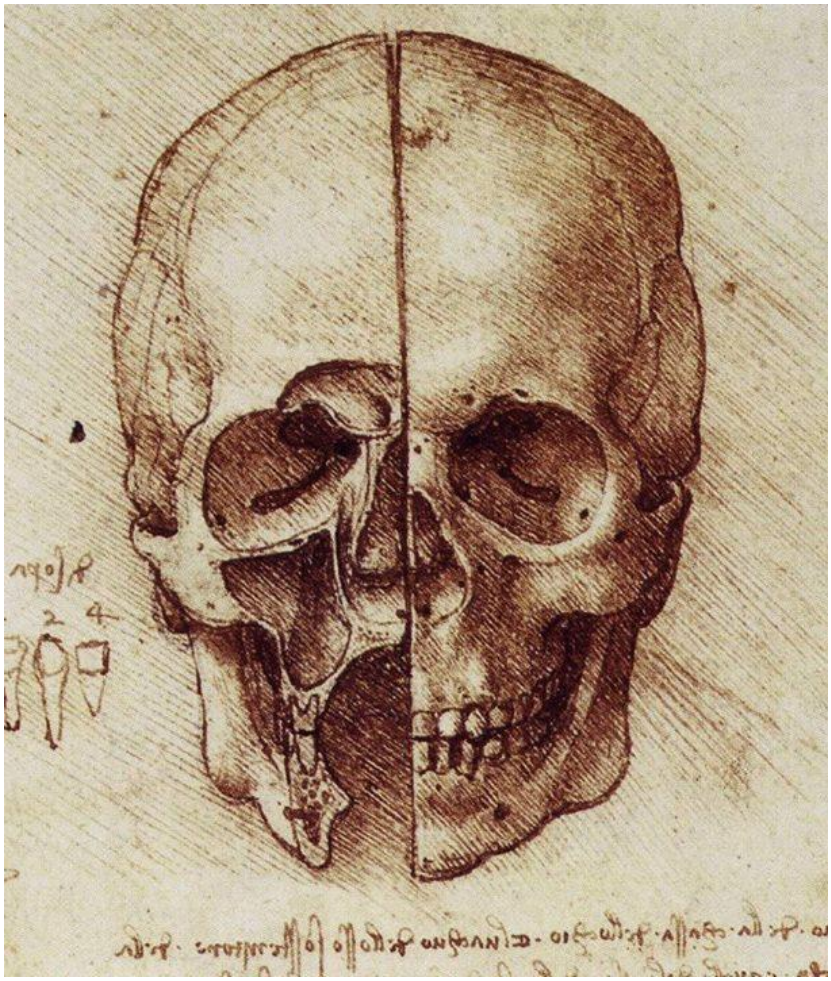
Medicine through time, c1250-present



Key Topic 1: c1250–c1500: Medicine in medieval England

Key Topic 1.1 Ideas about the causes of disease and illness

Religious explanations

- Committed a sin from God – he was punishing you
- If there was a famine that caused malnutrition it was because of God. When people recovered it was because a miracle had taken place
- Blaming sickness on God acted as proof of the divine
- Leprosy was included in the Bible as an illustration of a punishment for sin. Leprosy began as a painful skin disease, followed by paralysis, and eventually death. Fingers and toes would fall off, body hair would drop out and ulcers would develop in and out of your body. There was no cure, so lepers were banished from their communities.
- Disease was mainly seen as a result of sin, the Church also taught that disease was sent by God to cleanse one's soul of sin.
- Most of what ordinary people learned was taught by the Church. It was also the centre of formal learning; it set up and ran universities where physicians were trained. The Church also discouraged dissection.

Astrology and supernatural explanations

- Alignment of planets and stars considered important when diagnosing illness
- A physician would consult star charts, looking at when the patient was born and when they fell ill, to help identify what was wrong
- Traditionally, the Church frowned upon the idea of using astrology in diagnosing illness, seemed only step away from predicting the future/fortune telling
- After the Black Death (1348), astrology became more popular
- Astrology was a supernatural explanation for disease

