

# DEATHS REGISTERED IN NORTHERN IRELAND WITH METHICILLIN RESISTANT *STAPHYLOCOCCUS AUREUS* (MRSA) MENTIONED ON THE DEATH CERTIFICATE (1998-2008)



9.30am – Thursday, 23 April 2009

## Introduction

1. There has been significant public interest regarding healthcare-associated infection (HCAI) and in particular the number of MRSA and *Clostridium Difficile* related deaths. This report looks at *Staphylococcus aureus* bacteraemic infections that are the methicillin resistant form commonly known as MRSA - methicillin resistant *Staphylococcus aureus*.
2. The Communicable Disease Surveillance Centre Northern Ireland (CDSCNI), which is part of the new Northern Ireland Public Health Agency, publishes quarterly data on the number of healthcare-associated infections which includes data on *Staphylococcus aureus* from bacteraemia (blood stream infections) surveillance in acute hospitals in Northern Ireland. This information can be obtained from the CDSCNI website<sup>1</sup>.
3. Cause of death statistics are classified by the International Classification of Diseases, the current version of which does not include a specific code for MRSA. However, statistics on deaths where MRSA was a contributing factor can be obtained by identifying deaths registered with specific conditions likely to be linked with MRSA and then checking whether MRSA was actually recorded on the death certificate. Patients who die with MRSA are often already seriously ill with another condition, which, if it is the underlying condition, is recorded as the cause of death in mortality statistics.
4. This report provides statistics on the number of deaths registered in Northern Ireland where *Staphylococcus aureus* or methicillin resistant *Staphylococcus aureus* (MRSA) was recorded on the death certificate for the period 1998 to 2008. Further information on the method used to identify MRSA related deaths is given in Annex A and detailed data for earlier years can be found on the NISRA website<sup>2</sup>.

<sup>1</sup> [www.cdscni.org.uk](http://www.cdscni.org.uk)

<sup>2</sup> <http://www.nisra.gov.uk/demography/default.asp29.htm>

5. Results presented in this report identify deaths where the underlying cause was *Staphylococcus aureus* or MRSA and also where *Staphylococcus aureus* or MRSA were not the underlying cause but was a contributory factor in the death. The mortality figures for *Staphylococcus aureus* include deaths where MRSA was mentioned, as MRSA is a specific form of *Staphylococcus aureus*. The report contains five tables:

- Table 1: Number of deaths with *Staphylococcus aureus* or MRSA mentioned and recorded as the underlying cause on the death certificate by registration year, 1998-2008
- Table 2: Age-standardised mortality rates per 1,000,000 population, for deaths with MRSA mentioned on the death certificate by sex, 2001-2008
- Table 3: Number of deaths and age-specific mortality rates per 1,000,000 population, for deaths with MRSA mentioned on the death certificate by sex and age, 2008
- Table 4: Number and percentage of deaths with *Staphylococcus aureus* or MRSA mentioned on the death certificate by underlying cause of death (ICD), 2008
- Table 5: Number of deaths with MRSA mentioned on the death certificate by place of death, 2002-2008

6. Also published today by NISRA is a report on the number of deaths registered in Northern Ireland with *Clostridium difficile* mentioned on the death certificate (2001-2008), which can be found on the NISRA website<sup>3</sup>.

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<sup>3</sup> [http://www.nisra.gov.uk/archive/demography/publications/mrsa\\_papers/CDiff\\_2008.pdf](http://www.nisra.gov.uk/archive/demography/publications/mrsa_papers/CDiff_2008.pdf)

