

Context: Medicine in the
early 20th Century

LINK TO YOUR MEDICINE COURSE:

1) Understanding infection and move to aseptic surgery

Learning outcomes

- Understand the growth of medical knowledge in the late 19th and early 20th centuries.
- Understand the developments in aseptic surgery, x-rays and blood transfusions that were the basis of further developments during the First World War.

As you know from your medicine course, there have been many medical breakthroughs, especially in the 19th century.

How many breakthroughs before 1914 can you remember?

Medical advancements in WWI were built on these foundations!

1) Due to the work of Lister with his carbolic spray, building on the work of Pasteur, by 1900, most operations were carried out using **aseptic** methods.

Exam-style question 1

Describe **two** features of aseptic surgery in the early 20th century. **4 marks**

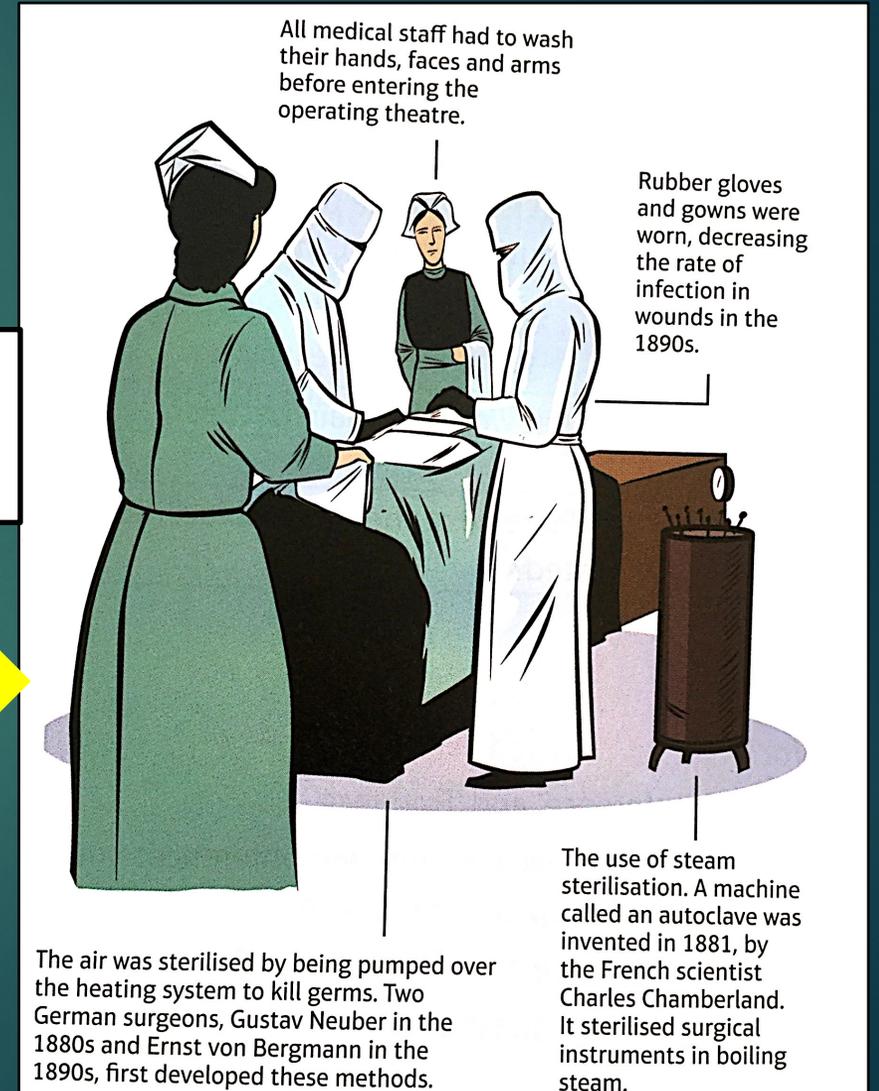
Eg's of the detail you can use

Identify the key feature (say what it is)... Develop it with details

The first key feature of aseptic surgery was... This was / showed / meant

Repeat with a second key feature

The second key feature of aseptic surgery was... This was / showed / meant



2) Development of X-Rays

Learning outcomes

- Understand the growth of medical knowledge in the late 19th and early 20th centuries.
- Understand the developments in aseptic surgery, x-rays and blood transfusions that were the basis of further developments during the First World War.



The development of the X-Ray was completely accidental. In 1895, Wilhelm Roentgen, a German physicist, was studying the effects of passing an electric current through a glass tube covered in black paper. He noticed that the light rays still penetrated the paper. **Watch this clip and try to explain what happened.**

(<https://www.youtube.com/watch?v=5XeG9cpFO6Y> 0.00-3:20/4:45-5:40/6.40-9.00)

Roentgen further experimented, putting a piece of lead in front of the tube and could see his flesh glowing around the bones, he then placed photographic paper between the tube – the worlds first X-Ray!



Why is this important for medicine but especially treatment in the trenches?

