BELGIAN HOSPITALS – SURVEILLANCE OF ANTIMICROBIAL CONSUMPTION (BEH-SAC)

Eline Vandael, Boudewijn Catry

Contact: eline.vandael@sciensano.be

BAPCOC workshop – 02/10/2019
Content

- Introduction and objectives
- Methodology
- National results
- Reports on Healthstat.be: demo
- Strengths and weaknesses
- Future plans
- Experiences from hospitals: Caroline Briquet (St. Luc Brussels) and Franky Buyle (UZ Gent)
**Introduction**

**Anatomical Therapeutic Chemical (ATC) classification**

- Active substances are divided into different groups according to the organ or system on which they act and their therapeutic, pharmacological and chemical properties.

- Five different levels

<table>
<thead>
<tr>
<th>J</th>
<th>Anti-infectives for systemic use</th>
<th>1st level, anatomical main group</th>
</tr>
</thead>
<tbody>
<tr>
<td>J01</td>
<td>Antibacterials for systemic use</td>
<td>2nd level, therapeutic subgroup</td>
</tr>
<tr>
<td>J01C</td>
<td>Beta-lactam antibacterials, penicillins</td>
<td>3rd level, pharmacological subgroup</td>
</tr>
<tr>
<td>J01CA</td>
<td>Penicillins with extended spectrum</td>
<td>4th level, chemical subgroup</td>
</tr>
<tr>
<td>J01CA04</td>
<td>Amoxicillin</td>
<td>5th level, chemical substance</td>
</tr>
</tbody>
</table>

https://www.whocc.no/atc_ddd_index/
**Introduction**

**Defined Daily Dose (DDD) =**
the assumed average maintenance dose per day for a drug used for its main indication in adults (70 kg)

- Numerator for drug consumption
- International unit
- To assess trends in drug consumption and to perform comparisons between population groups
- Normally one DDD for each drug (per administration route)
- Systematic update by experts
- Disadvantages: not appropriate for children and patients with reduced drug excretion, not always in line with the actual doses in the hospitals

https://www.whocc.no/atc_ddd_index/
Introduction

ESAC-Net

- Europe-wide network
- Reporting for Belgium: 1x/year (July-August)
- Reimbursement data
- Overall AM consumption
- Hospitals vs community
- DDDs/1000 inhabitants/day
- Results publically available

- Belgian hospitals
- Reimbursement data
- Individual reports for each hospital + benchmarking
- DDDs/1000 patient days + DDDs/1000 admissions

Objectives

- To develop and offer a **scientifically standardized methodology** to Belgian hospital (acute and chronic care hospitals), to follow-up their antimicrobial consumption in a quantitative way through time.

- To give Belgian hospitals the opportunity to **benchmark**, based on their antimicrobial consumption, with similar hospitals.

- To provide recent **national and regional data** (with an acceptable delay in time) to be able to evaluate the antimicrobial consumption in Belgian hospitals.
### Methodology

<table>
<thead>
<tr>
<th>Source of the data</th>
<th>2007</th>
<th>2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hospitals</td>
<td>BeH-SAC</td>
<td></td>
</tr>
<tr>
<td>Data collection</td>
<td>1x/year</td>
<td>2x/year</td>
</tr>
<tr>
<td>Feedback reports</td>
<td>NSIH-web</td>
<td>Healthdata</td>
</tr>
</tbody>
</table>

- ↓ workload for hospitals
- ↓ variation in data collection
- more detailed data
- improved reporting
## Methodology