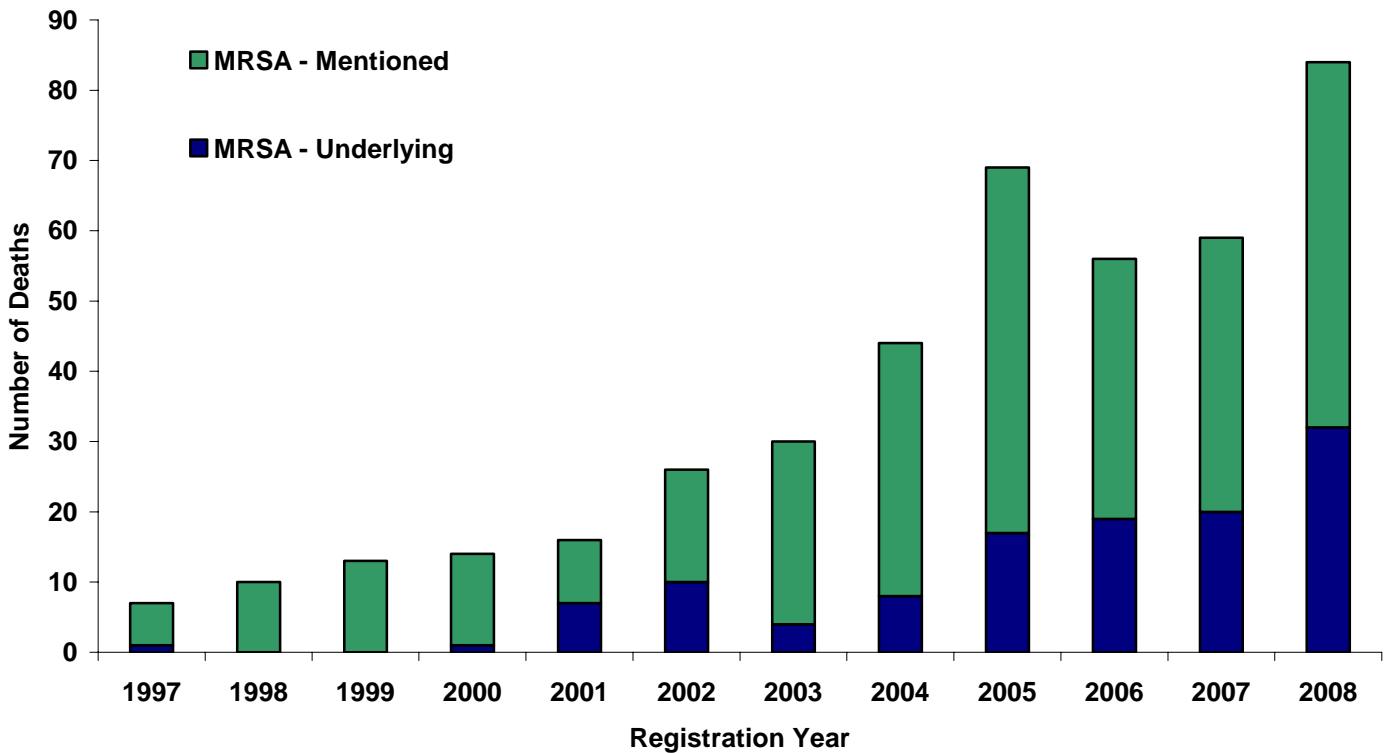
**Table 1: Number of deaths with *Staphylococcus aureus* or MRSA mentioned and recorded as the underlying cause on the death certificate by registration year, 1998-2008<sup>P</sup>**

Registration Year	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008 <sup>P</sup>	Total (1998-2008) <sup>P</sup>
<b><u>Mentioned on death certificate</u></b>												
All <i>Staphylococcus aureus</i>	14	22	17	33	35	41	52	76	69	70	94	<b>523</b>
Of which MRSA	10	13	14	16	26	30	44	69	56	59	84	<b>421</b>
Percentage of <i>Staphylococcus aureus</i> mentions that were MRSA	71%	59%	82%	48%	74%	73%	85%	91%	81%	84%	89%	<b>80%</b>
<b><u>Underlying cause of death</u></b>												
All <i>Staphylococcus aureus</i>	1	3	1	17	15	7	12	21	27	25	38	<b>167</b>
Of which MRSA*	-	-	1	7	10	4	8	17	19	20	32	<b>118</b>
<b><u>Underlying cause as a percentage of mentions on death certificate</u></b>												
All <i>Staphylococcus aureus</i>	7%	14%	6%	52%	43%	17%	23%	28%	39%	36%	40%	<b>32%</b>
MRSA*	-	-	7%	44%	38%	13%	18%	25%	34%	34%	38%	<b>28%</b>

<sup>P</sup> Provisional data

\*The ICD code specifies *Staphylococcus aureus* as the underlying cause of death and a search on the text field shows that it was the methicillin resistant form (see Annex A for further details)

**Figure 1: Number of deaths with MRSA mentioned and recorded as the underlying cause on the death certificate by registration year, 1997-2008<sup>P</sup>**



7. Table 1 shows that in overall terms, between 1998 and 2008, *Staphylococcus aureus* was mentioned on 523 death certificates and the number has broadly increased year on year over the period 1998 to 2008 with the figures stabilising between 2006 and 2007. Of these 523 deaths, 421 included a mention of MRSA.

8. In 2008, 84 deaths were registered where MRSA was mentioned on the death certificate – this is an increase on the 2007 figure of 59 and the highest number recorded since analysis began in 1997. In the period 1998-2008, there were 161,786 deaths registered from all causes of death and thus deaths with *Staphylococcus aureus* or MRSA mentioned make up only 0.32% and 0.26% respectively of all deaths in Northern Ireland.

