



Feidhmeannacht na Seirbhíse Sláinte  
Health Service Executive

HSE West (Clare, Limerick, Tipperary North)

# **Report on the Surveillance of *S. aureus* Bacteraemia in the Hospitals of the Health Service Executive - West (Clare, Limerick, Tipperary North), 2002 – 2006**

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**Background:**

Health-care associated infections (HCAI) represent an enormous challenge to patient care in the Irish hospital and healthcare system. This problem is further compounded by the increase in antimicrobial resistance in Ireland and around the world. There is rising concern in Ireland about what is commonly perceived as “superbugs”.

Meticillin resistant *Staphylococcus aureus* (MRSA) is an organism that has dominated headlines in medical journals for three decades. In recent years fears about the organism have migrated to national newspaper headlines. The public have genuine concerns about the “level” of MRSA in the institutions that deliver healthcare and the consequences of the organism for patients.

In 2001, the then National Disease Surveillance Centre (now Health Protection Surveillance Centre) launched the Strategy for the Control of Antimicrobial Resistance in Ireland (SARI). This landmark document is a touchstone for the current state of affairs in relation to antimicrobial resistance in Ireland, its impact on healthcare and the measures that need to be fully implemented to curb progression of this problem. In 2005, the Health Protection Surveillance Centre SARI Infection Control Committee and the National Hospitals Office launched National Guidelines for the Control and Prevention of MRSA in Hospitals and in the Community ([www.hpsc.ie](http://www.hpsc.ie)). National Guidelines on hand hygiene were also produced and a campaign is underway in Irish hospitals to increase awareness of the vital aspects of hand disinfection for staff, patients and visitors. In 2006 Irish hospitals participated in the Hospital Infection Society HCAI Prevalence Survey and the results of this study will be discussed. In early 2007, the Health Service Executive (HSE) announced the formation of a national committee to co-ordinate local implementation groups action on prevention of HCAI. A media campaign from the National Hospitals Office and Population Health Directorate - “Say No to Infection” – was launched ([www.hse.ie](http://www.hse.ie)).

The European Antimicrobial Resistance Surveillance System (EARSS) was initiated in Ireland in 1999. It is a Europe-wide network of surveillance systems. It allows data on antimicrobial resistance in *S. aureus*, *S. pneumoniae*, *K. pneumoniae*, *Pseudomonas aeruginosa*, *Enterococcus* sp. and *E. coli* to be compared between countries by the use of standardised definitions. Data is collected on bloodstream infections with *S. aureus* (bacteraemia). *S. aureus* bacteraemia surveillance in the UK has been mandatory for over three years now and Trust data are published annually.

This report examines the occurrence of *S. aureus* bacteraemia in the hospitals of the HSE West (Clare, Limerick, Tipperary North) (formerly the Mid-Western Health Board). Trends over time are presented, some comparative data from other sources are available. The profile of when and where these cases occur and what risk factors might be important are highlighted. Special emphasis is given to instances of bacteraemia due to MRSA.

Results for hospitals in the Area from the first and second audits of hospital hygiene were made available through the HSE website ([www.hse.ie](http://www.hse.ie)). Hygiene audits are now to be expanded both in scope and in focus – meaning other health centres providing patient services will be audited in future.

## Methods and Materials:

The EARSS data comprised the core dataset for 2002 to 2006. The report is based on all instances of *S. aureus* bacteraemia reported via this surveillance system. Cases were identified from blood cultures processed at the Microbiology Department at MWRH, Limerick. This laboratory provided the blood culture service for all six acute hospitals in the region in 2002-6 (SJHL since July 2002).

Further information was sought on patient episodes of *S. aureus* bacteraemia identified. This is consistent with other surveillance systems. Where duplicates were detected (based on dates of birth) they were excluded if the episode occurred within 2 weeks of a previous positive result, although cases of MRSA bacteraemia that followed an MSSA bacteraemia (or vice versa) were not excluded. These data were extracted from the Laboratory Information System at the Mid-Western Regional Hospital, Limerick.

Data on *S. aureus* bacteraemia (especially MRSA bacteraemia) are important indicators of healthcare associated infections because they reflect true infection (in the majority of cases) rather than colonisation. The rates of MRSA bacteraemia are less likely to be influenced by sampling variations between centres.

Meticillin susceptibility or sensitivity is a proxy measure for susceptibility to flucloxacillin, an oral antimicrobial agent. MRSA infection may require treatment with a more expensive and toxic, parenteral second-line antimicrobial and necessitate prolonged hospital stay.

Cases were exclusively blood cultures (or through intravascular devices) and **did not** include any fluids (e.g. knee aspirates) that may have been cultured in the same manner. Under enhanced surveillance it was deemed that some episodes of bacteraemia were not clinically significant – these **have not** been excluded and are dealt with in the analysis of enhanced surveillance of *S. aureus* bacteraemia.

Data on bed days and occupancy were kindly supplied by the HIPE Departments of Mid-Western Regional Hospital and St. John's Hospital, Limerick, Ireland (2002-5). *Bed day data requested for 2006 were not provided by St. John's Hospital, Limerick, so rates there remain provisional.*

## Abbreviations:

HSE-West*	– Health Service Executive West (Clare, Limerick, Tipperary North)
MWRHE	– Mid-Western Regional Hospital Ennis, Co. Clare
MWRHL	– Mid-Western Regional Hospital, Limerick City.
MWRHN	– Mid-Western Regional Hospital Nenagh, Co. Tipperary
MWRMH	– Mid-Western Regional Maternity Hospital, Limerick City.
SJHL	– St John's Hospital, Limerick City.
MWROH	– Mid-Western Regional Orthopaedic Hospital, Co. Limerick
MSSA	– Meticillin sensitive <i>S. aureus</i>
MRSA	– Meticillin resistant <i>S. aureus</i>

### Results:

Data on 432 episodes of *S. aureus* bacteraemia were collected for the five years January 2002 to December 2006. Figure 1 shows the percentage of patients with *S. aureus* bacteraemia that were MRSA, by quarter from 2002 to 2006. The percentage of patients that yield MRSA isolates from bacteraemia fluctuates widely in the area from quarter to quarter but the trend is clearly downward.

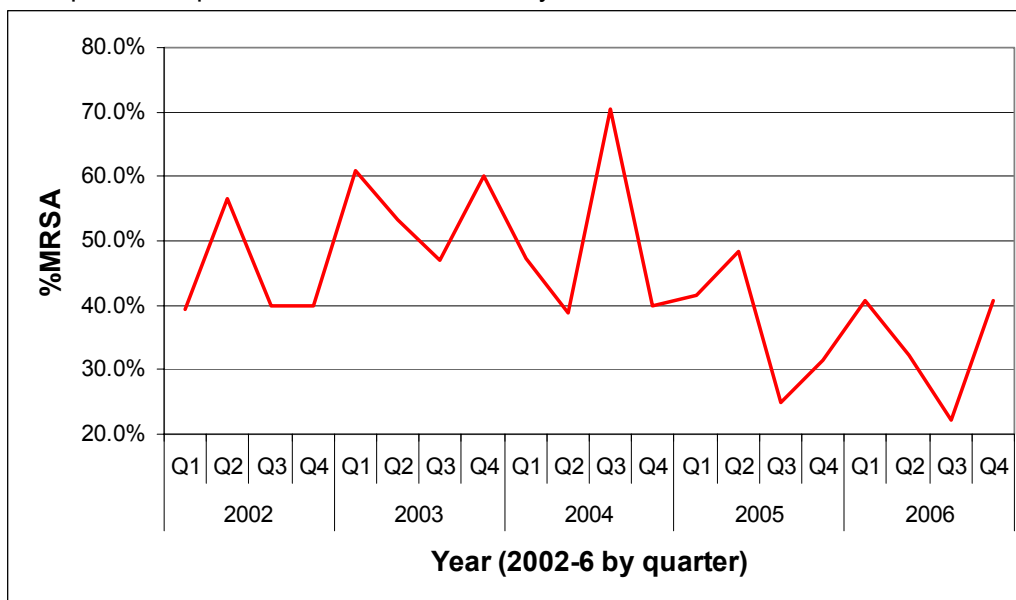


Figure 1: Percentage of *S. aureus* bacteraemia that were meticillin resistant, by quarter 2002-6 in HSE-West\*.

