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Methicillin resistant *Staphylococcus aureus*

MRSA is the term used for bacteria of the *Staphylococcus aureus* group (*S. aureus*) that are resistant to the usual antibiotics used in the treatment of infections with such organisms. Traditionally MRSA stood for methicillin (meticillin) resistance but the term increasingly refers to a multi-drug resistant group. Such bacteria often have resistance to many antibiotics traditionally used against *S. aureus*.

This resistance to methicillin is due to the presence of the *mec* gene in the bacteria. This alters the site at which methicillin binds to kill the organism. Hence, methicillin is not able to effectively bind to the bacteria.

Infections caused by MRSA are the same as other staphylococcal infections because the organism itself is not any more virulent (or infectious) than usual type *S. aureus*.

Like other *S. aureus*, MRSA can colonise the skin and body of an individual without causing sickness, and in this way it can be passed on to other individuals unknowingly. Problems arise in the treatment of overt infections with MRSA because antibiotic choice is very limited.

Where is MRSA found?

MRSA is found worldwide, predominantly in hospitals and institutions such as nursing homes. Much less commonly, MRSA is found in the general community. There are three main reservoirs (and hence sources of spread and infection) for MRSA in hospital and institutions: staff, patients and inanimate objects such as beds, linen and utensils. By far the most important reservoir is patients who may be colonised with MRSA without evidence of infection. The usual sites of colonisation with MRSA are the nostrils, skin, groin, axilla, and wounds.

Most health professionals who are colonised with MRSA do not develop infection and many spontaneously clear the organism without treatment. Once colonisation has been present for more than three months, it becomes much more difficult to clear.

Patients, however, have a 30–60% risk of infection following colonisation. This is probably due to factors related to the illness for which they are hospitalised, which impair their ability to clear or control colonisation with the organism.

Most MRSA infections occur in wounds (e.g. surgical wounds), skin (e.g. intravenous access sites), or in the bloodstream. Mortality from these infections is not significantly different from those seen with usual type *S. aureus* infections.

Prevention and Management of MRSA

In hospitals, patients who have been transferred from another hospital or institution may have swabs taken on admission to screen for MRSA colonisation or infection. The swabs are taken from the nostrils, armpits, groins, genital region and any areas of broken skin (e.g. surgical wounds, ulcers, sores).

New or transferring hospital staff are also screened. The results of swabs take a few days to be reported.

If an inpatient is found to have MRSA colonisation or infection:

- He or she should be isolated from unnecessary contact with staff and other patients in a single room, or share a room with other patients who have MRSA.
- Linen and clothing should be carefully sterilised.

- Barrier precautions should be taken by staff and visitors (gloves and gowns).

In order to limit spread of MRSA throughout a ward or hospital, such precautions should be strictly enforced until repeat swabs from the patient are negative for MRSA. This may take some weeks. Staff found to be colonised with MRSA should be removed from patient contact.

Eradication treatment consists of:

- Topical application of an antibiotic ointment such as mupirocin or fucidin to the nostrils, 2–3 times per day for 3–5 days.
- Antibacterial soaps.

The antibiotic of choice for an infected inpatient is vancomycin given intravenously. Oral [clindamycin](#) may be used in minor soft tissue infections in outpatients. These antibiotics are no better than flucloxacillin in the treatment of usual type *S.aureus* but are much more effective in MRSA infections.

Less effective alternatives are:

- Fluroquinolones
- Cotrimoxazole
- [Minocycline](#)

In life-threatening infections such as infective endocarditis multiple antibiotics are often prescribed simultaneously (e.g. vancomycin plus an aminoglycoside plus [rifampicin](#)).

Concerns about MRSA in the future

There is growing concern about MRSA infections. They appear to be increasing in frequency and displaying resistance to a wider range of antibiotics.

Of particular concern are the VISA strains of MRSA (vancomycin intermediate susceptibility *S.aureus*). These are beginning to develop resistance to vancomycin, which is currently the most effective antibiotic against MRSA. This new resistance has arisen because another species of bacteria, called enterococci, relatively commonly express vancomycin resistance. In the laboratory enterococci are capable of transferring the gene for vancomycin resistance over to *S.aureus*.

New antibiotics such as linezolid and synercid look promising for treatment of infections not responding to vancomycin. Other antibiotics are under development.

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