9. Of the 523 deaths which had *Staphylococcus aureus* mentioned, 167 (32%) of those had *Staphylococcus aureus* recorded as the underlying cause. The deaths with *Staphylococcus aureus* recorded as the underlying cause then had the text field of the death certificate searched to find if they were the methicillin resistant form of *Staphylococcus aureus*. There was a smaller percentage of deaths with MRSA mentioned where it was recorded as the underlying cause of death with 118 out of the 421 mentions (28%) between 1998 and 2008 recorded as the underlying cause of death.

**Table 2: Age-standardised mortality rates, per 1,000,000 population, for deaths with MRSA mentioned on the death certificate by sex, 2001-2008<sup>P</sup>**

Registration Year	Age-standardised mortality rate* for deaths with MRSA mentioned		
	Male	Female	All Persons
2001	8.0	5.4	6.8
2002	12.8	10.0	10.8
2003	17.9	10.0	13.3
2004	29.0	13.6	19.2
2005	40.1	24.2	29.6
2006	36.7	15.2	23.8
2007	37.5	15.1	23.2
2008 <sup>P</sup>	42.8	26.5	33.5

<sup>P</sup> Provisional data

\* Rates per 1,000,000 population and standardised using the European standard population

10. Table 2 shows that generally age-standardised mortality rates for those deaths with MRSA mentioned on the death certificate were higher for males. Rates for deaths from MRSA among both males and females rose by around 5 times between 2001 and 2008 although rates did stabilise between 2006 and 2007.

**Table 3: Number of deaths and age-specific mortality rates, per 1,000,000 population, for deaths with MRSA mentioned on the death certificate by sex and age, 2008<sup>P</sup>**

Age-group	Deaths with MRSA mentioned 2008 <sup>P</sup>					
	Number			Age Specific Mortality Rate*		
	Male	Female	All Persons	Male	Female	All Persons
Under 45	-	1	1	-	1.8	0.9
45-74	18	8	26	67.1	28.1	47.0
75+	24	33	57	558.3	464.9	500.1
<b>All ages</b>	<b>42</b>	<b>42</b>	<b>84</b>	<b>48.3</b>	<b>46.5</b>	<b>47.4</b>

<sup>P</sup> Provisional data

\* Rates per 1,000,000 population

11. Table 3 shows the majority of deaths reported with MRSA recorded relate to the elderly.

In 2008 of the 84 deaths recorded which included a mention of MRSA, 68% related to those aged 75 years or older. This compares to those aged 75 years or older accounting for 62% of deaths due to all causes.

12. Age-specific rates for deaths with MRSA mentioned on the death certificate in 2008

show there have been 500 deaths per million people in the 75 and over group compared with 47 deaths per million people in the 45 to 74 age group and less than 1 death per million people aged under 45 at time of death.

**Table 4: Number and percentage of deaths with *Staphylococcus aureus* or MRSA mentioned on the death certificate by underlying cause of death (ICD), 2008<sup>P</sup>**

Underlying Cause of Death (ICD)	ICD10 code	Deaths with all <i>Staphylococcus aureus</i> mentioned 2008 <sup>P</sup>		Deaths with MRSA mentioned 2008 <sup>P</sup>	
		Number	Percentage of all causes	Number	Percentage of all causes
Infectious & Parasitic Diseases	A00-B99	25	27%	19	23%
Neoplasms	C00-D48	6	6%	6	7%
Endocrine, Nutritional and Metabolic Diseases	E00-E90	2	2%	2	2%
Mental and Behavioural Disorders	F00-F99	4	4%	4	5%
Diseases of Nervous System and the Sense Organs	G00-H95	4	4%	4	5%
Diseases of the Circulatory System	I00-I99	11	12%	9	11%
Diseases of the Respiratory System	J00-J99	18	19%	18	21%
Diseases of the Digestive System	K00-K93	9	10%	8	10%
Diseases of the skin, musculoskeletal system and Connective tissue	L00-M99	3	3%	3	4%
Diseases of the Genitourinary System	N00-N99	6	6%	5	6%
External Causes of Mortality	V01-Y98	6	6%	6	7%
<b>All Causes of Death</b>		<b>94</b>	<b>100%</b>	<b>84</b>	<b>100%</b>

<sup>P</sup> Provisional data

13. Patients who die with MRSA are often already seriously ill with another condition. The table shows that when *Staphylococcus aureus* or MRSA is mentioned on a death certificate, the most likely underlying cause of death is either Infectious & Parasitic Diseases or Diseases of the Respiratory System. Of those deaths which had *Staphylococcus aureus* or MRSA recorded as the underlying cause of death the majority (61% and 56% respectively) were coded to Infectious & Parasitic Diseases.

