MRSA – Is Search & Destroy the Way to Go?
Prof. Andreas Voss, Radboud University Nijmegen Medical Centre, Netherlands
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Content

- MRSA background
- What is “Search & Destroy”
- Decolonization of MRSA carriers
- Recent literature

What is MRSA

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• Intrinsic resistance
  - Penicillins, Cephalosporines, Carbapenems (think empiric treatment)

• Possible multi-resistance
  - Clindamycine/erythromycine (think bone & joint infections)
  - Ciprofloxacin (think oral treatment of S.T.A.U. infections)
  - Rifampicin (think THP etc. infections)
  - Aminoglycosides (think endocarditis)
  - Mupirocin (think decolonization)

Most importantly ...
• More infections
• Higher mortality
• Higher costs

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Staphylococcus aureus

- panaritium
- impetigo
- endocarditis
- osteomyelitis
- pneumonia

HA-MRSA

MRSA in Europe

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More about MRSA

Types of MRSA

• E-MRSA
• HA-MRSA (HO-CA-MRSA, HO-LA-MRSA)
• CA-MRSA (CD-HA-MRSA, CO-LA-MRSA)
• LA-MRSA

The only type of MRSA I find important:
• DCHYCI-JTMHTGROI-MRSA*

* Don’t care how you call it – just tell me how to get rid of it-MRSA

Idea: Scott Weese

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First cases of CA-MRSA in the USA

Risk-groups for CA-MRSA
- Aboriginals
- Native Americans
- Prison inmates
- Sauna visitors
- Sport Teams
- Homosexual men
- Military recruits
- Kindergarten kids

Nosocomial CA-MRSA infections

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**Conclusion CA-MRSA**

- New type of MRSA, different and independent of HA-MRSA.
- More virulent (severe SSTI, necrotizing pneumonia)
- More frequently in the healthy young patients without „typical“ risk-factors
- Now emerging as nosocomial pathogen
- CA-MRSA = challenge to countries presently using “Search&Destroy”

**Risk-groups for CA-MRSA**

- Aboriginals
- Native Americans
- Prison inmates
- Sauna visitors
- Sport Teams
- Homosexual men
- Military recruits
- Kindergarten kids
- Animal lovers

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*Methicillin-resistant Staphylococcus aureus in Pig Farming*

Andreas Voss, T. Franke, O. Loeffer, J. Babler, C. Klassen, C. and M. Wolf

We conducted a study among a group of 310 pig farmers to determine the occurrence of methicillin-resistant Staphylococcus aureus (MRSA) in pigs. The prevalence of MRSA in pigs was significantly higher compared to the general population.

2004: 23% of farmers MRSA+  
2006: 50% of farmers MRSA+

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Risk for ST398 carriage

• All persons in direct contact with pigs and calves
  – Farmers, their help, and other persons coming into the stables
  – Veterinarians
  – Animals transport personnel
  – Slaughterhouse personnel (part with living animals)
• Persons living on pig and calve farms

Fact about ST398 MRSA

• Global problem
• Less transmissible than HA-MRA
  – Main spread to persons in contact with pigs & calves
  – ... but permanently & broadly present!
• Assumed to be less virulent than HA-MRSA
  – ... but due to high occurrence many cases
• Multi-drug resistant ST398 MRSA reported
• PVL-pos ST398 reported
• First outbreaks reported
• Cases without animal contacts are described

Future of MRSA

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What is Search & Destroy?

Search & Destroy (Control) strategy to avoid introduction of MRSA into health-care settings and reduce the chance of transmission:

- National MRSA guidelines (WIP)
- National detection methods (NVMM)
- Use fast and reliable detection methods

How to control MRSA – the Dutch way!

Fighting MRSA the “Dutch way”

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Key elements of the Dutch MRSA guidelines

- Isolation and screening of risk-patients on admission
  - at all times
  - colonized and infected patients
- Decolonization of MRSA carriers
- Consequent actions when transmissions occurs
  - screening of all patients and HCWs at risk
  - MRSA-positive HCWs not allowed to work

MRSA isolation measures in the NL

- Placement in isolation room
  - with anteroom and negative pressure
- Gloves, gowns and face-masks
  - for all entering the room
- Handhygiene

What others do ...

- Isolation and screening of risk-patients on admission
  - can’t determine patients at risk
  - only certain departments!
  - not when too busy/weekends
  - only infected patients
- No decolonization of MRSA carriers
- Screening of all patients but not HCWs → consequently MRSA-positive HCWs may continue to spread

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When fighting MRSA, be consequent

Does that mean the Dutch way is the only way that works?

MRSA in Europe

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More importantly – what is the trend?

MRSA in Europe

Trends of MRSA

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What did our French colleagues do?
- Isolation Interventions
- Promotion of Hand Hygiene
- Identification of patients with MRSA infections or colonizations
- Feedback
- Annual reports

MRSA CONTROL:
the major components count not the details

MRSA in Denmark

The battle against HA-MRSA seems easy

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The control of CA+ LA-MRSA is a problem

Is the good strategy all that's count in the fight against MRSA and other HRMOs?

While important other factors count:
- Compliance with basic infection control measures
- Infrastructure of the hospital
- HCW-patient ratio
- Antibiotic use control
- Cooperation of all healthcare sectors
- Farming (!) & food (?)

