

Key Words:

Contagion – spread of disease between people.

Classical – relating to Ancient Greece and Ancient Rome.

Astrology – study of the position of stars and planets.

Diagnosis – deciding what is wrong with someone based on symptoms.

Dissection – cutting open dead bodies to observe them.

Theriaca – herbal remedy used for many different complaints.

Physician – someone who practices medicine.

Miasma – unpleasant air thought to cause and spread disease.

Barber surgeon – someone who performed minor surgery (e.g. bleeding). Usually actual barbers.

Apothecary – made herbal remedies and medicines (like a pharmacist).

Hippocrates (c.460-c.370 BCE)

Ancient Greek physician who devised the 'four humours' theory. He observed and recorded symptoms of his patients to develop theories. Began idea of medical ethics through the 'Hippocratic Oath' ('first, do no harm').



Galen (129-c.210 CE)

Galen developed Hippocrates' theory of the humours through experimentation, devising the **Theory of Opposites** for treatments. Galen used dissection of monkeys to observe the circulatory system. Galen was an expert surgeon, including on the eyes – he was even able to remove cataracts.

Avicenna (Ibn Sina) (980-1037)

Persian philosopher and physician who wrote encyclopedic medical work *The Canon of Medicine*. This included Galen's ideas about the **humours** and anatomy, along with a list of 800 medical remedies used at the time and 650 recipes for other drug treatments. Other books summarised knowledge of disease & organs.



Treatment/Prevention:

- People **prayed** to be forgiven, and went on pilgrimage or punished themselves (flagellation) but if it was **God's will**, the patient would die.
- Usual treatments like **bloodletting** failed, but some physicians did **lance the buboes**.
- Strong-smelling **herbs** were prescribed to purify the air and **theriaca** was often tried.
- Some people **left the area** to escape and it was common to **avoid the houses** of the infected.
- Quarantine** laws were brought in – people new to the area had to avoid contact for 40 days.
- The **inability to understand the cause of disease made a successful cure impossible**.

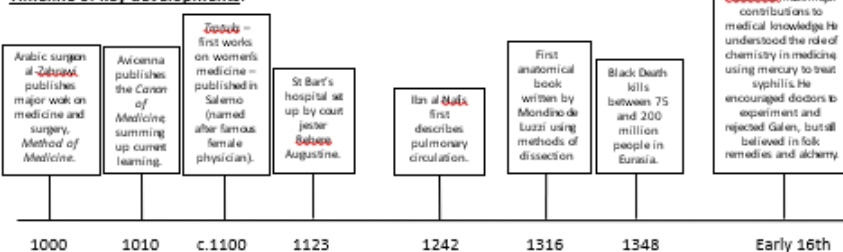


Case Study – The Black Death, 1348-49:

Causes:

- Many believed the Plague was a **punishment from God**.
- There was an unusual **alignment of planets** during 1348, taken as an omen.
- Miasmata**, perhaps from a volcano were also blamed by some.
- In Europe **Jews were blamed** for the spread of the disease, but not in England (the Jews had been expelled in 1290).

Timeline of key developments:



Causes of Disease:

Religious causes:

Widespread belief that disease was a punishment or a test from God. Sin was the cause of illness, so the Church taught to avoid sin to avoid illness.



Supernatural causes:

Widespread belief in supernatural causes of disease, including **astrology** – along with God's role, things like position of stars and planets affected disease.



Four Humours Theory:

Originally from Ancient Greece, the idea that the body was made up of four different elements – blood, phlegm, black bile & choler (yellow bile). Disease was caused by and imbalance in the humours. Physicians looked for characteristics linked to the different humours when making a **diagnosis**.



The humours were also strongly linked to: [1] the 'elements' of the universe (fire, water, earth, air); [2] the seasons; [3] people's personalities (e.g. choleric people were quick to anger); [4] astrology and star signs.

A very popular theory because: [1] it was detailed and it explained a lot of disease; [2] it gave means of actively treating disease and maintaining health; [3] it had the support of the Church; [4] Classical writers like Galen were trusted authorities.

