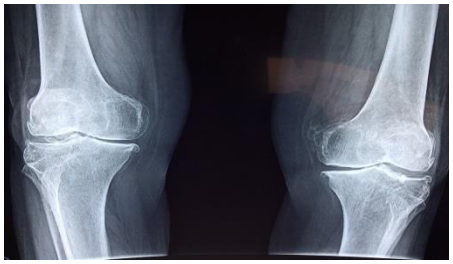
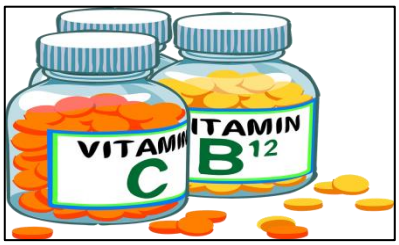
Revised for 2019

Britain: Health and the People

c.1000 to present

GCSE 9-1 Revision Guide





AQA

Course content

Exam questions and skills

Exam questions:

1. Study Source A. How useful is Source A to a historian studying medieval medicine? (8 marks)

Study tip: (COP)

- Content
- Own Knowledge
- Provenance (time, author, purpose)

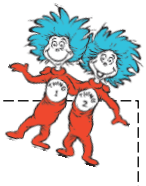
2. Explain the significance of …….. in the development of modern medicine? (8 marks)

Study tip:

Think short term / medium term / long term impact

- At the time
- Overtime
- Nowadays

3. Compare X with Y. In what ways were they similar? (8 marks)



Study tip:

Plan: Jot down a list of similarities that you have noticed between the two things

Have an example from both periods to show these similarities

Try to give reasons to explain why the similarities continue through time

Do not explain any differences or you will be awarded 0 marks

4. Has ……. been the main factor in the development of medicine in Britain? (16 marks, 4 SPaG)

Study Tip: Write down at least 3 examples of how this factor has affected medicine through time

Choose at least 2 other factors and individuals and explain how they also affected medicine.

Explain how these factors have had different effects at different times.

Make a judgement on which factor was most important to show you are answering the question

Science and technology, war, government, religion, individuals, chance, communication

Ancient Greece

Context:

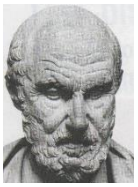
Asclepios was the Greek God of healing with his daughters Panacea and Hygeia. Temples were built, dedicated to them. People would go there to rest, exercise and eat a healthy diet (natural treatment) but they believed they would be healed in the night by the Gods (supernatural treatment). People did get better. This may be because of rest, or because they believed they would!

At the time: The Hippocratic Collection – first detailed list of symptoms and treatments.

Nowadays: The Hippocratic Oath is still used by doctors today. It makes clear that doctors are not magicians. They have to keep high standards of treatment and behaviour and work for the benefit of the patients rather than make themselves rich.

Over time: He Encouraged doctors to look for natural treatments rather than praying to Gods.

Hippocrates: The father of medicine



At the time: He believed that the body was made up of the Four Humours (black bile, yellow bile, phlegm and blood). He believed that when people became ill when one of their four humours was unbalanced.

At the time: He created the Hippocratic Oath – doctors swear to work for the patients, not just to become wealthy.

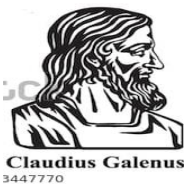
Overtime: He encouraged observation and recording of illnesses and treatments. Could be used to help diagnose other patients in the future.

At the time: Galen was a Roman physician who built on Hippocrates Theory of the Four Humours and developed ideas on how to treat illness through his ideas on the Theory of the Opposites.

Overtime: His influence reigned supreme over medicine for fifteen centuries after his death. It was not until the **Renaissance** that many of his theories were challenged.

Nowadays we still recognize his most important discovery that arteries carry blood.

At the time: Galen based most of his information about anatomy on what he saw when he dissected the bodies of animals. This led him to make mistakes. For example, he thought that blood was created in the liver. He realised that it flowed round the body, but said it was burned up as fuel for the muscles.



At the time: Although Galen said observation and dissection were important, he strongly promoted his books which he said contained everything there was to know about the human body.

Overtime: The **Christian Church** promoted his teachings which were used to train medical students. However criticising Galen was seen as heresy.

Exam Question

Explain the importance of Hippocrates and Galen in medicine (8 marks)

Key skill:

Short, medium and long terms

Christianity and medicine

The **Christian Church** was a powerful organization in the Middle Ages and greatly influenced the decision of Kings and Emperors in Europe. It had a say in how people should run their lives.

The **Christian Church** thought it was good to look after the sick as Jesus did. They founded many hospitals. However, care not cure was expected as only God could heal the sick through prayer.

The **Church** encouraged the belief in miraculous healing. Shrines were built filled with the bones, hair and other body parts of saints. People went on a pilgrimage to these shrines such as the shrine of Thomas Becket in Canterbury to be healed and pray for forgiveness.

Hospitals:

Between 1000 and 1500AD, more than 700 hospitals were started in England. Many hospitals were centres of rest where the sick might recover in quiet and clean surroundings. Many were small with only enough room for 12 patients (as Jesus had disciples). Many hospitals did not have doctors but a Chaplain (priest) and were run by monks or nuns on a strict pattern of diet and prayer. Most hospitals relied on charity, funding from the Church or wealthy patrons.

The **Christian Church** preserved a great deal of knowledge handed down from the Greeks and Romans. Monks in monasteries copied out the Bible, histories and other Ancient books, including the books by **Galen** and other medical writers from Greece and Rome.

In a hospital, nuns fed the sick and gave them herbal remedies but a prayer was the most important treatment. At the end of the hall (or ward) was an altar where priests said mass seven times each day. The patients joined in, hoping that prayer would help them recover.

Specialist hospitals were set up: Bedlum (lunatics), Monasteries (sick), Almshouses (pregnant women), Lazar (lepers) and Hospitallers (soldiers)

Supporting Galen:

Galen's books were the main books read by physicians in Europe for two reasons. Firstly the **Christian Church** controlled the universities where physicians were trained and the Church believed the ancient writings should not be questioned. If people started questioning **Galen** they might question the Bible so questioning was not a good idea. Secondly the **Church** supported **Galen** because he said that each part of the body had a definite purpose. This fitted the Churches belief that God created human beings. Therefore, when **Roger Bacon** said that doctors should do their own research instead of just reading Galen, he was thrown in prison by Church leaders.

Islamic medicine

During the Middle Ages, Islam became the main religion of the Middle East and North Africa. During the height of its culture and power, Islamic doctors made great contributions to medical knowledge in Europe and Britain.

The Islamic Empire was a single state ruled by one man, known as a Caliph. Caliphs provided peace and order needed for medical progress. They were also interested in science and supported Islamic medicine.

The Big Three

Ibn Sina or Avicienna

He wrote a million-word book on medicine 'The Canon of Medicine'. It contained all sorts of treatments for all known diseases and was used by trainee doctors in Britain as a textbook until 1600's

Abucasis

He described how to perform simple surgery. His ideas allowed doctors to operate on veins and remove cancers. He used tubes to remove fluids. He could amputate arms and legs using anaesthetics like opium and operated on eyes to remove cataracts.

Rhazes

He agreed with Hippocrates and Galen to observe patients and study diseases. He wrote over 100 books on medicine. He wrote observations on smallpox and measles and the symptoms of each.

NB: The Christian Church was at war with Islam, therefore Muslim ideas spread only **slowly** to western

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Exam skills:

They were similar because..

They were similar because..

They were similar because..

