AQA GCSE HISTORY

Britain: Health and the People, c.1000 – present day

Knowledge Organiser Pack

Student Name		Form	
History Teacher		History Group	

THE
ST MARY'S RC HIGH SCHOOL
HISTORY DEPARTMENT

How to use this knowledge organiser pack…

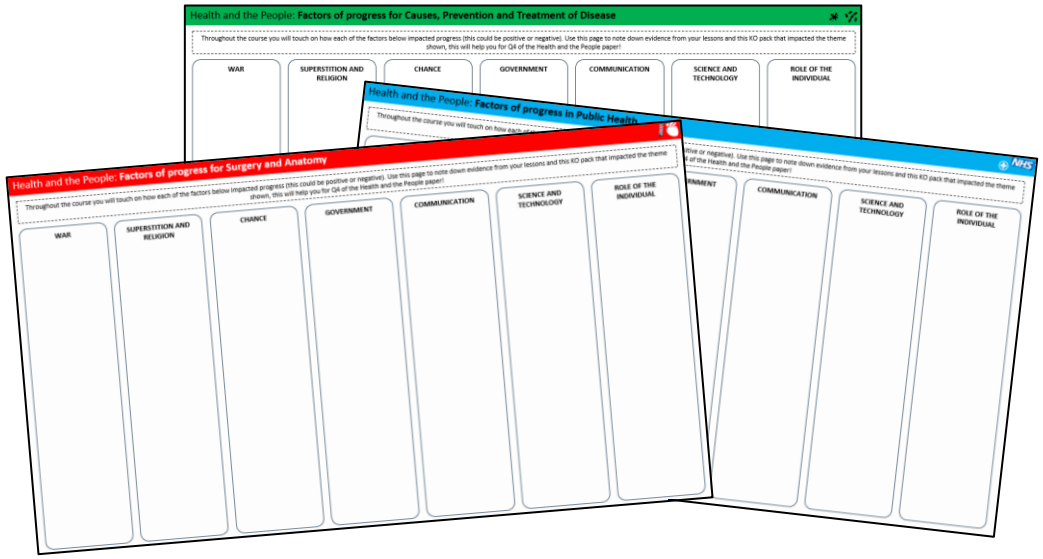
Thematic approach

This set of knowledge organisers has been **organised into the AQA specified themes**, as shown by the section dividers and colour-coded headers. It is then organised **chronologically within the themes.**

The themes and colours are:

- Causes, prevention and treatment of disease
- Public health
- Surgery and anatomy

There are 3 summary pages with the factors of progress at the start of this pack, you can use these to find evidence for each factor:



Time periods

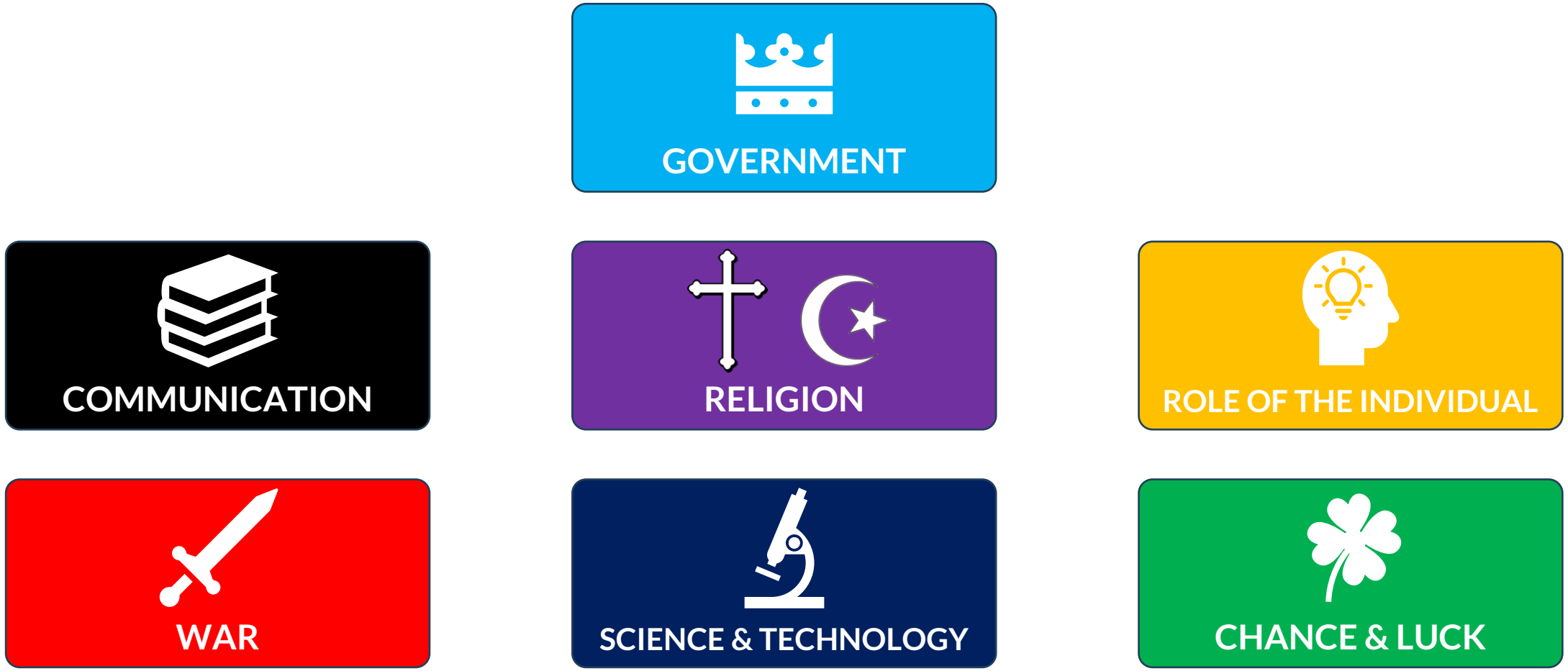
Remember that this study covers from c.1000 – present day and there are four time periods, this is indicated in the top right of each knowledge organiser.

The time periods are:

MEDIEVAL	Renaissance	INDUSTRIAL	MODERN
c.1000 - 1400	1400 - 1799	1800 - 1899	1900 – present

What are the factors of progress?

To successfully respond to the Question 4 'Factors Question' for Health and the People you will need to organise your argument into factors. **AQA have given us the below factors:**



Health and the People: **Factors of progress for Causes, Prevention and Treatment of Disease**

Throughout the course you will touch on how each of the factors below impacted progress (this could be positive or negative). Use this page to note down evidence from your lessons and this KO pack that impacted the theme shown, this will help you for Q4 of the Health and the People paper!

WAR	SUPERSTITION AND RELIGION	CHANCE	GOVERNMENT	COMMUNICATION	SCIENCE AND TECHNOLOGY	ROLE OF THE INDIVIDUAL

Health and the People: **Factors of progress in Public Health**

Throughout the course you will touch on how each of the factors below impacted progress (this could be positive or negative). Use this page to note down evidence from your lessons and this KO pack that impacted the theme shown, this will help you for Q4 of the Health and the People paper!

WAR	SUPERSTITION AND RELIGION	CHANCE	GOVERNMENT	COMMUNICATION	SCIENCE AND TECHNOLOGY	ROLE OF THE INDIVIDUAL

Health and the People: **Factors of progress for Surgery and Anatomy**

Throughout the course you will touch on how each of the factors below impacted progress (this could be positive or negative). Use this page to note down evidence from your lessons and this KO pack that impacted the theme shown, this will help you for Q4 of the Health and the People paper!

WAR	SUPERSTITION AND RELIGION	CHANCE	GOVERNMENT	COMMUNICATION	SCIENCE AND TECHNOLOGY	ROLE OF THE INDIVIDUAL

Theme:

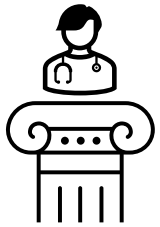
Causes, prevention and treatment of disease

Health and the People: **Ancient Ideas – Hippocrates and Galen**

MEDIEVAL

The ideas of ancient thinkers had a huge impact for thousands of years on what people believed caused disease and how it should be treated. Some of these ancient ideas were carried well into the Renaissance.

HIPPOCRATES



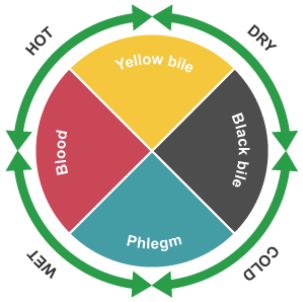
Ancient Greek doctor
c.460BC

Focused on careful **observation of the patient** and their symptoms.

Hippocrates **encouraged doctors to seek natural causes and cures** of illness - Theory of the Four Humours.

Hippocratic Oath: doctors promise to do no intentional harm to patients.

THEORY OF THE FOUR HUMOURS



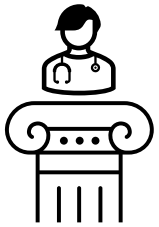
Hippocrates theorised that the human body was made up of four humours;

- Blood
- Black bile
- Yellow bile
- Phlegm

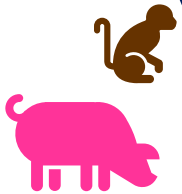
An imbalance of these humours would **cause illness**.

