1. Title

Fact Sheet on the Control of Methicillin-Resistant *S. aureus* (MRSA) in Hong Kong Hospitals

2. Overview of MRSA and its Control

2.1 Strains of *Staphylococcus aureus* which are resistant to penicillinase resistant penicillins (e.g. methicillin, oxacillin, cloxacillin) and cephalosporins are usually referred to as methicillin-resistant *S. aureus* (MRSA). Such isolates are typically multiresistant, frequently carrying genes conferring resistance also to other antibiotics such as tetracyclines, macrolides, chloramphenicol, aminoglycosides and quinolones. In Hong Kong, as in other places like USA, Europe or East Asia, MRSA has been endemic in hospitals for some time with MRSA representing approx. 30 - 40% of *S. aureus* isolates.

2.2 Healthcare associated MRSA (HA MRSA) first appeared in the 1960s. MRSA with epidemic potential appeared in the 1980s and has typically been linked to persons with health care associated risk factors such as hospitalization or nursing home care, chronic dialysis, antibiotic treatment, or exposure to invasive devices or procedures.

2.3 Beginning in the 1990s community associated MRSA (CA MRSA) infections emerged in persons having none of the risk factors associated with MRSA in the past. Genetic and epidemiologic evidence shows that CA MRSA is caused by strains of *S. aureus* different from those associated with HA MRSA. The predominant strains of CA MRSA contain the staphylococcal chromosomal cassette (SCC) *mec* IV and V, a smaller version of the genetic package that confers less resistance, in comparison to the SCC *mec* I, II, III, found in HA MRSA. Apart from *β* lactams, most CA MRSA are susceptible to clindamycin, trimethoprim/sulphamethoxazole, doxycycline, minocycline, and fluoroquinolones.

2.4 CA MRSA strains also possess the *Panton Valentine Leucocidin* (*PVL*) gene that allows the production of a necrotizing cytotoxin, which may be responsible for the invasiveness and virulence of the organism. In contrast, only about 5 percent of methicillin sensitive strains of *S. aureus* and HA MRSA carry the *PVL* gene.

2.5 CDC define CA MRSA as MRSA infections in people with no history of the following risk factors within one year prior to the MRSA culture date:

- MRSA infection or colonization
- Hospitalization or surgery
- Permanent indwelling catheters or percutaneous medical devices
- Residence in a long term care facility
- Dialysis

2.6 The most frequent infections caused by CA MRSA are skin and soft tissue infections that typically present as boils, abscesses, or cellulitis. CA MRSA although less commonly, can also cause bacteremia, surgical site infections, hemorrhagic necrotizing pneumonias and necrotizing fasciitis associated with high mortality. Factors that have been associated with the spread of CA MRSA skin infections include: close skin to skin contact, openings in the skin such as cuts or abrasions, contact with contaminated items and surfaces, crowded living
conditions and poor hygiene.

2.7 Members of staff may become transiently colonized after contact with patients, and occasionally become carriers for prolonged periods. Outbreaks of MRSA have been attributed to environmental sources. The main means of spread of MRSA is by direct contact, particularly on the hands of healthcare workers. The importance of the airborne route is still unclear, but may be important in patients dispersing large numbers of infected squames (e.g. burns patients).

2.8 There are a number of general approaches to the control of MRSA, and these range from the aggressive detection and treatment of carriers approach advocated in some countries (Netherlands, Scandinavian countries, UK, Western Australia) to a more pragmatic approach which emphasizes the basic hygiene measures such as glove use and hand hygiene (USA). The latter is more appropriate in situations where MRSA is endemic in hospitals at a fairly high level (as in Hong Kong).

2.9 The following measures are recommended as a minimum for all acute care hospitals. The emphasis is on ensuring good standards of hand hygiene, use of barriers (e.g. gloves), adequate environmental cleaning and disinfection, appropriate use of antibiotics and isolation or cohorting patients to minimize risk of further transmission. Further measures (e.g. patient screening in special units, patient decolonization) may be added by hospital infection control teams in certain special situations but are not recommended for universal adoption.

3. Recommended control measures

3.1 Antibiotic use

- Prudent use of antibiotics is of great importance in the prevention of antibiotic-resistant organisms. Hospitals should promote rational antibiotic under the Antibiotics Stewardship Program.