Rational explanations for disease

- Still based on ideas from the Ancient world, in particular those of Hippocrates and Galen
- The Theory of the Four Humours: Ancient Greeks thought everyone had a mix of four humours in their body. They believed people became ill when this mix was unbalanced, so to make people better they tried to put this balance right.
- The Four Humours were – blood, phlegm, black bile and yellow bile. People believed that a combination of age, family traits, and circumstances (season in which you were born), usually combined to make one or two of the humours stronger than the others
- Theory of Opposites: Galen developed the idea of the Four Humours further. This aimed to balance the humours by giving the patient the 'opposite' of their symptoms. For example, if you had too much phlegm (linked to water and cold), you should eat hot peppers
- Theory was so popular as it was very detailed and could be used to explain almost every kind of illness – physical or mental
- Ideas were supported by the Church and because the Church educated the majority of people, that is all they knew

Other explanations

- Miasma: bad air that was believed to be filled with harmful fumes. Galen and Hippocrates suggested that swamps, corpses and other rotting matter could transmit diseases. Smells and vapours were also associated with God. Homes that smelt badly suggested sinful and corruption and, if a person was unwashed, other people would avoid them.

- Urine charts: although medieval physicians did not blame people's urine for making them ill, hey did carefully examine the urine in order to make their diagnosis. It was thought to be one of the best ways to check on the balance of the humours inside the body. Samples of a patient's urine could be sent to a physician, where it would be examined and compared with a urine chart. The physician would carefully check the colour, thickness, smell and taste of the urine before making their diagnosis.

<u>What factors influenced the ideas about the causes of disease?</u>

The Church	The Church did not like change and wanted to keep things the way they were. The Church controlled medical learning and it chose which books were copied and distributed. Church strongly discouraged anybody from criticising the Theory of the Four Humours.
Science and technology	A lack of scientific understanding meant that new knowledge was limited. Physicians and medical students tried to make new discoveries fit into the old theories, rather than experimenting to explain the discoveries.
Attitudes in society	Medieval people had a strong belief in God and did not want to risk going to hell by being critical of the Church. Many people believed that, since medicine had always been done this way, there was no need to change it
Individuals	Galen and Hippocrates were important individuals in the Middle Ages. Galen in particular was popular with the Church, which meant that his work was widely promoted.
Government	Did not spend any money on medicine, and therefore there was no money for medical breakthroughs

Key Topic 1.2 Approaches to treatment and prevention 1250-1500

Treatments:

Religious treatments:	*Supernatural treatments:*
Healing prayers and incantations (spells) Praying for a special mass to be said (bread and wine) Fasting Pilgrimages Touching holy relics Lighting a candle Chanting incantations and using charms	Varied according to the horoscope of a patient Alignment of planets checked at every stage of the treatment prescribed – herb gathering, bleeding, purging, operations, cutting hair and nails at the right time

Humoral treatments:

Today, when we fall ill, doctors assess the symptoms, make a diagnosis, and treat the infection. If a patient catches a chest infection, the treatment prescribed will be to attack the germ, rather than to stop the patient from coughing. Medieval physicians broke down and treated each symptom separately, as they believed each symptom represented an imbalance in the humours. Conflicting remedies may be provided.

Blood-letting (phlebotomy)	*Purging*
Most common treatment for an imbalance in the humours. The idea behind it was that bad humours could be removed from the body by removing some of the blood. Usually done by barber surgeons and wise women. • Cut a vein with a lancet or other sharp instrument. Most straight forward. Phlebotomy charts like the vein man were used to show points in the body where bleeding was recommended for specific illnesses • Leeches: freshwater leeches were collected, washed and kept hungry for a day before being placed on the skin. Bleeding might continue for up to 10 hours after the leech was full. This was used for people whose age or condition made traditional bleeding too dangerous • Cupping: skin was pierced with a knife or a pin, or scratched with fingernails until it was bleeding. A heated cup was placed over the cuts to create a vacuum which drew blood out of the skin. This was used for women, children and the very old. People believed different areas treated different illnesses. People believed that cupping on the back of the neck was good for eye trouble	The Humours were created from the foods eaten, a common treatment was purging the digestive system to remove any leftover food. Done by vomiting (emetics) or a laxative/enema to clear out anything left over in the body Emetics consisted of strong bitter herbs (e.g. scammony or parsley). Laxatives common Sometimes people would need a bit more help to purge, and the physician would administer an enema. John of Arderne, a famous English surgeon, mixed water with honey, oil, wheat bran, soap and herbs. This would be squirted up into the patient's anus using a greased pipe fixed to a pig's bladder, while the patient rubbed his stomach

