Feidhmeannacht na Seirbhíse Sláinte
Health Service Executive

hpsc

Healthcare-Associated Infection and Antimicrobial Resistance-Related Data from Acute Public Hospitals in Ireland, 2006-2007

Introduction

As part of the HSE strategy for prevention and control of healthcare-associated infection (HCAI), launched in March 2007, the Health Protection Surveillance Centre (HPSC) has been asked to coordinate the publication of data relating to HCAI and antimicrobial resistance (AMR) for acute public hospitals in Ireland. This report provides the initial baseline publication of these data.

Three datasets are included in this report, all relating to data reported by hospitals for 2006 and 2007:

1. Antibiotic consumption (Section 1, page 2)
2. *Staphylococcus aureus* bloodstream isolates (Section 2, page 6)
3. Alcohol-based hand rub consumption (Section 3, page 9)

The first two datasets are based on data reported as part of existing European surveillance networks, namely the European Surveillance of Antimicrobial Consumption (ESAC) network and the European Antimicrobial Resistance Surveillance System (EARSS). The third is an indirect surveillance measure of hand hygiene activity. The primary value of these datasets, as with any surveillance data, is to the individual data providers, allowing individual hospitals to monitor trends over time, assess the impact of infection prevention and control interventions, and identify targets for future interventions and resource requirements.

The datasets included in this report do not allow direct comparison of results between individual hospitals. This is due to a number of reasons:

1. **Differences in hospital activity:** The data do not take account of differences in patient populations, clinical services provided, inter-hospital patient transfers and other differences in activity between hospitals.

2. **Differences in data collection:** The data do not take account of potential differences in data collection methodology or resources between hospitals.

3. **EARSS and ESAC methodology:** The EARSS and ESAC surveillance systems are designed to collect national-level data on AMR and antibiotic consumption, respectively. Thus, when the data are broken down to individual

hospital level the comparisons that can be made at national level may no longer apply.

4. **Denominator data used:** Rates have been calculated using data on acute bed-days used, provided to the HSE Performance Monitoring Unit (PMU) by all acute publicly-funded hospitals on a monthly basis and validated by the reporting hospital before being released. This is based on the average number of available acute in-patient beds during the previous month, and not on the total bed capacity of a hospital. It does not include long-stay or day case (including dialysis) bed use, but does include acute psychiatric bed use (where the latter are included in the bed compliment of an acute hospital). The use of these denominator data may lead to an overestimate of rates for some hospitals, particularly if a hospital has a large number of non-acute beds, day-case beds and dialysis beds, which may contribute to overall hospital activity.

   While the PMU make every effort to ensure the data are validated, there are likely to be small discrepancies in the estimated number of acute bed-days used, compared to locally estimated data, due to fluctuations in the number of available acute beds. In addition, the denominator data are validated at the annual level only (rather than monthly or quarterly). **Data on bed-days used for 2007 have not been fully validated, and rates based on these data should therefore be considered preliminary.**

There are a number of other caveats that need to be taken into account when interpreting the data in this report, and these are dealt with in more detail under each individual section.

The rationale for publishing national results for the above datasets is to assess what surveillance is possible within current resources and identify future targets for standardised surveillance. (Section 4, Conclusions and recommendations, page 11)

1: Antimicrobial Consumption

Background

Over-use of antibiotics is a key factor in the emergence of antibiotic resistant bacteria. Ireland participates in ESAC, which aims to collate antibiotic consumption data across Europe using standardised methods.

Hospital pharmacies in Ireland provided data on antibiotic usage in 2006 and 2007 to HPSC, where the data were analysed using ESAC methodology. Antibiotic usage is expressed in total defined daily doses per 100 bed-days used for both years.

Further information can be found at the HPSC website under “Antimicrobial Consumption Surveillance” in the A-Z Index (www.hpsc.ie)

Definitions

ESAC uses the Anatomical Therapeutic Chemical (ATC) index (www.whocc.no/atcddd) to classify all drugs used in human medicine into a hierarchical system with five levels. All systemic antimicrobial drugs at level one are divided into antibiotics, antifungals, antivirals, etc at the second level. The drugs are divided into their major classes and therapeutic subgroups at levels three and four, while the fifth level (ATC5) is the chemical substance. Each drug at ATC5 in conjunction with the route of administration (oral or intravenous) is given a defined daily dose (DDD), which is the assumed average maintenance dose per day for a drug used for its main indication in adults. The ATC-DDD system is the most widely used standardised system for measuring antibiotic consumption, and allows ESAC to make valid comparisons of national antibiotic consumption data from different participating countries.

The following data are included in this report:

- The principle measure of antibiotic consumption for each hospital is the **inpatient antibiotic consumption rate**, expressed as DDD per 100 bed days used.
- The **proportion of injectable antibiotics** [parenteral or intra-venous (IV)] used over total antibiotic used is an indicator of the level of patient acuity and types of patients treated by a hospital. Hospitals with high levels of patient acuity and hospitals with a large paediatric patient population are likely to have a high proportion of injectable antibiotic use.
- The proportion of **hospital-specific antibiotics** over total antibiotic consumption is a reflection of the level of patient acuity of a hospital, as well as an indicator of how much of a hospital's antibiotic consumption is accounted for by outpatient or community care usage. This comprises drugs seldom used outside of the hospital setting (i.e. glycopeptides, aminoglycosides, carbapenems, monobactams, and third and fourth-generation cephalosporins).
- The **total DDD dispensed** by a hospital pharmacy includes drugs dispensed for inpatient, outpatient and community use.
- The **proportion outpatient use** is a measure of how much of the antibiotic dispensed by a hospital pharmacy is accounted for by non-inpatient use.

