

CASE STUDIES

ATC / DDD methodology

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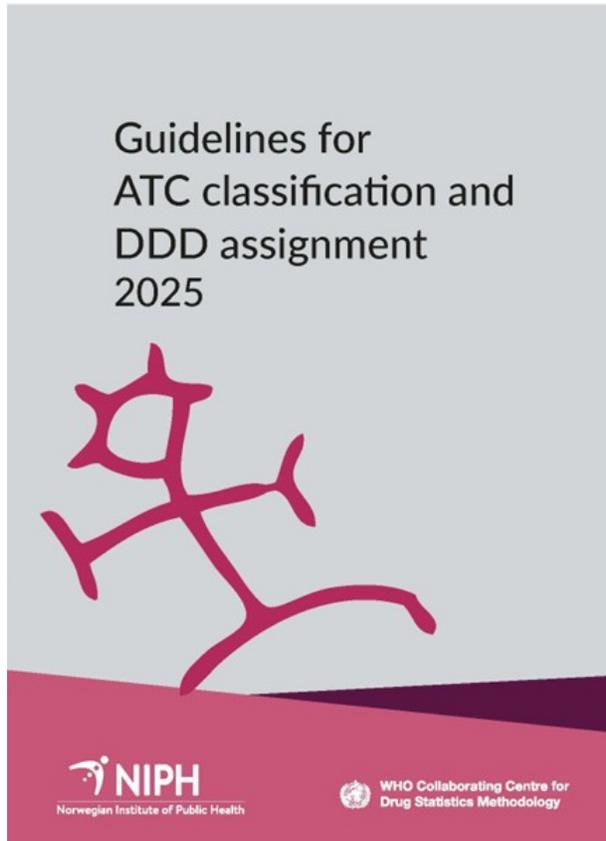
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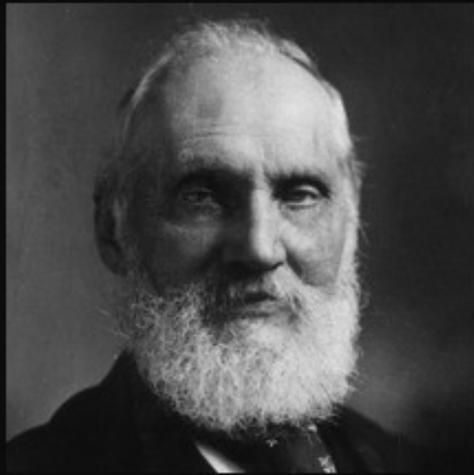
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ATC / DDD guidelines



https://atcddd.fhi.no/atc_ddd_index_and_guidelines/guidelines/



If you can not measure it, you
can not improve it.

~ Lord Kelvin

AZ QUOTES

Purpose of ATC/DDD system

- Drug utilization (aim to improve drug use)
- Allows standardization of drug groups
- Stable metric which enables comparisons of drug use between countries, regions and health care settings as well as examining trends in drug use over time and in different settings

Prescribing surveillance

Level:

- hospital, ambulatory; regional, national / international

Data sources:

- wholesalers, health insurers/reimbursement, prescription registers, patient charts, pharmacies...

Time window:

- point prevalence, longitudinal; repeated, continuous

Data availability and coverage:

- electronic databases, manual extraction; population covered

Methods in expressing drug use:

- volume, expenditures
- denominator

ATC / DDD methodology allows drug use evaluation at different levels



Interpreting results

Quality assurance

Audits

- Comparison of the data to some agreed upon standard (90% of patients receiving guideline-compliant treatment).
 - patient level data

Intrahospital comparison

- Comparison of the data to the institution's historical data or to other patient care groups in the institution (% of patients being switched from IV to PO th)
 - Patient level and/or aggregate (ecologic) data

Interhospital comparison / benchmarking

- Used to identify potential problem areas in prescribing practice and to aid in establishing appropriate and attainable goals
- Comparison of data to those obtained in similar institutions
 - Usually needed aggregate (ecologic) data

Drug use surveillance

Drug utilization

- Patterns
- Quality
- Determinants
- Outcomes

Benchmarking

- used to identify potential problem areas in prescribing practice and to aid in establishing appropriate and attainable goals

