Severe MRSA in Acute Care Setting
Dr. Philippe Eggimann, Service de médecine intensive adulte, Lausanne University
A Webber Training Teleclass

Severe MRSA in acute care setting
Key factors for preventing MRSA in the ICU

Philippe Eggimann MD
Adult intensive Care
www.soins-intensifs.chuv.ch

Hosted by
Martin Kiernan

Anything I say can be highly biased

Dr Eggimann collaborated to several industry-sponsored clinical trials since 1990.
No offshore account! All goes to the Hospital to pay research nurse data manager.

DISCLOSURE

Dr Eggimann served on an advisory board for and/or sponsored lectures for Astellas 3M, Janssen, Lilly, Medex MSD, Pfizer, Weyth-Lederle

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ICUs, the world of infection

Where reality surpasses fiction
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ICUs, the world of infection

<table>
<thead>
<tr>
<th>Risk factors</th>
<th>OR</th>
</tr>
</thead>
<tbody>
<tr>
<td>urinary catheter</td>
<td>1.41</td>
</tr>
<tr>
<td>mechanical ventilation</td>
<td>2.07</td>
</tr>
<tr>
<td>central venous cath.</td>
<td>4.40</td>
</tr>
</tbody>
</table>

Prevalence of infection among 14’414 patients (1’265 ICU)
51% with infection

EPIC I study
Vincent JAMA 1995

EPIC II study
Vincent JAMA 2009

The world of nosocomial infections
1’265 worldwide ICU
14’414 patients

Infection rate

Days in the ICU before the study day

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The world of nosocomial infections

Including MSSA and MRSA

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The world of nosocomial infections

Increased mortality associated with meticillin-resistant Staphylococcus aureus (MRSA) infection in the Intensive Care Unit: results from the EPIC II study

Håkan Hanberger\(^a\), Sten Walther\(^b\), Marc Leone\(^c\), Philip S. Barie\(^d\), Jordi Rello\(^e\), Jeffrey Lipman\(^f\), John C. Marshall\(^g\), Antonio Anzueto\(^h\), Yasser Sakr\(^i\), Peter Pickkers\(^j\), Peter Felleiter\(^k\), Milo Engoren\(^l\), Jean-Louis Vincent\(^m\), EPIC II Group of Investigators

<table>
<thead>
<tr>
<th>Variable</th>
<th>OR (95% CI)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (per year)</td>
<td>1.01 (1.00-1.03)</td>
<td>0.01</td>
</tr>
<tr>
<td>Type of admission</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Surgery: elective</td>
<td>Ref</td>
<td></td>
</tr>
<tr>
<td>Medical</td>
<td>1.70 (0.91-3.19)</td>
<td>0.10</td>
</tr>
<tr>
<td>Surgery: emergency</td>
<td>1.52 (0.87-2.65)</td>
<td>0.14</td>
</tr>
<tr>
<td>Trauma</td>
<td>1.46 (0.52-4.11)</td>
<td>0.48</td>
</tr>
<tr>
<td>Source of admission</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating room/ICU</td>
<td>Ref</td>
<td></td>
</tr>
<tr>
<td>Emergency department/ambulance</td>
<td>0.50 (0.28-0.88)</td>
<td>0.02</td>
</tr>
<tr>
<td>Hospital ward</td>
<td>0.96 (0.57-1.60)</td>
<td>0.87</td>
</tr>
<tr>
<td>Other hospital</td>
<td>0.82 (0.46-1.47)</td>
<td>0.51</td>
</tr>
<tr>
<td>Other</td>
<td>1.21 (0.41-3.58)</td>
<td>0.73</td>
</tr>
<tr>
<td>SAPS II score (per point)</td>
<td>1.05 (1.04-1.07)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Co-morbid conditions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chronic renal failure</td>
<td>1.84 (1.16-2.94)</td>
<td>0.01</td>
</tr>
<tr>
<td>Type of microorganism</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pseudomonas spp.</td>
<td>1.73 (1.09-2.74)</td>
<td>0.02</td>
</tr>
<tr>
<td>Acinetobacter spp.</td>
<td>2.63 (1.24-5.57)</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>MRSA</td>
<td>1.46 (1.03-2.06)</td>
<td>0.03</td>
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</table>

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The world of *nosocomial* infections

