



MRSA Dinner Symposium

13 July 2007, 6pm

York Hotel, Carlton Hall, Level 2. Singapore

Chair and Co-chair:

1. Dr Ling Moi Lin, President Infection Control Association (Singapore).
2. Dr Trish Pearl, Professor of Medicine, Johns Hopkins University School of Medicine.

Guest speakers:

1. Dr William R. Jarvis, President, Jason and Jarvis Association, Hilton Head Island, SC.
2. Ms Glenys Harrington, Infection Control Program Co-ordinator, The Alfred Hospital, Melbourne, Victoria, Australia.
3. Prof Didier Pittet, Infection Control Program, Department of Internal Medicine, University Hospitals of Geneva, Geneva, Switzerland.

“Prevention and Control of Methicillin-resistant *Staphylococcus aureus*” - Dr William R. Jarvis, President, Jason and Jarvis Association, Hilton Head Island, SC

The objectives of his presentation were:

- 1) To describe the current trends in MRSA in U.S. healthcare facilities
- 2) To discuss the current infection control recommendations for preventing MRSA transmission
- 3) To discuss on ways to prevent MRSA colonization and infection.

The CDC guideline for isolation precautions recommends contact isolation (gowns, gloves, single room or cohorting and environmental cleaning) for patients “known or suspected to be colonized or infected with epidemiological important antibiotic-resistant microorganisms.

1. Current trends in MRSA in U.S. healthcare facilities

¹Analysis of discharge diagnoses from National Hospital Discharge Survey, 1999-2000 using ICD-9 codes for *S. aureus* reveals the following results:

- 125,969 hospitalizations
- 31,440 septicemias
- 29,823 pneumonias
- 64,076 other infections
- 3.95 per 1,000 hospital discharges.

²In another study on MRSA in U.S. Hospital ICUs, 1992 – 2003, using the CDC’s NNIS ICU component data, results revealed:

- 35.9% *S. aureus* infections were caused by MRSA (1992).
- 64.4% were MRSA (2003)
- An increase of 3.1% per year.

The number of hospital-acquired MRSA infections more than tripled and the proportion of *S. aureus* infections caused by MRSA nearly doubled at NNIS hospitals in the past decade.

¹ Kuehnert M. et al. EID 2005;11:868-872.

² Klevins M. et. al. CID 2006; 42:389-391.

In an ³observational study at a teaching hospital in Montreal, Canada, results show that the rate of compliance was 31% (8am to 4pm), 8% (4pm to 12am) and 3% (12am to 8am). Compliance rate in the weekday was 30% and 12% for the weekend.

⁴Studies have shown that clinical cultures to detect MRSA patients was not enough as only 15% to 36% of patients colonized or infected with MRSA were detected using clinical cultures.

Two recent, large prevalence studies focusing on children, because of frequent reports of community acquired MRSA in children, showed a prevalence rate of 0.2%. ^{5,6}A third study gave a higher rate among homeless adults, but of those without healthcare contacts it was 0.2%. ⁷A national prevalence survey found that <1% of the U.S. population is culture positive for MRSA⁸.

2. Ways to prevent MRSA colonization and infection and current infection control recommendations for preventing MRSA transmission

Table 1 MRSA Guidelines

| SHEA guideline recommendations: | New CDC MDRO Guideline: A two-tiered approach |
|---|--|
| <ol style="list-style-type: none"> 1. Active surveillance cultures to identify the reservoir for spread. 2. Hand hygiene. 3. Barrier precautions for patients known or suspected to be colonized or infected with epidemiological important antimicrobial-resistant pathogens, such as MRSA or VRE. 4. Antibiotic stewardship. 5. Decolonization or suppression of colonized patients. | <ol style="list-style-type: none"> 1. The baseline level of MDRO control activities designed to ensure recognition of MDROs as a problem, involvement of healthcare administrators, and provision of safeguards for managing unidentified carriers of MDROs. 2. With the emergence of an MDRO problem that cannot be controlled with the basic set of infection control measures, additional control measures should be selected from the second tier of interventions. <ul style="list-style-type: none"> • Identification of an MDRO from even one patient in a facility or special unit with a highly vulnerable patient population (e.g. an ICU, NICU, burn unit) that had previously not encountered that MDRO. • Failure to decrease prevalence or incidence of a specific MDRO (e.g. incidence of resistant clinical isolates) despite infection control efforts to stop its transmission. |

³ Aiff. Et. al. AJIC 2004.