Drug use surveillance

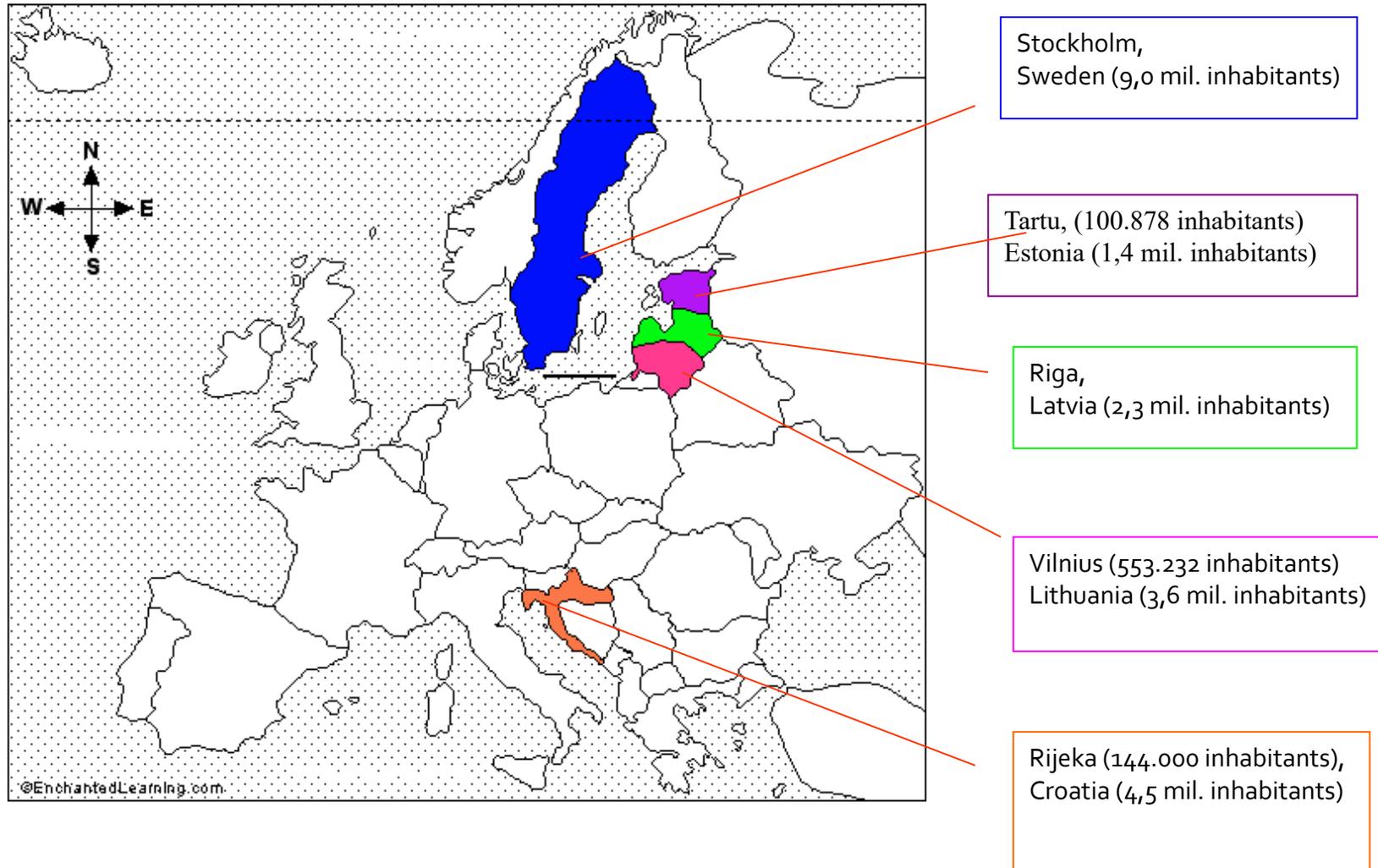
- Patterns
- Quality
- Determinants
- Outcomes

