Use of antibiotics in Swiss hospitals: investigation of a sentinel monitoring

Club de Pathologie Infectieuse
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Rationale for monitoring

- To understand the main determinants of bacterial resistance
- To predict the evolution of resistance
- To choose interventions fostering rational use
- To measure the impact of interventions
Example of monitoring in Europe

Only continuous source in CH:

-IMS Health

- Private data provider
- Market-oriented
- Manufacturers' sales data

* Defined daily doses per 1'000 inhabitants per day
Study goals

• To implement a sentinel monitoring of antibiotic use in Switzerland based on pharmacy delivery data:
  – Hospitals: Swiss Society of Hospital Pharmacists (GSASA)
  – Community: Swiss Society of Pharmacists (SSPh)

• To compare sentinel data with Swiss market data (IMS):
  – Validity
  – Added value: density of antibiotic use
    adjustment to covariates (*e.g.* to hospital size)
    ward-specific consumption in hospitals
    ...

### Hospital consumption

**Methods**

- Survey of pharmacists in Swiss acute care public hospitals
- Collection of 2004 – 2005 data
  - Consumption of systemic antibiotics
  - *Ward in some hospitals (ICU or not)*
  - Hospital occupancy

<table>
<thead>
<tr>
<th>Pharmacists (sentinel)</th>
<th>IMS</th>
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<tbody>
<tr>
<td>X</td>
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**Data management**

- Aggregation per substance (ATC code) and administration route
- Conversion into Defined Daily Doses (approx. number of treatment days) *

*WHO, www.whocc.no/atcddd/
Hospital consumption
Survey of hospital pharmacists

Heads of hospital pharmacy contacted: 37

Respondents: 33 (89%)

Participants: 28 (76%)

Number of hospitals represented: 50*

* ~ 49% of all beds in Swiss public acute care hospitals
  (~41% of public + private)
By linguistic region:

- **German**
  - 2004: 26% Sentinel hospitals
  - 2005: 22% Sentinel hospitals
  - Beds in sentinel hospitals (% of all public beds): 37%

- **French**
  - 2004: 62% Sentinel hospitals
  - 2005: 62% Sentinel hospitals
  - Beds in sentinel hospitals (% of all public beds): 81%

- **Italian**
  - 2004: 64% Sentinel hospitals
  - 2005: 60% Sentinel hospitals
  - Beds in sentinel hospitals (% of all public beds): 54%
Distribution of antibiotic families

- Penicillins
- Cephalosporins
- Quinolones
- Macrolides
- Glycopeptides
- Carbapenems
- Aminoglycosides
- Tetracyclines
- Sulfonamides,...
Sentinel monitoring

Example of added value

Density of antibiotic use per linguistic region

Global consumption
\( p = 0.02 \)

Distribution of antibiotic families
Sentinel monitoring

Example of added value II

Density of antibiotic use per hospital size

Global consumption
(p = 0.05)

Distribution of antibiotic families
Sentinel monitoring

Example of added value III

Density of antibiotic use in adult intensive care units

- Whole hospitals
- Intensive care units

Global consumption
\( p < 0.001 \)

Distribution of antibiotic families

<table>
<thead>
<tr>
<th>Antibiotic Families</th>
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<tbody>
<tr>
<td>Glycopeptides</td>
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<tr>
<td>Carbapenems</td>
</tr>
<tr>
<td>Macrolides</td>
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<tr>
<td>Quinolones</td>
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<tr>
<td>Cephalosporins</td>
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<tr>
<td>Penicillins</td>
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</tbody>
</table>
Sentinel monitoring

Example of benchmarking

Density of total antibiotic use per hospital

![Bar chart showing density of total antibiotic use per hospital for medium-size hospitals.](chart.png)

**Medium-size hospitals**
Proportion of very broad spectrum antibiotic use

medium-size hospitals
Limitations

• DDD value
  - based on adult dosage
  - based on average dose for moderate infections

• Bed-days
  - depend on length of stay
  → alternative : number of admissions
## Limitations II

<table>
<thead>
<tr>
<th>Sentinel pharmacists</th>
<th>IMS</th>
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</thead>
<tbody>
<tr>
<td>Expensive</td>
<td>X</td>
</tr>
<tr>
<td>Distant from clinical practice</td>
<td>X</td>
</tr>
<tr>
<td>No adjustment to hospital activity</td>
<td>X</td>
</tr>
<tr>
<td>Representativity</td>
<td>X</td>
</tr>
<tr>
<td>No adjustment to case-mix</td>
<td>(x) X</td>
</tr>
</tbody>
</table>

- Expensive
- Distant from clinical practice
- No adjustment to hospital activity
- Representativity
- No adjustment to case-mix
Conclusion

A sentinel monitoring based on hospital pharmacy delivery data

• Seems to be feasible
• Provides access to in-depth analyses
• Shows the patterns of hospital antibiotic use in Switzerland
• Allows to benchmark the use of similar-size hospitals
Future prospects

• The monitoring is going on
• Enhancement of the representativity
• Correlation between antibiotic use and resistance (SEARCH project)
• Investigation of determinants of use
• Participation to international projects : e.g. ESAC
Thanks