Emergence and resurgence of **MRSA** as a public-health threat

Grundmann M, Aires-de-Sousa M, Boyce J, Tiemersma E Lancet 2006; 368:874-85

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### HA-MRSA ≠ CA-MRSA ≠ LA-MRSA

<table>
<thead>
<tr>
<th>MRSA</th>
<th>Definition and/or salient features</th>
</tr>
</thead>
<tbody>
<tr>
<td>HA-MRSA</td>
<td>Identified &gt;48 h after admission to a healthcare facility, or MRSA identified in an individual with history of MRSA infection or colonisation, admission to a healthcare facility, dialysis, surgery or insertion of indwelling devices in the past year</td>
</tr>
<tr>
<td>CA-MRSA</td>
<td>Identified in the outpatient setting or within 48 h following hospital admission in an individual with no medical history of MRSA infection or colonisation, admission to a healthcare facility, dialysis, surgery or insertion of indwelling devices in the past year</td>
</tr>
<tr>
<td>LA-MRSA</td>
<td>No formal definition. Usually belong to CC398 lineage in Europe but often CC9 in Asia. Acquired via occupational contact with livestock</td>
</tr>
</tbody>
</table>

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Risk factors for HA-MRSA

10,072 pts screened within 24 hrs of admission (90%) over 8 months
355 cases (3.5%) including 204 new cases (2.0%)

Risk factors at admission identified in new cases by multivariate analysis

- Previous hospitalisation < 2 years
- Age > 75 years
- Previous cephalosporins
- Previous fluoroquinolones
- Previous carbapenem
- Previous hospitalisation
- Parenteral treatment
- Urinary catheter
- Transferred from another ward

1.0  10.0

OR (CI 95%)

1.7  2.0
1.8  2.1
2.0  2.3
2.6  3.3
2.1  2.7

Harbarth S et al. Am J Med 06

BRIEF REPORT

David Bracco
Marc-Jacques Dubois
Redouane Boutali
Philippe Eggimann

Risk of MRSA acquisition
Outcome (ICU dead)
Mechanical ventilation
Days with MV (per day)
Parenteral nutrition
Type of bed: single room or cubicles

Effect [OR (95% CI)] p value
1.04 (0.57–1.84)  NS
0.82 (0.58–1.18)  NS
1.28 (1.20–1.36)  <0.001
2.95 (1.17–7.52)  0.02
0.65 (0.42–0.98)  <0.05

Coronary care unit
All traffic to CCU through ICU

Single rooms may help to prevent nosocomial bloodstream infection and cross-transmission of methicillin-resistant Staphylococcus aureus in intensive care units

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?? How did we reach that ??

At that time,...

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Anything was easy!
Patients >>>>> nurses

Pandemia of poliomyelitis in the 50’s

So easy!!

1928: Alexander Fleming
1940: Ernst Chain
1940: Howard Foley

43-year-old Oxford policeman who had nicked the corner of his mouth shaving. 
-> Facial and orbital cellulitis -> Improvement -> relapse and death

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So easy !!!

penicillin

PBP
Penicillin-Binding Protein

penicillin

PBP
Penicillin-Binding Protein

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So easy !!!

penicillin

PBP

Penicillin-Binding Protein

Maybe too easy !!

Publicity in the 50’s
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INFECTIONS ➔ ANTIBIOTICS

INFECTIONS ➔ ANTIBIOTICS ➔ RESISTANCE
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INFECTIONS ➔ ANTIBIOTICS ➔ RESISTANCE

PBP 2a: modified penicillin-binding protein

Methicillin-resistant *Staphylococcus aureus*

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Methicillin-resistant *Staphylococcus aureus*
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INFECTIONS ➔ ANTIBIOTICS ➔ RESISTANCE

INFECTION BY PENICILLIN-RESISTANT STAPHYLOCOCCI

Mary Barber
M.D. Lond.
Mary Rozwadowska-Dowzenko
M.D. Warsaw

From the Bacteriology Department, Postgraduate Medical School of London

Many studies have been carried out on the incidence of penicillin-resistant infection. Until 1944, the incidence was rapidly increasing, particularly in the USA, with more than 10% of staphylococcal strains being resistant to penicillin. However, following the introduction of penicillin in the 1940s, the incidence of penicillin-resistant strains decreased. The work reported here shows that this decrease has continued.