**Table 5: Number of deaths with MRSA mentioned on the death certificate by place of death, 2002-2008<sup>P</sup>**

Place of Death	Registration Year							2002 to 2008 <sup>P</sup>		
	2002	2003	2004	2005	2006	2007	2008 <sup>P</sup>	MRSA related deaths	All deaths	MRSA deaths as a percentage of all deaths
Altnagelvin Area Hospital	7	1	4	4	1	2	3	22	3,870	0.6%
Antrim Area Hospital	1	2	-	2	2	4	4	15	4,486	0.3%
Ards Community Hospital	-	-	-	1	-	-	-	1	125	0.8%
Belfast City Hospital	1	4	7	7	8	2	7	36	6,319	0.6%
Braid Valley Hospital	-	-	1	-	1	-	-	2	500	0.4%
Causeway Hospital	1	1	-	2	1	2	4	11	2,020	0.5%
Craigavon Area Hospital	4	1	5	8	11	7	8	44	4,701	0.9%
Daisy Hill Hospital	-	1	-	1	-	1	-	3	2,263	0.1%
Downe Hospital	-	1	2	-	-	1	1	5	1,059	0.5%
Erne Hospital	-	-	2	1	-	-	2	5	1,862	0.3%
Lagan Valley Hospital	-	1	-	4	-	1	2	8	1,996	0.4%
Lurgan Hospital	3	1	-	1	1	1	3	10	387	2.6%
Mater Infirmorum Hospital	3	3	1	6	2	7	6	28	2,984	0.9%
Mid-Ulster Hospital	-	1	1	3	-	3	2	10	1,339	0.7%
Moyle Hospital	-	-	-	-	1	2	2	5	361	1.4%
Musgrave Park Hospital	-	-	-	1	-	-	-	1	275	0.4%
Robinson Memorial Hospital	-	-	-	1	-	-	-	1	473	0.2%
Royal Group of Hospitals	1	2	4	6	7	6	9	35	5,988	0.6%
South Tyrone Hospital	-	-	-	-	-	1	-	1	148	0.7%
Tyrone & Fermanagh Hospital	-	-	1	-	-	-	-	1	152	0.7%
Tyrone County Hospital	-	2	2	2	1	-	-	7	1,218	0.6%
Ulster Hospital	4	1	2	7	9	7	18	48	6,909	0.7%
Whiteabbey Hospital	-	1	2	-	2	5	1	11	1,604	0.7%
All Other Hospitals*	-	-	-	-	-	-	-	-	1,678	-
Nursing Homes	1	7	7	8	8	5	12	48	16,168	0.3%
All Other Places**	-	-	3	4	1	2	-	10	32,829	0.0%
<b>Total</b>	<b>26</b>	<b>30</b>	<b>44</b>	<b>69</b>	<b>56</b>	<b>59</b>	<b>84</b>	<b>368</b>	<b>101,714</b>	<b>0.4%</b>

<sup>P</sup> Provisional data

\*All other hospitals are hospitals in which deaths occurred but none relating to MRSA

\*\*Other place of death include those deaths which occurred at home

14. In 2008, half of all deaths registered in Northern Ireland occurred in a hospital (50%); in contrast 86% of deaths with MRSA mentioned on the death certificate occurred in a hospital. There is no specific question on death certificates asking where an infection was acquired. The place of death is recorded but this may not be the place or origin of infection. Figures may differ from hospital to hospital for a variety of reasons such as the number of beds occupied in each hospital, the number of patients in intensive care and high dependency units and the age profile of patients.

## Further Information

15. Further information on the statistics provided in this publication can be obtained from:

Customer Services

Northern Ireland Statistics and Research Agency

McAuley House

2-14 Castle Street

BELFAST

BT1 1SA

Phone: 02890 348160

Faxsimile: 02890 348161

E-mail: [census.nisra@dfpni.gov.uk](mailto:census.nisra@dfpni.gov.uk)