⁴ (Muder et al. SHEA Annual Meeting 2004), (Salgado et al. ICHE. 2006; 27:116-21), (Muto et al. SHEA Annual Meeting 2005).

⁵ Sa-Leao R. et al. Microbial Drug Resist 2001; 7:237-245.

⁶ Shopsin B et al, JID 2000; 182:359-362.

⁷ Charlebois E. et al. CID 2002; 34:425-33.

⁸ National Health and Nutrition Examination Survey (NHANES)

Table 2 Essential elements of MRSA prevention guideline comparison

| | IHI | CDC | SHEA | APIC |
|-------------------------------------|---|--|--|---|
| Guideline | 5 Million Lives Capaign: Reduce MRSA Infections. Dec 2006 | Management of MDROs in healthcare settings, Nov 2006. | Guideline for preventing nosocomial transmission of multi-resistant strains of <i>S. aureus</i> and Enterococcus 2003. | Implementation guide to best practices for the elimination of MRSA transmission, March 2007 |
| Active surveillance | Essential intervention recommended. | By all guidelines | For prevention and control. | MRSA associated infections |
| Testing. When to conduct? | Routinely; on admission; periodic/weekly sweeps of high-risk areas and high-risk patients. | When MDRO rates are not going down. Routinely; on admission; periodic/weekly sweeps of high-risk areas and high-risk patients. | Routinely; on admission; periodic/weekly sweeps of high-risk areas and high-risk patients. | Routinely; on admission; periodic/weekly sweeps of high-risk areas and high-risk patients. |
| AST which patient? | High-risk patients upon admission and weekly – each hospital to determine risk. | Including – prior history of MRSA – admission to ICU. | Recent hospitalization (<one year) – roommates of colonized or infected persons. | History of transfer from long-term care facility – skin wounds. |
| Which site to test/culture for MRSA | Anterior nares will identify majority of colonized adults; adding wound cultures increases sensitivity. Anterior nares and umbilicus for new borns. | Anterior nares usually sufficient. Obtain cultures from areas of skin breakdown and draining wounds. | Anterior vestibule of the nose – always throat cultures can enhance sensitivity; consider peri-rectal perineal, but never as only culture. Site areas of skin breakdown. | Anterior nares. Areas of skin breakdown and wounds. |

| | IHI | CDC | SHEA | APIC |
|--|---|----------------------------|----------------------------|----------------------------|
| Contact precautions including hand hygiene | Per CDC/HICPAC Guidelines. Routinely for all patients known to be colonized or infected with MRSA. If single rooms are not available for patient isolation, MRSA colonized or infected patients can be cohorted together. | Per CDC/HICPAC Guidelines. | Per CDC/HICPAC Guidelines. | Per CDC/HICPAC Guidelines. |
| Environmental measures including surface and equipment decontamination | Essential | Element | Recommended | By all. |
| Antibiotic stewardship | Essential | Element | Recommended | By all. |

In conclusion, MRSA colonization precedes infection and colonized patients contaminate healthcare workers and the environment the same as infected patients. Routine clinical cultures do not detect most MRSA colonized patients. Active surveillance cultures are necessary, if the unrecognized reservoir is to be detected.

MRSA colonized and infected patients should be placed in contact isolation and hand hygiene is needed to prevent MRSA cross transmission.

The SHEA guideline approach i.e. active surveillance culture, barrier precautions (contact isolation or cohorting), and hand hygiene is supported by over 60 studies. The Infection Control Community should take a more aggressive approach to controlling antimicrobial-resistant pathogens.

“MRSA Reduction Strategies in Australia”- Ms Glenys Harrington, Infection Control Program Co-ordinator, The Alfred Hospital, Melbourne, Victoria, Australia

MRSA remains a significant problem for Australian hospitals. From January 1999 to December 2002, ⁹51% of *Staphylococcus aureus* bacteraemias were hospital onset (>48 hours after admission) and 40% were methicillin resistant. ¹⁰In 2004, medial MRSA episodes were 0.22/1000 admissions (range 0-0.89).

⁹ Nimmo GR, Coombs GW, Pearson JC. Et al. Med J Aust 2006; 184: 384-388.

¹⁰ Collignon P. et al. Emerg Infect Dis 2005; 11:554-561.

