



Feidhmeannacht na Seirbhíse Sláinte
Health Service Executive

HSE West (Clare, Limerick, Tipperary North)

Report on the Surveillance of *Staphylococcus aureus* Bacteraemia in the Network 7 Hospitals of the Health Service Executive - West (Clare, Limerick, Tipperary North), 2002 – 2007

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SUMMARY

Background:

Health-care associated infections (HCAI) represent an enormous challenge to patient safety and quality of 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 “super bugs”. Meticillin resistant *Staphylococcus aureus* (MRSA) is an organism that has dominated headlines in medical journals for four 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 about the consequences of the organism for patients.

In 2001, the then National Disease Surveillance Centre (now HPSC) 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, it’s 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). 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. In early 2007, the Health Service Executive (HSE) announced the formation of a national committee to co-ordinate local implementation team 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) in 2007.

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*, *Streptococcus pneumoniae*, *Klebsiella pneumoniae*, *Pseudomonas aeruginosa*, *Enterococcus sp.* and *Escherichia coli* to be compared between countries by the use of standardised definitions. Data is collected on bloodstream infections with *S. aureus* (bacteraemias). *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 (blood-stream infection) 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 is 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). 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.

The organism *Staphylococcus aureus* is a commensal bacterium (living harmlessly) commonly found in the nose and skin surface of 30-35% of the general population. In a small number of cases the organism can lead to simple skin/soft tissue infections. It is thought that MRSA is not commonly found in the general population – although there is a lack of data in Ireland. Some studies suggest it can be present in 1-3% of the general population depending on the sample and the country. Healthcare workers have higher rates of harmless carriage (or colonisation) of MRSA (around 6-8%). Rates of antibiotic resistant organisms, like MRSA, can be higher in these settings due to selective pressures of antimicrobials, disinfectants, and colonisation/infection rates. Where patients are elderly, receiving invasive healthcare interventions or immunocompromised for other reasons they may be susceptible to colonisation with *S. aureus* and MRSA. It may not be clearly determined whether the organism was acquired in the home or community or whether it was acquired in the hospital. In a subset of such patients this colonisation may develop into a serious infection that will need to be treated. Such infections with *S. aureus* can occur in the community or the healthcare facilities but infections due to MRSA are more commonly healthcare associated (whether that care is provided in an acute hospital or a long-term care facility or nursing home).

Methods and Materials:

The EARSS data comprised the core dataset for 2002 to 2007. 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 2002-7 (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. MRSA bacteraemia as a healthcare associated infection still represents a minority of MRSA infection in Irish healthcare.

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.

Due to the lateness of this report, provisional data for 2008 has been included in some charts.

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.

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>
SAB	– <i>S. aureus</i> bacteraemia
HIPE	– Hospital In-Patient Enquiry

Results:

Data on 515 episodes of *S. aureus* bacteraemia were collected for the six years January 2002 to December 2007. Figure 1 shows the percentage of patients with *S. aureus* bacteraemia that were MRSA, by quarter from 2002 to 2007. 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.

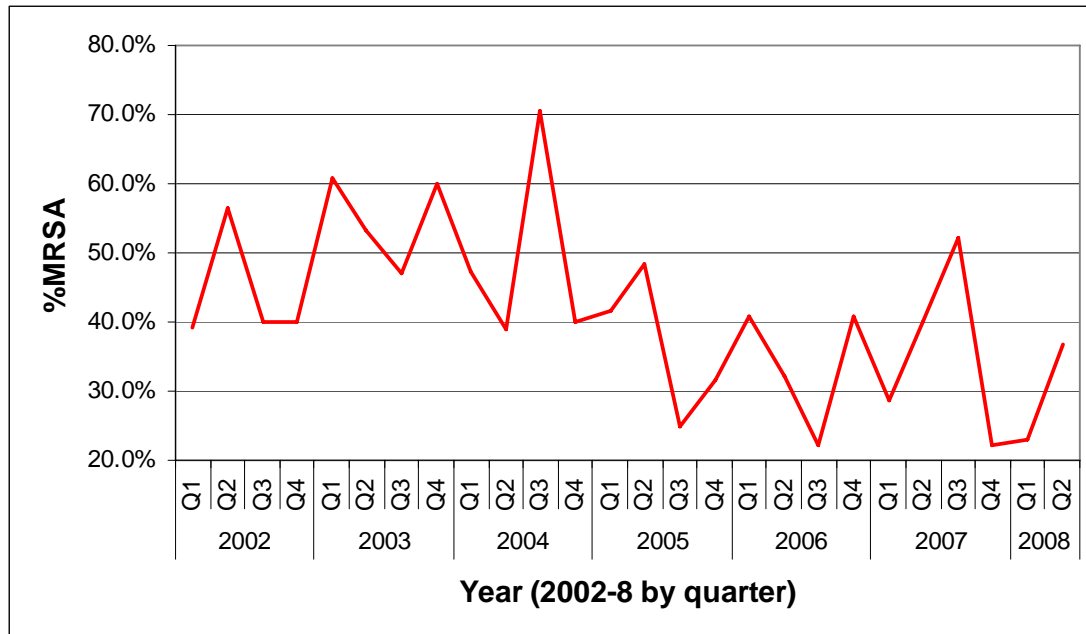


Figure 1: Percentage of *S. aureus* bacteraemia that were meticillin resistant, by quarter 2002-7 in HSE-West*.

Nationally, over the period 1999 – 2007, data published by the Health Protection Surveillance Centre (formerly NDSC) which co-ordinates EARSS in Ireland, shows the percentage of *S. aureus* bacteraemias caused by MRSA 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 - 2007 is shown in Table 1.

Table 1: Number of episodes of *S. aureus* bacteraemia (meticillin sensitive and resistant) and percentage due to MRSA by hospital 2002-7 in HSE-West*.

HOSPITAL	MRSA	MSSA	Total	%
MWRHE	23	29	52	44.2%
MWRHL	140	223	363	38.6%
MWRHN	35	16	51	68.6%
MWRMH	1	10	11	9.1%
MWROH	3	1	4	75.0%
SJHL	12	18	30	40.0%
Other	2	2	4	-
HSE-West*	216	299	515	41.9%

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* bacteraemias 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. In the 83 episodes of *S. aureus* bacteraemia reported in 2007, 81 patients were affected.

