Incidence of Methicillin-Resistant Staphylococcus aureus (MRSA) in Belgian hospitals: seven years after introduction of national guidelines

Scientific Institute of Public Health (IPH), Epidemiology unit and the Belgian Group for Screening, Study and Prevention of Hospital Infections (GDEPIH - GOSPIZ)
**MRSA—problem in Europe**

1994

Global MRSA-resistance proportion in Europe: 12.8%

<table>
<thead>
<tr>
<th>Country</th>
<th>MRSA-Proportion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scandinavia</td>
<td>0.1%</td>
</tr>
<tr>
<td>the Netherlands</td>
<td>2%</td>
</tr>
<tr>
<td>Germany</td>
<td>10%</td>
</tr>
<tr>
<td>Spain</td>
<td>30.3%</td>
</tr>
<tr>
<td>France</td>
<td>33.6%</td>
</tr>
<tr>
<td>Italy</td>
<td>34.4%</td>
</tr>
</tbody>
</table>

MRSA-problem in Belgium

Resistance proportion in blood cultures:

- **1983-1985** 11.3%  
- **1988** 20%  
- **1991** 29%  

Resistance proportion (all samples):

- **1995** 21%  

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3 Van der Auwera et al., *Antimicrobial agents and chemotherapy*, nov. 1990, pp. 2260-2262.
“Guidelines for control and prevention of MRSA transmission in Belgian hospitals”

- Identification of MRSA
- Surveillance of MRSA
- Identification of reservoirs, sources and transmission modes of MRSA
- Isolation measures and barrier precautions
- Decontamination of hospital environment
- Follow-up and reporting

Continuous multi-centre MRSA-surveillance in acute Belgian hospitals:

- period of data collection: 6 months,
- participation on voluntary basis,
- confidentiality,
- standardised data collection
- feedback of local data, national comparison

Since 1994
Collected data

- Total number of patients with MRSA* with \textit{Staphylococcus aureus} -strains

- Number of new hospital-acquired MRSA-cases from clinical samples / from screening samples

- Total number of admissions and hospitalisation-days

* Quality of data: each patient is counted only once during the hospitalisation period (exclusion: screening & doubles)
Descriptive statistics

Resistance proportion:

\[ \frac{\sum \text{MRSA} \times 100}{\sum \text{S.a.-strains}} \]

MRSA- incidence:

\[ \frac{\sum \text{nosocomial MRSA}}{1000 \text{ admissions}} \]

MRSA- incidence density:

\[ \frac{\sum \text{nosocomial MRSA}}{1000 \text{ hosp-days}} \]
Trend analysis

Multiple linear regression for repeated observations for 3 series:

- Continuous since January 1996 (cohort '96)
- Continuous since June 1994 (cohort '94)
Results

Min. 1 participation: **80%** Belgian hospitals

Results 1999, last semester:

- Resistance proportion: 18%
- MRSA incidence: 2.4 / 1000 admissions
- MRSA incidence density: 0.3 / 1000 hosp-days
Methicillin resistance proportion, 1999
Nosocomial MRSA incidence rate, 1999

- Nosocomial MRSA/1000 admissions

- Number of hospitals:
  - 0 - 0.9
  - 1 - 1.9
  - 2 - 2.9
  - 3 - 3.9
  - 4 - 4.9
  - 5 - 5.9
  - 6 - 6.9
  - >7

- Bed size categories:
  - < 200 beds
  - 200 - 399 beds
  - 400+ beds
Resistance proportion, MRSA incidence rate and hospital status

<table>
<thead>
<tr>
<th></th>
<th>Teaching hospitals</th>
<th>Other hospitals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resistance proportion</td>
<td>20.3%</td>
<td>17.7%</td>
</tr>
<tr>
<td>MRSA incidence rate</td>
<td>3.5/1000 admissions</td>
<td>2.6/1000 admissions</td>
</tr>
</tbody>
</table>
Quality of data collection

% hospitals

study periods

Mean resistance proportion, Nosocomial MRSA incidence rate minimum 3 participations

-1.4% / year  
$p<0.001$

- 0.2/ year  
$p=0.003$

N= 115

N= 90

Study periods

Resistance proportion  Incidence rate
Mean resistance proportion, nosocomial MRSA incidence rate

**cohort '94**

- **Study periods**

<table>
<thead>
<tr>
<th>Year</th>
<th>MRSA / SA (%)</th>
<th>MRSA / 1000 admissions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1994/2</td>
<td>N=11</td>
<td>4</td>
</tr>
<tr>
<td>1995/1</td>
<td>N=11</td>
<td>3.5</td>
</tr>
<tr>
<td>1995/2</td>
<td>N=8</td>
<td>3</td>
</tr>
<tr>
<td>1996/1</td>
<td>N=8</td>
<td>2.5</td>
</tr>
<tr>
<td>1996/2</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>1997/1</td>
<td></td>
<td>1.5</td>
</tr>
<tr>
<td>1997/2</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>1998/1</td>
<td></td>
<td>0.5</td>
</tr>
<tr>
<td>1998/2</td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>1999/1</td>
<td></td>
<td>0.5</td>
</tr>
<tr>
<td>1999/2</td>
<td></td>
<td>0</td>
</tr>
</tbody>
</table>

- **Resistance proportion**
- **Incidence rate**

- *p* = 0.005
- *n.s.*
Mean resistance proportion, nosocomial MRSA incidence rate

cohort '96

Study periods

MRSA / SA (%)

MRSA / 1000 admissions
Conclusions

• dynamic participation

• slow, significant decrease of the rates

**BUT**

• importance to remain alert

• importance of a national approach
Thanks to all Belgian hospitals!

Their devoted work over the field contributed to the success of this project.
Mean resistance proportion, MRSA incidence rate (2000) minimum 3 participations

Study periods:

- 1994/2
- 1995/1
- 1995/2
- 1996/1
- 1996/2
- 1997/1
- 1997/2
- 1998/1
- 1998/2
- 1999/1
- 1999/2
- 2000/1

MRSA / SA (%)

- Resistance proportion
- Incidence rate

N= 118
N= 105

MRSA / 1000 admissions