Feidhmeannacht na Seirbhíse Sláinte
Health Service Executive

hpsc

CONSUMPTION OF ANTIBIOTICS IN PUBLIC ACUTE HOSPITALS IN IRELAND 2008 DATA

MAIN POINTS

- **Inpatient antibiotics consumption figures for 2008 from 42 public acute hospitals are shown**
- **There was a 5% drop in the median usage rate from 80.1 Defined Daily Doses per 100 Bed-Days Used (DDD/100BDU) for the updated 2007 figure to 76.4 DDD/100BDU in 2008**
- **There was a small drop in the proportion of a specific set of antibiotics in intravenous form (those that could be easily switched to oral form) of 1%**
- **The decreases were seen in all categories of hospitals**
- **Among different groups of antibiotics, there was a 4% increase in usage of penicillins with beta-lactamase inhibitor and a 23% decrease in fluoroquinolone usage. Both of these groups are commonly used broad-spectrum antibiotics targeted for reduction strategies in hospitals**

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) was asked to coordinate the publication of data relating to antimicrobial consumption for acute public hospitals in Ireland. The first report was produced in 2007 providing the initial baseline publication of these data.

The primary value of this dataset is to the individual data providers, allowing individual hospitals to monitor trends over time, assess the impact of antibiotic stewardship programmes, and identify targets for future interventions and resource requirements. The data included in this report do not allow direct comparison of results between individual hospitals.

CONTENTS

SECTION A. METHODS AND LIMITATIONS

Using a protocol developed in conjunction with clinical pharmacists, yearly or quarterly antimicrobial data for 2008 were extracted from appropriate hospital computer systems that record data on dispensed drugs. At the HPSC, the data from individual hospitals were converted to standardised units of doses. Only consumption relating inpatients were taken further for rate calculation.

In this report the Anatomical Therapeutic Chemical (ATC) index (www.whocc.no/atcddd) is used 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 main limitation for the ATC-DDD system is that the quantities refer to adult patients. There are many hospitals in the sample that provide maternity services and/or paediatric care, therefore there is an inherent bias in the system. A further limitation with the ATC-DDD system is that the measure is for the main indication only but a single drug can be used to treat several different conditions. Also note that the case-mix within the same hospital may change over time.

The denominator data were obtained from the Performance Monitoring Unit (PMU) of the HSE National Hospitals Office. Rates are calculated by taking the total (inpatient) DDD per hospital and dividing by the total number of bed-days used (BDU) for the hospital. This is multiplied by 100 to obtain the rate in DDD per 100 BDU.

The HPSC provided each hospital with a detailed report, as advised by the Irish Antimicrobial Pharmacists Group.

Measures Presented in Table 1

1. Total acute inpatient antibiotic consumption in Defined Daily Doses per 100 Bed-Days Used (DDD/100BDU) for each hospital is presented for 2007 and 2008. Acute inpatient means that data on antibiotics dispensed to outpatients, day cases and external facilities are excluded

2. The following antimicrobial agents have good oral bioavailability and therefore, for many patients, it may be possible to switch from intravenous (IV) to oral use or initiate treatment orally: *ciprofloxacin, levofloxacin, moxifloxacin, linezolid, fusidic acid, clindamycin, metronidazole, erythromycin, clarithromycin, rifampicin and fluconazole*. In Table 1, the proportion of the volume used in DDD of these specific agents in IV form over total antibiotic use in DDD expressed as percentage for each hospital is presented for 2007 and 2008

Note that figures for 2007 have been updated and may vary from previously published data

Acute hospital pharmacies that lack any information technology system are unable to provide data

SECTION B. TOTAL CONSUMPTION BY INDIVIDUAL HOSPITAL (MAIN TABLE)

Table 1. Antibiotic consumption data for 42 public acute hospitals for 2008 presented with updated figures for 2007. See methods for details of the measures.