Do not mention they are different or you will be awarded 0 marks

- ✓ Similar belief in hospitals for sick
- ✓ Separate wards for different illnesses
- ✓ Belief in observation and diagnosis
- ✓ Herbal treatments used by both
- ✓ Both rich and poor alike were treated as religion focused on caring for sick
- ✓ Reading the books of Galen and Hippocrates similar
- ✓ Training of doctors similar as dominated by religion
- ✓ Doctors examined patients' urine, pulse and lifestyle

Compare the ideas of the Islam with the ideas of the Christian Church. How similar were they? (8 marks)

Doctors and Surgery in medieval medicine

Doctors and beliefs:

- Doctors would use urine charts to diagnose patients, they test the colour, smell and even taste of the urine.
- They still believed in **Hippocrates** and **Galen** and the theory of opposites and so would use methods such as bleeding to balance the humours.
- Doctors were also superstitious and a zodiac chart (linked to the planets) showed the doctor when to avoid treating different parts of the body

Doctors and treatments:

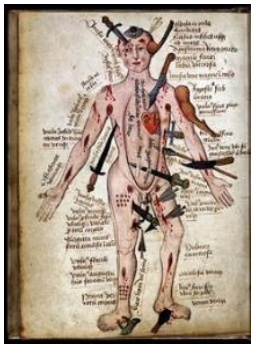
- Doctors tended to concentrate on two things: they took the pulse and noted the colour of the patient's urine.
- Doctors used the theory of the four humours regularly. This involved bloodletting, vomiting and purging.
- Bleeding charts told the surgeon where to take blood from. Bleeding charts told the surgeon where to take blood from. Warm cups and leeches were used to draw the blood out. Rich people were bled regularly to avoid disease – it was thought to 'clear the mind and strengthen.
- Home herbal remedies included Foxglove (used for heart conditions today), Garlic (kills bacteria), Poppy and willow (painkillers). Antibiotics such as onion and wine were used by Hugh of Lucca and his son Theodoric

For most people, the local wise woman or man offered traditional remedies for illness. They used a mixture of natural herbal remedies, first aid and supernatural cures. Most of their knowledge was passed down by word of mouth

In markets or fairs there would be may people offering herbal remedies. Some would pull teeth, mend dislocated limbs or even set a fracture in splints. However many were bogus doctors who claimed they could cure you of the plague, stomach cramps and other illness. They were called quacks.

If you had a little money you could visit the local 'barber' surgeon – they could amputate, remove tumours as well as dealing with dislocations. Some, such as **Guy de Chauliac** wrote a 7-volume book on surgery.

Barber surgeons were lower class medical tradesmen. They were not trained and learned from experience. However as there was not a lot of money to be made from surgery – they also cut hair.



Source A: A Wound Man. Printed in a German book from 1517 to show what treatments could be done by medieval surgeons.

Cauterisation was commonly used for wounds. This was done with a heated iron to stop the flow of blood and then poring boiling oil into the wound.

A surgeon's tools included saws for amputation, arrow pullers, cautery irons and bloodletting knives.

Successes: Amputating parts of the body for breast cancer, bladder stones or hemorrhoids were successful in the Middle Ages

Trepanning involved drilling a hole in the head to remove demons in the brain (for epilepsy).

Exam Question

How useful is Source A to an historian studying Medieval Medicine? (8 marks)

Key Skill:

Content, Own knowledge, Provenance (time, author, purpose.)

Make sure you use lots of your own knowledge from above! Note the use of the chart for where and when to make cuts.

Public Health in the Middle Ages

Towns in general with some exceptions were dirty places.

Open drains, overflowing cesspits, polluted drinking water were common.

However some medieval town councils tried their best to keep the environment clean.

Lots of problems:

- Some towns had public baths called stewes where people bathed together in large wooden tubs.
- No one expected local authorities to organise the removal of rubbish.
- Leather tanners used dangerous chemicals which they then dumped into the rivers
- No one expected kings or the central government to make laws about public health or raise taxes so improvements were paid for by rich individuals
- Butchers left rotting meat and waste products in the streets.
- Cesspits were usually built next to drinking wells and often the sewerage leaked into them
- People could buy water from water sellers but it was often taken from polluted rivers.
- Councillors knew that improvements would be expensive and did not want to become unpopular by increasing local taxes
- Often nothing was done until there was a serious outbreak of disease in a town.

Some solutions:

- Local authorities in some towns paid for piped water supplies and sewer systems.
- In the 1300s in London lead pipes brought water from the River Tyburn to conduits in the streets.
- People could pay to have their cesspits emptied.
- Butchers were thrown in the pillory if they sold rotten meat.

'The jury decided that Ebbegate Lane used to be a public passage. Master **Thomas Wytte** and **William de Hockele** built privies projecting out from the walls of their houses. From the privies human filth falls onto the heads of the passers-by and blocks the passageway.

From the records of a London Court in 1321

Skill: COP

Content: Two men had built privies (toilets) above a passage way and filth was falling onto passers by which shows how filthy this medieval lane was.

Own knowledge: Towns were filthy places in many cases e.g. butchers, cesspits, leather tanners, stewes. Some places (such as London) tried to improve conditions e.g. piped water, lead pipes, use of pillory (all of these examples you would need to explain fully)

Provenance: Time is 1321 when councils found it hard to improve public health in Middle Ages, Author and purpose is London Court so they want things to change and take action.

How useful is Source A when studying the health of Medieval Towns? (8 marks)

The Black Death and the Plague

The **Black Death** was an endemic disease of the Medieval period. It began in Asia and rapidly spread through trade routes in Europe.

In 1348 it arrived in Britain. At least **1.5 million** people died. In Europe it killed nearly half the population.

What did people think caused it and why did it spread? Why were people so terrified of catching it and how did this affect medical ideas?

Bubonic:

This was spread by fleas from rats. **Buboes** or lumps were found on a person's groin, neck and armpits. The lumps oozed pus and bled when opened, then a high fever and vomiting of blood would follow.

Pneumonic:

This was more deadly; it infected the lungs, causing fever and coughing and was spread by contact with a victim's breath or blood.

Doctors were baffled as to what caused the disease. This had a bad effect on medicine:

Beliefs:

- Doctors blamed it on the position of stars and planets
- Bad air (miasmas)
- Jews poisoned the drinking wells
- God's punishment for sins

Treatments:

- Prayers were used to ask God for forgiveness.
- Religious public marches were held to ask God to end the epidemic.
- Candles were lit as a symbol of hope and people believed it would deter the darkness of death.
- Bleeding and herbal ointments were used to treat the plague. With figs, onions and butter applied to the buboes.
- Flagellants whipped themselves and begged God for mercy

At the time: Towns and cities faced food shortages as nearly half the population was killed there were fewer people to grow crops. Also landowners changed their land from crop to sheep farming.

Overtime: After the Black Death, farmers were desperate for workers to farm the land. They encouraged peasants to leave their villages. peasants who survived found they were now in demand as labourers and they began to challenge the traditional feudal system by asking for higher wages and more freedom.

Overtime: The government panicked and passed a **Law** about wages and movement. Peasants could only be paid the same as wages before 1346. Also, peasants were not allowed to leave the village they belonged to.

Overtime: The reputation of the church was damaged with the Black Death. Although many good and experienced priests were killed, some Churchmen were called cowards as they fled their villages.

Nowadays: The Church does not have the power it once had over people and does not dictate over medicine. Moreover, the peasants laid the foundations for the Trade Union movement to come.

Explain the significance of the effects the Black Death had in Britain (8 marks)

The Black Death and the Plague

There were further outbreaks of the Black Death (or plague) over the next few hundred years.

However in 1665, it returned once more with devastating results. About 100,000 people in London alone were killed, which was a quarter of the city's population

It became known as the Great Plague. It also killed thousands more in the rest of the country. Although there were differences, but beliefs and treatments still stayed the same.

There were however some differences:

- There was a much more organised approach to dealing with the Plague this time
- Majors and councilors issued orders to try to halt the disease. They paid 'women searchers' who would examine the sick and note those with plague symptoms
- The plague victims were then 'quarantined' (locked up) in their houses. Watchmen stood guard to make sure that they did not leave and spread the disease
- Those houses with plague victims had a red cross painted on the door with the words 'Lord have mercy on us.'
- Homeowners were ordered to sweep the street in front of their houses to remove the poisons in the air (miasmas)
- Pigs, dogs and cats were not allowed in the streets

Similarities on beliefs:

- People still believed that the plague was a punishment from God and went on pilgrimages to shrines or whipped themselves in processions on the streets
- Other people blamed the movement of the stars and planets
- Poisonous air or miasmas were blamed for it spreading
- The Government still had no idea what caused the disease, hence natural and supernatural ideas.