Theory of Four Humours become **the basis of many treatments.**

CLAUDIUS GALEN



Ancient Roman doctor
c.AD123



Dissected animals (pigs, monkeys and dogs) **to learn about anatomy.**

Developed the **Theory of Opposites** (see below).

The **Church supported Galen's ideas** as he said there must be a 'creator'.

☑ CORRECT DISCOVERIES

Brain controls the body.

☒ INCORRECT DISCOVERIES

Said blood was made in the liver.

Said human jawbone was 2 separate bones, not 1.

THEORY OF OPPOSITES

Galen believed that if the humours were out of balance, **doctors should intervene with an opposite treatment.**

For example, if someone has a cold, they have a runny nose, and Galen believed that this was the body's way of getting rid of excess phlegm.

Bloodletting became a common treatment under this theory.

Something can be historically significant if you can NAME it…

- **N**EW — Something new, which had never been seen before.
- **A**PPLICABLE — Applicable or relevant to something happening in the present.
- **M**EMORY — Remembered in a particular way over time.
- **E**FFECT — A lot of people have been affected (immediately or over time).

WHAT WAS THE SIGNIFICANCE OF HIPPOCRATES AND GALEN?

N

First time natural causes were considered for illness.

First time careful observation was promoted.

Created the Hippocratic Oath.

A

Hippocratic Oath used today.

Careful observation used today.

M

E

Four Humours became the basis for diagnoses and treatments (bloodletting was used for thousands of years).

Incorrect ideas about anatomy were used for thousands of years.

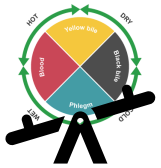
Health and the People: **Medieval Causes and Treatment of Disease**

The medieval period saw very little development in the beliefs and treatment of disease, with much of their beliefs stemming from the ideas of the ancient thinkers Hippocrates and Galen. The Church also impacted medical beliefs and can be seen to have both helped and hindered medical progress.

MEDIEVAL BELIEFS ON CAUSES OF DISEASE

The medieval beliefs on causes if illness and disease are either NATURAL (can be explained) and SUPERNATURAL (not easy to explain):

'NATURAL' CAUSES



Imbalance or blockage of the **Four Humours**.

Miasma – bad smells/ air causing illness.

'SUPERNATURAL' CAUSES

Punishment from God.

Witchcraft – a curse.

Bad alignment of the **planets**.

MEDIEVAL MEDICS

Medic	Training	Methods and Treatments	Patients
Physician 	University for 7 years – more familiar with books and theory than practically.	Job was to **observe patients** through; - Studying the humours (urine charts etc.) - Consulting *astrology* charts. - Predicting symptoms. - Offer explanations as to why God was punishing the patient. Used the ideas of Hippocrates and Galen.	Rich people.
Barber-Surgeon 	Apprenticeship – very hands on!	Very skilled with sharp implements. Carried out small procedures from pulling teeth, removing skin lesions and amputating limbs.	Rich, but mostly poor people.
Apothecary 	Apprenticeship.	Like a modern chemist/ pharmacist today. Provided herbal remedies and other potions believed to help treat illness.	Rich and poor people.
Wise woman 	Knowledge was passed down through generations.	Provided herbal remedies to treat common illnesses. Often the only access to some healthcare for the poorest.	Poor people.

IMPACT OF CHRISTIANITY

Central belief was that illness, and disease was a punishment from God.

Treatment provided by Christians was PRAYER.

Christian hospitals focused on '**care not cure**'.

Hospitals – calm and **clean surroundings**.

Lazar houses – hospitals which dealt with people's leprosy.

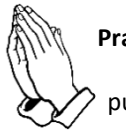
GALEN'S IDEAS – "there must be a creator!" 

The Church approved of Galen's ideas and said he was correct. You could not challenge the Church's views.

Galen's ideas were taught at universities.

Stopped new discoveries being made as **training was to make the old ideas clear, not discover new ideas.**

TREATMENTS IN MEDIEVAL ENGLAND



Prayer was used to treat illnesses seen as a punishment from God.

Trepanning* – drilling a hole into the head to release 'evil spirits' causing headaches.

Limbs may have been **amputated**.

Hot bath to dissolve blockages in the humours.

Bloodletting through use of leeches or cutting into the flesh to balance the humours.

Purging the humours by being forced to vomit, to balance the humours.

Health and the People: **Impact of Islam on Medieval Medicine**

MEDIEVAL

Although there was limited progress in Western Europe in medieval times, there were new discoveries and developments in medicine in the Islamic Empire which spread to Europe.

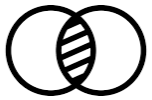
WHAT ALLOWED ISLAMIC MEDICINE TO ADVANCE?

The Prophet **Muhammad** (pbuh) **said that Allah had provided a cure for all** illnesses and said people should **search for these** through discoveries.

Islamic Empire was **ruled by a Caliph**, one strong ruler which **provided peace and order to enable discoveries.**

Many **Caliphs were interested in science** and supported medical learning. **Libraries preserved ancients texts.**

KEY INDIVIDUALS OF ISLAMIC MEDICINE

INDIVIDUAL	CONTRIBUTIONS TO MEDICAL KNOWLEDGE		
AL-RAZI (RHAZES)	 Stressed the need for **careful observation**.	 Distinguished the **differences between measles and smallpox.**	 Wrote over **150 books**. He did **follow Galen**, he thought that students should improve on the work of their teacher.
IBN SINA (AVICENNA)	 Wrote a great encyclopaedia of medicine called **'Canon of Medicine'.** It was a **summary of the whole of Greek and Islamic medical knowledge.**		Listed the **medical properties of 760 drugs** and contained chapters on medical problems. It became the **standard European textbook** used to teach doctors in the West until the 17th century.
IBN AL-NAFIS	 Concluded that **Galen was wrong** about how the **heart** worked.		Unfortunately **his books were not read in the West**, so this meant that **Europeans continued to accept Galen's mistake** into the 17th century.

BIMARISTANS – ISLAMIC HOSPITALS

Built all across the Empire in **large centres of population** – easy access.

Treated everyone **with compassion** (unlike Christian hospitals) and **focus on curing** illness.

First hospitals for people with **mental illness** established.

Welcomed everyone, no matter of religion or wealth – inclusive healthcare.

Often designed to allow **natural breeze for fresh air** to help healing and cleanliness.

Centres for training new doctors, who worked alongside trained doctors to gain experience.

SIGNIFICANCE OF ISLAMIC MEDICINE

Something can be historically significant if you can NAME it…

- **N**EW – Something new, which had never been seen before.
- **A**PPLICABLE – Applicable or relevant to something happening in the present.
- **M**EMORY – Remembered in a particular way over time.
- **E**FFECT – A lot of people have been affected (immediately or over time).

N

First time mental illness had been specifically cared for.

First time measles and smallpox had been differentiated.

First time Galen had been argued to be wrong about the heart.

A

Hospitals today train new doctors under supervision of more experienced doctors.

M

E

Spread new knowledge to doctors with the books written.

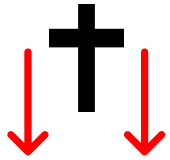
Provided the 'go to' medical textbook into the 17th century with the **Canon of Medicine.**

Health and the People: **Renaissance Medicine Overview**

Renaissance

The Renaissance saw the beginnings of change with medicine, it became much less superstitious and much more grounded in the need for scientific evidence.

WHAT ALLOWED MEDICINE TO DEVELOP DURING THE RENAISSANCE?



The Reformation resulted in the **Church losing power**. People still believed in God, but they were less afraid of challenging old ideas.

Scientific method of learning was adopted such as observation, hypothesis and experimentation.

The **invention of the printing press** by Johannes Gutenberg in the 1440s meant **new knowledge** could be **accurately** and **quickly** reproduced.

A new style of **art wanted to show the human form as realistic as possible** allowed for a more detailed study of the body to happen.

Voyages of Discovery brought back new knowledge and **plants with medical properties** which allowed for **new treatments** and a desire to continue to find other developments.

WHAT CHANGED ABOUT CAUSES AND TREATMENTS OF DISEASE DURING THE RENAISSANCE?

TREATMENTS

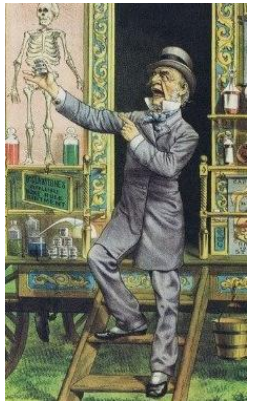
Bloodletting remained a popular treatment for many illnesses. It was even **used as a prevention** of ill health.

'The Royal Touch' was believed to cure some illnesses such as scrofula. 3,000 a year travelled to London hoping to receive this!

Herbal remedies continued in popularity, such as honey preventing infection.

Nicholas Culpepper's 'The Complete Herbal' discussed the properties of herbs and plants – he was even critical of bloodletting and purging. The printing press allowed for books to detail new treatments.

