bacteraemia	MRSA bacteraemia	% Meticillin resistant
2001/02	1110	466	41.98
2002/03	1147	486	42.37
2003/04	1116	489	43.82
2004/05	1119	439	39.23
2005/06	1039	390	37.54
2006/07	993	319	32.12
2007/08	1009	374	37.07
2008/09	1018	340	33.40
2009/10	958	274	28.60
2010/11	877	218	24.86
2011/12	850	199	23.41
2012/13	889	161	18.11
Apr-Dec 2013*	709	129	18.19

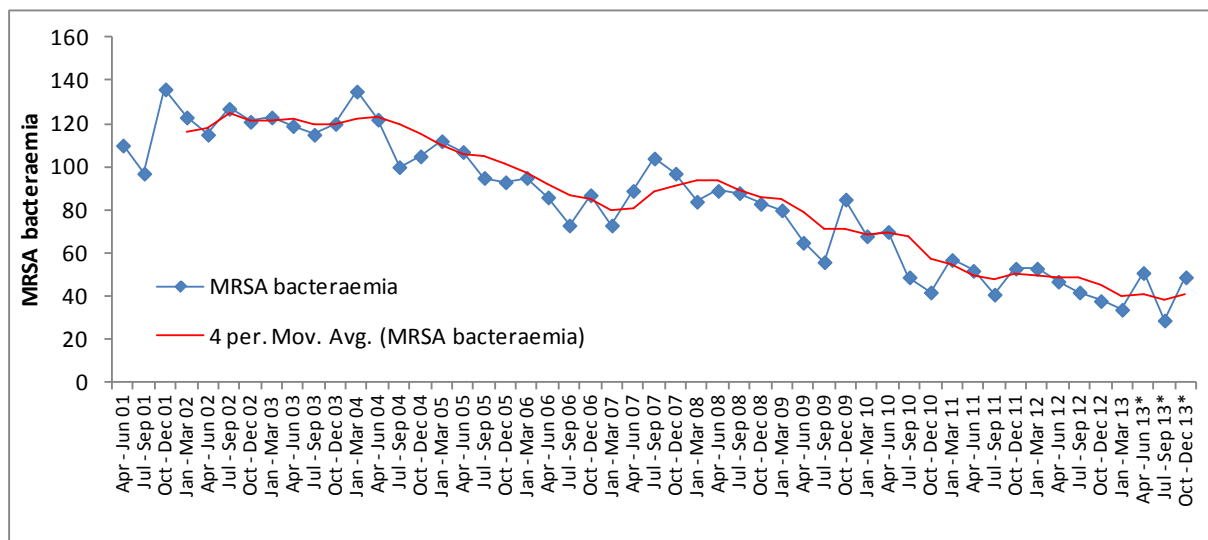
\*Data for 2013/14 is provisional

### 1.2.1 Trends in MRSA bacteraemia incidence in Wales

After surveillance started in 2001, numbers of MRSA bacteraemia initially increased and were at their highest between 2002 and 2004. Numbers declined from this peak until mid 2007, when they started to rise again. There has been a general downward trend since mid 2008, although there have been a number of periods where numbers have remained steady. Provisionally, numbers of MRSA bacteraemia for the 2013/14 financial year look on course to be slightly higher than the numbers for the 2012/13 financial year; this is as a result of much higher numbers than usual occurring in April 2013 and in the Oct-Dec 2013 quarter (Fig 4).

The highest number of MRSA bacteraemia cases occurred in the 2003/04 financial year (489); there has been a 67% reduction in numbers of cases since 2003/04 (2012/13 financial year: 161).

