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Annual Epidemiological Report

September 2018

Antimicrobial Consumption in Ireland, 2017

Key Facts

- The overall outpatient antimicrobial consumption in Ireland for 2017 was 23.1 defined daily doses (DDD) per 1,000 inhabitants per day (DID), a 4% decrease on the updated 2016 rate of 24.1 DID. This rate is mid-to-high in comparison with other European countries
- The median rate of hospital antimicrobial consumption was 86.6 DDD bed-days used (DBD) (range 30.8 – 126.7 DBD). This was a 2.4% increase from 2016's median rate on 84.6 DBD. The overall (mean) rate for 2017 was 84.5 DBD. This level is mid-to-high in comparison with other European countries. In 2017, 42 acute public hospitals contributed data

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Background

Ireland participates in ECDC's European Surveillance of Antimicrobial Consumption Network (ESAC-Net), which aims to collect systemic antimicrobial usage data from the outpatient (ambulatory, community or primary care) setting and from the hospital (inpatient) setting. Antimicrobial consumption is measured in defined daily dose (DDD), which is the assumed average maintenance dose per day for a drug used for its main indication in adults. Rates are calculated in DDD per 1,000 inhabitants per day (DID) for outpatients and DDD per 100 bed-days used (DBD) for inpatients.

Results

Outpatient Antimicrobial Consumption

The overall outpatient antimicrobial consumption for Ireland in 2017 was 23.1 DID, a decrease of 4% on the updated 2016 rate of 24.1 DID. In the latest ESAC-Net report (2016 data), the reported range of outpatient J01 (antibacterial agents for systemic use) antimicrobial usage among European countries was 10.5 to 36.3 DID; the median for 30 European countries with reliable data was 19.7 DID.

The underlying trend for outpatient antimicrobial consumption for Ireland (Figure 1) has been increasing steadily since 2000. After a decrease in 2008 and 2009, the rate increased again, reaching a peak in quarter 1 of 2015. Since then, there has been an overall downward trend in the rate. There is a marked seasonal fluctuation in usage, with highest consumption observed during periods of increased influenza activity.