<table>
<thead>
<tr>
<th>Year + trimester</th>
<th>2003-2017 (→ year data 2018 expected in Jan 2020)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Numerator</td>
<td>Consumed units per drug, translated in DDDs</td>
</tr>
<tr>
<td>ATC-codes</td>
<td>A07A = Intestinal anti-infectives</td>
</tr>
<tr>
<td></td>
<td>J01 = Antibacterials for systemic use</td>
</tr>
<tr>
<td></td>
<td>J02 + D01BA = Antimycotics and antifungals for systemic use</td>
</tr>
<tr>
<td></td>
<td>P01AB = Nitroimidazole derivatives</td>
</tr>
<tr>
<td></td>
<td>J04A = Drugs for treatment of tuberculosis</td>
</tr>
<tr>
<td></td>
<td>J05 = Antivirals for systemic use (only starting from 2015)</td>
</tr>
<tr>
<td>Denominators</td>
<td>Patient days + admissions</td>
</tr>
<tr>
<td>Hospitals</td>
<td>Acute care, chronic care and psychiatric hospitals</td>
</tr>
<tr>
<td></td>
<td>Identified based on the RIZIV/INAMI-number</td>
</tr>
<tr>
<td></td>
<td>Benchmarking per:</td>
</tr>
<tr>
<td></td>
<td>- Kind (acute, chronic, psychiatric)</td>
</tr>
<tr>
<td></td>
<td>- Type (primary, secondary, tertiary, specialised)</td>
</tr>
<tr>
<td></td>
<td>- Size (large, medium, small)</td>
</tr>
<tr>
<td></td>
<td>- Region (Brussels, Flanders, Wallonia)</td>
</tr>
<tr>
<td>Hospital units</td>
<td>Including internal medicine, surgery, pediatrics, neonatology, maternity, ICU, infectious diseases, burn unit, geriatrics, specialised/chronic care, (neuro)psychiatry, surgical day hospitalisations</td>
</tr>
</tbody>
</table>

ATC = Anatomical Therapeutic Chemical classification; DDD = defined daily dose; ICU = intensive care unit
National results

Overall antibiotic consumption (J01) – All units without psychiatry and day hospitalizations

All Belgian acute-care hospitals (n=101)

Median antibiotic use in 2017:

503.2 DDDs/1000 patient days

→ 2003-2017: +9.4%

3271.7 DDDs/1000 admissions

→ 2008-2017: -8.5%

Legend boxplot: a. maximum (without outliers, 1.5x interquartile range), b. 75 percentile (P75), c. median, d. mean, e. 25 percentile (P25), f. minimum (without outliers, 1.5x interquartile range).
National results

Overall antibiotic consumption (J01) – All units without psychiatry and day hospitalizations

All Belgian acute-care hospitals (n=101)

Legend boxplot: a. maximum (without outliers, 1.5x interquartile range), b. 75 percentile (P75), c. median, d. mean, e. 25 percentile (P25), f. minimum (without outliers, 1.5x interquartile range). Outliers included in the graph.
National results

Top 10 most used products in 2017

- Parenteral antibiotic use: 64.0%
- Broad-spectrum antibiotic use: 31.7%

Median DDDs/1000 patient days

- Piperacillin + enzyminhibitor
- Ciprofloxacin
- Fluoroacillin
- Ceftriaxone
- Fluconazole
- Moxifloxacin
- Meropenem

Broad-spectrum: piperacillin in combination with a beta-lactamase inhibitor (J01CR05), third- and fourth-generation cephalosporins (J01DD and J01DE), monobactams (J01DF), carbapenems (J01DH), fluoroquinolones (J01MA), glycopeptides (J01XA), polymyxins (J01XB), daptomycin (J01XX09) and oxazolidinones: linezolid (J01XX08) and tedizolid (J01XX11)
DEMO
BEH-SAC REPORTS
ON HEALTHSTAT
Demo BeH-SAC reports on Healthstat.be

- National reports → publically available
- Hospital reports → login with e-ID

www.healthstat.be
BeH-SAC reports on Healthstat.be
Step 1: Contact the RAE (Responsible Access Entity) of your hospital to activate your access to the BeH-SAC reports
→ Link to step by step instructions for the RAE on www.nsih.be

Step 2: login on www.healthstat.be with your electronic identity card to open the reports
→ user manual to getting started on Healthstat on www.nsih.be

In case of technical problems, please contact the support of Healthdata: support.healthdata@sciensano.be or 02 793 01 42.

