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

Eline Vandael, Boudewijn Catry

Contact: eline.vandael@sciensano.be

NSIH symposium – 26/09/2019
Antibioticabeleid in Belgische ziekenhuizen
Gebruik van gegevens bij de implementatie van antibiotic stewardship programma’s

SAVE the DATE

Woensdag 2 oktober 2019
Brussel
Feedback over lopende BAPCOC-projecten in Belgische ziekenhuizen:
P4P, BeH-SAC, ECDC-PPS en Global-PPS
Met inleiding van Dhr. Pedro Facon, Directeur-generaal Gezondheidszorg
www.bapcoc.be
www.becaremagazine.be
- Introduction and objectives
- Methodology
- Reports on Healthstat.be
- National results
- Future plans
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>
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
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

#### ABUH → BeH-SAC

<table>
<thead>
<tr>
<th>Source of the data</th>
<th>2007</th>
<th>2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hospitals</td>
<td></td>
<td>RIZIV-INAMI Reimbursement data</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

**ABUH = Antibiotic use in Hospitals; BeH-SAC = Belgian Hospitals – Surveillance of Antimicrobial Consumption; RIZIV = Rijksinstituut voor ziekte- en invaliditeitsverzekering; INAMI = Institut National d‘Assurance Maladie-Invalidité**
### Methodology

<table>
<thead>
<tr>
<th>Year + trimester</th>
<th>2003-2017 (→ year data 2018 expected in Jan 2020)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Numerator</strong></td>
<td>Consumed units per drug, translated in DDDs</td>
</tr>
<tr>
<td><strong>ATC-codes</strong></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><strong>Denominators</strong></td>
<td>Patient days + admissions</td>
</tr>
<tr>
<td><strong>Hospitals</strong></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><strong>Hospital units</strong></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
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
Current use of the reports

- Number of registered hospitals:
  - May 2018: 67
  - August 2018: 88
  - August 2019: 164

- Number of registered users:
  - May 2018: 20
  - August 2018: 40
  - August 2019: 88

- Number of users that opened at least one BeH-SAC report on Healthstat:
  - May 2018: 0
  - August 2018: 20
  - August 2019: 67

Graph: Number of hospitals/users
National results

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

All Belgian acute-care hospitals

Median antibiotic use in 2017:

- 501.9 DDDs/1000 patient days → 2003-2017: +8.1%
- 3273.1 DDDs/1000 admissions → 2008-2017: -7.7%

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

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%

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)
Future plans

- New indicator: DDA = DDD adjusted for the Belgian setting
- Validation of high consumers (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
BeH-SAC: Belgian Hospitals - Surveillance of Antimicrobial Consumption

Introduction

Antimicrobial resistance leads to higher morbidity and additional healthcare expenses.

Therefore in 2001, the European Commission commanded the Member States to encourage the prudent use of antimicrobial medicines. This was confirmed in June 2017 in the new ‘One Health Action Plan against Antimicrobial Resistance’ of the European Commission.

Starting from 01/07/2007, Belgian acute care hospitals and chronic care hospitals with 150 beds or more are obligated to install an antibiotic management team in their hospital. The working group Hospital Medicine of the Belgian Antibiotic Policy Coordination Committee (BAPCOC) follows up the actions of these antibiotic management teams and ensures that Belgian hospitals receive a feedback report of their antimicrobial consumption.
Acknowledgements

Participating hospitals
BAPCOC working group Hospital Medicine

**BAPCOC**
*Belgian Antibiotic Policy Coordination Committee*

**NSIH-team**, Nathalie Verhocht, Tadek Kryzwania
Healthdata: Thaddé Mahmoudian, Juan Quesada, Kris Vranken, Gaëtan Muyldermands

Contact: [eline.vandael@sciensano.be](mailto:eline.vandael@sciensano.be)
ECDC POINT PREVALENCE STUDY OF HEALTHCARE-ASSOCIATED INFECTIONS AND ANTIMICROBIAL USE IN BELGIAN ACUTE CARE HOSPITALS IN 2017

Eline Vandael, Katrien Latour, Boudewijn Catry

Contact: eline.vandael@sciensano.be

NSIH symposium – 26/09/2019
Content

- Introduction
- Methodology
- Results
- Discussion
Introduction

PPS on HAIs and antimicrobial use in European acute care hospitals

2011 (52 hospital sites)

<table>
<thead>
<tr>
<th>Prevalence</th>
<th>28.9%</th>
</tr>
</thead>
<tbody>
<tr>
<td>AM use</td>
<td></td>
</tr>
<tr>
<td>Prevalence</td>
<td>7.1%</td>
</tr>
<tr>
<td>HAIs</td>
<td></td>
</tr>
</tbody>
</table>

PPS on Antimicrobial Consumption and Resistance (worldwide)

2015 (100 hospital sites)

<table>
<thead>
<tr>
<th>Prevalence</th>
<th>27.4%</th>
</tr>
</thead>
<tbody>
<tr>
<td>AM use</td>
<td></td>
</tr>
<tr>
<td>Prevalence</td>
<td>7.5%</td>
</tr>
<tr>
<td>HAIs*</td>
<td></td>
</tr>
</tbody>
</table>

2017: Second ECDC and Global-PPS

* AM = antimicrobial; HAIs = Healthcare-Associated Infections; PPS = Point-Prevalence Study
  * Based on the indication of antimicrobial prescriptions
Methodology