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**Implementation of GL increases treatment success**

- 60% of MRSA carriers were successfully decolonised after the first eradication.
- Risk factors for decolonisation failure: COPD, throat-perineum carriage, and carriage among household contacts (uncomplicated); throat carriage and dependence in activities of daily living (complicated)

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Transmission of Methicillin-Resistant Staphylococcus aureus to Household Contacts

62 newly diagnosed MRSA index persons (46 patients and 16 health care workers) and their 160 household contacts were included in the study.

Transmission of MRSA from an index person to household contacts occurred in nearly half of the cases (47%; n=29).
- These 29 index persons together had 84 household contacts, of which two-thirds (67%; n=56) became MRSA positive.

Risk factors of transmission of MRSA to household contacts

- Prolonged exposure time to MRSA at home
- Being the partner of a MRSA index person
- Increased number of household contacts
- Index younger age (average age 26yrs vs 45 yrs)
- MRSA index with eczema
- MRSA colonization in the throat
- Presence of wounds was negatively associated

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Screening of household contacts and providing MRSA eradication therapy to those found positive simultaneously with the index person

Literature

Huskins versus Jain

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**Intervention to Reduce Transmission of Resistant Bacteria in Intensive Care**

W. Charles Huskins, M.D., Charmaine M. Huskibe, M.S., Naomi P. O’Grady, M.D., Patrick Murray, Ph.D., Heather Kapetshis, M.S., Louisa Zimmer, M.A., M.P.H., Mary Ellen Walker, M.S.N., Ronda L. Sinkowitz-Cochran, M.P.H., John A. Jernigan, M.D., Matthew Samore, M.D., Dennis Wallace, Ph.D., and Donald A. Goldmann, M.D., for the STARICU Trial Investigators


**Intervention to reduce transmission of MRSA and VRE**

• **Aim:**

Effect of surveillance for MRSA and VRE colonization and of the expanded use of barrier precautions (intervention) as compared with existing practice (control)


**Precautions taken**

<table>
<thead>
<tr>
<th>Type of Contact</th>
<th>Medical Precautions</th>
<th>Universal Gowning</th>
<th>Contact Precautions</th>
<th>Known pos.</th>
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<tbody>
<tr>
<td>Sterile</td>
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<td>-</td>
<td>-</td>
<td>-</td>
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<tr>
<td>Recommended</td>
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<td>-</td>
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</tr>
<tr>
<td>Barrier gown full</td>
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<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Non-patient Environment</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Control</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Intervention unknown</td>
<td>-</td>
<td>-</td>
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<td>-</td>
</tr>
<tr>
<td>Intervention known pos.</td>
<td>-</td>
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**Intervention to reduce transmission of MRSA and VRE**

- **Result:**

  The mean (±SE) ICU-level incidence of events of colonization or infection with MRSA or VRE per 1000 patient-days at risk, adjusted for baseline incidence, did not differ significantly between the intervention and control ICUs (40.4±3.3 and 35.6±3.7 in the two groups, respectively; P=0.35).


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**Questions/Comments**

- How many patients of the control group underwent expanded contact precautions because of clinical samples with HRMO?

- The average time until results were know and assignment of a patient to care with (full) contact precautions was 5-6 days!

- Where other preventive measures applied?
  - ed.: probably not – e.g. HH compliance low: 15-60%

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**VA initiative to prevent MRSA**

**Original Article**

Veterans Affairs Initiative to Prevent Methicillin-Resistant Staphylococcus aureus Infections


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Methods

- A “MRSA bundle” was implemented in 2007 in acute care VA hospitals nationwide in an effort to decrease HAIs with MRSA.
- The bundle consisted of universal nasal surveillance for MRSA, contact precautions for patients colonized or infected with MRSA, hand hygiene, and a change in the institutional culture whereby infection control would become the responsibility of everyone who had contact with patients.

Results (1)

- A total of 1,712,537 surveillance screening tests (10/2007 to 06/2010)
- Percentage of patients who were screened at admission increased from 82% to 96%

Results (2)

- Rate of MRSA transmission in the ICUs was reduced by 17%, in the non-ICUs by 21%.
- Rate of MRSA-HAI’s declined from 1.64 to 0.62 per 1000 patient-days, a decrease of 62%
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Questions/comments

- Huskins vs Jain – culture vs PCR – capture 40% vs >80% of patient days = optimize treatment early
- The interventions (screening, contact precautions & culture change) effect transmission … how can a small effect on transmission (17% red.) have such a large effect on HAIs (62% red.)?
- Other concurrent interventions?


Comments on both studies

- Which component of the bundle contributed to the overall reduction in HAIs – or failed to do so?
- Is it even about the measures in the “bundle”, or is the effect due to other concurrent measures that “intrinsically” occur while implementing the bundle:
  – CEO support and commitment to infection control
  – Culture change including improvement of basic infection control measures (including HH)

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Huskins versus Jain

… and who cares even if it was the culture change and not the bundle?

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February 1 - Quality Improvement in Infection Prevention and Control
April 9 - Hand Hygiene Education and Monitoring: Returning to the WHO "Five Moments" Campaign
May 5 - The Importance of Widespread Hand Hygiene Practice and Antimicrobial Stewardship
June 30 - Establishing an Infection Control Program for Acute Respiratory Infections and Ensuring Pandemic Preparedness
August 31 - Latest Updates on Outbreaks and Infection Control
September 7 - Highlights from May 5, 2011 Initiative Around the World
October 4 - MRSA – Is Search & Destroy the Way to Go?
November 7 - Best Practice for Cleaning, Disinfection and Sterilization in Healthcare

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