Miasma Theory:



Belief that 'bad air' could cause disease. Bad smells, swamps and corpses could transmit disease. Hippocrates and Galen both mentioned this. A bad-smelling house suggested disease; good smells were a sign of spiritual cleanliness. People avoided lepers and unwashed people to avoid **contagion** through miasma.

Treatment/Prevention of Disease:

Religious and supernatural:

- The Church offered various spiritual remedies – **prayers**, **mass**, **fasting**, **pilgrimage**, **votive candle lighting**, making offerings at shrines and touching holy relics.
- Charms and amulets** could be worn to ward off illness, but the Church did not approve of this.

Humoural:

- Treatments linked to the 'imbalance' of humours, somewhat based in the **Theory of Opposites** (e.g. bloodletting).
- In medieval medicine, the emphasis was often on getting rid of 'bad' humours through **bleeding**, **purging** or **enemas**.

Remedies:

- Herbal treatments**, some of which had a basis in fact, while others were superstitious. Could be drunk, inhaled or bathed in.

Regimen Sanitatis:

- A set of rules, dating back to Hippocrates, giving advice on **sanitation**, **diet** and **exercise**. Medieval people were concerned with public health because of the fear of **miasmata**.

Who delivered treatments?

Apothecaries:

- Made up **herbal remedies**, sold **poisons** and often dabbled in the **supernatural**, selling amulets and charms.
- Often had good medical knowledge, based on book learning and experience. However, they did not have to go to university.

Physicians:

- Doctors who **diagnosed** illness and **prescribed** treatment. This was based on **observations**, **astrology** and **humoural theory**.
- Mostly **clergymen**, since they required university degrees, though Church control of education did loosen in Europe later on.

Surgeons:

- Barber surgeons** were not qualified. Barbers had sharp tools and a steady hand, so they performed minor surgery like bleeding.
- Skilled surgeons** could set broken limbs and remove arrows.

Context – Medieval Religion:

- Most people's only education came from the Church, meaning they believed the teaching and looked **mostly to religion to explain the world**.
- The Church was a hugely powerful institution at the time, controlling **book publishing** and **university teaching** – this meant controlling knowledge.
- The Church generally opposed possible scientific methods of medical enquiry including **dissection**.
- The Church strongly supported **Classical** ideas of disease, like those of Galen, so they persisted.

Concept – Continuity in medicine:

- The Church wanted to keep things the same, emphasising Galen because his ideas could be fitted to their teaching (even though he had lived many centuries before).
- Science and technology** were limited. Physicians worked to make discoveries fit old theories, rather than experimenting. The **printing press** allowed faster sharing of ideas, but had little effect on medieval medicine (it was invented c.1440).
- Attitudes** held back change. Medieval people did not want to criticise the Church and go to Hell. Many believed that there was no need to change – it had always been done that way.

Key Words:

Secular – not religious or in any way connected with spiritual beliefs.

Alchemy – an early form of chemistry, trying to turn one metal into another.

Royal Charter – a document from the monarch granting a right or power to a particular group or person.

Humanism – a belief system characterised by the belief that humans could make up their own minds.

New World – North and South America.

Journeyman – an experienced member of a profession who did not yet have his own business.

Renaissance – the revival of European art and literature under the influence of classical models.

Pneuma – 'breath of life' Galen thought it was your breath and life force.

Quack Doctors – someone with no medical training who sold services as a doctor or apothecary.

Case Study – The Great Plague in London 1665:

Causes:

- Many believed the Plague was a **punishment from God**.
- There was an unusual **alignment of Mars and Saturn** during 1664, they were seen as unlucky planets (even worse a comet had been spotted).
- Miasmata** was the most popular explanation for the plague. Thought to be created by stinking rubbish and dunghills.
- Increasingly people recognised that the plague was spread from person to person. Although this was not a very popular theory quarantines were enforced by searchers.

