

Methicillin-resistant *Staphylococcus aureus* (MRSA)

- ❖ *S. aureus* is a bacterium that is found on the skin and in the nose.
- ❖ *S. aureus* is the most common cause of hospital-acquired infection (HAI).
- ❖ MRSA is *S. aureus* which is resistant to the methicillin class of antibiotics.
- ❖ Community associated MRSA has been isolated in the USA.

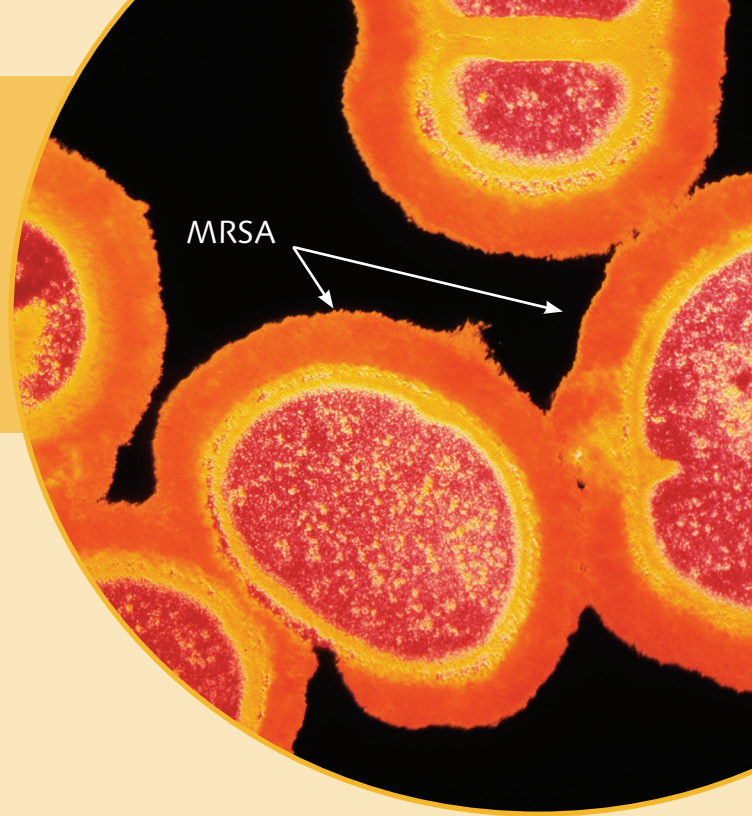
What is *Staphylococcus aureus*?

S. aureus is a bacterium that is found on the skin and in the nose. It usually lives there completely harmlessly, this is called colonisation. About 30% of the healthy population is colonised by *S. aureus*, but this figure is higher in hospitals. If you cut yourself and the wound gets inflamed and produces pus, you probably have a *S. aureus* infection. It was first described in the 1880s by Ogston, in Edinburgh, who found it was the most common cause of infected surgical wounds. If you are healthy, your immune system will fight the infection and it will clear up without treatment.

S. aureus in Hospital

In hospitals, patients with surgical cuts, wounds, catheters, or those who have had any procedure that pierces the skin are susceptible to *S. aureus* infection. Patients who are already sick and have a compromised immune system are less able to fight the infection. This includes the elderly, those on cancer or transplantation therapy and diabetics.

S. aureus is the most common cause of hospital-acquired infection (HAI). *S. aureus* infects 1.6% of all patients having operations in England. Infection with *S. aureus* in a hospitalised patient is usually minor, but some can be very severe and even fatal. Patients may develop illnesses such as wound infections, bacteraemia (blood poisoning), pneumonia or an abscess (muscle).

