PAPER 1

Historic Environment:

The British Sector of the Western Front, 1914-18:
Injuries, Treatments and the Trenches

Name .................................................................
# British Sector of the Western Front – Revision Checklist

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Medical Developments Before WW1

Before looking at medicine during WW1, it is important to have an idea of the medical progress made in the years leading up to the war.

**Aseptic surgery**

Joseph Lister first used **carbolic acid** to kill infections in 1865. By the early 1900s, most operations used **aseptic** methods. This involved removing all germs **before surgery**.

- Surgeons washed their hands, face and arms.
- Rubber gloves and gowns were worn.
- Surgical instruments were steam sterilised, using a machine called an autoclave.
- The air was sterilised by being pumped through the heating system.

**X-rays**

X-rays were discovered by German physicist Wilhelm Roentgen in 1895. Radiology departments opened in some British hospitals as early as 1896. This meant that doctors were now able to look inside the body without having to cut the patient open.

However, there were some problems with early x-rays:

- People didn’t fully understand the risks of **radiation**. Radiation in early x-rays was 1500 times the amount in modern x-rays.
- Early machines had fragile glass tubes which were easily broken.
- An x-ray of a hand took about 90 minutes.
- Larger x-ray machines were difficult to move around.

**Blood transfusions**

James Blundell had carried out the first human blood transfusion in 1818. Because blood could not be stored for later use, early transfusions involved the **donor** being directly connected to the **recipient** by a tube.

Several attempts were made to solve the problems with blood transfusions in the early 1900s:

- In 1894, Almroth Wright found that certain chemicals stopped blood from clotting, although they also caused side effects such as convulsions.
- In 1901, Karl Landsteiner discovered the first **blood groups** (A, B and O). This solved the problem of transfused blood being rejected by the body.
WW1 began in August 1914. The war quickly developed into a **static** conflict of **trench warfare**.

**How did the trenches develop?**

- The **British Expeditionary Force (BEF)** was sent to France to stop the Germans advancing through Belgium.
- After the Battle of the Marne in September 1914, both sides pulled back and **stalemate** developed.
- Neither side could advance, so both dug in to hold the ground they had.
- Eventually a line of trenches stretched from the English Channel in the north to Switzerland in the south.

**Describe two features of the trench system.**

**Feature 1**
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Key Battles

The First Battle of Ypres (Oct-Nov 1914)

Ypres was a salient – an area surrounded on 3 sides by the enemy. The British lost over 50,000 troops during this battle, but crucially kept control of the important English Channel ports.

Hill 60 (April 1915)

Hill 60 was a man-made hill near Ypres that was captured by the Germans in December 1914. Its height gave them a strategic advantage. In April 1915, the British tunnelled under the hill, placed five mines under it, then blew the top off to recapture it.

The Second Battle of Ypres (April-May 1915)

The Germans used chlorine gas for the first time. British soldiers were unprepared for gas and often used urine-soaked cloths as makeshift gas masks. The British lost 59,000 men and the Germans moved 2 miles closer to Ypres.

The Battle of the Somme (July-Nov 1916)

Around 20,000 British soldiers died on the first day alone. The British tried out two new tactics:

- The creeping barrage: This was where artillery was launched from the trenches just ahead of the British troops as they advanced forwards.
- Tanks: These were unsuccessful because of their low speed and unreliability.

In total, the Somme cost the British over 400,000 lives.

The Battle of the Arras (April-May 1917)

Tunnelling companies from Britain and New Zealand dug a network of underground caves at Arras, where the ground was chalky and soft. In April 1917 24,000 men attacked from the tunnels. The British advanced 8 miles, but their progress slowed and by the end of the battle there were nearly 160,000 British and Canadian casualties.

The Battle of Passchendeaue (Third Battle of Ypres) (July-Nov 1917)

The aim of this battle was for the British to break out of the Ypres Salient. Bad weather made the ground waterlogged and many men drowned in the mud. By the end the British had regained about 7 miles, at a cost of about 245,000 casualties.

The Battle of Cambrai (Nov-Dec 1917)

Cambrai saw the first successful large-scale use of tanks – nearly 500 were used. They could move easily over the barbed wire and their machine guns were very effective.
Transporting the Wounded

A number of problems made the movement of wounded soldiers very difficult:

- Heavy shelling destroyed roads and created large craters, making problems for transportation.
- The region was previously farmland, so fertiliser and manure in the soil created dangerous bacteria that could infect wounds.
- Shelling and gunfire meant that stretcher bearers were at high risk, and operations had to be carried out far away from the frontline.

