Defined Daily Dose (DDD)

Introduction to DDD and its relevance in understanding drug utilization patterns

Live Storehagen Dansie

WHO Collaborating Center for Drug Statistics Methodology

3 April 2025, the Institute of Public Health, Chile

NIPH
Norwegian Institute of Public Health

Topics

- Definition of DDD

- Purpose of DDDs

- Main principles for the assignment of DDDs

- Implementation of the ATC/DDD system

- Drug consumption figures expressed in DDDs

- DDD alterations

DDDs for single substances

NIPH

Definition

The Defined Daily Dose (DDD)

is the assumed

average maintenance dose per day

for a drug used for its

main indication in adults

NIPH

The DDD

- **Theoretical worldwide unit** convenient for its purpose
- **International compromise** to facilitate drug consumption statistics based on a review of available documentation
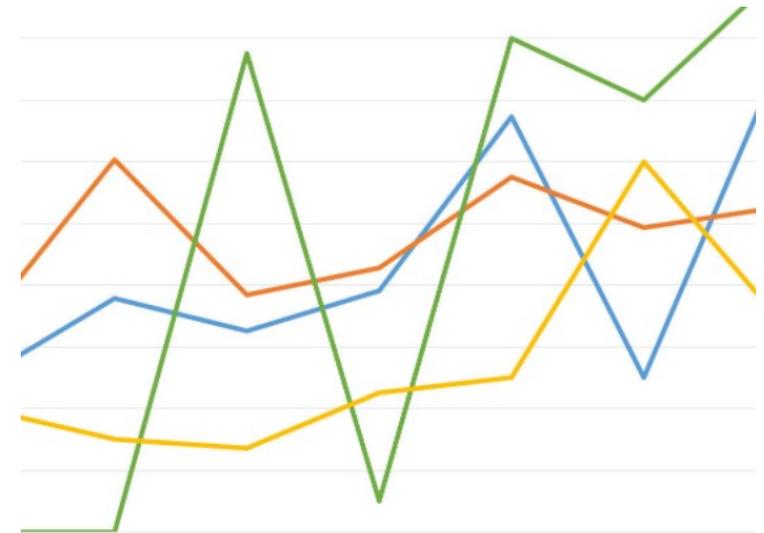- Should **not** be considered as a "correct dose"

Why DDDs?

The DDD is a **fixed measuring unit**
- independent of package size, strength, price, currencies

Purpose: Drug Utilization Resaearch (DUR)

- international and local comparisons
- conduct long term studies/analyse trends
- comparison of alternative therapies

NIPH

Why DDDs?

Country	Product	No. of packages	No. of grams	No. of DDDs (No. of grams /DDD value)
A	Amoxicillin 500 mg 100 capsules (J01CA04)	100	5 000	3 333 (DDD=1.5g)
B	Amoxil 250 mg 20 capsules (J01CA04)	1000	5 000	3 333 (DDD=1.5g)
C	Amoxicillin 125 mg/5 mL 100 ml (J01CA04)	100	250	167 (DDD=1.5g)
D	Cephalexin 500 mg 100 capsules (J01DB01)	100	5 000	2 500 (DDD=2g)

NIPH

Main principles

The DDD is based on:

1. **Main indication** (globally)

   - Different indications – one ATC code:
     liraglutide (glucagon-like peptide-1 agonist, Victoza®/Saxenda®)

     - Type 2 diabetes → A10BJ02

     - Obesity → DDD based on type 2 diabete

   - Severity of illness

     - Antidepressants (N06A): moderately severe depressions

     - Antiinfectives (J): moderate severity (main rule), except antiinfectives only used in severe infections

NIPH

Main principles (cont.)

The DDD is based on:

1. **Main indication** (globally)

2. **Average maintenance dose** (in adults)
   - The therapeutic dose used in monotherapy is normally the basis for the DDD (main rule)
   - Initial doses (high/low) usually not considered
   - The duration of treatment is usually not taken into consideration
     - Exception: Antibacterials
   - Intermittent dosing: DDD is the average daily dose during the treatment period

Treatment **>** 1 week

DDD = maintenance dose

Treatment **≤** 1 week

$$DDD = \frac{total\ course\ dose\ (incl.\ loading\ dose)}{number\ of\ treatment\ days}$$

NIPH

Main principles (cont.)