Similarities on treatments:

- Patients were still bled by leeches
- People smoked to keep away the 'poisoned air' or sniffed a sponge soaked in vinegar or used flowers.
- Remedies using herbs, onions, butter as well as frogs, snakes and scorpions were still used to draw out the poison
- Chickens and pigeons were also still used

Explain the similarities between the Black Death and the Great Plague in Britain (8 marks)

The Renaissance

The **Renaissance** is a term that describes a period of history where there was a rebirth of learning.

Originating in Italy, there was a new interest in the ideas and knowledge of the **Ancient Greeks** and **Romans**.

This led to new developments in art, science, religion, technology, astronomy, **medicine** and literature.

Has the role of the individual been the main factor in the development of medicine in Britain during the Renaissance? (16 + 4 marks SPaG)

Key Skill: Always use at least 3 individuals and link them to at least 3 factors.

Andreas Vesalius:

Born in Belgium in 1514., he studied medicine in France and Italy where he ransacked cemeteries and gibbets for bones and for bodies to dissect to understand the anatomy of the body.

He came to realise through a series of experiments and dissections that the famous doctor **Galen** could be wrong, when he discovered that the great man was mistaken about there being two bones in the jaw, and about how muscles were attached to the bone. He became Professor of Medicine at Padua University.

He said that medical students should perform dissections for themselves, stating that:"... our true book of the human body is man himself." In 1543, he published 'Fabric of the Human Body' (with high-quality annotated illustrations). This allowed scholars and medics the chance to read and question **Galen**, never done before. He was helped by the fact that the Church was fragmenting and losing its power in Europe due to new ideas about Protestantism.

Individual Brilliance

Science and technology

Communication

Ambroise Paré

Paré began his career as an apprentice to his brother, a barber surgeon. In 1536, he became a surgeon in the French army, where he worked for 20 years. During this time, he developed his ideas about surgery.

Paré changed ideas about surgery. Before Paré, wounds were treated by pouring boiling oil into them. To stop the bleeding they were cauterized, ie sealed with a red-hot iron. During one battle, supplies of cautery oil ran out. Instead, Paré used an ointment of egg yolk, oil of roses and turpentine which had been used in Roman times. He found that the wounds treated with this mixture healed better than those treated with boiling oil.

He introduced the crow's beak' clamp to halt the bleeding and then used ligatures, ie silk threads to tie blood vessels Unfortunately, ligatures did not reduce the death rate. Dirty surgeons' hands and contaminated ligatures caused infections in the wounds being treated. He also began making false limbs for soldiers. The first edition of Pare's '*Collected Works*' was published in 1575 and was widely read in Britain. **William Clowes**, surgeon to Queen Elizabeth I greatly admired **Paré** and adopted his techniques. He also agreed with Paré that that gunshot wounds were not poisonous.

War

Individual Brilliance

Chance

Communication

The Renaissance

William Harvey:

Born in 1578 in Kent, he studied medicine in Cambridge and Padua, Italy. He then worked as a doctor in London and then as a lecturer in anatomy.

Many doctors still believed in Galen's idea that new blood was constantly being made in the liver to replace the blood that was burnt up in the body, in the same way as wood is burnt by fire. No one had as yet proved exactly how blood moved around the body.

Harvey showed that blood flows around the body is carried away from the heart by the arteries and returns to the heart in veins. He proved that the heart acts as a pump, recirculating the blood and that blood does not burn up so no organ is needed to manufacture new blood.

In 1628 he published 'An Anatomical Account of the Motion of the Heart and Blood in Animals.' Despite some criticisms of Harvey being a 'circulator' or quack, understanding the circulation of the blood was a vital stage in the development of surgery and in the diagnosis of illness.

Individual Brilliance

Science and technology

Communication

Opposition: Amazingly all 3 of these Renaissance pioneers had their critics:

Vesalius:

Vesalius faced heavy criticism for daring to say that **Galen** was wrong. He had to leave his job in Padua but later became a doctor for the Emperor **Charles V**. He paved the way for others to conduct proper dissections and learn more about the body.

Paré:

Although **Paré's** ideas and treatments improved surgery, they were slow to catch on. Cauterising wounds was still common place amongst surgeons for example.

Harvey:

Harvey too received heavy criticism as he contradicted Galen. Harvey was called a 'circulator' – a quack who tricked people about the body's blood. However many modern medical treatments would not work today unless blood circulation was understood such as blood tests, blood transfusions or heart transplants.

Medicine in the 17th and 18th Century

Although some doctors and surgeons began to use the Renaissance approach to science and the ideas of Vesalius, Pare and Harvey, many more did not. Ancient unscientific beliefs such as the four humours were still used to treat everyone.

How was the dying King Charles II treated in 1685 using allegedly the best doctors money could buy?

On 2 February, King Charles II collapsed with a 'disturbance in his brain'. The royal medical team swung into action.

He received in total some 58 drugs. He was purged, bled, blistered and cauterized.

None of the treatments helped the chronic kidney disease that killed him.

In fact the kidney disease may have been brought on by the poisonous mercury treatments the King had taken for 'curing' syphilis.

What treatments were available for ordinary people?

Barber surgeons poorly trained people who would give you a haircut and perhaps perform a small operation like bloodletting or tooth extraction.

Quacks were showy, travelling salesmen who sold all sorts of medicines and 'cure-alls.' Most of course did not work.

Apothecaries had little or no medical training but sold medicines and potions

People still had faith in the royal touch to cure the disease scrofula, or **king's evil**. An average of 30,000 people a year arrived in London hoping to be cured by the King's touch.

Wise women who relied on superstition. However they did have an extensive knowledge of plants and herbs passed on through word of mouth

Nicolas Culpepper became a famous English doctor and produced 'The complete herbal' in 1653. He used plants and astrology in his treatments. Unusually he was highly critical of bloodletting and purging.

Which new medicines appeared from the discovery of new lands?

The bark of the Cinchona tree from South America contained quinine, which helped treat malaria.

Opium from Turkey was used as an anaesthetic.

John Woodall, a military surgeon, began using limes and lemons to treat scurvy in 1617 .

Tobacco from North America was wrongly said to cure many illnesses from toothache to plague.

Key biography: Thomas Sydenham (1624-89)

English doctor who was famous for recognizing the symptoms of epidemic diseases such as scarlet fever.

He was critical of quack doctors and stresses the need for careful observation of patients.

Although he still bled patients, he also advocated doing nothing and letting nature take its course.

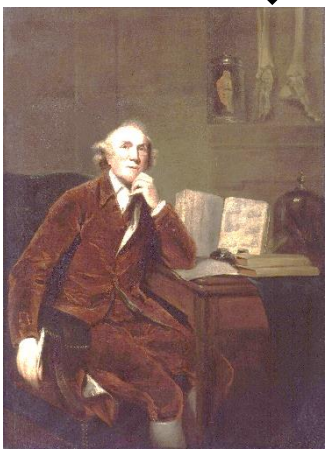
John Hunter

John Hunter was born in Glasgow in 1728. At the age of 20, he joined his brother William who had started an anatomy school.

He soon became skilled in precise dissection and anatomical research. His other job was to rob graves at night for his brother's school.

Professor **Robert Winston** (of TV fame) has described Hunt as someone who was determined to drag surgery out of the Middle Ages and put it on a scientific basis.

So why did **Professor Robert Winston** think he was so significant and why should we remember **John Hunter today**?

