MRSA Pneumonia: The ICU Experience

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Learning Outcomes
- Differentiate between Hospital acquired (HA) & Community acquired (CA) MRSA
- Identify the at risk population for CA-MRSA & HA-MRSA
- Recognize the therapies currently used for treatment of CA-MRSA & HA-MRSA
- Initiate infection prevention & control practices for MRSA

CA-MRSA! HA-MRSA! What’s the Difference?

CA-MRSA
- Transmissible
- Presentation unusual
- Known to cause skin & soft tissue infections
- Affects vital organs when associated with virulence factors
  - Panton-Valentine Leukocidin (PVL) + meca gene
  - Super adapted CA-MRSA

HA-MRSA
- Transmissible
- Depends on the host factors and environmental factors
- Affects vital organs to cause HAP & VAP
- Presentation of HA-MRSA is unusual, more likely colonization than infection
Host Factors for HA-MRSA

- Debilitated host
- Lengthy hospitalization
- Diabetes
- CV disease
- Previous nursing homes admissions

This differentiates it from CA-MRSA as the host is usually healthy, such as athletes, kids, etc.

MRSA: A Major Global Concern

- CA-MRSA increasing worldwide
- Can be missed
- Choice & timely antibiotics crucial
- CA-MRSA in a clinical sepsis can result in treatment failure and a poor outcome
- Guidelines for the prevention and management of CA-MRSA have recently been developed for Canada & available online www.ccar-ccra.com/english/ca-mrsa.shtml

Which Is the Most Virulent?

- CA-MRSA or HA-MRSA

Epidemiology: Prevalence

- Europe (England, Scotland, the Netherlands, Latvia, Denmark, Finland, Sweden, Switzerland, Italy & France)
- United States
- Asia
- Australia
- New Zealand
- Canada

- CA-MRSA less common in Canada than in the United States

Public Health Agency of Canada

Spreading the CA-MRSA

- Direct contact with a colonized or infected patient or with their contaminated personal belongings
- Can spread within a household and between families
- Can affect young immuno-competent people

CA-MRSA

What you need to know

CA-MRSA is a type of skin infection caused by resistant Staph bacteria. These infections can become more severe or even life-threatening if not treated right away. CA-MRSA is spread through close physical contact with an infected person or by touching things contaminated with Staph, e.g., towels, sheets, clothes, wound dressings, or sports equipment.

The infected area should not be covered with a bandage, dressings, or ointments. For more information, please contact your local health department.
**CA-MRSA**

**What can you do?**

Here are things YOU can do to help prevent and control the spread of CA-MRSA in a sport setting.

**WASH** your hands with soap and water **OFTEN** or use an alcohol-based hand rub (minimum 60%).

**NEVER SHARE** personal items (e.g., soap, towels, clothes, razors, clothing, brushes, nail files).

**CLEAN** and disinfect all shared sports equipment after each use (e.g., mats, pads, helmets).

**REPORT** any suspicious sores to your doctor.

**COVER** all open sores with a bandage.

Coaching Association of Canada

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**The Chain of Infection**

- **Host** (susceptible person)
- **Reservoir** (where germs are found)
- **Portal of Entry** (way germs get in)
- **Portal of Exit** (way germs get out)
- **Means of Transmission** (way germs travel)

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**Who Is at Risk?**

- Children
- First Nations populations
- Athletes
- Military trainees
- Men who have sex with men
- Intravenous drug users
- Prison populations
- Homeless
- Poor Hygiene
- People living in cramped conditions

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**HA-MRSA: Risk Factors**

- Catheters: CVC, arterial
- Tubes: gastrostomy, jejunostomy, urinary
- Abdominal surgery
- GI colonization
- Prolonged hospital LOS
- Prior antibiotics
- Prior nursing home stay
- Severity of illness
- Mechanical ventilation
- Invasive procedures
- HD
- Decubitus ulcers
- Reservoirs/vectors
- Hand colonization
- Ultrasound gel
- Thermometers
- BP cuffs

