Super bugs: super problems

Methicillin-resistant Staphylococcus aureus (MRSA) continues to be a major cause of serious infections in hospitals and in the community worldwide. Following its initial isolation in the UK in 1961, many outbreaks of infections due to MRSA have occurred and it has now become endemic in several centres in the world (1). Methicillin-resistant S. aureus were initially associated with large teaching hospitals, but they now also colonize or cause infections in patients in smaller health care facilities, nursing homes, general hospitals and in the community (2). A new study describes the incidence and distribution of invasive MRSA disease in nine US communities and estimates the burden of invasive MRSA infections in the United States in 2005 (3). Methicillin-resistant S. aureus are important because, in addition to being methicillin or oxacillin resistant, most of them are also resistant to commonly used antibiotics.

In the USA, after being at first reported among injecting drug users in Detroit in 1981 and then associated with the deaths of four children in Minnesota and North Dakota in 1997, community-associated MRSA has become the most frequent cause of skin and soft tissue infections presenting to emergency departments in the United States (4). Although community outbreaks of MRSA in diverse populations, including American Indian and Alaska Natives, sports teams, prison inmates, and child care attendees, usually involved skin disease, MRSA also can cause severe, sometimes fatal invasive disease (5).

Translating to clinical practice

Old diseases have learned new tricks. Consequently, new collaborations between the public health and medical communities are needed to prevent, identify and control antimicrobial resistance. Abuse of antibiotics must stop, and hand-washing and other hygiene procedures among hospital workers and other health care professionals need improvement to control this deadly infection. In addition to feeding tubes, catheters, incubators, mattresses and school-based spread, the main vector for the spread of *S. aureus* infection is the hands of healthcare providers. Prevention is the key to stopping the spread of this deadly pathogen.

Symptoms of infection

Methicillin-resistant *S. aureus* skin infections are generally minor, such as pimples, boils and other skin conditions. They are often mistaken for spider bites. Left untreated, these infections can worsen, spread to the bloodstream or lungs, and cause serious illness and possibly death. If one suspects a MRSA skin infection, they should *seek medical attention*.

The following steps can be taken to *prevent* the spread of antibiotic-resistant staph skin infections to others:

• Cover skin infections with clean bandages. Pus and drainage from the infection can easily spread to others. Wear clothing that covers the infected area.

• Wash your hands! Wash hands with soap and water frequently throughout the day, especially after touching the wound or changing bandages. Soap does not need to be 'antibacterial' soap.

• Do not share personal care items such as towels, razors or bar soap with others.

• Clean your bathroom and personal care items frequently.

• Wash towels, bedding and clothing in hot water and bleach. Dry these items in a hot air dryer to help kill the bacteria.

• Tell your healthcare providers if you have a history of MRSA skin infection.

Transmission of MRSA in schools and among sports participants and those in close quarters (such as schools and dorms) is another concern. Close physical contact, a break in the skin, and sharing of equipment and clothing place athletes at increased risk for MRSA acquisition. Students have died in schools in a number of states in the USA, most recently Virginia. All 21 school buildings in Bedford County, VA, were being scrubbed and sanitized on 17 October, 2007 after the death of a 17-year-old high school student from a powerful drug-resistant strain of staph bacteria(6). Centers for Disease Control (CDC) measures for preventing MRSA transmission among sports participants include (7).

• Cover all wounds. If a wound cannot be covered adequately, consider excluding players with potentially infectious skin lesions from practice or competitions until the lesions are healed or can be covered adequately.

• Encourage good hygiene, including showering and washing with soap after all practices and competitions.

• Ensure availability of adequate soap and hot water.

• Discourage sharing of towels and personal items (e.g. clothing or equipment).

• Establish routine cleaning schedules for shared equipment.

• Train athletes and coaches in first aid for wound and recognition of wounds that are potentially infected.

• Encourage athletes to report skin lesions to coaches and encourage coaches to assess athletes regularly for skin lesions.

When MRSA infection is suspected, students should be referred to their primary care provider for evaluation and treatment.

Relationship to dental operatories

A survey of MRSA contamination on the surfaces of the dental operatory, and an analysis of MRSA transmission via the dental operatory between patients was carried out in the department of special dental care and oral surgery (8). Methicillin-resistant S. aureus was observed on the surfaces of dental operatory including the air-water syringe and reclining chair. These results suggest that MRSA contaminates the surfaces of the dental operatory, and therefore the dental operatory should be considered a possible reservoir of MRSA. Another study reported that the nose and mouth are the natural habitat of S. aureus, and carriage on dentures has been reported (9). Oral health care workers who become nasally colonized with MRSA may transmit the organism to patients through shedding from their noses or via their hands if infection control practices are inadequate. Bacteria capable of causing serious disease are present in the mouth and saliva of patients who may show no symptoms. Simple infection control precautions, such as use of gloves and a mask and effective hand hygiene practices, can prevent transmission to dental personnel, their families and their patients. This is particularly important for drug-resistant microorganisms (10).

Summary

In the UK in the early 1990s, 2% of *S. aureus* bacteremias were due to MRSA; the mean figure is now about 45%. UK levels of MRSA bloodstream infections are among the highest in Europe (11). Denmark and the Netherlands have maintained low infection rates, primarily due to an aggressive 'search and destroy' policy to identify patients and healthcare workers colonized with MRSA. In 2002, levels of MRSA as a proportion of all staph infections in Denmark and the Netherlands were as low as one per cent (12). Japan has one of the highest prevalences of MRSA in the world. Among *S. aureus* bloodstream isolates in 2001, nearly 70% were methicillin resistant (11). There is substantial evidence that active screening of high-risk patients, when combined with contact precautions, appropriate hand hygiene and education of personnel, can reduce transmission of MRSA, even in facilities where it is highly endemic (13). Although MRSA is resistant to certain classes of antibiotics, other kinds of antibiotics remain effective against MRSA. Vancomycin is often the first drug used against MRSA. There are other options for available antibiotics that can also be used to treat the bacteria. However, antibiotic resistance is emerging with some of these medications. Prevention is the key!

Additional reading:

http://www.cdc.gov/ncidod/dhqp/ar_mrsa_CDCactions.html

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