**Ambulance wagons**

At first horse-drawn ambulance wagons were used to carry the sick and wounded, but these were so shaky that they often made injuries worse.

**Motorised ambulances** were introduced with help from public donations. However, horse-drawn wagons were still used where the ground was too muddy for motor vehicles.

**Trains, barges and ships**

Wounded men were also taken by train to base hospitals on the coast - some trains even had operating theatres. Canal barges were even used because although slow, they provided a much more comfortable journey. Some of the wounded were transferred directly onto ships to be taken back to Britain.

*What can we learn from this source about the problems facing transportation of the wounded on the Western Front?*
On the Western Front, there was a chain of evacuation to get the wounded away from the frontline to a safe treatment area as quickly as possible.

**Stretcher bearers**
- When a soldier was injured, stretcher bearers would collect them and carry them to the first stage of treatment

**Regimental Aid Posts (RAP)**
- Gave immediate first aid
- Aimed to get as many men as possible back to the fighting
- Could not deal with serious injuries – these patients were moved onto the next stage
- Usually located near the frontline, in communication trenches or abandoned buildings

**Advanced Dressing Stations & Main Dressing Stations (ADS and MDS)**
- Dealt with more serious injuries
- Located in abandoned buildings, bunkers or tents
- Staff at the Dressing Stations belonged to a unit of the RAMC called the Field Ambulance. Each Field Ambulance unit was designed to deal with 150 patients, but during major battles they often dealt with several hundred

**Casualty Clearing Stations (CCS)**
- Dealt with more critical injuries
- Set up in buildings such as factories and schools, often near a railway line
- Used a triage system – men were divided into 3 groups:
  - The walking wounded could be patched up and sent back to the fighting
  - Those needing hospital treatment were transferred to a Base Hospital
  - Those with no chance of survival were made comfortable, but medical resources were not spent on them

**Base Hospitals**
- Located near the coast so wounded men could be shipped back to Britain
- Divided patients up into different wards according to their wounds. This allowed doctors to experiment and specialise in particular injuries
- Because CCSs were closer to the battlefield, they ended up doing many of the more serious operations originally intended for Base Hospitals
RAMC and FANY

Medical treatment was mainly provided by the Royal Army Medical Corps (RAMC), the branch of the army responsible for medical care.

The First Aid Nursing Yeomanry (FANY) was an organisation which sent women volunteers to help out on the Western Front. The first six FANY nurses arrived in France in October 1914.

FANYs provided emergency first aid and from 1916 they also drove ambulance wagons. There were never more than 450 FANYs in France, but they opened the way for more women (e.g. the Voluntary Aid Detachments [VAD]) to take part in the war.

The Underground Hospital at Arras

Beginning in November 1916, a fully working hospital was created in the tunnels and caves under Arras. It was also known as Thompson’s Cave. It had:

- Waiting rooms for the wounded
- 700 spaces where stretchers could be placed as beds
- An operating theatre
- Rest stations for stretcher bearers
- A mortuary
- Electricity and piped water

It was abandoned when its water supply was destroyed during the Battle of Arras in 1917.

What do we learn from this source about the problems facing medical treatment on the Western Front? Pick out two problems or difficulties it mentions.

An account of a British woman’s experiences as a Red Cross nurse during the war.

As the reader perhaps knows, treating wounds in a home-hospital under surgically clean conditions is a very different thing from dealing with mangled and shattered flesh where the wounds are filled with mud, torn clothing and shrapnel.

Often these men had received no first-aid treatment, and their wounds had remained uncovered for as long as two or three days. With few exceptions all these cases were septic.
# Medical Conditions on the Western Front

Below are some of the common medical conditions experienced by soldiers on the Western Front.

