Burden of Disease:

How MRSA Cross-Border Networks contribute to Patient Outcome, Medical Quality and Cost Savings

Dennis Haking, M.Sc.

CASiM Conference
June 12, 2014, Leipzig
MRSA: Medical and economic impact

MRSA spread in Europe

The EurSafety Health-Net
MRSA: Medical and economic impact

MRSA spread in Europe

The EurSafety Health-Net
MRSA – The „Hospital Superbug“

**MRSA**

MRSA - or methicillin-resistant staphylococcus aureus - is a bacterium that is resistant to a number of widely-used antibiotics.

People can carry the bug without health problems and it is spread by skin-to-skin contact or through contaminated objects such as bedding.

It can cause life-threatening infections if the bug breaches the skin, such as through a surgical wound.
Medical impact of MRSA

MRSA causes a variety of infections:

Abscess, sepsis, pneumonia, wound infections, osteomyelitis, joint infections, prosthesis infections, catheter infections and many more

Risk factors:

Long hospital stays, treatment in intensive care units, long treatment with antibiotics, surgeries, contact to MRSA-positive people, contact to intensive animal farming

Consequences:

Prolonged hospital stay, the use of expensive last-line antibiotics, isolation of patients, disadvantages in patient outcome
MRSA-associated infections lead to high costs which are not reimbursed.

<table>
<thead>
<tr>
<th>MRSA-associated infections</th>
<th>Average prolongation of length of stay</th>
<th>Average earnings per patient</th>
<th>Average costs per patient</th>
<th>Difference earnings / costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pneumonia</td>
<td>28,55</td>
<td>6.792,49 €</td>
<td>29.277,25 €</td>
<td>-22.484,76 €</td>
</tr>
<tr>
<td>Bacteraemia</td>
<td>21,93</td>
<td>5.013,93 €</td>
<td>13.536,52 €</td>
<td>-8.522,59 €</td>
</tr>
<tr>
<td>Urinary tract infections</td>
<td>14,00</td>
<td>2.894,36 €</td>
<td>4.656,82 €</td>
<td>-1.762,46 €</td>
</tr>
<tr>
<td>Other infections</td>
<td>24,55</td>
<td>4.317,86 €</td>
<td>5.299,12 €</td>
<td>-982,26 €</td>
</tr>
</tbody>
</table>
Not all kinds of MRSA-related costs are tangible and calcuable.

- **Treatment Costs**
  - Prolonged retention time
  - Antibiotics
  - Decontamination and eradication measurements
  - Material for isolation

- **Prevention costs**
  - Education of the staff
  - Screening-costs in hospital
  - Disinfectant dispenser

- **Opportunity costs**
  - Closed beds / wards
  - Bounded labour capacities
  - Disturbance of hospital logistics

- **Intangible Costs**
  - Pain
  - Increased mortality
  - Mental consequences
  - Loss of image / reputation
MRSA: Medical and economic impact

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Agenda

1. MRSA: Medical and economic impact
2. MRSA spread in Europe
3. The EurSafety Health-Net
In an European comparison Germany is ranked in the mid-range with an MRSA rate of 20 %.

The MRSA-rate is defined as the share of MRSA isolates in the Staphylococcus aureus isolates from blood cultures.
MRSA spread in Europe

MRSA bacteraemia episodes per 1,000,000 inhabitants:

- NL: 1.8
- NRW: 57.6

Source: van Cleef et al, (2012)
MRSA: Medical and economic impact

MRSA spread in Europe

The EurSafety Health-Net
### Burden of Disease: How MRSA Cross Border Networks contribute to Patient Outcome, Medical Quality and Cost Savings

<table>
<thead>
<tr>
<th>Parameters</th>
<th>EDR-NL</th>
<th>EDR-GER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inhabitants</td>
<td>1,7 Mio.</td>
<td>1,3 Mio.</td>
</tr>
<tr>
<td>Acute hospitals (beds)</td>
<td>15 (5813)</td>
<td>29 (6839)</td>
</tr>
<tr>
<td>Hospital beds per 1.000 inhabitants</td>
<td>3,4</td>
<td>5,1</td>
</tr>
<tr>
<td>Nursing homes per 1.000 inhabitants</td>
<td>0,1</td>
<td>0,2</td>
</tr>
<tr>
<td>Public health offices</td>
<td>3</td>
<td>10</td>
</tr>
<tr>
<td>General practitioners per 1.000 inhabitants</td>
<td>0,44</td>
<td>1,5</td>
</tr>
<tr>
<td>Med. Microbiologists present per 1.000 beds</td>
<td>3</td>
<td>0,3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Parameters</th>
<th>EUREGIO NL</th>
<th>EUREGIO GER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waiting time for a hip prothesis</td>
<td>4-20 weeks</td>
<td>3-10 days</td>
</tr>
<tr>
<td>MRSA cases per year</td>
<td>120</td>
<td>3205</td>
</tr>
<tr>
<td>MRSA / S. aureus in blood cultures</td>
<td>1 %</td>
<td>19 %</td>
</tr>
<tr>
<td>MRSA-bacteraemia per year</td>
<td>0</td>
<td>79</td>
</tr>
</tbody>
</table>
Burden of Disease: How MRSA Cross Border Networks contribute to Patient Outcome, Medical Quality and Cost Savings

Source: Ciccolini, M et al (2013)
The EurSafety Health-Net

Interdisciplinary

Interdependent

Inter-sectoral

International

Burden of Disease: How MRSA Cross Border Networks contribute to Patient Outcome, Medical Quality and Cost Savings
Aims of the EurSafety Health-Net