**Figure 4. Quarterly numbers and 4-quarter moving average numbers of MRSA bacteraemia in Wales, Apr 2001 – Dec 2013**

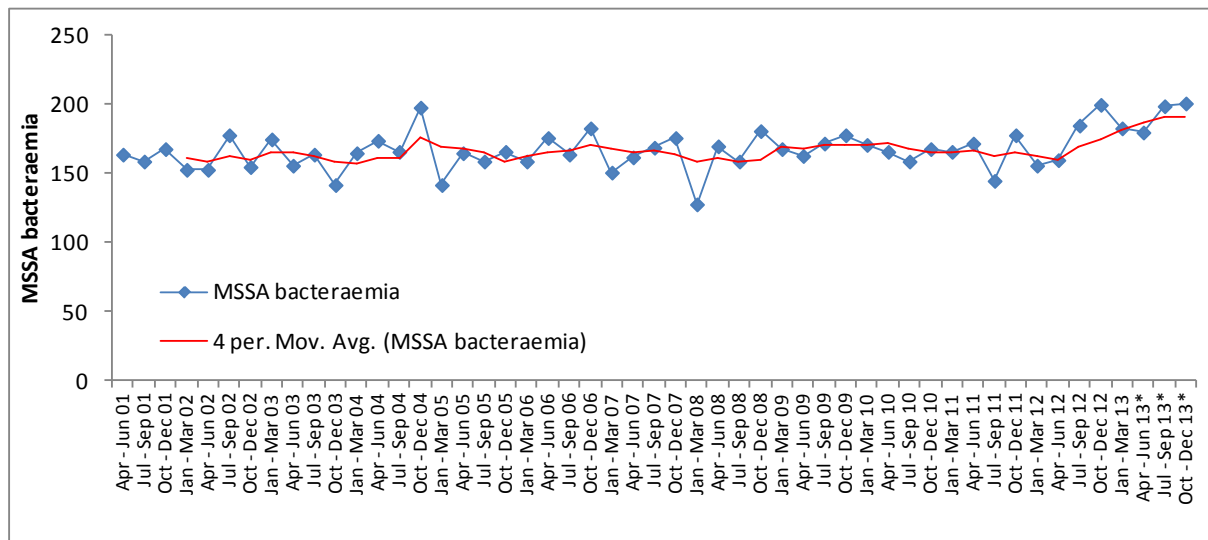


\*Data for 2013/14 is provisional

### 1.2.2 Trends in MSSA bacteraemia incidence in Wales

Numbers of MSSA bacteraemia remained steady for nearly 10 years after the start of surveillance, however there has been a distinct upward trend in numbers of MSSA bacteraemia since mid 2012 (Fig 5). Public Health Wales are conducting an investigation into this recent trend.

**Figure 5. Quarterly numbers and 4-quarter moving average numbers of MSSA bacteraemia in Wales, Apr 2001 – Dec 2013**



\*Data for 2013/14 is provisional

### 1.3 Trends in incidence in health boards, 2009 - 2013

Although no specific numerical targets for MRSA and MSSA bacteraemia were introduced in Wales when the *C. difficile* target was introduced, the expectation was that health boards would achieve year on year reductions starting from the baseline year of 2009/10.

Initially many of the health boards did achieve reductions in the number of overall cases of *S. aureus* bacteraemia. This was achieved by reducing numbers of MRSA bacteraemia. All of the major health boards have achieved reductions in MRSA bacteraemia since 2009/10 but the size of the reduction varies considerably. Cardiff & Vale University Health Board achieved a reduction of 60% between 2009/10 and 2012/13, whereas numbers of MRSA bacteraemia in Betsi Cadwaladr University Health Board have reduced by 9% (Table 3).

Numbers of overall *S. aureus* bacteraemia cases have recently started increasing in a number of the health boards because of increases in numbers of MSSA bacteraemia. The change in MSSA numbers in the health boards between 2009/10 and 2012/13 varied considerably. Three of the major Health Boards achieved reductions, with the largest reduction (11%) in Betsi Cadwaladr University Health Board. Numbers of MSSA bacteraemia increased over this time period in the other three major Health Boards, with the largest percentage increase in Cardiff & Vale Health Board (23%) (Table 3). The increase in Cwm Taf Health Board has been more recent and is not reflected in Table 3.