Limitations

- The data are based on the quantity of drugs issued from the pharmacy department in a hospital to the wards or outlying centres, and not on individual patient prescriptions.
- The ATC-DDD system is based on the main indication for a given drug in adults. Thus, it tends to under-estimate antibiotic consumption in some patient groups, such as children and patients with chronic kidney disease. Conversely it tends to over-estimate antibiotic consumption in situations where a prolonged duration of antibiotic therapy is required, such as some HIV-related infections and treatment of chronic skin infections.

- The ATC-DDD system does not take account of local variations in antibiotic dosing or duration of therapy.
- Only those hospitals with the “CliniScript” computer system have been able to participate fully. While a few hospitals with different systems have been able to supply data, there is a regional bias for using one or other computer system.

Table 1. Data on antimicrobial consumption by acute public hospital in Ireland, 2006 and 2007

	2006					2007				
Acute Public Hospitals	**Acute Inpatient Antibiotic Consumption Rate (DDD per 100 bed-days used)**	**Proportion of IV antibiotics**	**Proportion of hospital-specific antibiotics**	**Total DDD used**	**Proportion Antibiotics Issued for Outpatient and Non-acute Use**	**Acute Inpatient Antibiotic Consumption Rate (DDD per 100 bed-days used)**	**Proportion of IV antibiotics**	**Proportion of hospital-specific antibiotics**	**Total DDD used**	**Proportion Antibiotics Issued for Outpatient and Non-acute Use**
Adelaide & Meath & National Children's Hospital, Tallaght	**89.7**	49.0%	12.9%	170450.2	5.8%	**86.2**	52.5%	14.7%	167951.1	4.4%
Bantry General Hospital	*	*	*	*	*	*	*	*	*	*
Beaumont Hospital (Incl. St Joseph's Hospital, Raheny)[a]	**78.9**	52.3%	11.4%	194562.6	10.0%	**79.6**	47.0%	9.9%	199468.1	10.0%
Cappagh National Orthopaedic Hospital, Dublin	**50.7**	52.2%	10.1%	12793.1	18.4%	**54.2**	52.7%	11.1%	13286.6	18.0%
Cavan General Hospital	*	*	*	*	*	*	*	*	*	*
Children's University Hospital, Temple Street	**74.4**	59.1%	22.6%	22357.4	1.1%	**77.2**	61.8%	24.3%	26045.0	1.3%
Connolly Hospital, Blanchardstown[b]	**88.8**	43.4%	7.5%	51418.4	2.3%	**80.8**	39.9%	6.8%	69137.8	4.7%
Coombe Women's Hospital	**37.3**	34.8%	4.5%	30930.7	28.9%	**25.6**	53.5%	9.3%	19130.6	21.1%
Cork University Hospital[c]	**62.7**	55.1%	13.6%	139236.1	7.1%	**61.2**	55.9%	15.4%	143852.1	8.6%
Kerry General Hospital, Tralee	**55.9**	43.0%	5.4%	56584.3	16.0%	*	*	*	*	*
Letterkenny General Hospital	**83.8**	37.3%	7.8%	110960.8	22.6%	**88.2**	38.3%	7.1%	112081.4	20.5%
Lourdes Orthopaedic Hospital, Kilcreene, Kilkenny	*	*	*	*	*	*	*	*	*	*
Louth County Hospital, Dundalk	**85.0**	29.2%	4.7%	35941.4	10.8%	**91.8**	30.9%	4.1%	38169.8	14.4%
Mallow General Hospital	*	*	*	*	*	*	*	*	*	*
Mater Misericordiae University Hospital	**85.4**	58.3%	11.9%	170424.7	4.8%	**105.8**	62.2%	13.4%	203451.1	6.0%
Mayo General Hospital, Castlebar	*	*	*	*	*	*	*	*	*	*
Mercy University Hospital, Cork	**88.3**	43.4%	11.2%	66166.2	11.6%	**78.0**	43.7%	11.7%	58626.3	9.0%
Merlin Park Regional Hospital, Galway[d]	*	*	*	*	*	*	*	*	*	*
Midland Regional Hospital Mullingar	**78.5**	40.5%	6.5%	75998.2	41.0%	**81.6**	39.1%	6.1%	80678.1	44.7%
Midland Regional Hospital Portlaoise	*	*	*	*	*	*	*	*	*	*
Midland Regional Hospital Tullamore	**82.4**	34.4%	2.8%	61374.7	12.1%	**89.1**	33.7%	3.4%	63787.2	12.1%
Mid-Western Regional Hospital Ennis	**79.0**	42.8%	4.9%	27166.1	0.6%	**101.3**	40.5%	4.9%	32358.8	1.0%
Mid-Western Regional Hospital Nenagh	**88.6**	31.3%	2.8%	25647.6	5.3%	*	*	*	*	*
Mid-Western Regional Hospital, Dooradoyle, Limerick[e]	**70.1**	51.8%	9.7%	142657.0	9.6%	**78.6**	51.5%	10.3%	152649.7	8.2%
Monaghan General Hospital	*	*	*	*	*	*	*	*	*	*
Naas General Hospital	**43.8**	38.0%	8.6%	59708.1	45.8%	**45.4**	42.3%	9.3%	61814.5	46.4%
National Maternity Hospital, Holles Street[f]	*	*	*	*	*	**17.1**	47.5%	5.6%	5590.1	15.8%
Our Lady of Lourdes Hospital, Drogheda	**74.9**	50.7%	10.2%	75946.1	2.9%	**74.4**	48.8%	9.6%	75656.4	3.1%
Our Lady's Hospital for Sick Children, Crumlin	**77.6**	63.5%	32.0%	45460.5	2.5%	**76.6**	59.9%	28.3%	48272.9	3.4%
Our Lady's Hospital, Cashel	*	*	*	*	*	*	*	*	*	*
Our Lady's Hospital, Navan	**91.1**	41.1%	4.0%	39160.8	4.0%	**89.8**	38.6%	3.7%	39523.6	4.4%
Portiuncula Hospital, Ballinasloe	**70.6**	36.7%	5.2%	42141.9	12.8%	**71.2**	38.9%	5.5%	40963.9	13.2%
Roscommon County Hospital	**100.0**	37.1%	4.5%	31568.9	0.2%	**100.6**	38.2%	4.2%	32208.4	0.1%
Rotunda Hospital	*	*	*	*	*	*	*	*	*	*
Royal Victoria Eye & Ear Hospital, Dublin	**66.9**	37.5%	8.5%	7764.4	10.6%	**80.3**	30.3%	5.0%	7914.4	10.5%
Sligo General Hospital	**75.8**	40.6%	7.0%	103576.1	35.3%	**76.4**	42.0%	6.6%	102123.2	34.0%
South Infirmary - Victoria University Hospital, Cork	**65.7**	41.1%	7.3%	38702.4	7.6%	**79.6**	46.8%	8.0%	46688.0	5.3%
South Tipperary General Hospital, Clonmel	*	*	*	*	*	*	*	*	*	*
St Columcille's Hospital, Loughlinstown	**90.9**	35.5%	5.2%	46587.3	13.9%	**103.1**	35.2%	6.1%	53686.0	18.0%
St Finbarr's Hospital, Cork	*	*	*	*	*	*	*	*	*	*
St James's Hospital	**71.4**	44.5%	8.3%	299721.6	27.9%	**76.8**	48.9%	11.0%	307108.8	24.8%
St John's Hospital, Limerick	**85.0**	36.4%	7.4%	24054.0	2.4%	**93.6**	37.7%	6.5%	24775.5	2.6%
St Luke's General Hospital, Kilkenny	**106.6**	26.9%	3.4%	97098.1	4.6%	**92.3**	31.6%	4.6%	86068.3	5.9%
St Luke's Hospital, Dublin	**28.3**	28.1%	6.6%	14257.0	13.6%	**36.1**	23.8%	5.0%	16952.2	4.6%
St Mary's Orthopaedic Hospital, Gurranebraher, Cork	*	*	*	*	*	*	*	*	*	*
St Michael's Hospital, Dun Laoghaire	**87.0**	34.7%	5.3%	27451.6	7.1%	**95.9**	37.4%	6.7%	26417.1	6.3%
St Vincent's University Hospital	**109.8**	61.4%	21.2%	204011.8	6.7%	**120.0**	61.2%	20.6%	227077.6	6.5%
University College Hospital Galway[d]	*	*	*	*	*	*	*	*	*	*
Waterford Regional Hospital	**77.7**	49.3%	9.3%	132194.6	13.8%	**84.2**	48.8%	8.8%	141582.8	15.0%
Wexford General Hospital	*	*	*	*	*	**84.6**	42.7%	5.4%	94683.7	33.5%
Median	**78.7**	**41.1%**	**7.5%**		**9.8%**	**80.6**	**42.5%**	**6.9%**		**8.8%**