- Security for patients and population against infections
- Research for the establishment of euregional knowledge in the cases of epidemiology and prevention
- Comparability of the access to medical care
- Euregional education and training of the staff
- Awareness training in the public
- Platform for communication and telematic services
The Search and Follow Strategy in Germany

- **Search** → **Diagnostics, Screening**
- **Restrict** → **Restrictive use of Antibiotics**
- **Control** → **Guidelines for Hygiene**
- **Follow** → **Follow-up outpatient treatment**

**Benchmarking (Seal of Quality)**
**Table 1**

Admission screening rates and meticillin-resistant *Staphylococcus aureus* related rates in 40 hospitals in the EUREGIO, 2007–2011

<table>
<thead>
<tr>
<th>Parameter</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Median (IQR)</td>
<td>Median (IQR)</td>
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<td>Median (IQR)</td>
<td>Median (IQR)</td>
</tr>
<tr>
<td>Screening rate (MRSA/100 patients admitted)</td>
<td>4.38 (2.15–11.8)</td>
<td>17.5 (6.19–30.9)</td>
<td>25.6 (12.5–43.9)</td>
<td>30.0 (20.6–40.9)</td>
<td>34.4 (27.4–51.6)</td>
</tr>
<tr>
<td>MRSA admission incidence (MRSA cases/100 patients admitted)</td>
<td>0.51 (0.39–0.79)</td>
<td>0.94 (0.60–1.24)</td>
<td>0.86 (0.60–1.34)</td>
<td>1.12 (0.75–1.39)</td>
<td>1.09 (0.70–1.35)</td>
</tr>
<tr>
<td>MRSA incidence density (MRSA cases/1,000 patient days)</td>
<td>0.87 (0.56–1.21)</td>
<td>1.37 (0.93–1.89)</td>
<td>1.62 (1.01–2.20)</td>
<td>1.63 (1.19–2.35)</td>
<td>1.54 (0.92–2.27)</td>
</tr>
<tr>
<td>Nosocomial MRSA incidence density (nosocomial MRSA cases/1,000 patient days)</td>
<td>0.14 (0.06–0.24)</td>
<td>0.15 (0.10–0.21)</td>
<td>0.13 (0.04–0.25)</td>
<td>0.13 (0.06–0.23)</td>
<td>0.08 (0.05–0.15)</td>
</tr>
<tr>
<td>Mean daily MRSA burden (MRSA-in-hospital days/100 patient days)</td>
<td>1.30 (0.86–1.95)</td>
<td>1.98 (1.53–2.67)</td>
<td>2.01 (1.39–2.62)</td>
<td>1.80 (1.58–3.24)</td>
<td>1.82 (1.27–2.96)</td>
</tr>
<tr>
<td>MRSA-days-associated nosocomial MRSA rate (nosocomial MRSA cases/1,000 MRSA days)</td>
<td>9.52 (2.97–17.4)</td>
<td>8.14 (4.53–11.7)</td>
<td>5.51 (3.31–12.5)</td>
<td>7.77 (3.62–10.4)</td>
<td>3.80 (2.04–7.97)</td>
</tr>
</tbody>
</table>

IQR: Interquartile range; MRSA: meticillin-resistant *Staphylococcus aureus*.

**Table 2**

Numbers of meticillin-resistant *Staphylococcus aureus* cases documented in 40 German hospitals in the EUREGIO, 2007–2011

<table>
<thead>
<tr>
<th>Numbers of MRSA cases</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>n (%)</td>
<td>n (%)</td>
<td>n (%)</td>
<td>n (%)</td>
<td>n (%)</td>
<td>n (%)</td>
</tr>
<tr>
<td>MRSA (total)</td>
<td>2,351 (100)</td>
<td>2,352 (100)</td>
<td>4,206 (100)</td>
<td>4,276 (100)</td>
<td>4,512 (100)</td>
</tr>
<tr>
<td>MRSA (stratified)</td>
<td>1,804 (100)</td>
<td>3,263 (100)</td>
<td>3,759 (100)</td>
<td>4,150 (100)</td>
<td>4,347 (100)</td>
</tr>
<tr>
<td>Imported MRSA cases</td>
<td>1,481 (79)</td>
<td>2,807 (86)</td>
<td>3,262 (87)</td>
<td>3,641 (88)</td>
<td>3,992 (92)</td>
</tr>
<tr>
<td>Nosocomial MRSA cases</td>
<td>383 (21)</td>
<td>56 (14)</td>
<td>497 (13)</td>
<td>509 (12)</td>
<td>355 (8)</td>
</tr>
</tbody>
</table>

MRSA: meticillin-resistant *Staphylococcus aureus*.

Source: Eurosurveillance, Volume 18, Issue 36, 05. September 2013
Growing resistance to last-line antibiotics

Carbapenems are a major last-line class of antibiotics to treat bacterial infections. The spread of carbapenem-resistant infections is a threat to healthcare and patient safety in Europe as it seriously curtails the ability to cure infections.

Each year, 30 EU/EEA countries report data on antimicrobial resistance to the European Antimicrobial Resistance Surveillance Network (EARS-Net) and on antimicrobial consumption to the European Surveillance of Antimicrobial Consumption network (ESAC-Net). Both networks are hosted at ECDC. For the first time, 38 countries reported data on Acinetobacter spp. to EARS-Net. In addition, experts in 38 European countries participated in the European Survey on Carbapenemase-producing Enterobacteriaceae (ESCAPE) done for ECDC by the University Medical Centre Utrecht, The Netherlands.

Source: European Center for Disease Prevention and Control (ECDC) 2013
Thank you!