Table 2: Number of episodes 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	<u>5</u>	<u>43</u>	<u>3</u>	<u>0</u>	<u>1</u>	<u>2</u>		<u>54</u>
	SAB All	9	74	8	0	3	2		96
2003	MRSA	4	25	6	0	0	4		39
	MSSA	<u>3</u>	<u>21</u>	<u>0</u>	<u>4</u>	<u>0</u>	<u>3</u>		<u>31</u>
	SAB All	7	46	6	4	0	7		70
2004	MRSA	4	20	9	1	1	3		38
	MSSA	<u>2</u>	<u>30</u>	<u>4</u>	<u>0</u>	<u>0</u>	<u>5</u>		<u>41</u>
	SAB All	6	50	13	1	1	8		79
2005	MRSA	3	22	4	0	0	2		31
	MSSA	<u>5</u>	<u>42</u>	<u>2</u>	<u>2</u>	<u>0</u>	<u>2</u>		<u>53</u>
	SAB All	8	64	6	2	0	4		84
2006	MRSA	5	26	2	0	0	1	2	36
	MSSA	<u>6</u>	<u>51</u>	<u>4</u>	<u>2</u>	<u>0</u>	<u>3</u>	<u>1</u>	<u>67</u>
	SAB All	11	77	6	2	0	4	3	103
2007	MRSA	3	16	9	0	0	2	0	30
	MSSA	<u>8</u>	<u>36</u>	<u>3</u>	<u>2</u>	<u>0</u>	<u>3</u>	<u>1</u>	<u>53</u>
	SAB All	11	52	12	2	0	5	1	83
2002-7		52	363	51	11	4	30	4	515

Table 2 shows that the MWRHL consistently records the highest number of *S. aureus* bacteraemias in the region. This is a likely reflection of the higher inpatient bed-days activity and the case mix of patients provided with healthcare at large tertiary care centres. These facilities provide more specialist services (e.g. dialysis, surgery, oncology, burns, intensive care, etc...).

The number of MRSA bacteraemias detected each year over the study period was lowest in 2007.

The number of episodes of MRSA bacteraemia in Mid-Western Regional Hospital Nenagh (MWRHN) showed an apparent increase in the period 2002-4 and a decline to 2006, when there were two MRSA bacteraemia cases compared to nine in 2004. However, in 2007 there were again nine episodes of MRSA bacteraemia.

In the largest hospital in the Area (MWRHL), the number of episodes of MRSA bacteraemia fell by 47% between 2002 and 2007. Table 2 shows that the only year to upset the downward trend of the absolute numbers of MRSA bacteraemias since 2002 was 2006. This contrasts with the percentages evident in Figure 1 which appears to show higher levels of MRSA falling in 2005 and 2006. This is partly explained by the fluctuation in meticillin sensitive *S. aureus* (MSSA) bacteraemia numbers.

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 case mix are not equivalent. 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 2007, there were almost 13,000 blood culture samples processed for six of the acute hospitals of the HSE West (Clare, Limerick, Tipperary North):

Hospital	Year	2003	2004	2005	2006	2007
MWRHL, MWRMH, MWROH – “MWRH Complex”	Blood Cultures processed	7460	8310	9425	10839	10333
	<i>Rate per 1000 in-patient BDU</i>	45.9	50.7	58.2	65.4	62.2
MWRH, Ennis	Blood Cultures processed	513	737	676	826	1160
	<i>Rate per 1000 in-patient BDU</i>	17.2	22.7	19.5	24.4	37.0
MWRH, Nenagh	Blood Cultures processed	164	747	607	532	598
	<i>Rate per 1000 in-patient BDU</i>	6.4	28.0	22.7	19.4	22.3
St John's Hospital, Limerick	Blood Cultures processed	256	393	513	654	677
	<i>Rate per 1000 in-patient BDU</i>	9.5	14.7	21.2	23.2	26.2

Very few blood culture requests are made from MWROH and about 1000 are requested from MWRMH annually. Almost twice as many blood culture requests were received in 2007 from MWRMH and MWRHE compared to MWRHN and SJHL. 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. Since 2007, there is evidence of blood culture requests from non-acute centres such as St. Camillus' Hospital, Limerick, Milford Hospice etc...

Table 3: Incidence (per 1000 bed days) of MRSA bacteraemia and % MRSA by hospital 2002 - 2007.

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	28156	255235
	Incidence (95% C I)	0.15	0.21	0.07	0.00	0.00	0.04	0.13 (0.09-0.18)
	%MRSA (95% C I)	45	34	33	0	n/a	25	34.0 (25-44)
2007	BDU	31360	121335	26856	33501	11379	25832	250263
	Incidence (95% C I)	0.10	0.132	0.34	0.00	0.00	0.08	0.12 (0.08-0.16)
	%MRSA (95% C I)	27.3	30.8	75	0	n/a	40	36.6 (26-48)

95% C I – 95% confidence intervals; Data excludes three episodes “Other” in 2006 and one “Other” in 2007

Table 3 showing incidence rates (based on the absolute numbers in Table 2) would suggest that there was a slow downward trend in the MRSA bacteraemia incidence rate between 2002 and 2007. It is interesting that bed days used (and perhaps occupancy levels) have fallen in some acute hospitals but the bed days used in the Regional Maternity Hospital is increasing. Estimate of percentage bed occupancy in MWRHE, MWRHN and recently MWRMH are approaching 100%, contrasting with lower levels in MWROH, MWRHL and SJHL.

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 2007 by quarter. Studying the trend in the incidence rate of MRSA bacteraemia from 2002 to 2007, a 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 MRSA) fluctuated widely in the years 2002-7.

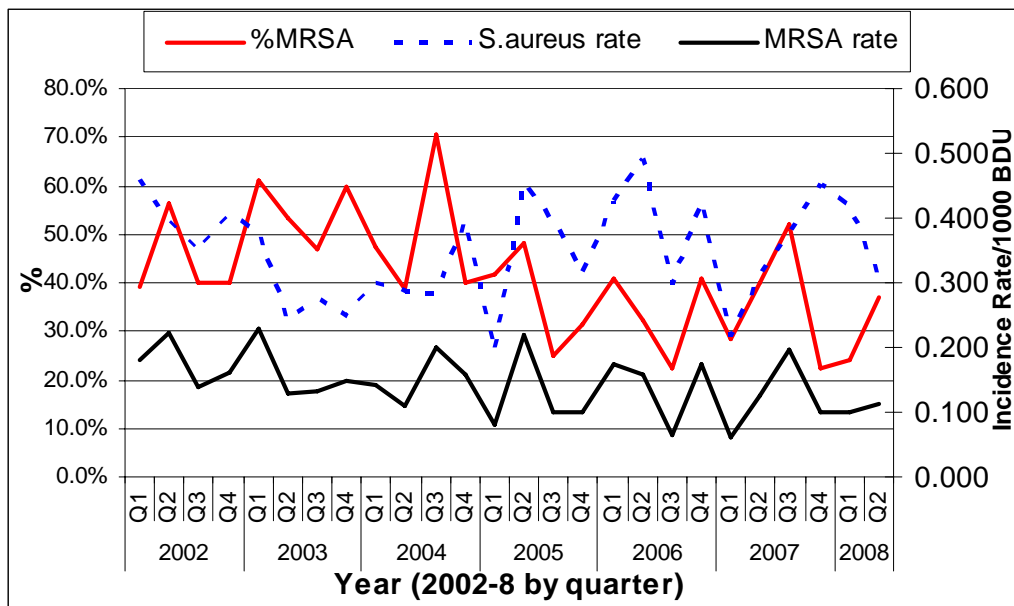


Figure 2: Incidence rate (per 1000 bed days used) of patients with *S. aureus* bacteraemia (MRSA and MSSA) by quarter 2002-7 in HSE West*.