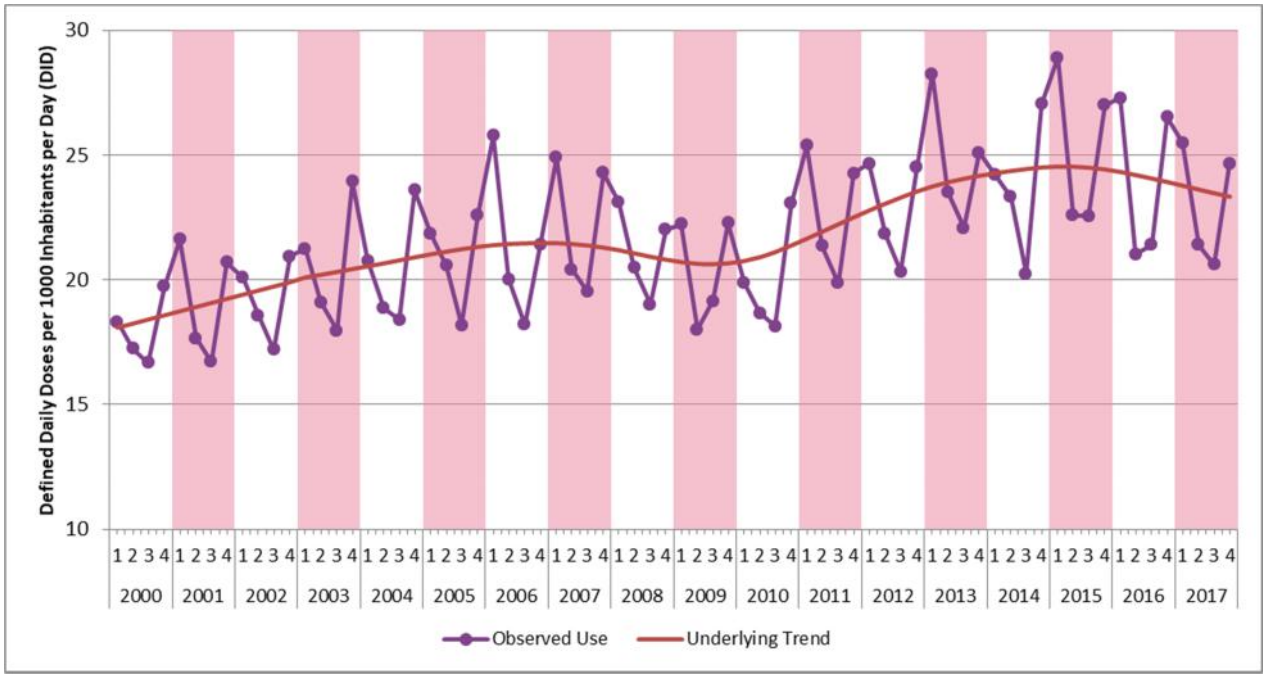

Figure 1. Outpatient antibiotic consumption in Ireland by quarter, 2000-2017

In Ireland in 2017, outpatient consumption of penicillins accounted for the largest class used (56% of total at 13.0 DID), followed by macrolides (18%, 4.2 DID), tetracyclines (12%, 2.8 DID), cephalosporins (5%, 1.1 DID), sulphonamides/trimethoprim (5%, 1.1 DID) and fluoroquinolones (3%, 0.8 DID). Penicillin in combination with a beta-lactamase inhibitor (such as co-amoxiclav) accounted for the largest proportion among penicillins at 28.2% (5.8 DID). Broad-spectrum penicillin (such as amoxicillin) usage was also high at 19.1% (4.8 DID). See Table 1 for a detailed breakdown by pharmacological drug groups.

Table 1. Breakdown by pharmacological drug groups for outpatient antibiotic use in Ireland for 2016 and 2017, in DDD per 1,000 inhabitants per day

	2016	Percent of 2016	2017	Percent of 2017	Percent Change 2016 to 2017
Penicillins	14.0	58.0%	13.0	56.5%	-6.8%
Narrow spectrum penicillins	1.1	4.5%	1.2	5.1%	6.9%
Beta-lactamase resistant penicillins	1.5	6.3%	1.3	5.7%	-12.4%
Broad spectrum penicillins	4.6	19.1%	4.8	20.8%	4.2%
Penicillin with beta-lactamase inhibitor	6.8	28.2%	5.8	24.9%	-15.2%
Macrolides and related drugs	4.4	18.1%	4.2	18.1%	-4.1%
Tetracylines	2.5	10.5%	2.8	12.1%	10.4%
Cephalosporins and other beta-lactam drugs	1.2	4.8%	1.1	4.7%	-6.9%
First-generation cephalosporins	0.3	1.3%	0.4	1.6%	14.2%
Second-generation cephalosporins	0.8	3.3%	0.7	2.9%	-15.1%
Third-generation cephalosporins	<0.1	0.1%	<0.1	0.1%	-19.1%
Quinolones	0.9	3.6%	0.8	3.5%	-7.3%
Sulfonamides and Trimethoprim	1.1	4.6%	1.1	4.7%	-1.3%
Other antibiotics	0.1	0.4%	0.1	0.4%	-0.2%
TOTAL	**24.1**	**100.0%**	**23.1**	**100.0%**	**-4.3%**

There was considerable variability in the overall outpatient antimicrobial usage at county level (18.6 to 30.5 DID), as shown in Figure 2.

