C1250-c1500: Medicine in medieval England

Religious explanations of the cause of disease	Supernatural explanations of the cause of disease
The church taught that God made people ill because He was displeased with them or He was testing their faith.	The alignment of planets and stars could cause some diseases.
People believed the church was right so there was no need to search for any other explanation for disease. This held back medical research and meant there were not many new medical ideas	Astrology was used to help diagnose what was wrong with a patient. Use of astrology wasn't new but increased during this period – especially after the Black Death.

The Four Humours

Hippocrates and Galen
Everyone has a mix of four humours in their body.
When the mix was imbalanced, people became ill.
Balancing the humours again would make someone better – you could do this by purging, bleeding or using the theory of opposites.
Theory was popular because it covered nearly every type of illness you could get.

Who treated the sick?

Physician	Apothecary	Barber Surgeon	Wives
Medically trained at university and passed exams. Diagnosed illnesses and gave treatments, or sent patients to the apothecary or barber-surgeon. Expensive, so mainly used by the wealthy. Very few of them, with women physicians incredibly rare.	Received training but no medical qualifications. Mixed medicines and ointments based on their own knowledge or directions of a physician. Cost money – but less than a physician.	No training. Carried out bloodletting, pulling teeth and lancing boils. Also cut hair! Di basic surgery such as amputating limbs (very low success rate). Cost less than a physician.	Most ill people throughout this period were treated at home by a female family member. The village 'wise woman', often the Lady of the Manor would also tend to people in their homes for free.

Hospitals

Number of hospitals increased during the middle ages;
Mostly run by the Church, so emphasis on God and healing souls;
Patients given food and plenty of rest.

How people thought the Black Death was caused	How people tried to avoid catching it
Religion: God sent the plague as a punishment for people's sins. **Astrology:** the position of Mars, Jupiter and Saturn was unusual at this time. **Miasma:** Bad air or smells called by decaying rubbish **Volcanoes:** poisonous gases from European volcanoes and earthquakes carried in the air. **Four Humours:** most physicians believed that disease was caused by an imbalance in the Four Humours. **Outsiders:** strangers or witches had caused the disease.	**Praying and fasting:** because people believed that God had sent the disease, it made sense to show God they were sorry by punishing themselves. **Clearing up rubbish** in the streets. **Smelling** their toilets or other bad smells, in the belief this would overcome the plague. **Lighting a fire** in the room, ringing bells or having birds flying around the room to keep the air moving. **Carrying herbs and spices** to avoid breathing bad air. Not letting **unknown people** enter the town or village.

C1500-1700: The Medical Renaissance

Continuity

The theory of miasma continued to be believed by many to be the cause of disease. It was a particularly popular theory during epidemics.
The Theory of the Four Humours continued to be an accepted explanation for disease, although by 1700 very few physicians still believed in it.

Change

Gradually, throughout the Renaissance period, fewer people believed in supernatural or religious causes of disease. Various new rational explanations for disease were suggested, such as seeds in the air spreading disease. The real change in the period was the reduced influence of the Church and a scientific approach to diagnosing illness.

Sydenham

Sydenham worked as a doctor in the 1660s and 1670d. He wrote the book *Observationes Medicae* (1676) outlined his theories and observations. He didn't rely on medical books when making a diagnosis, but observed patients and recorded symptoms in detail.
He was important in the 'new' idea that a disease had nothing to do with the nature of the person who had it. He treated the disease as a whole not individual symptoms.

Vesalius

Vesalius studied medicine in Paris in 1533, then became a professor of surgery in Padua, Italy. He carried out a large number of dissections on human bodies and many discoveries on how the body worked.
He improved understanding of the human body. He made the study of anatomy fashionable. He proved some of Galen's theories incorrect, which encouraged others to question his work. His work was widely published.

Harvey

Harvey was a lecturer of anatomy and had a keen interest in dissection and observing the human body. He believed dissection and observation would improve knowledge of the body. He carried out public dissections to teach training physicians. He taught them to observe the body rather than read classical texts. Harvey worked particularly closely with blood. He had been taught Vesalius's theory that all blood flowed towards the heart. Through dissections Harvey was able to prove that blood could only flow one way through these valves because when he tried to pump liquid the other way through veins it did not work. This contradicted Galen's theory about blood, Galen had said that blood flowed from the liver to provide energy and was burnt up. – Harvey said if this had been correct then the body would need to produce 1,800 litres of blood every day!