Life: John Hunter became an army surgeon in 1760. After three years he left the army to set up a surgical practice in London. In 1768 he became a surgeon at St George's Hospital. He was appointed Surgeon to **King George** and Surgeon General to the army in 1790. Although he earned large amounts of money during his life, he used most of it for research and for his specimen collection. He died in debt and poverty in 1793. ***(At the time / short term)***	**Teaching:** Hunter set up a large practice and trained hundreds of other surgeons in his scientific approach. Many young surgeons he trained became great medical teachers and professors in the teaching hospitals in nineteenth century Britain and America. For example **Edward Jenner** (who discovered the vaccination for smallpox) trained with him and became a good friend. ***(Over time / medium term)***	**Specimens:** Hunter collected a huge collection of anatomical specimens. He preserved 3000 stuffed or dried animals, plants, fossils, diseased organs and other body parts. His most famous item was the skeleton of the Irish giant **Charles Byrne** who was 7 foot 7 inches tall. ***(At the time / short term)***
Books: All Hunter's writings were based on his observations. His books included: 'The natural History of the teeth' (1771), 'On Venereal Disease' (1786) which was translated into several languages and was widely read and 'Blood inflammation and gunshot wounds' (which explained that these wounds were not poisoned and the area around the wound did not need to be cut out). ***(Over time / medium term)***	**Scientific method:** Hunter was an early promoter of careful observation and the use of scientific method in surgeries. In 1785 a man was admitted to St George's hospital with a lump on his knee joint (aneurysm). The usual treatment was to amputate the leg above the throbbing tumour. His previous dissections led him to believe if the blood supply was restricted above the lump then it would encourage new blood vessels to develop and bypass the damaged area. He cut into the man's legs at several points and tied off the artery to restrict the blood flow above the lump. Six weeks later the man walked out of hospital and he had saved his leg. **(Over time medium term/ nowadays long term)**	Note the bones of the giant Charles Byrne 

Exam Question

Explain the significance of John Hunter's work for the development of medicine (8 marks)

Edward Jenner

One of the biggest killer diseases in the eighteenth century was smallpox. It was highly infectious virus which passed from one person to another by coughing, sneezing or touching. It killed 30% of the people who caught it.

The first symptoms were fever, headache and a rash, followed by pus filled blisters covering the whole body. Even if you survived, you could be left blind or with deep scars.

Doctors at the time tried to prevent it by using inoculation. This was introduced by **Lady Wortley Montague** from Turkey in 1721. It became big business and very profitable to many.

Inoculation involved scratching pus or scabs from a smallpox victim onto a healthy person's skin which allowed them to build up a resistance against attacks of the full killer form of the disease. However, it was dangerous as sometimes inoculation gave people a strong (instead of mild) dose of smallpox which could kill them. Furthermore, it was really only the rich who could afford it and any inoculated person could still pass smallpox onto others.

This inoculation theory was well known when **Edward Jenner** became a doctor in the 1770s. Jenner had studied in London with **John Hunter**, the greatest surgeon of the time. Hunter had encouraged his students to use their powers of observation to carry out new experiments.

Jenner had heard that milkmaids who caught cowpox from cows never caught smallpox. In 1796 Jenner decided to carry out an experiment. He used a poor local boy, James Phipps, and gave him a dose of the cowpox germs from Sarah Nelmes. Six weeks later, he gave the boy some smallpox germs. 'No disease followed.'

Jenner carried out the experiment 23 times. Only then did he conclude that cowpox protects the human from the infection of smallpox.

He called his technique 'vaccination' because the Latin word 'vaccinus' means from a cow.

Unfortunately, the Royal Society rejected his findings – probably due to him being a country doctor and he could not prove how it worked.

Luckily Parliament decided to give Jenner £30,000 to open a vaccination clinic.

By 1803, doctors were using Jenner's technique in America. In France, Napoleon had all his soldiers vaccinated! In 1852, the British Government made smallpox vaccination compulsory.

Opposition to Jenner:

- Jenner could not explain how the vaccination worked
- Many doctors were not willing to stop inoculations as it made so much money
- People were against change
- Jenner was not a fashionable London doctor
- In London, **William Woodville** and **George Pearson** used Jenner method using contaminated needles and then suggested it didn't work!

Surgery in the 19th Century

The three barriers to surgery were:

PAIN

INFECTION

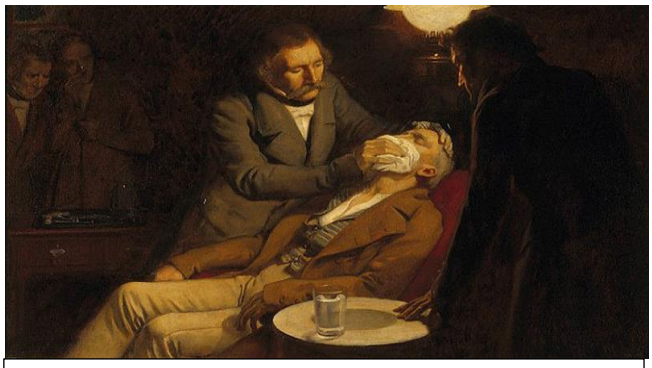
BLOOD LOSS

Anaesthetics

Nitrous Oxide: In 1795, **Humphrey Davy** experimented with inhaling nitrous oxide. In 1800, he published an account of how it made him laugh and feel giddy and relaxed. It became a fairground novelty; people paid to inhale it and then fell about laughing hysterically, much to the amusement of the crowd. It was not until 1844 that an American dentist **Horace Wells** saw it as an anaesthetic and removed one of his own teeth. He failed to convince other doctors to use it however.

Ether: In 1846 **William Morton** helped give a public demonstration in a Boston hospital using ether to extract a tooth. Robert Liston was quick to try it in England. He called it a 'Yankee dodge' and used it for a leg amputation. An effective anaesthetic had arrived at last. However, it did have its drawbacks. It was difficult to inhale, it caused vomiting and it was highly flammable. This was a problem as many patients chose to have their operations at home in front of a fire rather than choose an infection ridden hospital.

Chloroform: There was still a need for a safe and effective anaesthetic. The breakthrough came in 1847 when a Scottish doctor **James Simpson** discovered chloroform. Simpson and his friends had been testing a number of different substances until they came across chloroform which knocked them out. Problems came with the death of a young woman, Hannah Greener when she took it during an operation to remove a toenail. Objections were overcome when **Queen Victoria** used it with the birth of her son, Prince Leopold and after **Dr John Snow** worked out the correct quantities to administer to patients.



Source produced showing William Morton giving ether to a patient in 1846

Key Skill: COP

What is the content of the Source?

What is your own knowledge of anaesthetics? (see above)

What is the provenance? (time, author, purpose)

Exam Question

How useful is the Source to a historian studying the development of surgery? (8 marks)

Surgery in the 19th Century

Antiseptics

Explain the significance of Joseph Lister in the history of antiseptics? (8 marks)

At the time (Short term significance)

Born in Essex, Lister moved to Glasgow in 1860 to become a Professor of surgery. He soon realised that operations went well as long as the wound was kept free from infection. Lister had heard of Louis Pasteur's work on the germ theory. He also noticed on a visit to Durham that the city's drains had a similar smell to the operating theatre. The local authorities used **carbolic acid** to mask the smell.

Lister believed that infection only happened when the skin was broken and microbes could get in and start an infection. He decided to experiment using carbolic on a young boy, Jamie Greenlees, who had been run over by a cart which had fractured his leg. The bones were sticking out through the skin of his leg. The common practice was to amputate, but Lister set the bones and used dressings soaked in carbolic acid. The dressings remained for four days; when removed Lister was impressed to see the skin was healing. He replaced the dressings using less carbolic to avoid irritation to the skin. After six weeks, he walked out of the hospital.

Lister next turned his attention to the Operating Theatre. His method was to spray everything in carbolic from the surgeon's hand, wound, instruments, bandages, ligatures and dressings in an operation. In March 1867, Lister published his results. 11 patients had compound fractures none of whom died of infection. Between 1864-1870, death rates fell from 46% to 15% after Lister used his antiseptic method.

Overtime: (Medium term significance)

Doctors at the time still did not accept Pasteur's Germ Theory. Carbolic was very unpleasant to use as people's hands dried up and cracked and it irritated the lungs making it difficult to breathe. It also took a long time to prepare his carbolic methods. However, Lister lectured doctors about his techniques and credited Pasteur's Germ Theory. He was convinced infection was caused by microbes in the air; the cause of sepsis came from outside the body and not from spontaneous generation.

Nowadays: (Long term significance)

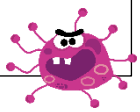
Due to Lister (and Listerism), carbolic became linked to a germ-free environment. Carbolic soap became popular in the 1900's. Even Listerine mouthwash gets its name from the famous surgeon.

