Medicine in the 20th Century
1900–2000

The History of Medicine
The 20th century

The 150 years up to 1900 were ones of rapid change or revolution. The world was a hugely different place to that of 1750. Yet the revolutions did not stop there. If anything, they accelerated after 1900.

What 20th-century developments can you think of that might have had an impact on medical development?
What do you think the impact of these developments were on health?

Click on the images to learn more about changes in the 20th century.
People’s health improved dramatically because of improvement in the **standard of living, education, public health** and **diet**, as well as the development of a free **national health service**.

Progress in **science and technology** led to the invention of new techniques and machinery for diagnosing and treating disease.

**Prevention of disease** became a key reason for the huge rise in the average life expectancy from 47 to 75 years.
Between 1914 and 1918 a totally new type of war ripped Europe apart. Huge quantities of mass-produced weapons caused unprecedented death rates and horrendous injuries. Instead of men fighting one to one, a machine gun could obliterate hundreds in a few moments.

This cemetery in Belgium contains the graves of 11,000 soldiers who died at the Battle of Passchendaele in 1917, and commemorates the 33,000 whose bodies were never found.
How World War I affected medicine

The huge number of casualties meant that surgeons and doctors gained a wealth of **surgical** experience. Practice led to improvements in mending broken bones, grafting skin and all types of surgery.

These surgeons were used to working in clean, well-equipped hospitals. Suddenly they were trying to operate in dirty conditions just behind the front line or in a field hospital, often without the supplies they needed. This led to them having to **improvise**, resulting in new discoveries.

The experience gained in the war led to many surgeons **specializing** in different forms of surgery after the war.
Many soldiers died not from the bullets, but from the dirt which the bullets carried deep into the body. Doctors used antiseptic techniques but could not apply this to stopping infection inside the body.

Conditions in the trenches were appalling. Soldiers often stood knee-deep in filthy water. Even small wounds turned septic and many soldiers developed gas gangrene, where the infection of dead flesh produced a foul-smelling gas.

Doctors experimented with ways of treating infection. Although progress was not great, knowledge and techniques did help in the longer-term fight to understand infection.
**X-rays** were in use in many hospitals by the end of the 19th century.

During World War I they were in constant use to help surgeons locate shrapnel and bullets in their patients. Use of the technique developed and many soldiers’ lives were saved because of it.

The importance of X-rays become very apparent and the technology was improved after the war.
Scientists had discovered that there were different blood groups, and this explained why 19th century attempts at blood transfusion often failed. However, blood could still not be transported as doctors had no way of storing the blood without it clotting.

Huge quantities of blood were needed for the injured soldiers, and doctors had to find a way of moving blood to wherever it was needed.

Experiments revealed that blood could be separated into plasma (the liquid) and corpuscles (very small particles). The corpuscles could now be packed in ice and diluted with a warm saline solution when needed. This helped soldiers and saved many civilians after the war.
Were these benefits realized in the **short**- or **long**-term?

Can you think of any ways in which World War I **hindered** the progress of medicine?
The fight against infection

World War I interrupted an important research programme into **fighting infection**. Research had been going on for years to find a chemical compound which would kill bacteria in the body.

Robert Koch had found a way of staining bacteria to identify them. **Paul Ehrlich**, a member of his team, decided to take this idea further.

Ehrlich thought that a chemical compound could be used not only to stain the bacteria causing an infection, but which would kill them (and only them) as well. Ehrlich said this would be like a **magic bullet**.

What do you think this means?
Magic bullets

A magic bullet would ‘shoot’ the bacteria, but not harm the patient.

Ehrlich had seen how the body produces antibodies to attack the specific bacteria causing an infection, and believed he could find a chemical which would work in the same way.

After many years, in 1909 he was proved right. His team had tried 605 varieties of an arsenic compound to cure syphilis, a common venereal disease. The 606th one killed the syphilis bacteria. They had discovered the first magic bullet, and they called it Salvarsan 606.
This was a major step in the progress of medicine, although Salvarsan 606 needed to be improved upon, because it could kill the patient as well as the infection as it was made from arsenic.

After World War I research into magic bullets resumed. The number of men who had died because of infection in the trenches made it all the more necessary.
In 1932 **Gerhard Domagk** found the second magic bullet after years of methodical research. This was a red dye called **Prontosil**.

He injected mice with a lethal dose of a streptococcal infection. He then injected them with Prontosil, which cured them.

Soon he had the chance to try it out on a human, his own daughter, who was seriously ill with the same streptococcal infection. Having no other cure, he injected her with Prontosil and she recovered.

The next task was to find out which component of Prontosil made it a magic bullet.
With the aid of the new, powerful electron microscopes which had been in use since the early 1930s, scientists found that the active ingredient was a **sulphonamide** which came from coal tar.

The discovery of sulphonamides led to the development of drugs which cured **gonorrhoea, pneumonia, meningitis** and **scarlet fever**. They led to the number of mothers dying following postnatal infection being slashed from 20% to 4.7%.
Are you up to speed on your magic bullets?

Read the definition at the bottom and then 'shoot' the right answer... press start to begin.
Alexander Fleming had worked on wounds and infections during World War I and spent years researching the body’s natural defences against infection.

In 1928, chance helped the scientific search for antibacterial drugs, as it had helped Pasteur. Fleming returned from holiday to find that mould had grown on the cultures in some of the petri dishes in his laboratory.