	2007		2008	
Acute Public Hospital	**Acute Inpatient Antibiotic Consumption Rate (DDD per 100 bed-days used)**	**Proportion of Specific IV antibiotics**	**Acute Inpatient Antibiotic Consumption Rate (DDD per 100 bed-days used)**	**Proportion of Specific IV antibiotics**
Adelaide & Meath & National Children's Hospital, Tallaght	**86.1**	12.2%	**86.9**	12.6%
Bantry General Hospital	*	*	*	*
Beaumont Hospital	**86.2**	11.9%	**72.8**	12.2%
Cappagh National Orthopaedic Hospital, Dublin	**54.2**	3.7%	**66.5**	4.9%
Cavan General Hospital	*	*	**85.8**	7.4%
Children's University Hospital, Temple Street	**76.4**	7.8%	**78.6**	7.8%
Connolly Hospital, Blanchardstown	**80.7**	9.9%	**91.7**	10.1%
Coombe Women's Hospital	**25.6**	8.3%	**22.2**	7.5%
Cork University Hospital	**60.8**	9.8%	**58.8**	8.8%
Galway University Hospitals	*	*	**102.9**	8.5%
Kerry General Hospital, Tralee	*	*	**60.5**	12.0%
Letterkenny General Hospital	**77.5**	10.8%	**75.7**	10.4%
Lourdes Orthopaedic Hospital, Kilcreene, Kilkenny	*	*	*	*
Louth County Hospital, Dundalk	**91.2**	9.6%	**77.8**	9.0%
Mallow General Hospital	*	*	*	*
Mater Misericordiae University Hospital	**105.6**	8.6%	**96.6**	11.4%
Mayo General Hospital, Castlebar	*	*	**102.2**	5.9%
Mercy University Hospital, Cork	**77.5**	13.4%	**81.6**	7.4%
Midland Regional Hospital Mullingar	**81.6**	12.0%	**72.2**	12.7%
Midland Regional Hospital Portlaoise	*	*	*	*
Midland Regional Hospital Tullamore	**87.5**	7.4%	**91.8**	7.7%
Mid-Western Regional Hospital Ennis	**101.3**	10.8%	**94.3**	12.5%
Mid-Western Regional Hospital Nenagh	**80.5**	12.6%	**67.8**	13.0%
Mid-Western Regional Hospital, Dooradoyle, Limerick	**78.5**	10.7%	**72.0**	10.1%
Monaghan General Hospital	*	*	**87.1**	10.6%
Naas General Hospital	**45.5**	13.3%	**40.9**	12.4%
National Maternity Hospital, Holles Street	**17.1**	3.9%	**19.8**	4.9%
Our Lady of Lourdes Hospital, Drogheda	**74.3**	11.9%	**77.0**	12.4%
Our Lady's Hospital for Sick Children, Crumlin	**74.4**	7.1%	**74.1**	6.9%
Our Lady's Hospital, Navan	**89.9**	11.9%	**94.3**	10.0%
Portiuncula Hospital, Ballinasloe	**71.2**	11.0%	**68.4**	10.6%
Roscommon County Hospital	**100.6**	4.9%	**114.1**	6.0%
Rotunda Hospital	*	*	**28.0**	7.7%
Royal Victoria Eye & Ear Hospital, Dublin	**75.6**	10.2%	**55.8**	12.9%
Sligo General Hospital	**72.3**	10.4%	**78.5**	9.9%
South Infirmary - Victoria University Hospital, Cork	**79.7**	13.6%	**71.2**	4.9%
South Tipperary General Hospital, Clonmel	**81.8**	9.9%	**83.1**	7.9%
St Columcille's Hospital, Loughlinstown	**103.1**	11.1%	**81.7**	10.2%
St James's Hospital	**76.1**	14.9%	**73.9**	10.6%
St John's Hospital, Limerick	**93.6**	11.1%	**87.8**	11.6%
St Luke's General Hospital, Kilkenny	**62.9**	6.4%	**69.8**	6.9%
St Luke's Hospital, Dublin	**36.2**	7.8%	**34.2**	7.3%
St Mary's Orthopaedic Hospital, Gurranebraher, Cork	*	*	*	*
St Michael's Hospital, Dun Laoghaire	**95.9**	5.2%	**74.5**	5.8%
St Vincent's University Hospital	**120.0**	12.2%	**117.4**	11.4%
Waterford Regional Hospital	**84.2**	9.1%	**79.0**	5.8%
Wexford General Hospital	**82.4**	5.6%	**70.4**	5.6%