* Data not available; [a] Figures for outpatients and non-acute care were estimations; [b] The 2006 figures represent quarters 2 to 4 only; [c] Includes Erinville Hospital, Cork for 2006 and Cork University Maternity Hospital; [d] Data for Merlin Park Regional Hospital, Galway not presented here as these will be presented with University College Hospital Galway in future reports; [e] Includes Mid-Western Regional Orthopaedic Hospital, Croom and Mid-Western Regional Maternity Hospital, Limerick; [f] Data collection started from quarter 3 of 2007

2: *Staphylococcus aureus* bloodstream isolates

Background

Bloodstream infection (bacteraemia) due to *S. aureus* in general, and meticillin-resistant *S. aureus* (MRSA) in particular, has long been recognised as a major healthcare problem in Ireland. Since 1999, Irish hospitals have been contributing data on a voluntary basis on such infections to EARSS. As of January 2008, all 44 microbiology laboratories in Ireland were participating in EARSS, covering 65 acute hospitals (both public and private).

Definitions

Under the case definition for EARSS, data are collected on the first bloodstream isolate of *S. aureus* per patient per quarter. The following data are included in this report:

- The **number of *S. aureus* isolates**, including the **number of MRSA isolates**.
- The **percentage MRSA** (i.e. the proportion of *S. aureus* isolates reported that were meticillin-resistant)
- The ***S. aureus* and MRSA rates per 1,000 bed-days used**
- An indication of the frequency with which MRSA was isolated from blood cultures is provided by the **MRSA rate per 100 blood cultures**

Details of the reported bed-day usage and number of blood cultures processed are included in Appendix 1.