If this is the first time that your hospital participates in this surveillance, contact Eline Vandael of Sciensano for further instructions (eline.vandael@sciensano.be or 02 642 50 26).
Aanmelden bij de online overheid

Kies uw digitale sleutel om aan te melden

Digitale sleutel(s) met eID of digitale identiteit

- **AANMELDEN** met eID kaartje
  - **AANMELDEN** via itsme
    - Je itsme-account aanmaken

Digitale sleutel(s) met beveiligingscode en gebruikersnaam + wachtwoord

- **AANMELDEN** met beveiligingscode via mobiele app

Ik wil me aanmelden als:

- **Burger**

Binnen de organisatie:

- **HOSPITAL WILMAR 1**

Profiel bevestigen

Hulp nodig
Focus on the most used products
Focus on different AM groups
- Overall antibiotic (J01) and antimycotic use (J02)
- Fluoroquinolones (J01MA)
- Third-generation cephalosporines (J01DD)
- Carbapenems (J01DH)
- Penicillins in combination with enzym inhibitors (J01CR)
- Glycopeptides (J01XA) and polymyxins (J01XB)
- Broad-spectrum antibiotics (J01CR05, J01DD, J01DE, J01DF, J01DH, J01MA, J01XA, J01XB, J01XX08/09/11)

Focus on different hospital units
- ICU (490)
- Geriatrics (300)
- Surgery (210)
- Internal medicine (220)

CAVE: denominator = patient days for analyses per unit
BeH-SAC reports on Healthstat.be

- Evolution with a line
- Evolution of denominators (second y-axis)

→ Check denominators
Current use of the reports

Number of registered hospitals

Number of registered users

Number of users that opened at least one BeH-SAC report on Healthstat

Number of views (August 2019)

- Graph with boxplots: 1501
- Line graph with evolution: 1635
- Top 10 most used product: 577

<table>
<thead>
<tr>
<th>Month</th>
<th>Number of registered hospitals</th>
<th>Number of registered users</th>
<th>Number of users that opened at least one BeH-SAC report on Healthstat</th>
</tr>
</thead>
<tbody>
<tr>
<td>May 2018</td>
<td>67</td>
<td>20</td>
<td>67</td>
</tr>
<tr>
<td>August 2018</td>
<td>164</td>
<td>88</td>
<td>88</td>
</tr>
<tr>
<td>August 2019</td>
<td>164</td>
<td>1501</td>
<td>1635</td>
</tr>
</tbody>
</table>
### Strengths and weaknesses

<table>
<thead>
<tr>
<th>Positive</th>
<th>Negative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reuse of existing data</td>
<td>Delay in data (± 1 year), adjustments possible</td>
</tr>
<tr>
<td>No registration load for hospitals</td>
<td>Non-reimbursed use not included</td>
</tr>
<tr>
<td>Uniformity data collection</td>
<td>DDDs ↔ actual doses used</td>
</tr>
<tr>
<td>Extended database</td>
<td>DDDs not appropriate for children</td>
</tr>
<tr>
<td>Detailed data on different levels (national, regional, hospital, unit)</td>
<td>No duration of treatment available</td>
</tr>
<tr>
<td>Interactive reporting (Healthstat.be) with benchmarking</td>
<td>Units not detailed enough for feedback to specific prescribers</td>
</tr>
<tr>
<td>Hospital-specific indicators (DDDs/1000 patient days and DDDs/1000 admissions)</td>
<td>No link with indication</td>
</tr>
</tbody>
</table>

! Own surveillance on AM consumption in your hospital
Future plans

- New indicator: 
  \[ DDA = DDD \] adjusted for the Belgian setting

- Validation of high/low consumers - outliers or other hospitals volunteering...