Medicine Through Time, c.1500-1700: Early Modern Medicine Knowledge Organiser

Thomas Sydenham (1624-1689)

Nicknamed 'the English Hippocrates' he was a well-respected doctor in London. He encouraged doctors to observe the symptoms of a patient before diagnosis, aiming to treat the cause. He thought diseases were like plants or animals and had species.



Andreas Vesalius (1514-1564)

A famous anatomist who published books based on his dissections of executed criminals. Six *Anatomical Tables* showed different parts of the body labelled in four languages. On the *Fabric of the Human Body* showed errors made by Galen. He encouraged anatomy professors to carry out dissections and made the study of anatomy fashionable.



William Harvey (1591-1657)

Dr to James I with a keen interest in dissection. He relies on careful observation of anatomy, his book *An Account of the Motion of the Heart and Blood in Animals* could be considered to be the start of modern physiology. His work encouraged scientist to experiment on actual bodies. His discoveries wouldn't have an impact on practical medicine for some time.



Causes of Disease:

Religious causes:

A belief that illness is caused by god persists and many continue to follow traditional religious and supernatural beliefs. During the plague physicians recommend prayer and the king decrees that people should fast.

Supernatural causes:

Widespread belief in supernatural causes of disease, including **astrology** – along with God's role, things like position of stars and planets affected disease.

Four Humours Theory:

The four humours had been rejected by more radical physicians like Paracelsus. Many physicians still relied on the theory though and it remained a key part of medical understanding.

Miasma Theory:

Belief that 'bad air' could cause disease. Bad smells, swamps and corpses could transmit disease. Hippocrates and Galen both mentioned this. A bad-smelling house suggested disease; good smells were a sign of spiritual cleanliness. People avoided lepers and unwashed people to avoid **contagion** through miasma.

External Factors:

Many scientists started to theorise that diseases had external factors in a variety of different ways:

There was a theory that disease was caused by seeds spread in the air – **Fracastoro** published this idea in his book 'On Contagion'.

Many scientists suggested external factors were to blame. They proposed that observation of patients was essential

Advances in microscopes allowed Leeuwenhoek to observe tiny animalcules supporting the idea that diseases had external causes.

Treatment/Prevention of Disease:

Transference:

- Illness or diseases could be transferred to something else.
- Popular ideas were rubbing warts with an onion or sleeping with a sheep in the room to transfer the fever.

Humoural:

- Treatments linked to the 'imbalance' of humours, somewhat based in the **Theory of Opposites** (e.g. bloodletting).
- These continue in the early modern period with purges, sweating and bleeding remaining common.

Remedies:

- Herbal treatments**, these saw increased use as new herbs became available from the New World.
- There was an emphasis on colour or shape – yellow herbs were used to treat jaundice with turns the skin yellow.

Chemical Cures:

- Prompted by a growth in alchemy people started to look for chemical cures for disease. Often known as **iatrochemistry** or **medical chemistry**.
- Salts, metals and minerals were all used, including antimony and mercury.

Regimen Sanitatis:

- A set of rules, dating back to Hippocrates, giving advice on **sanitation, diet and exercise**. Efforts were made to get rid of **miasmata** by draining swamps and removing sewage and rubbish.
- Bathing became less popular due to links between bath houses and syphilis (also known as the Great Pox) which became more common in this period. People wiped themselves clean with linen cloths.

Who delivered treatments?

Apothecaries and Surgeons:

- Apothecaries made up **herbal remedies**, often using new herbs from the new world.
- Wars and new technology meant that new wounds became more common and so surgeon's skill increased.
- Both often had good medical knowledge, based on book learning and experience. Both had to have a licence to practice.