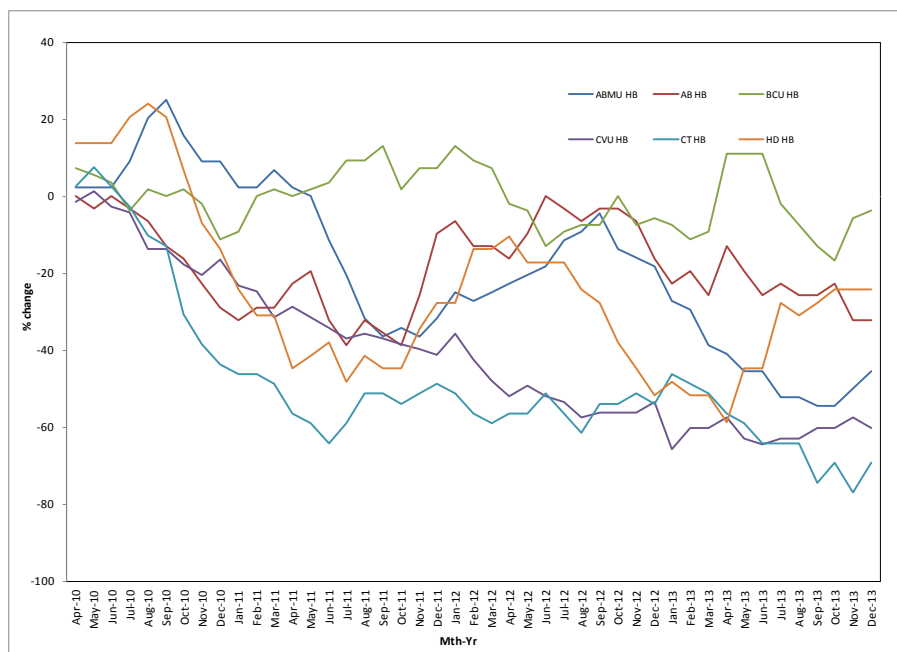
**Table 3. Numbers of *S. aureus* bacteraemia by major health board in Wales for 2012/13 financial year and the target baseline year (2009/10)**

Health Board	MRSA bacteraemia			MSSA bacteraemia		
	2012/13	2009/10	% change	2012/13	2009/10	% change
ABMU	27	44	-38.6	169	151	+11.9
Aneurin Bevan	23	31	-25.8	113	116	-2.6
Betsi Cadwaladr University	49	54	-9.3	118	132	-10.6
Cardiff and Vale University	29	73	-60.3	156	127	+22.8
Cwm Taf	19	39	-51.3	63	68	-7.4
Hywel Dda	14	29	-51.7	101	85	+18.8

Figures 6 and 7 compare trends in reductions of MRSA and MSSA bacteraemia against the baseline year for the six major Health Boards compared to 2009/10. Figure 6 provides individual trends in the average monthly cases in each Health Board against the baseline for MRSA (6a) and MSSA (6b) bacteraemia. These show clearly that there is variation between health boards in the changes that have taken place in numbers of cases of MRSA and MSSA bacteraemia. It is interesting to note the increasingly divergent trends in MRSA and MSSA bacteraemia in a number of the health boards, particularly ABMU, Cardiff & Vale and Cwm Taf (Fig 7).

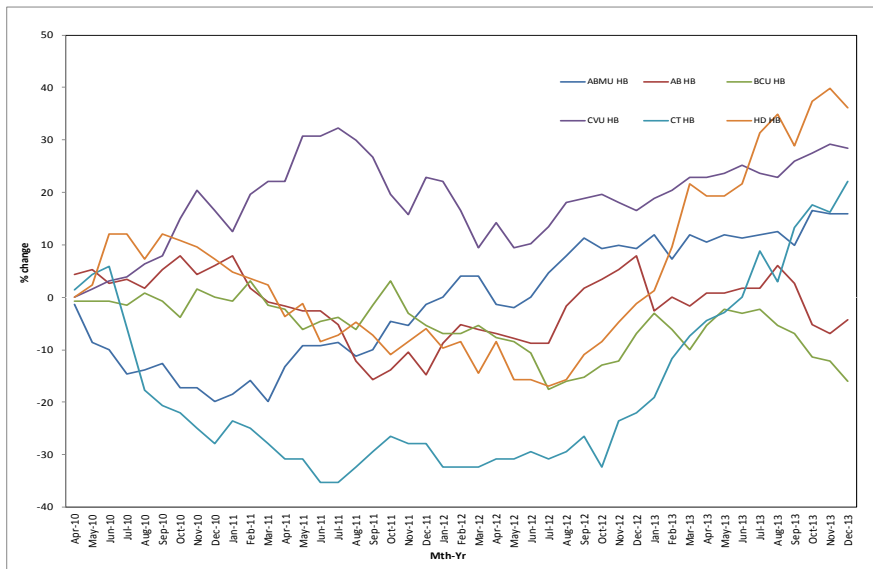
**Figure 6: Monthly percentage change in 12 month moving average numbers of *S. aureus* bacteraemia compared to Apr 09 – Mar 10**