Pattern of use

covers the extent, profiles and trends in drug use and costs over time

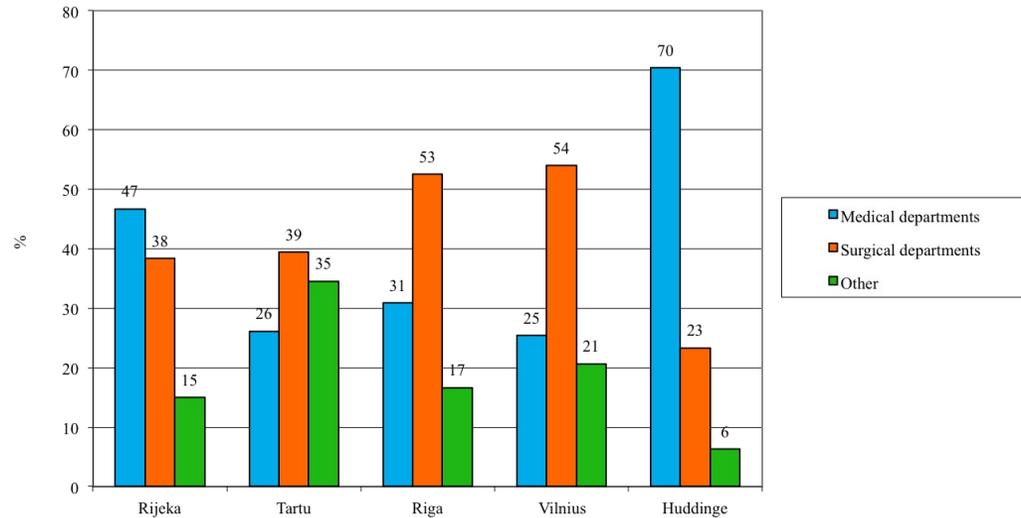
Benchmarking study

Cross national, point prevalence study on antimicrobial drug use (ATC group J01), 2003, individual hospitals, ATC/DDD, patient charts

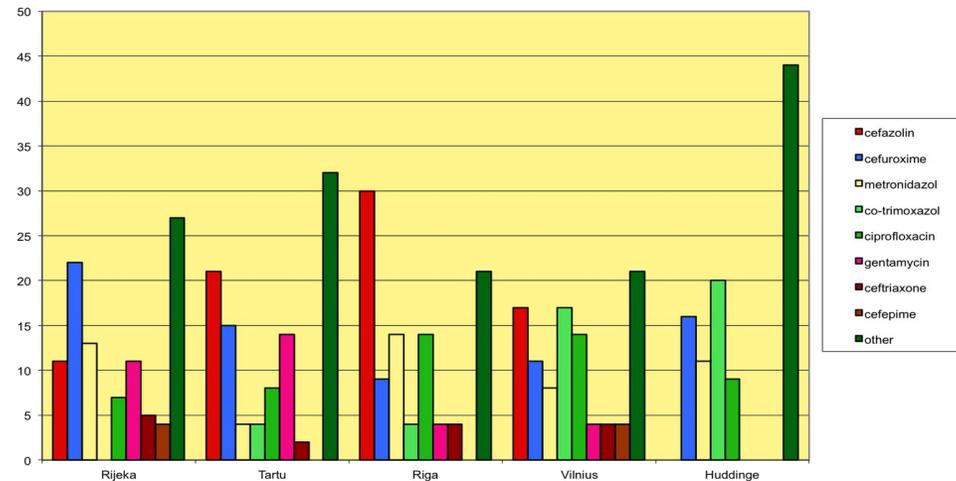
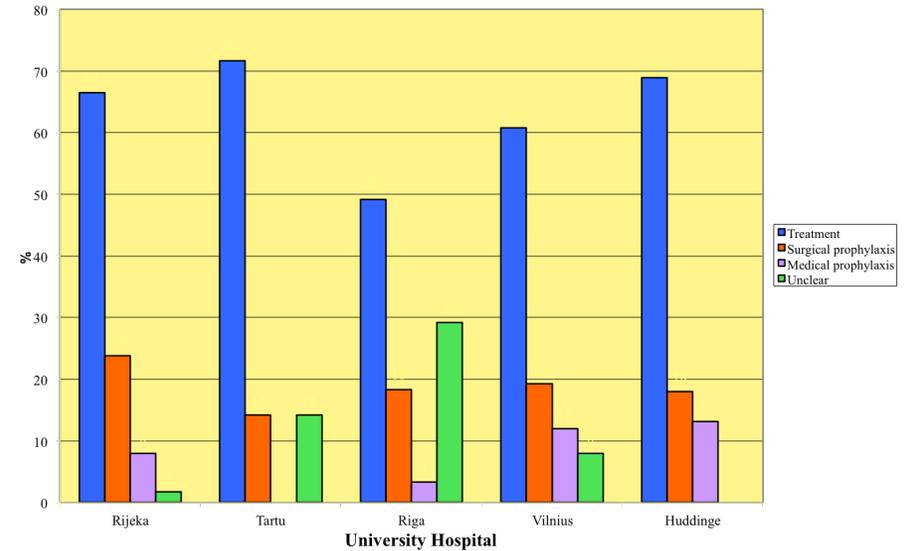


Pattern of use

The prevalence of antimicrobial drug use in different departments, and the reason for prescribing