Nationally, over the period 1999 – 2006, data published by the Health Protection Surveillance Centre (formerly NDSC) which co-ordinates EARSS in Ireland, shows the percentage MRSA causing *S. aureus* bacteraemia, to be 39-42%. For some periods in the HSE-West\* the percentage was in excess of that percentage although the difference is not statistically significant.

The average percentage of *S. aureus* bacteraemia caused by MRSA in each of the acute hospitals in the Mid-West Area for 2002 - 2006 is shown in Table 1.

Table 1: Number of *S. aureus* bacteraemia (meticillin sensitive and resistant) and percentage MRSA by hospital 2002-6 in HSE-West\*.

HOSPITAL	MRSA	MSSA	Total	%
MWRHE	20	21	41	48.8%
MWRHL	124	187	311	39.9%
MWRHN	26	13	39	66.7%
MWRMH	1	8	9	11.1%
MWROH	3	1	4	75.0%
SJHL	10	15	25	40.0%
Other	2	1	3	-
HSE-West*	186	246	432	43.0%

This report is compiled with the input of infection control, medical microbiology and public health professionals in the Mid-West or Network 7 hospitals.

**Important:** The annual numbers of *S. aureus* are small when broken down and are subject to variation year to year. Estimates of percentages and rates must be interpreted with caution.

### Hospital rates:

All patient episodes were assigned to the Network 7 / HSE-West\* hospital referring the sample to the laboratory. Of the 103 patient episodes reported in 2006, these affected 95 patients.

Table 2: Number of *S. aureus* bacteraemia (MRSA and MSSA) by year and hospital in HSE-West\*.

	Hospital	MWRHE	MWRHL	MWRHN	MWRMH	MWROH	SJHL	Other	HSE-West*
2002	MRSA	4	31	5	0	2	0		42
	MSSA	5	43	3	0	1	2		54
SAB		9	74	8	0	3	2		96
2003	MRSA	4	25	6	0	0	4		39
	MSSA	3	21	0	4	0	3		31
SAB		7	46	6	4	0	7		70
2004	MRSA	4	20	9	1	1	3		38
	MSSA	2	30	4	0	0	5		41
SAB		6	50	13	1	1	8		79
2005	MRSA	3	22	4	0	0	2		31
	MSSA	5	42	2	2	0	2		53
SAB		8	64	6	2	0	4		84
2006	MRSA	5	26	2	0	0	1	2	36
	MSSA	6	51	4	2	0	3	1	67
SAB		11	77	6	2	0	4	3	103
2002-6		41	311	39	9	4	25	3	432

Table 2 shows that the MWRHL recorded the highest number of *S. aureus* bacteraemias in the region. This is a likely reflection of the casemix of patients given healthcare at large tertiary care centres. Large tertiary care facilities provide more, specialist services (e.g. dialysis, oncology, burns, intensive care etc...). In the region, the number of MRSA bacteraemia in 2005 had fallen to 74% of the number seen in 2002 but the number increased by five in 2006.

The number of MRSA bacteraemia in Mid-Western Regional Hospital Nenagh (MWRHN) apparent in 2002-4 has fallen recently. In 2006, there were two MRSA bacteraemia cases compared to nine in 2004.

In the largest hospital in the Area, the number of MRSA bacteraemia cases fell from 31 in 2002 to 25 in 2003 to 20 in 2004 but increased to 22 in 2005 and to 26 in 2006. This table shows that the absolute number of MRSA bacteraemia since 2002 only increased for the first time in 2006. This contrasts with the percentages evident in Figure 1 which appears to show high levels of MRSA falling in 2005 and 2006. This is partly explained by the fluctuations in meticillin sensitive *S. aureus* (MSSA) bacteraemia.

An incidence rate (per 1000 in-patient bed days used - BDU) was calculated (based on HIPE data) for each hospital. This rate is useful for comparative purposes because it takes into account some of the difference in the relative size of hospitals. However, services and casemix are not equivalent. However, year on year comparison of incidence in the same hospital does provide some insight where no major structural changes have occurred in the healthcare facility.

In 2006, there were over 13,000 blood culture samples processed for five of the acute hospitals of the HSE West (Clare, Limerick, Tipperary North):

<b>Number of Blood Cultures Requests by Hospital</b>	<b>2005</b>	<b>2006</b>
MWRHL, MWRMH, MWROH – “MWRH Complex”	9905	11169
Mid-Western Regional Hospital Ennis	1728	832
Mid-Western Regional Hospital Nenagh	605	534
St John’s Hospital	-	654

Very few blood culture requests are made from MWROH and about 900 are requested from MWRMH annually. The number of blood cultures processed expressed as a rate per 1000 in-patient bed days used shows requests are much higher in tertiary care facilities. Compared to 2005, blood cultures requests, both absolute numbers and rate, increased in Mid-Western Regional Hospital complex (MWRHL, MWROH, MWRMH) and decreased in MWRHE and MWRHN.

<b>Hospital</b>	<b>Rate per 1000 BDU</b>		
	<b>2004</b>	<b>2005</b>	<b>2006</b>
MWRHL, MWRMH, MWROH – “MWRH Complex”	48.4	61.2	67.4
Mid-Western Regional Hospital Ennis	22.0	49.9	24.6
Mid-Western Regional Hospital Nenagh	28.0	22.6	19.5

Table 3: Incidence (per 1000 bed days) of MRSA bacteraemia and % MRSA by hospital 2002 - 2006.

Year		Hospital						
		MWRHE	MWRHL	MWRHN	MWRMH	MWROH	SJHL	HSE-MW
	Beds	88	426	75	99	68	95	832
2002	BDU	28661	113134	25117	29919	12886	28710	238427
	Incidence (95% C I)	0.140	0.274	0.199	0.000	0.155	0.000	0.18 (0.12-0.23)
	%MRSA (95% C I)	44	42	62	0	67	0	44 (33-55)
2003	BDU	29888	121629	25468	28653	12348	26852	244838
	Incidence (95% C I)	0.134	0.206	0.236	0.000	0.000	0.149	0.16 (0.11-0.21)
	%MRSA (95% C I)	57	54	100	0	0	57	56 (43-68)
2004	BDU	32422	125074	26653	26201	12510	26784	249644
	Incidence (95% C I)	0.123	0.160	0.338	0.038	0.080	0.112	0.15 (0.10-0.20)
	%MRSA (95% C I)	67	40	69	100	100	38	48 (37-60)
2005	BDU	34631	124009	26746	26005	11938	24232	247561
	Incidence (95% C I)	0.09	0.18	0.15	0.00	0.00	0.08	0.13 (0.08-0.17)
	%MRSA (95% C I)	37	34	67	0	0	50	36.9 (27-48)
2006	BDU	33813	126064	27452	28852	10898	24232	247561
	Incidence (95% C I)	0.15	0.21	0.07	0.00	0.00	0.04	0.135 (0.09-0.18)
	%MRSA (95% C I)	45	34	33	0	n/a	25	34.0 (25-44)

95% C I – 95% confidence intervals; BDU SJHL estimated from 2005; Data excludes 3 episodes “Other” in 2006

Table 3 showing incidence rates (based on the absolute numbers in Table 2) would suggest that there a slow downward trend in the MRSA bacteraemia incidence rate between years.

Figure 2 shows the incidence rate (per 1000 bed days used) of patients with bacteraemia due to MRSA and all *S. aureus* in the HSE-West (Clare, Limerick, Tipperary North) from 2002 to 2006 by quarter. Studying the trend in the incidence rate of MRSA bacteraemia from 2002 to 2006, a very different picture of *S. aureus* bacteraemia emerges, compared to the trend in percentage MRSA isolated. While there is a fall in the incidence rate of MRSA bacteraemia in the area, the rate of *S. aureus* bacteraemia (specifically MSSA) fluctuated widely in the years 2002-6.

