# Biology Module 7 Antibiotic Resistance

## Teacher notes

### **Outcomes**

**A student:**

* **selects and processes appropriate qualitative and quantitative data and information using a range of appropriate media BIO 11/12-4**
* **analyses infectious disease in terms of disruption to homeostatic mechanisms and the organism’s response including the human immune system. BIO 12-14**

**Learning across the curriculum**

* **Personal and social capability**
* **Literacy**

This document references the [Subject Syllabus](https://www.educationstandards.nsw.edu.au/wps/portal/nesa/k-10/learning-areas/pdhpe/pdhpe-k-10-2018) © [NSW Education Standards Authority](https://www.educationstandards.nsw.edu.au/wps/portal/nesa/home) (NESA) for and on behalf of the Crown in right of the State of New South Wales 2017.

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| Guiding question:  | How effective are antibiotics as a treatment strategy for the control of infectious disease?  |
| What are your students going to learn? (Objectives) | Students will understand the importance of using antibiotics appropriately to effectively control infectious disease. They will have an understanding of how antibiotic resistance arises and how it is connected to antibiotic misuse and bacterial evolution.  |
| How are they going to learn it? (Resources and Strategies) | **Resources**:* Video : [Catalyst Series 7 Antibiotic resistance](https://iview.abc.net.au/show/catalyst/series/17/video/SC1502H012S00) (duration: 29:38)
* Article : [Whooping cough evolving to beat antibiotics and possibly vaccine](https://newsroom.unsw.edu.au/news/health/whooping-cough-evolving-beat-antibiotics-and-possibly-vaccine)
* Article : [The looming threat of C-diff](https://cosmosmagazine.com/biology/the-looming-threat-of-c-diff)
* Game: [Bacterial Survivor](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6203629/#sup1)

**Strategies**1. Watch video and answer questions
2. Read articles and analyse the information
3. Play a game and complete accompanying worksheet.
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| Target date for completion | Approximately 3 hours |
| How are you going to know that they learned it? (Success criteria) | Students will be able to explain the importance of the appropriate use of antibiotics and the consequences of the inappropriate use of antibiotics.  |
| Collecting evidence of student learning (Verification) | Students will complete questions relating to video and discusss. Answers to the questions about the articles should be submitted and reviewed by the teacher. Pre and post questions and worksheet are provided with the Bacterial Survivor game.  |
| Feedback (Evaluation) | Verbal and written feedback on student answers to questions.  |

### Sequence of lessons

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| Lesson sequence | Activities | How this will be measured |
| One | Watch the video [Catalyst Series 7 Antibiotic resistance](https://iview.abc.net.au/show/catalyst/series/17/video/SC1502H012S00) (duration: 29:38) and complete questions | Discussion of answers to questions |
| Two | Read the article [Whooping cough evolving to beat antibiotics and possibly vaccine](https://newsroom.unsw.edu.au/news/health/whooping-cough-evolving-beat-antibiotics-and-possibly-vaccine) . **Analyse** the statement:Professor Lan stressed the need to maintain our own high vaccination coverage to prevent this new strain from gaining a foothold.Lachlan Gilbert: Whooping cough evolving to beat antibiotics and possibly vaccine.  | Teacher assessment of submitted answer, not only focusing on knowledge of topic but the degree to which the student **analysed** the statement.  |
| Three | Read the article [The looming threat of C-diff](https://cosmosmagazine.com/biology/the-looming-threat-of-c-diff).**Discuss** why Clostridium difficile is becoming an increasing problem.  | Teacher assessment of submitted answer not only focusing on knowledge of topic but the degree to which the student **discussed** the statement. |
| Four | Play the game [Bacterial Survivor](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6203629/#sup1) - an interactive game that combats misconceptions about antibiotic resistance. Instructions are provided with the game. This game would be best played in face to face lesson. If conducted in the learning from home environment a synchronous lesson would be best with students using a random number generator. This activity also links back to modules 3 and 6.  | Pre and post questions and a worksheet with answers are provided with the game.  |

## Student Instructions

### Activity 1

Watch the video [Catalyst Series 7 Antibiotic resistance](https://iview.abc.net.au/show/catalyst/series/17/video/SC1502H012S00) (duration: 29:38) and complete questions.

1. Define
	* sepsis
	* antibiotic resistance
2. Explain what the statement that we need to live “harmoniously with bacteria”.
3. What proportion of the population died in the 1930’s, before the use of antibiotics? How did the development of antibiotics change this?
4. What happens in a bacterial population when an antibiotic does not kill all the pathogenic bacteria?
5. In the documentary a patient who has an E. coli infection develops a population of resistant E. Coli within 24 hours. What features of bacteria allow this to happen so quickly?
6. Why is using antibiotics to treat viral infections a misuse of antibiotics?
7. 70% of all antibiotic use is on farm animals and pets. Explain why should this be a concern?
8. How do antibiotic resistant bacteria develop in the environment? Explain why this is a problem?
9. We know clearing forests is a concern for conservation of species, biodiversity and climate change. Explain why it is also a concern in the area of combating antibiotic resistance.
10. Explain how phage therapy is used to destroy pathogenic bacteria. What benefits and limitations of phage therapy?
11. How is genetic modification being used in mice to combat antibiotic resistance?
12. Having watched this video, what are three precautions you can take to avoid developing a population of antibiotic resistant bacteria?

### Activity 2

The articles in this and the following activity discuss antibiotic resistance in different bacteria.

Read the article [Whooping cough evolving to beat antibiotics and possibly vaccine](https://newsroom.unsw.edu.au/news/health/whooping-cough-evolving-beat-antibiotics-and-possibly-vaccine) .

**Analyse** the statement:

Professor Lan stressed the need to maintain our own high vaccination coverage to prevent this new strain from gaining a foothold.

Lachlan Gilbert: Whooping cough evolving to beat antibiotics and possibly vaccine

**Note**: Analyse: Add a degree or level of accuracy depth, knowledge and understanding, logic, questioning, reflection and quality

### Activity 3

Read the article [The looming threat of C-diff](https://cosmosmagazine.com/biology/the-looming-threat-of-c-diff).

**Discuss** why Clostridium difficile is becoming an increasing problem.

**Note**: Discuss: Identify issues and provide points for and/or against

### Activity 4

Follow the instructions provided by your teacher during the lesson.