QUACK MEDICINE



Quacks were **travelling salesmen** who sold **'cure all' remedies.**

The medicines they sold didn't work and were dangerous because they contained…

Alcohol

Opium (a powerful drug)

Quacks **would leave the town before people realised** the remedies **did not work**.

THOMAS SYDENHAM

Was an **English doctor** who **identified epidemic diseases.**

He **promoted** observation of patients – called the **'English Hippocrates'.**

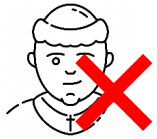
He was critical of Quack medicine and disagreed with dissections.

Used bleeding but also felt it was important for a disease to take its course without treatment.

Successfully treated malaria by using the chinchona bark and smallpox by a cooling therapy.

His book **'Medical Observations' (1676)** became the **standard English medical textbook.**

RENAISSANCE HOSPITALS



In 1536, **Henry VIII closed the monasteries in England**, leading to a loss of charity for the poor and the **closure of hospitals.**

Foundling hospitals were set up to care for orphans (or found children). These hospitals arranged for foster families to care for the babies and children until the age of 5. Aged 5-15 the children lived and were educated at the foundling hospital.

Voluntary hospitals were set up and funded by rich people who donated to them. **These treated the sick** (and not the needy like medieval hospitals). **Treatments here were usually free. Physicians worked in these hospitals.**

Health and the People: **Edward Jenner and Smallpox – The first vaccine**

Renaissance

Edward Jenner created the world's first successful vaccine. He found out that people infected with cowpox were immune to smallpox. In May 1796, English physician Edward Jenner expands on this discovery and inoculates 8-year-old James Phipps with matter collected from a cowpox sore on the hand of a milkmaid.

THE PROBLEM OF INOCULATION

Inoculation was when a healthy person was given a mild dose of a disease (usually from the pus or scabs of smallpox victims) to allow the immune system to develop strength against disease.

People **did not understand** how it worked.

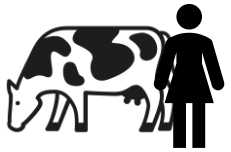
Only the rich could afford it as **it was expensive**.

It was easy to accidentally give **too high a dose** and kill the patient as they would **develop the full disease.**

Inoculated people became infectious while their immune system fought the disease, they could spread the disease!

THE WORK OF EDWARD JENNER

Edward Jenner was a doctor from Gloucestershire, who made the discovery in 1796.

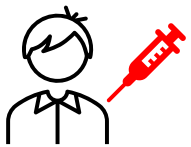


Jenner noticed that milkmaids did not seem to suffer from smallpox.

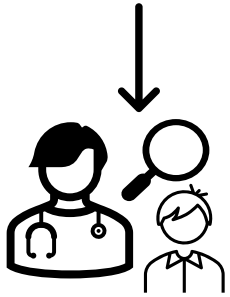
Jenner hypothesised that there must be a link between cowpox and smallpox.

Jenner harvested pus from a cowpox victim.

Jenner experimented on an 8-year-old boy called James Phipps and he inserted cowpox pus into James.



Six weeks later, Jenner inserted smallpox pus into James to test his idea.



Jenner studied James and no disease followed.

Jenner tested this again on **16 other people** – no one developed the smallpox infection.

Jenner concluded that cowpox protected humans from smallpox. He called this 'vaccination' – *vacca being Latin for cow.*

IMPACT OF JENNER

Attitudes towards vaccination and science changed as it was proved to work.

Jenners work made sure people noticed the method.

Smallpox vaccination was made compulsory in 1853.

Smallpox was eradicated worldwide in 1980.

OPPOSITION TO JENNER

Jenner did not understand the science behind why his vaccination worked – so couldn't repeat it for other diseases.

Jenner was rewarded with £10,000 from Parliament for his work on vaccination.

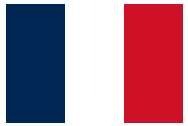
Manny doctors profited from giving inoculations, so vaccination did not immediately become popular.

Jenner was also not a city doctor and so faced snobbery against him!

Up to the 1860s, beliefs about the causes of disease were still based on ancient ideas, such as miasma. Louis Pasteur's discovery of germ theory would revolutionise medicine.

LOUIS PASTEUR & GERM THEORY

Who was Louis Pasteur?

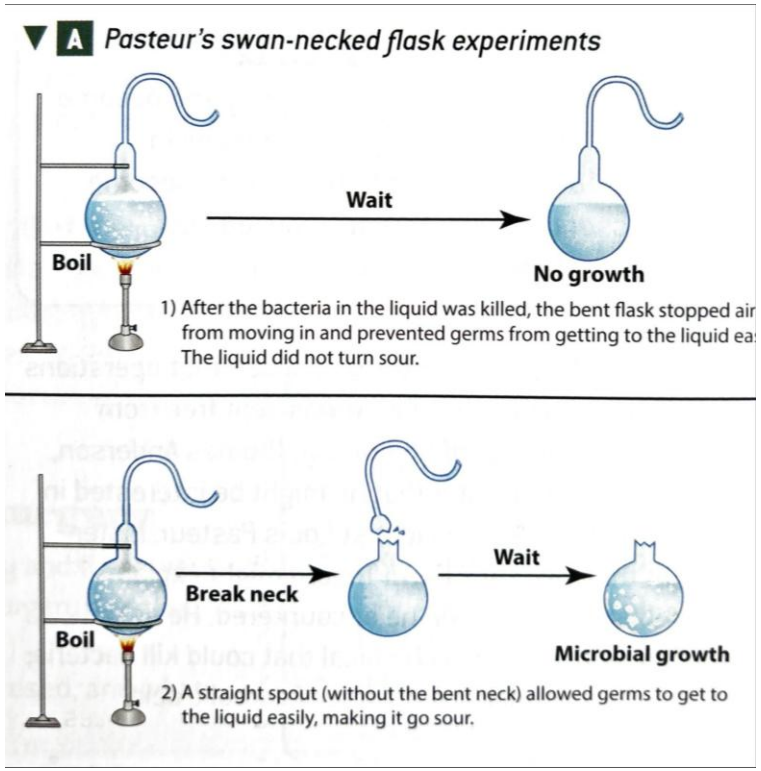


Pasteur was a French chemist and biologist. Rivalled Koch.

Employed by the French government to work out why wine and milk went off.

First to argue that bacteria (or germs) caused decay and disease. **This challenged the theory of Spontaneous Generation.**

How did Pasteur prove Germ Theory?



Why is Pasteur significant?

Devised **pasteurisation** – a process of heating liquids to kill bacteria.

He encouraged others to continue work in microbiology.

Contributed to vaccine technology against anthrax.

Vaccine against anthrax was communicated by newspapers.

Inspired Joseph Lister – and use of Carbolic Acid in surgery.

ROBERT KOCH

Who was Robert Koch?

Koch was a German microbiologist. Rivalled Pasteur.

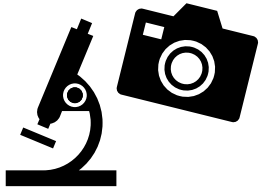
Was provided a team by the German government.

First to identify that specific bacteria lead to specific diseases.

How did Robert Koch develop understanding of disease?

Koch developed industrial dyes to stain bacteria which allowed them to be studied better.

Used solidified agar that allowed microbes to grow.



Developed a way to photograph microbes that allowed other scientists to study them.

Also developed a more powerful lens.

Why is Robert Koch significant?

Identified the specific bacteria that caused TB in 1882 and cholera in 1883.

Discoveries were spread by scientific papers and conferences.

Health and the People: **Factors for Pasteur & Koch and Opposition to Germ Theory**

INDUSTRIAL

Up to the 1860s, beliefs about the causes of disease were still based on ancient ideas, such as miasma. Louis Pasteur's discovery of germ theory would revolutionise medicine.

WHAT FACTORS HELPED PASTEUR AND KOCH?

Key individuals
Pasteur and Koch are both significant figures in the fight against disease. Their work relied on careful observation, scientific experiments, and years of work to develop new methods and treatments.

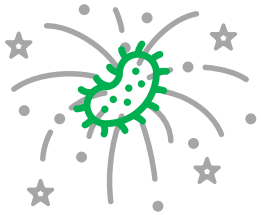
Chance
Pasteur developed the chicken cholera vaccine when he left some cholera germs unrefrigerated before going on holiday. When his assistant, Charles Chamberland, injected these germs into a chicken on their return, the chicken did not become ill. Pasteur realised that the old germs had given the chicken immunity without making it ill.

War
The 1871 Franco-Prussian War led to rivalry between Pasteur and Koch. Their respective governments invested in their research to show they had more advanced science and for national pride.

Technology
Koch's assistant, Julius Richard Petri, invented the Petri dish. This enabled Koch to grow bacteria. He could then use industrial dyes to stain the bacteria. Finally, he could use powerful microscopes to identify the bacteria.

OPPOSITION TO GERM THEORY

As germ theory was so revolutionary, **many people refused to believe it.**



Henry Bastian was an English surgeon. He did not believe in Pasteur's germ theory. Bastian argued that germs came from **spontaneous generation**, so they appeared as a symptom of disease rather than a cause.

