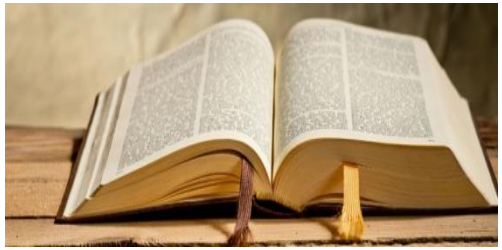
C1250-c1500 Medicine in medieval England

Ideas about the cause of disease and illness

Common problems at this time: malnutrition; famine.

Supernatural/religious

- People were very religious at this time.
- The church took money from people (tithes) and used this to look after the community.
- The church said that illness was punishment from God for sin. For example, leprosy (a skin disease that led to paralysis and then death) was a punishment for sin in the Bible. People with leprosy were isolated and sent to leper colonies.
- The supernatural: some people looked to astrology to predict what was going to happen. Hippocrates (a physician) thought astrology could impact on health.



Miasma

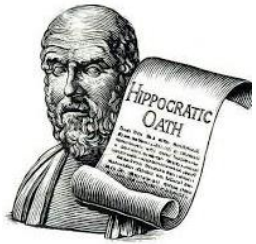
- This was bad air that was seen as bad for the body. Swamps, corpses and rotting food would cause miasma.
- Incense was burned to keep homes smelling sweet to prevent disease.

Urine charts

- Urine was not seen as a cause of disease but it was used to diagnose patients.
- Colour, smell, and taste was checked against a urine chart. E.g. Norwich Cathedral Priory had a full-time physician to check urine.

Key influences on medicine at this time

- The church controlled all medical learning and chose which books to copy.
- The printing press was invented in 1440. This meant more medical books could be produced.



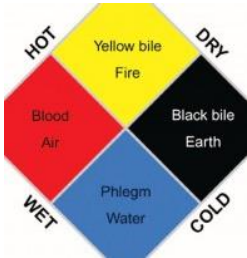
Classical thinking in the middle ages

- Galen, an important ancient Greek physician, was religious and believed that God created different parts of the body for different reasons. The church promoted his ideas.
- People were seen as good physicians if they had read lots of books (rather than seen lots of patients). This was because many people could not read at this time. This made Galen and Hippocrates' theories more important as people wanted to read these to be seen as good physicians.
- These ancient physicians were also popular because there was not any scientific evidence.
  - Bodies were not dissected because the Church said bodies needed to be buried whole
  - When bodies were dissected executed criminals' bodies were used. If any part of the body disagreed with Galen's theory then they said this was because a physician's body was imperfect.

Theory of the four humours

- The theory was created by Hippocrates, a famous Ancient Greek physician, and developed by Galen.
- This theory said that the body had four humours which were created when you ate different foods.
- If you were ill people thought that this was because the four humours were unbalanced and needed balancing.
- Humours were seen as affected by astrology (each humour had its own planet) and personality (e.g. if you were depressed people thought you had too much black bile).

Humour	Substance in the body	Quality
Blood	Blood	Hot and wet
Choler	In pus or vomit	Hot and dry
Black bile	Clotted blood in vomit or faeces	Cold and dry
Phlegm	In saliva or tears	Cold and wet



C1250-c1500 Medicine in medieval England

Approaches to treatment and prevention

Type	Method	Uses
Cutting a vein	A vein was cut with a sharp instrument	A phlebotomy chart was used to show where on the body blood should be let for different illnesses.
Leeches	Leeches were starved for a day and then put on open wounds for up to ten hours	This was used it a person was too weak for normal bleeding.
Cupping	The skin was pierced, and a hot cup put over this piercing which made a vacuum and drew blood out	This was used for women, children and the elderly.

Religious and supernatural treatments

- Healing spells and incantations (spells)
- Paying for a special mass to be said for you
- Fasting
- Pilgrimages
- Sometimes the Church said you should not find treatment for disease because it was a punishment from God.
- Astrology: physicians checked how the planets were aligned in order to see when different parts of treatment should take place (e.g. bleeding, purging and operations

Humoural treatment

Several treatments were used to rebalance the humours.

- Blood-letting (see table)
- Purging: patients were given emetics to make them sick and a laxative or enema. Emetics were made of things like aniseed and parsley, and laxatives were often mallow leaves stewed in ale, or linseeds in hot fat.

Remedies

- These were herbal infusions.
- E.g. theriaca was an infusion with 70 ingredients, such as ginger, pepper and saffron. Galen wrote a book on different types of theriacas.
- Different foods would rebalance the humours.

Caring for the sick

- Hospitals: there were 1100 hospitals by 1500 and 30% were owned by the Church in this period. Wealthy people would give money to hospitals (endowments). Nuns would care for patients but often terminally ill patients were not allowed in.
- Home: many people were treated at home.

Bathing

- People thought that warm baths stopped blockages
- Impurities would exit the body and joints would be less achy.
- Plants and herbs were put in the water to help the patient.

Preventing disease

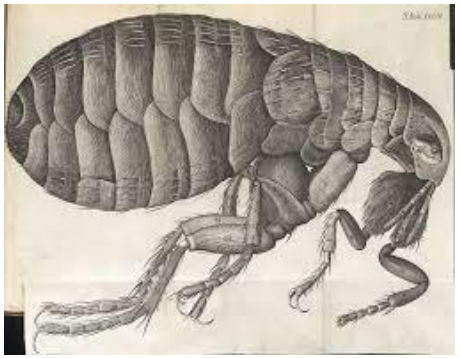
- The church: disease could be prevented if you avoided sin.
- Regimen Sanitatis: a physician would create a regime for their patient to help them get better .
- Eating the right of food would prevent disease.
- Keeping the air pure would prevent disease. Some people carried bunches of flowers, others had jewellery with incense in such as a pomander around the waist.

Medieval 'medics'

- Women did a lot of the medical care as physicians were expensive.
- Physicians had to take a degree that was between seven and ten years long. They would diagnose a patient but barber surgeons or apothecaries would carry out the treatment. There were three stages in diagnosis: collection of samples (blood, faeces, urine), checking against astrological charts, and lastly checking analysing the humours of the patient to decide treatment.
- Apothecaries (less respected than physicians) created medicines, treated patients and some created charms to give patients.
- Barber surgeons were the least qualified and would do smaller surgeries and bleed patients. They had lots of practical experience

C1250-c1500 Medicine in medieval England

Dealing with the Black Death, 1348-49



What was the Black Death?

- In 1348 the Black Death came to England from Europe.
- Bacteria came with fleas carried by rats in merchant ships and the fleas would then bite people.
- Symptoms were buboes which swelled and filled with pus.
- People normally died 3-5 days after the got the disease
- At its worst in London 200 people were buried each day.
- Roughly a third of the population died.

Causes of the Black Death

- Religious and supernatural: people thought that it was a punishment for sin. In 1345 Mars, Jupiter and Saturn were in unusual positions so some people said this meant that awful things were going to happen.
- Natural causes: many thought the Black Death was caused by impure air (miasma). They thought the miasma originated from an earthquake or volcano.
- Some people blamed Jews for the Black Death in Europe (there were no Jews in England at this time).