In a population study of patients with severe staphylococcal infections, the incidence of penicillin-resistant strains was found to be significantly lower than in the general population. This suggests that the decrease in incidence is not due to a decrease in the overall incidence of staphylococcal infections, but rather to a decrease in the incidence of penicillin-resistant strains.

The penicillin sensitivity of Staph. pyogenes in relation to previous treatment with penicillin was as follows:

<table>
<thead>
<tr>
<th>Type of Infection</th>
<th>Total Patients</th>
<th>Penicillin-sensitive Strains</th>
<th>No Penicillin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Septicemia</td>
<td>20</td>
<td>15</td>
<td>5</td>
</tr>
<tr>
<td>Holl, knee, wrist</td>
<td>10</td>
<td>8</td>
<td>2</td>
</tr>
<tr>
<td>Septicemia</td>
<td>10</td>
<td>8</td>
<td>2</td>
</tr>
<tr>
<td>Septicemia</td>
<td>10</td>
<td>8</td>
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<td>8</td>
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</tr>
<tr>
<td>Septicemia</td>
<td>10</td>
<td>8</td>
<td>2</td>
</tr>
</tbody>
</table>

The incidence of penicillin-resistant strains is shown in the graph below:

- Penicillin resistance (1946)
- Methicillin resistance (1963)
- Multidrug-resistant MRSA (1976)
- VISA (1997)
- VRSA (2002)
- CA-MRSA
- LA-MRSA
- Vancomycin introduced (1956)
- Methicillin introduced (1959)
- Penicillin introduced (1943)

Schmidt T et al. Antimicrobial Resistance in Staphylococci at the Human–Animal Interface. In: Immunology and Microbiology


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INFECTIONS ➔ ANTIBIOTICS ➔ RESISTANCE

- Inappropriate Antibiotic treatment
- Mortality sepsis/VAP peritonitis
- Resistant microorganisms
- Broad spectrum antibiotics

[Citations]
Celis et al., Chest 1988
Alvares-L. et al., ICM 1996
Luna et al., Chest 1997
Kollef et al., Chest 1999
Rello et al., Chest 2002
Leroy et al., ICM 2003
Clech et al., ICM 2004

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Deaths attributable to AMR every year compared to other major causes of death:

- Tetanus: 60,000
- Road traffic accidents: 1.2 million
- Measles: 130,000
- Diarrhoeal disease: 1.4 million
- Cholera: 100,000 – 120,000
- Diabetes: 1.5 million
- Cancer: 8.2 million
- AMR now: 700,000 (low estimate)
- AMR in 2050: 10 million

Welcome to the post-antibiotic era
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We should prevent them!

Because MRSA is now everywhere!!!
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Because MRSA is now everywhere!!!
Environemntal reservoir of MRSA in isolation rooms
25 MRSA positive patients isolated in single-rooms

% of positive screening

Because MRSA is now everywhere!!!

A meta-analysis of the rates of Staphylococcus aureus and methicillin-resistant S aureus contamination on the surfaces of environmental objects that health care workers frequently touch
Dongxin Lin MSc, Qianting Ou MSc, Jialing Lin MSc, Yang Peng MSc, Zhenjiang Yao PhD

![Graph showing the percentage of positive screening for different surfaces over four weeks.](chart)


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Strategies for infection control

General measures
Surveillance
Isolation precautions

Antibiotic control
Restriction of use, guidelines, rotation
Selective digestive decontamination

Specific measures
Specifically targeted against VAP
Specifically targeted against BSI
Specifically targeted against ....
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Characteristics and determinants of outcome of hospital-acquired bloodstream infections in intensive care units: the EUROBACT International Cohort Study