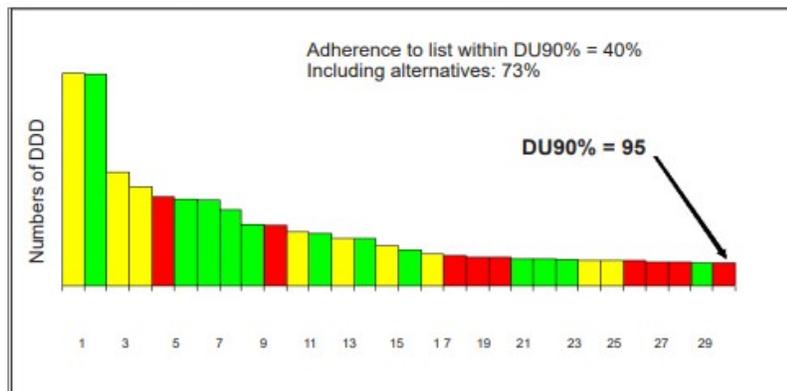
University Hospital



Adherence to WHO's Model List of Essential Medicines in two European countries

- adherence to the 2003 WHO Model List of Essential Medicines (EML) was analysed in outpatient care in two European countries — Croatia and Sweden.
- analyses focused on medicines accounting for 90% of use in Defined Daily Doses (DU90%).
 - DU90% profiles provide a quick method to overview and evaluate potential for improvement while offering a reflection on the relevance and appropriateness of the WHO Model List of Essential Medicines

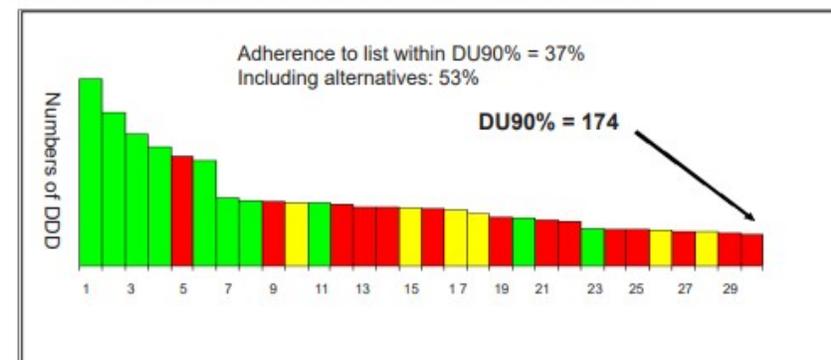
Figure 1A. DU90% profile for Croatia 2003 — outpatient care



Green = medicines included in the core EML. Yellow = alternatives to medicines, i.e. those marked with a box symbol in the EML. Red = medicines not on the EML.

	SUBSTANCE	(DDD)	Mill. DDD	% TOT	Mill Euro	Euro/DDD
1	Estradiol	2 mg	85	7.7%	1.1	0.01
2	Acetylsalicylic acid	1 tabl	84	7.7%	2.3	0.03
3	Lisinopril	10 mg	45	4.1%	12.3	0.27
4	Amlodipine	5 mg	39	3.6%	10.0	0.25
5	Diclofenac	0.1 g	36	3.3%	6.6	0.19
6	Ascorbic acid (vit C)	0.2 g	35	3.2%	1.1	0.03
7	Furosemide	40 mg	34	3.1%	1.6	0.05
8	Diazepam	10 mg	31	2.8%	3.0	0.10
9	Atenolol	75 mg	25	2.3%	3.5	0.14
10	Simvastatin	15 mg	24	2.2%	16.2	0.67
11	Isosorbide mononitrate	40 mg	22	2.0%	4.0	0.19
12	Levothyroxine	0.15 mg	21	1.9%	0.4	0.02
13	Oxazepam	50 mg	19	1.7%	4.4	0.23
14	Glibenclamide	7 mg	19	1.7%	1.8	0.09
15	Alprazolam	1 mg	16	1.5%	2.5	0.16
16	Verapamil	0.24 g	15	1.3%	2.5	0.17
17	Cilazapril	2.5 mg	13	1.2%	4.3	0.34
18	Loratadine	10 mg	12	1.1%	3.3	0.27
19	Metildigoxin	0.2 mg	11	1.0%	0.9	0.08
20	Chlortalidone	25 mg	11	1.0%	0.8	0.07
...						
95						
DU90%	1-95		987	90.1%	241	0.24
	96-388		109	9.9%	93	0.85
TOTAL	1-388		1096	100.0%	334	0.30

Figure 1B. DU90% profile for Sweden 2003 – outpatient care



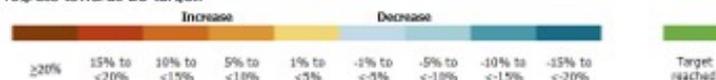
Green = medicines included in the core EML. Yellow = alternatives to medicines, i.e. those marked with a box symbol in the EML. Red = medicines not on the EML.