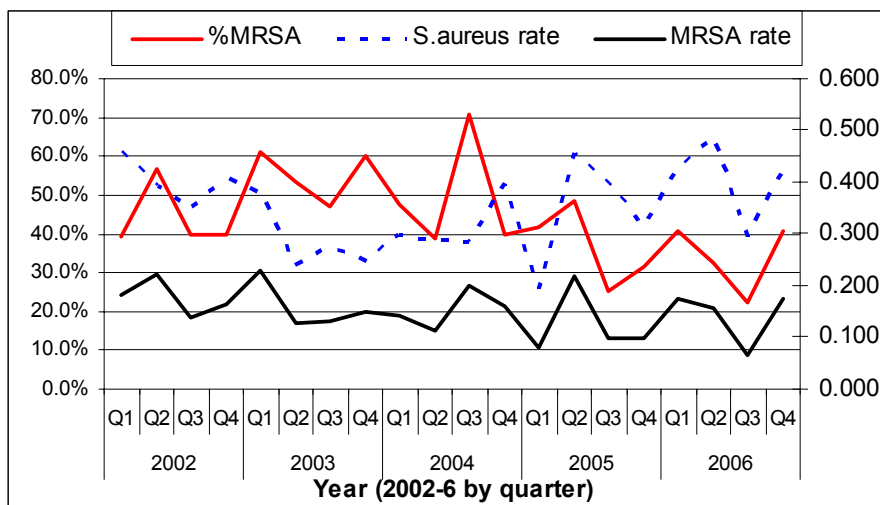


Figure 2: Incidence rate (per 1000 bed days used) of patients with *S. aureus* bacteraemia (MRSA and MSSA) by quarter 2002-6 in HSE West\*.

For the first time, statistical process charts are presented. These charts assist in identifying shifts in the rate of bacteraemia (MRSA and total) over time. There are now twenty data points available to indicate trends by region and hospital. These charts may be less sensitive to small changes over long time periods. The charts illustrate data trends by quarter from 2002-6. These include the mean (average PE) number of MRSA patient episodes, the actual number of patient episodes (PE) and incidence rate each quarter (PE rate), an upper warning limit (PE UWL) and an upper control limit (PE UCL). The SPCs show MRSA bacteraemia to be relatively stable over the period studied. Data for MWRMH and MWROH not shown as numbers are small.

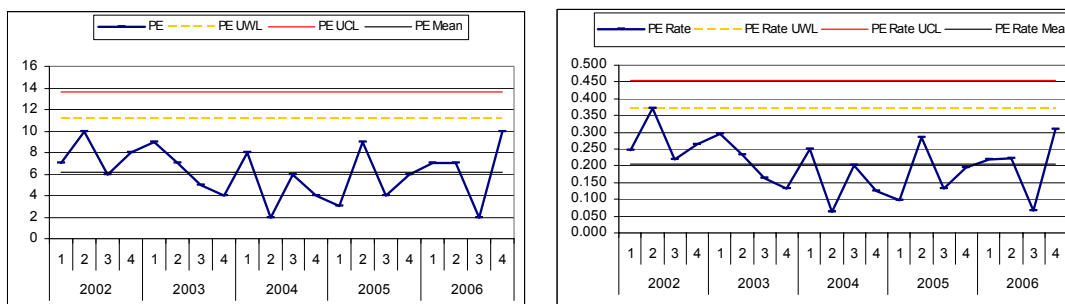


Figure 3: SPC Chart for MWRHL, patient episode and incidence MRSA bacteraemia 2002-6.

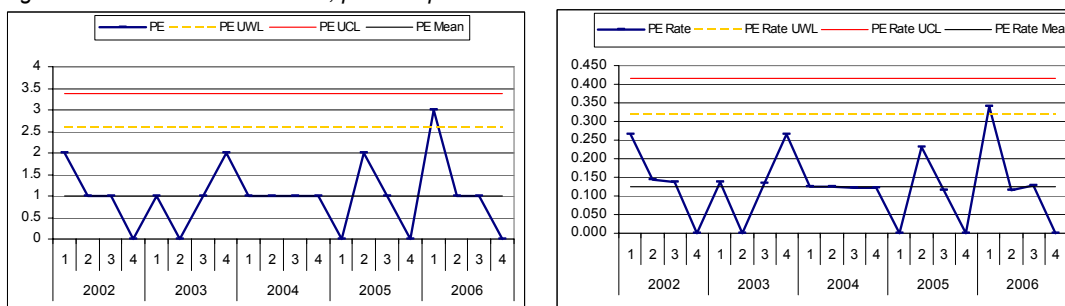


Figure 4: SPC Chart for MWRHE, patient episode and incidence MRSA bacteraemia 2002-6.

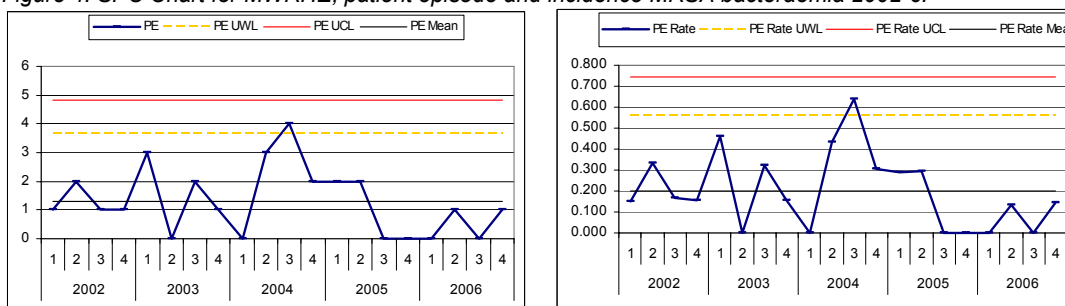


Figure 5: SPC Chart for MWRHN, patient episode and incidence MRSA bacteraemia 2002-6.

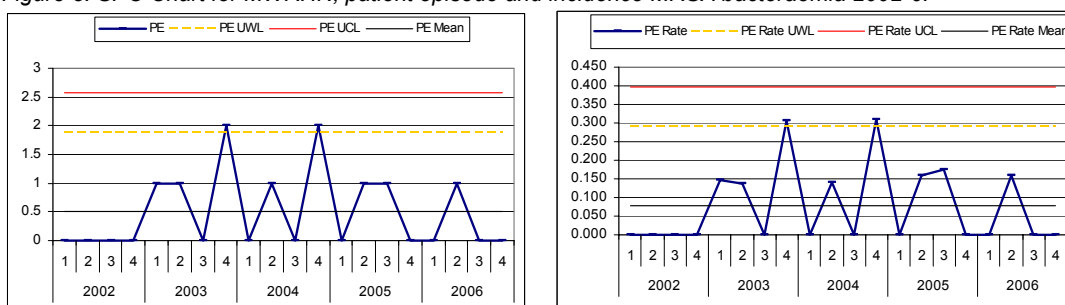


Figure 6: SPC Chart for SJHL, patient episode and incidence MRSA bacteraemia 2002-6.

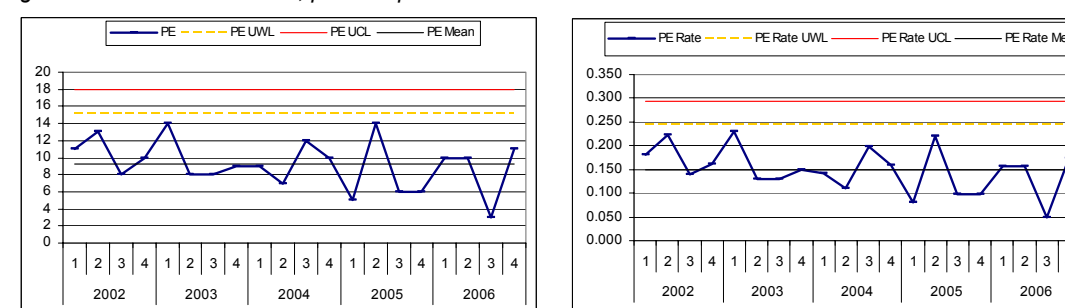


Figure 7: SPC Chart for Network 7 (all acute hospitals), patient episode and incidence MRSA bacteraemia 2002-6.