Treatments of the Black Death

- Supernatural: God was asked for forgiveness through prayer. However, many thought it was punishment for sin so knew that praying would not cure their disease.
- Natural: bleeding and purging were used but this actually made people die more quickly. Herbs such as aloe and myrrh were prescribed as they were strong-smelling, and others were given theriaca.
- Common beliefs: most people relied on prayer to help them. Apothecaries also made remedies but none were successful.

Preventing the Black Death

- Supernatural
  - Pray to God and fast
  - Go on a pilgrimage
  - Self-flagellation (whipping yourself).
- Natural means
  - People tried to run away from the Black Death
  - Others held flowers to their noses to stop them breathing in miasma
  - Some stopped bathing as it was thought that the water would open up pores and let disease in.
- Government action
  - Quarantine laws were introduced to stop people moving around.
  - If people came to a new place they had to stay away from other people for 40 days.
  - However, local government were not that powerful at this time so not very much could be done.

C1500-c1700 The Medical Renaissance in England

Ideas about the causes of disease and illness


Paracelsus

Change	Small change	Continuity
There were epidemics such as the plague and many serious diseases, such as small pox, so more people wanted to learn about medicine.	Physicians recorded more observations of patients	Many people still thought miasma existed
Alchemy became more popular	Most people now thought that God did not send disease as punishment for sin	
There were new discoveries about the body (anatomy)	Astrology was less popular but some people still wore charms to stop disease	
Scientists like Galileo and Copernicus started to challenge what the Church was saying about medicine		
Paracelsus, a Swiss physician, said that the Theory of the Four Humours was not true		
People understood the digestive system and realised urine could not be used to diagnose disease		

Improved communications

- More people were able to read and write than in the medieval period
- In 1440 the first printing press was invented. By 1500 there were hundreds of presses in Europe and this meant information could be produced quickly and took power away from the Church.
- The Royal Society: this was set up in London in 1660 to share and talk about science. The king supported this society. In 1665 a journal, *Philosophical Transactions* was published each year. Discoveries published here were respected.

Scientific approaches to diagnosis

- Humanism developed in the Renaissance which made learning about new things popular. They did not think God was responsible for disease, but many still relied on Galen and Hippocrates' theories. E.g. in the 16th century 590 editions of Galen's works were published.
- Thomas Sydenham
  - Sydenham was a well-respected physician
  - He made people rely less on Galen and Hippocrates
  - Instead of using medical books he made observations of patients during diagnosis
  - He treated each symptom separately rather than seeing all symptoms as a result of one cause.

1546 *On Contagion* argued that disease was caused by seeds in the air

In **1628** there was a new theory in Britain that blood moved around the body rather than was created in the liver (Galen)

1676 *Observationes Medicae* argued that illness was caused by things outside the body rather than the humours.

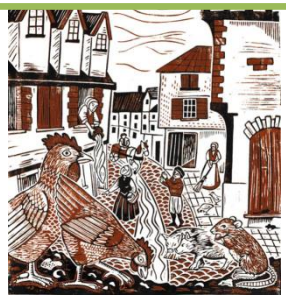
1683 a more powerful microscope was developed.

C1500-c1700 The Medical Renaissance in England

Approaches to prevention and treatment

Prevention
- People thought you could stop yourself from getting ill by avoiding things such as draughts, exhaustion, too much food, strong alcohol and laziness.
- At this time people also thought that your 'constitution', how strong or weak your body was, could help you avoid illness.
- Being clean was seen as important: in the 16th century Henry VIII had to close many bathhouses because of the rise of syphilis. People therefore changed their clothes often rather than bathing to avoid disease.
- Atmosphere/weather was seen as increasingly important and barometers and thermometers were used to measure this.
- Miasmata was still seen as a problem. You would be fined if you did not keep the area outside your house clean.

Medical care
- Education for apothecaries and surgeons grew 1500-1700.
- Both professions needed licences to work
- Physicians: their training courses did not change much in this time and most still learned from books rather than practice. Although dissection was now legal, it was very hard to find corpses. Due to the printing press many more textbooks were available, and poorer medics could get copies of pictures in the books: these were call fugitive sheets.



Treatment
- A new theory called transference was used in this period. This was where an illness could be transferred to something else if it was touching it. E.g. warts were cured through rubbing them with an onion.
- Herbal remedies were still used but extra herbs from the New World. For example, sarsaparilla from the New World used to treat the Great Pox. Another example is that Thomas Sydenham made the idea of using cinchona bark from Peru to treat malaria popular.
- Chemical cures: this was a new science called iatrochemistry or medical chemistry. In the *Pharmacepoeia Londinensis,* published by the College of Physicians 1618, there were 122 chemical cures. An example of a chemical cure is wine left overnight in an antimony cup – if drank in the morning this would make the patient vomit, so is a type of purge.

Andreas Vesalius
- Vesalius was the most famous anatomist. He studied at Paris and Padua which were important universities at this time.
- In 1537 he published *Six Anatomical Tables* which showed different parts of the body.
- He used this when he gave lectures.
- He then published *On the Fabric of the Human Body* in 1543 after dissecting many bodies of criminals. In doing this he found 300 mistakes in Galen's works as Galen had dissected animals.
- Vesalius encouraged other doctors to dissections and popularised them.
- Artists drew the diagrams of dissected bodies in his works.

Caring for the sick
- In the 16th century in hospitals patients would get good food, a visit from a physician and medication.
- After the dissolution of the monasteries in 1536 many hospitals closed as many were attached to the Church.
- New hospitals were developed that catered for specific diseases – these were called pest houses.
- Local communities often looked after the sick, including women caring for others and often the aristocracy e.g. Lady Grace Mildmay (1552-1620).

C1500-c1700 The Medical Renaissance in England

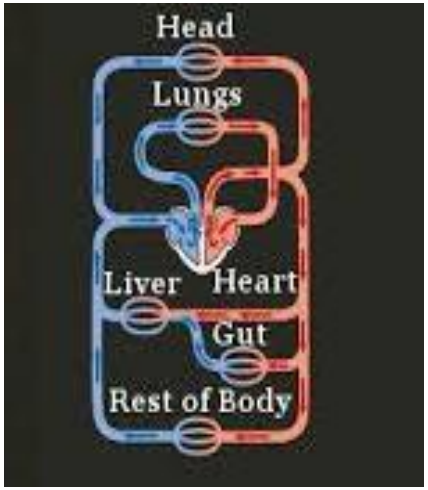
William Harvey

Who was William Harvey?

- He studied medicine in Cambridge and Padua, important universities at this time, and by 1618 he was a royal doctor to James I.
- He was very interested in dissection and wanted his students to observe the body rather than just read about it in books.