For the second time, statistical process charts (SPCs) are presented. These charts assist in identifying shifts in the rate of bacteraemia (MRSA and total) over time. There are now over 20 data points available to indicate quarterly 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 2002-7. 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 or falling over the period studied. Data for MWRMH and MWROH are not shown as numbers are small.

Annual and quarterly reports on trends in the rate of *S. aureus* bacteraemia (including bacteraemia caused by MRSA) are not regarded as a substitute for clinical surveillance of healthcare associated bacteraemia in healthcare facilities. Data presented here represent the medium to long-term surveillance of such infections.

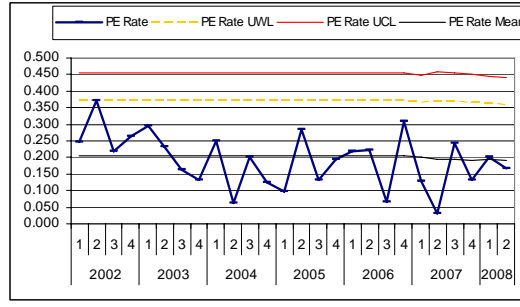
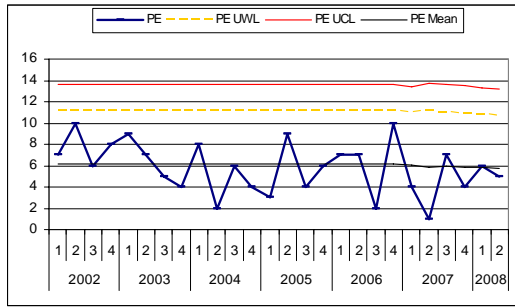


Figure 3: SPC Chart for MWRHL, patient episode (PE) and incidence rate MRSA bacteraemia 2002-7.

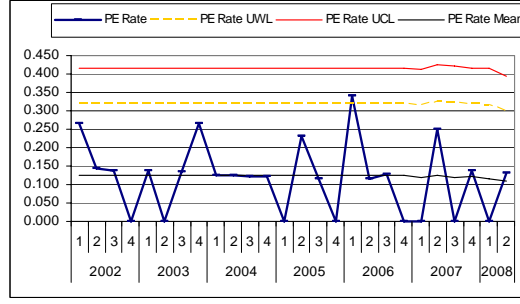
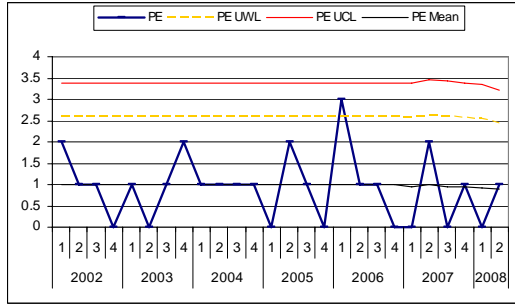


Figure 4: SPC Chart for MWRHE, patient episode (PE) and incidence rate MRSA bacteraemia 2002-7.

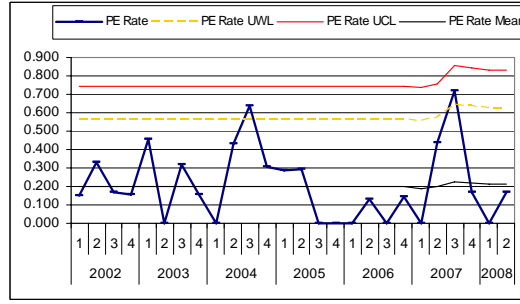
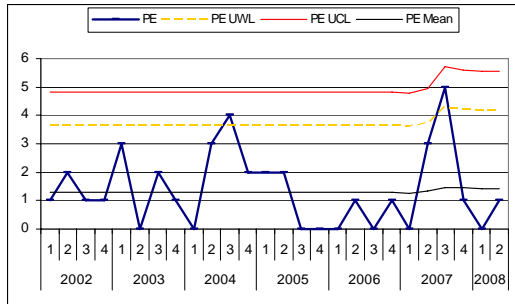


Figure 5: SPC Chart for MWRHN, patient episode (PE) and incidence rate MRSA bacteraemia 2002-7.

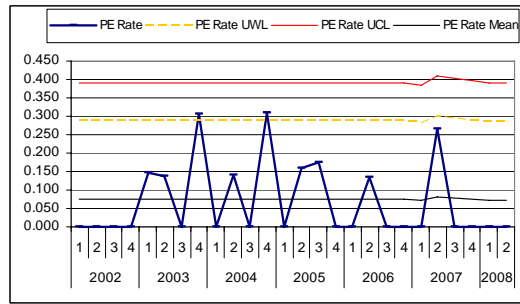
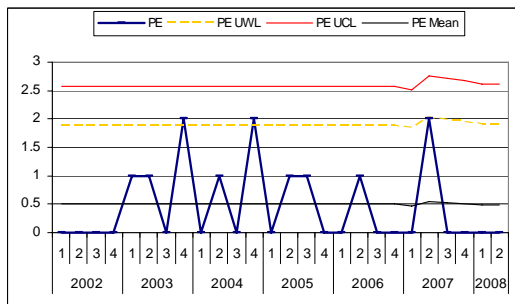


Figure 6: SPC Chart for SJHL, patient episode (PE) and incidence rate MRSA bacteraemia 2002-7.

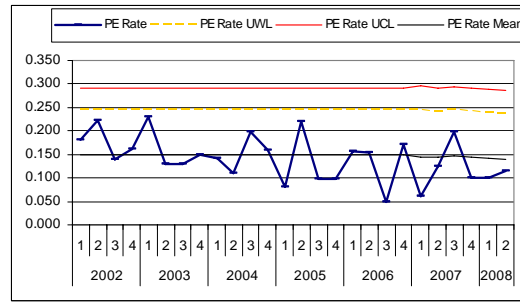
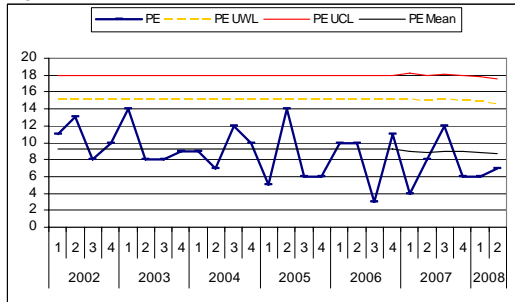


Figure 7: SPC Chart for Network 7 (all acute hospitals), patient episode (PE) and incidence rate MRSA bacteraemia 2002-7.

