Feidhmeannacht na Seirbhíse Sláinte
Health Service Executive

hpsc

CONSUMPTION OF ANTIBIOTICS IN PUBLIC ACUTE HOSPITALS IN IRELAND DATA TO END OF 2011

MAIN POINTS

- **There was a 4% rise in the median usage rate from 79.3 Defined Daily Doses per 100 Bed-Days Used (DDD/100BDU) for 2010 to 82.6 DDD/100BDU in 2011**
- **The median antibiotic consumption rate increased among general and regional/tertiary hospitals but decreased among specialist hospitals**
- **As per recent trends, usage of penicillins with beta-lactamase inhibitor (such as co-amoxiclav) has continued to increase sharply, along with moderate increases in all other agents except fluoroquinolones**
- **There was a continued drop in the proportion of a specific set of antibiotics in injectable form (those that could be easily switched to oral form) by 0.4 percentage points to 6.5%**

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, quarterly antimicrobial data 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 to 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. Each systemic antimicrobial substance 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. Additionally, as well as the case-mix, guidelines for the optimal dosage regimen of an antibiotic 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. 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* and *rifampicin*. In Table 1, the proportion of the volume used in DDD of these specific agents in IV form over total antibiotic use in DDD is expressed as percentage for each hospital

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

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

Table 1. Antibiotic consumption data for 42 public acute hospitals for 2011 are presented with updated figures for 43 hospitals for 2010. See methods for details of the measures.