Discovering of the circulation of blood

- As a professor he taught Vesalius's theory that veins had valves in them.
- He dissected bodies and found that Vesalius was right. He also discovered that blood flowed towards the heart, which went against what Galen had argued (blood was made in liver).
- He proved that all veins and arteries were linked together:
  - He created an experiment where a tight cord was tied around an arm (cutting the blood flow) and when the cord was undone slightly blood could flow into the arm but not out of it. This was because **a**rteries (taking blood **a**way from the heart out to the body) were deeper than veins.
  - His theory therefore showed that the heart acted like a pump. This disagreed with what Galen had argued (blood flowed through invisible pores in the heart).



Why did people believe Harvey's theory?

- Other people, such as Vesalius, had disagreed with Galen before.
- Harvey was personal physician to Charles I so it made him look like a good physician
- The Church was now less powerful so it made it easier for Harvey to disagree with Galen
- There were new technologies such as pumps used to fight fires which inspired Harvey
- People were looking for more logical explanations to the human body in this period

The impact of Harvey

Significant	Not significant
Many think his book (*An Anatomical Account of the Motion of the Heart and Blood in Animals*) was that start of modern physiology.	Lots of doctors did not pay attention to Harvey's research.
	He was criticised by some doctors.
	It was difficult to apply in everyday medicine
	His ideas were not used in universities until 1673.

C1500-c1700 The Medical Renaissance in England

Dealing with the Great Plague in London, 1665

What was the Great Plague?
- It was a disease spread by fleas on rats.
- It lasted from June to November 1665.
- In September there were 7000 deaths in just one week.
- 100,000 people died in London in total (one in five people).

Ideas about causes
- People still did not really understand why people got diseases.
- People also still believed in the power of astrology: for example, in October 1664 there was a strange alignment of Saturn and Jupiter. People thought that this would mean that something bad was going to happen.
- Some thought if was punishment from God
- Some people thought that it was due to miasma. This was especially because the plague started in the summer which suggested the warm air was a cause.
- A few people thought that disease spread between people. This meant that the sick were quarantined.

Treatment
- Little is known about treatments because a lot of treatment took place in the home when family members were quarantined from others.
- Sweating was a key treatment: patients were wrapped in thick woollen clothes and put next to the fire.
- Transference was still popular – for example, some people tied live chickens to their buboes as it was thought that this would take the poison away
- Quacks sold remedies to make money

Prevention
- The College of Physicians recommended several things:
  - Prayer
  - Quarantine
  - Taking a pomander ball with you everywhere
  - Certain diets e.g. lots of garlic and sage fried with butter
  - Doctors to wear costumes with masks that looked like a bird's beak with herbs in it to try and avoid being infected with the miasma.

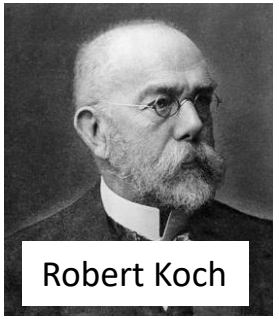
- Healers' suggestions
  - Certain herbs were recommended e.g. mint and rosemary.
  - Smoking tobacco was thought to help remove the miasma
  - Some thought that getting syphilis would stop you from becoming infected with the plague because both diseases caused buboes.
- The government
  - Charles II said that people should fast (stop eating food)
  - Public events were stopped e.g. theatres were closed and public meetings banned
  - Streets were cleaned, fires burned herbs on streets, dogs and cats were killed (around 240,000 in total)
  - A red cross was put on the door of houses with those infected

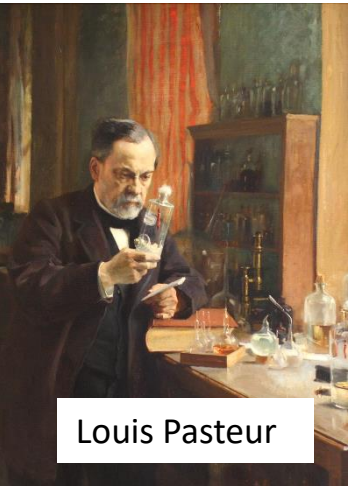
C1700-c1900: Medicine in 18th- and 19th-century Britain

Ideas about the cause of disease and illness

Change
- Fewer people believed in God
- There was a scientific revolution
- Cities were now bigger and people moved here to find jobs
- Due to a larger population diseases such as tuberculosis, typhus and small pox were serious threats.

Continuity
- People still believed in miasma
- Even though there were some new theories scientists were not able to prove these scientifically until the nineteenth century


Robert Koch


Louis Pasteur

Germ theory
- Louis Pasteur:
  - By the 19th Century microscopes were more advanced. This meant that Pasteur was able to see microbes in food -- he found that these microbes turned food 'bad'
  - He published a work about this in 1861
  - His four pricinples
    - The air has living microorganisms
    - microbes are *not* in all parts of air equally
    - you can kill microbes with heat
    - microbes in air cause things to decay
  - This theory went against the theory of spontaneous generation (where it was thought that things that were rotting *created* microbes.
  - However, many people still believed in spontaneous generation because one doctor who supported this, Dr Henry Bastian, was very popular.
  - Some scientists started to investigate the link between microbes and disease (Lister and John Tyndall).
  - Many doctors refused to believe that there was a link between microbes and disease.
- Robert Koch
  - Koch found that bacteria caused tuberculosis
  - He wrote about how to find microbes that caused disease
    1) Microbes are always present when there is disease
    2) Once taken from the body it can be grown in a culture
    3) This can be put in a test animal
    4) Microbes can then be taken from the test animal and put in a new culture
  - In 1883 he found the microbe that caused cholera, and in 1884 he found that it was in drinking water in India
  - He found an effective way of growing cultures (in agar jelly in a petri dish) which helped future scientists.
  - He got the Nobel Prize for medicine in 1905

Impact of Germ Theory
- The British Government did not believe Germ Theory immediately
- Eventually doctors started to look for symptoms in disease and link this to a specific microbe.

C1700-c1900: Medicine in 18th- and 19th-century Britain

Approaches to prevention and treatment

How far had things changed?

- Most people now knew what germs where but they did not know exactly how to deal with this in hospitals or in the home in 1900.
- People still thought that it was better to prevent rather than treat disease.
- There were some new hospitals in the 18th century built from donations from rich people
- The role of hospitals changed as now people were treated rather than just resting and praying
- However, rich people stayed in their homes rather than visit unsanitary hospitals
- Disease still spread quickly as doctors did not wash their hands

Improvements in surgery

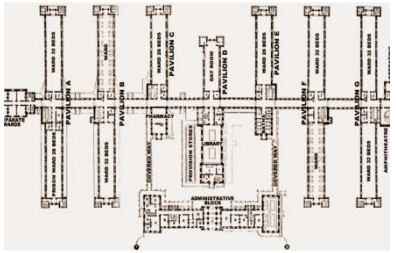
- The three key issues were <u>bleeding, pain and infection.</u>
- Anaesthetic was used to tackle pain
  - James Simpson found that chloroform sent you to sleep when inhaled. However, some people died from overdoes (e.g. 14 year-old Hannah Greener in 1848), and it damaged some people's hearts. As patients were asleep it allowed surgeons to operate for longer, but this led to more infection and bleeding.
- Infection
  - Joseph Lister used Pasteur's Germ Theory and found that germs caused flesh to rot. In 1865 he used carbolic acid on a bandage on a patient's leg and it did not get infected. However, it was not popular at the time as people still did not think that germs existed and carbolic acid caused dry hands so surgeons thought that it must be bad for patients too.
  - Even though Lister's ideas did not influence people immediately doctors began to perform safer surgeries and realised the importance of cleanliness.