* Data not available

SECTION C. BREAKDOWN BY HOSPITAL CATEGORY

Graph 1. Box plot of antibiotic consumption in DDD per 100 BDU for public acute hospitals by hospital category, for 2007 and 2008. See end of page 5 for explanation of the plot.

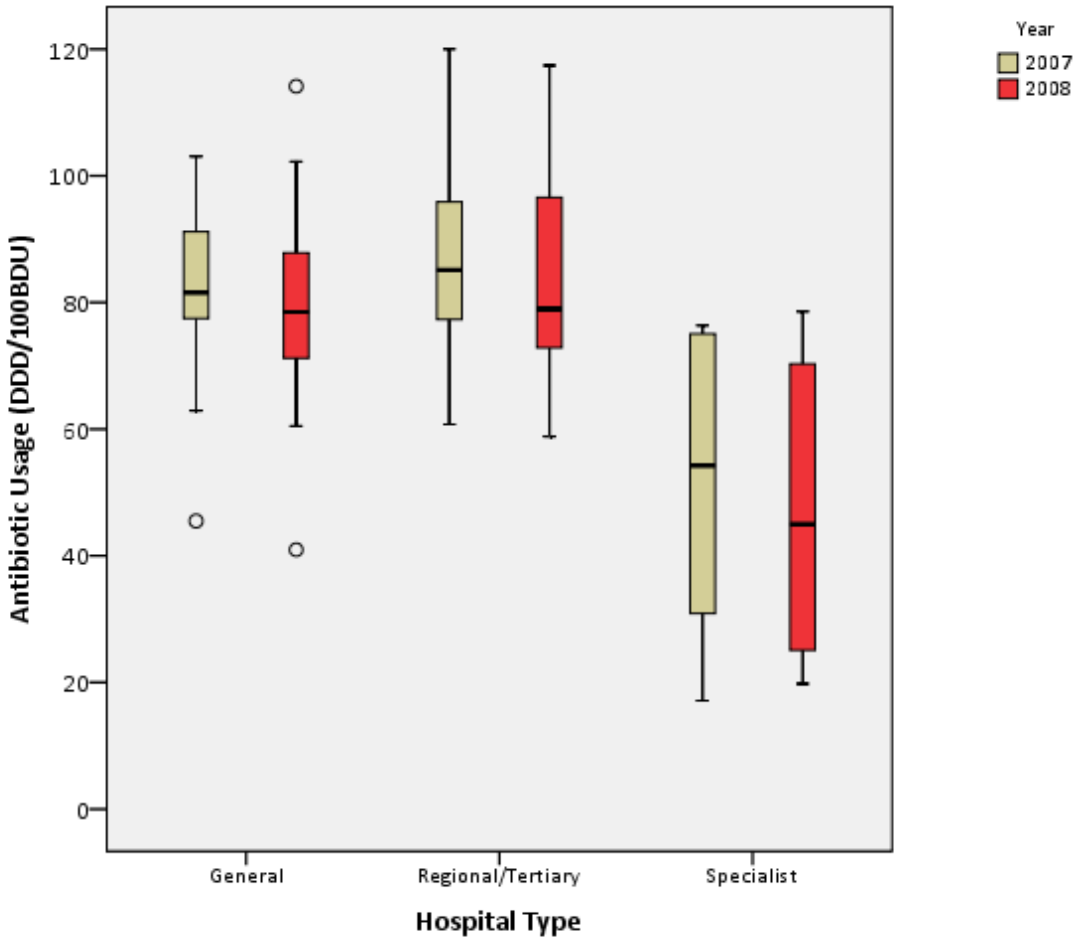


Table 2. Median antibiotic consumption in DDD per 100 BDU for public acute hospitals by hospital category, for 2007 and 2008.