Limitations

- The EARSS case definition does not distinguish between clinically significant and non-significant bloodstream isolates. Thus, some of the *S. aureus* (including MRSA) isolates reported may be contaminants (e.g. from bacteria on the patient's skin), rather than true bloodstream infections.
- The EARSS case definition only includes bacteria isolated from blood cultures, and does not include other types of infection caused by *S. aureus*, such as wound infections, pneumonia etc.
- The EARSS case definition only includes the first isolate of *S. aureus* from each patient in each three month period or quarter. This is a standardised method for surveillance of antimicrobial resistance and allows comparison of data between participating countries. However, this does mean that not all episodes of *S. aureus* bloodstream infection are reported, e.g. a patient may have more than one episode of infection in a three month period, but only the first episode is reported to EARSS. If MRSA is isolated subsequent to meticillin-susceptible *S. aureus*, or MSSA, in the same quarter then the MRSA isolate will not be included in the data, and *vice versa* if MSSA is isolated subsequent to MRSA. In addition, some duplicates are also included as

S. aureus (either MRSA or MSSA) can be isolated from the same patient over two or more quarters during the year.

- The fact that a patient is diagnosed with a bloodstream infection at a given hospital does not indicate that that infection was acquired at that hospital. Many bloodstream infections are acquired in the community, but only diagnosed on admission to hospital. Likewise a patient may have acquired a bloodstream infection in one hospital, but the infection may only be diagnosed on transfer to another hospital.
- The frequency with which blood cultures are taken depends on the numbers and types of patients being treated at that hospital and access to laboratory services. Hospitals that have a high frequency of taking blood cultures are more likely to diagnose bloodstream infections, but are also more likely to detect contaminated blood cultures.
- For any dataset, including the EARSS data, it is difficult to know how consistently/uniformly the case definitions have been applied in the absence of a mechanism for auditing the data collection process.

Table 2. Data on *S. aureus* bloodstream isolates by acute public hospital in Ireland, 2006 and 2007 [including total numbers of *S. aureus* and MRSA isolates, rates of *S. aureus* and MRSA bacteraemia per 1,000 bed-days used and MRSA rate per 100 blood culture (B/Cs)]