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.

Country	Incidence (per 1000 bed days)
Scotland (2002)	0.16
Scotland (2003-4)	0.15
Scotland (2004-5)*	0.20
Scotland (2005-6)*	0.19
Scotland (2006-7)*	0.19
Scotland (2007-8)*	0.17
Wales (2004-5)	0.10
Wales (2005-6)	0.08
England (2002-3)	0.18
England (2003-4)	0.18
England (2004-5)	0.18
England (2005-6)	0.18
England (2006-7)	0.17
England (2007-8)	0.12
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
Northern Ireland 2007	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) 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.

While there are admirably low levels of MRSA in some countries where “search and destroy” policies are rigidly enforced, it may be too simplistic to simply “copy and paste” such strategies into the current Irish context. However, much can be learned about the approach to controlling HCAI from European initiatives. In the last year, there was a large fall in the incidence of MRSA bacteraemia in England.

Each year, in Ireland, almost 600 MRSA blood culture isolates are analysed. Virtually all hospitals in Ireland now participate in EARSS. In 2007, reports showed the percentage of bacteraemia that are MRSA in Ireland was 38.5%. This was similar the percentage in the HSE West (Clare, Limerick, Tipperary North) (36%). The incidence rate of MRSA bacteraemia

in the HSE West (Clare, Limerick, Tipperary North) in 2004 (0.12) is lower than the estimated rate nationally (0.16). Since legislation changes came into force in 2004 there has been a gradual reduction every year in the number of MRSA bacteraemias detected in Ireland.

Proportion of MRSA isolates in participating countries in 2003, 2004, 2005, 2006, 2007
(c) EARSS

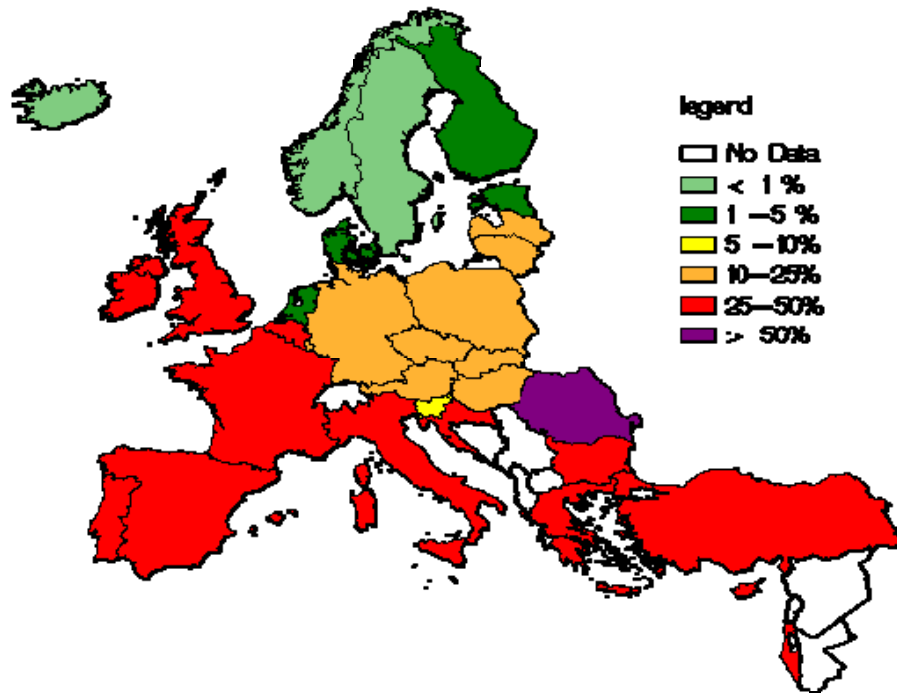


Figure 8: Percentage of blood culture isolates reported to be MRSA in EARSS participant countries 2003-2007 (EARSS data ©. Available at: <http://www.earss.rivm.nl>. Data retrieved on 17/09/2008).

Conclusion: The MRSA bacteraemia incidence rate in the Mid-West is comparable with other regions that have published 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 fell from 2002 to 2007.

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%20Cultures%20NI.pdf>

<http://www.cdscni.org.uk/publications/AnnualReports/pdf/4th%20report%20MRSA%20Blood%20Cultures%20NI.pdf>

<http://www.cdscni.org.uk/publications/AnnualReports/pdf/HCAI2005Version3.pdf>

http://www.cdscni.org.uk/publications/AnnualReports/pdf/HCAI_NI_2007.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/web/HPAweb&HPAwebStandard/HPAweb_C/1216193832294

Scotland -

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>

<http://www.documents.hps.scot.nhs.uk/ewr/pdf2008/0829.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%202022.pdf>

Monthly trends:

In HSE West*, Network 7 acute hospitals, on average, seven cases of *S. aureus* bacteraemia are detected monthly of which roughly three cases may be due to MRSA.

Figure 9 shows the occurrence of both by month in 2002-7.

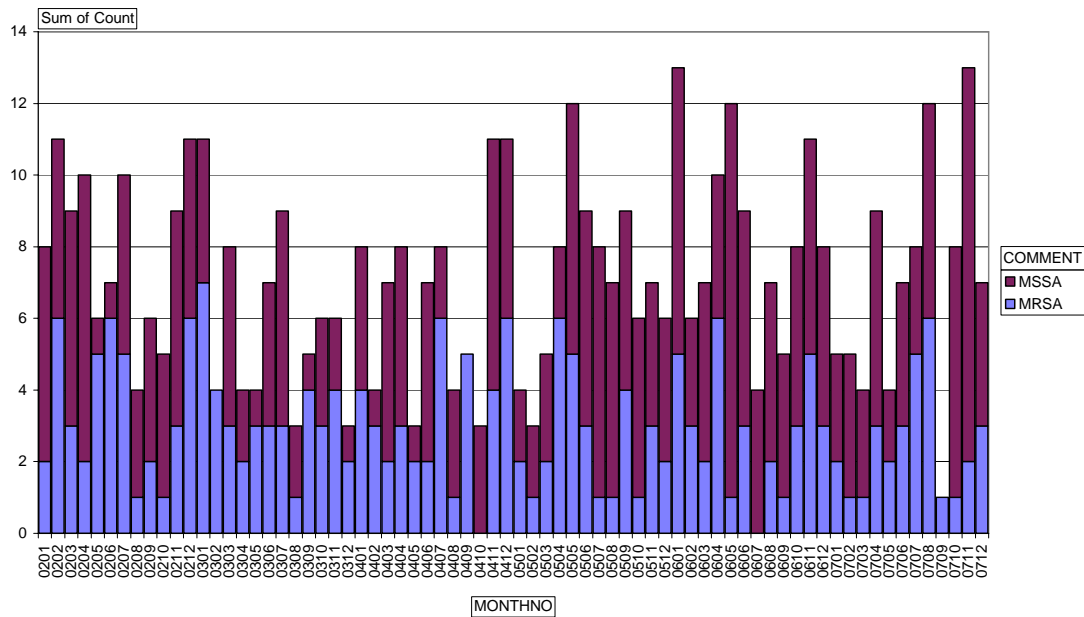


Figure 9: Cases of *S. aureus* bacteraemia (MRSA and MSSA) by month of occurrence in 2002-7.

