TOPICS

- Development of medical penicillin
- Factors that affect medical research
- Living conditions in England during WWII
- Historical impact of penicillin
- Commercialisation of medicine

BACKGROUND

Before penicillin, a simple bacterial infection was a huge health problem. The smallest wound, if infected, could lead to amputation (removal of an arm or a leg) or death. Such cases were sent to a hospital’s septic ward and often never returned. Finding a cure for infection would have been like curing cancer today.

Born in 1898, Howard Florey was the only son of a bootmaker. After studying Medicine at the University of Adelaide, Florey was awarded a Rhodes Scholarship to study at Oxford University. Florey was 36 when he landed his dream job as head of Oxford University’s School of Pathology, a major research centre in the fight against disease worldwide.

Florey recruited a team of leading scientists from different fields, including Ernst Chain and Norman Heatley. The team based their research on the antibiotic discovery that Alexander Fleming had made nearly a decade earlier (1928) in Scotland. Fleming had found that some moulds could produce an effective bacteria-killing substance, which he had called penicillin. Although he tried, Fleming gave up on penicillin research because he could not purify it from mould.

Florey’s team was challenged greatly by the living conditions during WWII. Food was in short supply, the British public lived in constant threat of invasion and the government was preoccupied with military matters. In case they had to evacuate, Florey and his colleagues rubbed mould spores into the fabric of their clothes so that they could start again. Despite the hardship, Florey’s team was able to isolate enough penicillin to conduct an experiment on eight mice.
Late in May 1940, on the same infamous weekend that 300,000 Allied soldiers were evacuated from Dunkirk, Florey’s team proved that their purified penicillin was effective in mice. Interestingly, Florey said that his motivation was not to ease the suffering of humanity but rather just to answer the scientific problem. Without emotional burdens, it may be possible for a scientist to think more clearly to make informed decisions.

Larger quantities of penicillin were needed for human trials. So, Florey turned his Oxford lab into a 24-hour mould factory. After hundreds of litres of mould juice and several months of painstaking work, they produced the bare minimum required for a human trial. The first patient, in 1941, showed signs of improvement but he needed more penicillin than Florey’s team had produced, and ultimately died from his infection. Florey then travelled to America in search of a way to produce vast quantities.

Florey found that large volumes of penicillin could be grown in Illinois, USA, where large liquid fermenters were being used to ferment maize products. The technology was able to produce thousands of litres of culture. Howard Florey convinced the key decision-makers to begin mass-producing penicillin, and the American industrial machine kicked into gear, producing armaments and medicine.

By late 1943, the massive build-up to the coming Nazi invasion saw supplies streaming into England from America, including the first large-scale batches of penicillin produced in Illinois. British authorities then had to prioritise between soldiers injured in battle and soldiers with sexually transmitted diseases, (which was rife in the defence forces). Ultimately, Churchill himself decided that penicillin should be used to the ‘best military advantage’. That meant giving servicemen who had venereal disease priority for treatment because they could quickly be made combat ready.

Howard Florey’s team didn’t make any money from penicillin because Florey felt it was unethical to patent their work. The big American drug companies had no such qualms though, and licensed the mass production technology for huge profits. Regardless, Howard Florey’s legacy was assured when his team was awarded with a Nobel Prize in 1945. Penicillin has saved millions of lives around the world and continues to do so today.

**CURRICULUM POINTERS**

**Year 9**

ACHHS164 Use chronological sequencing to demonstrate the relationship between events and developments in different periods and places

ACHHS165 Use historical terms and concepts

ACHHS170 Process and synthesise information from a range of sources for use as evidence in an historical argument

ACHHS175 Select and use a range of communication forms (oral, graphic, written) and digital technologies
**CURRICULUM POINTERS**

**Year 10**
ACHHS182  Use chronological sequencing to demonstrate the relationship between events and developments in different periods and places
ACHHS183  Use historical terms and concepts
ACHHS188  Process and synthesise information from a range of sources for use as evidence in an historical argument
ACHHS193  Select and use a range of communication forms (oral, graphic, written) and digital technologies

**DURATION**
60 minutes

**MATERIALS**
Medical Penicillin segment from Episode 3: Wartime (video)
(Go to Episode 3 segment timecode 01:36 – 11:57. Please note that this time code is only relevant when viewing the episode on demand.)