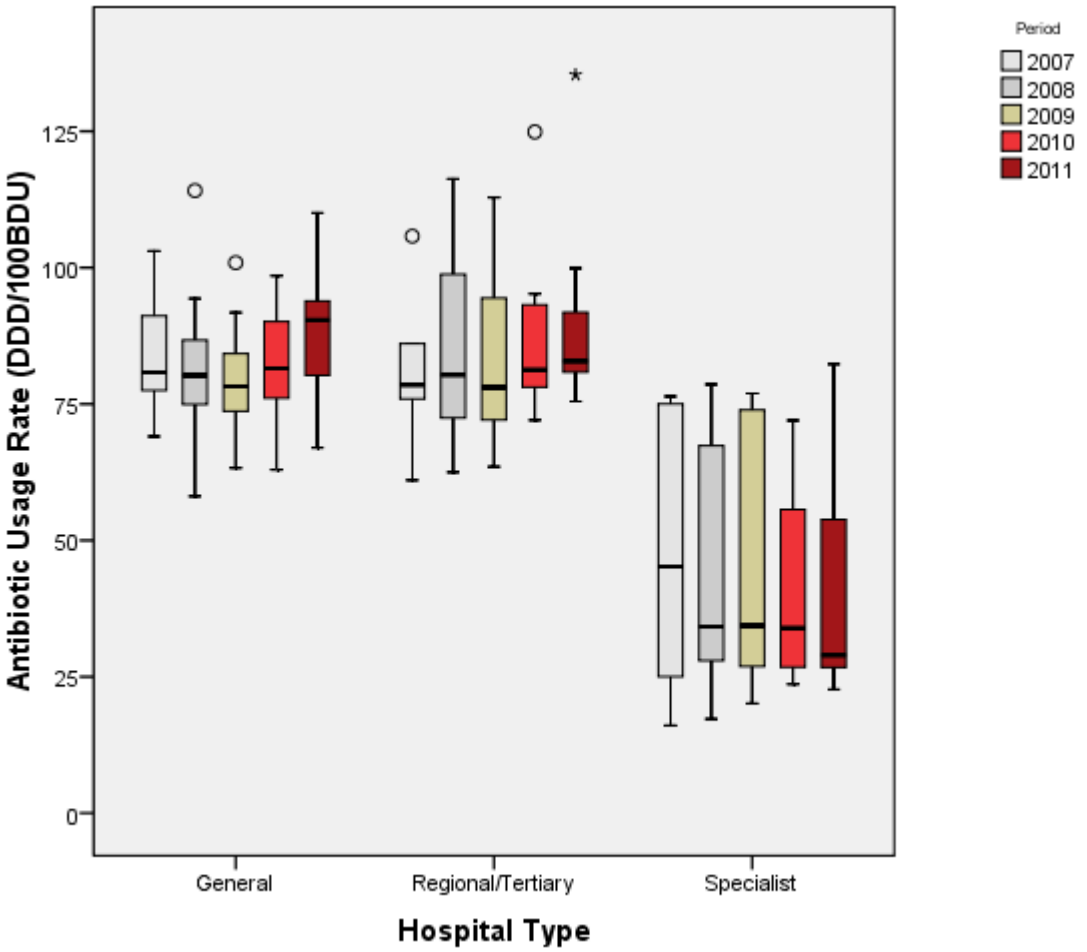
Acute Public Hospital	Acute Inpatient Antibiotic Consumption Rate (DDD per 100 bed-days used)		Proportion of Specific IV antibiotics	
	2010	2011	2010	2011
Adelaide & Meath & National Children's Hospital, Tallaght	**95.2**	**91.8**	10.3%	10.1%
Bantry General Hospital	*	*	*	*
Beaumont Hospital	**74.5**	**77.6**	5.7%	6.4%
Cappagh National Orthopaedic Hospital, Dublin	**54.2**	**53.8**	1.7%	0.7%
Cavan General Hospital	**80.5**	**92.2**	4.0%	4.9%
Children's University Hospital, Temple Street	**68.8**	**82.3**	7.1%	8.3%
Connolly Hospital, Blanchardstown	**69.5**	**71.6**	7.2%	6.6%
Coombe Women's Hospital	**29.9**	**28.9**	6.8%	6.4%
Cork University Hospital	**72.0**	**75.5**	6.9%	6.8%
Galway University Hospitals	**93.2**	**99.9**	6.9%	6.5%
Kerry General Hospital, Tralee	**65.8**	**71.1**	8.6%	7.8%
Letterkenny General Hospital	**78.8**	**93.6**	8.4%	8.3%
Lourdes Orthopaedic Hospital, Kilcreene, Kilkenny	**25.6**	**26.7**	0.8%	0.8%
Louth County Hospital, Dundalk [1]	**72.2**	**NA**	3.6%	NA
Mallow General Hospital	**79.3**	**89.7**	16.9%	14.4%
Mater Misericordiae University Hospital	**81.3**	**82.9**	8.7%	9.1%
Mayo General Hospital, Castlebar	**89.7**	**91.2**	4.3%	4.5%
Mercy University Hospital, Cork	**90.1**	**91.0**	5.7%	4.8%
Midland Regional Hospital Mullingar	**83.2**	**86.5**	16.2%	13.0%
Midland Regional Hospital Portlaoise	*	*	*	*
Midland Regional Hospital Tullamore	**80.6**	**103.0**	6.3%	6.1%
Mid-Western Regional Hospital Ennis	**83.9**	**89.8**	3.4%	1.9%
Mid-Western Regional Hospital Nenagh	**93.0**	**81.4**	2.3%	1.9%
Mid-Western Regional Hospital, Dooradoyle, Limerick	**78.1**	**80.8**	10.5%	9.8%
Naas General Hospital	**90.1**	**97.1**	7.5%	8.6%
National Maternity Hospital, Holles Street	**23.6**	**22.7**	7.8%	7.3%
Our Lady of Lourdes Hospital, Drogheda	**88.4**	**97.8**	8.9%	7.8%
Our Lady's Hospital for Sick Children, Crumlin	**72.0**	**74.5**	6.5%	5.3%
Our Lady's Hospital, Navan	**98.0**	**110.0**	7.2%	4.4%
Portiuncula Hospital, Ballinasloe	**76.5**	**82.4**	8.3%	8.3%
Roscommon County Hospital	**98.5**	**105.3**	5.2%	3.7%
Rotunda Hospital	**33.9**	**29.0**	8.4%	7.2%
Royal Victoria Eye & Ear Hospital, Dublin	**55.6**	**46.0**	16.3%	12.3%
Sligo General Hospital	**63.0**	**67.0**	8.0%	7.3%
South Infirmary - Victoria University Hospital, Cork	**63.9**	**71.4**	4.6%	4.8%
South Tipperary General Hospital, Clonmel	**76.1**	**86.3**	6.8%	5.0%
St Columcille's Hospital, Loughlinstown	**81.5**	**93.1**	8.0%	8.9%
St James's Hospital	**80.0**	**81.3**	8.3%	9.3%
St John's Hospital, Limerick	**91.3**	**94.2**	4.7%	3.7%
St Luke's General Hospital, Kilkenny	**72.5**	**79.1**	4.8%	4.7%
St Luke's Hospital, Dublin	**26.8**	**25.7**	4.8%	4.7%
St Mary's Orthopaedic Hospital, Gurranebraher, Cork	*	*	*	*
St Michael's Hospital, Dun Laoghaire	**97.2**	**93.3**	7.3%	6.7%
St Vincent's University Hospital	**124.9**	**135.4**	8.5%	7.3%
Waterford Regional Hospital	**81.9**	**90.6**	6.1%	5.4%
Wexford General Hospital	**85.2**	**78.2**	5.8%	5.1%

