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Annual Epidemiological Report

October 2019

Antimicrobial Consumption in Ireland, 2018

Key Facts

- The overall consumption of outpatient systemic antibacterial antimicrobials in Ireland for 2018 was 22.9 defined daily doses (DDD) per 1,000 inhabitants per day (DID), a 1% decrease on the updated 2017 rate of 23.1 DID. This rate is mid-to-high in comparison with other European countries
- The median rate of hospital systemic antibacterial consumption was 88.4 DBD (range 30.3 – 113.4 DBD). This was a 2.4% increase from 2017's median rate of 86.3 DBD. The overall (mean) rate for 2018 was 87.9 DBD. This level is mid-to-high in comparison with other European countries. In 2018, 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. This report relates specifically to antibacterial agents only.

Results

Outpatient Antimicrobial Consumption

The overall outpatient J01 (antibacterial agents for systemic use) antimicrobial consumption for Ireland in 2018 was 22.9 DID, a decrease of 1% on the updated 2017 rate of 23.1 DID. In the latest ESAC-Net report (2017 data), the reported range of outpatient antibacterial consumption among European countries was 8.94 to 32.15 DID; the median for 27 European countries with reliable data was 16.83 DID.

The underlying trend for outpatient antibacterial consumption for Ireland (Figure 1) was a general steady increase from 2000 to the first quarter of 2015, albeit with a decrease in 2008 and 2009. Since the first quarter of 2015 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.

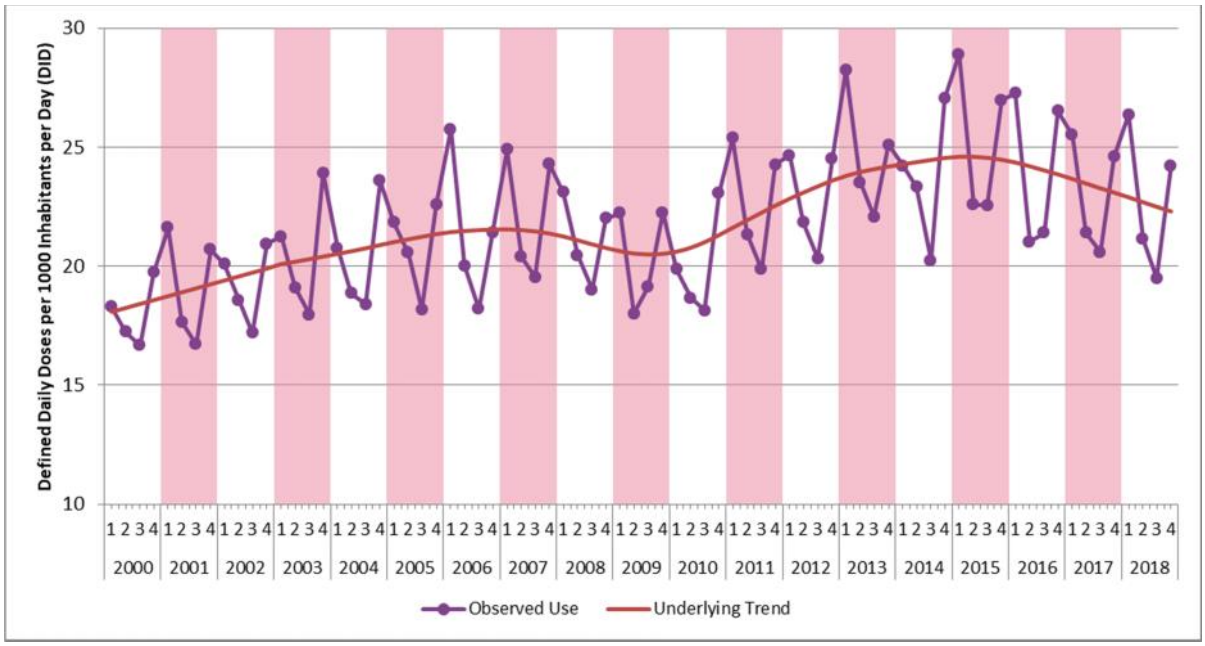

Figure 1. Outpatient antibacterial consumption in Ireland by quarter, 2000-2018.

In Ireland in 2018, outpatient consumption of the penicillin class accounted for the largest quantity used (58% of total at 13.2 DID), followed by macrolides (18%, 4.0 DID), tetracyclines (11%, 2.6 DID), cephalosporins (5%, 1.1 DID), sulphonamides/trimethoprim (4%, 1.0 DID) and fluoroquinolones (3%, 0.8 DID). Penicillin in combination with a beta-lactamase inhibitor (such as co-amoxiclav) accounted for the largest proportion of all penicillins at 42% (5.6 DID). Broad-spectrum penicillin (such as amoxicillin) usage was also high, at 39% of all penicillins (5.2 DID). See Table 1 for a detailed breakdown by pharmacological drug groups.