Table 4 shows the incidence rate of MRSA bacteraemia published for neighbouring jurisdictions.

*Table 4: Rates (per 1000 bed days) of MRSA bacteraemia in neighbouring jurisdictions.*

<b>Country</b>	<b>Incidence (per 1000 bed days)</b>
Scotland (2002)	0.16
Scotland (2003-4)	0.15
Scotland (2004-5)*	0.20
Scotland (2005-6)*	0.19
Wales (2004-5)	0.10
Wales (2005-6)	0.08
England (2002-3)	0.17
England (2003-4)	0.18
England (2004-5)	0.17
England (2005-6)	0.17
Northern Ireland (2001-2)	0.13
Northern Ireland (2002-3)	0.12
Northern Ireland (2003-4)	0.17
Northern Ireland (2004-5)	0.14
Northern Ireland (2005-6)	0.13

*\*Changes in ascertainment*

The European Antimicrobial Resistance Surveillance System (EARSS) provides data from 31 countries including data on *S. aureus* bacteraemia. It is co-ordinated by the National Institute for Public Health and the Environment, RIVM ([www.earss.rivm.nl](http://www.earss.rivm.nl)) in the Netherlands. Map 1 shows data on MRSA bacteraemia in participant countries over several years. MRSA is a huge problem faced by several EU countries. Where rates were historically low (Finland, Norway, Sweden, Denmark and the Netherlands) there appears to be an increase, perhaps with the emergence of community-acquired MRSA.

Each year, in Ireland, about 600 MRSA blood culture isolates are analysed. Virtually all hospitals in Ireland now participate in EARSS. In 2006, reports showed the percentage of bacteraemia that are MRSA in Ireland was 42%. This was much higher than the percentage in the HSE West (Clare, Limerick, Tipperary North) (34%). However, the incidence rate of MRSA bacteraemia in the HSE West (Clare, Limerick, Tipperary North) in 2004 (0.13) is the similar to the estimated rate nationally (0.16).

Proportion of MRSA isolates in participating countries in 2002, 2003, 2004, 2005  
(c) EARSS

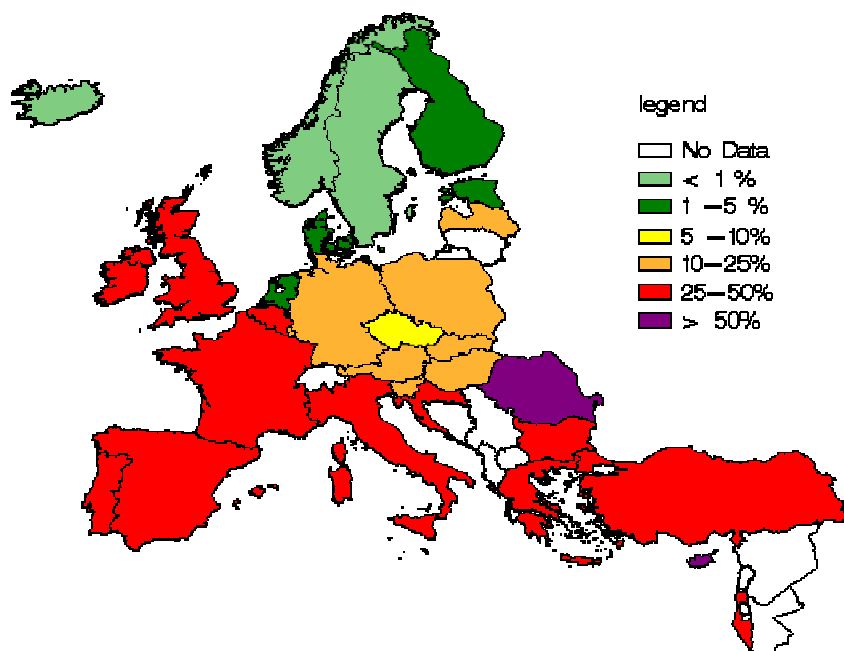


Figure 8: Percentage of blood culture isolates reported to be MRSA in EARSS participant countries 2002-2006 (EARSS data ©. Available at: <http://www.earss.rivm.nl>. Data retrieved on 01/05/2007).

**Conclusion:** The MRSA bacteraemia incidence rate in the Mid-West is comparable with other regions that publish data. The incidence rate (per 1000 bed days) is a better indicator of MRSA infection in the healthcare setting because the percentage of bacteraemias caused by MRSA fluctuates widely between periods. The incidence of MRSA bacteraemia in the hospitals of the Mid-West is falling from 2002 to 2005 but increased slightly in 2006.

Northern Ireland -

<http://www.cdscni.org.uk/publications/AnnualReports/pdf/2nd%20report%20MRSA%20Blood%20Cultures%20NI%20.pdf>  
<http://www.cdscni.org.uk/publications/AnnualReports/pdf/3rd%20report%20MRSA%20Blood%20Culture%20NI.pdf>  
<http://www.cdscni.org.uk/publications/AnnualReports/pdf/4th%20report%20MRSA%20Blood%20Culture%20NI.pdf>  
<http://www.cdscni.org.uk/publications/AnnualReports/pdf/HCAI2005Version3.pdf>

England -

<http://hpa.org.uk/cdr/PDFfiles/2003/cdr2503.pdf>  
<http://www.hpa.org.uk/cdr/archives/2004/cdr2904.pdf>  
<http://www.hpa.org.uk/cdr/archives/2005/cdr2505.pdf>  
[http://www.hpa.org.uk/infections/topics\\_az/hai/MandSurvHCAI2006.pdf](http://www.hpa.org.uk/infections/topics_az/hai/MandSurvHCAI2006.pdf)

Scotland -

[http://www.show.scot.nhs.uk/scieh/infectious/hai/MRSA\\_quarter\\_reports/MRSA\\_July\\_04/MRSA\\_July\\_04.pdf](http://www.show.scot.nhs.uk/scieh/infectious/hai/MRSA_quarter_reports/MRSA_July_04/MRSA_July_04.pdf)  
<http://www.documents.hps.scot.nhs.uk/hai/sshaip/publications/mrsa-quarterly-reports/jan-2003-to-dec-2006.pdf>

Wales -

<http://www.wales.nhs.uk/sites/documents/379/Anon%2018th%20S.aureus%20Report.pdf>  
<http://www.wales.nhs.uk/sites3/Documents/379/All%20Wales%20Mandatory%20SA%20Surveillance%2022.pdf>

## Monthly trends:

About 6 – 8 cases of *S. aureus* bacteraemia are detected monthly of which 3 – 5 cases are MRSA bacteraemia.

Figure 9 shows the occurrence of both by month in 2002-6.

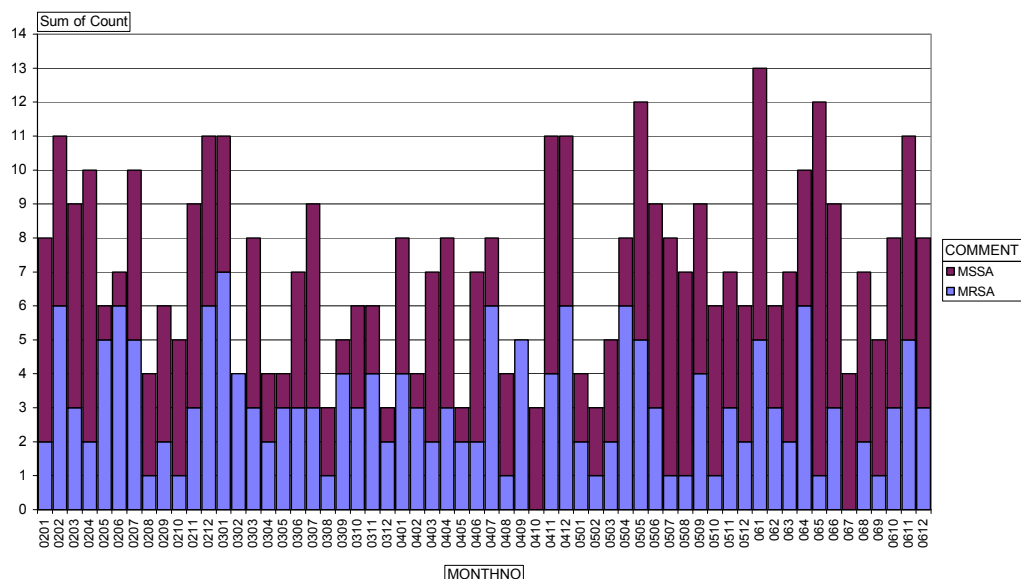


Figure 9: Cases of *S. aureus* bacteraemia (MRSA and MSSA) by month of occurrence in 2002-6.