Bastian wrote several books and articles where he spoke out against germ theory.

SUPPORT FOR GERM THEORY

High-profile doctors in Britain translated and promoted the work of Pasteur and Koch.

John Tyndall carried out an experiment where he placed items such as meat and fish in a wooden chamber that had sterile air in it. None of the items went off when he did this. When he put the items in non-sterile air, they went bad.

This helped Tyndall to **prove that the idea of spontaneous generation was wrong**. He had shown that microbes in the air made things go off and caused disease.

Tyndall shared his findings with Pasteur and helped to persuade people that germ theory explained how disease was caused.

Health and the People: **Magic Bullets and Penicillin**

The turn of the twentieth century saw major developments in the treatments of diseases with magic bullets and the birth of antibiotics.

EHRLICH'S MAGIC BULLETS

Following Louis Pasteur's germ theory and Robert Koch's work on identifying specific bacteria, researchers began to **find ways of killing germs inside the body without harming healthy human tissue.** This idea was called a 'magic bullet'.

Ehrlich had worked with Koch and had a theory that some chemicals might be able to **kill specific germs without harming healthy human tissue.**

Ehrlich investigated chemicals that would kill **syphilis** germs without harming human cells. He tested various substances by **infecting rabbits** with syphilis, then giving them a chemical to see whether the rabbit would be cured without the medication making them ill.

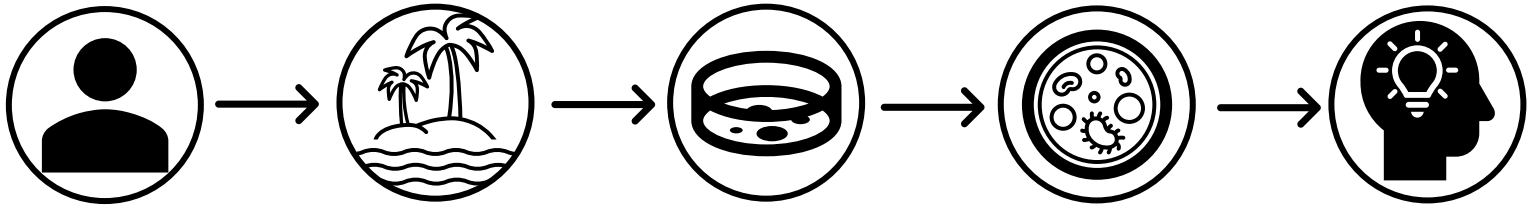
Salvarsan was found **to only target syphilis** and as it was the **606th compound** they had tried, it was named 'Salvarsan 606'.

Why were magic bullets significant?

Salvarsan 606 was a key breakthrough. It **led to research into other chemicals that might be magic bullets.**

PENICILLIN – THE FIRST ANTIBIOTIC

How was penicillin discovered?



Alexander **Fleming** was a Scottish doctor.

He went on holiday after researching Staphylococcus.

He left out a petri dish of Staphylococcus.

A mould grew and killed the bacteria around it.

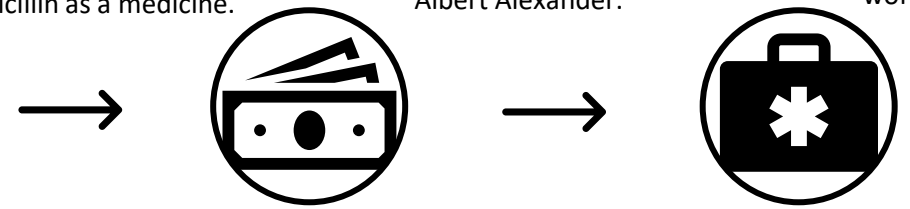
Fleming identified this as penicillin and wrote his findings in a medical journal.

How was penicillin developed?

Florey and **Chain** found Fleming's findings and attempted to use penicillin as a medicine.

They produced penicillin for human trials and treated a policeman – Albert Alexander.

They ran out of penicillin supplies before Alexander could recover and he died – but they proved it worked!



Florey and **Chain** received **funding** from the UK (£20) and US ($3 million) governments during WW2 to mass produce the drug.

250,000 soldiers were treated with penicillin and new methods were used to produce it.

What factors helped?

Health and the People: **Modern developments**

MODERN

Since World War Two, there have been significant developments in new medicines and treatments.

WATSON & CRICK (DNA)

Rosalind Franklin was an English researcher and an expert in the use of X-rays. During the 1950s, she **used X-rays to take images of DNA**.

In 1953, Francis **Crick** (a British researcher) and James **Watson** (an American geneticist) built on the earlier work done by Franklin. They were able to **discover the double helix structure of DNA.**

Watson and Crick **wrote about their findings in the medical journal 'Nature'.**

This has **helped researchers to understand the causes of some diseases**. This field focused on **developing treatments** based on the structure and make-up of people's DNA.

OTHER DEVELOPMENTS

The use of in vitro fertilisation (IVF) led to the birth of Louise Brown in England in 1978.

This allows people who have trouble conceiving a baby naturally to receive some help. Although it is not always successful.

New vaccines have been developed!

The HPV (human papillomavirus) vaccine is now routinely offered to young people in Britain. This reduces their chance of developing certain cancers.

Pfizer and Astra-Zeneca used MNRA technology to develop an effective **vaccine to fight Covid-19.**

MHRA (drug regulator) tests and regulates all medicine in the United Kingdom to ensure it is safe for use on humans.

Before there was adequate testing, drugs like **Thalidomide caused infant disfigurement.**

Pharmaceutical industry mass produces drugs that can be purchased over the counter.

This means many minor illnesses such as the flu and colds can be treated at home using paracetamol and other painkillers.

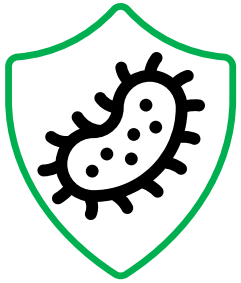
ALTERNATIVE MEDICINE

Acupuncture
Using needles inserted into specific parts of the body to help with pain relief.

Hypnotherapy
Using relaxation and focusing of thoughts to support people with mental health challenges or help them change their behaviour.

Herbal remedies
People take herbs to help with a range of medical issues, including mental health challenges, pain or a low immune system.

ANTIBIOTIC RESISTANCE (MRSA)



In recent years, a problem has emerged with some bacteria becoming resistant to antibiotics. One example bacterium is MRSA. These bacteria are sometimes referred to as superbugs. Some of the potential causes of antibiotic resistance include:

- **patients not fully completing a course of antibiotics**
- **overuse of antibiotics**
- **use of antibiotics in some farming**

There is a concern that antibiotic resistance could grow, so more bacteria become resistant to antibiotics. Superbugs could make easily treatable infections life threatening again. To deal with this, research is being done to try to discover new antibiotics and ways of dealing with superbugs.

Theme:
Public Health

Health and the People: **Medieval Public Health**

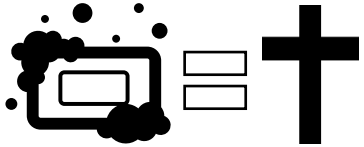
MEDIEVAL

Public health in the medieval period very much depended on where you look. The monasteries were designed with cleanliness in mind, but the towns were a law unto themselves, despite some attempts to clean them up!

WHERE WAS PUBLIC HEALTH GOOD IN THE MEDIEVAL PERIOD?

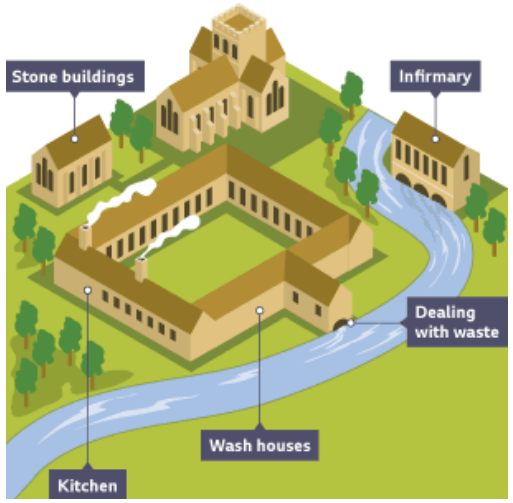
Monasteries had the best public health in the medieval period.

- ✓ 1,000+ monasteries all over the country.
- ✓ Isolated locations.
- ✓ Gave people **free care** when they were in need.
- ✓ **Preserved ancient ideas** about medicine.



A belief that '**cleanliness was next to Godliness**' and therefore a huge focus on hygiene.

Located on **rivers to carry away wastewater**.



WHERE WAS PUBLIC HEALTH BAD IN THE MEDIEVAL PERIOD?

Medieval towns had problems with public health. Filthy streets and poor provided the perfect conditions for the spread of disease.

WHAT WERE THE PROBLEMS WITH MEDIEVAL TOWNS?

Butchers **dumped entrails** into streets and streams.

Human waste was left in the streets.

Rat population thrived and spread disease.

There were **no official waste collections**, so dirt collected in streets.