* Data not available

[1] Acute activity too low for reporting for 2011

NA Not applicable

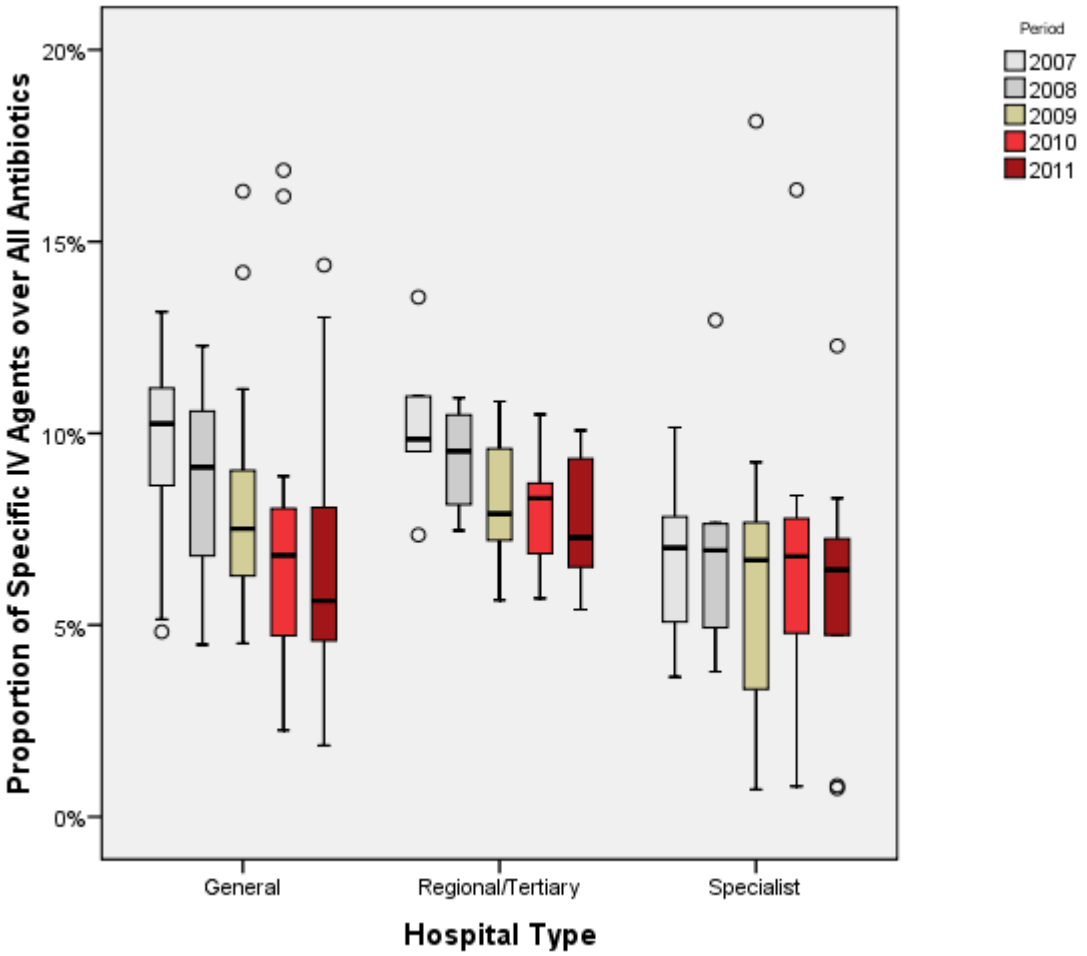
SECTION C. BREAKDOWN BY HOSPITAL CATEGORY