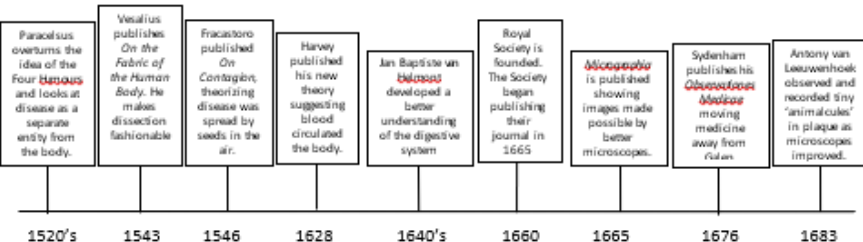
Physicians:

- Doctors who **diagnosed** illness and **prescribed** treatment. This was based increasingly on **observations**. Many still used **astrology** and **humoural theory**.
- Some iatrochemistry and anatomy introduced into medical training but anatomy theatres are still rare.

Hospitals:

- No longer so closely linked to the church and with more of a focus on curing the sick rather than just caring for them before death.
- Pest houses focused on specific diseases – e.g. the Great Pox (syphilis).

Timeline of key developments:



Context – Renaissance, Reformation and Scientific Revolution

- The renaissance (meaning rebirth) saw the beginning of changing ideas that would have an impact on medicine.
- It was fuelled by the invention of the printing press that allowed ideas to spread and reduced the control of the church over what was published.
- The reformation further reduced the influence of the Catholic church as Protestantism gained support.
- The scientific revolution saw changing ideas about how disease should be observed and understood.
- The Royal Society encouraged and spread research in England.

Key Words:

Anaesthetic – pain-killing medication like chloroform and ether.

Antiseptic – chemical or process used to kill or prevent microbes growing.

Bacteriology – the study of micro-organisms (esp. bacteria).

Inoculation – deliberately infecting someone with a small dose of disease to make them immune.

Patent remedies – similar to 'quack' treatments – cheap, ineffective medicines.

Public health – aspects of healthcare and quality of life like cleanliness of water, sewers and pollution.

State intervention – actions of governments to improve people's health.

Vaccination – preventative treatment for disease, where patients are infected with a milder version of disease to provide immunity.



Louis Pasteur (1822-1895)

French scientist who initially developed 'Germ Theory' (published 1861), disproving the idea of spontaneous generation and showing that decay was caused by micro-organisms in the air. In 1878 he published the germ theory of infection, linking germs to human diseases.

Robert Koch (1843-1910)

German scientist who built on Pasteur's germ theory. He suggested that microbes were present in every case of disease and he identified specific bacteria that caused cholera and tuberculosis. He developed methods to isolate, grow and experiment on microbes.



Florence Nightingale (1820-1910)

British nurse who became famous for her work during the Crimean War (1850s). She worked to secure clean conditions in hospitals and organized the nursing staff, which decreased mortality rate. After Crimea, she influenced the design of hospitals and established a school of nursing.



Causes of Disease:

Miasma Theory:

Belief that 'bad air' could cause disease. Bad smells, swamps and corpses could transmit disease. This was more a 'folk belief' and was less popular. It was linked to spontaneous generation, which said miasmata spread microbes.

Spontaneous Generation

Scientists could now see microbes down better microscopes, and they observed them on decaying matter. In the 18th century, this gave rise to the belief that microbes were the product of decay, not the cause.

Germ Theory:

Pasteur observed that there must be something in the air that caused decay (so, spontaneous generation was wrong). He also theorised that disease could be the same – that germs caused and spread illness.

Not everyone accepted the germ theory, but it gradually became highly influential. Lister and Tyndall both helped expand Pasteur's work, but neither could show conclusively the link to disease. Robert Koch's work on microbes made the link to specific diseases and isolated bacteria that could then be studied in depth.

Treatment/Prevention of Disease:

Vaccination:

- This began with the work of **Edward Jenner**, who developed the smallpox vaccine, but without the underlying knowledge of why it worked.
- Parliament gave support to smallpox vaccination, making it **compulsory** in 1852, even though this was only enforced from about 1872.
- Germ theory helped push forward the cause of vaccination:
 - + Pasteur identified **cholera** and **anthrax microbes**, using animal experiments to develop vaccines against these diseases.
 - + Koch had provided the capability to identify and isolate microbes, allowing the development of further vaccines (like **diphtheria**).