Figure 10 indicates the hospital facilities identifying the *S. aureus* bacteraemia cases, although they are not necessarily the source of the infection or the organism.

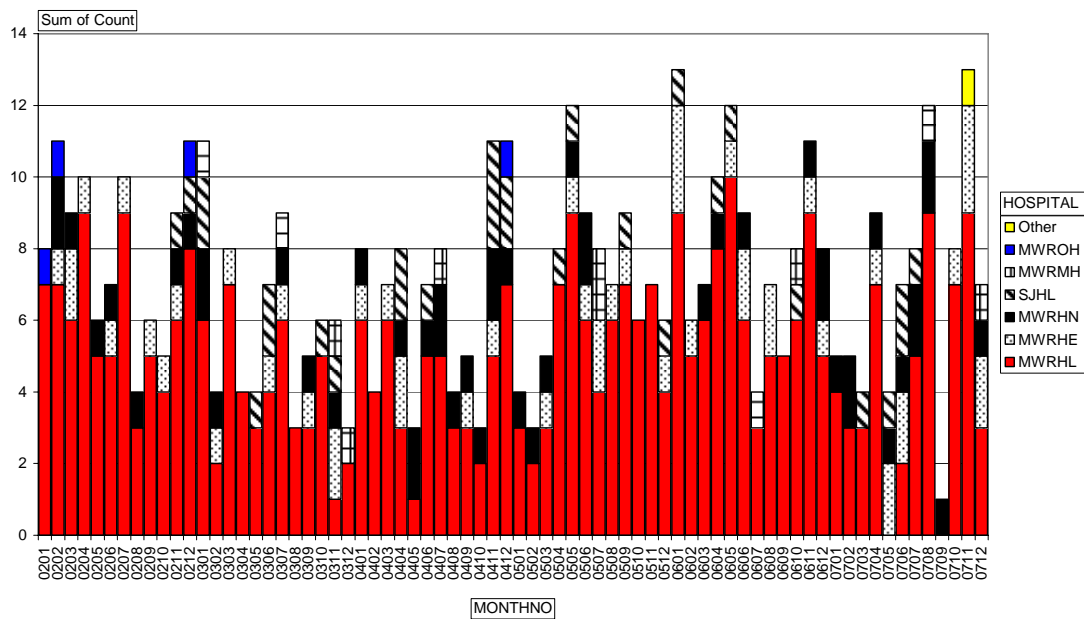


Figure 10: Cases of *S. aureus* bacteraemia by month of occurrence and by hospital in 2002-7.

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

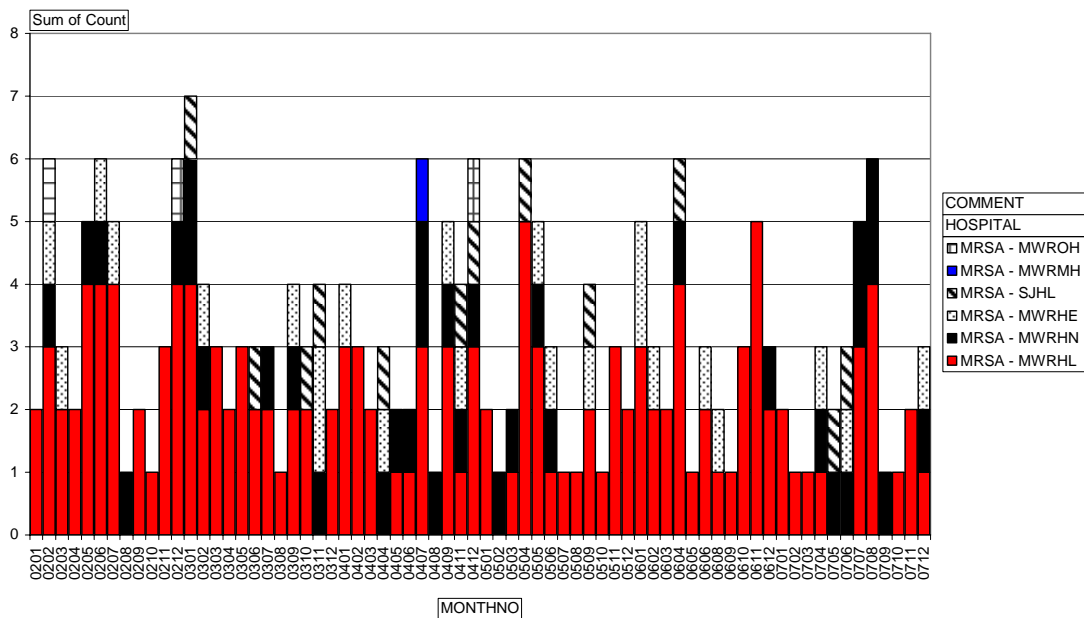


Figure 11: Cases of MRSA bacteraemia by month of occurrence and by hospital in 2002-7.

Figure 12 shows the hospital facilities yielding MSSA bacteraemias.