Surgery in the 19th Century

Antiseptics

Despite the genius of Lister there was still opposition to him and his use of antiseptics:

Some doctors still did not believe that microscopic germs could harm something as large and strong as a human.



Using carbolic spray caused irritation to the eyes and skin and was very unpleasant to use in surgery.

Lister was not a showman. He also kept changing his methods so made his ideas unclear and confusing.

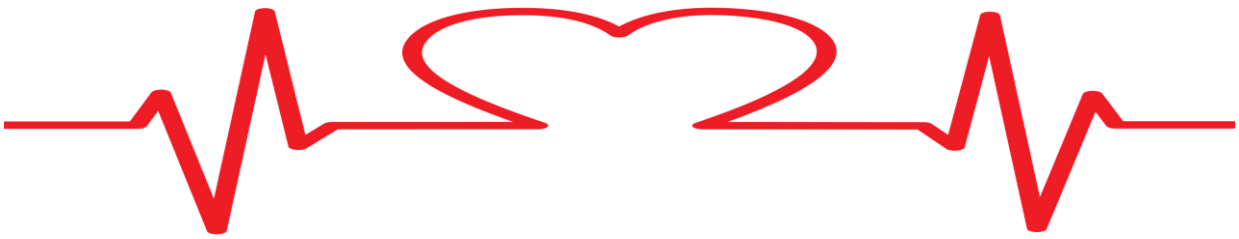
Blood Loss

Before 1901, early blood transfusions were often unsuccessful and more often than not fatal in humans. The first successful blood transfusion was performed by a British physician Richard Lower in 1665 when he transfused blood from one dog to another via a tied artery.

In 1901, **Karl Landsteiner** discovered the existence of different blood groups which helped doctors to work out that a transfusion only worked if the donor's blood type matched the receiver.

Even then it wasn't possible to store blood for long because it clotted so quickly. As a result, many people still died from loss of blood, so a solution to the problem of storing blood was needed.

In 1914, **Albert Hustin** discovered that glucose and sodium citrate stopped blood from clotting on contact with air. Other advances meant that blood could be bottled, packed in ice and taken to where it was needed by surgeons operation on soldiers.



Florence Nighingale and hospitals

Until Florence Nightingale came along, nurses and nursing had a terrible reputation. They were seen as **drunks** and **untrained**.

An ideal woman described by W.M. Thackeray, a novelist in 1850: 'An exquisite slave; a humble flattering, tea making pianoforte-playing being who laughs at our jokes, however old they may be'

A statement by all students at Middlesex hospital, London: 'We consider that the mix of the sexes in the same class is likely to lead to results of an unpleasant nature. The presence of young females as spectators in the operating theatre is an outrage to our natural instincts and feelings.'

War has been the most important factor in the development of medicine since the 1800's. How far do you agree? (16 marks +4 SPaG)

Florence Nightingale was born into a wealthy family in 1820. When she told her parents that **God** wanted her to be a nurse and care for the sick, they were horrified.

✓ Religion

In 1850, she went to Germany to train as a nurse for three months. Back in Britain, she got a **job** running a hospital for rich women – but she wasn't happy.

✓ Individuals

In 1854, **war** broke out between Britain and Russia in the **Crimea**. Around 100,000 British soldiers were killed or wounded but many more fell ill through typhus and other diseases.

✓ **War**

Reports got back to Britain about the dreadful conditions in the army hospitals. The man in charge of the army knew Florence and **asked her** to take control of nursing the troops at the main army hospital in Scutari.

✓ Chance

Florence took a group of 38 nurses with her to the war zone. She was horrified at the conditions. There were no toilet facilities, no cleaning basins, soap, mops, towels or cleaning materials.

✓ Individuals

Florence wrote home to the British Government straightaway. As well as describing the conditions, she **ordered** all sorts of cleaning materials. She even offered to pay for some herself.

✓ Individuals

Florence and her nurses cleaned the hospital thoroughly – she also hired 200 builders to rebuild part of a ward. Some of the doctors objected to a nurse telling them how to run their hospital. But she **persisted** and her nurses removed a vast amount of rubbish.

✓ Individuals

Within six months, she reduced the death rate in the hospital from 40% to 2%. Even the doctors must have been impressed with the increased survival rate amongst the wounded soldiers.

✓ Individuals

Newspapers back in Britain called her 'The Lady with the Lamp' because it was claimed she walked around at night making sure the soldiers were fine. After two years she returned to Britain as a **hero** – but she was very ill.

✓ Communication

Florence Nighingale and hospitals

Florence recovered and knew she could improve hospitals in Britain. She wrote an **800-page report** to the government telling them how to improve things. In 1860, her new book, '**Notes on Nursing**' became a bestseller.

✓ Communication

She raised £44,000 to set up Britain's first **nurse training school** at St Thomas' Hospital. She aimed to turn nursing into the respectable profession it is today by training women and taking control away from the men.

✓ Individuals

In 1863, she published '**Notes on Hospitals'** which introduced new ideas of open, spacious, well ventilated hospitals. Unfortunately she believed stale air spread disease. Countries all over the world copied her ideas.

✓ Communication

Hospitals pre-Florence Nightingale

Wealthy Individuals

Thomas Coram, a retired ship's Captain was so horrified by the lack of care for sickly or poor children whom he found abandoned on the streets, he set up **Foundling Hospital** in 1741. It cared for orphaned children by giving them a clean environment, clothing and some simple education up to the age of 15.

Westminster Hospital was founded by a private bank in 1719

Guy's Hospital was founded by a merchant, Thomas Guy in 1724.

Training Hospitals

New charity hospitals such as in **Edinburgh** allowed students to follow medical professors through the wards.

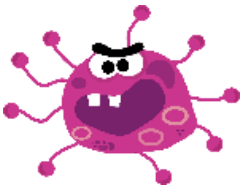
Medical schools were often attached to hospitals and gave doctors valuable training facilities.

Specialist hospitals

London's Lock Hospital was opened in 1741 for venereal disease (sexually transmitted).

St Luke's Hospital and **Bedlum Hospital** was set up in London in 1751 for the mentally ill.

Pasteur, Koch and Tyndall



In the eighteenth century, scientists had all sorts of ideas about how diseases came about. One theory was **spontaneous generation**, the idea that microbes could appear as if by magic when something rotted. They thought that the disease caused the microbes and not the other way around. There was also the belief that all microbes were much the same!

In 1857 Pasteur was asked to find out why wine went sour. He concluded that germs were harming the liquid and they did the same to milk and beer.

Pasteur then looked for ways to solve the problem. He killed the bacteria by gently heating the liquid. He used the same technique with beer and milk. He had invented a process called **pasteurisation.** It was a huge step forward in keeping liquids free from germs and safe to drink.

Pasteur was convinced germs were coming from the air around him. He tried to prove the idea of spontaneous generation wrong. He used two glass containers and put the liquid in each. Then he boiled it to kill the germs.

He heated the spout of one flask until it started to melt. Then he bent it into a curvy shape. Pasteur claimed the liquid in the flask with the bent tube would last for years and not turn sour.

Pasteur said the bend in the spout would stop the movement of air. He said the germs in the air would settle in the lowest part of the curve and wouldn't reach the liquid.

Pasteur argued the liquid in the other flask would soon go bad. He said the straight spout would allow germs to get to the liquid easily.

Everything Pasteur said was correct. He had proved that germs did not come alive on their own. Germs could only be found in places they could reach. The theory of spontaneous generation was dead. In 1861 he published his germ theory. Despite having a stroke and losing his daughter, Pasteur was determined and hard working.

Pasteur was a chemist not a doctor. Many doctors did not entertain the idea that germs could damage humans too. They thought it ridiculous that a tiny germ could harm something as large as a human. It took a German doctor, Robert Koch to apply Pasteur's theory and prove germs caused most human diseases.

In 1879, Pasteur was investigating chicken cholera, a disease that was crippling the French poultry industry.

By accident, his assistant Charles Chamberland, used an old weakened sample of the disease microbes. When the chickens were injected, they survived.

The chickens were then injected with fresh strong germs and again survived. Pasteur and his team had shown a new way to create **vaccines** in the lab.