Graph 1. Box plot of antibiotic consumption in DDD per 100 BDU for public acute hospitals by hospital category, from 2007 to 2011. See page 5 for an explanation of the plot.

Table 2. Median antibiotic consumption rate in DDD per 100 BDU for public acute hospitals by hospital category and the number of hospitals (n), from 2007 to 2011

	2007		2008		2009		2010		2011	
Hospital Category	**Rate**	**n**	**Rate**	**n**	**Rate**	**n**	**Rate**	**n**	**Rate**	**n**
General	80.8	21	80.3	25	78.2	26	81.5	25	90.4	24
Regional/Tertiary	78.5	5	80.4	8	78.0	9	81.3	9	82.9	9
Specialist	45.2	8	34.2	9	34.4	9	33.9	9	29.0	9
All Hospitals	**78.0**	**34**	**76.4**	**42**	**76.0**	**44**	**79.3**	**43**	**82.6**	**42**



Graph 2. Box plot of proportion of specific agents in intravenous form over total (%) for public acute hospitals by hospital category, from 2007 to 2011. Please see methods section for list of specific agents and see below for an explanation of the plot

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.

Table 3. Median proportions of specific agents in intravenous form over total (percent) for public acute hospitals by hospital category and the number of hospitals (n), from 2007 to 2010. Please see methods section for list of specific agents

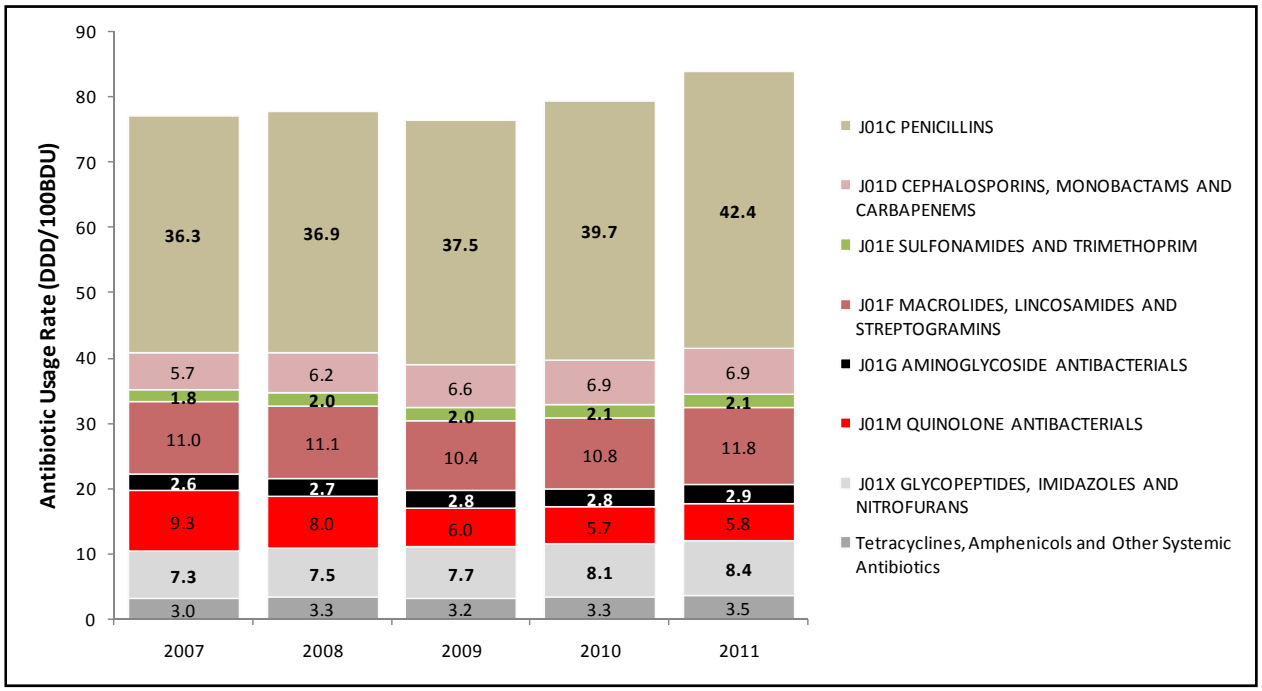
	2007		2008		2009		2010		2011	
Hospital Category	**Rate**	**n**	**Rate**	**n**	**Rate**	**n**	**Rate**	**n**	**Rate**	**n**
General	10.3%	21	9.1%	25	7.5%	26	6.8%	25	5.6%	24
Regional/Tertiary	9.8%	5	9.5%	8	7.9%	9	8.3%	9	7.3%	9
Specialist	7.0%	8	6.9%	9	6.7%	9	6.8%	9	6.4%	9
All Hospitals	**9.6%**	**34**	**8.7%**	**42**	**7.5%**	**44**	**6.9%**	**43**	**6.5%**	**42**