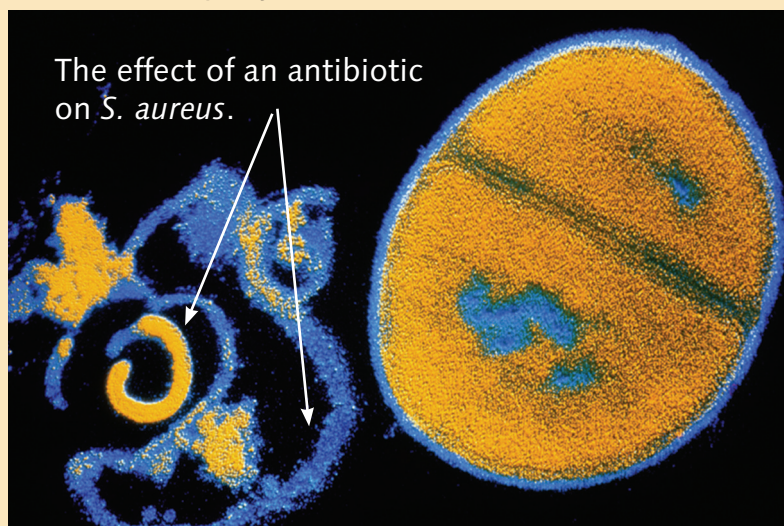


Prevention and Treatment

Prevention is by good infection control practice such as handwashing and cleanliness. In addition, patients at high risk, such as those undergoing surgery, may be screened and decolonised, or given antibiotics to prevent infection. If a patient shows signs of infection, they will be treated with antibiotics such as flucloxacillin (a member of the methicillin group of antibiotics, which is a type of penicillin). It takes two days for any infection to be diagnosed, so a doctor has to give treatment before they know that the infection is caused by *S. aureus*.

Cost

S. aureus infection costs the NHS approximately £500 million per year.



What is MRSA?

MRSA is *S. aureus* which is resistant to the methicillin class of antibiotics. Less than a year after the introduction of methicillin to treat *S. aureus* infections the first MRSA was reported in England, but it did not become widespread in UK hospitals until the early-to-mid 1990s. In the UK, 40% of all *S. aureus* are now MRSA. Some people carry MRSA in their nose. It is generally not necessary to treat MRSA colonisation as it is not harmful to a healthy person. However, if you are in contact with immunocompromised or elderly people, you should maintain high levels of personal hygiene.

MRSA Prevention and Treatment

Because MRSA is so widespread in our hospitals, prevention and treatment with flucloxacillin is now not effective. We are now dependent on the last reliable antibiotic class, vancomycin. This drug does not work as well, is more expensive, has side effects and has to be administered in hospital. Even with treatment 25% of patients that develop MRSA bacteraemia will die. This equates to approximately 2000 people each year. The UK has one of the highest rates of MRSA infection in Europe, but it is not as high as in the USA. Very recently, new antibiotics have been introduced to fight MRSA. However, they are all very expensive, and it is likely resistance will develop to them quickly, so they are often kept in reserve and not widely used. This makes it uneconomical for pharmaceutical companies to develop new drugs.



Wound infected with MRSA

How do we fight it?

MRSA is already established in our hospitals. The main reservoir is patients colonized or infected with MRSA. It is probably spread via hands and equipment, but many patients are admitted to hospital already colonised, and may infect themselves. There are no simple solutions to stopping the spread of *S. aureus* or MRSA. With no single prevention approach being likely to work on its own, reductions in infection rates can only be achieved through greater awareness, more hand washing resources, screening and decolonisation, and isolation of patients and staff carrying the bacteria. The recent introduction of rapid screening may be helpful, but we are desperately short of evidence to support any interventions that will work. Research studies remain poorly funded and most strategies are adopted without supporting evidence.

Future Problems

Since 2002 the Centers for Disease Control and Prevention in Atlanta, USA have reported six cases of *S. aureus* with high-level resistance to the antibiotic vancomycin (VRSA). This is very serious as vancomycin is one of the only antibiotics left that is used to prevent and treat MRSA. It is highly likely that in time the UK will see cases of VRSA.

Recently, reports of a new type of MRSA that causes infection in healthy people in the USA have been increasing. The strains are often called community associated MRSA (CA-MRSA). They usually cause severe skin and soft tissue infections, and are occasionally fatal. Outbreaks occur amongst people in close contact with others, such as schools, the military, prisons, sports teams and gym users, i.v. drug users and men who have sex with men. Presently this is not a major problem in the UK, but it seems likely that these strains will also spread here. This highlights the need for good personal hygiene, stringent hospital infection control programmes to be funded, implemented and maintained, and for further research into surveillance, screening, decolonisation, the development of new drugs and into all aspects of this infection and how it evolves.

Web links — Search for MRSA

www.sgul.ac.uk

www.cdc.gov

www.hpa.org.uk

www.dh.gov.uk