They had also proved that weakened strains of a disease could help develop immunity.

Pasteur now turned his attention to rabies, a fatal disease with gruesome symptoms which caused a long and painful death. He faced a dilemma with Joseph Meister, a boy bitten by a rabid animal. It wasn't certain that Joseph would develop the human form of rabies, but Pasteur went ahead and tested his treatment anyway. Joseph survived. The first human trial of a **man-made vaccine** was another landmark, although when Pasteur later wrote up his experiments, he exaggerated again, saying he'd done more animal testing than he really had!

Compare the work of Louis Pasteur and Robert Koch in the fight against germs. In what ways were they similar? (8 marks)

Pasteur, Koch and Tyndall

Louis Pasteur had made a momentous breakthrough in 1861 with the publication of The Germ Theory. However, he wasn't able to link his germ theory to humans. It took a German doctor, Robert Koch, to apply Pasteur's theories to human disease.

Koch found a way of **staining** and growing the germ he thought was responsible for causing anthrax. He then proved this by injecting the germ into mice and making them ill.

Using similar methods, Koch was able to **identify** the germs that caused the deadly diseases cholera and tuberculosis. It was Pasteur and his team however which came up with the vaccines for both.

Both Pasteur and Koch saw each other as rivals. Through their scientific discoveries, they competed in honour of their countries. They both however were not able to kill the specific germs they Identified in the body.

Koch proved specific germs (bacterium) caused specific diseases. He also showed how bacterium could be retrieved from dead animals and grown again. He did this using **agar** (a seaweed extract which encouraged them to grow).

As well as staining germs, Koch developed ways of photographing microbes so that other scientists could study them in detail and find them in samples.

Both went on to win awards. The **Copley Medal** in 1874 went to Pasteur and the **Nobel Peace Prize** to Koch in 1905. Both went on to develop vaccines for anthrax, rabies, chicken cholera, diphtheria and T.B.

Compare the work of Louis Pasteur and Robert Koch in the fight against germs. In what ways were they similar? (8 marks)

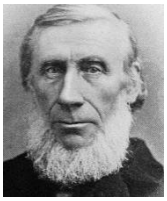
Checklist:

- ✓ Use of science and technology
- ✓ Individual genius and determination to succeed
- ✓ Use of the microscope
- ✓ Competition between both France and Germany
- ✓ Development of vaccines

How were these new ideas received in Britain?

Charlton Bastion had written many articles in the 1860's supporting spontaneous generation. He believed that infection occurred spontaneously and it was a chemical reaction that produced poisons.

John Tyndall publicly defended Pasteur's Germ Theory lectured on both dust and disease with experiments on light that showed tiny particles in the air.



Public Health in the 19th Century

Public Health, the health and well being of ordinary men, women and children, was in a poor state in the 1800's.

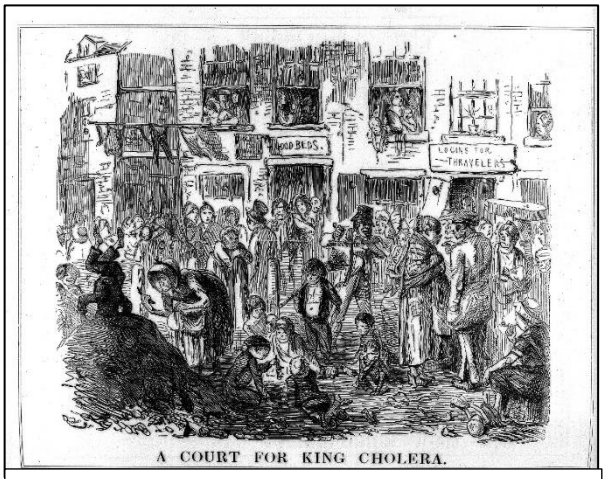
Overcrowding was a big problem. Houses were built close together, cheaply and families lived in small spaces usually in a single room.

Most houses had no bathrooms and instead shared an outside toilet, called a privy. Each privy or toilet was built above a cesspit which was collected by nightmen, who threw the waste into the rivers or on the streets.

Water companies set up water pumps in the streets, which were shared by many houses. Unfortunately, the water supplies usually became infected by waste from the nearby cesspits or rivers.

The average age of death for a working man was about 30 years of age. In some places such as Liverpool, it was 15!

In Manchester, one in every five children died before their first birthday and one in three died before they reached the age of five.



British cartoon published in 1853

How useful is this source to a historian studying Public Health in the 1800's? (8 marks)

Key skill:

What is the content of the source?

What is your own knowledge? (see above)

What is the provenance of the source? (time, author, purpose)

The British Government was more concerned about its Empire and its wealth than helping the poor in the cities.

The British Government adopted a **laissez-faire** approach – it wasn't their problem.

The British Government had made the link between dirt and high death rates but was unclear on how to act.

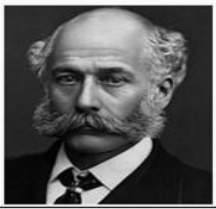
5 key men to help improve Public Health in Britain

Edwin Chadwick

Factor: Government

John Snow

Factor: Science and Technology

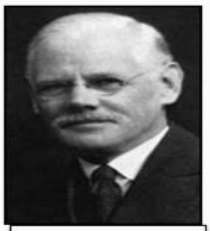


Joseph Bazalgette

Factor: Science and Technology / Individual

Charles Booth

Factor: Government / Individual



Seebohm Rowntree

Factor: Government / Individual

Public Health in the 19th Century

Edwin Chadwick

In 1842, social reformer **Edwin Chadwick** produced a report on poverty and health. It showed that living conditions in towns were worse for people's health than in the countryside. His report suggested the following things to the Government:

- The Government should pass laws for proper drainage and sewerage systems
- All improvements should be funded by local taxes
- All waste and sewerage in London should be pumped into the Thames
- Disease was spread by poor sanitation and bad air (miasmas)
- In 1848, six years after his report a terrible outbreak of **cholera** which killed 53,000 people forced the government to act

1848 Public Health Act

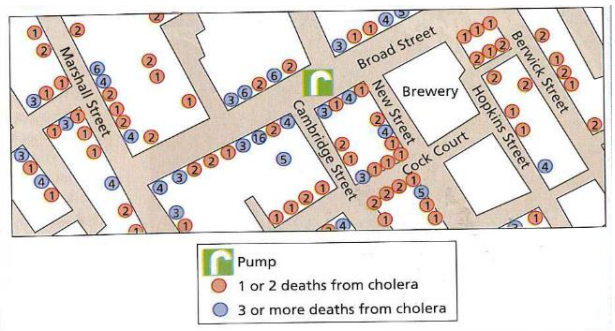
- This set up a Central Board of Health with Chadwick as a member.
- It **allowed** towns to set up their own local boards of health as long as taxpayers agreed.
- Councils were **allowed** to appoint Medical Officers of Health to oversee public health.
- Therefore the Public Health Act was i**neffective.**

1875 Public Health Act

- Eventually (after further outbreaks of cholera) the Government passed another Public Health Act, but this time it was **compulsory**.
- Local councils **forced** to provide clean water, public toilets and proper drains and sewers.
- Councils **forced** to appoint a Medical Officer of Health.
- Therefore the Public Health Act was **effective.**

Dr John Snow

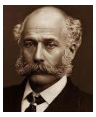
John Snow had been an apprentice surgeon at 14 before becoming a fully qualified doctor as an adult. He was a strong believer in evidence-based theories and mocked other doctors who believed in miasma (which didn't win him much support from other doctors).



- Cholera was one of the biggest killers at this time and Snow believed it was caused by dirty water.
- To prove this, he investigated the 700 deaths around Broad Street in Soho, London and wrote a report about his findings.
- Using a **colour coded map** to plot all the deaths, he concluded that all the victims used the same water pump. He made sure the authorities removed the pump handle and the cholera outbreak stopped.
- Snow's work received *little attention* at first, especially as he could not prove that water carried the cholera germ.
- Most people still believed in the miasma theory of disease and he had to wait until Pasteur's Germ Theory to get the recognition he deserved.