	2007		2008	
Hospital Category	**Rate (DDD / 100 BDU)**	**Number of Hospitals**	**Rate (DDD / 100 BDU)**	**Number of Hospitals**
General	81.57	21	78.51	25
Regional/Tertiary	85.14	8	78.95	9
Specialist	54.24	7	44.96	8
All Hospital	**80.10**	**36**	**76.39**	**42**

Graph 2. Box plot of proportion of specific agents in intravenous form over total (%) for public acute hospitals by hospital category, for 2007 and 2008. Please see methods section for list of specific agents and see end of this page for explanation of the plot.

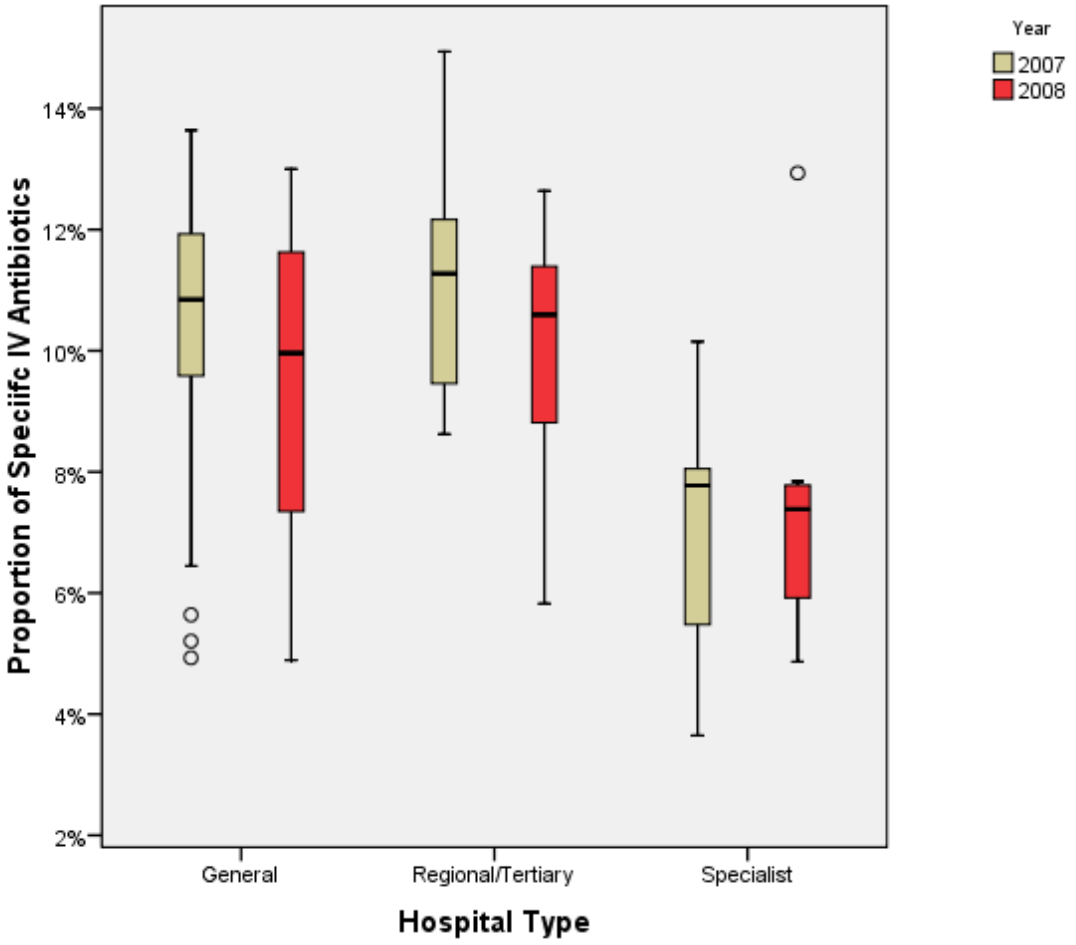


Table 3. Median of proportion of specific agents in intravenous form over total (%) for public acute hospitals by hospital category, for 2007 and 2008. Please see methods section for list of specific agents.

	2007		2008	
Hospital Category	**Proportion of Specific Agents in IV Form**	**Number of Hospitals**	**Proportion of Specific Agents in IV Form**	**Number of Hospitals**
General	10.8%	21	10.0%	25
Regional/Tertiary	11.3%	8	10.3%	9
Specialist	7.8%	7	7.4%	8
All Hospital	**10.3%**	**36**	**9.4%**	**42**