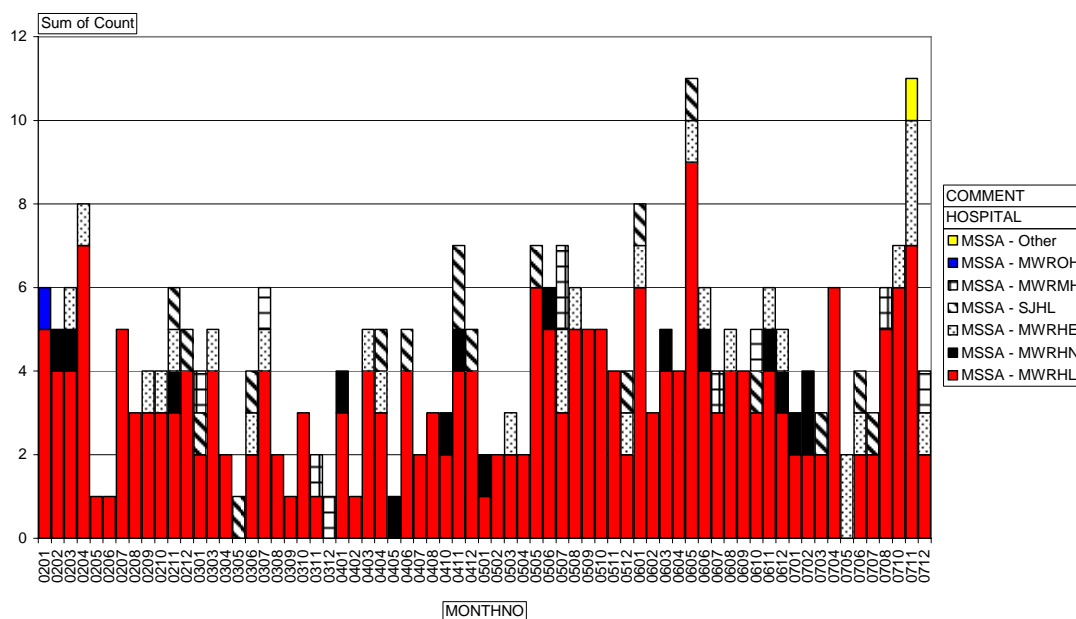


Figure 12: Cases of MSSA bacteraemia by month of occurrence and by hospital in 2002-7.

Conclusion: The number of patient episodes of MRSA bacteraemia in the region decreased from January 2002 to December 2007 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, November 2006 and July/August 2007.

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.

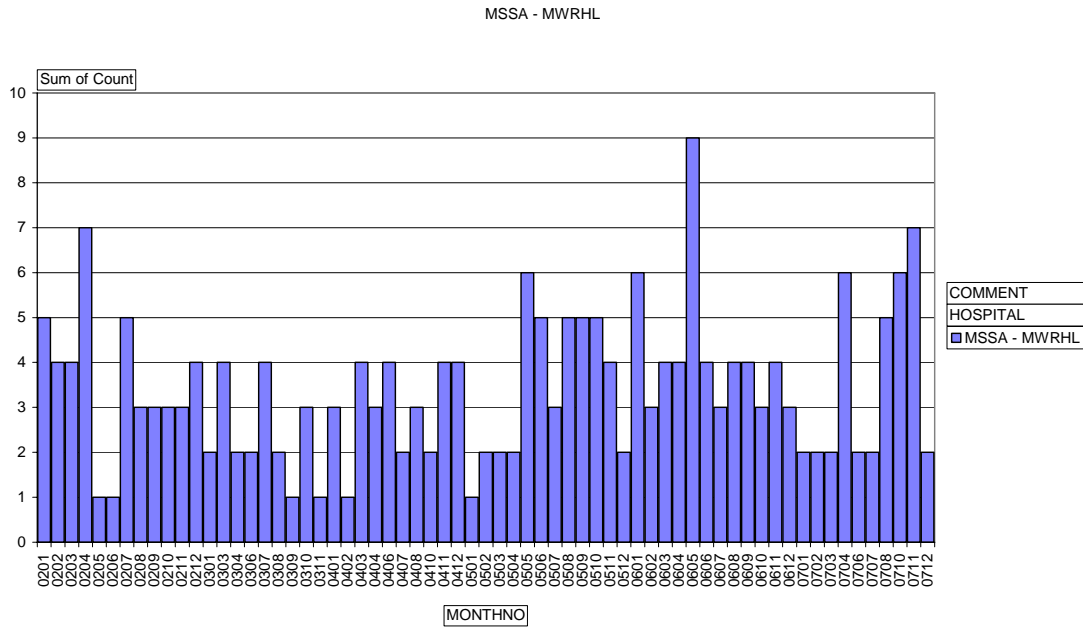


Figure 13: Cases of MSSA bacteraemia by month of occurrence in MWRHL in 2002-7.

The drop in MSSA bacteraemia in MWRHL, from 43 in 2002 to 21 in 2003 is evident in this chart. From 2004 to 2006 the number of MSSA annually in MWRHL increased from 30 to 51 but fell to 36 in 2007.

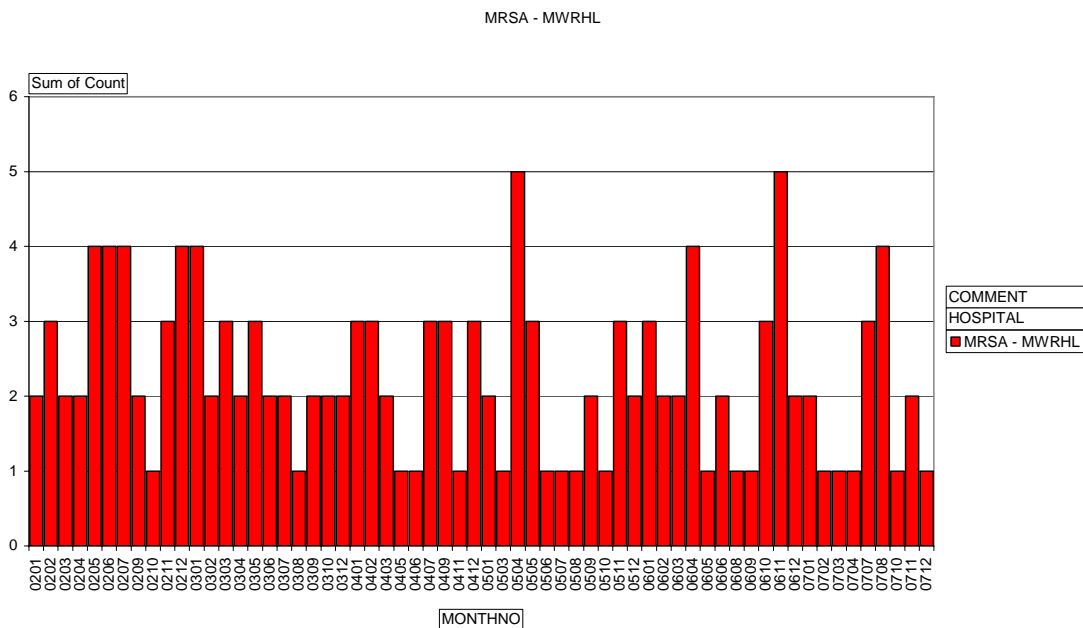


Figure 14: Cases of MRSA bacteraemia by month of occurrence in MWRHL in 2002-7.

In February 2005, the use of alcohol gels for hand disinfection was phased into the hospital setting. In 2002, the number of MRSA bacteraemia cases in MWRHL was 31, compared to 25 in 2003, 20 in 2004, 22 in 2005. In 2006, the number of MRSA episodes increased to 26 but fell to 16 in 2007 – the lowest number of MRSA bacteraemia episodes in a year in the hospital.