Remedies:	*Bathing:*
Herbal infusions to drink, sniff or bathe in Aloe vera was used to improve digestion Theriaca – spice-based mixture containing up to 70 ingredients Different foods prescribed to encourage the balance of humours – a dish called blanc mangier (chicken and almonds) recommended for medieval invalids because the ingredients were warm and moist	Warm baths helped the body to draw in heat to dissolve blockages in the humours Steam out impurities and ease aching joints For people with paralysis a fox was boiled in water and then the person would bathe in the water

<u>Preventing disease</u>

Although a physician could expect to be paid a lot more money for providing treatments for disease, there was a strong focus on following various regimes to prevent getting sick in the first place. This was seen as a far safer plan of action, since cures and treatments were hit-and-miss in their effectiveness

The Church:	*Diet:*
Regular praying, confessing and paying tithes (1/10th of your wage to the Church).	Since the humours were thought to be produced by digestion, what and when you ate were both considered very important in preventing an imbalance. Eating too much was strongly discouraged Fear of digestive problems leading to death was so great that many people purged themselves, either by vomiting or using laxatives, as a way of preventing disease as well as treating it Hippocrates recommended using an emetic once a fortnight in the winter, to use enemas in the summer
Hygiene:	*Purifying the air:*
Once your spiritual health was taken care of, it was important to concentrate on your bodily health Followed a loose set of instructions called the Regimen Sanitatis which was provided by physicians to help a patient maintain good health. Included instructions such as undertaking moderate exercise, not overeating, making sure you get a reasonable amount of sleep, regular bathing, not having too much sex, and being friendly with your neighbours. Bathing – used as a prevention method as bad smells indicated miasma. Only the wealthy could afford a private bath of hot water. Public baths or stews were available for a fee. Poorer people swam in rivers. No matter how rich or poor you were, everybody washed their hands before and after a meal.	Purify the air by using sweet herbs such as lavender. Sometimes they may also carry a posy of flowers Local authorities also tried to tackle miasma outside of the home putting into place measures to keep towns clean. For example, not leaving rotting animals lying around

What medieval medics were there?

Most people in the Middle Ages would have been treated at home by a female family member. Women did most of the treatment at home, caring for the sick and mixing remedies themselves. Women also acted as midwives.

Asking for medical advice cost a lot of money. Since the treatments were not guaranteed most people were not willing to spend this money even if they had it. There were other treatment options for people willing to pay.

1. *Physicians:* during the Middle Ages, new universities were set up across Europe including Oxford and Cambridge. Medicine became more professional. A medical degree took between 7-10 years to complete. Medieval doctors were known as physicians – they diagnosed illness and recommended a course of treatment. They rarely got involved in treating the patients themselves, this was left up to less educated midwives, apothecaries or barber surgeons.
    a. Looked at a sample of the patient's urine, faeces and blood – collected and sent to him
    b. Consult the astrological charts under which the patient was born and at the time they fell the sick
    c. Humoral tendencies of the patient would be used to create a course of treatment

   Less trained and lower paid professionals carried out the treatment. Many physicians were clergymen who were forbidden from carrying out procedures such as bleeding. From 1215 onwards, any operations likely to involve cutting the patient were forbidden for clergymen. Physicians were very expensive as there were not many of them due to training taking a long time.

2. *Apothecaries:* mainly mixed herbal remedies. They had a good knowledge of the healing power of herbs and plants thanks to studying herbal manuals such as Materia Medica. They usually had a good amount of knowledge from their own experience, or passed down from family members. Not considered as skilled or knowledgeable as physicians. Physicians prescribed the medication and apothecaries were just there to mix the remedy. Lots of people would see apothecaries were comparatively cheap. They also prescribed poison – went against an idea fundamental to physicians, (they should do no harm). All doctors must swear a Hippocratic Oath before practising medicine. Apothecaries not bound by this rule so they could not be trusted to do the best for their patient, and did not have to attend university to set up their businesses.