Explanation of the box (or **box-and-whiskers**) plot: the bottom and top of the box are the 25th and 75th percentile (the lower and upper quartiles, respectively, so the box represents the inter-quartile range or IQR). The band near the middle of the box is the 50th percentile or the median. The ends of the whiskers represent the lowest data point still within 1.5 times the IQR of the lower quartile, and the highest data point still within 1.5 times the IQR of the upper quartile. Any data point not included between the whiskers is plotted as an outlier with a circle. Box plots are used to display differences between populations or categories without making any assumptions of the underlying statistical distribution. They help to indicate the degree of dispersion (spread) and skewness in the data, and identify outliers.

SECTION D. TYPES OF ANTIBIOTICS

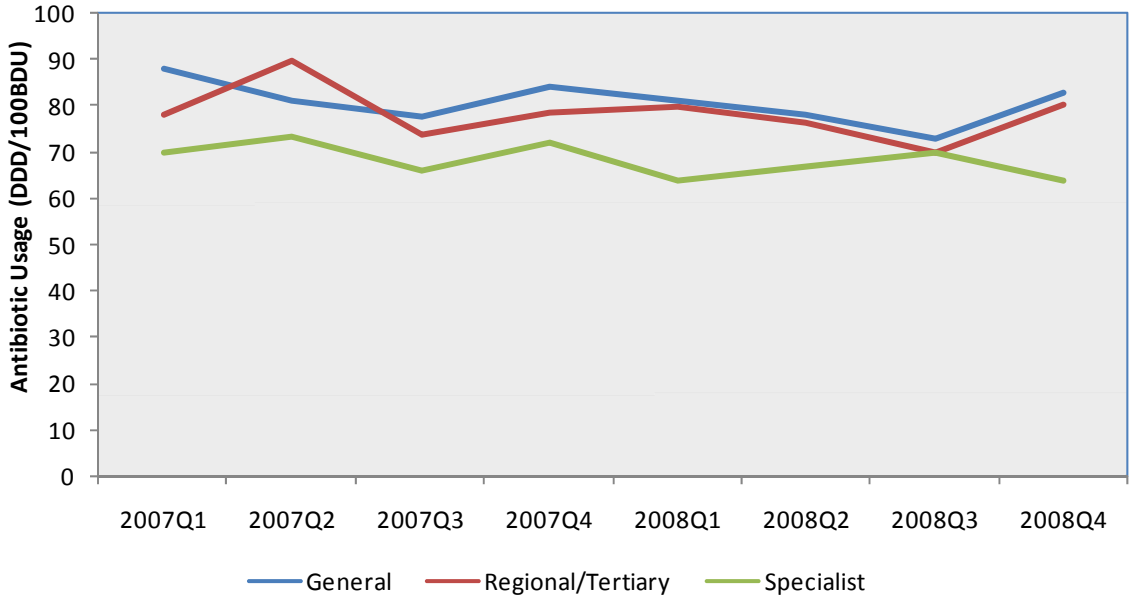
Table 4. Antibiotic consumption grouped by ATC levels. Rates are in DDD per 100 BDU for 2007 and 2008. Also shown is the change in consumption in units of consumption and the proportion of each group of antibiotic over total use.