**a. MRSA bacteraemia**

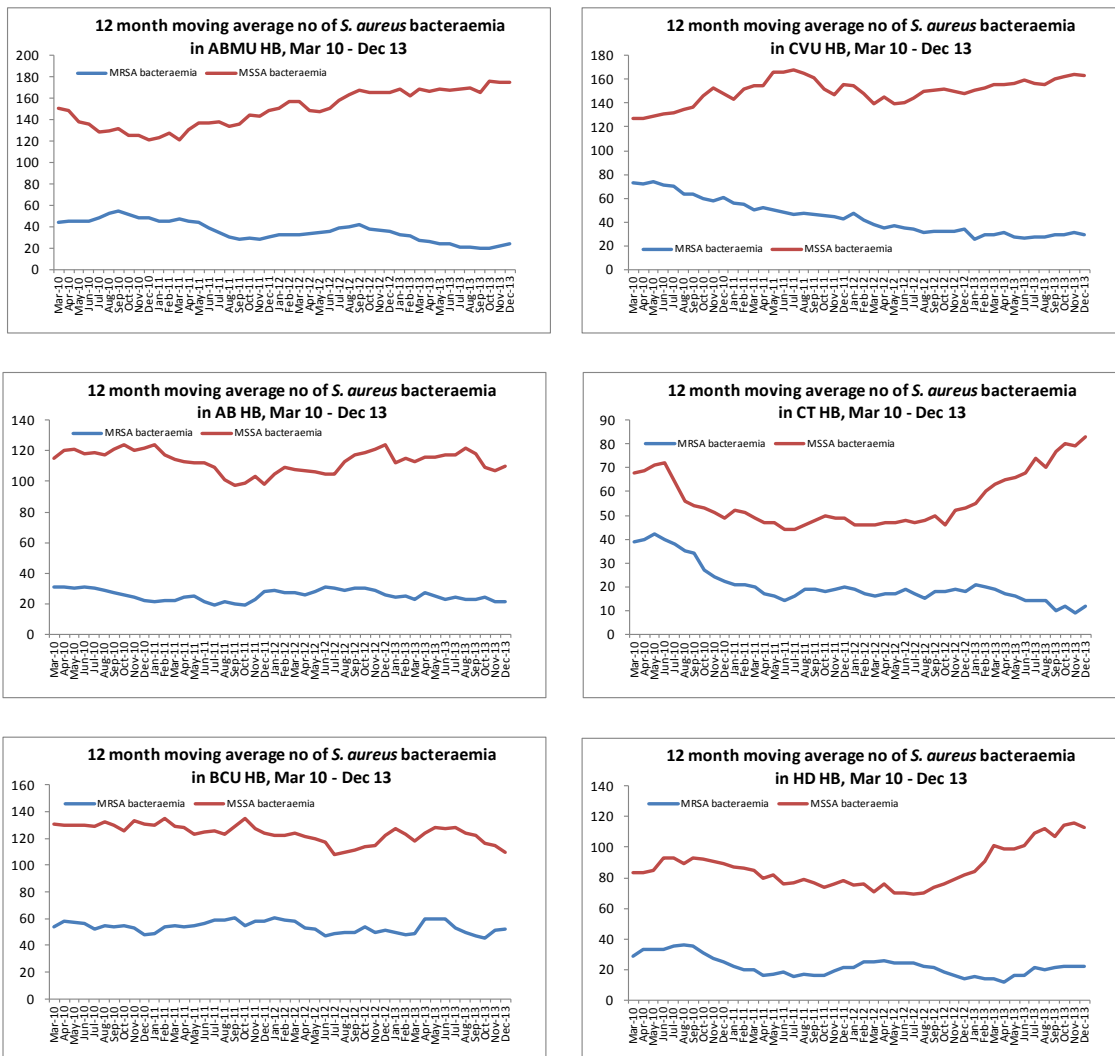




**b. MSSA bacteraemia**



**Figure 7. Twelve month moving average number of *S. aureus* bacteraemia by major health board in Wales, Mar 10 – Dec 13**



## 1.4 Incidence at a population level – comparisons with other UK countries

The incidence of MRSA bacteraemia in the population in Wales was higher than elsewhere in the UK and more than three times that in England in 2012/13 (Table 4). The incidence of MSSA bacteraemia in Wales was similar to the incidence in Scotland, but higher than the rates for England and Northern Ireland.