SECTION D. OVERALL RATE AND BREAKDOWN BY TYPE OF ANTIBIOTICS

The overall rate (weighted mean) is calculated by adding the total antibiotic consumption values in DDD of all the participating hospitals and dividing by the sum of the denominator for each hospital in BDU. Unlike the median value (Table 3), this measure is not a realistic reflection of the national level of antibiotic use as the rate can be skewed by a few large hospitals. However, this method does allow for comparison of rates of differed types of antibiotics.

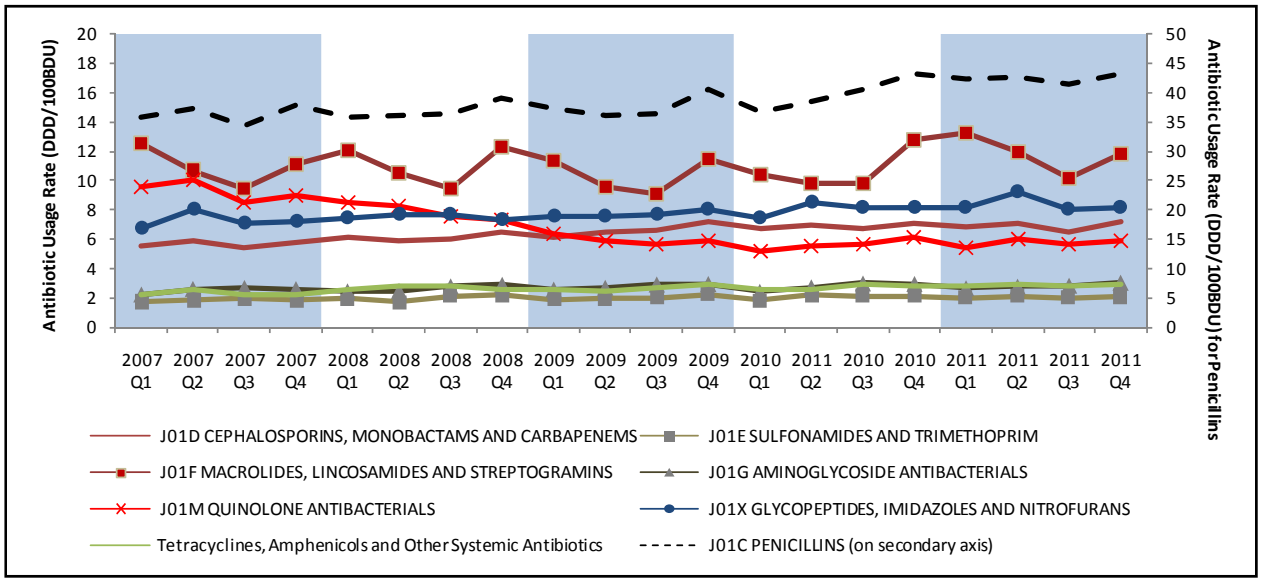
Table 4. Overall (weighted mean) antibiotic consumption rate in DDD per 100 BDU for public acute hospitals by hospital category and the number of hospitals (n), from 2007 to 2011