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.

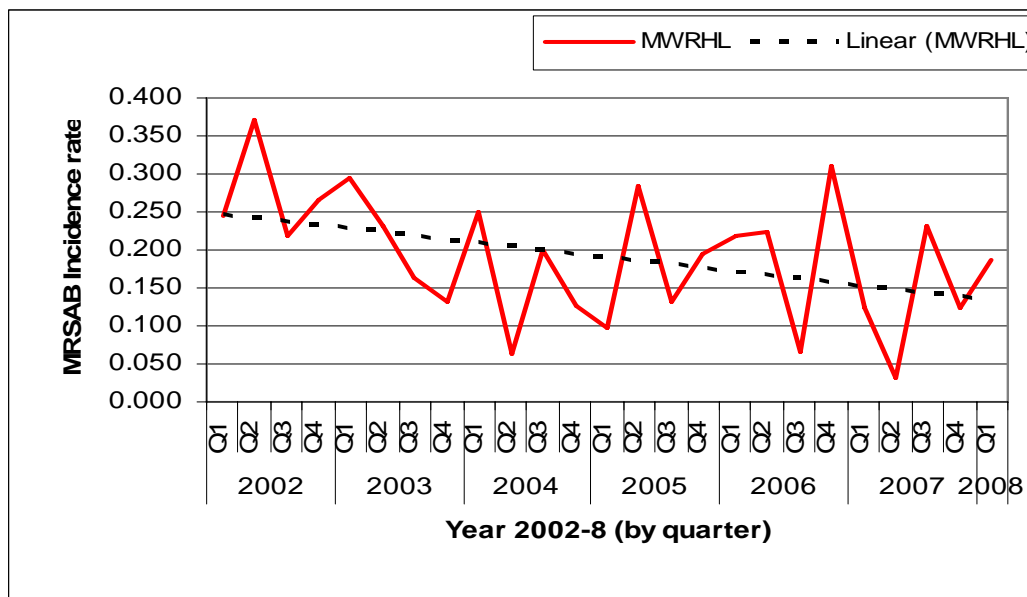


Figure 15: Incidence rate (per 1000 bed days used) of MRSA bacteraemia by quarter in MWRHL in 2002-8.

Further efforts, adequately resourced with appropriate levels of consultant microbiologists and infection control nurses, are needed to maintain the response and further reduce the 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 (61%) than females (39%) were reported with *S. aureus* bacteraemia in the acute hospitals of the Mid-West, annually. This is a consistent finding in EARSS and is reflected in data from other nations.

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).

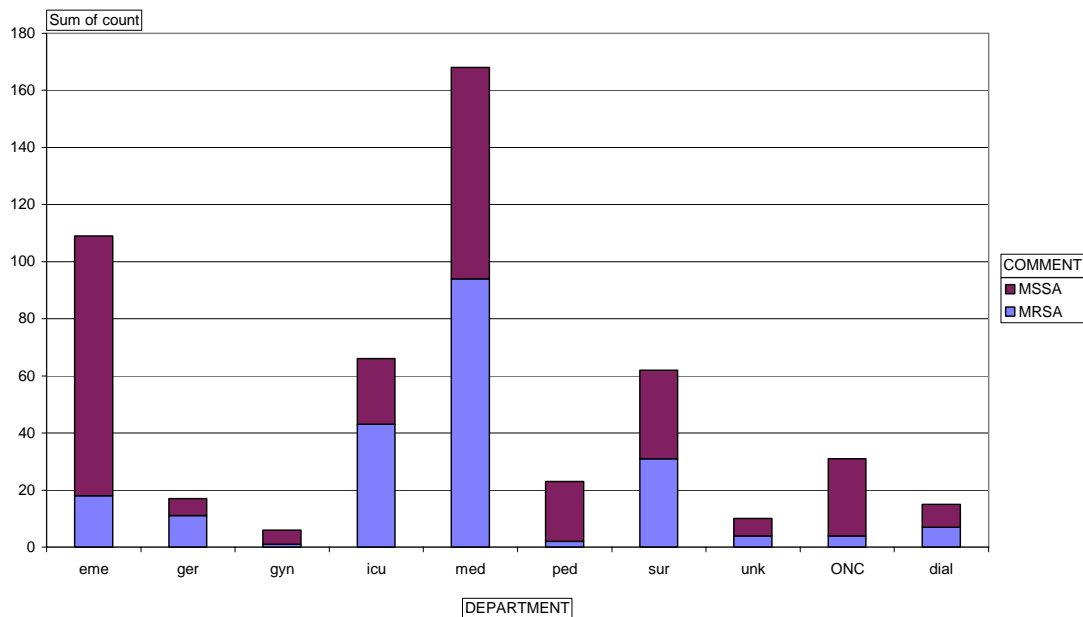


Figure 16: Sex distribution of cases of *S. aureus* bacteraemia by department type in 2002-7.

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, 65% of *S. aureus* bacteraemias reported from ICU over the period were MRSA, although the percentage appears to be decreasing to about 50% in more recent years (Table 5).

Table 5: Number of *S. aureus* bacteraemias (MSSA and MRSA) and percentage meticillin resistant by department type in 2002-6 and 2007.

DEPARTMENT	2002-6				2007				All	%
	MRSA	MSSA	Total	%MR	MRSA	MSSA	Total	%MR	All	%MR
eme	14	79	93	15	4	12	16	25	109	17
ger	9	5	14	64	3	1	4	25	18	67
gyn	1	5	6	17	-	-	-		6	17
icu	37	17	54	69	6	6	12	50	66	65
med*	83	62	145	57	9	11	20	45	165	56
ped	2	19	21	10	-	2	2	0	23	9
sur	28	25	53	53	3	6	9	33	62	50
onc	4	18	22	18	-	9	9	0	31	13
dial*	3	5	8	37	4	3	7	57	15	47
unk	4	4	8	50	-	2	2	0	10	40
All	185	239	424	43.6	29	52	81	36	505	42.4

Onc-oncology; *dial-dialysis (included in "med" 2002-5).MR=meticillin resistant

Table 6 shows that the average annual number of *S. aureus* bacteraemia in A/E at 16 from 2002 to 2007 (excluding 2006 when there was a two-fold rise). 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 caused by MRSA rise and fall every second year. Bacteraemia due to *S. aureus* in ICU was stable from 2002-7 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 2002-5 but this drop has levelled off up to 2007. 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 but no MRSA bacteraemia episodes were reported in 2007 in this area.

Table 6: Cases of *S. aureus* bacteraemia (MSSA and MRSA) by department in 2002-4, 2005, 2006 and 2007.