Antibiotic	2007 Propotion of Total Antibiotiocs	2008 Propotion of Total Antibiotiocs	Rate 2007 (DDD/100 BDU)	Rate 2008 (DDD/100 BDU)	Absolute Change in DDD/100 BDU	Noted Changes in Common Antibiotics
J01A TETRACYCLINES	0.9%	1.0%	0.76	0.74	-0.02	
J01AA Tetracyclines	*0.9%*	*1.0%*	*0.76*	*0.74*	*-0.02*	
J01B AMPHENICOLS	0.0%	0.0%	0.01	0.00	0.00	
J01BA Amphenicols	*0.0%*	*0.0%*	*0.01*	*0.00*	*0.00*	
J01C BETA-LACTAM ANTIBACTERIALS, PENICILLINS	46.1%	48.5%	37.24	37.28	0.03	
J01CA Penicillins with extended spectrum	*4.4%*	*4.3%*	*3.56*	*3.29*	*-0.26*	
J01CE Beta-lactamase sensitive penicillins	*7.2%*	*7.1%*	*5.83*	*5.48*	*-0.35*	
J01CF Beta-lactamase resistant penicillins	*9.6%*	*9.8%*	*7.74*	*7.51*	*-0.23*	
J01CR Penicillins with beta-lactamase inhibitors	*24.9%*	*27.3%*	*20.11*	*20.99*	*0.88*	*4.4%*
J01CR02 Amoxicillin and enzyme inhibitor (Oral)	*13.7%*	*15.1%*	*11.10*	*11.65*	*0.55*	*4.9%*
J01CR02 Amoxicillin and enzyme inhibitor (IV)	*6.5%*	*6.9%*	*5.22*	*5.28*	*0.06*	
J01CR03 Ticarcillin and enzyme inhibitor (IV)	*0.0%*	*0.0%*	*0.00*	*0.01*	*0.00*	
J01CR05 Piperacillin and enzyme inhibitor (IV)	*4.7%*	*5.3%*	*3.80*	*4.06*	*0.26*	*6.9%*
J01D OTHER BETA-LACTAM ANTIBACTERIALS	7.9%	8.0%	6.39	6.12	-0.27	
J01DB First-generation cephalosporins	*0.4%*	*0.3%*	*0.33*	*0.24*	*-0.09*	
J01DC Second-generation cephalosporins	*3.1%*	*3.3%*	*2.53*	*2.50*	*-0.03*	
J01DD Third-generation cephalosporins	*2.3%*	*2.1%*	*1.82*	*1.59*	*-0.23*	*-12.8%*
J01DF Monobactams	*0.1%*	*0.1%*	*0.10*	*0.08*	*-0.02*	
J01DH Carbapenems	*2.0%*	*2.2%*	*1.61*	*1.71*	*0.10*	
J01E SULFONAMIDES AND TRIMETHOPRIM	2.3%	2.6%	1.90	1.98	0.09	
