

DEATHS REGISTERED IN NORTHERN IRELAND WITH METHICILLIN RESISTANT *STAPHYLOCOCCUS AUREUS* (MRSA) MENTIONED ON THE DEATH CERTIFICATE (1997-2007)



9.30am – Thursday, 29 May 2008

Introduction

1. There has been significant public interest regarding healthcare associated infections 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 Health Protection 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 website¹.
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 1997 to 2007. 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 website².
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

¹ www.cdscni.org.uk

² <http://www.nisra.gov.uk/demography/default.asp4.htm>

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, 1997-2007
 - Table 2: Age-standardised mortality rates for deaths with MRSA mentioned on the death certificate by sex, 2001-2007
 - Table 3: Number of deaths and age-specific mortality rates for deaths with MRSA mentioned on the death certificate by sex and age, 2007
 - Table 4: Number and percentage of deaths with *Staphylococcus aureus* or MRSA mentioned on the death certificate by underlying cause of death (ICD), 2007
 - Table 5: Number of deaths with MRSA mentioned on the death certificate by place of death, 2001-2007
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 (2001-2007), which can be found on the NISRA website³.

³ http://www.nisra.gov.uk/archive/demography/publications/mrsa_papers/CDiff_2007.pdf

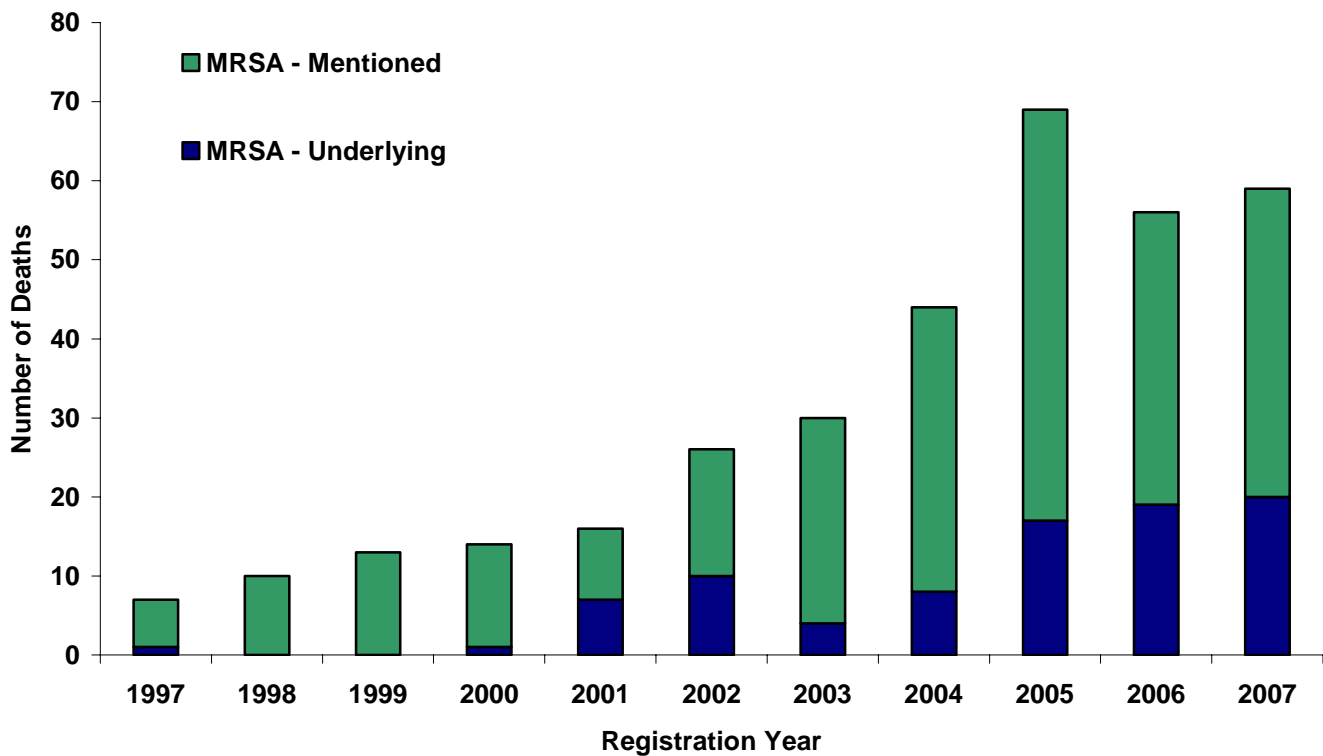
Table 1: Number of deaths with *Staphylococcus aureus* or MRSA mentioned and recorded as the underlying cause on the death certificate by registration year, 1997-2007