	2006						2007					
Acute Public Hospitals	Total number of isolates of *S. aureus*	MRSA	% MRSA	Rate[a] per 1,000 bed days used *S. aureus*	MRSA	MRSA rate[a] per 100 B/Cs	Total number of isolates of *S. aureus*	MRSA	% MRSA	Rate[a] per 1,000 bed days used *S. aureus*	MRSA	MRSA rate[a] per 100 B/Cs
Adelaide & Meath & National Children's Hospital, Tallaght	69	19	27.5%	0.39	0.11	0.16	61	18	29.5%	0.33	0.10	0.15
Bantry General Hospital	10	8	80.0%	0.38	0.30	4.65	11	8	72.7%	0.42	0.31	1.73
Beaumont Hospital (including St Joseph's Hospital, Raheny)	141	70	49.6%	0.64	0.32	0.62	127	50	39.4%	0.56	0.22	0.45
Cappagh National Orthopaedic Hospital, Dublin	0	0	0.0%	0.00	0.00	0.00	0	0	0.0%	0.00	0.00	0.00
Cavan General Hospital	15	5	33.3%	0.24	0.08	0.22	24	9	37.5%	0.36	0.14	0.33
Children's University Hospital, Temple Street	8	0	0.0%	0.27	0.00	0.00	5	0	0.0%	0.15	0.00	0.00
Connolly Hospital, Blanchardstown	36	15	41.7%	0.48	0.20	0.54	28	14	50.0%	0.34	0.17	0.48
Coombe Women's Hospital	4	0	0.0%	0.07	0.00	0.00	11	2	18.2%	0.19	0.03	0.07
Cork University Hospital[b]	125	43	34.4%	0.72	0.25	0.40	128	39	30.5%	0.60	0.18	0.37
Erinville Hospital, Cork[b]	1	1	100.0%	0.03	0.03	0.19	N//A	N/A	N/A	N/A	N/A	N/A
Kerry General Hospital, Tralee	38	20	52.6%	0.45	0.24	0.57	38	16	42.1%	0.44	0.19	0.45
Letterkenny General Hospital	38	15	39.5%	0.37	0.15	0.22	34	13	38.2%	0.34	0.13	0.19
Lourdes Orthopaedic Hospital, Kilcreene, Kilkenny	0	0	0.0%	0.00	0.00	0.00	0	0	0.0%	0.00	0.00	0.00
Louth County Hospital, Dundalk	10	3	30.0%	0.27	0.08	0.30	9	1	11.1%	0.25	0.03	0.10
Mallow General Hospital	12	4	33.3%	0.52	0.17	1.14	8	4	50.0%	0.28	0.14	1.22
Mater Misericordiae University Hospital	78	35	44.9%	0.41	0.18	0.46	97	40	41.2%	0.54	0.22	0.45
Mayo General Hospital, Castlebar	20	12	60.0%	0.23	0.14	0.29	39	20	51.3%	0.44	0.23	0.47
Mercy University Hospital, Cork	35	17	48.6%	0.53	0.26	0.41	27	15	55.6%	0.39	0.22	0.31
Merlin Park Regional Hospital, Galway	19	10	52.6%	0.31	0.16	0.80	14	7	50.0%	0.29	0.14	0.54
Midland Regional Hospital Mullingar	27	11	40.7%	0.47	0.19	0.42	15	5	33.3%	0.27	0.09	0.20
Midland Regional Hospital Portlaoise	14	6	42.9%	0.33	0.14	0.23	9	3	33.3%	0.21	0.07	0.14
Midland Regional Hospital Tullamore	22	14	63.6%	0.34	0.21	0.70	28	13	46.4%	0.45	0.21	0.69
Mid-Western Regional Hospital Ennis	11	5	45.5%	0.32	0.15	0.63	10	3	30.0%	0.32	0.09	0.26
Mid-Western Regional Hospital Nenagh	6	2	33.3%	0.22	0.07	0.38	13	10	76.9%	0.49	0.37	1.67
Mid-Western Regional Hospital, Dooradoyle, Limerick	79	28	35.4%	0.56	0.20	0.28	52	16	30.8%	0.38	0.12	0.18
Mid-Western Regional Maternity Hospital, Limerick	2	0	0.0%	0.06	0.00	0.00	2	0	0.0%	0.06	0.00	0.00
Mid-Western Regional Orthopaedic Hospital, Croom	0	0	0.0%	0.00	0.00	0.00	0	0	0.0%	0.00	0.00	0.00
Monaghan General Hospital	3	2	66.7%	0.14	0.09	0.45	10	3	30.0%	0.48	0.14	0.66
Naas General Hospital	15	6	40.0%	0.20	0.08	0.34	21	11	52.4%	0.29	0.15	0.56
National Maternity Hospital, Holles Street	5	2	40.0%	0.10	0.04	0.08	4	0	0.0%	0.07	0.00	0.00
Our Lady of Lourdes Hospital, Drogheda	*	*	N/A	N/A	N/A	N/A	*	*	N/A	N/A	N/A	N/A
Our Lady's Hospital for Sick Children, Crumlin	23	2	8.7%	0.40	0.03	0.02	33	4	12.1%	0.54	0.07	0.05
Our Lady's Hospital, Cashel[c]	2	1	50.0%	0.16	0.08	0.50	N/A	N/A	N/A	N/A	N/A	N/A
Our Lady's Hospital, Navan	10	0	0.0%	0.24	0.00	0.00	9	6	66.7%	0.21	0.14	0.74
Portiuncula Hospital, Ballinasloe	14	7	50.0%	0.27	0.13	0.34	9	3	33.3%	0.18	0.06	0.15
Roscommon County Hospital	5	4	80.0%	0.16	0.13	0.41	8	3	37.5%	0.25	0.09	0.31
Rotunda Hospital	9	0	0.0%	0.18	0.00	0.00	12	0	0.0%	0.22	0.00	0.00
Royal Victoria Eye & Ear Hospital, Dublin	0	0	0.0%	0.00	0.00	0.00	0	0	0.0%	0.00	0.00	0.00
Sligo General Hospital	38	16	42.1%	0.43	0.18	0.33	28	13	46.4%	0.32	0.15	0.25
South Infirmary - Victoria University Hospital, Cork	14	6	42.9%	0.26	0.11	0.46	6	4	66.7%	0.11	0.07	0.25
South Tipperary General Hospital, Clonmel	14	4	28.6%	0.24	0.07	0.17	8	1	12.5%	0.11	0.01	0.04
St Columcille's Hospital, Loughlinstown	21	10	47.6%	0.48	0.23	0.74	22	8	36.4%	0.52	0.19	0.55
St Finbarr's Hospital, Cork[b]	3	2	66.7%	0.10	0.07	0.24	5	3	60.0%	0.19	0.11	1.85
St James's Hospital	114	65	57.0%	0.38	0.21	0.41	125	61	48.8%	0.42	0.20	0.39
St John's Hospital, Limerick	3	1	33.3%	0.11	0.04	0.15	4	2	50.0%	0.16	0.08	0.30
St Luke's General Hospital, Kilkenny	23	6	26.1%	0.26	0.07	0.25	20	10	50.0%	0.23	0.11	0.36
St Luke's Hospital, Dublin	0	0	0.0%	0.00	0.00	0.00	3	2	66.0%	0.07	0.04	0.44
St Mary's Orthopaedic Hospital, Gurranebraher, Cork	1	1	100.0%	0.05	0.05	2.86	0	0	0.0%	0.00	0.00	0.00
St Michael's Hospital, Dun Laoghaire	5	4	80.0%	0.17	0.14	0.59	4	2	50.0%	0.15	0.08	0.25
St Vincent's University Hospital	60	25	41.7%	0.35	0.14	0.30	69	28	40.6%	0.39	0.16	0.30
University College Hospital Galway	79	36	45.6%	0.49	0.22	0.39	78	30	38.5%	0.43	0.17	0.30
Waterford Regional Hospital	51	24	47.1%	0.35	0.16	0.32	54	26	48.1%	0.38	0.18	0.34
Wexford General Hospital	16	5	31.3%	0.23	0.07	0.18	13	0	0.0%	0.17	0.00	0.00
National Total	**1,348**	**572**	**42.4%**	**0.37**	**0.15**	**0.34**	**1,335**	**526**	**39.4%**	**0.36**	**0.14**	**0.30**