J01EA Trimethoprim and derivatives	*1.1%*	*1.3%*	*0.93*	*0.99*	*0.06*	
J01EC Intermediate-acting sulfonamides	*0.1%*	*0.1%*	*0.07*	*0.10*	*0.02*	
J01EE Combinations of sulfonamides and trimethoprim, incl. derivatives	*1.1%*	*1.2%*	*0.89*	*0.90*	*0.01*	
J01F MACROLIDES, LINCOSAMIDES AND STREPTOGRAMINS	13.6%	14.0%	10.99	10.74	-0.25	
J01FA Macrolides (incl. Erythromycin)	*12.9%*	*13.3%*	*10.46*	*10.24*	*-0.22*	*-2.1%*
J01FF Lincosamides	*0.6%*	*0.6%*	*0.52*	*0.49*	*-0.04*	
J01FG Streptogramins	*0.0%*	*0.0%*	*0.01*	*0.01*	*0.00*	
J01G AMINOGLYCOSIDE ANTIBACTERIALS	3.9%	3.5%	3.11	2.69	-0.43	
J01GA Streptomycins	*0.0%*	*0.0%*	*0.01*	*0.00*	*0.00*	
J01GB Other aminoglycosides (incl. Tobramycin)	*3.8%*	*3.5%*	*3.11*	*2.68*	*-0.42*	*-13.6%*
J01M QUINOLONE ANTIBACTERIALS	12.7%	10.3%	10.30	7.93	-2.37	
J01MA Fluoroquinolones	*12.7%*	*10.3%*	*10.30*	*7.93*	*-2.36*	*-23.0%*
J01MB Other quinolones	*0.0%*	*0.0%*	*0.00*	*0.00*	*0.00*	
J01X GLYCOPEPTIDES, IMIDAZOLES AND NITROFURANS	10.5%	9.9%	8.48	7.60	-0.88	
J01XA Glycopeptide antibacterials (incl. IV Vancomycin)	*3.5%*	*3.3%*	*2.86*	*2.58*	*-0.29*	
J01XB Polymyxins	*0.8%*	*0.7%*	*0.66*	*0.55*	*-0.11*	
J01XC Steroid antibacterials	*0.6%*	*0.5%*	*0.50*	*0.37*	*-0.13*	
J01XD Imidazole derivatives (incl. IV Metronidazole)	*4.0%*	*3.5%*	*3.21*	*2.69*	*-0.52*	*-16.2%*
J01XE Nitrofuran derivatives	*0.6%*	*0.9%*	*0.48*	*0.73*	*0.25*	
J01XX Other antibacterials	*0.9%*	*0.9%*	*0.75*	*0.68*	*-0.07*	
NonJ antimicrobials	2.1%	2.4%	1.66	1.85	0.19	
A07AA02 Nystatin	*0.1%*	*0.2%*	*0.07*	*0.12*	*0.05*	
A07AA09 Vancomycin (Oral)	*0.0%*	*0.0%*	*0.03*	*0.02*	*-0.01*	
P01AB01 Metronidazole(Oral)	*1.9%*	*2.2%*	*1.56*	*1.70*	*0.14*	*8.8%*