DEPT	2002-4		Total	2005		Total	2006		Total	2007		Total	2002-7
	MRSA	MSSA		MRSA	MSSA		MRSA	MSSA		MRSA	MSSA		
eme	7	41	48	3	13	16	4	25	29	4	12	16	109
ger	4	1	5	3	4	7	1	-	1	3	1	4	18
gyn	1	3	4	-	-	-	-	2	2	-	-	-	6
icu	27	8	35	4	2	6	6	7	13	6	6	12	66
med*	60	44	104	17	12	29	7	6	13	9	11	20	165
ped	2	9	11		7	7	-	3	3	-	2	2	23
sur	16	13	29	3	4	7	9	8	17	3	6	9	62
ONC	-	4	4	1	9	10	3	5	8	-	9	9	31
dial*	-	-	-	-	-	-	3	5	8	4	3	7	15
unk	2	3	5				2	1	3	-	2	2	10
All	119	126	245	31	51	82	35	62	97	29	52	81	505

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%).

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 ICU, medical, surgical and emergency departments with *S. aureus* bacteraemia.

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

Age band	Eme	ger	gyn	icu	med	ped	sur	ONC	dial	unk	Total
0-4y	7					16					23
5-9y	3					2					5
10-14y	5					4	1				10
15-19y	3				2	1	2				8
20-24y	4		1	2	3		3				13
25-34y	4		1	1	2						8
35-44y	3		2	6	13		3	2	1		30
45-54y	7			5	14		4	10		1	42
55-64y	14		1	8	20		12	10	5	2	72
65-74y	30	1	1	23	42		10	5	4	2	118
75-84y	19	7		14	53		18	2	4	4	121
85-94y	9	9		5	14		8	1	1		47
95+	1										1
All	109	17	6	64	163	23	61	31	15	9	498

A substantial proportion, (86/110, 78%), of the MRSA bacteraemias seen *in the medical and emergency departments* are in patients over 65 years.

Table 8: Cases of MRSA bacteraemia by age band and department in 2002-7.

Age band	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			4	5		2				12
45-54y				3	3		2	1		1	10
55-64y	2			5	11		6	1	3		28
65-74y	7	1	1	16	29		4	1	2	1	62
75-84y	5	4		10	34		9	1	1	2	66
85-94y	2	6		3	9		6		1		27
Grand Total	18	11	1	42	92	2	30	4	7	4	211

Elderly patients over 65 years constitute a large proportion (73%) of the MRSA bacteraemia reported in the region. Patients over 65 years account for 58% of all *S. aureus* bacteraemia. The intensive care/high dependency unit patients and medical patients (63% of all MRSA bacteraemias) have particularly high numbers of MRSA bacteraemia (134/211). These patients account for 46% of all cases of *S. aureus* bacteraemia (227/498).

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, perhaps from nursing homes, healthcare facilities). The patient types and areas might be useful pilot points for interventions aimed at reducing bacteraemia and MRSA colonisation. 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*.

Enhanced Surveillance of *S. aureus* bacteraemia in the hospitals of the HSE West (Clare, Limerick, Tipperary North), 2007:

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

No data were available for 16/83 patient episodes; (ten episodes MWRH, Limerick [eight MSSA and two MRSA]; four MSSA in MWRH Ennis; and one MSSA case in MWRMH and one MSSA [not acute hospital]). Data on 67 patient episodes of SAB (39 male; 28 female) which affected 66 patients were collated. Looking at MRSAB alone, 15 episodes were female and 13 male.

Hospital	SAB Episodes	MSSAB	MRSAB
MWRHL	42	28	14
MWRHE	7	4	3
MWRHN	12	3	9
SJHL	5	3	2
MWRMH	1	1	0
All	67	39	28 (42%)

MSSAB-meticillin sensitive S. aureus; MRSAB-meticillin resistant S. aureus

Forty-two patient episodes (63%) involved patients **admitted** from the “community”; seven were admitted from long-term care facilities; two were admitted from other acute hospitals and data was unavailable in 16/67 cases. 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. Seven episodes (10%) were reported as “not clinically significant”; six (two MRSA and four MSSA) from MWRHL and one MRSA from MWRHN. These are not included in later analyses in Tables and Figures. This is consistent with data in previous years. Of 60 clinically significant bacteraemia episodes, 25 were MRSA (42%).

Patient Admitted From:	Hospital					All
	MWRHL	MWRHE	MWRHN	MWRMH	SJHL	
Community	23	2	10		4	39 (65%)
Long Term Care Hosp	2	3	1		1	7
Other Acute Hosp	2					2
Not known	9	2		1		12
Total	36	7	11	1	5	60

Twelve episodes (20%) 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	8	12
Other Hosp	1	2	3
This Hosp	10	9	19
Healthcare associated	4	8	12
Not known	6	8	14
Total	25	35	60

Nineteen episodes were classified as “acquired in the acute hospital” of HSE West*, of which ten were MRSA. Three bacteraemia episodes were reported as acquired in a referring hospital, one was MRSA. Acquisition was deemed “healthcare associated” in twelve instances (four being MRSAB). Data unknown in 14 episodes – six MRSAB.

The data collected in the enhanced surveillance system for SAB may not be entirely representative of the overall distribution of MRSA and MSSA in the Hospital Network in 2007.

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 three days. The average time was 5.4 days. For MRSA bacteraemia the average was seven days and for MSSA it was four days. 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.

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 not available on seven other cases (four MRSA and three MSSA).

Risk Factors	MRSA	MSSA
Haematological malignancy / BMT	0	1
Other malignancy	1	9
Major Trauma	0	1
Surgery (same admission prior to infection)	5	1
Haemodialysis	3	2
Other immunosuppressive illness	0	1
Immunosuppressive drugs	2	1
Diabetes	5	2
Intensive Care Unit admission	4	2
Other risk factor	8	7
Not known / undetermined	1	8

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. The percentage in 2007 was 40%. In six MRSAB cases where respiratory tract was the primary source, three 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	6	11	17
PVC	2	5	7
Resp. Tract	6	1	7
Skin	2	7	9
Urinary tract (no catheter)	2	1	3
Other Wound	1		1
Urinary Catheter	0	2	2
No data	2	2	4
Unknown/not determined	4	6	10
Total	25	35	60

Secondary sources of the bacteraemia were skin or abscesses in eight cases and bone/joint in two cases. In 47 patients no identifiable secondary source was specified or it was unknown.

It is clear that a significant proportion 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 bodily defences are compromised, e.g. immunosuppression, neoplasia (cancer), 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. Poor skin condition can predispose to *S. aureus* and MRSA carriage – this can be an issue for patients as well as healthcare workers and specialist advice may be sought.

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. General practice also needs to have greater awareness and implement measures to prevent community spread of 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 lower than the national rate. In virtually all hospitals of the HSE West (Clare, Limerick, Tipperary North), rates of MRSA bacteraemia fell during the period 2002 to 2007.