	SUBSTANCE	(DDD)	Mill. DDD	% TOT	Mill Euro	Euro/DDD
1	Acetylsalicylic acid	1 tablet	201	4.6%	10	0.05
2	Furosemide	40 mg	164	3.7%	14	0.08
3	Sodium fluoride	1.1 mg	142	3.2%	11	0.07
4	Ascorbic acid (vit C)	0.2 g	128	2.9%	3	0.02
5	Simvastatin	15 mg	118	2.7%	52	0.44
6	Paracetamol	3 g	113	2.6%	49	0.43
7	Enalapril	10 mg	73	1.7%	10	0.13
8	Levothyroxine	0.15 mg	71	1.6%	9	0.12
9	Lactulose	6.7 g	70	1.6%	8	0.11
10	Ramipril	2.5 mg	68	1.5%	22	0.32
11	Atenolol	75 mg	68	1.5%	9	0.13
12	Citalopram	20 mg	67	1.5%	27	0.41
13	Atorvastatin	10 mg	64	1.4%	45	0.71
14	Cyanocobalamin	1 mg	63	1.4%	8	2.00
15	Metoprolol	0.15 g	63	1.4%	39	0.63
16	Multivitamins and iron	1 tablet	62	1.4%	4	0.06
17	Felodipine	5 mg	60	1.4%	23	0.37
18	Isosorbide mononitrate	40 mg	57	1.3%	9	0.15
19	vitamin b-mixed	1 tablet	53	1.2%	9	0.16
20	Ibuprofen	1.2 g	51	1.2%	21	0.42
...						
174						
DU90%	1-174		3,970	90.1%	1,535	0.39
	175-828		438	9.9%	961	2.19
TOTAL	1-828		4,408	100.0%	2,496	0.57

Table 2. Total consumption (community and hospital sectors combined) of antibacterials for systemic use (ATC group J01), EU/EEA countries, 2019–2023 (expressed as DDD per 1 000 inhabitants per day)

Country	2019	2020	2021	2022	2023	Trend 2019–2023	Progress towards 2030 target*			
							Change (%) 2019–2023	Recommended reduction (%) 2019–2030	2023	Target 2030
Austria	11.6	8.8	8.8	10.5	11.3		-3%	-3%	11.3	11.2
Belgium	21.4	16.7	17.4	20.5	20.6		-3%	-18%	20.6	17.5
Bulgaria	20.7	22.7	24.4	25.7	26.3		+27%	-18%	26.3	17.0
Croatia	18.8	15.7	18.2	20.2	21.2		+13%	-9%	21.2	17.1
Cyprus	30.1	28.9	25.0	33.5			N/A	-27%	N/A	22.0
Czechia	16.9	13.4	13.7	17.1	18.1		+7%	-9%	18.1	15.4
Denmark	15.3	14.3	14.4	15.2	16.2		+6%	-9%	16.2	13.9
Estonia	11.8	10.5	10.1	12.4	12.7		+8%	-3%	12.7	11.4
Finland	14.7	11.9	11.3	12.5	12.9		-12%	-9%	12.9	13.3
France	25.1	20.3	21.5	24.3	24.1		-4%	-27%	24.1	18.3
Germany					13.3		N/A	-9%	13.3	11.5
Greece*	34.1	28.1	23.5	32.9	28.5		N/A	-16%	28.5	24.9
Hungary	14.4	11.2	11.9	14.4	14.2		-2%	-9%	14.2	13.1
Iceland	19.3	16.5	16.8	18.6	18.5		-4%	N/A	18.5	N/A
Ireland	22.8	18.6	17.8	23.1	22.4		-2%	-27%	22.4	16.6
Italy	21.7	18.4	17.5	21.9	23.1		+6%	-18%	23.1	17.8
Latvia	13.9	11.9	11.6	14.9	14.9		+7%	-9%	14.9	12.6
Lithuania	16.3	14.2	14.1	18.5	18.7		+15%	-9%	18.7	14.6
Luxembourg*	21.1	16.1	15.9	19.1	20.2		-4%	-18%	20.2	17.3
Malta	20.7	16.6	15.8	24.0	22.9		+11%	-18%	22.9	17.0
Netherlands	9.5	8.5	8.3	9.1	9.6		+1%	-3%	9.6	9.2
Norway	14.9	13.9	14.0	15.3	15.5		+4%	N/A	15.5	N/A
Poland	23.6	18.5	20.2	23.6	23.2		-2%	-27%	23.2	17.3
Portugal	19.3	15.2	15.3	18.8	19.7		+2%	-9%	19.7	17.6
Romania	25.8	25.2	25.7	27.6	27.4		+6%	-27%	27.4	18.8
Slovakia	19.3	14.4	16.0	20.8	20.1		+4%	-9%	20.1	17.6
Slovenia	13.0	10.2	10.2	12.4	13.4		+3%	-9%	13.4	11.8
Spain	24.9	19.7	20.0	23.2	24.1		-3%	-27%	24.1	18.2
Sweden	11.8	10.3	10.1	11.2			N/A	-3%	N/A	11.4
EU/EEA**	19.8	16.4	16.4	19.3	19.9		+1%	N/A	19.9	N/A
EU***	19.9	16.4	16.4	19.4	20.0		+1%	-20%	20.0	15.9