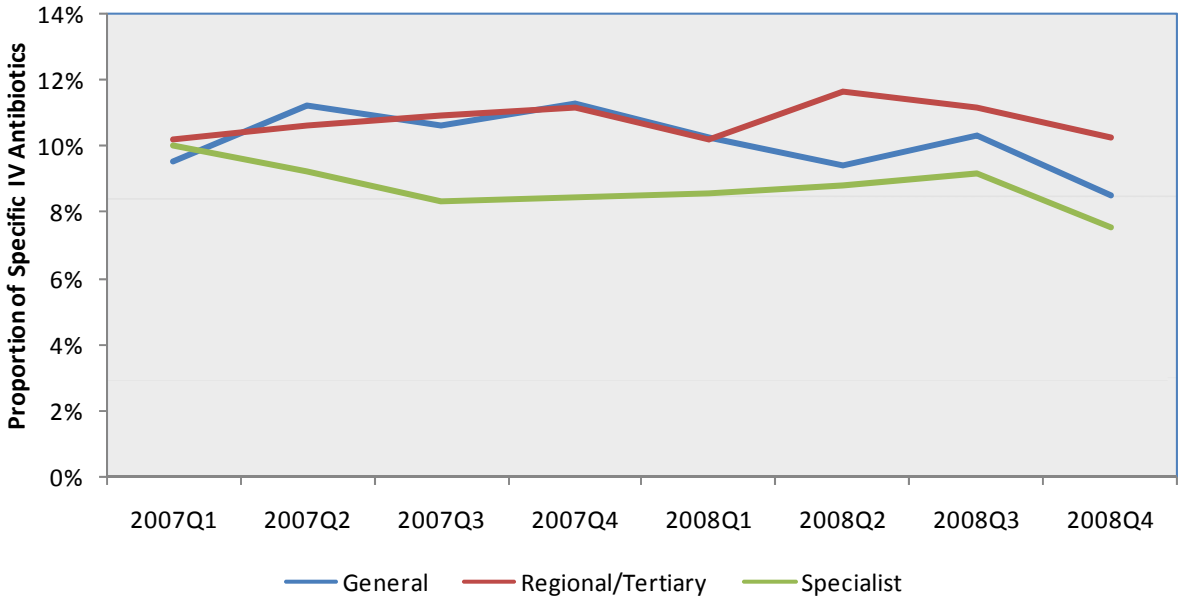
SECTION E. QUARTERLY TRENDS

Median quarterly trends by hospital category are presented for 32 hospitals that provided quarterly data for all quarters of 2007 and 2008.

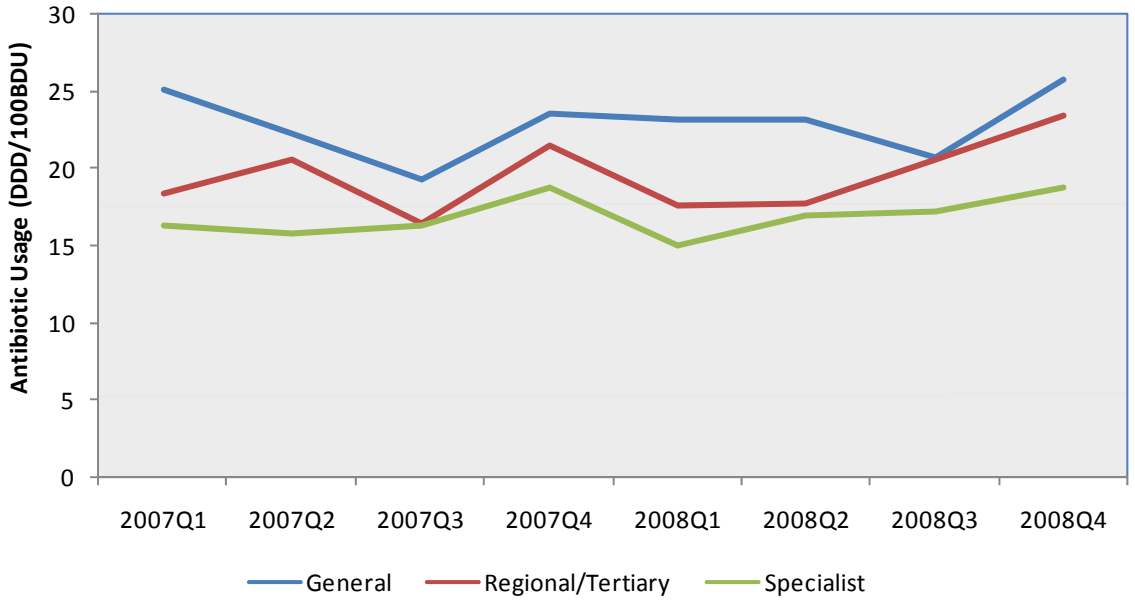
Graph 3. Changes in **total** antibiotic consumption in DDD/100 BDU by hospital category.



Graph 4. Changes in proportion of **specific intravenous agents over total** antibiotic consumption by hospital category. Please see methods section for list of specific agents.



Graph 5. Changes in **penicillins with beta-lactamase inhibitor** antibiotic consumption in DDD/100 BDU by hospital category.



Graph 6. Changes in **fluoroquinolone** antibiotic consumption in DDD/100 BDU by hospital category.