The Great Plague, 1665

Causes	Treatment	Prevention
Astrology: Unusual alignment between Mars and Saturn God: punishment for humankind's wickedness. Miasma: stinking rubbish and dunghills were common – the bad air was making people ill. People: the belief that disease could be spread from person to person was new but there was no proof.	Quarantine: Eyam, separating victims so they cannot infect others. Sweat the disease out Transference: strap a chicken to a buboe to draw the poison out. Herbal remedies Quack doctors: mixed remedies and advertised fabulous cures to try to make easy money.	Prayer and repentance quarantine Carry a pomander: to drive away miasma diets: lots of garlic and butter Plague doctors: special costumes to avoid infection or spread of disease Fire: to drive away miasma

Government actions: Streets and alleyways swept and cleaned; fires burnt on street corners; cats, dogs and pigeons killed; public meetings were banned; quarantining was enforced.

C1700-1900: Medicine in 18th & 19th century Britain

Spontaneous generation: the belief that germs were produced by decaying matter. This led to miasma becoming a much less popular theory.

Microscopes: developed by 1700. Allowed the identification of what became known as bacteria or germs. By 1850 they had been improved to provide even clearer images.

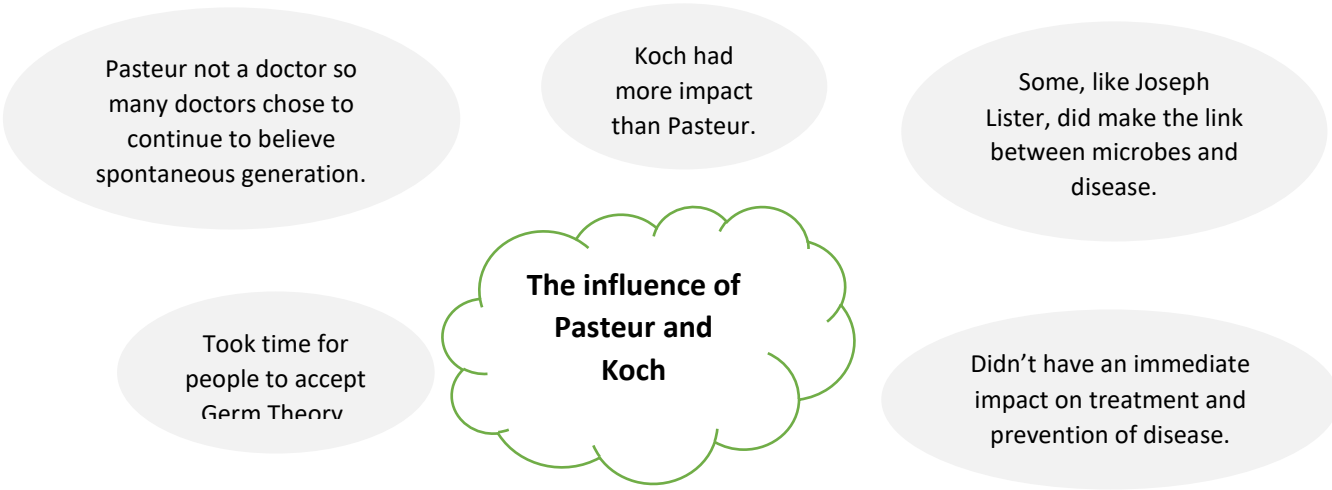
Germ Theory

In 1861, Louis Pasteur (a French chemist) published his Germ Theory, which showed that spontaneous generation was incorrect. He proved that microbes (bacteria or germs) in the air cause decay. He theorised that germs also caused disease but was unable to prove this.

Robert Koch (a German doctor and scientist) read Pasteur's work and began to study microbes himself. He proved that his theory was right, that microbes caused disease as well as decay. He identified the specific microbes that caused TB in 1882, and cholera in 1883.

Koch developed a new, easier way of growing bacteria in agar jelly, and discovered that chemical dyes stained bacteria, which made them easier to see under a microscope. Other scientists used these methods to identify the microbes that caused other diseases.

Eventually these discoveries were to have a direct impact of the prevention and cure of many diseases.



Florence Nightingale

Significant in influencing improvements in hospital care and public opinion about conditions within hospitals

Before FN, nursing wasn't seen as a respectable job for women and there was little training provided.

She attended the first nurses' training school in Germany.

She was asked to lead a team of nurses during the Crimean war.

She believed that miasma caused disease, so emphasised hygiene, fresh air, good supplies and training for nurses. Her approach lowered the death toll at Scutari hospital (Crimea) from 42% to 2%.