Suscceptible, MDR,^a^, XDR,^a^, PDR,^a^, Total

<table>
<thead>
<tr>
<th>Organism Type</th>
<th>Susceptible n (%)</th>
<th>MDR,^a^ n (%)</th>
<th>XDR,^a^ n (%)</th>
<th>PDR,^a^ n (%)</th>
<th>Total n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gram-negative</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acinetobacter spp.</td>
<td>13 (8.1 %)</td>
<td>14 (9.9 %)</td>
<td>11 (7.3 %)</td>
<td>1 (0.6 %)</td>
<td>759 (47.5 %)</td>
</tr>
<tr>
<td>Escherichia coli</td>
<td>46 (29.3 %)</td>
<td>110 (70.5 %)</td>
<td>76 (48.5 %)</td>
<td>3 (1.9 %)</td>
<td>156 (11.9 %)</td>
</tr>
<tr>
<td>Pseudomonas spp.</td>
<td>95 (63.3 %)</td>
<td>55 (36.7 %)</td>
<td>41 (27.3 %)</td>
<td>1 (0.7 %)</td>
<td>50 (3.6 %)</td>
</tr>
<tr>
<td>Enterococcus spp.</td>
<td>57 (58.2 %)</td>
<td>41 (41.8 %)</td>
<td>5 (5.1 %)</td>
<td>0 (0 %)</td>
<td>98 (7.4 %)</td>
</tr>
<tr>
<td>Enterococcus spp.</td>
<td>69 (64.5 %)</td>
<td>38 (35.5 %)</td>
<td>15 (14.0 %)</td>
<td>0 (0 %)</td>
<td>107 (10.1 %)</td>
</tr>
<tr>
<td>Other gram-negative</td>
<td>103 (71.5 %)</td>
<td>41 (28.5 %)</td>
<td>2 (1.4 %)</td>
<td>0 (0 %)</td>
<td>144 (10.3 %)</td>
</tr>
<tr>
<td>Coagulase-negative staphylococci</td>
<td>141 (100 %)</td>
<td>0 (0 %)</td>
<td>0 (0 %)</td>
<td>0 (0 %)</td>
<td>141 (10.7 %)</td>
</tr>
<tr>
<td>Other staphylococci</td>
<td>60 (58.4 %)</td>
<td>51 (49.6 %)</td>
<td>0 (0 %)</td>
<td>0 (0 %)</td>
<td>119 (9.0 %)</td>
</tr>
<tr>
<td>Other gram-positive</td>
<td>36 (100 %)</td>
<td>0 (0 %)</td>
<td>0 (0 %)</td>
<td>0 (0 %)</td>
<td>36 (2.3 %)</td>
</tr>
<tr>
<td>Anaerobes</td>
<td>13 (100 %)</td>
<td>0 (0 %)</td>
<td>0 (0 %)</td>
<td>0 (0 %)</td>
<td>13 (1.4 %)</td>
</tr>
<tr>
<td>Other anaerobes</td>
<td>7 (100 %)</td>
<td>0 (0 %)</td>
<td>0 (0 %)</td>
<td>0 (0 %)</td>
<td>7 (0.5 %)</td>
</tr>
<tr>
<td>Fungi</td>
<td>98 (74.4 %)</td>
<td>36 (2.7 %)</td>
<td>0 (0 %)</td>
<td>0 (0 %)</td>
<td>98 (74.4 %)</td>
</tr>
<tr>
<td>Candida albicans</td>
<td>0 (0 %)</td>
<td>50 (0 %)</td>
<td>0 (0 %)</td>
<td>0 (0 %)</td>
<td>50 (0 %)</td>
</tr>
<tr>
<td>Candida non-albicans</td>
<td>0 (0 %)</td>
<td>39 (0 %)</td>
<td>0 (0 %)</td>
<td>0 (0 %)</td>
<td>39 (0 %)</td>
</tr>
<tr>
<td>Other</td>
<td>0 (0 %)</td>
<td>7 (100 %)</td>
<td>0 (0 %)</td>
<td>0 (0 %)</td>
<td>7 (0.5 %)</td>
</tr>
<tr>
<td>Total (patients)</td>
<td>570 (49.3 %)</td>
<td>586 (50.7 %)</td>
<td>254 (22 %)</td>
<td>5 (0.4 %)</td>
<td>1,156</td>
</tr>
<tr>
<td>Total (micro-organisms)</td>
<td>688 (52.2 %)</td>
<td>629 (47.8 %)</td>
<td>270 (20.5 %)</td>
<td>5 (0.38 %)</td>
<td>1,317</td>
</tr>
</tbody>
</table>

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**Isolation precautions**

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to prevent TRANSMISSION

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To prevent transmission
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Your 5 Moments for Hand Hygiene

1. Before touching patient
2. After aseptic procedure
3. After patient exposure
4. After touching a patient
5. Before touching patient's environment

Hand hygiene

Compliance to hand hygiene


53 dispensers for 14 beds!