3. *Surgeons:* barber surgeons were probably the least qualified medical professionals in England. Since good barbers had sharp knives and a steady hand, they regularly performed small surgeries as well such as teeth extraction. Some surgeons were highly trained and a skilled surgeon could set up a broken limb, remove an arrow or even successfully remove cataracts from the eyes

Caring for the sick: hospitals and homes

Hospitals	*The home*
Number of hospitals in England was on the ride. By 1500, there were 1,100 hospitals ranging in size from a few beds to hundreds. Bury St Edmunds had six hospitals. Many hospitals did not actually treat the sick – instead they offered hospitality to travellers and pilgrims 30% of hospitals were owned by the Church – run by monks/nuns who lived in nearby monasteries. Rest was funded by an endowment (wealthy person had left money in their will). Charity was a foundation of religion, and the Church taught that charitable	Vast majority of the sick were treated ad cared for at home Women would care for their relatives and dependents when needed This care would have involved making the patient comfortable, preparing restorative foods, mixing herbal remedies Women would also be responsible for the garden Some suggestion they carried out minor surgeries and bleedings – records are very patchy

donations could help to heal disease. Medieval hospitals were places to rest, recover and sleep. The space would have been kept clean and bed linen changed regularly. Patients would share beds Insane and pregnant patients were often rejected, though some hospitals had special beds, reserved for unmarried mothers	

Key Topic 1.3 Case study: The Black Death, 1348-1349

In 1348, a new disease reached the shores of England. It had spread from the Far East along trade routes, arriving in Sicily in 1347, quickly spreading across the whole of Europe. The Black Death, as it eventually came to be known, was a new plague that was unfamiliar to the ordinary people of England, as well as English physicians. Within months, it had spread the length and breadth of England, killing thousands of people. It did not matter if you were rich or poor, a city dweller or a country farmer, the plague did not discriminate. Those who caught it could expect to die within a matter of days.

	Causes	Treatments	Preventing
Religious and supernatural	God had deserted mankind Punishment for the sin of the world 1345 – unusual positioning of the planets – a sign of something that was going to happen Part of God's plan to make people less sinful, saving them from Hell	Confess sins Praying for forgiveness Inevitability – once you have it you were meant to get it Go to church services once a day Candle vigils Pilgrimages Praying in public	Pray Fast Pilgrimage Whipping yourself to show you are sorry
Natural	Impure air – miasma causing disruption to the humours Impure air may have originated from poisonous fumes released by an earthquake/volcano Filth in the streets – the King ordered them to be cleaned Measures to stop dirty air	Bleeding/purging – caused more people to die Strong smelling herbs Bursting buboes Tried treatments based on treatment by opposites	Escaping – running away from the foul air Carrying flowers/fragrant herbs Avoid breathing in miasma Avoid bathing – water would open your pores to the bad air
Common beliefs	Europe many people blamed Jewish people Jews had been expelled from Britain during the 17th century	Strong Christian beliefs – confession and praying Clear nobody could cure the disease Lack of knowledge about what caused it stopped people being able to cure it	Listen to cheerful music Avoid doing anything sad Stop visiting family members who had the disease

How did the government act?

- Local authorities attempted to take action to prevent the plague from spreading
- New quarantine laws put in place to try and stop people from moving around too much
- People new to the area had to stay away from everybody else for 40 days to ensure they were not carrying the disease
- Authorities started to quarantine houses where the plague had broken out
- Considered banning preaching and religious processions to stop large crowds of people gathering but they could not enforce this
- Local authorities stopped cleaning the streets – the belief that the foul stench of the rubbish and rotting bodies would drive off the miasma causing the plague

Overview: What factors worked together to inhibit (prevent) change in medical thinking between 1250-1500?

THE CHURCH: extremely rich because it owned a great deal of land in every country. It was very powerful because they had a priest in every village and a bishop in every region. Through its bishops and priests it controlled education.

- The Bible said that God controlled every aspect of life so it was logical that God sent diseases. Believed that God also sent the Black Death as a punishment. If God sent diseases this meant that they were was no need to look for other causes.
- The Pope, bishops and priests told people that everything in the Bible was true and you could not challenge what the Bible said. If anyone did dare challenge the Bible and the Church they were told they would go to Hell when they died. People believed that Hell was a real place where they would suffer eternal pain from punishments such as being roasted over fires. This was a real fear which meant that hardly anyone dared to challenge what the Church said.
- The Church supported the ideas of Galen. Galen had not been a Christian but he had said that the body had been created by one God who made all the parts of the body fit together perfectly. The Christian Church said that God had created human beings and did not make mistakes so the two ideas fitted together perfectly. Church supported Galen's work and this meant that no Christian dared to question Galen's ideas.