HOW WAS MEDIEVAL PUBLIC HEALTH IMPROVED?

Butchers **banned from slaughtering** in the street.

1309 - **40p fine** was introduced for anyone dumping rubbish in the street.

Gongfarmers had the job of emptying out drains. Dig the sewage out and were supposed to take it out of the city on a horse and cart.

Muck rakers - were a bit like street cleaners. They were paid to remove waste from streets.

Surveyors of the pavement - remove rubbish and waste from pavements.

CASE STUDY: THE BLACK DEATH 1348

MEDIEVAL BELIEFS ON CAUSES OF THE BLACK DEATH

Miasma – bad smells/ air causing illness.

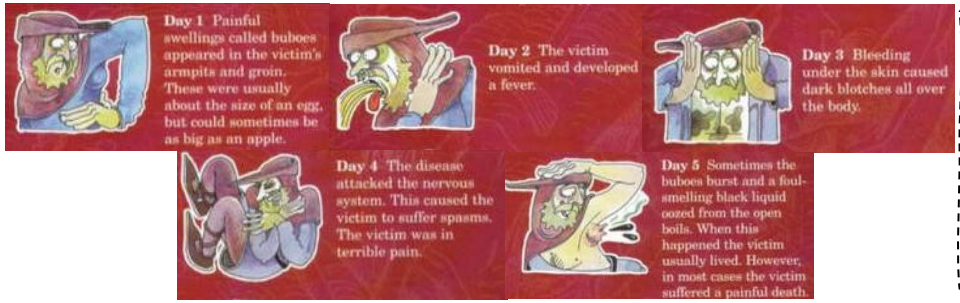
Punishment from God.

Witchcraft – a curse.

Bad alignment of the **planets**.

Belief that **Jews** had **poisoned wells**.

BLACK DEATH SYMPTOMS



The real cause of the Black Death was a **bacteria called *yersinia pestis*** which thrived in the fleas that lived on the rats.

Trade routes allowed it to spread.

TREATMENTS AND PREVENTIONS USED DURING THE BLACK DEATH

Flagellation – whipping yourself to show penance to God.

Prayer.

Drinking mercury.

Popping the buboes – this gave an improved survival rate.

Placing a **shaved chicken's bottom** on the buboes to draw out the poison.

Rubbing a frog or toad into the buboes– aiming to draw out the poison.

Fleeing affected areas – further spreading the plague across the country.

The Great Plague of 1665 has many similarities with the Black Death of 1348, but there was one major change – a connection between dirt and disease!

BELIEFS ABOUT CAUSES OF THE GREAT PLAGUE

Miasma – bad smells/ air causing illness.

Punishment from God.

Witchcraft – a curse.

Bad alignment of the **planets**.

Natural disasters – these were blamed for the plague.

Imbalance of the Four Humours

Dirt and disease link
People realised that the poorer and dirtier parts of London were worst affected.

PREVENTIONS AND TREATMENTS OF THE GREAT PLAGUE

Flagellation – whipping yourself to show penance to God.

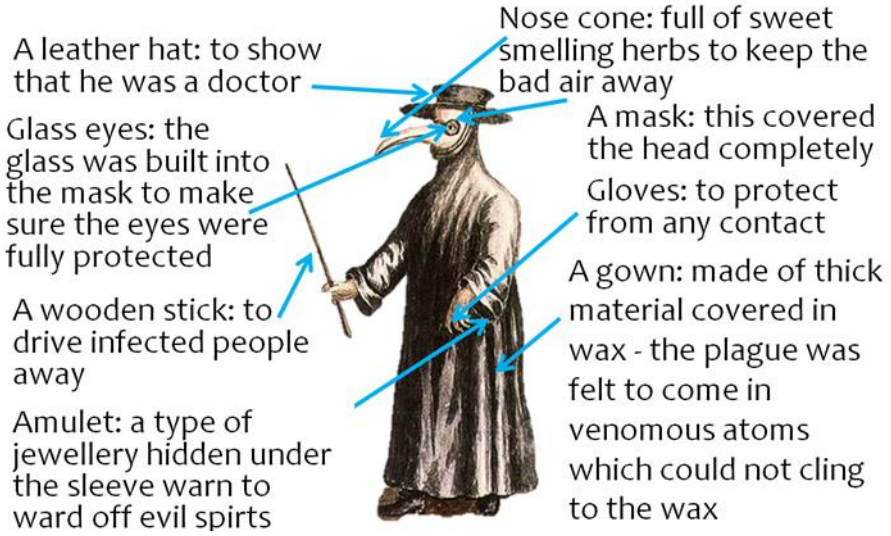
Prayer.

Smoking tobacco – to keep away poisoned air.

Using animals like frogs, pigeons, snakes and scorpions – aiming to draw out the poison.

Sniffing a sponge soaked in vinegar – to keep away poisoned air.

Wearing amulets (charms).

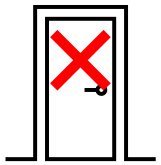


GOVERNMENT RESPONSE TO THE GREAT PLAGUE

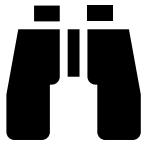
In 1665, there was a much greater government response to the Plague than there had been in 1348 with the Black Death. **This epidemic remained contained within London which shows that these measures worked!**

Bills of Mortality
These documents showed what people died of, and how many were dying of certain diseases. It allowed the government to track deaths of the Plague and in what area.

Street Fires
As miasma was still believed, the Mayor of London ordered street fires to be lit to keep away the 'bad air'.



Quarantine
Households of the infected were banned from leaving their home, and red crosses were drawn on the doors to alert the neighbourhood.



Searchers
People were given the job of enforcing quarantines and checking when people had died from the plague.

It's important to remember that Jenner fits into both themes of Causes, Prevention and Treatment of Disease AND Public Health.

THE PROBLEM OF INOCULATION

Inoculation was when a healthy person was given a mild dose of a disease (usually from the pus or scabs of smallpox victims) to allow the immune system to develop strength against disease.

People **did not understand** how it worked.

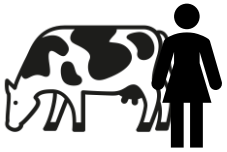
Only the rich could afford it as **it was expensive**.

It was easy to accidentally give **too high a dose** and kill the patient as they would **develop the full disease.**

Inoculated people became infectious while their immune system fought the disease, they could spread the disease!

THE WORK OF EDWARD JENNER

Edward Jenner was a doctor from Gloucestershire, who made the discovery in 1796.

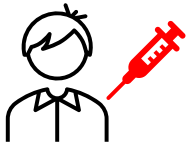


Jenner noticed that milkmaids did not seem to suffer from smallpox.

Jenner hypothesised that there must be a link between cowpox and smallpox.

Jenner harvested pus from a cowpox victim.

Jenner experimented on an 8-year-old boy called James Phipps and he inserted cowpox pus into James.



Six weeks later, Jenner inserted smallpox pus into James to test his idea.

Jenner studied James and no disease followed.

Jenner tested this again on **16 other people** – no one developed the smallpox infection.

Jenner concluded that cowpox protected humans from smallpox. He called this 'vaccination' – *vacca being Latin for cow.*

IMPACT OF JENNER

Attitudes towards vaccination and science changed as it was proved to work.

Jenners work made sure people noticed the method.

Smallpox vaccination was made compulsory in 1853.

Smallpox was eradicated worldwide in 1980.

OPPOSITION TO JENNER

Jenner did not understand the science behind why his vaccination worked – so couldn't repeat it for other diseases.

Jenner was rewarded with £10,000 from Parliament for his work on vaccination.

Manny doctors profited from giving inoculations, so vaccination did not immediately become popular.

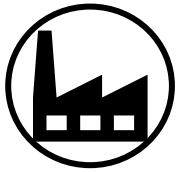
Jenner was also not a city doctor and so faced snobbery against him!

Health and the People: **Industrial Dangers and John Snow & Cholera**

INDUSTRIAL

In the 19th century, urban populations grew rapidly. Public health conditions were poor and this contributed to the spread of diseases such as cholera, typhus and typhoid.

INDUSTRIAL PUBLIC HEALTH DANGERS



Industrialisation resulted in **mass urbanisation** – causing public health problems.

Factory owners often built cheap houses for their workers. Back-to-back housing was common, with families living in a single room.

Pumps in the street supplied **heavily polluted water**. Cracked pipes could also lead to contamination from Cesspits.

Huge amounts of coal were being burned to power new factories and mills in towns and cities. Air pollution caused significant damage to health, as a **thick smog hung over towns and cities.**

Diseases like cholera and typhoid were rife.

EDWIN CHADWICK

Chadwick carried out research into the living conditions in different parts of the country. This work was put together in his ***Report on the Sanitary Conditions of the Labouring Population of Great Britain*** **in 1842.**

The report showed the impact of conditions and wealth on life expectancy:

- Labourers in northern towns had a life expectancy of just 15-19 years.
- People living in rural northern areas had a life expectancy of 52 years.

Chadwick **wanted the government to take action.** He said the government should ensure a clean water supply for everyone and invest in proper sanitation systems.

JOHN SNOW AND CHOLERA

What is cholera?