Table 1. Breakdown by pharmacological drug groups for outpatient antibacterial consumption in Ireland for 2017 and 2018, in DDD per 1,000 inhabitants per day.

	2017	Percent of 2017	2018	Percent of 2018
Penicillins	13.05	56.5%	13.25	57.9%
Narrow spectrum penicillins	1.17	5.1%	1.16	5.1%
Beta-lactamase resistant penicillins	1.33	5.7%	1.33	5.8%
Broad spectrum penicillins	4.79	20.8%	5.16	22.6%
Penicillin with beta-lactamase inhibitor	5.76	24.9%	5.60	24.5%
Macrolides and related drugs	4.18	18.1%	4.02	17.6%
Tetracylines	2.79	12.1%	2.60	11.4%
Cephalosporins and other beta-lactam drugs	1.08	4.7%	1.13	5.0%
First-generation cephalosporins	0.37	1.6%	0.43	1.9%
Second-generation cephalosporins	0.68	2.9%	0.67	2.9%
Third-generation cephalosporins	0.03	0.1%	0.03	0.1%
Quinolones	0.81	3.5%	0.76	3.3%
Sulfonamides and Trimethoprim	1.09	4.7%	1.01	4.4%
Other antibiotics	0.10	0.4%	0.09	0.4%
TOTAL	**23.10**	**100.0%**	**22.86**	**100.0%**

There was considerable variability in the overall outpatient antibacterial consumption at county level (19.6 to 32.0 DID), as shown in Figure 2. Antimicrobial consumption by county is based on the sales of agents by wholesalers to community pharmacists in the county. However, it is noteworthy that this is not a reliable guide to the county in which those agents were consumed, because a resident of one county may have items dispensed by a pharmacy in another county.

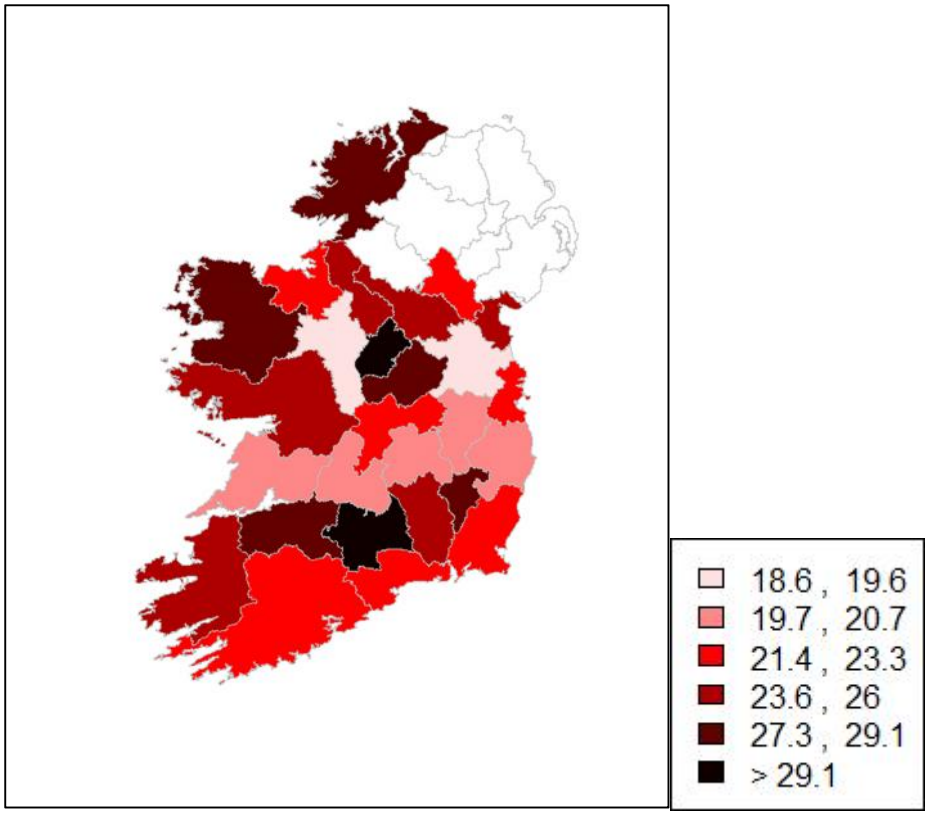

Figure 2. Outpatient antibacterial consumption in Ireland by county, in DDD per 1,000 inhabitants per day for 2018.

