

What is MRSA? Why is MRSA a Concern? How is MRSA Treated?

MRSA stands for methicillin-resistant *Staphylococcus aureus*. The term is used to describe a number of strains of the bacteria, *Staphylococcus aureus*, that are resistant to a number of antibiotics, including methicillin.

What is *Staphylococcus aureus*?

Staphylococcus aureus is a group of bacteria that live on the surface of people's skin and inside the nose. It is normally harmless: most people who are carrying it are totally unaware that they have it.

This group of bacteria can be spread quite easily from person to person through contact.

Why is MRSA a concern?

Problems occur if *Staphylococcus aureus* bacteria are able to enter the body through a cut or wound.

Most healthy people have strong immune systems and are able to fight off a *Staphylococcus aureus* infection themselves and have only mild symptoms. However, people with weakened immune systems (for example due to other illnesses) or who have undergone surgery (for example heart surgery or hip replacement) can develop more serious problems. In more vulnerable people, *Staphylococcus aureus* bacteria have been known to cause boils, abscesses, impetigo, septic wounds, heart-valve problems and toxic shock syndrome. In extreme cases, it can result in death.

People with weakened immune systems who have been infected with *Staphylococcus aureus* require treatment with antibiotics to help clear the infection. The concern with MRSA strains of bacteria is that they are resistant to a number of the antibiotics that are normally used to treat *Staphylococcus aureus* infections.

How is MRSA treated?

Because MRSA is resistant to a number of different antibiotics, it is harder to treat than non-resistant bacteria. However, MRSA is not resistant to every antibiotic and most strains of MRSA can still be treated with vancomycin, teicoplanin and mupirocin.

For people with weakened immune systems who have become infected with MRSA, the best treatments are with the antibiotics vancomycin or teicoplanin. These two antibiotics are given as injections or through an intravenous drip and so are only given to people in hospital.

Certain groups of people are at a higher risk of infection with MRSA. For this reason, some healthy people are screened for MRSA by having a swab of their skin or inside of their nose taken. If these healthy people are found to be carrying MRSA on their skin or in their noses, they are normally treated with an antibiotic cream - mupirocin. This is applied to the affected areas of the body. This is done to reduce the chance of the bacteria entering the body through an open wound and the chance of other people catching MRSA.

Where does MRSA come from?

MRSA has appeared for three reasons: the widespread use of antibiotics, genetic selection and our dislike of tablets.

Bacteria are constantly evolving because their genes are constantly changing. The result of this is that some of the bacteria will have more resistance to a certain antibiotic than others. So, when the weaker bacteria encounter that antibiotic, they are killed. But the more resistant ones will take longer to die. If these more resistant bacteria are not killed off, they will survive and multiply. Their "offspring" will have this resistance to the antibiotic and further changes to their genes will mean that some will be even more resistant to the antibiotic.

Over time this combination of bacterial genetic change and our dislike of taking tablets has resulted in strains of *Staphylococcus aureus* that are resistant to many of today's antibiotics. Normally these strains are resistant to just one or two antibiotics but, as in the case of MRSA, they can be resistant to more.

This is why doctors encourage us to finish the whole course of antibiotics when we are prescribed them. The antibiotic will rapidly kill off the weaker bacteria and we will start to feel better.

Many doctors believe that if we stop taking the antibiotic at this point, the stronger bacteria will survive and

could produce more drug-resistant "offspring". If the next person who is infected also fails to finish the whole course of the antibiotic, then even more resistant bacteria will result. For this reason, it is thought that this can all be avoided if we take the whole course of antibiotics in the first place: by taking all the tablets, all the bacteria (including the more resistant ones) should be killed off and no offspring can be produced.

Why is MRSA particularly important in hospitals?

MRSA is particularly important in hospitals for three reasons:

- hospitals contain a large number of people with weakened immune systems who could become infected with MRSA and develop unwanted symptoms
- many of the patients in a hospital have an intravenous drip or a catheter that creates a "wound" through which MRSA can enter the body
- in some hospitals, people are in close proximity to each other, which increases the chances of MRSA infecting patients. However, in others patients stay in separate rooms which helps to lower this risk
- hospitals offer many opportunities for *Staphylococcus aureus* bacteria to encounter a wide range of antibiotics and, through genetic change and survival, develop resistance to all of them.

What can be done to protect people?

If a person is suspected of being infected with MRSA, a swab of the infected wound or a sample of blood or urine is taken. Any bacteria in the sample are grown in a laboratory and then identified. The results can take several days as it takes this long for the bacteria to grow.

If a healthy person is found to be carrying MRSA, they are normally treated with an antibiotic cream - mupirocin. This is applied to the affected areas of the body. This is done to reduce the chance of other people catching MRSA.

If a person with a weakened immune system is infected with MRSA, they are treated with either vancomycin or teicoplanin. At the moment, very few strains of MRSA are resistant to either of these two antibiotics. These two antibiotics are given as injections or through an intravenous drip and so are only given to people in hospital.

In hospital, to prevent other patients becoming infected, people with MRSA are treated using "barrier nursing" techniques. This form of nursing means that the person may be placed in a separate room and they will be treated by doctors and nurses who will be wearing disposable gloves and aprons. To prevent other people from becoming infected with MRSA, the gloves and aprons will be disposed of and hands will be washed before the healthcare professionals treat another patient. It is worth mentioning that such measures are often used in hospitals and the use of gloves or aprons does not automatically mean that a person has MRSA.

What can be done to keep antibiotic resistance under control?

In the wider world, there is now concern that antibiotic resistance could continue to develop to the point where some bacteria are resistant to all antibiotics. To stop this from happening, the medical profession has taken a number of steps:

1. Reducing its levels of antibiotic prescribing by no longer prescribing antibiotics for viral infections. For example, many coughs and colds are caused by viruses and antibiotics will have no effect whatsoever. In the past, antibiotics were prescribed to help prevent co-infection with bacteria, however this only served to increase antibiotic resistance and has been stopped.
2. Encouraging patients to finish their whole course of antibiotics, regardless of whether they feel better earlier or not. This measure is particularly important in preventing resistant bacteria from surviving and multiplying.
3. Using infection control measures in hospitals, including hand washing between patients, to minimize the chances of bacteria being passed from one patient to another.