Progress towards EU target:



* As per the Council Recommendation on stepping up EU actions to combat antimicrobial resistance in a One Health approach (2023/C 220/01) [8].

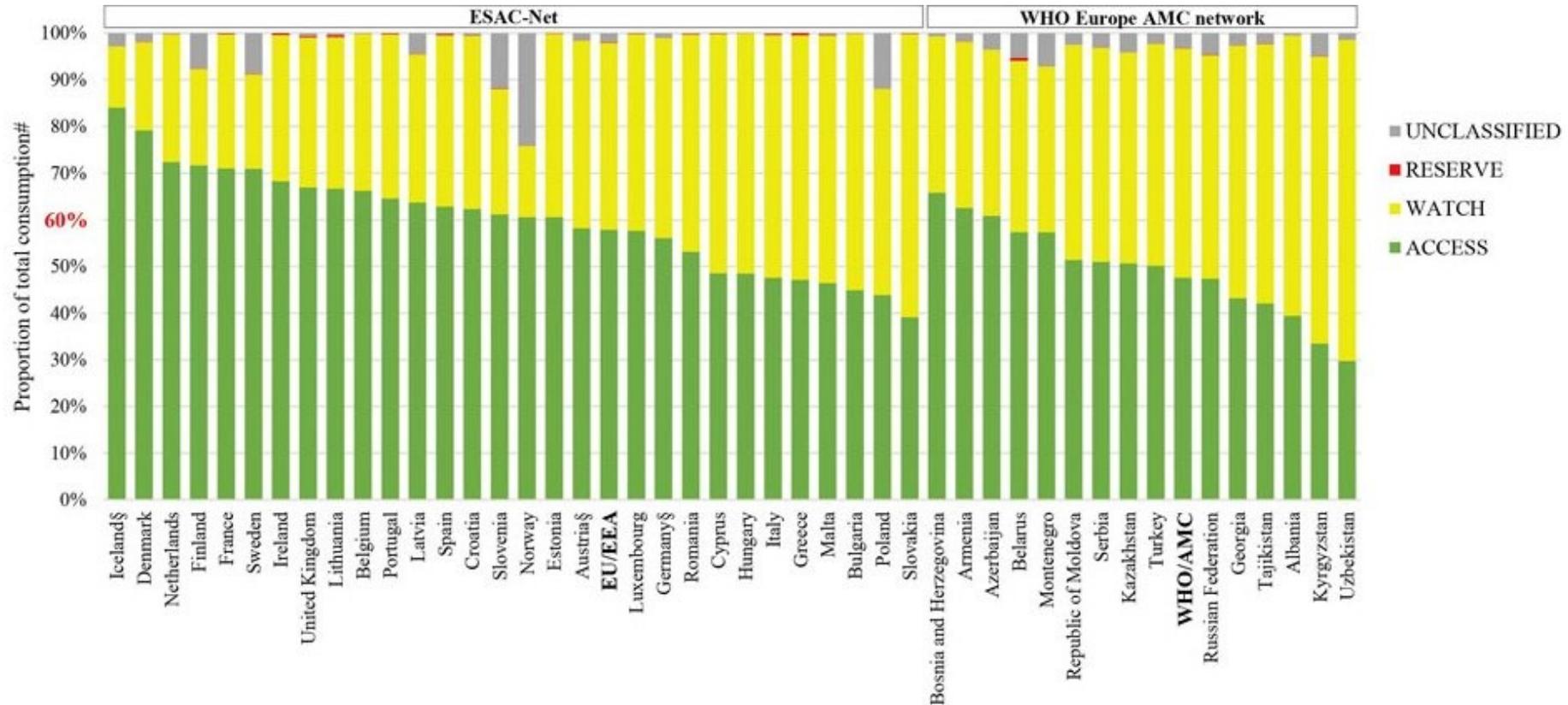
Drug use surveillance

- Patterns
- **Quality**
- Determinants
- Outcomes

Quality of use

audits to compare actual use to a standard (i.e. national prescription guidelines or local drug formularies)