**Table 4. Numbers and rates of MRSA and MSSA bacteraemia per 100,000 population in UK countries, 2012/13**

Country	MRSA bacteraemia	MSSA bacteraemia	Population	MRSA bacteraemia rate	MSSA bacteraemia rate
Wales	161	728	3074067	5.24	23.68
England <sup>1</sup>	924	8811	53107169	1.74	16.60
Scotland <sup>2</sup>	176	1344	5313600	3.31	25.29
Northern Ireland <sup>3</sup>	70	282	1823634	3.84	15.46

1. England data available from annual rate tables at: [http://www.hpa.org.uk/webw/HPAweb&HPAwebStandard/HPAweb\\_C/1233906818165](http://www.hpa.org.uk/webw/HPAweb&HPAwebStandard/HPAweb_C/1233906818165)

2. Annual rates by population are not published by Health Protection Scotland. Rates have been estimated from bacteraemia data (available at: <http://www.documents.hps.scot.nhs.uk/ewr/pdf2013/1327.pdf>) and 2012 mid-year population estimates (available at: <http://www.gro-scotland.gov.uk/files2/stats/population-estimates/mid2012/j29078406.htm#table1b>)

3. Annual rates by population are not published by the Public Health Agency Northern Ireland. Rates have been estimated from bacteraemia data (available at: <http://www.publichealth.hscni.net/directorate-public-health/health-protection/healthcare-associated-infections>) and 2012 mid-year population estimates (available at: <http://www.nisra.gov.uk/demography/default.asp17.htm>)

## 2. *S. aureus* – related mortality

*S. aureus* and MRSA related deaths are reported annually by the Office for National Statistics. These deaths may relate to any type of *S. aureus* or MRSA infection, not just those associated with bloodstream infections (bacteraemia). In comparison to *C. difficile*, numbers of deaths associated with *S. aureus* and MRSA are small; in 2012 there were 44 deaths in Wales where *S. aureus* was mentioned on the death certificate, 29 of these mentioned MRSA.

### 2.1 Trends in *S. aureus* related mortality in Wales

Over the past five years in Wales the numbers of death certificates mentioning *S. aureus* and MRSA have reduced (Table 5). Deaths where MRSA was mentioned on the death certificate have reduced by two thirds and where MRSA was the underlying cause by 81%. This has coincided with the period of decreasing incidence of MRSA bacteraemia in Wales.

**Table 5. Number of death certificates with MRSA mentioned and as the underlying cause, Wales 2008 – 2012**

Year	<i>S. aureus</i> – mention	<i>S. aureus</i> – underlying cause	MRSA - mention	MRSA – underlying cause
2008	101	31	90	27
2009	87	19	63	14
2010	72	20	47	14
2011	43	13	31	8
2012	44	6	29	5

Source: Office for National Statistics. Deaths involving MRSA: England and Wales, 2008 to 2012, Reference Table 2. Available at: <http://www.ons.gov.uk/ons/publications/re-reference-tables.html?edition=tcm%3A77-314063>

Nationally published rate data is provided separately for males and females. Since peaks in the mid 2000s, there have been large reductions in the rates of deaths mentioning *S. aureus* and MRSA in both England and Wales. Since 2008, rates of MRSA-associated deaths have been consistently higher in Wales compared to England for both males and females (Table 6). Generally the *S. aureus* associated deaths have also been higher in Wales over that time period. In 2012, the age-standardised mortality rate for MRSA-associated deaths in males in Wales was more than twice the rate in England; the rate was also higher in females, but the difference in rates was smaller. Although the rates were higher in Wales, because of the small numbers involved, the confidence intervals were wide and these differences were not statistically significant.