Florence Nightingale

- At the age of 17 Nightingale had a religious vision that her role in life was to look after mankind and she decided to train as a nurse.
- In 1854 Britain was at war with Russia: Nightingale asked the government if she could go with 38 nurses to the Crimea to help hospitals that were having huge problems.
- She made several changes:
  - She asked for 300 scrubbing brushes to remove dirt
  - She organised 2000 nurses to look after the wounded
  - Patients had clean bedding and hearty meals
- Impact
  - After only 6 months the mortality rate fell from 40% to 2%
  - When Nightingale came back to England in 1856 she was seen as a hero
  - After her work the way hospitals were run and how nurses were trained was modernised e.g. she liked the pavilion plan of a hospital as this meant better ventilation (see diagram)
  - She started a nursing school in London in 1860

Why did people not like change?

- As anaesthetics allowed deeper surgeries, this caused more bleeding and infection so many died
- Some believed pain was God's plan
- Some doctors thought pain helped keep patients alive
- Many doctors did not like to think that it could have been their fault that patients died



Prevention

- Vaccinations were a new method to prevent disease
- In 1879 Pasteur proved that a vaccination would work for chicken cholera using a weaker version of the disease. His work on animals made other scientists try this for humans
- The Public Health Act was introduced in 1875 (see following page)

C1700-c1900: Medicine in 18th- and 19th-century Britain

Vaccinations

Smallpox in the 18th century

- There were smallpox epidemics in 1722, 1723 and 1740-2.
- People realised that if you caught mild smallpox and recovered you would not get it again: this led to the idea of a vaccination.
- Rich people had doctors rub smallpox pus on an open wound to inoculate them. Doctors made a lot of money from this e.g. Thomas Dimsdale was paid £10,000 and given and annual salary of £500 after inoculating Catherine the Great in 1768.

Edward Jenner

- Jenner investigated 1000 cases of inoculation that had failed
- He tested the theory that if you had smallpox once you would not get it again on patients
- In 1789 he published a book about this. This was detailed enough to allow other doctors to follow this

Impact

- Many people did not like the idea of being infected with a disease

The Public Health Act 1875

- In the 19th century the government became more concerned about people's health and wellbeing
- The first Public Health Act (1848) had not been compulsory for local governments to follow. This act was compulsory.
- Snow's discovery that cholera was carried in water made people more concerned about public facilities
- The Public Health Act had several rules
  - Provide clean water
  - Get rid of sewage
  - Build public toilets
  - Employ a public health officer
  - Ensure the quality of houses
  - Check lodging houses
  - Install street lamps
  - Ensure there is good quality of food in shops

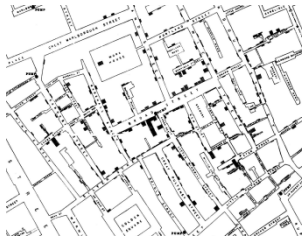
Case study: John Snow and cholera

Cholera

- Cholera caused diarrhoea and sickness eventually leading to dehydration.
- It would normally take the ill two to six days to die: their blood would become thicker from dehydration, rupturing blood cells which turned the skin blue.
- It's nickname was the 'blue death'
- It came to England in 1831: when it entered London in 1832 5275 people died.
- The greatest death toll was in 1848-9 when 53,293 people died.

What people did to prevent cholera spreading

- Streets were cleaned
- People still believed in miasmata so manure and dead animals were removed from streets
- The government introduced boards of health to provide clean water but this did not make a significant difference



John Snow

- He moved to Soho, London, in 1836 and was a very well-respected anaesthetist
- He had written a book on cholera in 1848-9: he argued that cholera was not caused by miasma because cholera affected the guts and not the lungs. He found that cholera was in dirty water
- 1854 epidemic:
  - There was cholera in Soho 1854 – this was where Snow lived
  - He looked at 93 local deaths and plotted these on a map: he found that they all happened around the same water pump. He took away the handle of the pump to stop people from using it.
  - He found the pump was also close to a cesspit
- Impact of John Snow
  - He suggested that the government should build new sewage systems. They did but the Great Stink (1858) also prompted the government to do this.
  - However, the General Board of Health still thought miasma existed.
  - Snow had evidence for cholera in water but no scientific proof

C1990-present: Medicine in modern Britain

Ideas about the cause of disease and illness

Genetics

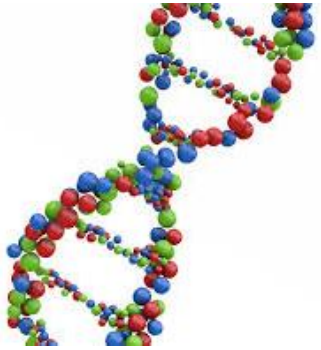
- In 1900 people realised that as some people were born with illnesses microbes did not cause all illnesses.
- Scientists also noticed that some illnesses were inherited. However, at this point in time microscopes were not advanced enough to find gene pairs
- DNA
  - This was discovered in 1953 by Watson and Crick
  - In 1951 scientists Franklin and Wilkins made an x-ray of DNA. This helped Watson and Crick find the shape of DNA – the double helix
  - The Human Genome Project was set up in 1990 to investigate the human genome. Once scientists had a clear picture of what this looked like, they could find differences in DNA where people had certain diseases.
  - An example of the success of this research is that now scientists know the gene that causes breast cancer and people (e.g. Angelina Jolie) can be tested for this and have a mastectomy if they choose.

The impact of genetics

- It allowed scientists to research genetic disorders such as Huntington's Disease.
- However, we still do not have the technology that allows us to treat many genetic diseases.

Lifestyle and health

- Smoking: From the 1920s smoking became very popular and by the 1950s doctors saw that lung cancer was rising, as well as high blood pressure, gum disease and tooth decay.
- Diet: people had always thought food was important because of the Theory of the Four Humours, but now doctors began to realise that what you ate affected your health in a different way. E.g. sugar and fat were now seen as 'bad' foods
- There were other important health issues at this point: alcohol, drugs, sex and tanning.



Factors that supported the development of genetics

- Technology: the electron microscope 1931 – these can magnify images 10,000,000 times
- Science: the rise of 'big science', where lots of scientists work together from across the world, was essential for the human genome project.