Anaesthetics

Joseph Lister: read Pasteur's Germ Theory, following this he started to soak bandages in carbolic acid to avoid wounds from becoming infected. He also developed a spray to kill germs in the air. In 1867, Lister stated that his wards had been free from infection for 9 months – he published his ideas to inform others.

Aseptic Surgery: Lister inspired others to search for methods to prevent the spread of infection. By 1900, operating theatres and wards were thoroughly cleaned using aseptic techniques and surgeons and nurses wore sterilised clothing and medical instruments.

Impact of anaesthetics and antiseptics: surgery became pain free and patients didn't struggle and surgeons could take more time and be more careful. More complex surgery became possible and the death rate dramatically decreased as surgery was more successful and infection reduced.

Reasons for the 1875 Public Health Act

Previously, the government did not believe it was its role to improve living conditions and saw it as interfering in people's lives.

It preferred a 'hands off' (laissez faire) policy.

During the C19th, the attitude of government began to change due to epidemics like cholera. There was increasing scientific evidence that these diseases were caused by poor living conditions.

By 1875, people recognised that it was the government's responsibility to improve living conditions in the cities.

Public Health Act, 1875

City authorities must provide:

1. Clean water
2. Sewers
3. Public toilets
4. Street lighting
5. Public parks

As well as:

1. Inspect lodging houses for cleanliness
2. Monitor the building of new houses to prevent damp and overcrowding.
3. Check the quality of food sold in shops
4. Employ a public officer of health to monitor disease.

CHOLERA

Spread by:
- drinking water contaminated by faeces
- person-to-person contact.

Symptoms:
- diarrhoea
- sickness
- dehydration
- blue skin

Affected:
-the poorest people
-slum dwellings
-workhouses
-prisons
-asylums
-but wealthier districts did have <u>some</u> cases (just not as many).

Prevention:
- clean up dirty streets
- belief in **miasmata** led to clearing rotting material
- clean water supplies
- **these steps did not solve problems with people's living conditions.**

Along came John Snow…

In 1854, cholera broke out where John Snow lived. He created a spot map to show where the deaths had occurred. After looking at the map he realised that there was a pattern: The number of deaths were centred around the water pump on Broad Street.

He removed the handle from the water pump and the cholera outbreak stopped! Later investigations showed that the pump was very close to a cesspit and that waste was seeping into the well.

He took this evidence to the House of Commons, he proved cholera was caused by **drinking dirty water.** He recommended the government make changes to London's sewer systems.
The government agreed and the system was completed in 1875. This was also because of 'The Great Stink'.
Many scientists had rejected Snow's theory and said there were other cases away from the water – therefore it must be miasma.

Short-term impact: many residents in Soho avoided cholera.

Long-term impact: not until much later that the importance of clean water was recognised with the support of Pasteur and Koch.

<u>C1900-Present: Medicine in modern Britain</u>

During the 19thC, Mendel showed how human characteristics could be passed between generations.

In the C20th new technology let scientists analyse human cells in detail. They found that every cell in the body contains DNA – codes controlling a person's genes.

James Watson and Francis Crick worked together on how the genetic codes of DNA fit together.

In 1990, Crick led the Human Genome project and started identifying and mapping every gene in human DNA.

They analysed x-ray crystallography by Wilkins and Franklin at King's College Hospital and eventually worked out the double helix structure of DNA (1953).

<u>Understanding lifestyle factors that negatively affect health</u>

Diet: a healthy balance of low and high fat food reduces chances of getting certain types of cancer and heart disease.	Smoking: diseases like emphysema, high blood pressure, heart disease and cancers.	Drinking alcohol: cancers and liver/kidney disease.

<u>Examples of C20th & C21st medicine</u>

- X-Rays
- Prosthetic limbs
- MRI, CT and ultrasound

- Dialysis machines
- Insulin pumps

Aim: to provide medical care for the entire population of Britain, no difference in treatment for poor or rich.
Paid for by: National Insurance contributions.
Replaced: 1911 National Insurance Act (entitled workers who earned under a certain amount to medical care but did not extend to women or families).
Meant that: women and children could now be treated for diseases before they became a serious problem.

Magic Bullets

The term 'magic bullet' was used to describe a chemical cure that would attack the microbes in the body causing the disease, whilst at the same time leaving the body unharmed. The perfect example of this is **antibiotics.** The first true antibiotic was **Penicillin.**

1. In 1928, Alexander Fleming noticed that bacteria in a Petri dish was being killed by a penicillium mould. He tested it on other bacteria and discovered that the mould produced an excellent antibiotic (penicillin).
2. In 1929, Fleming published his findings but did not believe that penicillin would work on living people and had no funding to continue his research.
3. Several years later, Howard Florey, Ernst Chain and their team continued Fleming's research on penicillin.
4. It proved effective on mice, so they tested it on humans. Penicillin killed bacteria and therefore the infection – it was a miracle drug!
5. Penicillin still wasn't used for medical treatment because huge amounts were needed to treat one person, and growing the mould took time and lots of space (expensive!). US drug companies only started to mass-produce the drug in 1942-3.