Table 3 Australian Infection Control Association Consensus MRO screening guidelines

| MRSA – Acute care facilities | Hospital wide approach | Specialised units* |
|--|---|--|
| Site: Nose/groin/clinical specimen. Clearance: More than 6 months since last positive. All wounds healed no devices. 3 consecutive negative screens/no time frame specified. | Re-admission within 6 months of an acute care anywhere or patient with chronic conditions (wounds/devices) or transfer from LTCF**. | All patients on admission then weekly or twice weekly depending on rates. Selected perioperative rates. |

Ferguson J. et al. Aust Infect Cont 2002; 7(3): vii-xii (<http://www.aica.org.au>)
 Australian Infection Control Association Consensus MRO definitions and screening guidelines recommends every acute care facility perform surveillance for MRSA. Standard and additional precautions are to be in placed.

1. Victorian strategies: Victorian Quality Council hand hygiene project.

The Victorian Quality Council hand hygiene project (commenced Sept 04 – Nov 06) is modeled on work by Pittet et al (2000)/Austin Health. A state rolled out between Feb 06 and Nov 06 (\$2.3 million).

Mandatory interventions include:

- Employment of a project officer.
- Establishment of a steering committee.
- Selection of 3 pilot wards.
- Tracking and monitoring of resource allocation.
- Introduction of an alcohol/chlorhexidine based hand hygiene product.
- Observational audits (performance feedback).
- Education of staff.
- Optional interventions, which include walkabouts, grand round feedback, project newsletter, hand hygiene policy, microbiological sampling of the environment.

Outcome measures on:

- Hand hygiene product usage (Litres/1000 bed days/month).
- Rates of hand hygiene compliance.
- MRSA positive blood cultures per month.
- MRSA isolates per month, including multiple isolates.

¹¹Results on the rates of new MRSA isolates in the Alfred Hospital show:

- ICU: Intervention period 6.7 per 100 patient admissions (p=0.047), compared to the pre-intervention period of 9.3 per 100 patient admissions.
- Hospital wide: Intervention period 1.8 per 100 patient admissions (p<0.001), compared to the pre-intervention period of 3.0 per 100 patient admissions.

* Specialty units/selected procedures – screening dependent on MRO morbidity in these units.

** Other HCFs – screening is important in localities where MRSA is prevalent in patient without chronic wounds/devices. No routine screening recommended for aged care facilities.

¹¹ Harrington G. et al. ICHE 2007; 27:837-844.

2. Strategies under consideration in Victorian

Reduction of MRSA:

- MRSA screening of patients in high-risk areas.
- MRSA screening of patients undergoing high-risk surgical procedures.
- Rapid diagnostic testing.
- Isolation of patients found to have MRSA if possible.
- Monitoring of isolation precautions.
- Regular, routine reporting of MRSA data (all MRSA isolates) as per Victorian Quality Council hand hygiene project.
- Regular, routine reporting of MRSA data (all MRSA bacteraemias) as per Victorian Quality Council hand hygiene project.
- Meet set targets for MRSA reduction (note future funding will be linked to set targets).

Hand hygiene compliance:

- Monitor hand hygiene compliance.
- Periodic audits utilizing the Victorian Quality Council hand hygiene audit tool.
- Implement intervention strategies to improve and sustain hand hygiene compliance.
- Regular, routine feedback of hand hygiene compliance data.

“Hand Hygiene and MRSA”- Prof Didier Pittet, Infection Control Program, Department of Internal Medicine, University Hospitals of Geneva, Geneva, Switzerland

The multimodal approach:

- Identify carriers through screening and isolation.
- Eliminate carriage (decolonization).
- Stop transmission (hand hygiene).

Challenges faced:

- Reservoir of unknown MRSA carriers.
- Prevention.
- Rapid detection tool.
- Nosocomial spread of CA-MRSA.

It is possible to detect unknown MRSA carriers only if two-third of the patient population is screened. Hence, would isolation work? The possible reasons for failure are:

- High colonization pressure (>10%).
- Not all patients screened (approx 50%).
- No rapid test available.
- No pre-emptive isolation used.
- No cohorting.
- Low hand hygiene compliance (approx 20%).

Based on a study conducted by Pittet et al., Annals of Internal Medicine 1999, 130:126. 1) Time constraint is the main explanatory factor; 2) as opportunities increase, compliance decrease 3) hand rub (15 sec – 20sec) versus hand washing (1 – 1.5minutes).

Reducing the time required for handwashing may make it feasible especially for healthcare workers with high workloads to wash their hands more frequently. Placement of alcohol handrubs should be evaluated on its effect in improving hand hygiene compliance.

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