Public Health in the 19th Century

Joseph Bazalgette



In the summer of 1858, a heatwave caused the filthy river Thames to smell worse than ever. The smell was so bad, politicians had to meet in Oxford instead of the Houses of Parliament. Known as the '**Great Stink'**, this was the final straw for the Government and work began on the London sewage system. MP's called on the engineering genius of **Joseph Bazalgette** to help them who had spent his early career in the railway industry.

- The beauty of Bazalgette's design was that it used the gravity and the slope of the London basin to get the sewers to flow downstream to the sea.
- At Crossness he built a pumping station where pumps, the largest ever made at the time, pumped the sewage up to the level of the Thames; at high tide it was released into the river and the river did the rest, taking it out to sea.
- **Bazalgette** was given £3 million (£1 billion today) in 1858 and told to start immediately.
- Using **318** million bricks, he built **83** miles of main sewers, **1100** miles of connecting sewers for each street, removing **420** million gallons of sewage a day.
- They took **10 years** to build and he doubled the capacity of the sewers to cope with a growth in the population. (Genius!)

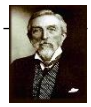
Impact: When the sewers were finished in 1866, **cholera** never returned to London. Other cities around the world looked to base their designs on London! Equally parliament started to improve public health all over the country. In 1867 working class men were given the vote. Soon political parties realized if they promised to improve living conditions in the towns, they would win votes. Not surprisingly Public Health became a **priority** for the Government.

In 1899, a large-scale recruitment drive took place to find men for the army to fight in the Boer war in South Africa, at that time part of the British Empire.

Army chiefs were shocked by the fact that **40** out of every **100** young men who volunteered to fight were unfit to be soldiers – and the entry standards weren't very high!

The Government of the day realized that reforms were needed to make Britain fitter and healthier to fight wars abroad and to keep the British Empire intact.

Charles Booth



- In 1886 **Charles Booth** had produced a report called, Life and Labour of the People in London.
- Charles Booth's survey of London was the most ambitious social survey ever conducted. Starting in 1886, it took Booth **17 years** to visit every one of its tens of thousands of streets.
- He produced a series of stunning social maps, which colour-coded each of London's streets according to the class of its residents - from yellow for the Servant Keepers, all the way down to black, for Vicious and Semi-Criminal.
- He came to the conclusion that 30 per cent of people in London lived in poverty.

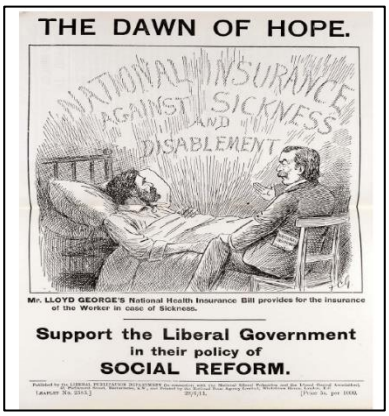
Seebohm Rowntree

- **Seebohm Rowntree** was a member of the wealthy Rowntree's sweets family.
- Rowntree conducted research in York between 1899 and 1901. His report was called Poverty, A Study of Town Life.
- He reached the conclusion that **30 per cent** of people in York lived in poverty and that they needed to earn 21 shillings per week to stay out of poverty. If they earned less than this, they were living below the 'Poverty Line'.
- He claimed that people could not help being poor and that large families helped to cause poverty.

Has Science and Technology been the main factor in the development of Public Health in the 19th Century? (16 + 4 marks)

The Liberal Reforms

Why did the Liberal Government in 1906 decide to take direct action to improve public health and the welfare of the nation?



- The scale of the problem – life expectancy was 45. The richest 10% also owned 92% of the country's wealth.
- Increasing information about poverty from charities, civil servants and local authorities
- National efficiency: A healthy army was needed. For the Boer War, 40% of volunteers failed medical inspection
- National efficiency: An effective workforce was needed– Britain's position as the world's leading industrial power was being challenged by Germany and the USA.
- Brilliant individuals like **David Lloyd George** and **Winston Churchill**
- Pressure from social reformers like **Booth** and **Rowntree**
- New Liberalism described a new attitude that recognised that being poor was not always the fault of the poor. The Government had to do something.

Exam Question

How useful is Source A to a historian when studying the Liberal Reforms? (8 marks)

Study tip: (COP)

Free School Meals, 1906

- Local councils were given powers to give free meals to children from poor families.
- By 1914, over 150,000 children were having a daily free meal, every day.
- In 1914, the Government made it compulsory for authorities to provide these meals.

School Medical Inspections, 1907

- Doctors and nurses went into schools to provide free compulsory medical checks for children.
- They could recommend any treatment that was necessary.
- Any treatment required by the children had to be paid for by the parents (until 1912).

Old Age Pensions, 1908

- Weekly pensions were provided by the Government for the elderly and became very popular.
- 5s per week to single people over 70, 7s 6d to married couples.
- Full amounts were only paid to those who earned less than £21 per year.
- by the children had to be paid for by the parents (until 1912).

Children's Act, 1908

- Children were now protected by law against cruelty from their parents. Children's homes to be registered and inspected. Children under 14 who committed crimes were now not to be sent to adult prisons.
- Criminal children were to be sent to **borstals**, specially built to cope with young offenders
- Children under 14 not to be allowed into pubs and cigarettes or alcohol not to be sold to children under 16

Labour Exchanges Act, 1909

- These Job centres meant that the unemployed could go to an exchange to look for a job
- By 1913 there were 430 job centres (exchanges) in Britain

National Insurance Act, 1911

- All workers had to join and paid 4d for insurance stamps which they stuck on a special card.
- Employers gave 3d per worker in the scheme. The Government gave 2d for each worker in the scheme.
- If a worker in the scheme fell ill, they got **sick pay** of 10s per week for 13 weeks, then 5s per week for a further 13 week in the year.
- Workers in the scheme could have free medical care

Medical Developments in the early 20th Century

MAGIC BULLETS

Magic bullets were the name first given to chemical drugs that killed bacteria in the body. The posh name for these drugs is sulphonamides. In 1909 Paul Ehrlich, a member of Koch's team, reasoned that, if certain dyes could stain bacteria, perhaps certain chemicals could kill them. He discovered **Salvarsan (606)** which killed the bacteria causing syphilis

Gerhard Domagk discovered that **Prontosil** was killing microbes causing blood poisoning in mice. He soon had to use it to save his daughter who had developed blood poisoning by pricking her finger on an infected needle. She was the first human cured by a chemical cure. Prontosil is derived from coal tar.

WORLD WAR 1

In 1895, **Wilhelm Rontgen** discovered x rays which could pass through black paper, wood and flesh. Within months x ray machines were introduced which proved to be vital in WWI to locate shrapnel and bullets lodged deep inside the body.

During World War 1, **Harold Gillies** a London based army doctor developed plastic surgery for wounded soldiers. He set up a specialist unit to graft skin and treat men suffering from severe facial wounds. Queen's hospital in Kent opened in 1917 and by 1921 provided over 1000 beds for soldiers with facial wounds.

New techniques were developed to repair broken bones in World War 1. For example, the Army Leg Splint (or Keller-Blake Splint) was developed which elevated and extended the broken leg in traction. This helped to knit the bones together more securely and is still used today.

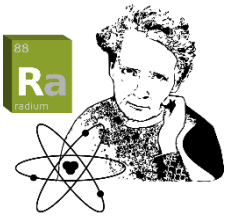
PHARMACEUTICAL INDUSTRY

Since 1900 big pharmaceutical companies have grown such as **Boots**, **Welcome** and **Beechams**. Their success has been built on providing 'all cure' pills such as aspirin (painkiller / fever) and paracetamol. In fact, the ingredients of aspirin come from Willow bark which the Ancient Egyptians used

However, the industry has faced sever problems. In the 1950s the drug thalidomide was released without thorough testing. It was used as a sleeping pill and women with morning sickness, but it had severe side affects as children born had under developed limbs. Rare diseases also go unresearched as common diseases will make the companies a lot of money.

RADIATION THERAPY

Radiation therapy or radiotherapy was introduced by **Marie Curie** in 1902, who noticed the skin on their hands was being burned by the material they were using. This is used today (together with chemotherapy) to diagnose or treat cancers often reducing the need for surgery.