Starting in 1819, a series of cholera pandemics spread the disease from the Ganges in India to the rest of the world, killing millions of people. In **1854, 23,000 died from the disease in the UK.**

Cholera kills its victims quickly through dehydrating them by causing severe diarrhoea and vomiting.

Most believed that cholera was caused by miasma and Germ Theory was not yet devised.

How did John Snow prove cholera was waterborne?

John Snow focused on cholera cases in Soho, London in

Snow plotted cases on a spot map.

Snow worked out that all cases were linked to the Broad Street Pump.

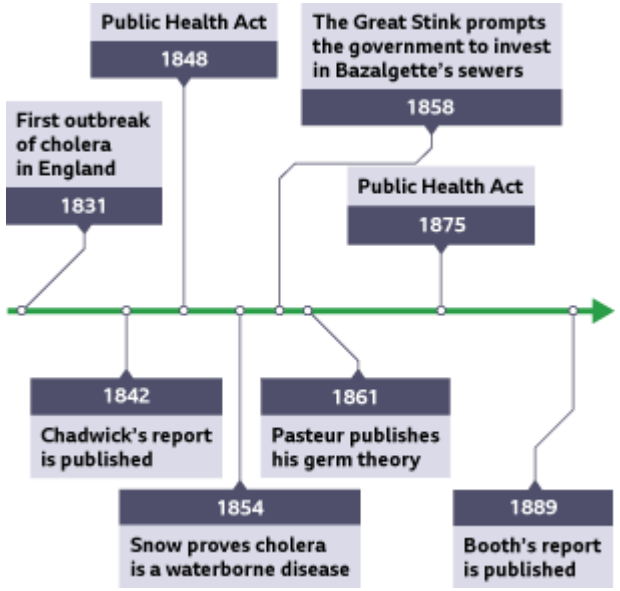
Snow identified that the brewery workers were not affected and had own water supply.

The council removed the pump handle and cases stopped.

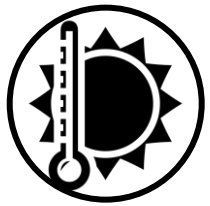
Snow proved cholera was a waterborne disease!

In the 19th century, urban populations grew rapidly. Public health conditions were poor and this contributed to the spread of diseases such as cholera, typhus and typhoid.

INDUSTRIAL PUBLIC HEALTH MILESTONES



THE GREAT STINK - 1858



The summer of **1858** was warm and dry. As a result, the **water level of the River Thames dropped**. This meant the **sewage** and waste that were being dumped in the river were **no longer being quickly washed away.**

The **resulting smell was awful and became such a problem that the Houses of Parliament were closed**. Miasma theory was still widely believed. As a result, people cleaned the walls of their homes with chloride of lime to take away the smell.

The government invested in the construction of a **new sewerage system for London**. This was designed by **Joseph Bazalgette**. The new system was designed in 1858 and completed in 1875.

There were no further significant cholera outbreaks in London.

PUBLIC HEALTH REFORMS

1848 Public Health Act

In 1848, the government responded to Chadwick's report and passed a Public Health Act. The act set up a Central Board of Health to oversee the improvement of public health. This meant that:

- Local authorities could set up a local board of health to oversee public health. If an area had a higher than 23 per 1,000 people, the local authority had to set up a board.
- The local board of health could then raise taxes to pay for clean water supplies and new sewerage systems.

The act was limited in that there was little funding and the local boards of health were usually not compulsory. However, it was an important first step in the government taking action to improve public health.

1875 Public Health Act

Following John Snow's work on cholera and Louis Pasteur's publication of germ theory, there was conclusive proof that cleaning up towns and cities would improve the health of the people who lived in them. There was now clear evidence that if public health systems were improved, lives would be saved. This marked a move away from a laissez-faire attitude.

This went further than the act of 1848. It said that **local authorities had to provide clean water supplies, build sewerage systems and appoint a medical officer.**

The government introduced further reforms in 1875-1876:

- The 1875 Artisans' and Labourers' Dwellings Improvement Act brought in new standards for housing quality.
- The 1875 Sale of Food and Drugs Act tightened laws around food labelling.
- The 1876 Rivers Pollution Prevention Act aimed to clean up rivers and the water supply.

Health and the People: **The Liberal Reforms**

After the public health reforms of 1875-1876, there was still a need for improvement. The Liberal Party brought in a series of measures at the start of the 20th century.

REASONS FOR THE LIBERAL HEALTH REFORMS

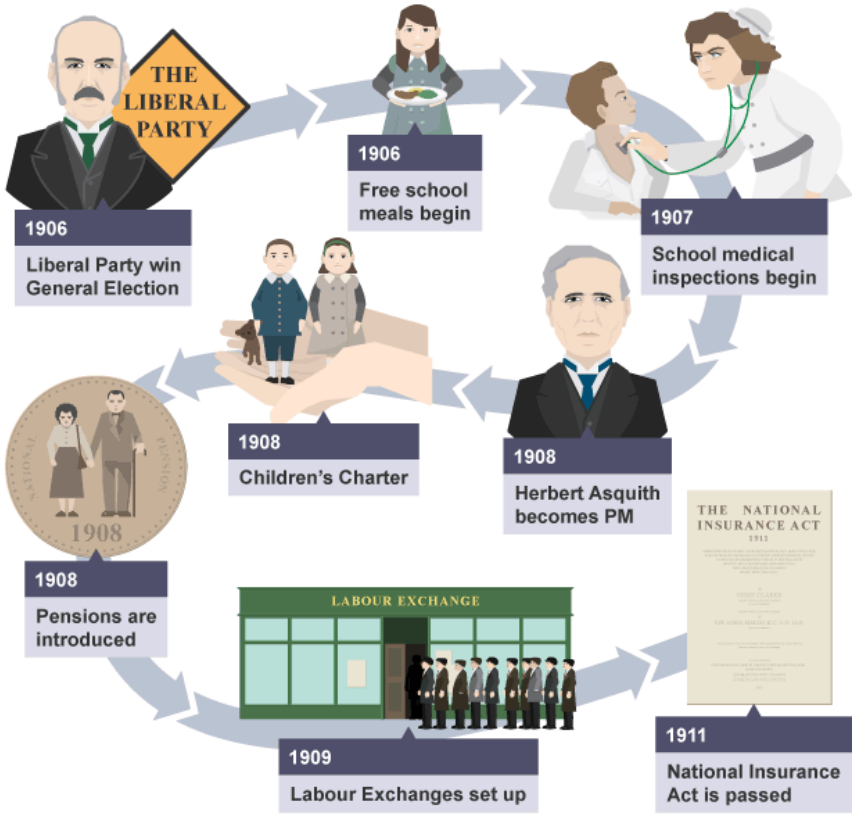
In the **1899 Boer War** Recruitment Campaign, **40% of men who volunteered were found to be too unfit** to serve.

The **1867 Reform Act** had given the vote to more working-class men. The **Liberal Party saw their own reforms as a way of maintaining the support of working-class voters.**

In 1904, the government published a report that said many men were not healthy enough because of the unhealthy lives they led.

Booth found in 1889 that 30% of Londoners were so poor they couldn't eat properly despite working full-time jobs. He called this 'absolute poverty'.

Rowntree completed a study in York in 1900 that found 28% of people did not have the minimum amount of money needed at some point in their life.



THE LIBERAL HEALTH REFORMS

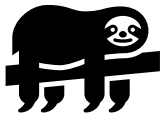
The Liberal reforms started to be introduced from 1906.

Some of the key changes were:

- In 1906, **free school meals** were introduced to improve the health of children.
- In 1907, **schools began medical inspections** of their pupils.
- In 1908, the **Old Age Pensions Act** was introduced. Eligible people, who were also over 70 years old with an annual income of less than 21 pounds per year, received a pension of five shillings per week. People who earned over 21 pounds per year or were married received a smaller amount. Anyone who earned over 31 pounds and 10 shillings per year received no pension.
- In 1909, the **Labour Exchanges Act** was brought in. Labour exchanges were similar to job centres today. Their aim was to match up employers and employees
- In 1911, the **National Insurance Act** came in. This set up a system where workers had a sum of money deducted from their wages to pay for health care and sick pay if needed.

OPPOSITION TO THE REFORMS

Some people argued that the Liberal reforms did not go far enough. The Labour Party said more should be done to help women, who were less likely to benefit from National Insurance. They also argued that old age pension payments should be higher.



Some Conservative Members of Parliament said that giving people too much from the state would make them dependent on being given aid and support. They also thought it might reduce people's desire to work. Additionally, there were concerns about the cost to taxpayers.

Health and the People: **The Welfare State & National Health Service (NHS)**

Following World War Two, the National Health Service (NHS) was created. There was some initial opposition from doctors and concerns about cost. However, the service was set up and has provided free health care in Britain since 1948.

THE BEVERIDGE REPORT

In 1942, William Beveridge wrote a report called *Social Insurance and Allied Services.* It became known as the Beveridge Report. He **recommended that the government should act to deal with what he called the 'five giants'.**

These were:

- **idleness** - caused by a lack of employment opportunities
- **ignorance** - caused by people lacking a good education
- **disease** - caused by unaffordable health care
- **squalor** - caused by poor-quality housing
- **want** - caused by poverty

Beveridge wanted the government to provide **'cradle-to-grave'** social security.