* No data received; N/A, Not applicable; [a] Rates calculated using the appropriate denominator data [Appendix 1: bed-days used or blood culture sets processed (B/Cs)]; [b] In 2007, maternity services at Erinville Hospital and St Finbarr's Hospital, Cork transferred to Cork University Maternity Hospital, which together with Cork University Hospital (CUH) compose CUH group. All data for CUH group in 2007 are presented under CUH; [c] In 2007, acute services at Our Lady's Hospital, Cashel transferred to South Tipperary General Hospital, Clonmel

3: Alcohol-based hand rub consumption

Background

Alcohol-based hand rubs have been shown to be an effective and rapid method of hand hygiene in healthcare settings, and are recommended as the primary means of hand hygiene in Irish national guidelines. Measurement of consumption of alcohol-based hand rub, expressed as volume used per 1,000 bed-days, has been shown to correlate with overall hand hygiene activity in hospitals. It is recommended as a process measure of hand hygiene activity by the World Health Organisation (WHO) and the US Centers for Disease Control (CDC).

Definitions

Hospitals were asked to report the total volume of alcohol-based hand rub delivered or dispensed to wards, clinics and other hospital areas per quarter, excluding that used for pre-operative surgical "scrub". The rate of usage per hospital was calculated as the total volume of hand rub consumed (in litres) per 1,000 bed-days used.

Limitations

- The data only refer to the use of alcohol-based hand rubs, and does not take account of other hand hygiene agents (e.g. medicated liquid soap) that may also be in used in hospitals.
- The data do not account for differences in the formulations of alcohol-based hand rubs used, such as concentration of alcohol or presence of other antimicrobial substances.
- The data do not give an indication of the frequency with which hand decontamination is carried out at a given hospital.
- The data are based on the volume of hand rub dispensed and does not take into account wastage of hand rub. For example a ward may choose to replace hand rub dispenser when they are not entirely empty, thus artificially increasing their apparent consumption of hand rub.
- The data do not distinguish between visitor, patient and healthcare worker usage of hand rub.
- Most hospitals report that volume of hand rub dispensed via Pharmacy departments. However, some hospitals report data from Supplies departments, which may include data on hand rub that has been purchased by the hospital, but not dispensed. This will tend to give a higher reported volume of hand rub consumption, compared to hospitals reporting Pharmacy dispensing data.
- The number of bed-days used only relates to acute inpatient beds, whereas alcohol-based hand rubs are also used in non-inpatient and non-acute areas of a hospital. Thus, hospitals with high use in the latter areas may, therefore, appear to have a disproportionately higher rate of use.

Table 3. Data on alcohol hand rub consumption by acute public hospital in Ireland, 2006 and 2007. The rate of hand gel consumption per hospital was calculated as the total volume of hand rub consumed (in litres) per 1,000 bed-days used

	2006		2007
Acute Public Hospitals	**Alcohol hand gel consumption rate (Litres per 1,000 bed-days used)**		**Alcohol hand gel consumption rate (Litres per 1,000 bed-days used)**
Adelaide & Meath & National Children's Hospital, Tallaght	15.4		15.2
Bantry General Hospital	8.2		8.4
Beaumont Hospital	23.6		27.3
Cappagh National Orthopaedic Hospital, Dublin	15.2		14.9
Cavan General Hospital	8.9		19.4
Children's University Hospital, Temple Street	12.0		30.3
Connolly Hospital, Blanchardstown	12.9		18.0
Coombe Women's Hospital	4.8		10.4
Cork University Hospital	10.0		13.9
Erinville Hospital, Cork[a]	2.7		*
Kerry General Hospital, Tralee	4.6		17.9
Letterkenny General Hospital	5.4		11.3
Lourdes Orthopaedic Hospital, Kilcreene, Kilkenny	4.4		9.1
Louth County Hospital, Dundalk	11.1		13.7
Mallow General Hospital	7.2		6.4
Mater Misericordiae University Hospital	16.7		24.2
Mayo General Hospital, Castlebar	9.4		10.8
Mercy University Hospital, Cork	6.3		14.7
Merlin Park Regional Hospital, Galway	11.1		16.5
Midland Regional Hospital Mullingar	16.9		22.0
Midland Regional Hospital Portlaoise	19.8		19.5
Midland Regional Hospital Tullamore	23.1		47.1
Mid-Western Regional Hospital Ennis	14.0		27.2
Mid-Western Regional Hospital Nenagh	14.6		10.6
Mid-Western Regional Hospital, Dooradoyle, Limerick	24.2		24.4
Mid-Western Regional Maternity Hospital, Limerick	14.4		15.0
Mid-Western Regional Orthopaedic Hospital, Croom	21.7		14.7
Monaghan General Hospital	11.1		9.4
Naas General Hospital	7.6		15.1
National Maternity Hospital, Holles Street	4.1		8.6
Our Lady of Lourdes Hospital, Drogheda	11.9		22.6
Our Lady's Hospital for Sick Children, Crumlin	29.0		33.7
Our Lady's Hospital, Cashel[b]	*		*
Our Lady's Hospital, Navan	6.9		10.1
Portiuncula Hospital, Ballinasloe	6.7		7.0
Roscommon County Hospital	6.1		13.9
Rotunda Hospital	11.3		14.3
Royal Victoria Eye & Ear Hospital, Dublin	7.3		35.3
Sligo General Hospital	11.0		13.4
South Infirmary - Victoria University Hospital, Cork	9.8		15.2
South Tipperary General Hospital, Clonmel	12.3		17.7
St Columcille's Hospital, Loughlinstown	9.2		22.6
St Finbarr's Hospital, Cork[a]	11.2		*
St James's Hospital	22.7		21.0
St John's Hospital, Limerick	6.7		12.8
St Luke's General Hospital, Kilkenny	6.2		8.5
St Luke's Hospital, Dublin	2.6		5.2
St Mary's Orthopaedic Hospital, Gurranebraher, Cork	0.5		8.7
St Michael's Hospital, Dun Laoghaire	8.3		11.3
St Vincent's University Hospital	12.2		20.0
University College Hospital Galway	11.8		12.9
Waterford Regional Hospital	9.2		18.5
Wexford General Hospital	8.2		16.5
National Median	**10.5**		**15.0**