Early problems with x-ray:

- Health risks were not fully understood. The amount of radiation was x1500 the amount released today. Any form of radiation can lead to problems like losing hair or burns
- Roentgen's table top machine had very fragile glass which could break
- Taking an x-ray of a hand took about 90 minutes
- Larger x-ray machines were being developed, but were difficult to move around



Radiology Department



What is the radiology department? The part of the hospital where x-rays are carried out

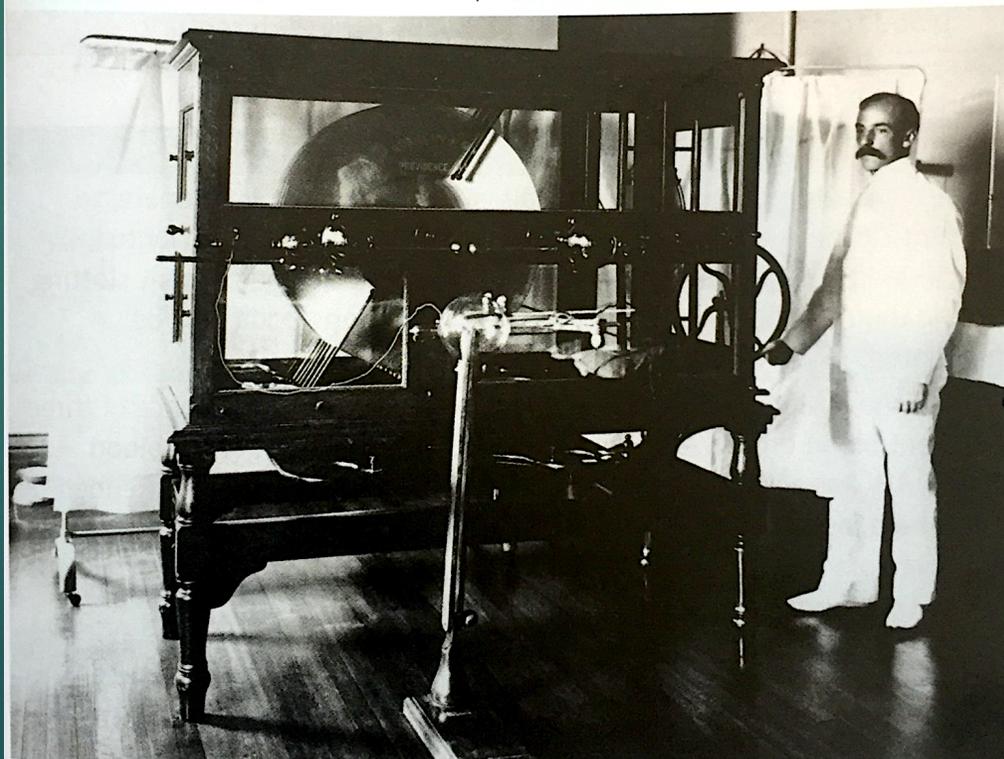
As early as 1896, radiology departments were opening in a number of British hospitals. At Birmingham General Hospital, Dr John Hall-Edwards was one of the first to make a diagnosis when he located a needle in a woman's hand.

How could this help in the trenches? Write a sentence or two explaining your answer...



Source A

A 19th-century x-ray machine in a hospital.



Look at Source A:

- 1) Describe the main features of the machine
- 2) What problems might arise from the use of this machine?
- 3) What other types of sources might help you to understand the problems linked to the use of X-Rays?

3: Blood: Transfusions

- An average adult's body contains c.5 litres of blood, the body will go into shock and die with too much blood loss. This was common in surgery in the 19th century and battle fields.
- With the development of aseptic surgery and x-rays, it was possible to carry out more complex surgical operations safely. However there was still the problem of blood loss, making these advances irrelevant!

Paré blood: Watch this clip (warning some blood will be splurting!)



James Blundell:

- 1818: First ever human blood transfusion (blood taken from a healthy patient and given to another) in order to help women in childbirth.
- Half of his patients survived
- Many of the transfusion techniques & basic equipment used in WWI were Blundell's
- Blood can only be transfused with someone of the same blood group
- As storage was a problem, the blood had to be used straight away!

Try and imagine how this would be done...

Here's how...



3: Blood: Storage



Design a leaflet or poster showing the problems and attempted solutions for blood storage.

Problem with transfusion	Attempted solution to the problem
Blood coagulates (clots) as soon as it leaves the body. This meant that the tubes which transfused blood from one person to another could become blocked up.	There were attempts to find chemicals, such as sodium bicarbonate, to prevent clotting. In 1894, Professor Almroth Wright, a British scientist, concluded that the soluble solution of certain acids could prevent clotting, but he thought that side effects, such as convulsions, could not be prevented.
Rejection of the transfused blood because the blood of the donor and the blood of the recipient was not compatible.	In 1901, Austrian doctor Karl Landsteiner discovered the existence of three different blood groups – A, B and O. The following year a fourth blood group, AB, was also found. This information was used in 1907 by Reuben Ottenberg, an American doctor, who was the first person to match a donor and a recipient's blood type before a transfusion. He also identified blood group O as a universal blood group.
Danger of infection from unsterilised equipment.	The introduction of aseptic methods of surgery had largely solved this problem in hospital conditions by the early 20th century.

So, WWI – Casualty rates were huge, storage of blood was vitally important.

- Sodium Citrate (bicarbonate) stopped it clotting, a citrate glucose solution allowed it to be stored for a few days, this led to the creation of blood banks by the British
- Scientists also discovered how to separate and store crucial blood cells which could then be bottled, packed in ice and used when needed, contributing to the growing blood banks

Summary

- By 1900, most surgery was carried out using aseptic methods.
- X-rays were discovered in 1895. They were used almost immediately for diagnostic purposes in medicine.
- Blood transfusions had to take place on a person-to-person basis because there was no way to store blood.
- The recognition of different blood groups enabled blood transfusions to become more effective.

Checkpoint

Strengthen

S1 Explain how the following were important developments in medicine?

- Aseptic surgery
- X-rays
- Blood transfusions

Challenge

C1 Although there had been many advances in medicine, there were still many problems remaining. Identify these problems.

C2 From your list of problems, which ones do you think would be particularly challenging in a war environment? If you are not confident about any of these questions, form a group with other students, discuss the answers and then record your conclusions. Your teacher can give you some hints.