Improvements in diagnosis

- Blood tests were developed
- Blood pressure monitors from the 1880s
- Endoscopes: from the beginning of the twentieth century. These were used to look inside the body at things such as the digestive system
- ECGs(electro cardiograms) were invented at the beginning of the twentieth century and would monitor heart activity
- Ultrasound scans (from 1940s) could find things like gall stones and kidney stones
- CT scans (from 1970s) could find tumours
- MRI scans (from 1970s) used magnets and radio waves to look at the inside of the body
- X-rays (from 1890s)
- Blood-sugar monitoring (from 1960s) meant that diabetics could check their blood sugar.

C1990-present: Medicine in modern Britain

Approaches to prevention and treatment

Medical treatments
- Magic bullets: these were what chemicals were called that attacked microbes in the body.
- Doctors wanted to find chemicals (or magic bullets) for many diseases

At the beginning of the 20th century Paul Ehrlich had tested 600 chemicals

In 1909 a Japanese scientist found that compound 606 cured syphilis

In 1932 Domagk found that Prontosil killed infections in mice. He cured his daughter of a blood infection with this

The Pasteur Institute found that Prontisil stopped bacteria multiplying in the body

Scientists investigated even more drugs e.g. M&B 693 which was an antibiotic

Antibiotics
- These destroy bacteria or stop it from growing in the body
- Penicillin was one of the first antibiotics, made using microorganisms, isolated by Alexander Fleming in 1928.
- In 1943 Selman Wakston discovered streptomycin which cured tuberculosis.

Science and technology
- Scientists became more successful at identifying causes of disease as they knew to look for microbes, tumours or unusual genes.
- However, drugs trials did sometimes go wrong e.g. thalidomide was given in the 1960s to pregnant women for morning sickness, which later caused birth defects
- New technology:
  - Mass production of pills
  - Capsules which ensured drugs reached the stomach and dissolved there
  - Hypodermic needles
  - Insulin pumps (young people could take insulin without infections

The NHS
- This began in 1948 and was financed through tax
- At first this was made up of 1143 voluntary hospitals and 1545 city hospitals
- It became easier to see your GP
- This improved in 1966 when GPs had a charter and they were encouraged to keep up-to-date with new research
- New technology: advanced x-rays, smaller machines like dialysis machines, robotics (prosthetic limbs), microsurgery, laparoscopic surgery, robotic surgery.

How much had changed?
- In 1900 25% deaths were due to infectious disease, this was only 1% in 1990.
- Scientists still faced issues though: bad lifestyles of patients, viruses becoming resistant to vaccines (e.g. flu), new diseases, and bacteria that was drug-resistant
- It was easier to access care through the NHS.

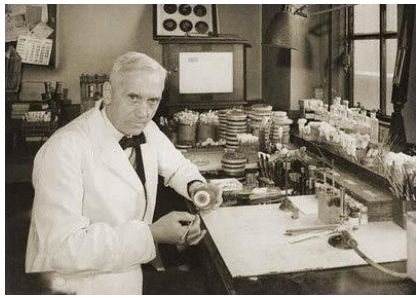
Preventing disease
- The public now knew about Germ Theory
- The government put more work into preventing disease and moved away from their laissez-faire policy because:
  - They understood what the causes of disease were
  - They had improved methods of preventing disease
- These methods were:
  - Vaccinations e.g. polio 1956
  - Laws on the environment e.g. the Clean Air Acts 1956 and 1968
  - Publicising health risks e.g. 2014-5 ebola

C1990-present: Medicine in modern Britain

Fleming, Florey and Chain's development of penicillin

Alexander Fleming

- Fleming was one of the scientists to find the 'magic bullet' to cure syphilis
- On a dirty petri dish Fleming found mould that killed the staphylococcus bacteria that was in the petri dish
- He found that the mould was penicillin and he published on this
- However, he did not think that it would kill bacteria in people



Florey and Chain

- They were investigating antibiotics and wanted to build on Fleming's research
- In 1940 they tested penicillin on mice
- They needed more penicillin to test this on humans but it was very difficult to produce it in large quantities
- They eventually tested it on a policeman with fatal septicaemia
    - They ran out of penicillin to give the patient so extracted it out of his urine. However, eventually they ran out of this and the policeman died.

Producing penicillin on a large scale

- Florey asked British pharmaceutical companies if they would help him produce lots of penicillin. However, because it was the Second World War nobody was able to help him.
- As the USA were not in WWII in 1941 Florey asked them to help. They did help but it took a year to make enough to treat just ten people
- The USA government paid for 21 companies to make penicillin

Ernst Boris Chain

Sir Howard Walter Florey

How penicillin was used

- By June 1944 there was enough to treat everyone who was injured at the D-Day landings.
- Scientists now wanted to find moulds to destroy more bacteria. Dorothy Hodgkin drew out the chemical structure of penicillin so scientists could research other moulds.
- People were more willing to go to doctors for help as they could see that they would have successful methods of treating them.
- However, not all bacteria can be treated by penicillin – the first resistant strain was in 1942 and this had now grown

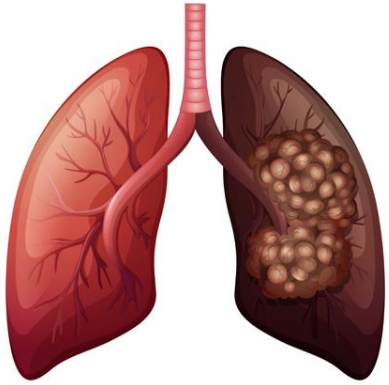
C1990-present: Medicine in modern Britain

The fight against lung cancer in the 21st century

Diagnosing lung cancer

- At first x-ray machines were used but it was very difficult to see the difference between tumours and lung abscesses so some people were misdiagnosed.
- The modern method of diagnosis is:
    1) A patient will be injected with dye (to make the lung show up more clearly) and they will have a CT scan
    2) If they are not sure if it is cancer they will inject the patient with radioactive material to see if they are cancerous cells
    3) The patient will be sent for a bronchoscopy – this will collect some cells to test from the lungs to be tested

A CT scan



Lung cancer

- It is the second most common cancer
- The highest number people affected are aged 70-74.
- 85% of people who have lung cancer smoke
- In 1973 26,000 people died from lung cancer

What the government did to force people to change	What the government did to persuade people to change
In 2007 public smoking was banned	In 2005 it became illegal to advertise tobacco
In 2015 there was a law that stopped people smoking if someone was under 18 in the car	The government campaigned for people to stop smoking
In 2007 you could not buy tobacco until you were 18 (previously 16)	It is now illegal to display tobacco in shops
There is now more tax on tobacco	

Science and technology

- Some people receive lung transplants
- Radiotherapy is used to shrink the tumour
- Chemotherapy can be used to shrink the tumour and to stop it from coming back
- Genetics have also been used to try and treat patients: their DNA is analysed in order to tailor their treatment to them. This is called pharmacogenomics.