Public Health:

- As democracy expanded, governments had to take more notice of **living conditions** for working people.
- Living conditions were understood to be **linked to disease** (like cholera), so more was done to (for e.g.) provide clean water and dispose of sewage.
- This was especially true from the **1860s onwards**, with new laws made.

Hospital care and surgical developments:

Hospital care:

- In the 18th century, the number of hospitals had started to recover, but they were still particular about who to treat – only the 'deserving poor' (respectable working class people). However, this did mean some poor people got to see trained doctors.
- These hospitals were not clean though. Florence Nightingale's influence helped revolutionise this from the 1850s, with cleanliness becoming the main concern and new methods spreading rapidly.

Surgical improvements:

- During the 19th century, developments were made in **pain relief**. **Anaesthetics** such as nitrous oxide (laughing gas) and ether had been experimented with. Around 1860, James Simpson tested **chloroform** on himself. It caused unconsciousness, but the dose had to be carefully controlled. This allowed more complex surgery to be attempted.
- Joseph Lister studied infected wounds, finding them to be rotting. Drawing on Pasteur's work, he looked for a chemical to stop microbes getting into wounds. He used **carbolic acid** – first as a way to soak bandages, then as a spray in operating theatres to stop microbes causing infection. The practice of **aseptic** and **antiseptic** surgery was crucial to preventing infection.



Case Study – Fighting Cholera in London, 1854:

Cholera before 1854:

- Cholera arrived in England (from India) in 1832. It caused thousands of deaths, **especially amongst the poorest**.
- It was believed to be caused by **miasmata**, so some efforts were made to clean up cities.

What did John Snow do?

- Snow observed a link between the water supply and the spread of cholera in Soho. He traced the outbreak to a pump in Broad Street, which he removed the handle from, stopping the outbreak and showing it was **water-borne**.

Impact/Significance of John Snow's findings:

- Snow presented his findings to a House of Commons committee in 1855. This helped convince them of the need for **more government involvement**.
- A new **sewer system**, planned by Peter Bazalgette, was finished in 1875. This helped reduce the chance of future outbreaks.
- Snow's findings helped people in Soho to not die of cholera, but the lack of proof meant that the impact was **limited** – it wasn't till germ theory that Snow's observations were proven and the importance of clean water wasn't appreciated till much later.

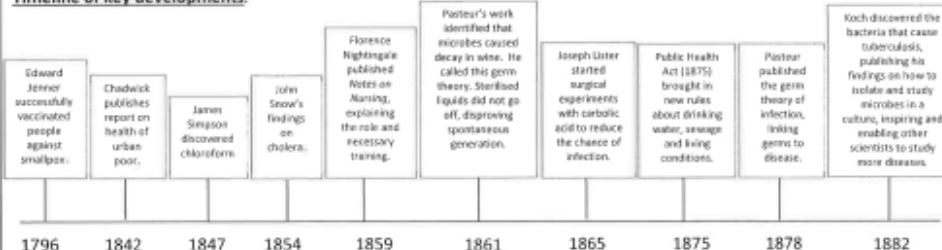


Case Study – Vaccination

- Smallpox was a very serious disease, with major **epidemics** and 1000s of deaths.
- People realised that if you caught a mild case you would be immune (**inoculation**).
- Edward Jenner studied inoculation and was interested in why it failed.
- He noticed that dairy maids who caught cowpox did not then get smallpox.
- In 1796 he infected a boy with cowpox and, six weeks later, the boy was **immune** to smallpox.
- He wrote up his findings in 1798, showing the possibilities of **vaccination** and, although there was opposition, it gradually got government support.



Timeline of key developments:



Context – Scientific and Industrial revolutions:

- The 'Age of Enlightenment' was a period when new, rational ideas in all fields (science, philosophy, politics, art) were being considered and changing profoundly the way people saw the world.
- The development of industrial cities was rapid after 1750. People moved to find work (54% of people lived in urban areas by 1851), but cities were unplanned and dirty, allowing disease to spread.
- The 18th century had not produced new ideas – it had discredited old ones; explanations were helped in the 19th by technology and attitudes.