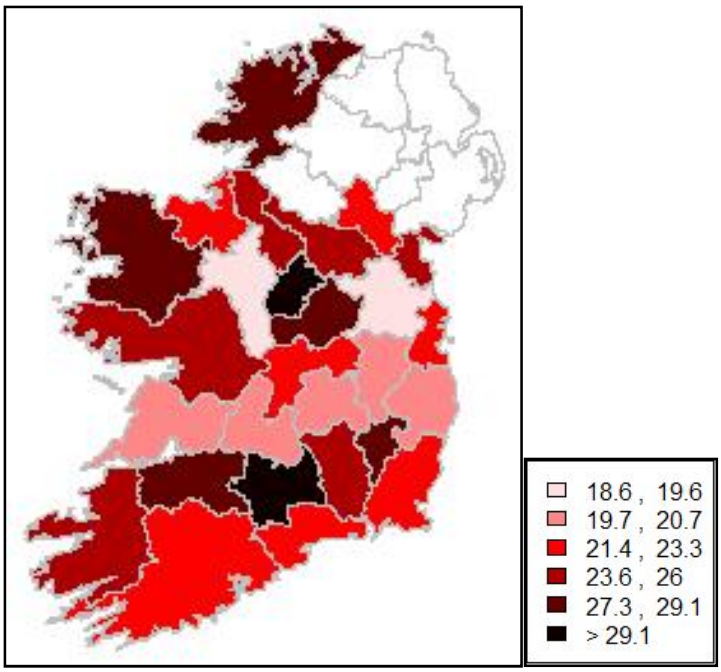

Figure 2. Outpatient antibiotic consumption in Ireland by county, in DDD per 1,000 inhabitants per day for 2017

Hospital Antimicrobial Consumption

Forty-two acute public hospitals provided valid antimicrobial usage data for 2017. The median rate of antimicrobial consumption was 86.6 DBD (range 30.8 – 126.7 DBD). This was a 2.4% increase from 2016's median rate on 84.6 DBD. The overall (mean) rate for 2017 was 84.5 DBD. These levels are mid-to-high, compared to other European countries.

Consumption by hospital group varied from 74.1 DBD to 89.7 DBD.

Table 2. Breakdown by hospital groups for hospital antibiotic use (J01, anti-bacterials) for 2015 and 2017 in DDD per 100 BDU

Hospital Group	2015	2016	2017
Ireland East	86.2	91.9	89.7
Dublin Midlands	82.1	89.6	86.2
RCSI Hospitals, Dublin North East	86.1	86.4	89.7
University of Limerick, Midwest	82.8	85.1	87.7
South/South West	80.8	83.2	85.1
Saolta University, West/North West	74.9	75.8	75.7
Children's Hospitals	71.8	73.8	74.7

The largest group of antimicrobials, penicillins at 42.3 DBD accounted for 50% of all inpatient antimicrobial usage. The use of fluoroquinolones such as ciprofloxacin (representing 6% of all inpatient antimicrobial usage) was 4.9 DBD. Consumption of

cephalosporins, monobactams and carbapenems (representing 11% of all inpatient antimicrobial usage) was 9.3 DBD. Consumption of glycopeptides such as intravenous vancomycin, imidazoles such as intravenous metronidazole and nitrofurans (representing 10% of all inpatient antimicrobial usage) was 8.2 DBD. Consumption of erythromycin and related agents (macrolides, representing 3% of all inpatient antimicrobial usage) was 2.3 DBD. Less frequently used agents in hospitals are tetracyclines, sulfonamides/trimethoprim, aminoglycosides and other systemic antimicrobials; collectively these drugs represent just less than 10% of all inpatient antimicrobial usage. See Figure 3 for a detailed breakdown by pharmacological drug groups.