The DDD is based on:

1. **Main indication** (globally)

2. **Average maintenance dose** (in adults)

3. **Administration/dosage form**
   - The DDD is described by the route of administration
   - Only one DDD per route of administration within an ATC code
   - The DDD is often the same for various administration/dosage forms of the same drug
   - The DDD can be different if the bioavailability between administration forms is substantially different

ATC code	Name	DDD	U	Adm.R	Note
N02AX02	tramadol	0.3	g	O	
		0.3	g	P	
		0.3	g	R	

ATC code	Name	DDD	U	Adm.R	Note
N02AA01	morphine	0.1	g	O	
		30	mg	P	
		30	mg	R	

NIPH

ATC/DDD system

«International language for drug utilization monitoring and research»

- Aims to serve as a tool for drug utilization monitoring and research in order to **improve quality of drug use**

- Allows standardization of drug groups and provides a stable drug utilization metric

- Drug consumption statistics can be used:
  - **Globally** - cross national comparisons
  - **Nationally** - changes in health policies
  - **Locally** - to provide feedback to prescribers

NIPH

First steps towards implementation

How to start

Each medicinal product has to be linked to the appropriate

- ATC code

- DDD

- Number of DDDs per package
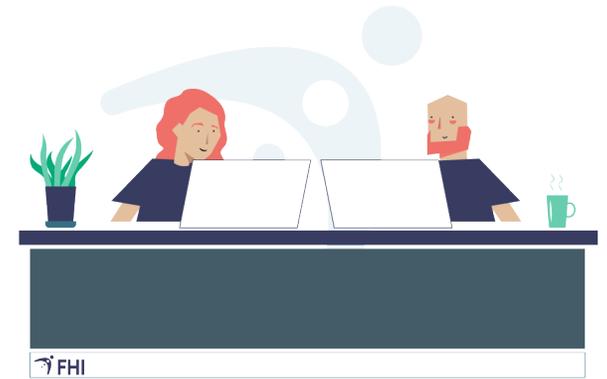
- Route of administration

- Active ingredient(s)
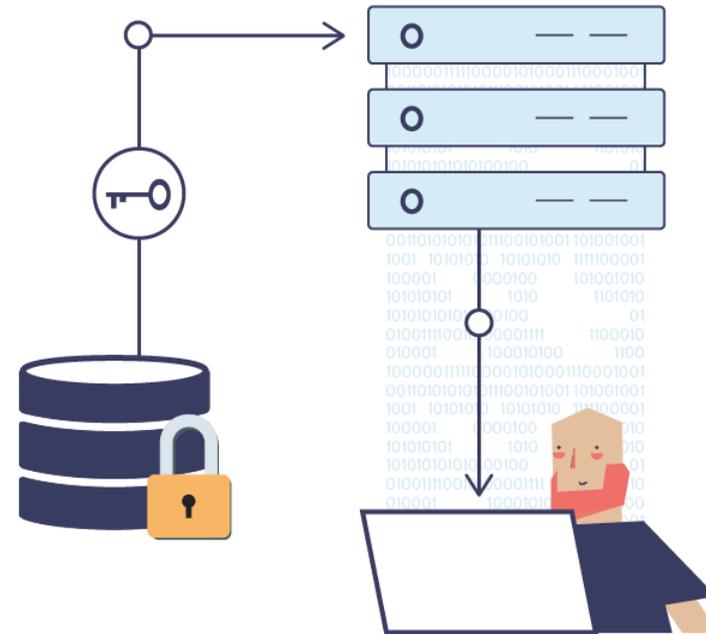
Implementation of the ATC/DDD system

- National Registers of Medicines

- Strict control routines for adding, changing and updating the ATC/DDD information

  ⓘ Annual updates

- Team responsible should be properly trained in the ATC/DDD methodology

NIPH

Drug registry – key elements

Example

$$\frac{Strength \; (value) \, x \, pack \; size}{DDD \; value}$$

Unique Identifier	Brand name and formulation	Strength	Pack size	ATC code	Generic name	DDD value	DDDs/ package
382531	Zocor tab	40mg	98	C10AA01	simvastatin	30mg	130,67
454165	Zocor tab	10mg	98	C10AA01	simvastatin	30mg	32,67
517292	Zocor tab	80mg	28	C10AA01	simvastatin	30mg	75,67