* No data received

[a] In 2007, Erinville Hospital, Cork and the maternity service at St Finbarr's Hospital, Cork merged with the Cork University Hospital group encompassing Cork University Hospital (CUH) and Cork University Maternity Hospital. All data for the CUH group in 2007 are presented under CUH

[b] Our Lady's Hospital, Cashel closed as an acute hospital on January 12th 2007, hence no data were received for this hospital

4: Conclusions and recommendations

Antibiotic consumption:

- Hospital antimicrobial consumption is in the mid-range, compared to other European countries. Nevertheless, it is considerably higher than that reported by countries with successful national programmes to promote prudent antibiotic prescribing, such as the Netherlands, Denmark and Sweden.
- The overall level of antimicrobial consumption in hospitals was higher in 2007, compared to 2006, though this difference was not statistically significant.
- Most of the variation in levels of antibiotic consumption between hospitals is probably explained by differences in patient populations and differences in methodologies for collecting and reporting the data.
- Future data on antibiotic consumption will need to ensure a common methodology is used, and that data can be adjusted according to hospital case mix. In addition, many hospitals were unable to report any data, due to the lack of appropriate pharmacy information technology.

***S. aureus* bloodstream infection:**

- The overall proportion of MRSA, along with the rate per 1000 bed-days used and the rate per 100 blood cultures was lower in 2007, compared to 2006. These differences, however, were not statistically significant.
- Most of the variation in reported numbers of *S. aureus* bloodstream infections between hospitals can be explained by differences in hospital size, activity and patient populations. At present there is no way to adjust the data to allow for these differences and hence direct comparisons between hospitals are not possible. In addition, the small number of bloodstream isolates reported by small or single specialty hospitals means that rates or proportions of infections calculated for such hospitals may not be meaningful.
- Experience from other countries, most notably Australia, has shown that measurement of process indicators (e.g. rate of new colonisation with MRSA) may be more appropriate for surveillance in smaller hospitals, while measurement of outcome indicators (e.g. MRSA bloodstream infection) may be more appropriate for larger hospitals. Future MRSA surveillance should take account of differences in requirements, as well as differences in activity and case mix, between different hospitals.

Alcohol hand rub consumption:

- There was a statistically significant (43%, excluding hospitals that only provided 2006 data) increase in the median rate of alcohol hand rub consumption, between 2006 and 2007. The overall level of alcohol hand rub consumption is similar to levels reported from successful hand hygiene campaigns internationally, such as that reported by Pittet *et al.* from Geneva.

- The wide variation in levels of hand rub consumption between hospitals may be largely explained by differences in methodologies for collecting and reporting the data, and differences in types and range of hand hygiene agents used.
- There is a need for better standardisation of data collection and reporting. However, even with better standardisation, the volume of alcohol-based hand rub consumed remains an inexact process measure of hand hygiene. Additional outcome measures are required, including detailed audits of hand hygiene compliance.

The data included in this report are associated with multiple caveats. Nevertheless, it demonstrates the willingness of hospitals in Ireland to provide data, and serves as a first step towards the development of effective standardised surveillance systems for HCAI and AMR.

April 2008

Appendix 1. Denominator data for Acute Public Hospitals during 2006 and 2007: numbers of bed-days used and in-patient admissions (courtesy of the Performance Monitoring Unit at the National Hospitals Office, HSE); numbers of blood cultures processed (provided by laboratories); and numbers of blood cultures processed per 1,000 in-patient admissions