<table>
<thead>
<tr>
<th>Condition</th>
<th>Caused by</th>
<th>Symptoms</th>
<th>Solutions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Trench fever</strong></td>
<td>Body lice, which thrived in the dirty trench conditions</td>
<td>Flu-like (high temperature, headache, aching muscles)</td>
<td>Delousing stations were set up</td>
</tr>
<tr>
<td><strong>Trench foot</strong></td>
<td>Standing in cold water or mud for long periods of time</td>
<td>Painful swelling of the feet, eventually leading to gangrene (decomposition)</td>
<td>Rubbing whale oil on the feet, keeping dry and changing socks regularly. Once gangrene set in amputation was the only solution.</td>
</tr>
<tr>
<td><strong>Shellshock</strong></td>
<td>Psychological damage as a result of the horrific war environment</td>
<td>Tiredness, nightmares, headaches, loss of speech, shaking, mental breakdown</td>
<td>In some cases, men were treated back in Britain. Generally, shellshock was misunderstood and sufferers were often accused of cowardice</td>
</tr>
<tr>
<td><strong>Gas gangrene</strong></td>
<td>Open wounds infected by bacteria from soil</td>
<td>Dead tissue and a build-up of gas in the wound</td>
<td>Amputation of infected areas was the only way to stop it spreading</td>
</tr>
<tr>
<td><strong>Gas injuries</strong></td>
<td>Chlorine, phosgene and mustard gas. First used by the Germans at the Second Battle of Ypres, April 1915</td>
<td>Burning skin, internal and external blisters, death by suffocation. Massive psychological impact – fear and panic</td>
<td>Gas masks were given from July 1915 onwards, but before then soldiers would use urine-soaked cloths to cover their faces</td>
</tr>
<tr>
<td><strong>Shrapnel and bullet injuries</strong></td>
<td>Being hit by bullets or shrapnel from rifles/explosions. 58% of wounds were caused by shells and shrapnel; 39% were caused by bullets. Head injuries were a major problem at the start of the war, because soldiers only wore soft caps</td>
<td>Pieces of metal would penetrate the body, taking with them dirt and pieces of uniform</td>
<td>Steel Brodie helmets were introduced in 1915</td>
</tr>
</tbody>
</table>
Note down two things we can learn from this source about gas attacks and the medical response to them.

From a post-war account by Beryl Hutchinson, describing her first experience of gas in 1915. Beryl was a FANY in Belgium.

At dawn I woke to a very queer noise and an even queerer smell. The Belgian Quarter-Master came round with gas masks. All our men had had gas masks already issued and were firing for all they were worth. Out of the mist came a procession of British, staggering up the lane or just lying in a groaning, gasping heap. They had the silliest bits of chewed cotton wool fastened to their faces. We had the idea that hot black coffee, being so very good for asthma attacks, might help...

<table>
<thead>
<tr>
<th>Describe 2 features of...</th>
<th>Feature 1</th>
<th>Feature 2</th>
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</thead>
<tbody>
<tr>
<td>The Battle of the Somme (1916)</td>
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<tr>
<td>Casualty Clearing Stations (CCS)</td>
<td><em>Casualty Clearing Stations were often located in buildings close to a railway line, so that the seriously wounded could easily be moved on to a Base Hospital.</em></td>
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<tr>
<td>The First Aid Nursing Yeomanry (FANY)</td>
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<tr>
<td>The underground hospital at Arras</td>
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</tbody>
</table>
Many new medical techniques were developed to meet the needs of the wounded in WW1.

**Dealing with infection**

Infection was one of the biggest problems facing medical treatment, because it was so easy for dirt, shrapnel and uniform to get into wounds. There were 3 ways of dealing with infection:

- **Debridement** – the removal of dead/infected tissue
- The **Carrel-Dakin method** – this killed infection using a sterilised salt solution in the wound (normal antiseptics like carbolic acid couldn’t treat gas gangrene).
- **Amputation** – the removal of infected limbs. 240,000 had men lost limbs by 1918.

**Thomas splint**

The Thomas splint was a large splint designed to keep limbs and joints still during surgery. Many men died from shrapnel wounds to the leg because the injured leg was not kept still, leading to blood loss and infection.

Robert Jones came forward with a splint that his uncle, Hugh Thomas, had developed in the late 1800s. In December 1915 he was sent to Boulogne to instruct medics how to use it.

The **Thomas splint** improved the survival rate for these leg injuries from 20% to 82%.

**Mobile x-ray units**

X-rays were used from the start of the war to locate bullets and shrapnel in wounds. However, early x-rays had some problems:

- X-rays couldn’t identify all objects in the body – e.g. fragments of clothing
- An x-ray took several minutes - a long time for a wounded man to keep still
- The x-ray machines could only be used for an hour before they overheated. 3 machines would be used in rotation, so that one worked while the others cooled down.

The Base Hospitals had static (non-moving) x-ray machines. The British also had 6 mobile x-ray units, which were vans loaded with x-ray equipment. The equipment was laid out in a tent at the back of the van.
Lawrence Bruce Robertson, a Canadian doctor, developed blood transfusions on the Western Front from 1915. He used a syringe and tube to transfer blood from the donor to the patient.