Antimicrobial consumption by county is based on the sales of agents by wholesalers to community pharmacists in the county. However, please note that this is not a reliable guide to the county in which those agents were consumed because residents of one county may have items dispensed by a pharmacy in another county

Hospital Antimicrobial Consumption

Forty-two acute public hospitals provided valid antimicrobial J01 (antibacterial agents for systemic use) consumption data for 2018. The median rate of antibacterial consumption was 88.4 DBD (range 30.3 – 113.4 DBD). This was a 2.4% increase from 2017's median rate on 86.3 DBD. The overall (mean) rate for 2018 was 87.9 DBD. These levels are mid-to-high, compared to other European countries.

Consumption by hospital group varied from 76.6 DBD to 92.9 DBD.

Table 2. Breakdown by hospital groups for J01 antibacterials for 2015 – 2018 in DDD per 100 BDU.

Hospital Group	2015	2016	2017	2018
Ireland East	86.2	91.9	93.9	89.5
Dublin Midlands	82.1	89.6	86.2	89.9
RCSI Hospitals, Dublin North East	86.1	86.4	89.7	92.9
University of Limerick, Midwest	82.8	85.1	87.7	88.9
South/South West	80.8	83.2	86.4	90.9
Saolta University, West/North West	74.9	75.7	75.7	78.6
Children's Hospitals	71.8	73.8	74.7	76.6

The largest group of antibacterials, penicillins accounted for 51% of the overall inpatient consumption (44.8 DBD). Fluoroquinolones, such as ciprofloxacin accounted for 6% (5 DBD), while macrolides, such as clarithromycin and erythromycin accounted for 3% (2.7 DBD).

Cephalosporins, monobactams and carbapenems combined, represented 11% (9.4 DBD) and glycopeptides (e.g., intravenous vancomycin), imidazoles (e.g., metronidazole) and nitrofurans combined accounted for 10% (8.4 DBD). Less frequently-used agents in hospitals are tetracyclines, sulfonamides/trimethoprim, aminoglycosides and other systemic antibacterials; collectively these drugs represented just less than 10% of total inpatient consumption.

See Figure 3 for a detailed breakdown by pharmacological drug groups.

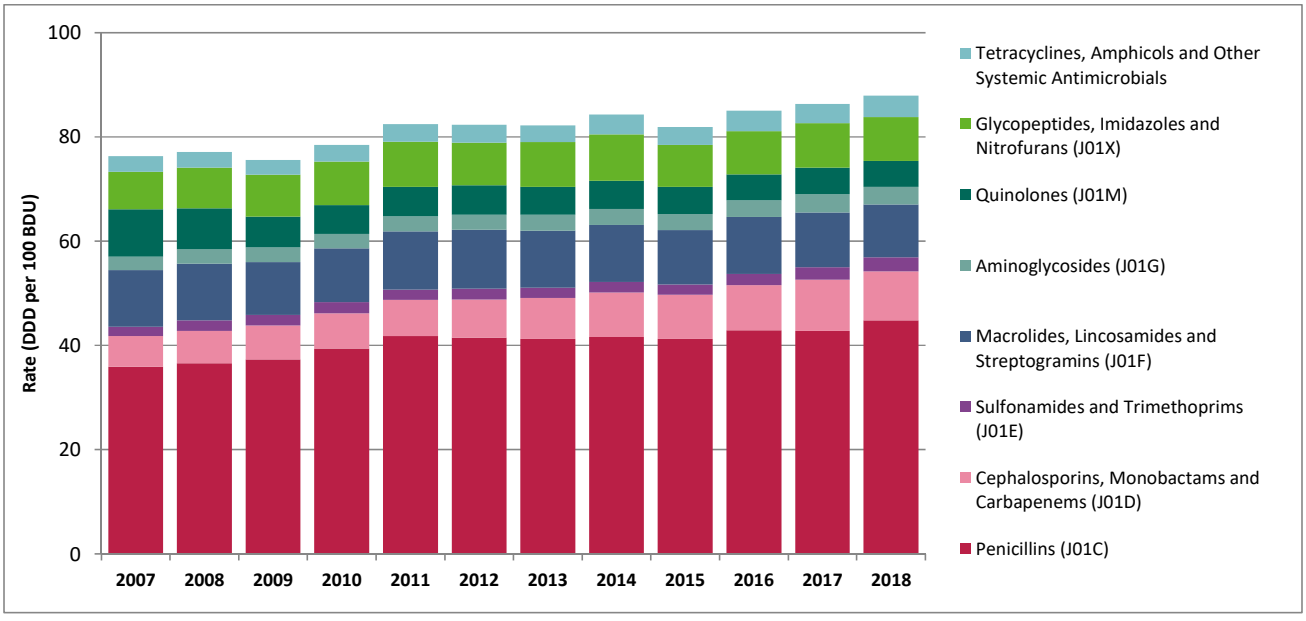

Figure 3. Overall hospital antibacterial consumption rate in DDD per 100 BDU by pharmacological subgroup (ATC level 3) by year, in Ireland.