Lung Cancer

Second most common cancer in the UK

Mainly affects people over the age of 40

85% of cases are people who smoke, or have smoked. (But, other chemicals in the air (such as radon) can sometimes be to blame.in the 19thC only 1% of all cancers were lung cancer, by 1927 this was more than 14%.

In 1950 the British Medical Research Council showed conclusively that this was linked to cigarette smoking.

It is so hard to treat because usually, by the time the cancer is detected, it is already very advanced. Patients often mistake symptoms for other diseases.

Ways you can treat lung cancer

Transplants you can replace cancerous lungs with a transplant from a healthy donor.	Radiotherapy concentrated waves of radiation are aimed at the tumour to try and shrink it. This can eliminate smaller tumours and shrink larger tumours.
Chemotherapy patients are injected with many different drugs that shrink the tumour before surgery, prevent the cancer from reoccurring, or relieve some symptoms when surgery is not possible.	Genetic research it is not yet possible to treat lung cancer using genetics but scientists have been studying genes of lung cancer sufferers to try to prescribe more effective treatments.

The government
The government was slow to respond to the evidence that cigarette smoking was linked to lung cancer. By 1985, smoking related deaths cost the NHS £165 million a year. But, the government earnt £4 billion from the tobacco tax and there were thousands of jobs related to the tobacco industry in the UK. Eventually, the government realised it had to respond because the death rate was too high.

The British section of the Western Front, 1914-18: injuries, treatments and the trenches

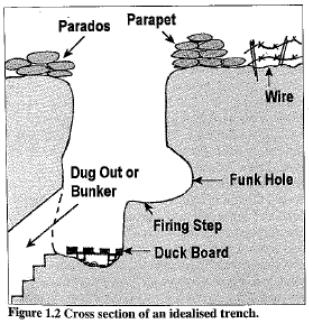


Figure 1.2 Cross section of an idealised trench.

Trench System

WW1 became a static war fought in trenches.
Trenches had to be defended from the enemy.
You would try to seize the enemy's trench to gain that part of the land.

Trenches were easier to defend than attack.
Machine guns would fire rapidly and barbed wire was placed in **no-mans-land.** This would slow down enemy attack.

New tactics – like gas attacks – were developed to attack trenches.

Problems of transport and communication

Many roads were destroyed from shelling – this made it hard to transport injured away from the frontline.

The battle was held on farming land (there was lots of fertiliser in the soil) – this led to infected wounds.

Wounds

- Trench Fever
- Trench Foot
- Shell-shock
- Infection
- Gas-gangrene
- Gas

Chain of Evacuation

Regimental Aid Post: RAP
Located within 200m of the frontline (very close). This meant that it could stay in touch with men in the trenches.
It held a **Regimental Medical Officer** and stretcher bearers that had first-aid knowledge.
Wounded men would either walk in themselves, or be carried in by other soldiers.
The purpose of the RAP was to give immediate first aid and get many men back to fighting as soon as possible.

Dressing Stations: ADS/MDS
Dressing stations were located in abandoned buildings, dugouts or bunkers, in order to offer shelter from enemy shelling. If not available, tents would be used.
Each dressing station would be staffed by ten medical officers, medical orderlies (someone who carries out minor tasks), and stretcher-bearers of the RAMC.
Those working at Dressing Stations belonged to a unit of the RAMC called the **field ambulance**. Each field ambulance unit could deal with 150 wounded men, but when major battles took place they would have to deal with many more.

Casualty Clearing Stations: CCS
Located some distance from the frontline to provide some safety against attack, but close enough to be accessible by ambulance wagon. They would specialise in operating on the most critical injuries, such as those to the chest.
As the war progressed, CCS played an increasingly important role in dealing with wounds – it became clear that if contaminated wounds were not dealt with quickly wounded men would develop **gangrene.** The CCS became the most important place for operations.
No chance of recovery: men who would be made comfortable, few medical resources would be given to these men; they would be saved for men more likely to survive.