Blood transfusions were carried out in Base Hospitals, and by 1917 in Casualty Clearing Stations too. Geoffrey Keynes, a British doctor in the RAMC, designed a portable blood transfusion kit so that transfusions could be carried out near the frontline.

Several people helped to solve the problem of storing blood during WW1:

- In 1915, Richard Lewisohn found that adding sodium nitrate to blood stopped it clotting; Richard Weil found it could then be stored for up to 2 days if refrigerated.
- In 1916, Francis Rous and James Turner found that adding a citrate glucose solution allowed blood to be stored for up to 4 weeks.

At the Battle of Cambrai in 1917, a doctor called Oswald Hope Robertson built a carrying case for bottles of donated blood. This allowed badly injured soldiers to be treated on the frontline. Robertson treated 20 soldiers at Cambrai - 11 survived.

About 20% of British wounds were to the head, face and neck. Brain injuries were hard to treat because few doctors had experience of brain surgery, plus it was hard to move unconscious or confused patients through the chain of evacuation.

An American surgeon called Harvey Cushing developed new brain surgery techniques by observing and experimenting.

He used a magnet to remove metal fragments from the brain, and used local anaesthetic rather than general anaesthetic. This made brain operations safer because general anaesthetic caused the brain to swell.

A New Zealand doctor called Harold Gillies developed methods of restoring and rebuilding destroyed facial features.

The complex operations and recovery needed for plastic surgery had to be carried out back in Britain. The key hospital for plastic surgery was the Queen’s Hospital in Kent, which Gillies helped design in 1917. By the end of 1917, the hospital had carried out nearly 12,000 operations.
<table>
<thead>
<tr>
<th>Problem</th>
<th>Solution</th>
<th>Any remaining problems</th>
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<tbody>
<tr>
<td>Wounds becoming infected</td>
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<td>High death rate from leg fractures and breakages</td>
<td>The Thomas splint was used from late 1915 onwards. This was a brace that kept the leg still while the bone healed, meaning there was less risk of blood loss or infection.</td>
<td></td>
</tr>
<tr>
<td>Locating bullets and shrapnel inside the body</td>
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<td></td>
</tr>
<tr>
<td>Transfusing blood</td>
<td>Lawrence Bruce Robertson used a syringe and tube method to carry out blood transfusions. Geoffrey Keynes designed a portable transfusion kit to be used on the frontline.</td>
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</tr>
<tr>
<td>Storing blood</td>
<td></td>
<td></td>
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<tr>
<td>Brain injuries</td>
<td></td>
<td>Neurosurgery was still in its infancy. Most doctors had little experience of brain surgery.</td>
</tr>
<tr>
<td>Facial injuries</td>
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</tr>
</tbody>
</table>
Below are examples of sources that you could use for a WW1-related enquiry.

- Soldier’s diary
- Hospital records
- Soldier’s diary
- Hospital records
- Doctor/medic’s diary
- Army casualty records
- Newspapers from the time
- Government records (e.g., weapon output)
- Sketches, diagrams and maps
- Paintings from the time
- Letters/postcards
- Poems/songs from the time
- Service records
- Military records
- Plans/strategies
- Speeches in Parliament
- Propaganda posters
- Photographs
- Official
- Unofficial
- Army instruction manuals
Recap Questions

1. What is aseptic surgery?

2. What did Wilhelm Roentgen discover in 1895?

3. What important discovery about blood did Karl Landsteiner make in 1901?

4. Why did WW1 develop into trench warfare?

5. What did the British do at Hill 60 in April 1915?

6. At which battle did the Germans first use poison gas?

7. Which battle cost over 400,000 British lives – 20,000 on the first day alone?

8. How did the British use the soft, chalky ground at Arras?

9. Describe one thing that made transporting wounded soldiers difficult.
10. Who were the RAMC?

11. What were the 4 stages of the chain of evacuation?

12. What does FANY stand for?

13. Name 3 common medical conditions on the Western Front.

14. What was the Carrel-Dakin method?

15. What was introduced in late 1915 to help with leg fractures and breakages?

16. What was one problem with x-ray machines on the Western Front?

17. Describe one brain surgery technique developed by Harvey Cushing.

18. Which New Zealand doctor developed new plastic surgery techniques to rebuild faces?