Registration Year	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007 ^P	Total (1997-2007) ^P
<u>Mentioned on death certificate</u>												
All <i>Staphylococcus aureus</i>	14	14	22	17	33	35	41	52	76	69	70	443
Of which MRSA	7	10	13	14	16	26	30	44	69	56	59	344
Percentage of <i>Staphylococcus aureus</i> mentions that were MRSA	50%	71%	59%	82%	48%	74%	73%	85%	91%	81%	84%	78%
<u>Underlying cause of death</u>												
All <i>Staphylococcus aureus</i>	1	1	3	1	17	15	7	12	21	27	25	130
Of which MRSA*	1	-	-	1	7	10	4	8	17	19	20	87
<u>Underlying cause as a percentage of mentions on death certificate</u>												
All <i>Staphylococcus aureus</i>	7%	7%	14%	6%	52%	43%	17%	23%	28%	39%	36%	29%
MRSA*	14%	-	-	7%	44%	38%	13%	18%	25%	34%	34%	25%

^P 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, 1997-2007



7. Table 1 shows that in overall terms, between 1997 and 2007, *Staphylococcus aureus* was mentioned on 443 death certificates and the number has broadly increased year on year over the period 1997 to 2005 and stabilised between 2006 and 2007. Of these 443 deaths, 344 included a mention of MRSA.

8. In 2007, 59 deaths were registered where MRSA was mentioned on the death certificate – this is a slight increase on the 2006 figure of 56 but a decrease from the 69 such deaths registered in 2005. In the period 1997-2007, there were 161,850 deaths registered and thus deaths with *Staphylococcus aureus* or MRSA mentioned make up only 0.27% and 0.21% respectively of all deaths in Northern Ireland.

9. Of the 443 deaths which had *Staphylococcus aureus* mentioned, 130 (29%) 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 87 out of the 344 mentions (25 per cent) between 1997 and 2007 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, 2001-2007

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^P	37.3	15.1	23.2

^P 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 highest for males. Rates for deaths from MRSA among both males and females rose by 5 and 4 times respectively between 2001 and 2005. However between 2006 and 2007 the rates for both male and female have stabilised.

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, 2007^P

Age-group	Deaths with MRSA mentioned 2007 ^P					
	Number			Age Specific Mortality Rate*		
	Male	Female	All Persons	Male	Female	All Persons
Under 45	1	-	1	1.8	-	0.9
45-74	9	6	15	34.2	21.5	27.6
75+	26	17	43	622.8	243.0	385.0
All ages	36	23	59	41.7	25.6	33.5

^P 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 2007 of the 59 deaths recorded which included a mention of MRSA nearly 75% 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 2007 show there have been 385 deaths per million people in the 75 and over group compared with almost 28 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), 2007^P

Underlying Cause of Death (ICD)	ICD10 code	Deaths with all <i>Staphylococcus aureus</i> mentioned 2007 ^P		Deaths with MRSA mentioned 2007 ^P	
		Number	Percentage of all causes	Number	Percentage of all causes
Infectious & Parasitic Diseases	A00-B99	15	21%	12	20%
Neoplasms	C00-D48	9	13%	5	8%
Endocrine, Nutritional and Metabolic Diseases	E00-E90	2	3%	2	3%
Diseases of Nervous System and the Sense Organs	G00-H95	5	7%	4	7%
Diseases of the Circulatory System	I00-I99	15	21%	15	25%
Diseases of the Respiratory System	J00-J99	10	14%	10	17%
Diseases of the Digestive System	K00-K93	1	1%	1	2%
Diseases of the skin, musculoskeletal system and Connective tissue	L00-M99	3	4%	2	3%
Diseases of the Genitourinary System	N00-N99	6	9%	6	10%
Certain Conditions Originating in the Perinatal Period	P00-P99	2	3%	-	-
External Causes of Mortality	V01-Y98	2	3%	2	3%
All Causes of Death		70	100%	59	100%

^P 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 Diseases of the Circulatory System or Infectious & Parasitic Diseases. Of those deaths which had *Staphylococcus aureus* or MRSA recorded as the underlying cause of death the majority (56% and 55% respectively) were coded to Infectious & Parasitic Diseases.