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Isolation precautions

Standard precautions
- dailywork
- gloves

Transmission

Isolation precautions

Transmission-based precautions
- exceptions
- exceptions
- exceptions
- exceptions

Standard precautions
- dailywork
- gloves

www.cdc.gov

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Strategies for infection control

**General measures**

*Surveillance* = screening
*Isolation precautions*

**Antibiotic control**
Restriction of use, guidelines, rotation
Selective digestive decontamination

**Specific measures**
Specifically targeted against VAP
Specifically targeted against BSIs
Specifically targeted against ....

---

Isolation precautions

**Transmission-based precautions**

*exceptions*

**FOR MRSA**

Hospital-wide education program

**Standard precautions**

dailywork
dailywork
dailywork
dailywork

donning

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Dr. Philippe Eggimann, Service de médecine intensive adulte, Lausanne University
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Efficacy of screening + isolation

Efficacy of screening + isolation

Rate of methicillin-resistance in invasive S. aureus infections

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Efficacy of screening + isolation

1. Mandatory reporting, 2004
2. ‘Getting ahead of the curve’, 2002
3. ‘Winning ways’, 2003
4. ‘Towards cleaner hospitals’, 2004
5. ‘Cleanyourhands’, 2004
6. Targets introduced, 2004
7. Cleanliness improvement, 2005
8. ‘Going further faster’, 2006
9. Root cause analysis, 2006
10. Revised national guidelines, 2006
12. Screening elective admissions, 2008
13. Universal screening, 2010

Doubts on screening + isolation

Interventions to reduce colonisation and transmission of antimicrobial-resistant bacteria in intensive care units: an interrupted time series study and cluster randomised trial

Interpretation: Improved hand hygiene plus unit-wide chlorhexidine body-washing reduced acquisition of antimicrobial-resistant bacteria, particularly MRSA. In the context of a sustained high level of compliance to hand hygiene and chlorhexidine bathing, screening and isolation of carriers do not reduce acquisition rates of multidrug-resistant bacteria, whether or not screening is done with rapid testing or conventional testing.

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The objective is not to isolate!
But to prevent the transmission of microorganisms

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Screening + preemptive isolation + decolonization may control MRSA
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Preemptive isolation
Detected at admission
Rapid Nosocomial Test (PCR)

MRSA outbreak in 35-bed ICU

Preemptive isolation
Detected at admission
Rapid Nosocomial Test (PCR)
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Strategies for infection control

**General measures**
Surveillance
**Isolation precautions**

**Antibiotic control**
Restriction of use, guidelines, rotation
Selective digestive decontamination

**Specific measures**
Specifically targeted against VAP
Specifically targeted against BSI
Specifically targeted against ....

CHX washing

active skin biofilm removal

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### CHX washing → source control

#### Chlorhexidine Gluconate to Cleanse Patients in a Medical Intensive Care Unit
*Source Control to Reduce the Bioburden of Vancomycin-Resistant Enterococci*

Cleansed with chlorhexidine cloths
- Skin Contamination
- Environmental Contamination
- Worker Hand Contamination
- Patient Acquaintness

Bathed with soap and water
- Skin Contamination
- Environmental Contamination
- Worker Hand Contamination
- Patient Acquaintness

<table>
<thead>
<tr>
<th></th>
<th>Favors cloths</th>
<th>Risk Ratio</th>
<th>Favors soap/water</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.5</td>
<td></td>
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<td>1.0</td>
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<td></td>
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<tr>
<td>1.5</td>
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<td>2.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.5</td>
<td></td>
<td></td>
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</tbody>
</table>

Vernon Arch Intern Med 06

---

**CHX washing → source control**

Prevention of Bloodstream Infections by Use of Daily Chlorhexidine
Baths for Patients at a Long-Term Acute Care Hospital

**Effectiveness of Chlorhexidine Bathing to Reduce Catheter-Associated Bloodstream Infections in Medical Intensive Care Unit Patients**

**The effect of daily bathing with chlorhexidine on the acquisition of methicillin-resistant Staphylococcus aureus, vancomycin-resistant Enterococci, and healthcare-associated bloodstream infections: Results of a quasi-experimental multicenter trial**

**Effectiveness of Routine Patient Cleansing with Chlorhexidine Gluconate for Infection Prevention in the Medical Intensive Care Unit**

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CHX washing → source control

Effect of Daily Chlorhexidine Bathing on Hospital-Acquired Infection

Targeted versus Universal Decolonization to Prevent ICU Infection

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CHX washing \(\rightarrow\) source control