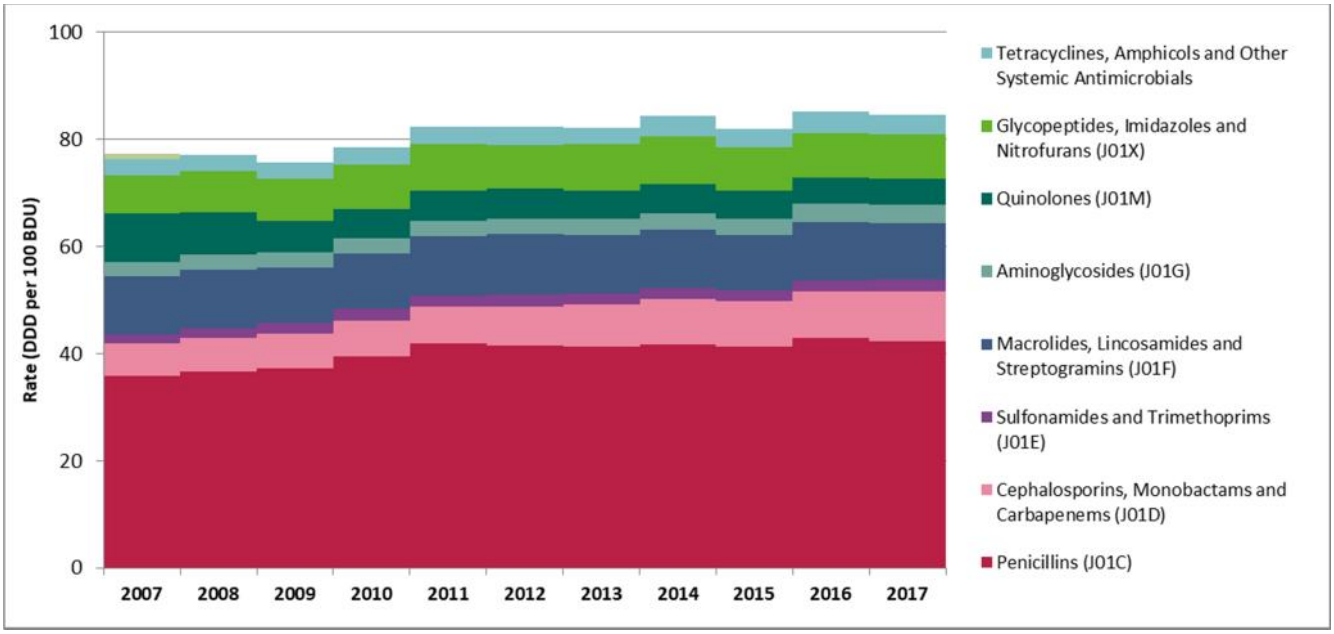

Figure 3. Overall hospital antimicrobial consumption rate in DDD per 100 BDU by pharmacological subgroup (ATC level 3) by year

As shown in Figure 4, carbapenem consumption increased from 1.2 DBD in 2007 to 3.8 DBD in 2014. The consumption has decreased since then, and was 3.1 DBD in 2017.