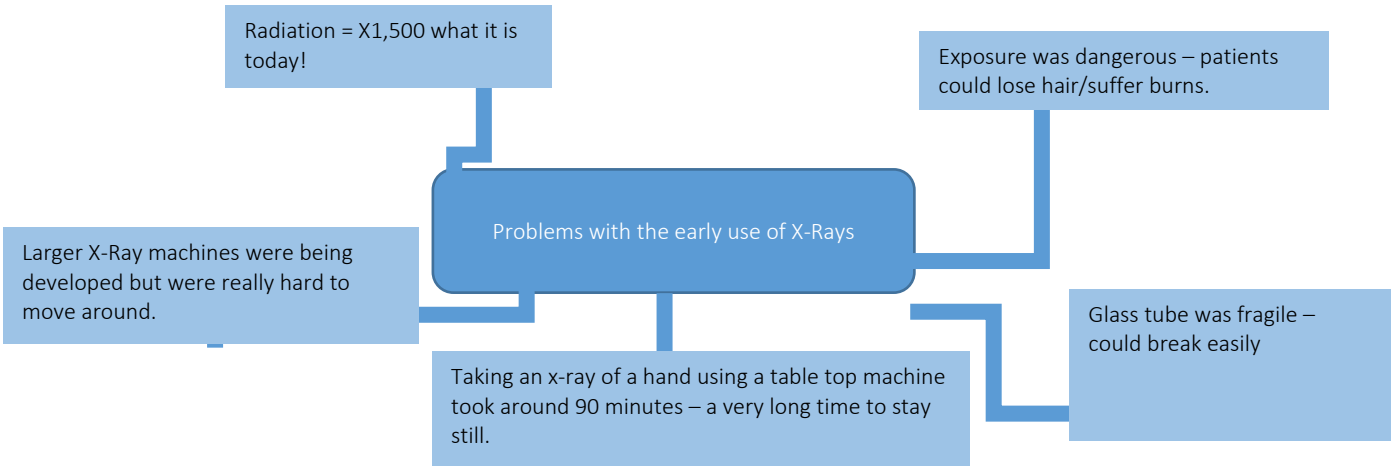
Base Hospitals
Located close to the coast so that the wounded could be close to the ports (for transportation home to Britain). Men were treated until they were returned to Britain for further treatment, or fit enough to return to fighting.
Base Hospitals continued treatment that had begun at the CCS.
Other important roles of the Base Hospitals included experimenting with new techniques, which, once successful, were used in the CCS.
After 1918, Base Hospitals became more important. CCS could not continue to carry out such an important role because trench warfare had developed into the Spring Offensive (no longer static warfare). This resulted in surgery for the wounded having to move to the Base Hospitals for safety.

X-rays

X-rays

1895, Wilhelm Roentgen, was studying the effects of passing an electrical current through a glass tube covered in black paper. Although the room was dark, a screen a metre away from the equipment began to glow.

He called these rays that could pass through glass 'x'.



Blood Transfusions

If someone loses too much blood they will go into shock and die. Blood loss was often the result of complex surgeries.

With the development of aseptic surgery and x-rays in the C19th it was possible to carry out more complex surgical operations.

Success of complex surgeries was often damaged by the loss of blood.

James Blundell did the first experiments in human blood transfusion.

He wanted to help women who lost blood when they gave birth.

1818-1929 – ten transfusions, with up to half of the patients surviving.

Blood banks at Cambrai. The identification of blood groups and the use of blood type O as a universal donor blood type meant that the risk of being transfused with the wrong blood group was reduced. The problem of clotting remained, and there was never enough blood on hand to meet demand. However, as the war continued, some advances were made in the storage of blood. The use of stored blood as clearly demonstrated in 1917 at the Battle of Cambrai. Before the battle a British doctor stored 22 units of blood in glass bottles. He built a carrying case for the bottles in ammunition boxes which he packed with ice and sawdust. He called this a 'blood depot'. During the battle he treated 20 severely wounded men with this blood that had been collected 26 days before – 11 of these men survived. This was the first time stored blood had been used to treat men in shock and although only on a small scale, demonstrated its potential to save lives.

Problems with blood transfusion	Attempted solutions to these problems
Blood coagulates (clots) as soon as it leaves the body. This means that the tubes which transfused blood from one person to another could become blocked up.	There were attempts to find chemicals, such as sodium bicarbonate, that would prevent blood clotting.
Blood donors could reject the blood transfusion.	In 1901, Austrian doctors discovered the existence of three different blood groups. This information was used in 1907 by an American doctor who was the first person to match a donor and a recipients blood group before transfusion.
Danger of infection from unsterilized equipment.	Equipment sterilised using Joseph Lister's techniques.