3.2 Isolation

a. Use spatial separation between patients known to be infected or colonized with MRSA and patients who are not known to be infected or colonized

b. For placement of patients known to be infected or colonized with MRSA
   - A single room, preferably with a self contained bathroom, is the first choice.
   - Room sharing by or cohorting of patients infected or colonized with MRSA is the second choice
   - If these options are not available, room or ward sharing with non-infected or non-colonized patient(s) is the third choice

c. Maintain appropriate staffing levels to provide adequate patient care for whatever means of placement is chosen.

3.3 Hand hygiene

a. Hand Hygiene is the single most important procedure for preventing the transmission of MRSA
b. Hand Hygiene should be performed before and after contact with the patient or a potentially contaminated source or environment

c. Hands can be decontaminated with an alcohol based hand rub. When there is visible soiling of the hands, hand washing with water and soap or other antiseptic agents is required. Alcohol Hand Rub should be readily available and accessible to all staff at the point of patient care.

3.4 Contact precautions

a. Wear clean, non-sterile gloves when touching the patient or a potentially contaminated environmental source
   • Change gloves between patients. Change gloves between tasks on the same patient when contamination has occurred
   • Perform hand hygiene after removing gloves

b. In addition to gloves, gowns or plastic aprons should be used to protect the skin or clothing from gross contamination during close patient contact

3.5 Screening of patients & staff

a. The goal of screening patients for MRSA must be identified before screening is undertaken

b. Before screening is undertaken
   • Cost-effectiveness must be considered
   • Appropriate laboratory support must be available

c. Situations in which strong recommendation for screening may be made after discussion with infection control team include
   • Exposed patients in an outbreak situation where identification of colonized patients is an adjunct in outbreak control
   • High risk areas eg. intensive care unit, burns unit or high risk procedures such as prosthetic joint / valve replacement

d. Do not screen staff unless they are epidemiologically linked to outbreaks or ongoing transmission

3.6 Decolonization therapy (patients or staff)

a. Decolonization therapy for outbreak control is not recommended unless there is epidemiological evidence that the colonized person is spreading the organism.

b. Decolonization may be appropriate for MRSA colonized pre-operative patients undergoing orthopaedic implant and cardiac surgery.

3.7 Environment

a. Routine culturing of the environment or air is discouraged.

b. Hospitals should have a method to validate compliance with cleaning, disinfecting and sterilization practices
c. Non-hand contact, infrequently touched, environmental surfaces (e.g. floors, walls) should be cleaned when visibly soiled and as required to maintain an aesthetically pleasing environment. Cleansing with detergent is adequate.

d. Hand contact environmental surfaces next to the MRSA patient (e.g. patient locker top, overbed table, bed side rails) should undergo at least daily thorough cleaning in acute care areas. The use of a disinfectant (e.g. sodium hypochlorite 1,000 ppm) for these surfaces is an appropriate additional measure.

e. Non critical equipment (e.g. blood pressure cuffs, stethoscopes) used for MRSA patients should be dedicated as much as possible.

f. When dedicated equipment is not possible, shared non critical items must be cleaned and disinfected between patient use.

g. Limit the quantity of disposable items taken into room or designated space of MRSA patients to what would reasonably be used for that patient.

h. Items not easily cleaned e.g. computer keyboards, but easily contaminated should be covered with plastic and cleansed regularly.

i. Terminal cleansing (when patient is discharged from room or when isolation is discontinued) is to be done as an opportunity to clean areas not routinely accessible.

3.8 Surveillance

a. Each hospital should have a system in place to monitor the number and distribution of MRSA cases in each ward in a timely manner to facilitate the detection and control of outbreak. The trend of MRSA infections for each clinical department in terms of MRSA cases per 1000 patient bed days or equivalent and percentage of MRSA / S. aureus bacteremia should be monitored and fed back routinely to health care workers.

3.9 Other measures

a. Transfers of patients colonized or infected with MRSA to other wards or departments should be kept to a minimum. The receiving wards should also be informed of the patient’s status.

b. Electronic tagging - the computer records of patients colonized or infected with MRSA should be clearly marked so that they can be quickly identified on readmission. This can be done by entering the status to the Clinical Alert System of CMS.

c. If a patient colonized or infected with MRSA is transferred to another hospital, information on the MRSA status of the patient must be given to the receiving hospital.

4. Reference


2. Ayliffe G. Recommendations for the Control of Methicillin-Resistant Staphylococcus aureus (MRSA). World Health Organisation/EMC/LTS96.1

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5. Community Associated MRSA Information for the Public. Centers for Disease Control and Prevention; 3 Feb 2005

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