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**Detection**

- Testing done at specific hospitals or shared labs (*guidelines*)
- Screening: detected by swabbing the nostrils, rectum & any open areas of patients and isolating the bacteria present
- Symptomatic fever: a sample of urine, blood, wound area or sputum sample needed

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**MRSA**

- Do treat symptomatic pt with appropriate antibiotics
  - UTI, wound infection, pneumonia or blood infections
  - Treatment based on culture, sensitivity & MIC
**Bill: Case Study**

- 17-year-old, previously healthy student
  - Recently visited relatives in Texas
  - Presented to ED with fever, SOB & dry cough
- Events: temp 39.5°C, HRBP, spO₂ 83
  - Respiratory distress
- PCXR: extensive bilateral lung infiltrates
- Diagnosis: CAP with septic shock
- Admitted to ICU for intubation, & ventilation
- Bronchoscopy: “patchy necrosis of the epithelial surface of the airways” suggesting necrotizing pneumonia
- Co-morbidities: URTI

**Septic Shock Management - Early goal-directed therapy**

- Treat the problem/source with droplet/contact isolation
- Promoting gas exchange & tissue oxygenation
  - Mechanical ventilation using “lung protective strategies” (CMV→ HFOV)
- Fluid resuscitation
- Monitor circulatory compromise
- Renal Failure → CRRT

**Septic Shock Management - Early goal-directed therapy**

- Pharmacological Intervention
  - Inotropes, sedation, & analgesia
  - Activated protein C
- Antibiotics: Azithromycin, Cefazidime, Ciprofloxacin, Clindamycin, Cloxacillin, & Vancomycin
- Prevent complications
  - Oral care & glucose control
  - DVT prophylaxis/stress ulcer prophylaxis, nutrition, HOB 30-45°
- Dealing with the psychosocial issues of pt., family & multidisciplinary team
MRSA = Teenage pt. arrested

Using hand hygiene & appropriate precautions for
Influenza A destroys the respiratory epithelium from the

Despite aggressive supportive care, Bill died

Psychosocial issues of patient & family
Can cause death
Can be spread directly by person to person contact
Appropriate & timely antibiotics crucial
Emotional issues of multi-disciplinary team

Influenza virus A + PVL positive CA
from family
Bill may have acquired MRSA in Texas & influenza
infection
necrotizing pneumonia with CA

Admission swabs for all patients
Strict adherence to appropriate hand hygiene
initiation of additional droplet/contact precautions
Relevance of febrile respiratory screening & pre-admission
physicians
Team management approach (including pharmacy & ID

Did We Learn From This?

Increased awareness of new developments in infectious
diseases
Admission swabs for all patients
Need for more research
Hospital wide educational sessions
Infection prevention & control week
Patient education material
"Flagging"
Team management approach (including pharmacy & ID
physicians)
Relevance of febrile respiratory screening & pre-emptive
initiation of additional droplet/contact precautions
Strict adherence to appropriate hand hygiene

Challenges

Diagnosis
Management of complications associated with multiple organ dysfunction
Dealing with varying issues
Teenage pt. arrested
Despite aggressive supportive care, Bill died on Day 6 after admission
Psychosocial issues of patient & family
Emotional issues of multi-disciplinary team

Summary

CA-MRSA
Can cause death
Can be spread directly by person to person contact
Importance of infection control through team collaboration
to prevent the spread of CA-MRSA through screening
(surveillance) & interventions
Using hand hygiene & appropriate precautions for
colonized and infected patients
Appropriate & timely antibiotics crucial
Case highlights the increased need for awareness and
preparation for an increase in CA-MRSA in Canada and
potential for poor outcome

Thank You!
The Scarborough Hospital Infection Prevention & Control Department
The ICU multidisciplinary team

"The patient in the next bed is highly infectious. Thank God for these curtains."