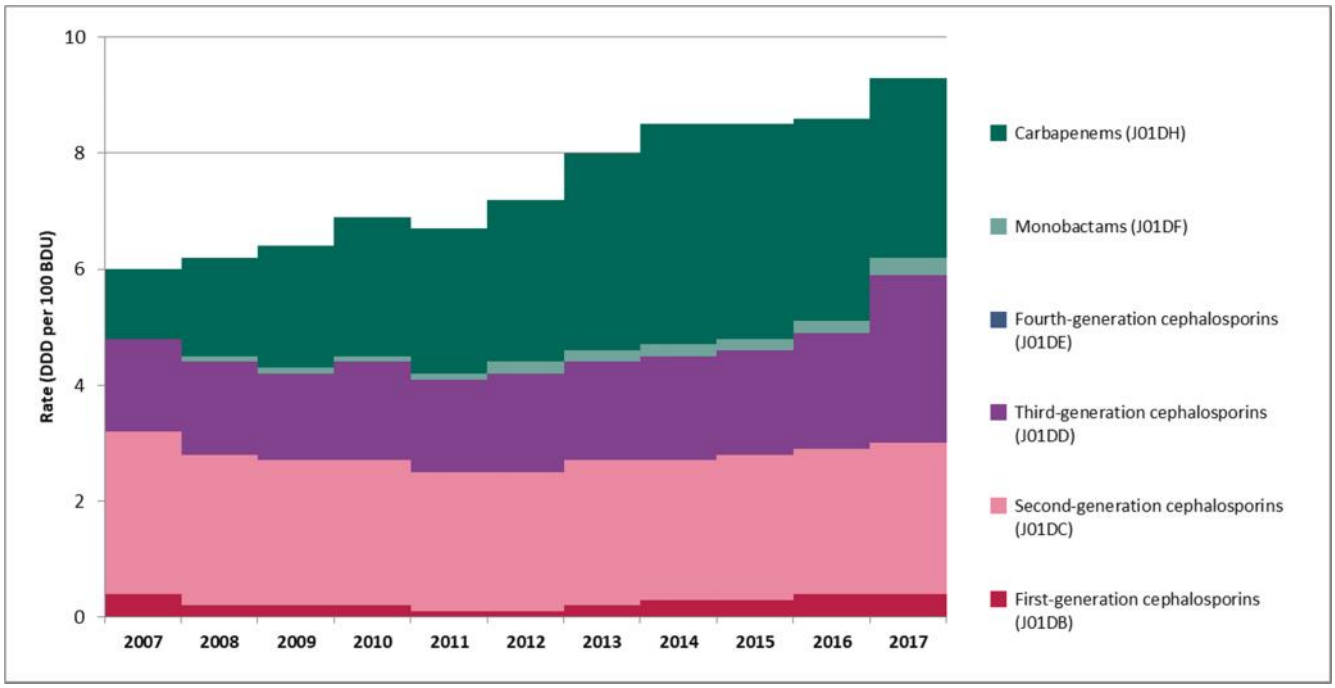

Figure 4. Overall hospital Cephalosporins, Monobactams and Carbapenems consumption rate in DDD per 100 BDU by year

Technical notes

Outpatient consumption data were obtained from IQVIA Technology Services Ltd (formerly IMS Health) and represent wholesaler to retail pharmacy sales figures for Ireland. Hospital consumption data were obtained directly from clinical pharmacies and validated with the support of the Irish Antimicrobial Pharmacists Association via HPSC's online data-management tool MicroB. Quarterly and annual consumption trends by named public acute hospitals are published on the HPSC website. All data were interpreted using the WHO Anatomical Therapeutic Chemicals index (www.whocc.no/atcddd/) in line with European Surveillance of Antimicrobial Consumption (ESAC-Net) methodology, which is now managed by ECDC.

Monthly population changes were estimated using a curve interpolation method for calculating outpatient antibiotic consumption rate. Bed-days used and other activity data for public acute hospitals were provided by the HSE-Business Information Unit and used to calculate hospital antibiotic consumption

The longitudinal (quarterly incidence) data in the above analysis for hospitals, do not indicate whether or not the level of antimicrobial use is appropriate for a given patient population. For example, higher levels of antimicrobial consumption among tertiary hospitals may be appropriate if such hospitals have specific patient populations that are more likely to require antimicrobial therapy (e.g. organ transplant, cystic fibrosis etc). Furthermore, DDD calculations are based on what is considered "typical" adult dosing and may therefore underestimate antimicrobial consumption in paediatric and other specialist settings.

While antimicrobial consumption data in Ireland are comprehensive, gaps remain. Most notably, data from private hospitals are missing from longitudinal data collection. All hospitals dispense to outpatients, day cases and external long-term care facilities, and the data representing this volume is excluded from our analyses. Likewise, antimicrobials dispensed via the national Outpatient Parenteral Antibiotic Therapy (OPAT) programme are not included in the data. Outpatient data represents 95% of wholesale-to-retail pharmacy transactions. Therefore, there is a further gap in the data. Collectively, these gaps would represent about 10% of the total antimicrobial consumption for Ireland. While HPSC provides antifungal consumption data to ESAC-Net, this report is primarily focused on antibacterial consumption only. ESAC-Net also collects data on antiviral and antiprotozoal agents, which are not currently analysed in Ireland.

Further information available on HPSC website

More detailed analyses of antimicrobial usage data can be found at http://www.hpsc.ie/a-z/microbiologyantimicrobialresistance/europeansurveillanceofantimicrobialconsumptionesac/

Acknowledgements

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