The British Sector of the Western Front, 1914-1918: injuries, treatments and the trenches

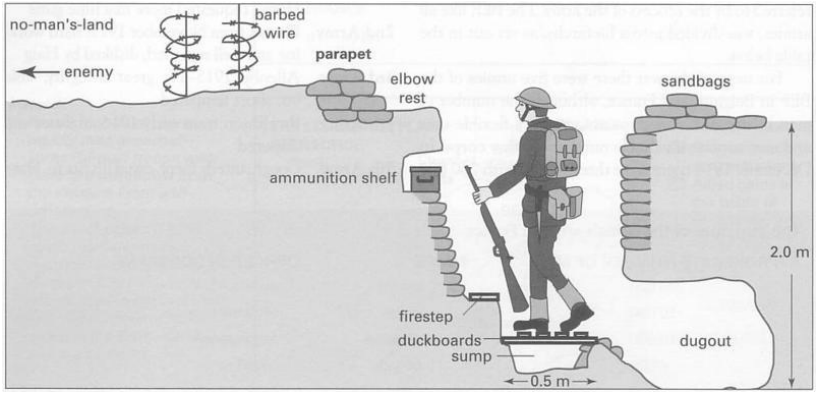
The historical context of medicine in the early 20th century

Infection
- By the end of the nineteenth century many doctors had been influenced by Lister's research on aseptic surgery
- The majority of operations were done using aseptic surgery

X-rays
- This was essential in WWI
- They had been discovered by Wilhelm Roentgen, a German, in 1895.
- There were radiology departments in many hospitals by 1896 this shows how important people though x-rays were.
- There were issues with x-rays, though:
  - When x-rays were first used doctors used too much radiation (1500 times that of today). Sometimes patients would lose hair or get burned
  - The top-table machine that Roentgen used took 90 minutes to take an x-ray
  - Large machines were invented but these were difficult to move

Blood transfusion and storing blood
- Due to pain relief/aseptic surgery doctors could do longer surgeries, but this could lead to more blood loss
- James Blundell had experimented with blood transfusion in the early nineteenth century. However, blood could not be stored at this point so the donor had to be right next to the patient to give them blood
- Issues and solutions with blood transfusion
  - Blood clots when it leaves the body -> chemicals such as sodium bicarbonate were experimented with to stop this
  - Some blood is not compatible in people -> In 1901 three different blood groups were discovered. In 1907 Reuben Ottenberg matched donors to recipients
  - There was the risk of infections from unsterilized tools -> aseptic surgery was developed

The context of the British sector of the Western Front



The Western Front

- War started 4 August 1914
- British Expeditionary Forces (BEF) were sent to France to stop the Germans advancing. The BEF had 70,000 soldiers but the Germans had 160,000
- There was a line of trenches from the English Channel all the way down to Switzerland

The trench system

- Trenches were 2.5m deep and were zig-zagged
- The <u>frontline trench</u> was where attacks moved forward
- The <u>support trench</u> was 80 metres behind the frontline. Troops could shelter here in attack
- The <u>reserve trench</u> was 100 metres behind the support trench. If the frontline attack had gone wrong then troops from the reserve trench would go forward and attack
- <u>Communication trenches</u> linked all other trenches together
- At the back of this system there were artillery emplacements

Tunnels, caves and quarries at Arras

- Due to the ground near Arras being chalky it was ideal for tunnelling.
- In 1916 the British army created an underground network under Arras so that they could protect themselves, if needed, from the Germans.
- The Tunnelling Companies from Britain and New Zealand completed the work.
- 2.5 miles of tunnels were dug.
- The underground network would be able to hold 25,000 men. There was also electric lights, running water, a light railway system and a hospital.

Issues with transport and communication

- The ground was bad on the western front due to craters, bad weather and there was bacteria in the ground as much of it was farmland
- <u>Stretcher bearers:</u> they would put their lives in danger to collect the wounded. If the weather was bad more stretcher bearers were needed.
- <u>Horse-drawn ambulances:</u> these could not cope with the high number of men. The wagons meant injured men were shaken about.
- <u>Motor ambulances:</u> October 1914 the *Times* asked the public for donations. They got enough money for 512 which gave soldiers a more comfortable ride. However, they could not be used on waterlogged ground so horse ambulances with six horses (rather than two) were used instead.
- <u>Trains</u> were also used to transport soldiers when injured

Key Battles

<u>1914 First Battle of Ypres</u>

- 50,000 troops died
- The allied front still had Ypres but now Germany had the area outside of Ypres

<u>The use of mines at Hill 60</u>

- The Germans captured this hill (near Ypres) December 1914
- The British tunnelled under the hill and set of five mines to regain this position

<u>1915 Second Battle of Ypres</u>

- This was the first time that the Germans used chlorine gas
- 59,000 men died
- The Germans were now two miles closer to Ypres

<u>1916 Battle of the Somme:</u>

- 20,000 British deaths on the first day
- 400,000 total casualties
- Strategies used for the first time were the creeping barrage and tanks.

<u>1917 Battle of Arras</u>

- The 24,000 men hiding in the Arras tunnels attacked the Germans
- Britain gained eight miles but 160,000 died

<u>1917 Third Battle of Ypres</u>

- The weather was bad during this battle (heaving rain causing very muddy ground)
- There were 245,000 casualties

<u>1917 Battle of Cambrai</u>

- This was the first use of tanks on a very large scale (around 500)
- They could move over barbed wire and they had good machine guns

Injuries on the Western Front

Wounds

- A study was made of 200,000 men taken to the Casualty Clearing Station: shrapnel had caused 58% of wounds. When a shell exploded it would throw shrapnel (pieces of metal) and these would injure men.
- Bullets caused 39% of wounds (machine guns would fire 450 rounds per minute and rifles were able to fire from a distance of 500 metres).
- Before the war a lot of the land had been used for farming so there was fertiliser and bacteria in the ground. This would cause both gas gangrene and tetanus. Gas gangrene could kill a person the same day that they were infected.
- At the start of the war soldiers wore soft caps, but from 1915 they wore the Brodie helmet, a steel helmet with a strap. The Brodie helmet meant 80% fewer casualties.

Problem	Symptoms	Solutions attempted
Trench foot	As men stood in wet, muddy trenches all day their feet would swell. The feet would then become gangrenous.	• Using whale oil on feet • Changing socks and keeping feet dry • Amputation if gangrene had started in the feet
Trench fever	People would get high temperatures, a headache and aching muscles. Half a million men got trench fever.	• In 1918 they realised that the cause was lice • There were delousing stations on the Western Front
Shellshock	Tiredness, headaches, nightmares, loss of speech, uncontrollable shaking and metal breakdown. 80,000 troops had shellshock.	• Some were treated in Britain (2000 in a hospital in Edinburgh) but people did not really understand shellshock

Gas attacks

- Only 6000 soldiers died from a gas attack.
- British soldiers had gas masks from 1915
- However, although relatively few soldiers died from gas, it was still something that really frightened soldiers and as such was a weapon of fear from the Germans.

GAS

Phosgene: First used 1915. Would kill a person in two days.

Chlorine: First used 1915. You would suffocate and there was no way to treat it at this point. The British attempted this in 1915 but it was blown back into their trenches by the wind.

Mustard: This was used for the first time in 1917. It had no odour, and would cause blisters inside and outside the body in 12 hours.