NIPH

Utilization figures in DDDs

- Sales volume expressed in number of packages for a given population and time period can be transferred to number of DDDs
  - Total utilization in DDDs: Number of packages sold x Number of DDD in the pack
- Drug utilization figures expressed in DDDs are generally reported in units that control for population size differences
- This provides a measure of exposure or therapeutic intensity in a defined population, allowing comparisons across various time periods and population groups

NIPH

Utilization figures in DDDs (cont.)

- DDDs/1000 inhabitants/day:

$$\frac{\text{Total consumption measured in D}}{\text{Number of days in the period of data collection (360)}} \quad \text{x 1000}$$
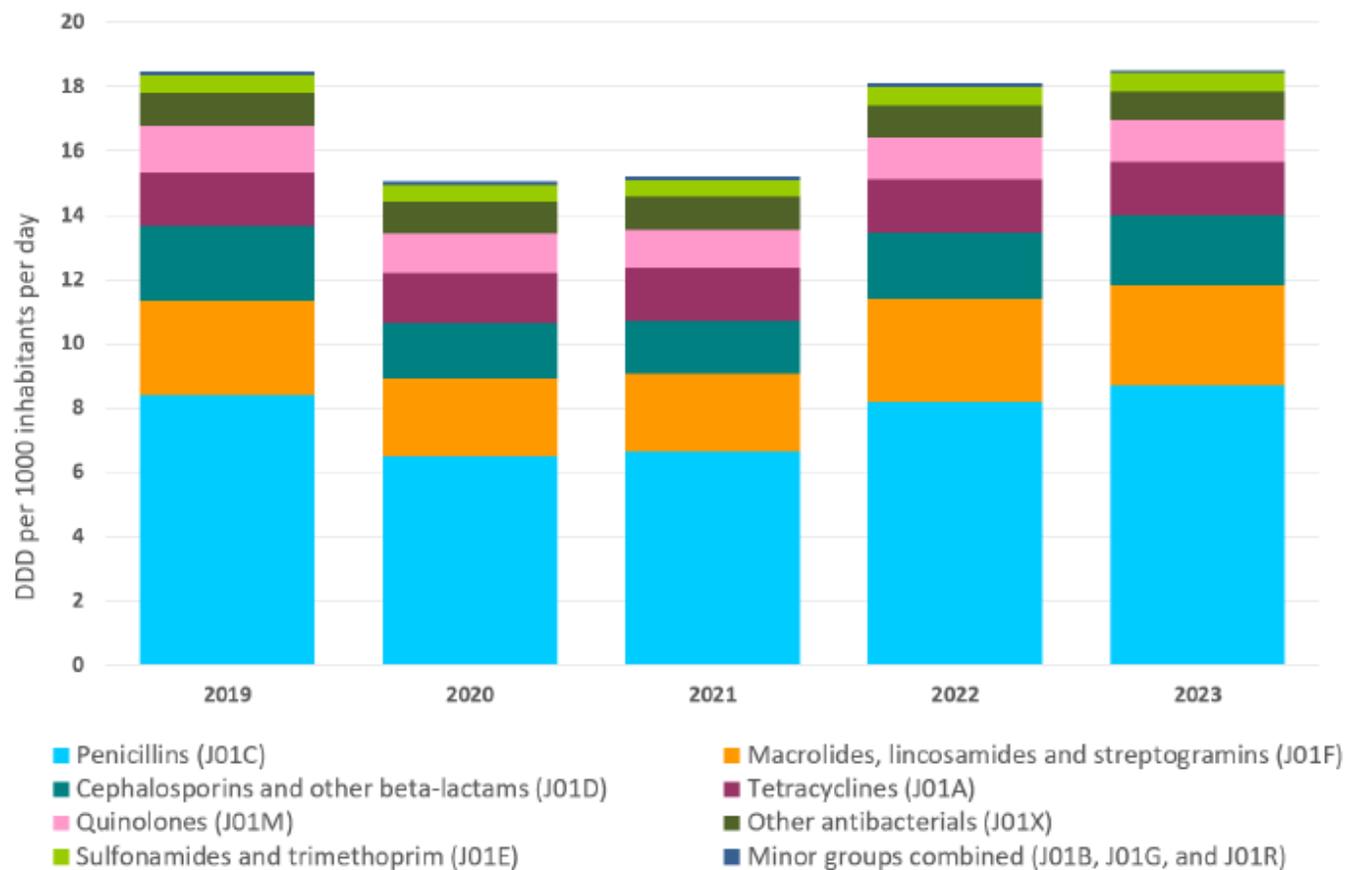
Example: The consumption of escitalopram (N06AB10) in Norway in 2024 was **20 DDDs/1000 inhabitants/day**