- Invitation sent to all acute-care Belgian hospitals
  - choice to participate in ECDC or Global-PPS
  - representative sample (N=34): encouraged to participate in ECDC PPS

- ECDC’s patient-based PPS protocol

- Data collection on one day for each ward, maximum 2-3 weeks per hospital

- Hospital-level, ward-level, patient-level data
  - all patients present at the ward at 8h00 a.m. + not discharged at time of PPS
  - use of antimicrobial agents and presence of active HAIs

- Training in September 2017
  Inclusions between September and November 2017

- Data collection → Sciensano → ECDC: Tessy
  All data converted to the Global-PPS database

HAIs = Healthcare-Associated Infections; PPS = Point-Prevalence Study
Definition healthcare-associated infection (HAI) in acute-care hospitals:

- Signs and symptoms have started on Day 3 of the current admission or later (day of admission = Day 1).

OR

- Signs and symptoms were present at admission or became apparent before Day 3 and
  - the patient was readmitted less than 48h after previous admission;
  OR
  - in case of a surgical site infection (SSI): symptoms occurred within 30 days of the operation (surgery involving implant: 90 days);
  OR
  - an invasive device was placed on Day 1 or 2 of the admission;
  OR
  - in case of a *Clostridium difficile* infection: onset less than 28 days after discharge from an acute-care hospital.
Results

47 acute care hospital sites (33 mergers)
→ 23 primary, 8 secondary, 2 tertiary

11800 patients

Crude prevalence of patients with at least one AM:
28.1% (95% CI 27.3%-29.0%)

Crude prevalence of patients with at least one HAI:
7.3% (95% CI 6.8%-7.7%)

AM = antimicrobial; CI = confidence interval; HAIs = healthcare-associated infections
Results

Crude prevalence of patients with at least one AM:
28.1% (95% CI 27.3%-29.0%)
→ Tertiary hospitals: 30.8% (95% CI 28.3%-32.4%)
→ ICU: 52.7% (95% CI 48.6%-56.7%)

<table>
<thead>
<tr>
<th>Top 5 most registered diagnoses (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pneumonia (22.2%)</td>
</tr>
<tr>
<td>Lower urinary tract infections (11.2%)</td>
</tr>
<tr>
<td>Intra-abdominal sepsis (8.4%)</td>
</tr>
<tr>
<td>Acute bronchitis (8.3%)</td>
</tr>
<tr>
<td>Skin and soft tissue infections (7.4%)</td>
</tr>
</tbody>
</table>

* In case of medical treatment (CAI, HAI, LAI)

<table>
<thead>
<tr>
<th>Top 5 most used AM (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amoxicillin in combination with a beta-lactamase inhibitor (J01CR02, 19.7%)</td>
</tr>
<tr>
<td>Cefazolin (J01DB04, 9.7%)</td>
</tr>
<tr>
<td>Piperacillin in combination with a beta-lactamase inhibitor (J01CR05, 7.7%)</td>
</tr>
<tr>
<td>Ciprofloxacin (J01MA02, 5.9%)</td>
</tr>
<tr>
<td>Cefuroxime (J01DC02, 4.3%)</td>
</tr>
</tbody>
</table>

AM = antimicrobials; CI= confidence interval; CAI = community-acquired infections; HAI = healthcare-associated infections; LAI = Infection present on admission from long-term care facility or nursing home; ICU = intensive care unit
Results

Crude prevalence of patients with at least one HAI: 7.3% (95% CI 6.8%-7.7%)
→ Tertiary hospitals: 9.1% (95% CI 7.5%-10.7%)
→ ICU: 20.9% (95% CI 17.6%-24.2%)

- UTIs (21.3%)
- Pneumonia (21.6%)
- SSI (16.9%)
- GI infections (9.6%)
- BSI (11.5%)

CI = confidence interval; HAI = healthcare-associated infection; ICU = intensive care unit; MO = micro-organism; BSI = bloodstream infections; GI= gastro-intestinal; SSI = surgical site infections; UTI = urinary tract infections
**Discussion**

<table>
<thead>
<tr>
<th></th>
<th>ECDC PPS 2011 (BE)</th>
<th>ECDC PPS 2017 (BE)</th>
<th>ECDC PPS 2017 EU countries*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prevalence AM use (95% CI)</td>
<td>28.9% (26.8%-31.1%)</td>
<td>28.1% (27.3%-29.0%)</td>
<td>31.4% (27.7%-35.3%)</td>
</tr>
<tr>
<td>Prevalence HAIs (95% CI)</td>
<td>7.1% (6.1%-8.3%)</td>
<td>7.3% (6.8%-7.7%)</td>
<td>6.5% (5.4%-7.8%)</td>
</tr>
</tbody>
</table>

AM = antimicrobial; BE = Belgium; EU = European; HAIs = healthcare-associated infections; PPS = point-prevalence study; EU: Plachouras et al. 2018; Suetens et al. 2018 *weighted and corrected prevalence after validation
More results...

- Belgian results:
  National report ECDC-PPS 2017 (www.nsih.be)

- European results:
  Eurosveillance → Plachouras et al. 2018, Suetens et al. 2018
  ECDC report 2016-2017 (Expected in Nov 2019)
Acknowledgements

- All participating hospitals
- University of Antwerp: Ann Versporten, Herman Goossens, Nico Drapier
- Sciensano: Katrien Latour, Boudewijn Catry, Louisa Ben Abdelhafidh, Laure Mortgat, Els Duysburgh, NSIH team