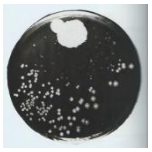


Penicillin

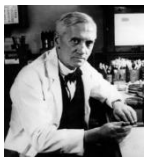
Penicillin is an **antibiotic**. 'Antibiotic' literally means 'against life' – but antibiotics only kill life that is harmful to living creatures, i.e. bacteria.

A bacterial infection is caused by millions of tiny bacteria that are trying to survive and multiply in the body. An antibiotic attacks and kills these bacteria.

Before the development of penicillin, many people suffered and died from bacterial infections that are no longer considered dangerous today.



By the 1920s, one nasty germ named staphylococcus remained undefeated by any magic bullet. It was a highly resistant form of bacteria that had over 30,000 different strains and it caused a wide range of illnesses.



Individual brilliance and war: A bacteriologist named Alexander Fleming was determined to find a cure against this bacteria, having observed first-hand the ill effects on wounded soldiers during World War 1.

Chance discovery: Fleming was beginning to conduct experiments on the hard to kill staphylococcus germs. Whilst one holiday, he left the window of his laboratory open and left several plates of the germs on a bench.

Science and Technology: When he returned, he noticed that mould which was growing in one of the dishes had killed the staphylococcus germs. Upon investigation, he found the sample of the mould to be penicillin, which had been grown in a room below his.

Communication: Fleming decided that penicillin was mistakenly a natural antiseptic and not an antibiotic. He wrote up his findings in a report and sent it to a medical journal. He gradually lost interest in his discovery.

It was the **Second World War** which finally brought about the successful development of penicillin. In the 1930s two Oxford scientists, Howard **Florey** and Ernst **Chain**, became interested in Fleming's 1929 paper on penicillin. In 1939 they assembled a team of pathologists, chemists and biochemists, and **three days after the outbreak of war** Florey asked the British government for money to fund the team's research into penicillin.

Individual brilliance and science and technology: Since it is a natural product, penicillin needs to be purified. A breakthrough was made by Howard Florey and Ernst Chain in Oxford between 1938-40. They received a government grant of £25 and devised a freeze-drying technique. At first, they struggled to produce in in large amounts, and used every container they could find in their laboratory.

Science and technology: Their first clinical trial was on a policeman named Albert Alexander. He had been scratched by a rose bush and had a nasty infection. When injected with penicillin, the infection began to clear up. After five days, the penicillin ran out and the patient died. However, they had proved the amazing properties of penicillin. The outbreak of World War 2 should have secured more funding, but the British Government and drug companies in Britain weren't interested.

War and Government: When the USA joined the war in 1942, they began to give out grants to businesses that manufactured penicillin. By 1943, British businesses also started to mass produce penicillin. This was sufficient for the needs of the military medics and treat all casualties in the D-Day landings in Normandy, France in June, 1944.

War has been the main factor in the development of penicillin. How far do you agree? (16+4 marks)

The NHS

Before and during the world wars, only certain people had access to health care. The National Insurance Act only helped fund workers for sickness benefits. Until 1948, about 8 million people had never seen a doctor because they couldn't afford it.

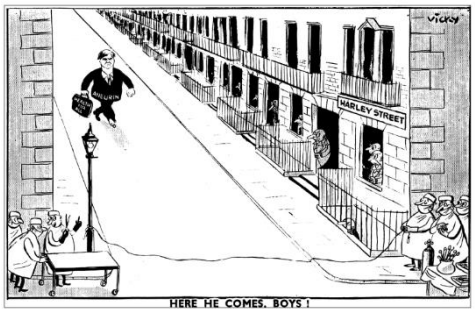
In 1942, William Beveridge produced a report, called 'The Beveridge Report'. He said that people had a right to be free of the five giants that ruined lives: Disease, want (need), ignorance, Idleness and squalor (poor living conditions.

He said the government should take charge of social security or welfare from the 'cradle to the grave'. His report soon became a best seller!

The introduction of the Welfare State

The new Labour Government led by Clement Atlee kept its promise to introduce many of Beveridge's ideas.:

1. The National Health Service was set up in 1948 to provide health care for everyone. This made all medical treatment – doctors, hospitals, ambulances, dentists and opticians free to all who wanted it.
2. A weekly family allowance payment was introduced to help with childcare costs
3. The school leaving age was raised to 15 to give a greater chance of a decent education and more free university places were created!
4. The Government also continued its slum clearance programme as large areas of poor-quality housing were pulled down and new homes were built. Twelve new towns were created and by 1948, 280,000 council homes were being built each year.



Exam Question

How useful is this source to an historian? The Minister in charge of introducing the NHS was Aneurin Bevan. He faced a lot of opposition from doctors who did not want to join the NHS as they thought they would lose money as they would treat fewer private patients. This is shown clearly from this British cartoon in 1948 which depicts Bevan walking down the famous Harley Street in London only to be tripped up by the doctors waiting for him.

Popularity: Once the NHS was introduced, it did prove to be popular with most people. 95% of all of the medical profession joined the NHS. In fact, the NHS proved to be too popular as it quickly found that its resources were being used up. From its earliest days, the NHS seemed to be short of money. Annual sums put aside for treatment such as dental surgery and glasses were quickly used up. The £2 million put aside to pay for free spectacles over the first nine months of the NHS went in six weeks. The government had estimated that the NHS would cost £140 million a year by 1950. In fact, by 1950 the NHS was costing £358 million. In 2015 by contrast, the bill was £116 billion.

Impact: The NHS is rarely out of the news mainly due to its problems:

- Waiting lists seem to be getting longer, doctors and nurses are over-worked and they are always crisis points in the colder weather.
- The main problem is money – people are living longer and modern drugs are more expensive.
- However, the health of the nation has improved significantly. Life expectancy for men has risen from 64 to 79 and for women, 66 to 83 since 1948, although this is affected by your wealth
- The quest to improve the nations health goes unabated with healthy eating campaigns, the sugar tax and of course banning smoking from public places.

Further Medical Developments

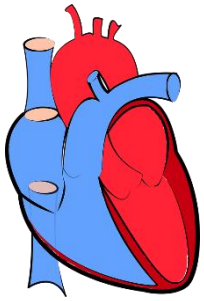
The second half of the twentieth century saw an explosion in scientific and medical discoveries and developments that proved significant in achieving a fuller understanding of health and medicine.

Life expectancy as mentioned has significantly increased for men and women. A recent UK article claimed that one in two babies born today is expected to live until its 100th birthday.

DNA: In 1953, Francis Crick and James Watson discovered the structure of DNA and how it passed from parents to children. Their model served to explain how DNA replicates and how hereditary information is coded on it. The impact was enormous for medicine because now doctors treat diseases which have genetic causes rather than bacteria. These include some cancers. Until the discovery of DNA, these illnesses were untreatable.

Stem Cells: In 1953 American Leroy Stevens discovers stem cells. These are cells in multi-cellular organisms that are able to renew themselves and differentiate into specific cell types. For example, in 2013 the first human liver was grown from stem cells

Transplants: In 1950 Canadian surgeon, William Bigelow performs the first open-heart surgery to repair a 'hole' in a baby's heart. In 1960 the first kidney transplant was performed in Britain. In 1962 surgeons at a hospital in America re-attach the arm of a 12 year old boy. In 1967 Dr Christian Barnard, a South African heart surgeon performed the first heart transplant. The patient lived for 18 days. In Britain in 1968, the first heart transplant was at Papworth Hospital. Finally, in 1986, British woman Davina Thompson is the first heart, lung and liver transplant patient.



Keyhole surgery and MRI scans: These have helped doctors and surgeons to develop new techniques for identifying illnesses and operating on them without having to without having to make large incisions in the skin.

Vaccines: In 1954 in Britain the first free vaccine was offered for diptheria, whooping cough and tetanus (the triple vaccine). In the following year, free vaccines were offered for polio and in 1969 rubella (German measles). In 1980 after a global vaccination campaign, smallpox was declared eradicated so far the only human disease where this has been possible