

Bacterial Resistance (10-15 mins)

Curriculum links (KS3, KS4 & KS5):

Biology: Working Scientifically; Scientific Attitudes; Experimental skills and Investigations; Analysis and evaluation; Structure and Function of Living Organisms - Cells and Organisations

PSHE: Core Theme 1: Health and Wellbeing

Learning Objectives for KS5:

- many infections get better on their own without the need for antibiotics.
- bacterial and viral infections may cause similar symptoms.
- antibiotics work on bacteria and have no effect on viruses.
- bacteria are continually adapting to develop ways of not being killed by antibiotics (known as antibiotic resistance).
- antibiotic resistance can spread between different bacteria in our body.
- antibiotics can affect all the bacteria in your body, not just the ones which cause an infection. Antibiotic resistant bacteria can be carried by healthy or ill people and passed on silently to others.
- the more often you take antibiotics, the more likely you are to have an antibiotic resistant infection.
- you should not share antibiotics as each antibiotic is personal to you and your infection.
- antibiotics should always be taken as instructed by a doctor or nurse, because overuse may make the antibiotics less effective against the bacteria, and then the next time we have an infection they may not work.

This activity is suitable for KS3, KS4, KS5 and community groups and can be found in the “Bug Busters” section in Beat the Bugs or “Antibiotics: Peer Education” for school groups. It uses a visual demonstration to explain what antibiotic resistance is using balloons, and how this can spread through reproduction to other bacteria.

Use the introduction in the Bug Busters community pack to discuss:

- Do you know anyone who had an infection and was treated with a course of antibiotics that didn't work?
- What does it mean when we say bacteria (not the patient) are becoming resistant to antibiotics?
- Explain that if we use antibiotics inappropriately, for example by using them when we shouldn't, they are less likely to work in the future.
- Ask if anyone has heard of Methicillin-resistant *Staphylococcus aureus* (or "MRSA").
- Antibiotic-resistant bacteria can be very dangerous
- Explain that bacteria are continually developing ways to avoid being killed by antibiotics, and that this is known as antibiotic resistance.
- Explain that you will show a demonstration to describe antibiotic resistance.

Before you begin you will need:

- "Bug Busters" section within Beat the Bugs or "Antibiotics: Peer Education"
- Different coloured balloons
- Sellotape or electrical tape
- Pin to pop balloons

Risk assessment: Ensure that participants do not have any allergies or sensitivities to balloons and are not sensitive or afraid of balloons popping. Ask participants if they are okay for balloons to be popped.

Click here to access the resources for this activity for peer education within [KS3, KS4, KS5](#) or [Beat the Bugs for community groups](#).

Use the following steps as a guide to implement this activity:

- Blow up different coloured balloons and put Sellotape or electrical tape on one of the balloons (e.g. one red balloon with Sellotape, and three yellow balloons with no Sellotape). Clear tape works the best.
- The Sellotape is best placed on the part of the balloon farthest from the opening where the balloon is thickest.



- Explain that the yellow balloons represent bacteria and the red balloon with tape on represents antibiotic resistant bacteria. The pin represents the antibiotic
- When we take an antibiotic, bacteria are killed or damaged – pop some yellow balloons with the pin. However, in bacteria that are antibiotic resistant, the bacteria are not affected by the antibiotics
- Put the pin through the Sellotape in the red balloons, it will not pop. These bacteria cannot be killed by antibiotics.

Antibiotic resistant bacteria are not killed by antibiotic



Bacteria killed by antibiotic

- This makes it more likely for the resistant bacteria to survive and reproduce. They have a selective advantage.
- Ask if anyone knows where resistance comes from? Explain it is due to a change in the bacterial DNA/genes that tell the bacteria how to make the cell wall or enzyme.
- Explain that bacteria can pass these resistant genes on to other bacteria in our bodies (horizontal transfer) – put Sellotape on a remaining yellow balloon, which represents the transfer of antibiotic resistance to another bacterium.

Antibiotic resistance can spread to other bacteria



- Resistance is also passed on when bacteria reproduce – demonstrate this by blowing up another red balloon and putting Sellotape on it (vertical transfer).



Antibiotic resistance is passed on when bacteria reproduce

Top Tip: Although the balloon with the tape on should not pop, it does release air slowly and deflates, so it is best to keep this out of sight after!

- Explain that resistant bacteria can be passed on from person to person just as normal bacteria can be. Ask how these bacteria can spread. The easiest way is via our hands. Examples include direct skin to skin contact or touching surfaces which may contain bacteria.

Use the plenary or discussion questions to check participants' understanding after the activity is completed. Then complete action plan ([Beat the Bugs](#) pack).