- Indicates that 2% of the population may have used escitalopram daily
  - Note: This interpretation is only correct if the DDD ≈ PDD

NIPH

Drug consumption statistics using DDDs

Example 1: Antibacterials, Europe (primary care)

Figure 1. Community consumption of antibacterials for systemic use (ATC group J01) by subgroup (ATC level 3), EU/EEA population-weighted mean*, 2019−2023 (expressed as DDD per 1 000 inhabitants per day)

- Penicillins (J01C)
- Macrolides, lincosamides and streptogramins (J01F)
- Cephalosporins and other beta-lactams (J01D)
- Tetracyclines (J01A)
- Quinolones (J01M)
- Other antibacterials (J01X)
- Sulfonamides and trimethoprim (J01E)
- Minor groups combined (J01B, J01G, and J01R)

Drug consumption statistics using DDDs

Example 2: Antidepressants, Nordic countries

Consumption of antidepressants (N06A) in Nordic countries 2013-2022
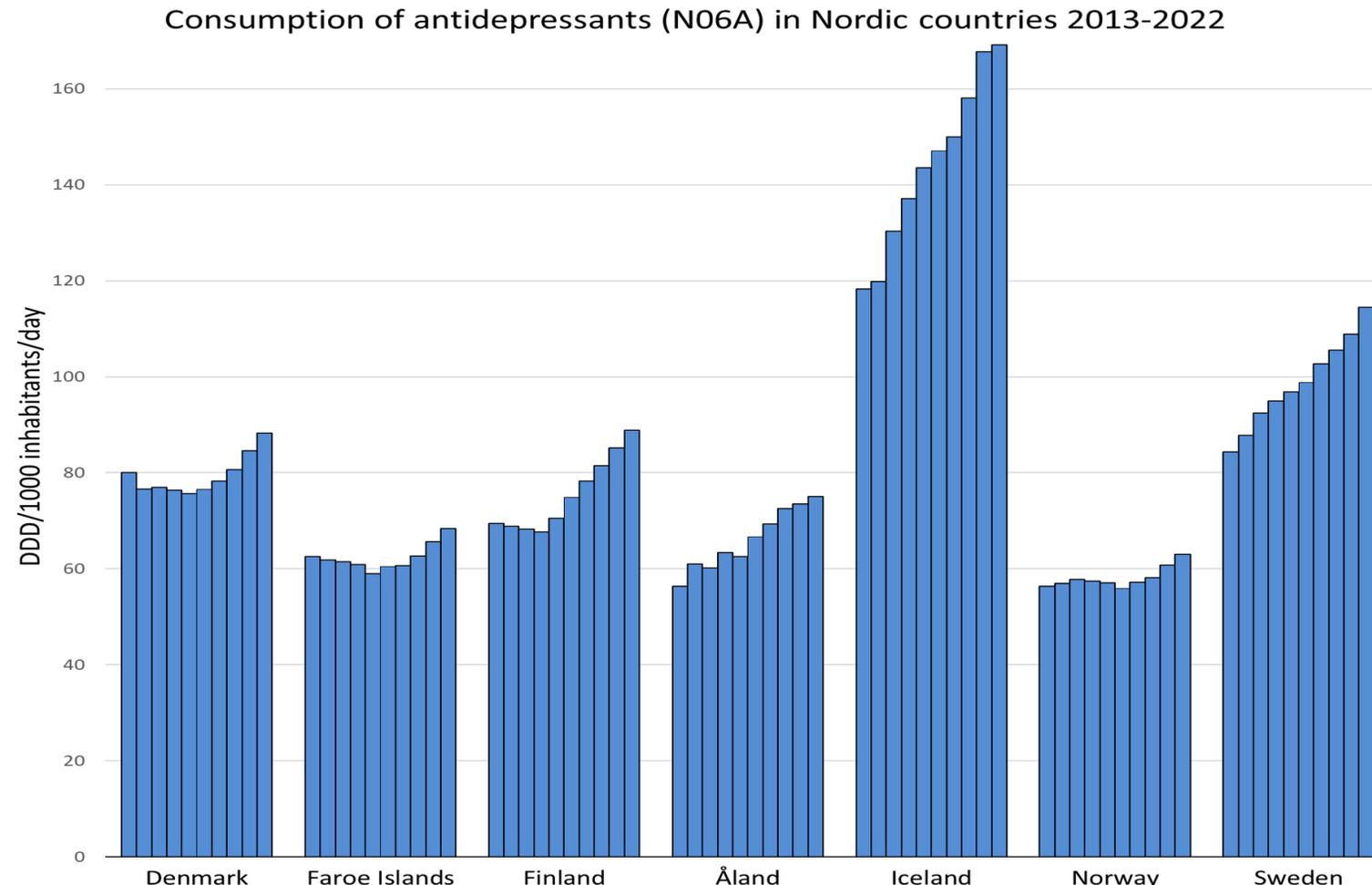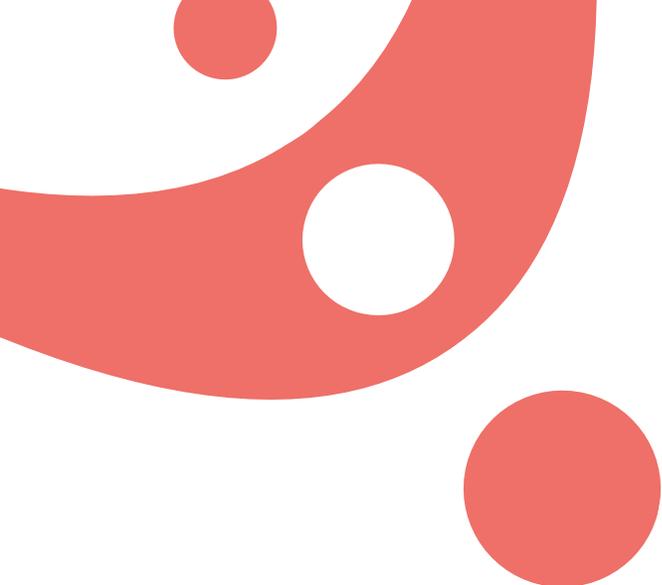
Source: NOMESCO, Nordic Health and Welfare statistics
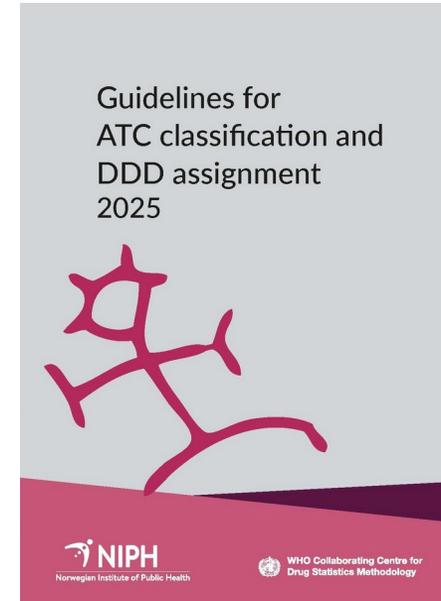
DDD alterations

- Changes should be kept to a minimum to keep the system stable

- All changes in the ATC/DDD system is challenging!
  - All historical data must be updated

- Therapeutically important drug groups and frequently used drugs are given priority

NIPH

Guidelines for
ATC classification and
DDD assignment
2025

NIPH
Norwegian Institute of Public Health

WHO Collaborating Centre for
Drug Statistics Methodology

atcddd.fhi.no
whocc@fhi.no

Questions?

Thank you!