## Annex A

1. All deaths occurring in Northern Ireland are registered with the General Register Office. After the death of a patient a qualified medical practitioner notes the cause of death of the deceased on the death certificate. This information is used to identify the underlying disease or circumstances, which initiated the train of events leading to death. The World Health Organisation International Statistical Classification of Diseases, Injuries, and Causes of Death (ICD) is used to classify this information. This process is in line with standard practice across the developed world.
2. However, information on methicillin resistant *Staphylococcus aureus* (MRSA) cannot be derived from the standard statistical classification, as the latest revision of ICD has no code to identify MRSA. Typically, patients who die with MRSA infections are vulnerable to a number of other conditions or have a chronic illness. In general, these diseases are used to classify the main cause of death using ICD.
3. However, it is possible to quantify the number of deaths in which MRSA has been mentioned on the death certificate; this has been derived by examining, both electronically and manually, the cause of death written by the doctor on the death certificate. To assist this process, research has been undertaken in England and Wales to identify which ICD codes are related to MRSA<sup>4</sup>. This information has been used in the analysis undertaken for this paper.
4. In summary, the method used to identify MRSA cases was as follows. Firstly, the text on all death certificates was searched electronically for the words methicillin resistant *Staphylococcus aureus*, the phrase MRSA or variants of these. Secondly, a more detailed manual search was undertaken of those specific death certificates with ICD codes which may be related to MRSA as noted in Griffiths *et al.*
5. The Health Protection Agency (HPA) and Office for National Statistics (ONS) launched an initiative to link surveillance data on serious infections held by the HPA with mortality data held by ONS. The data linkage study focused on healthcare-associated infections, initially targeting MRSA. Linkage of the data made it possible to identify whether patients who had a serious infection subsequently die and the proportion of these

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<sup>4</sup> "Deaths involving MRSA: England and Wales, 2003-2007". Health Statistics Quarterly 39, p56-66. Available at [http://www.statistics.gov.uk/downloads/theme\\_health/HSQ39.pdf](http://www.statistics.gov.uk/downloads/theme_health/HSQ39.pdf)

deaths for which the infection was recorded on the death certificate. The longer-term aim of this work was to improve understanding of the risk of mortality following HCAI. In parallel to the data linkage study, a small sample of deaths following MRSA infection occurring in hospital were investigated as part of a confidential, qualitative study to identify possible patient and healthcare factors that may have contributed to their death. This two year study was jointly undertaken by the HPA and ONS in response to the audit of deaths referred to in the Chief Medical Officer's (England) report. A report<sup>5</sup> on the work undertaken during the project is available on the HPA website.

6. NISRA now produce quarterly figures on MRSA deaths in the Registrar General Quarterly reports<sup>6</sup> and provide information to the Health Trusts on a weekly basis to help with better monitoring of deaths from healthcare associated infections.
7. The Office for National Statistics (ONS) publish annual figures for MRSA deaths for England and Wales in their Health Statistics Quarterly publication<sup>7</sup>.
8. The place of death reported in Table 5 is obtained from the death certificate. It is not possible to identify from the death certificate where the infection was acquired thus the figures should be treated with caution as it is possible the patient acquired the infection elsewhere. Conversely, it is also possible that some patients who acquired an infection in a particular hospital/nursing home may have died elsewhere following a discharge or transfer.
9. Different hospitals, and doctors, have different procedures for death certification therefore some hospitals may be more likely to record MRSA than others. In addition, some hospitals may undertake more comprehensive screening for MRSA on a regular basis and so it is more likely that infections are reported on death certificates for patients in these hospitals. This means figures may not be entirely comparable between hospitals.

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<sup>5</sup> [http://www.hpa.org.uk/webc/HPAwebFile/HPAweb\\_C/1194947311070](http://www.hpa.org.uk/webc/HPAwebFile/HPAweb_C/1194947311070)

<sup>6</sup> The latest Registrar General Quarterly Report is available at:

[http://www.nisra.gov.uk/archive/demography/publications/qtr\\_report/qtr4\\_2008.pdf](http://www.nisra.gov.uk/archive/demography/publications/qtr_report/qtr4_2008.pdf)

<sup>7</sup> "Deaths involving MRSA: England and Wales, 2003-2007". Health Statistics Quarterly 39, p56-66. Available at [http://www.statistics.gov.uk/downloads/theme\\_health/HSQ39.pdf](http://www.statistics.gov.uk/downloads/theme_health/HSQ39.pdf)

10. Hospitals and nursing homes can deal with different types of patients. It would be expected that higher numbers of MRSA cases would be apparent in establishments which treat those who are seriously ill or the elderly.
  
11. NISRA does not have any direct measure of the number of patients at risk, for example, data on the numbers of patients treated, or the total number of in-patient days, in each hospital. We have reported the number of deaths where MRSA was mentioned on the death certificate as a proportion of the total number of registered deaths that occurred in each hospital. Higher numbers of deaths would be expected in larger hospitals.