

Context: Medicine in the early 20th Century



(Pasteur – Germ Theory 1861)

(Lister - antiseptic)



(Aseptic surgery – Steam steriliser by Charles Chamberland, the autoclave, and gloves)

(Koch discovers microbes transfer from surface to surface via contact leading to desire for aseptic)



Complete this flow chart with some extra detail to show how surgery is now ASEPTIC

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 or your own knowledge

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

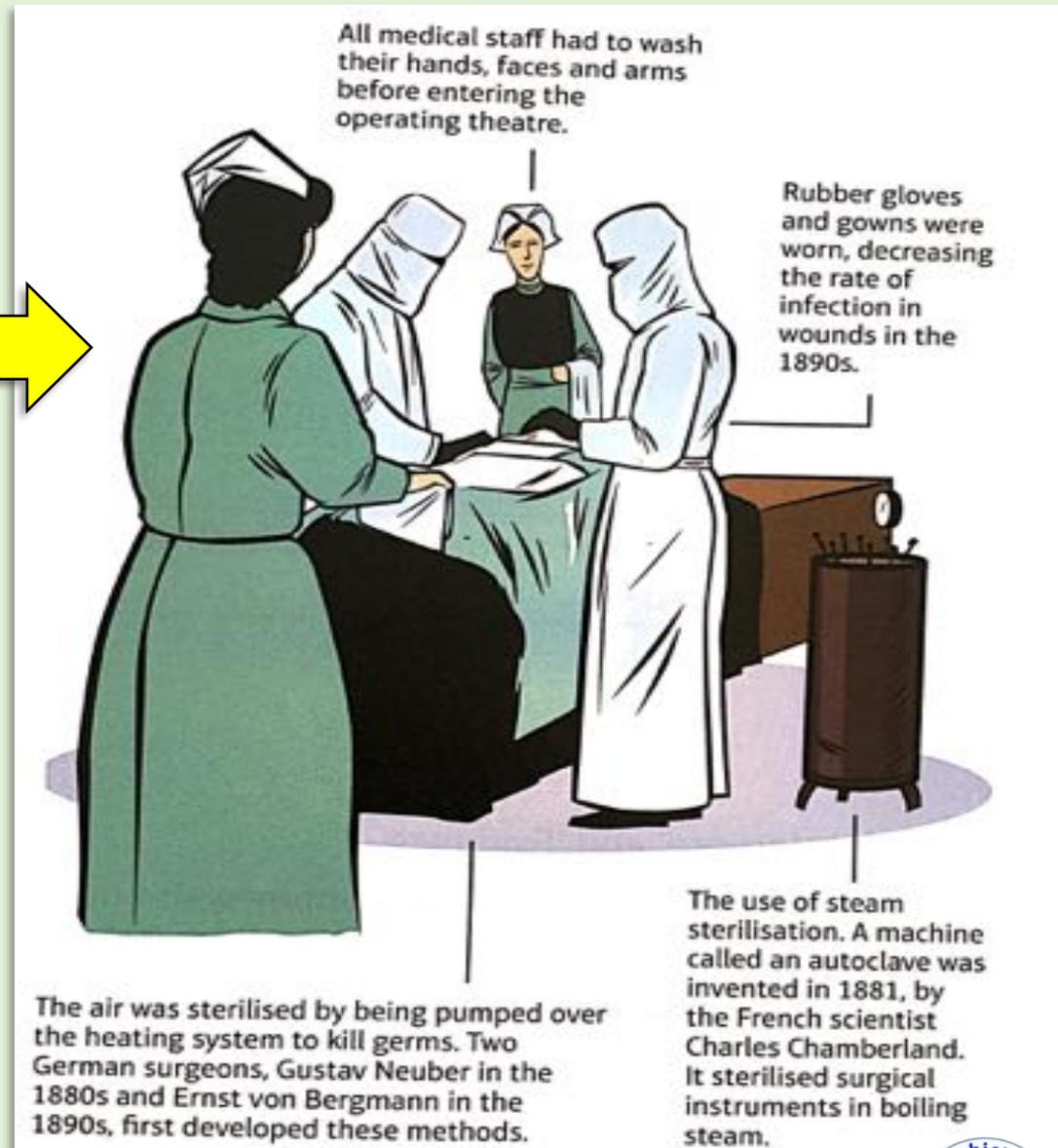
1 Describe two features of the

Feature 1

Feature 2

(Total for Question 1 = 4 marks)

Answer on a copy of the exam grid



Using purple pen and the peer assessment sheet, mark your partners

Development of the X-Ray



Accidentally discovered by Wilhelm Roentgen, a German physicist in 1895 while studying the effects of passing electric current through a glass tube covered in black paper.

Early problems with x-ray:

- Health risks were not fully understood. The amount of radiation was x1500 the amount released today. This led to burns and hair loss.
- Early x-rays had very fragile glass. This meant that moving it was difficult as the glass would break.
- Taking an x-ray of a hand took about 90 minutes. This meant that it was difficult to x-ray lots of patients quickly
- X-ray machines were large, this meant it was difficult to move them around to where they were needed



Radiology Department

What is a radiology department?

The place in a 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.



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

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?

Source A

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



Blood: Transfusions

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

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- 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!

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!



Have a discussion, how do you think these early blood transfusions were done?



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.

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

Blood: Storage



- **1915:** American doctor Richard Lewisohn discovered that by adding **SODIUM CITRATE** to blood stopped it from clotting, the need for donor-to-donor transfusion was removed
- **1915:** Richard Weil discovered that blood with sodium citrate could be refrigerated and stored for up to **2 days**
- **1916:** Francis Rous and James Turner found that by adding **citrate glucose** solution to blood, it could be stored for much longer – up to **4 weeks**. When planning a big attack, they could now ask for donations in the weeks before to prepare for the demand!
- **1917:** The first use of blood banks was at the Battle of Cambrai



Add this information to
your poster

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

- Sodium Citrate stopped it clotting, a citrate glucose solution allowed it to be stored for up to 4 weeks, 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 (after a battle), contributing to the growing blood banks.

We'll see this in action as we progress through the rest of this course