Patterns of consumption of antibacterials according to the AWaRe classification of antimicrobial agents, 2018



Robertson J, Vlahović-Palčevski V, Iwamoto K, Högberg LD, Godman B, Monnet DL, Garner S, Weist K, ESAC-Net Study Group, WHO Europe AMC Network Study Group. Variations in the consumption of antimicrobial medicines in the European region, 2014–2018: Findings and implications from ESAC-Net and WHO Europe. *Frontiers in pharmacology*. 2021 Jun 17;12:639207.

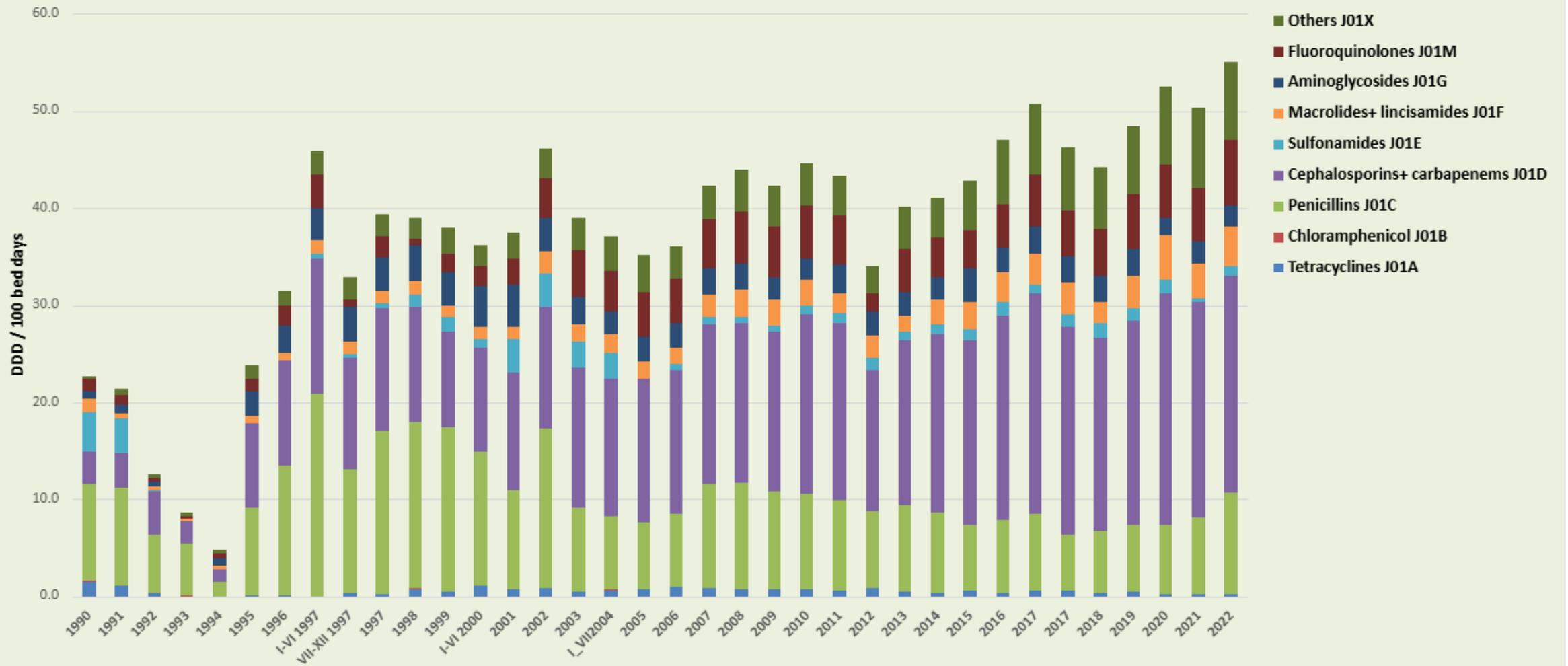
Drug use surveillance

- Patterns
- Quality
- **Determinants**
- Outcomes

Determinants of use

user, prescriber, drug characteristics

Clinical Hospital Center Rijeka, consumption of antibacterials for systemic use, ATC group J01