	2006				2007			
Acute Public Hospitals	**Number of Bed-Days Used**	**Number of In-patient Admissions**	**Number of blood cultures (B/Cs) processed**	**B/Cs per 1,000 admissions**	**Number of Bed-Days Used**	**Number of In-patient Admissions**	**Number of blood cultures (B/Cs) processed**	**B/Cs per 1,000 admissions**
Adelaide & Meath & National Children's Hospital, Tallaght	179,056	23,160	11,972	517	186,356	24,418	11,974	490
Bantry General Hospital	26,299	2,955	172	58	26,042	2,892	462	160
Beaumont Hospital (including St Joseph's Hospital, Raheny)	221,858	20,927	11,266	538	225,613	21,748	11,059	534
Cappagh National Orthopaedic Hospital, Dublin	20,576	3,110	63	20	20,075	2,786	70	25
Cavan General Hospital	63,515	12,954	2,247	173	65,896	13,144	2,700	205
Children's University Hospital, Temple Street	29,711	7,429	1,634	220	33,284	8,061	2,082	258
Connolly Hospital, Blanchardstown	75,403	9,190	2,771	302	81,519	10,081	2,890	287
Coombe Women's Hospital	59,052	18,435	3,174	172	58,861	17,448	3,070	176
Cork University Hospital[a]	172,642	28,050	10,824	386	214,758	44,833	10,442	233
Erinville Hospital, Cork[a]	33,693	10,267	540	53	N/A	N/A	N/A	N/A
Kerry General Hospital, Tralee	85,075	14,775	3,500	237	85,546	15,004	3,567	238
Letterkenny General Hospital	102,492	19,951	6,853	343	101,089	20,995	6,786	323
Lourdes Orthopaedic Hospital, Kilcreene, Kilkenny	9,697	1,079	36	33	8,507	1,016	29	29
Louth County Hospital, Dundalk	37,705	5,527	1,004	182	35,572	5,403	986	182
Mallow General Hospital	23,209	4,576	352	77	28,851	4,795	327	68
Mater Misericordiae University Hospital	189,926	16,167	7,595	470	180,865	16,406	8,889	542
Mayo General Hospital, Castlebar	87,221	16,732	4,163	249	88,385	17,354	4,295	247
Mercy University Hospital, Cork	66,216	9,636	4,188	435	68,383	9,893	4,774	483
Merlin Park Regional Hospital, Galway	60,734	7,707	1,256	163	48,290	6,003	1,294	216
Midland Regional Hospital Mullingar	57,174	17,107	2,636	154	54,722	17,146	2,545	148
Midland Regional Hospital Portlaoise	42,190	10,714	2,580	241	42,335	10,812	2,139	198
Midland Regional Hospital Tullamore	65,460	9,767	1,987	203	62,865	10,495	1,883	179
Mid-Western Regional Hospital Ennis	34,203	5,339	788	148	31,630	5,001	1,161	232
Mid-Western Regional Hospital Nenagh	27,425	4,641	532	115	26,756	4,698	598	127
Mid-Western Regional Hospital, Dooradoyle, Limerick	141,599	23,786	10,087	424	136,705	22,995	9,120	397
Mid-Western Regional Maternity Hospital, Limerick	31,428	7,963	1,056	133	33,190	8,183	1,178	144
Mid-Western Regional Orthopaedic Hospital, Croom	11,076	1,672	25	15	11,180	1,711	34	20
Monaghan General Hospital	21,070	2,813	441	157	20,909	2,866	452	158
Naas General Hospital	73,983	7,627	1,784	234	72,916	7,921	1,974	249
National Maternity Hospital, Holles Street	50,146	16,051	2,532	158	55,115	16,874	1,809	107
Our Lady of Lourdes Hospital, Drogheda	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Our Lady's Hospital for Sick Children, Crumlin	57,148	10,733	8,238	768	60,895	11,009	8,285	753
Our Lady's Hospital, Cashel[b]	12,647	3,369	202	60	N/A	N/A	N/A	N/A
Our Lady's Hospital, Navan	41,267	6,901	879	127	42,099	6,875	807	117
Portiuncula Hospital, Ballinasloe	52,058	10,988	2,042	186	49,979	11,280	2,068	183
Roscommon County Hospital	31,495	5,098	984	193	31,961	5,702	965	169
Rotunda Hospital	49,665	13,044	1,410	108	54,379	14,933	1,519	102
Royal Victoria Eye & Ear Hospital, Dublin	10,368	3,277	8	2	8,824	3,285	5	2
Sligo General Hospital	88,349	17,448	4,880	280	88,143	17,448	5,201	298
South Infirmary - Victoria University Hospital, Cork	54,440	9,054	1,299	143	55,554	8,749	1,577	180
South Tipperary General Hospital, Clonmel	57,683	9,186	2,375	259	74,538	11,900	2,676	225
St Columcille's Hospital, Loughlinstown	44,124	4,434	1,360	307	42,693	4,732	1,445	305
St Finbarr's Hospital, Cork[a]	29,374	1,484	831	560	26,552	879	162	184
St James's Hospital	302,942	24,440	15,727	643	300,653	23,927	15,589	652
St John's Hospital, Limerick	27,634	3,873	655	169	25,782	3,901	677	174
St Luke's General Hospital, Kilkenny	86,950	16,601	2,399	145	87,742	15,809	2,762	175
St Luke's Hospital, Dublin	43,612	1,804	539	299	44,758	1,819	453	249
St Mary's Orthopaedic Hospital, Gurranebraher, Cork	21,196	2,540	35	14	20,496	2,511	49	20
St Michael's Hospital, Dun Laoghaire	29,317	4,807	675	140	25,826	6,752	787	117
St Vincent's University Hospital	173,353	16,291	8,223	505	176,854	15,937	9,252	581
University College Hospital Galway	160,480	28,416	9,349	329	181,711	33,017	9,964	302
Waterford Regional Hospital	146,581	24,030	7,619	317	142,950	24,025	7,632	318
Wexford General Hospital	71,037	15,566	2,747	176	74,444	16,793	2,844	169
National Total	**3,691,554**	**573,491**	**170,534**	**297**	**3,723,048**	**592,265**	**173,308**	**293**

N/A, Not applicable; [a] In 2007, maternity services at Erinville Hospital and St Finbarr's Hospital, Cork transferred to Cork University Maternity Hospital, which together with Cork University Hospital (CUH) compose CUH group. All data for CUH group in 2007 are presented under CUH; [b] In 2007, acute services at Our Lady's Hospital, Cashel transferred to South Tipperary General Hospital, Clonmel