As shown in Figure 4, carbapenem consumption increased from 1.2 DBD in 2007 to 3.8 DBD in 2014. Subsequently, consumption decreased (2.8 DBD in 2018).

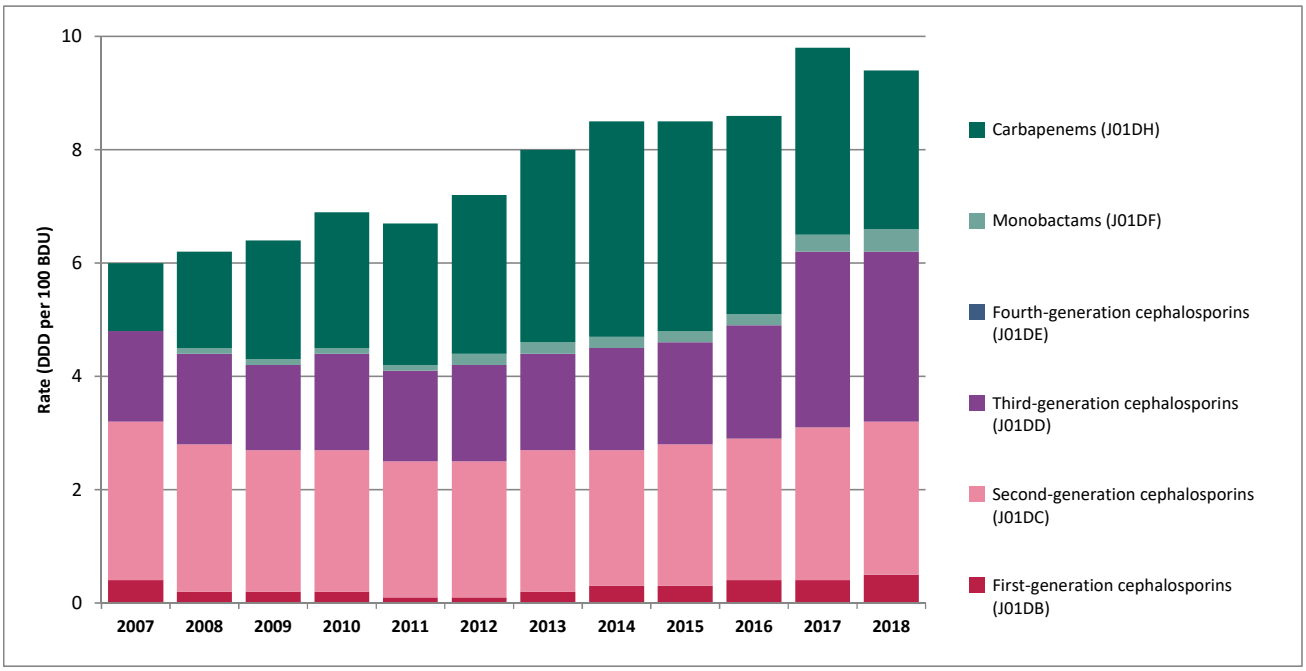

Figure 4. Overall hospital cephalosporins, monobactams and carbapenems consumption rate in DDD per 100 BDU by year, in Ireland.

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 hospital pharmacies and validated with the support of the Irish Antimicrobial Pharmacists Group 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 the calculation of outpatient antimicrobial consumption rate. Bed-days used and other activity data for public acute hospitals were provided by the HSE-Business Information Unit and used to express hospital antimicrobial consumption by bed days used.

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 model 4 (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). Furthermore, DDD calculations are based on what is considered "typical" adult dosing and

may therefore under-represent 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. The hospital data included only accounts for inpatients, all hospitals dispense to other clinical areas and facilities such as, day units, and external long-term care facilities, and the data representing this volume is excluded from our analyses. Outpatient data represents 95% of wholesale-to-retail pharmacy transactions. Therefore, there is a further gap in the data. Collectively, these gaps would represent up to 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 https://www.hpsc.ie/a-z/microbiologyantimicrobialresistance/europeansurveillanceofantimicrobialconsumptionesac/

Acknowledgements

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