He noticed that in one dish the staphylococci cells had disappeared around the edges of the mould. He realised that the mould had killed the bacteria. He identified the mould as penicillium, which had probably blown in through the open window.
The development of penicillin

Fleming had discovered that penicillin would attack certain forms of bacteria, but he did not have the resources to research whether or not it could be used to fight infection.

Two British scientists, Howard Florey and Ernst Chain and their assistants, continued with the study.

Florey and Chain grew penicillium (the mould which produces penicillin) to experiment with, and tested successfully on mice. In 1941 they conducted a trial on a dying man, who recovered until they ran out of penicillin.
To continue their research, they looked to the USA, who had entered the war in 1941 and feared heavy casualties. It financed drugs companies to mass-produce penicillin. By 1945 the US army used 2 million doses a month.

The first **antibiotic** had been created.
Can you link the items on the left with the definitions on the right?

- Alexander Fleming
- Florey and
- World War II
- Penicillin

Country which funded the mass-production of penicillin.
The first antibiotic, produced from penicillin.
Conflict which prompted the funding of penicillin research.

start
__________ developed the germ theory in the 1850s, which showed that bacteria caused disease.

__________ used dye to identify specific bacteria in the 1860s.

__________ identified the first magic bullet, a specific bacteria to kill an infection but not the patient, Salvarsan 606, in 1909.

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<tr>
<th>Chain</th>
<th>Koch</th>
<th>Ehrlich</th>
<th>Jenner</th>
<th>Fleming</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pasteur</td>
<td>Paré</td>
<td>Lister</td>
<td>Florey</td>
<td>Domagk</td>
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The entry of the USA to World War II had an impact on the development of penicillin. The war had other effects as well.
Infant mortality

Today, babies are expected to be born fit and well and live to adulthood.

During pregnancy the mother will have had access to nutritious food, been advised against smoking and drinking, will have had access to good medical care and her unborn baby will have been monitored for any problems.

Before the 20th century, many babies were lost in pregnancy or were stillborn. In 1899, more than 16% of babies born alive died before the age of one. More died before their fifth birthday.

There was a dramatic improvement in infant mortality rates in the early 20th century. This was mainly due to a number of laws made by the government between 1902 and 1930.
What other reasons can you think of for the decrease in infant mortality?
Government measures to reduce infant mortality were very effective. During World War II health services had been expanded to cope with civilian casualties and the first antibiotics were increasing life expectancy. Yet the poorer people in society could not afford basic medical care.

During the peaks of the economic depression of the 1920s and 1930s nearly three million were unemployed. In the worst-affected areas, infant mortality began to rise again.

During the war, ideas were evolving about widening the health care system to reach all people.
In 1942, William Beveridge, a civil servant, advised the government to set up a welfare state, including a free national health service, which was to give benefits ‘from the cradle to the grave’ for all.

The plans were passed by the post-war Labour government in 1946. Two years later the National Health Service (NHS) began. It was available free to everyone in the nation, and was to cover every aspect of health care.
What the NHS provides

- Hospitals and ambulance service
- Training of doctors and nurses
- Medicines
- Dentistry
- Eye tests
- Medicines
- Surgery
- GPs, surgeries, health clinics, district nurses
- Vaccination programmes
- Consultants
- Maternity care
- Medical aids
- Medical research
The effect of the National Health Service on people’s health was dramatic. For the first time ever, everyone had the right to free health care. Before the NHS many could not afford to visit the doctor, let alone buy medicines or have regular treatment.

By the end of the 20th century, however, the NHS was facing one financial crisis after another. Prescription charges, introduced in the 1950s, rose steeply. Charges were introduced for dental treatment and eye tests. Unable to pay for the necessary staff, many beds remained empty while the waiting lists grew longer.

Despite the problems, anyone could be treated free when needed, regardless of their ability to pay or whether they had insurance.
Why do you think that the NHS costs so much more to run in the 21st-century than when it was set up in 1948?

The provision of free health care for all resulted in people being healthier and living much longer. The NHS had many more people to look after, many of them at an age where they needed increasing amounts of treatment, such as cataract operations or hip replacements.

Developments in science and technology resulted in a far greater range of treatments being offered, many of which were extremely complex and expensive. Organ transplants, ultrasound scans, open heart surgery and laser treatments are just a few examples of everyday services offered today.
What diseases kill people today?

Medicine and health progressed dramatically during the 20th century. **Vaccination** meant that diseases such as smallpox or diphtheria were no longer a threat. Other illnesses became treatable with **antibiotics**. Previously incurable conditions can be treated with the latest surgical techniques.

There are, however, diseases which kill people today which were not known in earlier times.

What modern diseases can you think of?
One modern killer is Select from list, which still kills huge numbers of people. It affects many organs of the body and is often related to poor diet or smoking.

Poor diet and smoking also contribute to Select from list which accounts for many deaths. It tends not to affect people in poorer countries.

Select from list is caused by a virus, called HIV, and is spread via body fluids. It is most commonly caught through sexual activity, or by drug addicts using infected needles. In many poorer parts of the world AIDS is a huge problem, with millions of people infected.
Factors affecting medicine in the 20th century

Look at these examples of changes that occurred during the 20th century, and decide what type of factor each one is.