Concept – significant change due to breakthroughs:

- The revolutionary development of **germ theory** changed the understanding of causes of disease and, linked to that, treatment and prevention.
- **Individuals** like Jenner, Snow, Pasteur, Koch, Lister and Nightingale made major contributions.
- **Public attitudes** were receptive to rational explanations of disease, but people were reluctant to change their minds in the absence of proof.
- The **government** became gradually more willing to get involved, reflecting a more democratic society. States had vast resources that would speed change.

Key Words:

Hereditary diseases – disease caused by genetic factors meaning they can be passed from parents to children.

Genome – complete set of DNA containing all the information needed to build the particular organism.

Compound – a mixture of two or more different elements.

DNA – deoxyribonucleic acid, carries genetic information from one living thing to another.

MRSA – a strain of drug resistant bacteria that is particularly hardy.

Smog – a very heavy fog caused by air pollution, experienced particularly badly in London in 1952.

Antibiotic – any treatment that destroys or limits the growth of bacteria in the human body.

Magic-bullet – a chemical compound that would attack microbes in the body that cause disease while leaving the body unharmed.

Case Study – Development of Penicillin:

Role of Alexander Fleming:

- Fleming was keen to find a way of combating simple infections particularly staphylococcus.
- He noticed mould growing in a dirty petri dish had killed the bacteria he was working on. He took no further action but did publish his findings which were used by Florey and Chain.

Role of Florey and Chain:

- Florey and Chain tested the mould on mice and found it killed infection but they couldn't grow enough to fully cure a human.
- They took their discovery to America where they started growing it on a much bigger scale.



Rosalind Franklin (1920-1958)

English chemist and crystallographer who used x-rays to take photographs of DNA. Watson and Crick would later build their theories about DNA on her photographs. She commented upon their theories and suggested corrections

Crick and Watson

Watson was an American Biologist and Crick and English physicist. They built a model of DNA and discovered that it was shaped as a double helix that could 'unzip' itself. They published their findings in 1953. Watson went on to lead the Human Genome Project, launched in 1990.



Aneurin Bevan (1897-1960)

British Minister of Health for the 1945 Labour government. He made the decision that all hospitals should come into public ownership and launched the NHS in 1948. Paid for with National Insurance contributions the NHS aimed to provide medical care for the entire population of Britain.

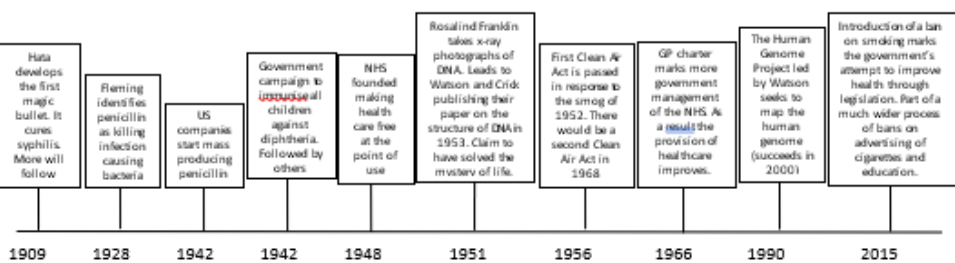
Impact/Significance of penicillin:

- Once mass production began in the USA it became clear penicillin was highly effective.
- By D-Day all Allied casualties were treated with it and it continues to be used today.
- Scientists looked for other moulds that would cure infection and Dorothy Hodgkin mapped the chemical structure so synthetic versions could be produced.
- Because it worked so well confidence in medical treatments increased.

Factors enabling development:

- Although the scientists were important in making discoveries the urgency of curing soldiers in WW2 and the involvement of institutions like the US government pushed production forward.