- Extra reports on Healthstat to identify outliers/high consumption

- New project AM-DIA (Antimicrobial Consumption data of Belgian Hospitals linked with Diagnoses) → minimal hospital data linked with facturation data

*DDA = daily dose administration; DDD = defined daily dose*
Validation

Possible differences between databases:

- DDD calculation (version WHO), ATC codes
- Denominator
- Which units are included (classification RIZIV/INAMI)
- Which hospital sites are included
- BeH-SAC: only reimbursed consumption

ATC = Anatomical Therapeutic Chemical classification; DDD = defined daily dose; WHO = World Health Organisation
RIZIV = Rijksinstituut voor ziekte- en invaliditeitsverzekering; INAMI = Institut National d’Assurance Maladie-Invalidité
Future plans

- New indicator:
  DDA = DDD adjusted for the Belgian setting

- Validation of high consumers/outliers
  or other hospitals volunteering…

- Extra reports on Healthstat to identify outliers/high consumption

- New project AM-DIA (Antimicrobial Consumption data of Belgian Hospitals linked with Diagnoses)
  → minimal hospital data linked with facturation data

DDA = daily dose administration; DDD = defined daily dose
Help/support/feedback

Need help?
eline.vandael@sciensano.be
+32 2 642 50 26

Feedback?
Satisfaction survey NSIH surveillances
Waakprogramma voor het systemisch en gastro-intestinaal gebruik van anti-infectieuze geneesmiddelen

BeH-SAC: Belgian Hospitals - Surveillance of Antimicrobial Consumption

Inleiding

Antimicrobiële resistentie leidt tot hogere morbiditeit en bijkomende gezondheidszorguitgaven.


De werkgroep ziekenhuisgeneeskunde van de Commissie voor de Coordinatie van het Antibioticabeleid (BAPCOC) volgt deze maatregel op en zorgt ervoor dat elk Belgisch ziekenhuis feedbackrapporten over zijn gebruik van antimicrobiële middelen kan ontvangen.

(EV_25072017)

- Protocol
- DDD/DDA list
- National report
- Instructions Healthstat
Acknowledgements

Participating hospitals
BAPCOC working group Hospital Medicine

NSIH-team, Nathalie Verhocht, Tadek Kryzwania
Healthdata: Thaddé Mahmourian, Juan Quesada, Kris Vranken, Gaëtan Muyldermans

Contact: eline.vandael@sciensano.be
National results

Hospitals with high total antibiotic consumption over time

<table>
<thead>
<tr>
<th>Hospital</th>
<th>2</th>
<th>2</th>
<th>2</th>
<th>2</th>
<th>2</th>
<th>2</th>
<th>2</th>
<th>2</th>
<th>2</th>
<th>2</th>
<th>2</th>
<th>2</th>
<th>2</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>4</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>5</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>6</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>7</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>8</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>9</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>10</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>11</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

≥ 90 percentile per type of hospital DDDs/1000 patient days

Further validation
National results

Percentiles total antibiotic consumption (DDD/1000 patient days) per type of hospital:

<table>
<thead>
<tr>
<th>Percentile</th>
<th>≤10</th>
<th>&gt;10 - ≤25</th>
<th>&gt;25 - ≤50</th>
<th>&gt;50 - ≤75</th>
<th>&gt;75 - &lt;90</th>
<th>≥90</th>
</tr>
</thead>
</table>

Distribution hospitals 2013-2017

- 5 years same percentile
- 4 years same percentile
- 3 years same percentile
- <3 years same percentile
National results

Overall antibiotic consumption (J01) – All units without psychiatry and day hospitalizations
ABUH versus BeH-SAC (database 2018)
Overlapping hospitals and years (2007-2014)

Legend boxplot: a. maximum (without outliers, 1.5x interquartile range), b. 75 percentile (P75), c. median, d. mean,
e. 25 percentile (P25), f. minimum (without outliers, 1.5x interquartile range). Outliers included in the graph