Figure 10 indicates the hospital facilities yielding all *S. aureus* bacteraemia cases, although not necessarily the source of the infection.

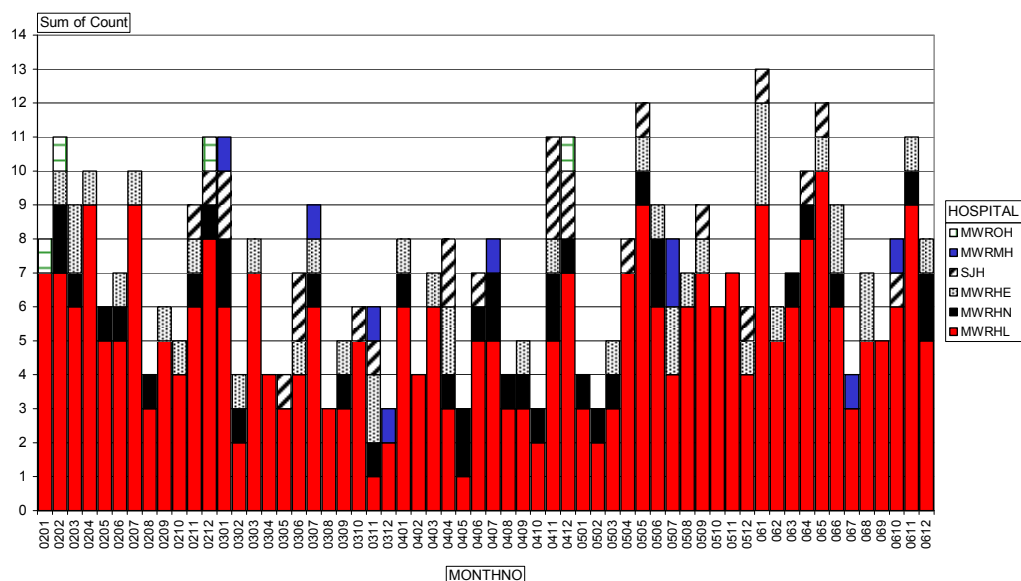


Figure 10: Cases of *S. aureus* bacteraemia by month of occurrence and by hospital in 2002-6.

It is possible to have outbreaks of MRSA in hospitals and this might be reflected in the number of MRSA bacteraemia that occur. Figure 11 indicates the hospital facilities yielding MRSA bacteraemia but not necessarily where the MRSA was acquired.

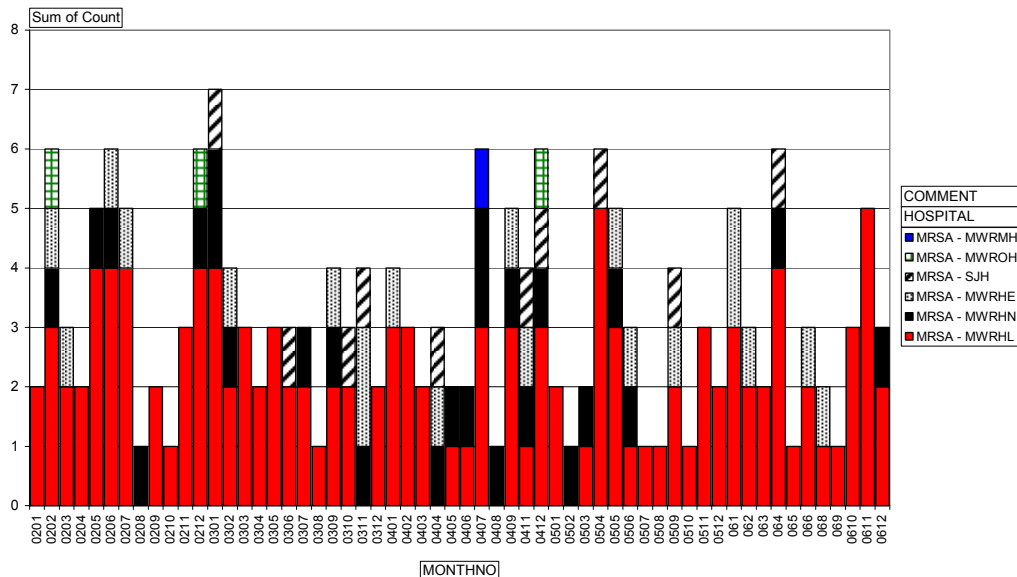


Figure 11: Cases of MRSA bacteraemia by month of occurrence and by hospital in 2002-6.

Figure 12 shows the hospital facilities yielding MSSA bacteraemias.

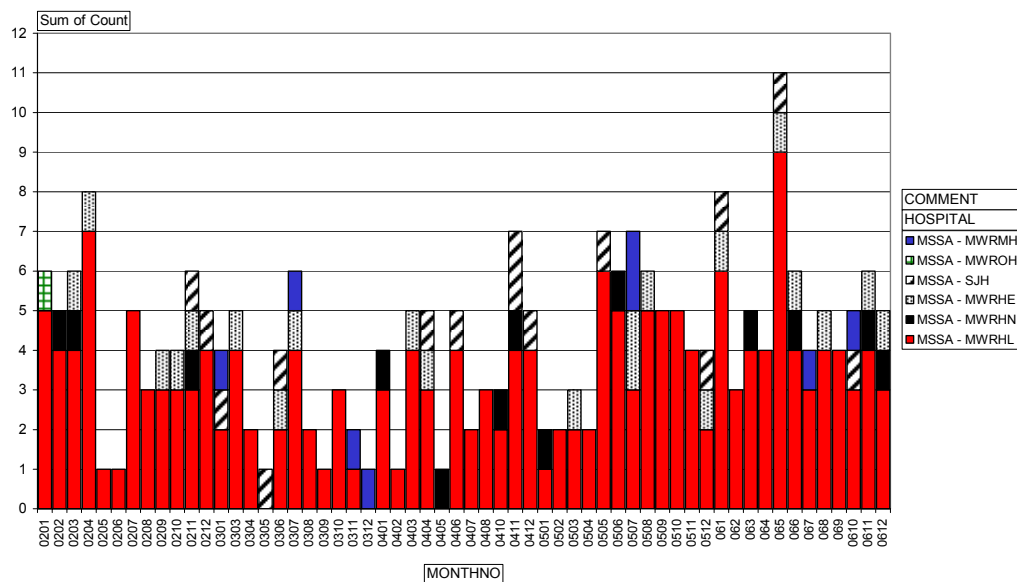


Figure 12: Cases of MSSA bacteraemia by month of occurrence and by hospital in 2002-6.

**Conclusion:** The number of patient episodes of MRSA bacteraemia in the region fell slightly from January 2002 to December 2005 but the MSSA bacteraemia rate fluctuated significantly. The percentage bacteraemia due to MRSA or MSSA changes on a monthly basis but greater attention should fall on periods where the monthly number of MRSA exceeds three cases per month. Extra attention must be given when it appears only one hospital is affected e.g. April 2005 and November 2006.

### Mid-Western Regional Hospital Limerick:

The monthly occurrence of *S. aureus* bacteraemia due to meticillin sensitive and meticillin resistant *S. aureus* in the MWRHL is shown in Figure 13 and 14.