MRSA in a 35-bed ICU

Preemptive isolation
Non-chlorhexidine Wipes
CHX Wipes

Detected at admission
Real-time PCR
Nosocomial

CHX washing \(\rightarrow\) source control

Insights into bacterial colonization of intensive care patients’ skin: the effect of chlorhexidine daily bathing

N. Cassir • L. Papazian • P.-E. Fournier • D. Raoult • B. La Scola

Table 1  Comparison of the number of different species identified per site

<table>
<thead>
<tr>
<th>Site</th>
<th>Chlorhexidine group, Median (IQR)</th>
<th>Water and soap group, Median (IQR)</th>
<th>(P) value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nares</td>
<td>3.3 (3–4.75)</td>
<td>4 (3.25–4.75)</td>
<td>0.68</td>
</tr>
<tr>
<td>Axillary vault</td>
<td>0.5 (0–1.65)</td>
<td>5 (3.25–6)</td>
<td>&lt;0.001(a)</td>
</tr>
<tr>
<td>Inguinal crease</td>
<td>3 (2–3)</td>
<td>5 (4–5)</td>
<td>0.04(a)</td>
</tr>
<tr>
<td>Mamabrium</td>
<td>2 (1.25–2)</td>
<td>3 (3–4)</td>
<td>&lt;0.001(a)</td>
</tr>
<tr>
<td>Back</td>
<td>1 (1–2)</td>
<td>2 (1–2)</td>
<td>0.20</td>
</tr>
<tr>
<td>All sites</td>
<td>17 (12.25–23)</td>
<td>33 (25.25–37.5)</td>
<td>0.004(a)</td>
</tr>
</tbody>
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Screening + CHX bathing

2014

Up to 10 x/day 1 x/day

MRSA: Number of cases

wipes CHX wipes

All cases

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Screening + preemptive isolation + CHX bathing may control MRSA

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Strategies for infection control

General measures
Surveillance
Isolation precautions

Antibiotic control
Combination therapy
SDD; probiotics
Stewardship (guidelines; deescalation)
New strategies (TDM/aerosols/mAb/phages)

Specific strategies
Specifically targeted against VAP
Specifically targeted against BSI
Specifically targeted against "..."

mAb


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mAb

The SAATELLITE and EVADE Clinical Studies Within the COMBACTE Consortium: A Public–Private Collaborative Effort in Designing and Performing Clinical Trials for Novel Antibacterial Drugs to Prevent Nosocomial Pneumonia

Bruno Fencevic,1 Jean Chastre,2 Philippe Eggimann,3 Pierre-François Latrève,4 Antonio Torres,5 Miguel Sanchez,4 Mark T. Ezen,6 Brian Bishop,7 Marc Bouton,8 Norman Goossens,9 and Hasan S. Jafri2

The Innovative Medicines Initiative–funded COMBACTE consortium fosters academic-industry partnership in pioneering studies to combat serious bacterial infections. We describe how this partnership is advancing the development of 2 monoclonal antibodies, MEDI4893 and MEDI3905, for the prevention of nosocomial pneumonia.

Anti-MSSA/MRSA

Anti-Pseudomonas

To summarize

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Prevention and Control of Methicillin-Resistant Staphylococcus aureus in Acute Care Settings

Andie S. Lee, MB BS, DTMBH, MS(Ed),*, Benedikt Huttner, MD, MS(Ed),*
Stephan Harbarth, MD, MS(Ed)

KEY POINTS

- Methicillin-resistant Staphylococcus aureus (MRSA) is an important cause of health care-associated infections and is endemic in many health care facilities worldwide.
- Decreasing rates of invasive MRSA infections have been reported in many countries over recent years, often following implementation of concerted and coordinated multifaceted interventions at a national level.
- Despite these successes, the optimal approach to MRSA control remains controversial, particularly with regards to MRSA screening, isolation, decolonization, and environmental cleaning.
- Over the last decade, new data from robust large-scale studies have emerged, particularly with regards to MRSA screening and decolonization (targeted and universal) strategies.
- Flexibility to adapt and institute evidence-based measures is the context of local epidemiology, infrastructure, and resources is essential for successful MRSA control.

Infect Dis Clin N Am 30 (2016) 931-952
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Prevention and Control of Methicillin-Resistant Staphylococcus aureus in Care Settings

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