CAUSES OF THE CREATION OF THE NHS

The Beveridge Report came out in 1942 and showed a need for change.

During WW2, the British public were making sacrifices and there developed a desire for change.

The Labour Party campaigned in 1945 to act on the Beveridge Report whereas Churchill's government ignored it.

THE NATIONAL HEALTH SERVICE AND WELFARE STATE

Aneurin Bevan became Minister of Health in 1945 and designed the NHS around Beveridge's principles.

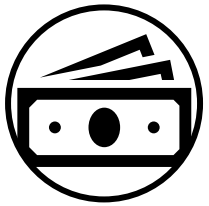
The NHS opened in 1948. The first patient was 13-year-old Sylvia Diggory, who was treated at Trafford General Hospital.

For the first time, everyone in the country could receive free health care, regardless of income.

This included eye tests, hearing tests, prescriptions and hospital care.

The NHS Today:

The NHS runs public health campaigns to try to encourage people to lead healthier lives. It encourages people to:
stop smoking, eat healthily, practise safe sex and get vaccinated (e.g. the flu vaccines)



The NHS faces ongoing challenges regarding the cost of new treatments. Decisions have to be made about which medications and services can be paid for by the NHS and which cannot.

OPPOSITION TO THE NHS

The General Medical Council, which represented doctors, was concerned that doctors would be employees of the government. They worried that doctors would lose their independence and receive less pay.

Some **politicians** argued that the cost of the NHS would be too great, and taxpayers should not have to pay.

The initial budget for the health service was £437 million per year - equivalent to around £15 billion in 2021. This was a huge amount of money after the debt of WW2.

Theme:

Surgery and Anatomy

Health and the People: **Medieval Surgery**

MEDIEVAL

Surgery was one of the few areas where there was progress in medieval medicine. This was because the number of wars across Europe gave surgeons many patients on whom to experiment with new techniques.

MEDIEVAL SURGERY SUMMARY

Trepanning* was drilling a hole into the head to release 'evil spirits' causing headaches.

Cauterisation was used to try and stop bleeding. This was when a red hot implement was pressed into the flesh to 'seal' the wound – very painful!

Amputation was a common treatment carried out by Barber-Surgeons.

Bloodletting through use of leeches or cutting into the flesh to balance the humours.

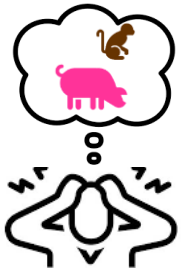
Re-setting broken bones or dislocated limbs were also carried out by Barber-Surgeons.

A wound man was a diagram that Barber-Surgeons could consult on how to deal with a particular injury.

WHO WERE THE KEY MEDIEVAL SURGEONS?

INDIVIDUAL	CONTRIBUTIONS TO SURGERY			
ABULCASIS	A **Muslim surgeon** considered the **'father of modern surgery'.**		**Wrote a 30 volume medical book (Al Tasrif),** in 1000 which spread new knowledge.	
JOHN BRADMORE	Treated an **arrow wound** in Prince Henry's face.	**Designed forceps** to remove arrow head and open the wound.	Used **honey** to keep the wound **free of infection.**	
JOHN OF ARDERNE	Gained knowledge in the **Hundred Years War**.	Used **opium** (drug) to help **manage pain.**	**50% survival rate** for anus operations.	Created an **illustrated manual** (*Practica*, 1376).
HUGH OF LUCCA AND SON THEODRIC	**Believed pus was bad for wounds** – challenging widely-held beliefs.		**Washed wounds in wine** – alcohol killed bacteria and this led to greater chance of infection-free wounds.	
DE CHAULIAC	**Textbook called Great Surgery (1363)** which dominated English and French knowledge for 200 years.		**References** to Greek and Islamic writers such as Avicenna, and he **quotes Galen 890 times.**	

WHAT PROBLEMS WERE THERE WITH MEDIEVAL SURGERY?



INCORRECT ANATOMICAL KNOWLEDGE

In the Middle Ages, **most still believed in Galen's ideas** that were **based on animal** anatomy.

The **Church's refusal to allow dissection** allowed this **incorrect knowledge to continue**.

When discoveries were made, it was **often believed that the body was wrong and Galen was right!**

3 MAIN PROBLEMS WITH SURGERY:

1. Pain – there was very little knowledge on how to reduce pain. Surgery had to be quick and could not be complicated.

2. Infection – there was very little knowledge on what caused infection and this led to many deaths after procedures from infection.

3. Blood loss – there was no way of replacing lost blood and this meant complex operations were not possible. Many died of blood loss.

Andreas Vesalius was able to prove in his studies that some of Galen's ancient ideas were wrong and this prompted other people to question long-held medical ideas and theories.

ANDREAS VESALIUS

Who was Vesalius and what did he do?

Studied at Padua University.

Specialist in human anatomy.

Carried out his own dissections on humans to learn about anatomy.

What did Vesalius discover?

Men and women have the same number of ribs – challenge to Galen.

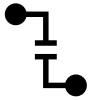
Blood did not flow from one side of the heart to the other – challenge to Galen.

Human jawbone was one bone on a hinge, not two separate bones – challenge to Galen.

What was the significance of Vesalius?

Wrote 'On the **Fabric of the Human Body**' in 1543. An encyclopaedia of human anatomy, which…

Included accurate and detailed drawings to help others learn.



Was organised into sections (digestive, reproductive, nervous systems etc.)

He encouraged others to carry out their own dissections.

He taught others in how to carry out dissections.

He corrected some of Galen's incorrect theories and updated knowledge of human anatomy.

AMBROISE PARÉ

Who was Ambroise Paré?

French Battlefield Surgeon.

Traditional method of dealing with gunshot wounds was cauterisation using hot oil.

Paré disliked the use of this as it caused pain to his patients.

Paré ran out of oil and created an ointment of egg, rose oil and turpentine.

By chance, he had discovered a more effective treatment, but he didn't understand why.

Paré used ligatures to tie blood vessels and stop bleeding. This was effective in stopping blood loss but could introduce infection.

What was the significance of Paré?

Paré showed that new methods, such as his ointment, could be more successful than ideas that had been followed for centuries.

He wrote about his ideas in several books, including Treatise on Surgery in 1564.

Ligatures would be useful. However, ligatures needed to be properly sterilised to lower the risk of infection.

Health and the People: **Harvey and Hunter**

Renaissance

William Harvey and John Hunter continued to develop understanding of human anatomy, from identifying the correct purpose of the heart and promoting a scientific approach.

WILLIAM HARVEY

Who was Harvey?

Studied at **Padua** University, after Vesalius and was inspired by his approach.

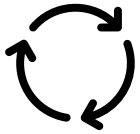
Worked at **St Bartholomew's Hospital** in London.

Was physician to James I and a fellow of the Royal College of Surgeons.

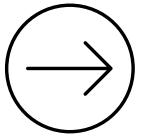
Carried out his own **dissections on cold-blooded animals like frogs and lizards** to learn about the heart.

What did Harvey discover?

The heart was a pump.



Blood circulates the body and is not created in the liver and used up in the muscles. Blood flows in only one direction.



Blood vessels have valves which he discovered by using rods that could only be pushed in one direction.

How did Harvey's ideas spread?

Wrote '**On the Motion of the Heart**' in 1628. The book included details and diagrams of experiments Harvey had carried out to support his findings.

His high profile as physician to the king helped Harvey's work to be widely shared.

JOHN HUNTER

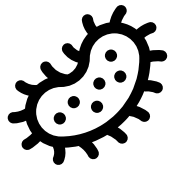
Who was Hunter?

Trained as a surgeon at St Bartholomew's Hospital in London.

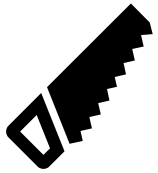
Developed a **collection of over 14,000 human and animal anatomical specimens** to encourage people to see surgery as a science.

Why should we remember John Hunter?

He was **keen to develop more scientific methods** in researching medicine.



Carried out an **experiment to prove his belief that syphilis and gonorrhoea** were caused by the same disease. He was wrong!



Hunter **disproved the idea that a gunshot injury poisoned the area around the wound.**

He also argued that **amputation should only be carried out as a last resort.**

Hunter **saved a man's leg when he tied off an aneurism and the blood found a new route.** The man would have had his leg amputated had it not been for Hunter's theory!

Why was Hunter significant?

Hunter was **responsible for the training of other doctors.** These included **Edward Jenner**, who went on to discover the Smallpox vaccine.

His high profile helped his work to be widely shared.

Surgery at the start of the 19th century was carried out on patients when they were conscious. Discoveries by Humphry Davy, William Morton and James Simpson meant effective anaesthetics were routinely being used by the end of the century, but they still had some problems! James Simpson found a better solution…

THE PROBLEM OF ANAESTHETICS

Medieval and Renaissance Anaesthetics

Alcohol was used to **dull pain,** but this **caused a faster heartbeat** and could lead to greater blood loss.