	2007		2008		2009		2010		2011	
	Rate	**n**	**Rate**	**n**	**Rate**	**n**	**Rate**	**n**	**Rate**	**n**
Overall Rate	**77.0**	**34**	**77.7**	**42**	**76.4**	**44**	**79.3**	**43**	**83.7**	**42**

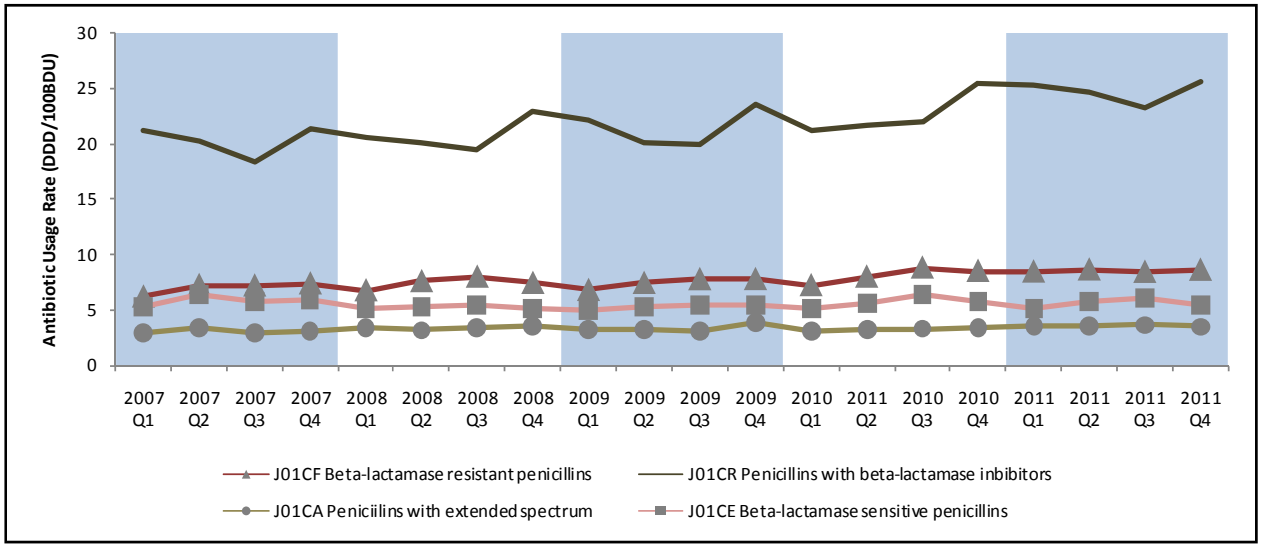


Graph 3. Antibiotic consumption grouped by pharmacological subgroup (ATC level 3) by year in acute public hospitals from 2007 to 2011

SECTION E. QUARTERLY TRENDS



Graph 4. Antibiotic consumption grouped by pharmacological subgroup (ATC level 3). Rates are in DDD per 100 BDU as overall (weighted mean) for inpatient antibiotic consumption in public acute hospitals for all quarters from 2007 to 2011



Graph 5. Penicillin consumption breakdown by chemical subgroup (ATC level 4). Rates are in DDD per 100 BDU as overall (weighted mean) for inpatient antibiotic consumption in public acute hospitals for all quarters from 2007 to 2011