Medical Penicillin Recap Quiz (one A4 copy per student)
Medical Penicillin Recap Quiz Answer Sheet (one A4 copy for teacher)

**ACTIVITIES**

*Video* (25 minutes)
Hand out a copy of the Recap Quiz to each student.
View the segment on Medical Penicillin from Episode 3: Wartime.
Give students five minutes to complete the quiz before going through the answers as a class.

*Short speeches* (35 minutes)
Ask all students to prepare a 1 minute speech in response to the following question:

*Considering the full story of Howard Florey and the development of medical penicillin, do you believe it was ethically correct that pharmaceutical companies commercialised the drug?*

Allow 5–10 minutes for students to prepare their speeches.
Allow 25–30 minutes for students to deliver their speeches.

**HOMEWORK ASSIGNMENT**

Please see the complementary Extra Activities for this lesson to assign homework based on other segments from Episode 3: Wartime.
LEARNING OUTCOMES

ACHHS164/ACHHS182
Students will have used chronological sequencing to demonstrate their understanding of the development of medical penicillin across Australia, UK and USA.

ACHHS165/ACHHS183
Students will have used historical terms and concepts associated with WWII and the development of medical penicillin.

ACHHS170/ACHHS188
Students will have processed information presented in Wartime for use as evidence in an historical argument.

ACHHS175/ACHHS193
Students will have practised oral communication in the form of a public speech.
EPISODE 3: WARTIME TRANSPORTER

EXTRA ACTIVITIES

History
Years 9–10

INVENTION: TRANSPORTER
INVENTION: ALEXANDER WORSFOLD
YEAR: 1917

TASK
Make a timeline and use it to form an opinion

MATERIALS
• Internet access
• Pen and paper OR word processing program/application (e.g. Microsoft Word)

INSTRUCTIONS
Watch the Transporter segment from Episode 3 of Wartime.
(Go to Episode 3 segment timecode 35:31 – 47:14. Please note that this time code is only relevant when viewing the episode on demand.)

1. Firstly, make a list of all the nations involved in WWI.
2. Then, research the events and reasons that caused each country to declare war.
3. Use your findings to make a timeline that shows when each country declared war and why.
4. For each country, give your opinion of whether their reasons to fight were valid.
5. Provide alternative options to war for each country that you believe should not have declared war. These alternative options must be specific. You will need to use your research to help you make each option relevant and valid.
6. Finally, write one sentence to express your opinion of how WWI began.

Remember to include a bibliography (That is; a list of the resources that you consulted).
EPISODE 3: WARTIME
MEDICAL PENICILLIN

RECAP QUIZ

History
Years 9–10

1. Before penicillin, a simple bacterial infection could lead to:

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2. Who led the team that purified penicillin from mould juice in 1940?

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3. What was the main challenge/s that penicillin research needed to overcome?

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4. The challenge of producing large quantities of penicillin was resolved when production of the new medicine:

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5. How did people react to medical penicillin at the end of the war?

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6. What legacy has this invention left us?

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__________________________________________________________________________
1. Before penicillin, a simple bacterial infection could lead to:  
Amputation or death

2. Who led the team that purified penicillin from mould juice in 1940?  
Howard Florey

3. What was the main challenge/s that penicillin research needed to overcome?  
Difficult living conditions in wartime England; lack of funding, equipment and support from the British Government; and the need to produce mass quantities.

4. The challenge of producing large quantities of penicillin was resolved when production of the new medicine:  
Moved to USA

5. How did people react to medical penicillin at the end of the war?  
The inventor and his team received a Nobel Prize

6. What legacy has this invention left us?  
It transformed public perception of what medicine can do. A powerful life-saving tool, still commonly used worldwide. An inspirational lesson of scientific enthusiasm and self-confidence.