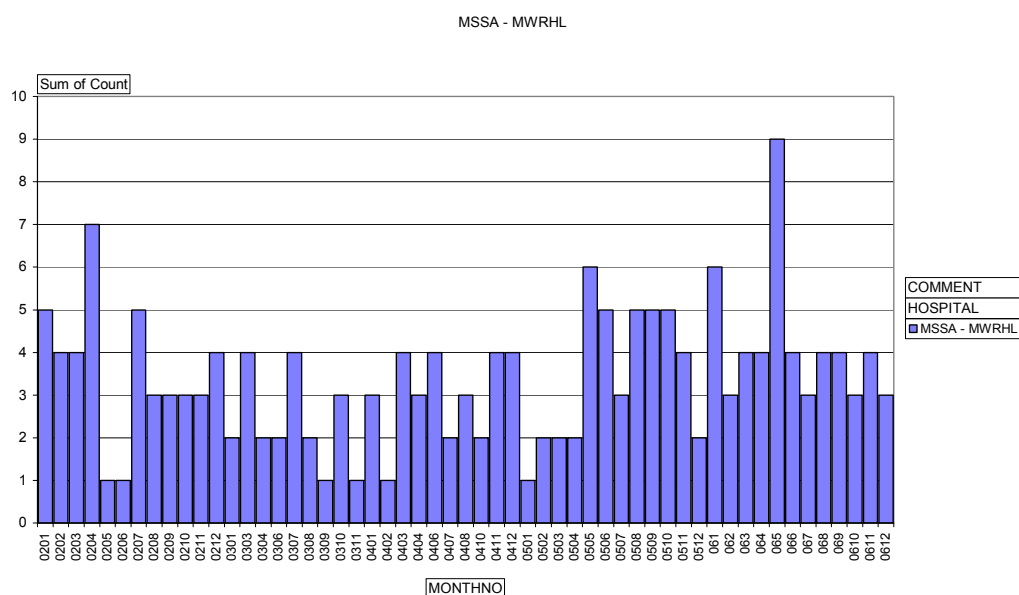


Figure 13: Cases of MSSA bacteraemia by month of occurrence in MWRHL in 2002-6.

The drop in MSSA bacteraemia in MWRHL, from 43 in 2002 to 21 in 2003 is evident in this chart. This figure increased to 30 in 2004, then rose to 42 in 2005 and to 51 in 2006.

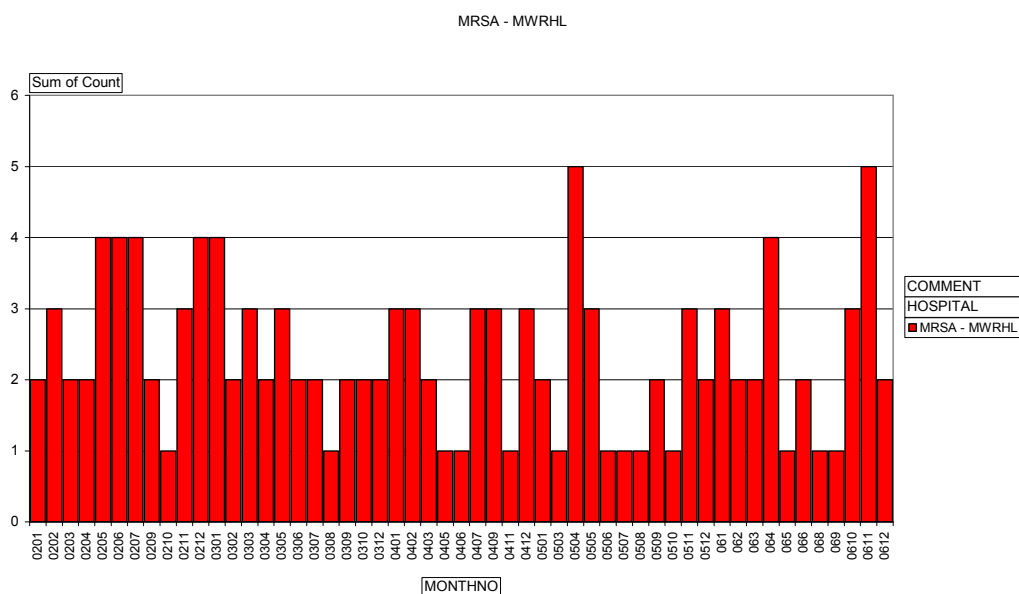


Figure 14: Cases of MRSA bacteraemia by month of occurrence in MWRHL in 2002-6.

In 2002, the number of MRSA bacteraemia cases in MWRHL was 31, compared to 25 in 2003, 20 in 2004, 22 in 2005 and in 2006 it increased to 26. In February 2005, the use of alcohol gels for hand disinfection was phased into the hospital setting.

The fall in the incidence rate of MRSA bacteraemia in the MWRHL is shown clearly in Figure 15, although the rise in 2006 has slowed the progress in reducing MRSA bacteraemia in MWRHL.

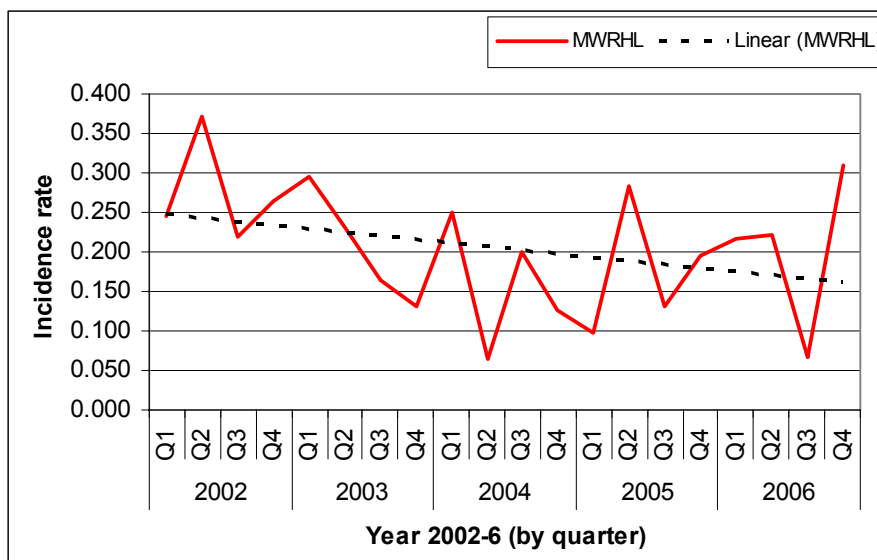


Figure 15: Incidence rate (per 1000 bed days used) of MRSA bacteraemia by quarter in MWRHL in 2002-6.

Further efforts, adequately resourced with appropriate levels of consultant microbiologists and infection control nurses, are needed to respond to the reversal in trends of MRSA bacteraemia in MWRH, Limerick.

# Patient Profiles:

For the purpose of patient profiles, patients are counted only once even if a second bacteraemia episode was detected, although the patient will be included twice if MSSA is isolated once and MRSA isolated subsequently (and vice versa).

With the exception of 2004, more males (64%) than females (36%) were reported with *S. aureus* bacteraemia in the acute hospitals of the Mid-West. This is a consistent finding in EARSS and is reflected in other national data.

Each case was classified according to type of in-patient “department”.

(eme – emergency; icu – intensive care unit; ger – geriatric; med – medical; sur – surgical; ped – paediatric; gyn – gynaecology; ONC – oncology; dial – dialysis; unk – unknown). Medical departments are the main source of patients identified with *S. aureus* bacteraemia, followed by A/E.