The evacuation route, the RAMC and the FANY

The Regimental Aid Post
- 200m from the frontline
- A Regimental Medical Officer was posted here, supported by stretcher bearers
- This was where first aid took place, in order to send men straight back to the frontline
- Serious injuries were *not* dealt with here

Dressing Stations ADS/MDS
- The Advanced Dressing Station (ADS) was supposed to be 400m away from the RAP and the Main Dressing Station (MDS) another mile away but often there was just one dressing station
- Abandoned buildings, dressing stations and bunkers were used for these stations
- Tents were used if there were no buildings
- The stations had ten medical officers, medical orderlies, and stretcher bearers (from the RAMC)
- The RAMC's Field Ambulance workers were at the dressing stations. Each Field Ambulance was supposed to be able to cope with 150 wounded but when there was a big battle they had to look after many more. However, they did not have the resources to look after them for more than a week.
- Men would be sent to the Casualty Clearing Station if they could not go back to the Front.

Casualty Clearing Station
- These were in buildings that used to be factories or schools.
- Men were divided into three groups (a triage):
    1) Walking wounded: they could go back to fight
    2) Those needing to go to hospital: they would go to the base hospital
    3) Severely wounded: these men would not recover and were made comfortable
- In the Ypres Salient there were a total of 24 CCS
- 3.7% men admitted died

Base Hospital
- These were on the coast to allow the seriously injured to be taken to England
- During the war the CCS had to do more operations than planned as gangrene was a problem
- Base hospitals continued treatment from the CCS
- The Base Hospitals became more important after the March 1918 German Spring Offensive: the CCS had to move back and the Base Hospital took on some of their roles

RAMC
- The Royal Army Medical Corps
- They were the section of the army in charge of medical care.

The FANY
- This stood for the First Aid Nursing Yeomanry
- It started in 1907
- It was made up of middle/upper class female volunteers.
- Roles:
    - Driving ambulances – they were the first women to do this
    - Emergency first aid
    - They ran a mobile bath unit for the soldiers
- There were only 450 FANYs in total in France. However, it did mean that other female organisations such as the Voluntary Aid Detachments (VADs) could work on the frontline.

Underground hospital at Arras
- Of the underground tunnels 800m was a hospital. This could act as a dressing station.
- It had: rooms for wounded; 700 spaces for beds; an operating theatre; a rest area for the stretcher bearers; and lastly a mortuary.
- The hospital was supplied with electricity and water.
- However, it was hit in the Battle of Arras, 1917, so could no longer be used.

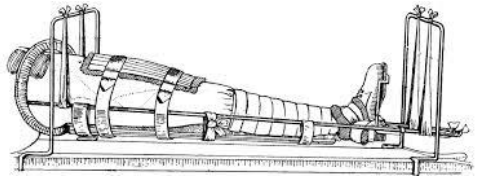
New Surgery and Medicine in WWI

The Thomas Splint

- If shrapnel entered the leg at the beginning of the war only 20% of men survived. Bones would be forced into piercing the skin and could lead to both internal and external blood loss.
- Broken bones in the leg would rub together which would lead to blood loss. Once a patient got to hospital they would have lost a lot of blood and potentially have gas gangrene also.
- Hugh Thomas, a doctor, invented the Thomas Splint. His nephew, Robert Jones, worked with disabled patients in London and also suggested the Thomas Splint to be used by the army.
- The Thomas Splint saved lives as it pulled the leg straight, stopped bones from rubbing together and therefore prevented blood loss.

Infection

- The RAMC struggled with gas gangrene as aseptic surgery was not achievable at the dressings stations and CCS as there were so many people.
- Three treatments dealt with this:
    1) Wound excision: cutting away infected tissue and stitching the wound up quickly
    2) The Carrel-Dakin model: Antiseptics were not effective against gas gangrene. Instead a sterilised salt solution was put in the wound through a tube. However, it was difficult to treat large numbers of people with this.
    3) Amputation: if the previous two methods would not work. At the end of the war 240,000 men had had amputations



The Blood bank at Cambrai

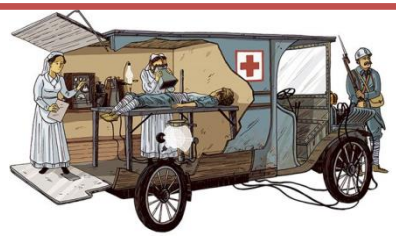
- 1915 sodium citrate was added to blood which ended donor-donor transfusion. It could be stored for two days.
- In 1916 citrate glucose solution was added to make it last four weeks.
- 1917 before the Battle of Cambrai Oswald Hope Robertson stored 22 bottles of universal blood and saved 11 seriously wounded men out of the 20 that he treated.

Mobile x-ray units

- X-rays could find shrapnel in the body and identify injuries
- There were six mobile units on the Western Front
- Issues with x-rays:
    - Not all debris or clothing in wounds showed up
    - The patient had to be still for several minutes
    - Tubes in the machine often overheated, which meant that after about an hour it had to be switched off to cool. A better version of the machine was not available in Europe until 1917

Blood transfusions

- In 1915 Canadian Lawrence Bruce Robertson first tested blood transfusion on the Western Front using a syringe and tube. This would stop a patient from dying of shock.
- This was used widely by 1917 at the CCS
- Geoffrey Keynes, a British doctor and member of the RAMC, came up with a portable blood transfusion kit and put an attachment on to stop blood from clotting



Brain surgery

- 20% of all wounds were to the head, face and neck.
- Brain injuries were often fatal due to: infection, moving unconscious men was dangerous, and many doctors had never done neurosurgery.
- Harvey Cushing used a magnet to remove metal. He also used local anaesthetic as general made the brain swell. He saved 71% of patients.

Plastic surgery

- Harold Gillies, from New Zealand and an ears, nose and throat doctor, went to the Western Front in 1915.
- He based himself at The Queen's Hospital in Kent from August 1917 and developed reconstructive surgery for many returning from war. After a year there had been 12,000 operations.

Sources

Type of Source	Why it might be useful	Limitations
National army records for individual soldiers	It would be useful for finding information about a particular person you were looking for.	It would not give you the bigger picture of people's experiences.
Newspaper reports	It would tell you commonly known public knowledge of the time.	In order to boost morale (people's levels of hope) the government did not let newspapers report very upsetting news such as large losses in battle or horrendous injuries/illnesses.
Government reports	These would give us a broad picture of what was happening in the war such as the impact of specific battles and how they had impacted on the situation of the allied forces versus Germany.	Government reports would not tell us how injuries and illnesses were experienced. Some will have been written by people who had no experience on the Western Front.
Medical articles by doctors and nurses	It would give you clear, scientific information about particular injuries and diseases.	It would not tell you how these were experienced or felt.
Personal accounts by doctors, nurses, soldiers etc.	These are likely to tell historians what day-to-day life was like for these individuals. Many will go into very specific detail such as food eaten and when people wrote home to family/received news from home.	Even if a person was writing from first-hand experience don't forget that people may have left details out if they were too distressing, or if they were worried their family may one day read them.
Photographs	These can show is resources available at the time, what conditions were like and what medical equipment/injuries/illnesses looked like.	Photographs can easily be staged, showing us what the army and government want to be remembered.
Hospital records	These would tell us the extent of certain conditions and injuries (how many people were affected). They would also be able to tell us at what points in the war there were most injuries/illnesses.	These would not tell us how injuries and illnesses were experienced.
Army statistics	These give us the wider picture of the numbers that were killed or sent home after particular battles.	Not very detailed information- does not tell us about the specifics of illnesses/injuries etc.