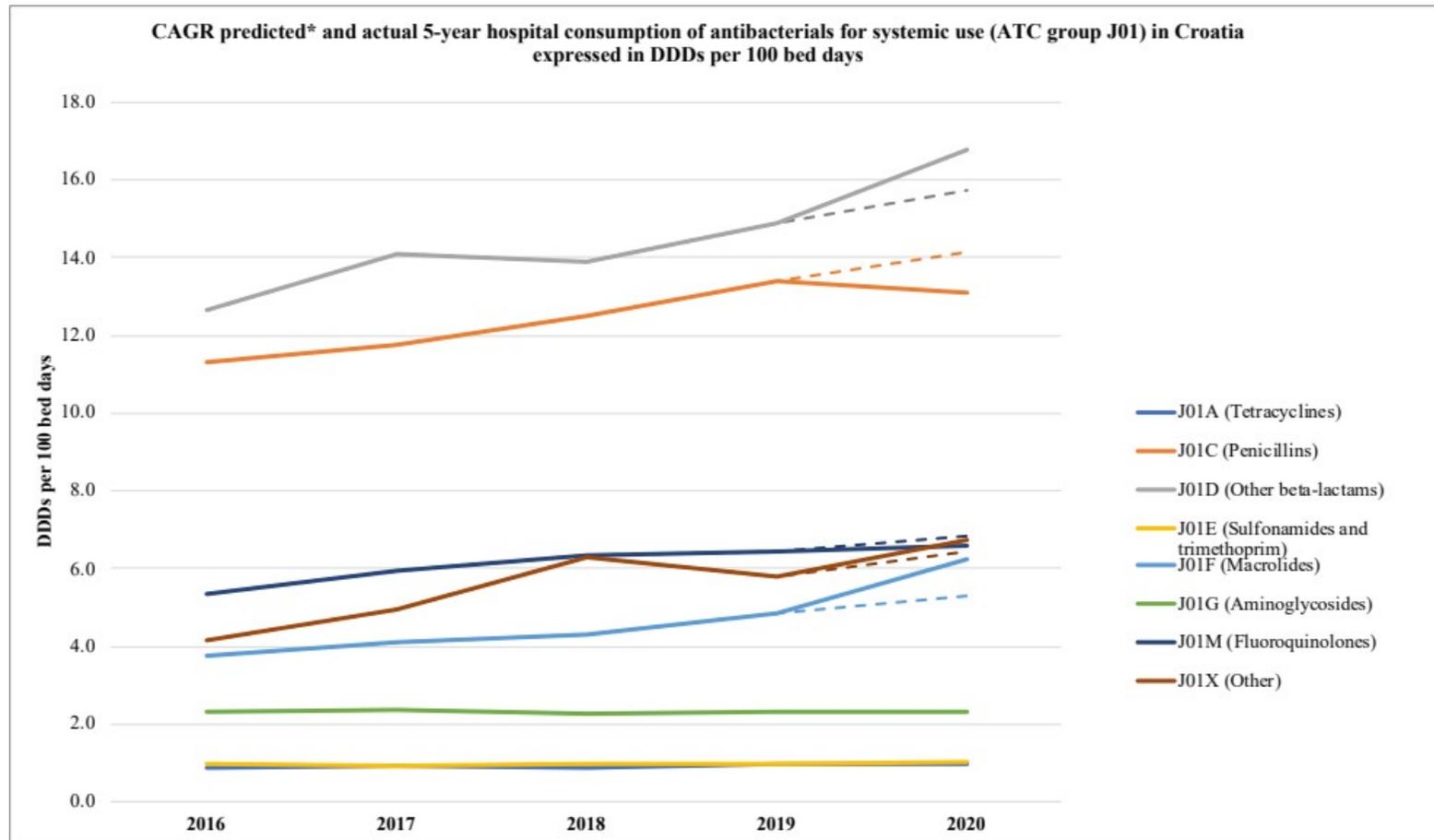
Drug use surveillance

- Patterns
- Quality
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Outcomes of use

health and economic related

CAGR predicted and actual 5-year hospital consumption of antibacterials for systemic use (ATC group J01) in Croatia expressed in DDDs per 100 bed-days. (*CAGR predicted AMC for 2020 is presented by dashed line for the respective ATC level 3 group).



Steps for implementing drug surveillance for improving drug use

- Assess current situation (data availability, data sources, data coverage and granularity...)
- Identify standards
- Set up a goal (AWaRe...)
- Plan interventions to meet the goal
- Conduct intervention
- Evaluate the impact of the intervention

THANK YOU!

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