**Table 6. Age-standardised mortality rates (per million population standardised to the European Standard Population) for deaths where *S. aureus* / MRSA was mentioned on the death certificate, by sex, England and Wales, 2001–2012**

Year	<i>S. aureus</i>				MRSA			
	Males		Females		Males		Females	
	Wales	England	Wales	England	Wales	England	Wales	England
2001	21.7	21.7	11.3	11.8	15.1	12.6	6.6	6.5
2002	20.8	22.8	12.6	10.8	17.0	14.4	9.3	6.8
2003	25.4	24.1	14.1	13.8	17.8	16.5	10.2	8.7
2004	23.8	27.2	11.6	14.2	19.5	19.4	9.1	9.0
2005	34.7	32.6	19.1	19.4	28.3	25.8	15.5	14.3
2006	34.0	35.8	16.1	18.2	26.0	27.1	12.5	13.2
2007	30.6	34.2	12.7	16.9	21.6	26.9	8.0	12.0
2008	26.3	22.2	13.3	13.3	23.9	17.9	11.5	10.2
2009	20.7	19.2	13.3	10.7	15.9	11.6	8.6	5.8
2010	19.5	13.6	10.5	8.1	12.9	6.5	5.5	3.6
2011	13.5	9.7	4.0	4.9	10.0	5.2	3.0	2.4
2012	12.1	8.0	5.1	4.3	7.6	3.7	3.8	2.3

Source: Office for National Statistics. Deaths involving MRSA: England and Wales, 2008 to 2012, Reference Table 2. Available at: <http://www.ons.gov.uk/ons/publications/re-reference-tables.html?edition=tcm%3A77-314063>

## 2.2 Trends in *S. aureus* related mortality by health board

Most of the health boards in Wales experienced a reduction in deaths where MRSA was mentioned on the death certificate between 2008 and 2012, although numbers are too small in some areas to deduce any sort of trend (Table 7). For the 5 year period, the highest proportion of total MRSA deaths occurred in Betsi Cadwaladr University Health Board at 23% (54/237), followed by Abertawe Bro Morgannwg University Health Board at 19% (46/237). For 2012, however, there was very little difference between health boards in numbers of death certificates mentioning MRSA, ranging from 0 to 6 cases. Too few death certificates in Wales mentioned MSSA to provide any useful information.

**Table 7. Deaths mentioning MRSA (as underlying cause or mentioned on death certificate), by health board area of residence, all persons, 2008-2012**

Health Board	2008	2009	2010	2011	2012
ABMU	14	13	9	<5	6
Aneurin Bevan	19	10	8	<5	<5
Betsi Cadwaladr	20	12	10	6	6
Cardiff & Vale	11	10	8	6	<5
Cwm Taf	9	<5	<5	<5	<5
Hywel Dda	<5	7	6	<5	<5
Powys	<5	<5	<5	<5	<5

Source: Public Health Wales Observatory. Deaths due to MRSA (as underlying cause or mentioned on death certificate). November 2013.

### 3. Conclusions

- Over the surveillance period there has been an overall reduction in numbers of cases of *S. aureus* bacteraemia.
- Reductions in total *S. aureus* bacteraemia have arisen as a result of decreases in numbers of MRSA bacteraemia in the health boards. Interventions introduced to reduce MRSA bacteraemia did not have a clear effect on numbers of MSSA bacteraemias.
- Since 2009/10, the size of the reduction in MRSA bacteraemia has varied considerably between health boards and results for 2012/13 show that there remains wide variation in incidence.
- Total *S. aureus* bacteraemia cases started to increase in 2012 as a result of increases in numbers of MSSA bacteraemia in a number of health boards; Public Health Wales is investigating this increase.
- Despite the large reductions in MRSA bacteraemia that have occurred in Wales, rates per 100,000 population for 2012/13 were high in comparison with other UK countries.
- Mortality as a result of *S. aureus* and MRSA has decreased in Wales in line with decreases in MRSA bacteraemia incidence, but remains higher than in England. Numbers of deaths by health board are too small to make conclusions on a health board basis.

### 4. Recommendations

- A target is already in process for all major health boards to reduce their rates of MRSA bacteraemia to 50% of the rate for Wales in 2012/13, by September 2015. If it is achieved, this will eliminate the variability observed between health boards in incidence of MRSA bacteraemia.
- Public Health Wales should provide any assistance required by the health boards in achieving this target.
- Public Health Wales should ensure that the investigation into the rise in MSSA bacteraemia is conducted and results fed back to the health boards.