Timeline of key developments:



Medicine Through Time, c.1250-present: Contemporary Medicine (1900-present) Knowledge Organiser

Causes of Disease:

Genetics:

In the 20th century scientists such as Watson and Crick developed an understanding of DNA. This enabled them to understand diseases that were not caused by microbes. The Human Genome Project brought scientists together to map the human genome (completed in 2000) and scientists can now identify mismatches or mistakes in DNA that cause hereditary diseases. It is now possible to prevent some diseases such as breast cancer using mastectomies (removing the breast)

Lifestyle Factors:

Doctors have gained a better understanding of the impact of lifestyle choices on the body. The dangers of alcohol, smoking, drugs and unprotected sex are known and there is an understanding of the impact of diet on our health. For example, too much sugar can lead to type 2 diabetes and too much fat to heart disease.

Germ Theory:

Knowledge of germs continues to be key in contemporary understanding of the causes of disease. We know that microbes are the cause of diseases such as cholera and diphtheria. It has totally replaced previous theories and the 20th century was the first in which miasma was no longer referred to.

Case Study – Fight against Lung Cancer:

- Lung cancer is the second most common cancer in the UK, around 85% of cases are smokers or people who have smoked.
- In 1950 the British Medical Research Council showed a conclusive link between smoking and lung cancer.
- Early diagnosis is hard as x-rays are not accurate enough. In the 21st century CT scans are used to detect tumours.
- Treatment ranges from transplants to radio and chemo therapy.
- The main government effort has been on prevention, banning smoking in work places in 2006 and attempting to educate people about the dangers of smoking.

Treatment/Prevention of Disease:

Antibiotics

- The discovery of specific microbes causing specific diseases allowed scientists to look for compounds that would attack them.
- The discovery of compounds that would cure diseases such as syphilis were hailed as 'magic bullets'
- Biologists experiment with substances that could cure specific infections and developed antibiotics, Penicillin being the first.

Vaccination:

- Inspired by the success of smallpox vaccination in the 19th century compulsory vaccinations were introduced in the 20th century
- A national vaccination campaign was launched against diphtheria in 1942, followed by campaigns on polio, Rubella and recently HPV.

Public Health:

- Government legislation focused on providing a healthy environment, the Clean Air Acts of 1956 and 1968 that sought to improve air quality.
- The government now focuses on encouraging a healthy lifestyle through campaigns against smoking and other lifestyle factors.

Hospital care and surgical developments:

Hospital care:

- In the first half of the 20th century the government established the Ministry of Health. Most doctors still had to be paid and few hospitals were free.
- The establishment of the NHS in 1948 made medical services free at the point of use (although hospitals and GP services struggled to meet demand, waits were long and appointments short).
- The NHS was organised into Hospitals, General Practitioners and Additional Services (e.g. ambulance, health service).
- Hospitals are now clearly for the treatment of the sick not end of life care.

Surgical improvements:

- With the three major problems of surgery (pain, infection and blood loss) solved doctors could carry out more daring and intrusive surgery.
- Operations like blood transfusions and hip replacements are now routine and new machinery is available to treat the body and even replace parts of it.
- Microsurgery means surgeons can carry out organ transplants by reattaching tiny nerve endings and blood vessels.
- Laparoscopic (keyhole) surgery makes procedures less intrusive.
- Robotic surgery allows surgeons to be more precise with procedures.

Context – Technological and Governmental advance:

- Advances in technology have rapidly changed methods of diagnosis and treatment.
- Advanced x-rays can be used to shrink tumours and smaller machines make heart bypasses possible.
- Seeing inside the body to diagnose illness is made possible by x-rays, CT scans, MRI scans and ultrasounds while blood tests and blood sugar and pressure monitoring make diagnosis more precise.
- Pressure on the government (particularly following WW1 & 2) has seen much more government intervention. Educating people to keep them healthy as well as treatment for free on the NHS.

Concept – significant change due to breakthroughs:

- The discovery and development of theories surrounding DNA changed the understanding of causes of disease and, linked to that, treatment and prevention.
- Individuals** like Fleming, Florey and Chain made major contributions to making treatments more specific and less dangerous.
- Public attitudes** are convinced by rational explanations of disease; people are increasingly willing to manage their health through lifestyle.
- The **government** has become integral to healthcare which is now seen as the right of British citizens.