Drugs like opium and hemlock were used but patients were **often given too much** and overdosed or **too little and it had no effect.**

Anaesthetic Developments into the Industrial Period

Nitrous Oxide (Laughing Gas)

In 1799, Humphry Davy discovered that nitrous oxide worked as an effective local anaesthetic. He gave it the name 'laughing gas' and wrote about its potential in surgery.

Horace Wells used nitrous oxide in a public demonstration to remove a tooth, but the patient wasn't given enough of the gas. As a result, they made a noise during the procedure, which convinced people it didn't work.

Ether

William Morton proved that ether worked effectively in preventing patients from feeling pain and quickly became widely used by surgeons in England. However, ether had problems too:

Caused irritation and some patients were sick from it.

Some woke up during surgery!

It was highly flammable!

JAMES SIMPSON & CHLOROFORM

James **Simpson** was a Scottish doctor.

In 1847, Simpson and some friends experimented with **chloroform**.

Knocked it over and **all were put to sleep**! His wife found them.

Chloroform was discovered to be an **effective general anaesthetic.**

Chloroform replaced ether as the most widely used anaesthetic.

Patients were still during an operation and felt no pain.

Surgeons could start to consider more complex operations.

OPPOSITION TO ANAESTHETICS

Some people in the Church argued that pain in childbirth was sent by God, so **using anaesthetics for women in labour was believed to be interfering with God's will**

When not used carefully, anaesthetics could be dangerous. **Hannah Greener was a 15-year-old girl who died during a procedure to remove an ingrown toenail** because she was given too much chloroform.

Army surgeons argued that patients being awake and in pain helped them to understand how the patient was feeling.

In 1853, when giving birth to her eighth child, **Queen Victoria used chloroform**. Her doctor was John Snow. She later spoke of that 'blessed chloroform' in easing the pain of childbirth. This **gave the public reassurance that chloroform was safe and effective.**

Health and the People: **Lister Cleans Up Surgery (Carbolic Acid)**

INDUSTRIAL

Following Louis Pasteur's discovery of germ theory, Joseph Lister found a way to kill germs in an operating theatre. This reduced the risk of infection.

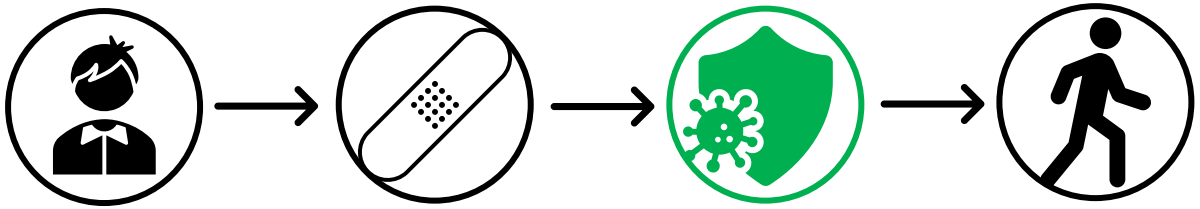
JOSEPH LISTER AND CARBOLIC ACID

Joseph **Lister** was a Scottish surgeon. He **read about Pasteur's work on germ theory**.

Lister **theorised that infection was caused by microbes breaking the skin** barrier.

Lister looked for a chemical that could be used to **create a barrier** and he was recommended **Carbolic Acid**.

How did Lister prove Carbolic Acid worked?



Jamie Greenlees was run over, and his bone broke the skin in 1865.

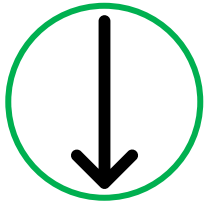
Lister set the bone and soaked bandaged in Carbolic Acid.

Jamie's wound stayed infection free, with some irritation.

Jamie walked out of hospital 6 weeks later – Lister had proved it worked!

What was the impact of Carbolic Acid?

Carbolic acid spray started to be used widely in surgery. Lister designed a pump at the side of the operating table. This **sterilised the air, equipment, dressings and surgeons' hands.**



Mortality rates in his surgery fell from 46% to 15%. This was a huge step forward in making surgery safer.

OPPOSITION TO LISTER

Some surgeons complained that the acid **irritated their eyes and hands,** making it difficult to carry out delicate surgery.

Some surgeons found the **machine spraying the acid was getting in the way** and making it more difficult for them to concentrate.

Instruments and **equipment** were soaked in the acid, **making them slippery**.

ASEPTIC SURGERY – IMPACT OF LISTER

William Halsted, asked a tyre company to **make rubber gloves for him to wear during operations**. Halsted came up with the idea after speaking to a nurse who had suffered from dry skin on her hands due to the use of carbolic spray. The use of gloves helped to make surgery cleaner and therefore safer.

Aseptic surgery became the aim - to sterilise equipment and hands, so there were **no germs that could cause infection during an operation**. This would later mean there was no need for carbolic acid to be used.

William **Roberts** was a Welsh physician. In the 1870s, he carried out a series of experiments to prove that the idea of spontaneous generation was wrong. Roberts also spoke out in favour of Lister's carbolic spray.

William **Cheyne** worked with Lister and studied the work of Robert Koch and translated it into English. This was important in enabling Koch's work to be widely shared and understood by doctors in England. He also went on to write books on the use of antiseptics in surgery. He also further promoted the work and research of Koch.

Health and the People: **Impact of the First World War**

MODERN

During World Wars One and Two, there were many advances in surgery, including plastic surgery and blood transfusions.

INJURY & PROBLEM	BULLET WOUNDS	FACIAL INJURIES FROM SHRAPNEL BLAST	BLOOD LOSS	LOST LIMBS AND INFECTION
SOLUTION & DEVELOPMENT(S)	Marie Curie **developed mobile x-ray units** that could be driven close to the front line. Surgeons x-rayed patients before surgery.	**Harold Gillies** developed **plastic surgery.** Gillies pioneered new skin graft techniques. In one technique, he moved a patch of skin on the face, called a **pedicle**. He left the veins attached to it, so it still had a blood supply and could successfully be attached to a different part of the face.	**Karl Landsteiner discovered blood groups in 1901**, this allowed for transfusions to be carried out. Use of **heparin** (which was added to donated blood) allowed for **blood banks to** be set up as it **prevented blood from clotting.**	**Wound excision** Infected flesh was cut away from wounds and they were washed with saline solution before being closed. **Thomas Splint** A splint was used to set and keep a broken bone straight in the leg – this previously had only a 20% chance of survival, it now had 80%. **Prosthetic limbs** replaced lost limbs in the war. They were heavy and cumbersome.
IMPACT	Surgeons could see what internal injuries a patient had, meaning surgery could be better planned and was safer.	Facial reconstruction allowed for men who had been disfigured to live a relatively normal life.	More soldiers survived despite heavy losses of blood. These techniques could then be used in hospitals across Britain.	**New and more sophisticated artificial prosthetic limbs were designed.** A company in London that made industrial and electric tools began to manufacture a new prosthetic leg made of metal. **This was lighter and easier to manoeuvre.**

During World War Two, there were further developments in surgery. Since 1945 there have been many technological developments in surgery too.

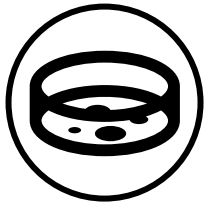
IMPACT OF WW2

Archibald McIndoe was born in New Zealand and was a cousin of Harold Gillies.

During World War Two, he worked with soldiers who had suffered severe facial injuries, especially from burns. McIndoe treated the physical injuries. He also supported soldiers who had difficulties with their mental health because of severe disfigurement from physical injuries.

Charles Drew was an American surgeon. He came up with **new methods to store and transport blood.**

When World War Two began, Drew was put in charge of a campaign called Blood for Britain. This involved US civilians donating blood, which was transported to Britain using Drew's techniques. It was then used to treat injured British civilians and soldiers in blood transfusions.



Penicillin was mass produced for the first time. Howard Florey and Ernst Chain's success in mass producing the first antibiotic meant US soldiers injured at D-Day were all given penicillin to **reduce the risk of infection to their wounds**.

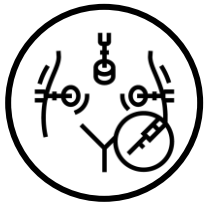
MODERN DEVELOPMENTS IN SURGERY

Radiotherapy allows doctors to shrink tumours without the need of invasive surgery.

CT scans allow surgeons to see inside the body to plan operations.

Lasers have replaced scalpels in some operations and this cauterises wounds.

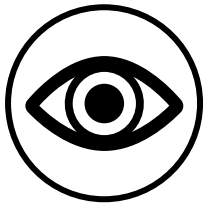
Transplants – today, surgeons can transplant some organs. Improved drugs have reduced risk of organ rejection.



Keyhole surgery – surgeons can operate using cameras and small incisions. This improves recovery time.

Open heart surgery and **pacemakers** have been developed to treat malfunctioning hearts.

Improved anaesthetics and antiseptics have led to improved outcomes.



Lasers are used in eye surgery and cataract removal.