Exam questions

Q1 Describe two features… (4 marks)

- Target: use knowledge of the period.
- You get one mark for each feature and another two marks if you use pieces of information to describe each of these.
- Information: dates, names, history terminology,

Q2a) How useful are sources A and B for an enquiry into… Explain your answer using Sources A and B and your knowledge of the historical context. (8 marks)

- Target: to analyse and evaluate how useful a source is.
- You need to write a separate paragraph for each source.

<u>For each source:</u>

This source tells historians that… (write about what is in the source)
This is useful because…
This is not useful because… (use own knowledge: what does the source not tell us about this enquiry?)
This source was written by…
This is useful because… (what perspective did they write from?)
This is not useful because… (who's perspective does it not tell us?)
This sources was written in…
This is useful because… (use your own knowledge: what happened at this point in the war?)
However, it does not tell us… (had this part of medicine been different at a different time in the war?)
This source was written because…
This is useful because… (why is the message they were telling important to them?)
This is less useful because… (do you think other people might have disagreed with them?

Q2b) How could you follow up Source B to find out more about the problems involved in performing operations on the Western Front?

- Target: to use and analyse sources
- Follow the instructions on the question paper

Q3 Explain one way… (4 marks)

- Target: to analyse the similarity between periods
- Target: to use knowledge of these periods
- Choose an example from both periods and back these up with facts
- Ensure that you explain how similar your two examples are

In the…(medieval, renaissance, industrial or modern)…period… (the factor in the question)…was…

This was..(partly, quite, very, extremely)… similar in the (medieval, renaissance, industrial or modern)…period… shown where…(given an example)

Q4 Explain why there was.. (12 marks)

- Target: to analyse causation and change
- Target: to use knowledge of the periods

<u>Introduction</u>

There was change in… for several reasons…(give the reasons in the bullet points *and* one of your own). However, the most important reason was…because…

<u>Paragraph 1-3</u>

[First factor] created change because…
An example of this is…
This meant that…

<u>Conclusion</u>

Overall, [factor] was most important because..
It was more important than… [another factor]…because…
It links with other factors where…
Therefore, it is the most important reason…

Q5/6 on following page.

Q5 or 6 'Statement'. How far do you agree? Explain your answer. You may use the following information in your answer… You must also use some information of your own. (16 marks)

- Target: to analyse how important (significant) events were
- Target: to use knowledge of the periods
- You MUST use another factors of your own – this can disagree or agree with the statement.

Introduction

This statement is partly true because…
However, there are reasons that disagree with the statement.
These are…
These factors make the statement…(quite, mostly, very, extremely)… weak.

Paragraph 1: agree

[Factor]… supports this statement.
An example of this is…
This is important because…
This factor support the statement…(partly, in some ways, very, extremely)… because…

Paragraph 2: disagree

[Factor]…disagrees with this statement.
An example of this is…
This is important because…
This factor makes the statement (partly, in some ways, very, extremely)… weak because…
It is a (more/less) important factor than (factor in paragraph 1) because…

Paragraph 3: repeat paragraph 2 structure

Conclusion

Overall/In conclusion/Fundamentally… it is necessary to [agree/disagree] with this statement because…
The factor(s) that [agree/disagree] with the statement are weak because…
The factor(s) that [agree/disagree] with the statement are stronger because…
Therefore, it is necessary to [agree/disagree with the statement.

Useful Essay Words

because therefore as such
as a result of this in addition
similarly overall
on the other hand moreover
furthermore more importantly
linked with this in conclusion
however although
despite equally
compared with this
meanwhile finally
especially beside this
after next

Words to discuss continuity (similarities) in history:

This is the same as… because…
This is similar to…
This closely resembles…
This reflects…
In the same way…
Equally, it is clear that…

Words to discuss change (differences) in history:

This is different from…
Whereas…
On the other hand…
There was clear change in this because…
Conversely…
On the contrary
Yet…

Key words

Alchemy	where people attempt to convert metals into gold
Ally	promising that you will support another group/country
Amputation	removing a limb in surgery
Anaesthetic	a drug that sends patients to sleep temporarily
Apothecary	someone who sells medicine
Aseptic	no bacteria or viruses etc.
Astrology	the study of stars and the moon
Barber surgeon	would perform surgery but had no medical training
Barometer	measures the weather
Cesspit	an area where sewage is collected
Chemotherapy	a chemical treatment, often used to treat cancer
Contaminated	dirty
Culture	habits or behaviour of a society or place
Dehydration	not having enough water in the body
Diagosing	finding out what is wrong with somebody
Dialysis	a process where the kidneys are cleaned using a machine
Dissect	cutting open the body to examine the insides
Dissolution	to get rid of something
Emplacement	something that is clearly fixed in place
Enema	where something is injected into the rectum to get rid of the contents
Epidemic	where disease has spread very quickly and affected a lot of people
Famine	hardly any food
Fasting	not eating
Gangrene	where tissue in the body dies and causes infection
Gas gangrene	an infection where a gas is produced in the wound
Genetics	studying how families have the same traits
Genome	all the genes present in an area of the body
Humanism	looking philosophically at humans than using religion
Incense	e.g a pomander
Innoculation	being given a small amount of a disease to make you immune

Laissez-faire	leaving things alone rather than interfering
Laparascopic surgery	where a small cut is made into the body to do an operation
Laxative	a drug that makes you defecate
Magic bullet	a chemcial that kills a specific microbe
Malnutrition	not having enough food to eat
Mastectomy	removing a breast via surgery
Miasma	bad air
Microbes	bacteria
Microscope	a piece of equipment that scientists use to magnify things
Neurosurgery	operations on the brain
Paralysis	not being able to move all or certain parts of your body
Pharmaceutical	to do with drugs
Physician	a doctor
Physiology	the study of the body
Phlebotomy	the study of blood
Pilgimage	a journey to a religious place
Pomander	a ball of herbs
Quack doctors	they did not have medical qualitifications but acted as a doctor
Quarantine	stopping ill people from being around others
Radiology	the science of x-rys
Radiotherapy	treating people using x-rays
Resistent strain	something that cannot be treated by antibiotics
Septicaemia	blood poisoning
Society	a group of people
Supernatural	things that are beyond the understanding of science
Syphilis	A disease caught in sexual intercourse
Thermometer	a piece of equipment that measures temperature
Transplant	moving something from one place to the other
Ventilation	letting fresh air into a building
Vivisection	testing on animals