Table 5: Number of deaths with MRSA mentioned on the death certificate by place of death, 2001-2007^P

Place of Death	Registration Year							2001 to 2007 ^P		
	2001	2002	2003	2004	2005	2006	2007 ^P	MRSA related deaths	All deaths	MRSA deaths as a percentage of all deaths
Altnagelvin Area Hospital	1	7	1	4	4	1	2	20	3,752	0.5%
Antrim Area Hospital	-	1	2	-	2	2	4	11	4,384	0.3%
Ards Community Hospital	-	-	-	-	1	-	-	1	129	0.8%
Belfast City Hospital	1	1	4	7	7	8	2	30	6,215	0.5%
Braid Valley Hospital	-	-	-	1	-	1	-	2	533	0.4%
Causeway Hospital	-	1	1	-	2	1	2	7	1,812	0.4%
Coleraine Hospital	1	-	-	-	-	-	-	1	138	0.7%
Craigavon Area Hospital	-	4	1	5	8	11	7	36	4,679	0.8%
Daisy Hill Hospital	2	-	1	-	1	-	1	5	2,269	0.2%
Downe Hospital	-	-	1	2	-	-	1	4	1,112	0.4%
Erne Hospital	-	-	-	2	1	-	-	3	1,868	0.2%
Lagan Valley Hospital	-	-	1	-	4	-	1	6	2,042	0.3%
Lurgan Hospital	1	3	1	-	1	1	1	8	400	2.0%
Mater Infirmorum Hospital	-	3	3	1	6	2	7	22	2,783	0.8%
Mid-Ulster Hospital	-	-	1	1	3	-	3	8	1,358	0.6%
Moyle Hospital	-	-	-	-	-	1	2	3	366	0.8%
Musgrave Park Hospital	-	-	-	-	1	-	-	1	291	0.3%
Robinson Memorial Hospital	-	-	-	-	1	-	-	1	487	0.2%
Royal Group of Hospitals	2	1	2	4	6	7	6	28	6,169	0.5%
South Tyrone Hospital	-	-	-	-	-	-	1	1	142	0.7%
Tyrone & Fermanagh Hospital	-	-	-	1	-	-	-	1	156	0.6%
Tyrone County Hospital	-	-	2	2	2	1	-	7	1,311	0.5%
Ulster Hospital	6	4	1	2	7	9	7	36	6,596	0.5%
Whiteabbey Hospital	1	-	1	2	-	2	5	11	1,713	0.6%
All Other Hospitals*	-	-	-	-	-	-	-	-	1,831	-
Nursing Homes	1	1	7	7	8	8	5	37	16,350	0.2%
All Other Places**	-	-	-	3	4	1	2	10	32,434	0.0%
Total	16	26	30	44	69	56	59	300	101,320	0.3%

^P 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 2007, more than half of all deaths registered in Northern Ireland occurred in a hospital (51%); in contrast 88% 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

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 MRSA⁴. 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 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

⁴ "Deaths involving MRSA: England and Wales, 1993-2006". Health Statistics Quarterly 37, p57-62. Available at http://www.statistics.gov.uk/downloads/theme_health/HSQ37.pdf

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 report⁵ 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 reports⁶ 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 publication⁷.
8. 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.
9. 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.
10. 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.

⁵ http://www.hpa.org.uk/webc/HPAwebFile/HPAweb_C/1194947311070

⁶ The latest Registrar General Quarterly Report is available at:
http://www.nisra.gov.uk/archive/demography/publications/qtr_report/qtr4_2007.pdf

⁷ "Deaths involving MRSA: England and Wales, 1993-2006". Health Statistics Quarterly 37, p57-62.
Available at http://www.statistics.gov.uk/downloads/theme_health/HSQ37.pdf