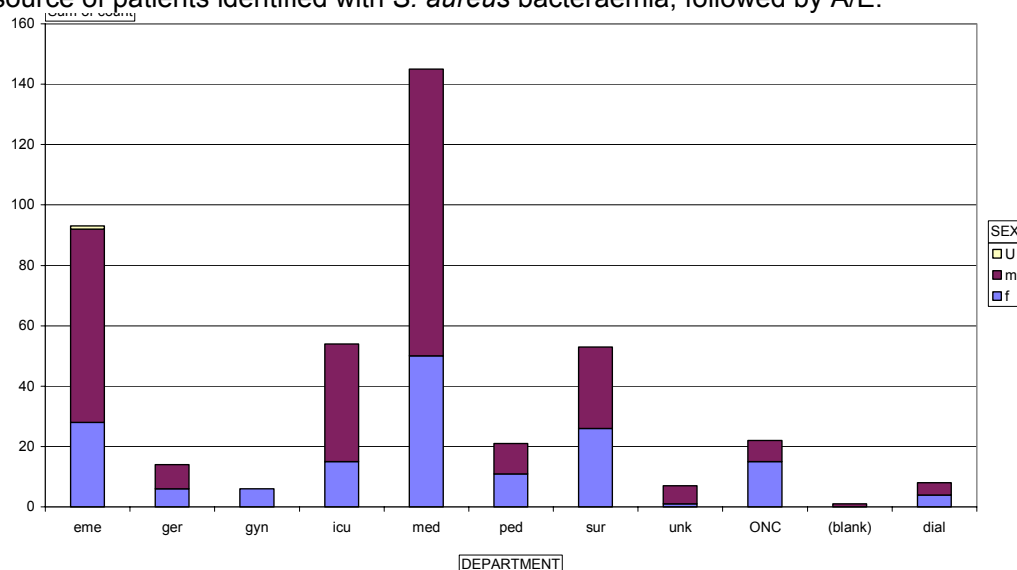


Figure 16: Sex distribution of cases of *S. aureus* bacteraemia by department type in 2002-6.

The level of MRSA bacteraemia varies according to the type of patient involved. Older patients, especially those with a history of care in healthcare facilities may be more likely to be colonised with MRSA and therefore have a higher risk of infection with their own endogenous flora.

Patients in intensive care or high-dependency units have a higher risk of resistant infections. In this region, 70-80% of *S. aureus* bacteraemias reported from ICU over the period were MRSA, although the proportion appears to be decreasing.

Table 5: Number of *S. aureus* bacteraemias (MSSA and MRSA) and percentage meticillin resistant by department type in 2002-5 and 2006.

DEPARTMENT	2002-5				2006				All	%
	MRSA	MSSA	Total	%MR	MRSA	MSSA	Total	%MR	All	%MR
eme	10	54	64	15	4	25	29	14	93	15
ger	7	5	12	58	1	-	1	100	13	64
gyn	1	3	4	25	-	2	2	0	6	17
icu	31	10	41	76	6	7	13	46	54	69
med*	77	56	133	58	7	6	13	54	146	58
ped	2	16	18	11	-	3	3	0	21	10
sur	19	17	36	53	9	8	17	53	53	53
onc	1	13	14	7	3	5	8	37	22	18
dial*	-	-	-	-	3	5	8	37	8	37
unk	2	3	5	40	2	1	3	67	8	50
All	150	177	327	45.9	35	67	97	36	424	43.6

Onc-oncology; \*dial-dialysis (included in “med” 2002-5).

Table 7 shows the number of *S. aureus* bacteraemia in A/E fell from 2002 to 2005 but isolates increased two-fold in 2006. There was no corresponding increase in MRSA in this setting. Surgery also appears to show a rise in bacteraemia due to *S. aureus* but episodes due to MRSA rise and fall every second year. Bacteraemia due to *S. aureus* in ICU was stable from 2002-6 with the exception of 2005 when numbers isolated were low. The number of bacteraemia due to MRSA in the ICU setting does appear to fall during the period 2002-6. In medical patients the number of bacteraemia episodes due to *S. aureus* (including MRSA) rises and falls every second year. The apparent fall in 2006 is due to the separate reporting of dialysis setting episodes. While the difference is small, patients in the oncology setting showed a rise in episodes due to MRSA in 2006, compared to 2005.

Table 6: Cases of *S. aureus* bacteraemia (MSSA and MRSA) by department in 2002-3, 2004, 2005 and 2006.

	2002-3		Total	2004		Total	2005		Total	2006		Total	2002-6
DEPT	MRSA	MSSA		MSSA	MRSA		MRSA	MSSA		MRSA	MSSA		
eme	5	31	36	2	10	12	3	13	16	4	25	29	93
ger	4	1	5	-	-	-	3	4	7	1	-	1	13
gyn	1	3	4	-	-	-	-	-	-	-	2	2	6
icu	19	4	23	8	4	12	4	2	6	6	7	13	54
med*	39	26	65	21	18	39	17	12	29	7	6	13	146
ped	1	8	9	1	1	2		7	7	-	3	3	21
sur	10	9	19	6	4	10	3	4	7	9	8	17	53
ONC	-	-	-	-	4	4	1	9	10	3	5	8	22
dial*	-	-	-	-	-	-	-	-	-	3	5	8	8
unk	2	3	5	-	-	-				2	1	3	8
All	81	85	166	38	41	79	31	51	82	35	62	97	424

Onc-oncology; \*dial-dialysis (included in "med" 2002-5).

Of 26 female surgical patients with *S. aureus* bacteraemia, 14 were MRSA (54%) and of 27 male surgical patients with *S. aureus* bacteraemia, 14 were MRSA (52%). Unlike 2002-5, there was a preponderance of MRSA bacteraemia in male surgical patients in 2006.

The age distribution of the patients is clearly important when assessing the potential risk of infection (including MRSA bacteraemia in this instance). The age distribution according to Department illustrates that elderly patients constitute a significant proportion of patients in medical, surgical and emergency departments with *S. aureus* bacteraemia.

Table 7: Cases of *S. aureus* bacteraemia by age band and department in 2002-6.

Ageband	eme	ger	gyn	icu	med	ped	sur	ONC	dial	unk	Total
0-4y	6					14					20
5-9y	3					2					5
10-14y	5					4	1				10
15-19y	2				2	1	1				6
20-24y	3		1	2	3		2				11
25-34y	3		1		2						6
35-44y	2		2	5	11		3		1		24
45-54y	5			4	13		4	9		1	36
55-64y	12		1	6	17		12	5	3	1	57
65-74y	27		1	18	37		8	5	1	2	99
75-84y	16	7		13	46		13	2	3	3	103
85-94y	9	6		4	12		8	1			40
All	93	13	6	52	143	21	52	22	8	7	417

A substantial proportion, 80% (77/97), of the MRSA bacteraemia, seen in *medical and emergency departments*, are in patients over 65 years.

Table 8: Cases of MRSA bacteraemia by age band and department in 2002-6.

Ageband	eme	ger	gyn	icu	med	ped	sur	onc	dial	unk	Total
0-4y	1					1					2
5-9y											0
10-14y						1					1
15-19y					1						1
20-24y				1			1				2
25-34y											0
35-44y	1			3	4		2				10
45-54y				2	2		2	1		1	8
55-64y	1			5	10		6	1	2		25
65-74y	6		1	14	26		3	1		1	52
75-84y	3	4		9	31		7	1	1	2	58
85-94y	2	4		2	9		6				23
Grand Total	14	8	1	36	83	2	27	4	3	4	182

Elderly patients over 65 years constitute a large proportion (73%) of the MRSA bacteraemia reported in the region, although in 2006 alone, the percentage was 60%. Patients over 65 years account for 58% of all *S. aureus* bacteraemia. In 2006 alone, this percentage was 49%. As the absolute number of cases in those over 65 years in 2005 and 2006 are similar, this would suggest more cases of *S. aureus* bacteraemia occurred in younger patients in 2006. This trend was not evident in MRSA bacteraemia.

The intensive care/high dependency unit patients and medical patients (65%) have particularly high numbers of MRSA bacteraemia (119/182). These patients account for 47% of all cases of *S. aureus* bacteraemia (195/417).

**Conclusion:** Initial and intensive efforts to reduce bacteraemia due to MRSA should focus on these particular patient types (e.g. elderly patients admitted at A/E from nursing homes). The patient types and areas might be useful pilot points for interventions aimed at reducing bacteraemia and MRSA. These data may prove useful to infection control and medical/nursing staff induction to highlight patients with known increased risk of resistant and serious infections caused by *S. aureus*.

#### Antibiogram-Resistogram Types:

As part of the EARSS programme all MRSA isolates from blood are sent to the National MRSA Reference Laboratory at St. James's Hospital who kindly type the isolates to determine similarity.

Of the 36 MRSA bacteraemia cases in 2006, typing was available in 34.

The most common AR type in the region is O6.5 (14-15 isolates) followed by O6.6 (7 isolates) in 2006. There was little evidence of clusters of MRSA bacteraemia.

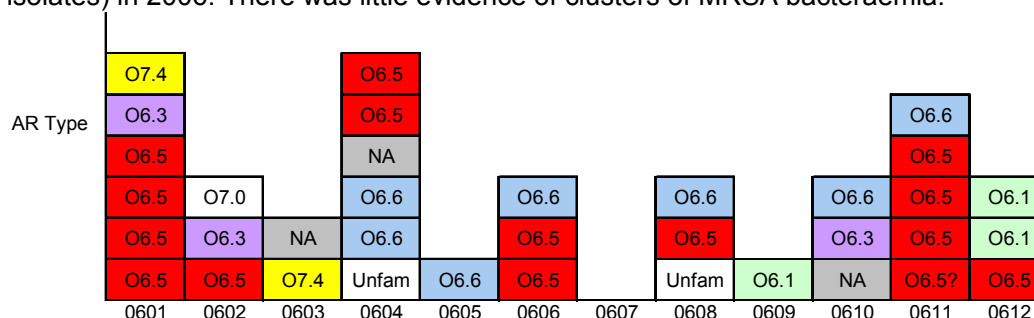


Figure 17: Distribution of Antibiotogram-Resistogram (AR) types in 2006.

## Enhanced Surveillance of *S. aureus* bacteraemia in the hospitals of the HSE West (Clare, Limerick, Tipperary North), 2006:

In January 2005, infection control professionals in five of the six acute hospitals began enhanced surveillance of *S. aureus* bacteraemia (SAB) in the region. In 2006, this merit in this initiative, although labour-intensive and time-consuming, justified its continuation in all acute hospitals.

No data were available for 17 patient episodes; (twelve episodes MWRH, Limerick [six MSSA and six MRSA]; one MSSA in MWRH Ennis; two MSSA cases in St. John's Hospital, Limerick and one MSSA case in MWRMH and one MRSA [not acute hospital]).

Data on 86 patient episodes of SAB (54 male; 32 female) which affected 79 patients were collated. Looking at MRSAB alone, nine episodes were female and 20 male.

Hospital	SAB Episodes	MSSAB	MRSAB
MWRHL	65	45	20
MWRHE	10	5	5
MWRHN	6	4	2
SJHL	2	1	1
MWRMH	1	1	0
Other*	2	1	1
<b>All</b>	<b>86</b>	<b>57</b>	<b>29 (34%)</b>

\* not acute hospital; MSSAB-meticillin sensitive *S. aureus*; MRSAB-meticillin resistant *S. aureus*

Fifty-six patient episodes involved patients **admitted** from the "community"; seven were admitted from long-term care facilities; six were admitted from other acute hospitals and data was unavailable in four cases.

Patient Admitted From:	Hospital						All
	MWRHL	MWRHE	MWRHN	MWRMH	SJHL	Other	
Community	53	8	5	0	2	1	69 (80%)
Long Term Care Hosp	6	1	1				8
Other Acute Hosp	3					1	
Not known	3	1		1			
Total	65 <sup>#</sup>	10	6	1*	2	2	

\* classified not clinically significant; two episodes classified not clinically significant

Thirty-one episodes of bacteraemia were classified as "**acquired** in the community" and four of these were MRSA. These would not be classically regarded as hospital associated infections. Further data would be desirable on the four MRSAB acquired in the community. The introduction of the category "Healthcare associated" has improved classification.

Bacteraemia acquired in:	SAB type		
	MRSA	MSSA	Total
Community	4	27	31
Other Hosp	4		4
This Hosp	16	14	30
Healthcare associated	2	11	13
Not known	3	5	8
<b>Total</b>	<b>29</b>	<b>57</b>	<b>86</b>

Thirty episodes were classified as “acquired in the acute hospital” of HSE West\*, of which sixteen were MRSA. Five were acquired from “a previous stay” in the acute hospital, of which 2 were MRSA.

Four episodes were deemed “acquired in another hospital or healthcare facility” – all were MRSA. Acquisition was deemed “healthcare associated” in thirteen instances (two being MRSAB). Data unknown in eight cases.

The data collected in the enhanced surveillance system for SAB appears broadly representative of the overall distribution of MRSA and MSSA in the Hospital Network.

It is important to stress that it is the bacteraemia acquisition which is assessed here and not the acquisition of the organism MRSA or MSSA. It is not possible to determine with this data where the patient acquired the organism.

The median time to diagnostic testing (from the date of admission to date of specimen taken) was one day. The average time was 9.5 days. For MRSA bacteraemia the average was 20 days and for MSSA it was 4 days (Median 12d and 0d respectively). It is well established that prolonged length of hospital stay may increase the risk of acquiring MRSA bacteraemia but also bloodstream infection with MRSA leads to prolonged hospital stay.

In previous analyses it was suspected that some blood isolates were not clinically significant. The organism *S. aureus* can be found on the skin of about 30% of people generally with no ill effects. The possibility exists that a skin commensal, like *S. aureus* may contaminate a culture vial during sampling. About 10% of samples were deemed not clinically significant. One isolate from MWRMH was regarded as “not significant”.

Clinically Significant?	Organism Code		
	MRSA	MSSA	All
No		3	3
Yes	25	52	77
Undetermined	4	2	6
Total	29	57	86

Risk factors in patients acquiring MRSAB and MSSAB were assessed based on a suggested list. Multiple risk factors may be associated with one episode of SAB. Data on other risk factors were available on 4 other cases (two MRSA and MSSA).

Risk Factors	MRSA	MSSA
Haematological malignancy / BMT	2	4
Other malignancy	3	8
Major Trauma	3	0
Surgery (same admission prior to infection)	3	2
Haemodialysis	1	6
Other immunosuppressive illness	1	2
Immunosuppressive drugs	2	3
Diabetes	6	6
Intensive Care Unit admission	5	7
Not known / undetermined	6	15

In previous analyses attention was drawn to the finding that many patients with SAB have “lines in”. This is confirmed by the finding that in about one third of SAB cases, lines are thought to be the primary source. In five MRSAB cases where respiratory tract was the primary source, two cases had exposure to ICU. It is possible some

patients acquire MRSAB and MSSAB in ICU, though others did appear to have the infection on entry to ICU.

Primary Source	SAB Type		
	MRSA	MSSA	All
CVC	3	11	14
PVC	6	6	12
Resp. Tract	5	4	9
Skin	3	4	7
Surgical Wound		1	1
Other Wound	1		1
Urinary Catheter	4	1	5
Other primary source	0	1	1
No data	5	24	29
Total	27	52	79

Secondary sources of the bacteraemia were abscesses in seven cases, cardiovascular in five cases and bone/joint in seven cases. In 36 patients no identifiable secondary source was specified or it was unknown.

It is clear that the majority of patients acquiring SAB (MRSA and MSSA), have complex medical care. Some factors predispose the patient to acquiring infection, e.g. immunosuppression, diabetes, intravascular devices. Other factors may increase their risk of colonisation with MRSA, e.g. repeated and lengthy hospital stays, antibiotic therapy.

Microbial flora are part of our normal skin and body cavities, even *S. aureus*, and may be referred to as colonisation. Normally these organisms do little harm apart from superficial skin complaints but when the bodies defences are compromised, e.g. immunosuppression, neoplasms, dialysis, breaking the skin barrier with surgery, medical devices or skin complaints, the organisms opportunistically take advantage to cause infection. MRSA may be acquired, in the hospital, the nursing home and the community. It may colonise without causing infection in the majority of cases. When it does cause infection it can be serious and difficult to treat.

Good infection control in hospitals, care facilities, medical and dental surgeries, nursing homes will minimise the risk of MRSA transfer between patients colonised or infected with MRSA and those not carrying MRSA. Hand disinfection and good environmental hygiene are vital aspects of infection control. Compliance with infection control guidelines is a minimal requirement in controlling and preventing further spread of MRSA and infections caused by the organism.

The rate of MRSA bloodstream infection (bacteraemia) in a hospital is a good proxy measure for MRSA in a hospital. The rate in the HSE West (Clare, Limerick, Tipperary North) is the same as the national rate. In virtually all hospitals of the HSE West (Clare, Limerick, Tipperary North), rates of MRSA bacteraemia are falling over the period 2002 to 2006.