EDUCATION: Church controlled education, including how physicians were trained at universities. There were in fact very few physicians in England as training took seven years and not many people could afford it. The main part of doctors' training was reading the books of Hippocrates and Galen. Doctors were taught to believe what Hippocrates and Galen said, which meant that they were not encouraged to experiment or think for themselves. Dissections were another way of demonstrating that Galen's descriptions of the human body were correct. The trainee doctors watched a surgeon carry out a dissection while a section of Galen's book was read aloud. This meant that hardly anyone tried to find out more about the structure of the human body or how it worked.

ATTITUDES – RESPECT FOR TRADITION: the result of the Church and of the way doctors were educated was that most people had great respect for the past and for traditional ideas. They wanted to keep everything as it was (conservative attitude). This meant that it was hard for new ideas to spread because books were written out by hand. Doctors were not trained to challenge existing ideas.

INDIVIDUALS: No individual made a great breakthrough in the Middle Ages because education was very limited and controlled by the Church which did not encourage new ideas. The key individuals were therefore Hippocrates and Galen who had died centuries before. Galen, unlike Hippocrates, thought it was very important to dissect dead bodies to find out more about anatomy and about how the body works. Galen and Hippocrates ideas were believed as there seemed to be evidence to prove their ideas were correct and they covered everything in detail. Their ideas seemed logical and reassuring if you were sick.

GOVERNMENT: In the Middle Ages, the King's government did not want to improve medicine. Kings did order for towns to be cleaned but they did not do this regularly. No taxes were collected which meant there was no money for medical breakthroughs.

Answer these quick fire questions to test your understanding

1) Who came up with the Four Humours theory?

2) What were the Four Humours?

3) How would you treat somebody that had a temperature because of too much blood?

4) Arguably, what was the most important institution in the medieval period?

5) How did they use religion to explain the causes of disease and illness?

6) How would a physician use star charts to explain the causes of disease and illness?

7) How did bad air (miasma) explain the causes of disease and illness?

8) What did physicians do with urine samples?

9) What disease was talked about in the Bible?

10) Where did most people's education come from during the Middle Ages?

11) Who controlled education during the Middle Ages?

12) Why did the Church lead to little change in medicine c1250-c1500?

13) What would happen if you challenged the Church's teaching?

14) Whose ideas did the Church support?

15) What was the main part of doctors' training?

16) What does it mean to have 'conservative' ideas?

17) Why was there no medical breakthroughs during the Middle Ages?

18) Why were Galen's ideas followed more than Hippocrates during the Middle Ages? What did Galen say needed to happen in order to have an understanding of the body?

19) What year did the Black Death hit Britain?

20) Give three causes of the Black Death

21) Give two treatments of the Black Death

22) How did people try and prevent the Black Death?

23) What role did the government play in helping with the Black Death?

Key topic 2: The Medical Renaissance in England 1500-1700

2.1 Ideas about the causes of disease and illness

Renaissance means rebirth and this period in European history saw a 'rebirth' of old ideas from Ancient Greece and Rome. People began to question, challenge and test assumptions. They started to slowly break down old beliefs and rethink the way the world worked. The Protestant reformation was challenging the teachings of the Catholic Church. Scientists started to provide evidence that the Greek teachers were wrong. However, some things stayed the same.

Ideas about the causes of disease and illness that stayed the SAME between 1250-1700	Ideas about the causes of disease and illness that CHANGED between 1250-1700
Theory of miasma continued to be believed by many to be the cause of disease. It was popular during epidemics. Miasma was the product of rotten vegetables, decaying human bodies and excrement The Theory of the Four Humours continued to be accepted explanation for disease, BUT… by 1700 very few physicians still believed in it Supernatural explanations	Gradually, fewer people believed in supernatural or religious causes of disease New rational explanations for disease were suggested – seeds in the air spreading disease Reduced influence of the Church and a move towards a scientific approach to diagnosing illness Urine analysis no longer used as physicians now understood that urine was not linked to ill health

An overview of the key ideas:

- The general population of Europe wanted better answers to what caused disease. Epidemics like the Black Death, small pox and sweating sickness could not be explained by the Theory of the Four Humours. They affected everybody and were not cured by blood-letting or traditional humoural treatments, therefore, there had to be a better explanation
- Alchemy (new form of chemistry). New chemical treatments started to appear
- Better understanding of the digestive system – people gradually stopped believing that disease was caused by eating the wrong foods.
- 1676 Observationes Medicae published which theorised that illness was caused by external factors rather than the Theory of the Four Humours (Sydenham)
- 1683 there were powerful microscopes which allows for the observation of tiny 'animalcules' or little animals in plaque scraped from between the teeth. First recorded observation of bacteria

The key point is that whilst the practice of medicine did not change much at this time, ideas were starting to change. There was little impact because there were still huge gaps in knowledge, the general public still believed in the Theory of the Four Humours and there was a lack of quality medical instruments.

Why did ideas start to change?

1. HUMANISM: Characterised by the love of learning, a new interest in classical scholars and a belief that human beings could make up their own mind. It represented a break with some of the old medieval traditions. They rejected the view that God was responsible. There were new translations of the works of Hippocrates and Galen – 590 editions published of Galen's work during the 16th century. More experiments began to take place in the field of medicine. The Church started to have less authority in everyday life.

2. THOMAS SYDENHAM: Known as the English Hippocrates. His work moved medicine in Britain away from the classical ideas of Galen and Hippocrates. He refused to rely on medical books when diagnosing a patient, instead, observing the symptoms and treating the disease causing them. Plants and animals could be organised into different groups. He encouraged medical students to observe their patients, note down their symptoms in detailed descriptions, and then look for remedies to tackle the disease. The nature of the patient had little to do with disease. This was a very modern idea and laid the foundation for a more scientific approach to medicine from the 18th century onwards. Sydenham was not able to isolate and identify the various microorganisms that caused the disease that he was observing. He did, however, identify that measles and scarlet fever were separate diseases.

3. PRINTING PRESS: In 1440 a German goldsmith created the first printing press (machine for printing text/pictures). Allowed for numerous copies of the same thing to be printed. Information could be spread quickly and accurately, Scientists could publish their work and share it across Europe. This also meant that there was a much wider variety of subjects written about. The Church was no longer able to prevent ideas they disproved of, being published.

4. THE ROYAL SOCIETY: "Take nobody's word for it". The desire to explain the world in secular terms led to a big increase in the number of experiments being carried out. Scientists wanted to talk to each other about their new discoveries and share their ideas which led to the Royal Society being set up. The monarch, Charles II, issued a Royal Charter (a right/power to a particular group). Due to the King supporting them, they Royal Society gained in credibility. If the King approved of them, they were surely doing something right. More people therefore sent their work in to be published. In 1665 they published Philosophical Transactions – the world's first scientific journal – still published today. The book provided a vitally important platform from which scientists could share their work – which contributed to the spread of new ideas. They offered funding for translations of European Scientific txts encouraging its members to write their reports in English instead of Latin, making them more accessible.

2.2. Approaches to prevention and treatment 1500-1700

Treatment

Change from the Medieval period	Continuity from the Medieval period
Transference – illness/disease could be transferred to something else. People believed if you rubbed an object on an ailment, the disease transferred to the object New herbs started to appear from other countries. Appearance of new remedies opened up a huge number of possibilities for treatments and cures. Sydenham popularised the use of cinchona bark from Peru in treating malaria. Growth of alchemy meant that people began to look for chemical cures for diseases instead of relying on herbs and blood-letting. New science was known as iatrochemistry (medical chemistry) *Pharmacopoeia Londinensis* was published by the College of Physicians in 1618 as a manual of remedies were 122 different chemical preparations including mercury and antimony – promotes sweating so cools the body down.	Belief in humoral treatments persisted. Old treatments aimed at rebalancing the humours continued. Bleeding, purging and sweating were all popular ways of removing too much of a particular humour Herbal remedies continued to be popular. 1500-1700 remedies were chosen because of their colour/shape. For example, saffron used to treat jaundice

Prevention

Change from the Medieval period	Continuity from the Medieval period
No change in preventing disease – only way to avoid dying was to avoid catching the disease Condition at birth was important – if you were born small then it could be used to explain death from an illness Cleanliness was still important in the home and the body Still practiced the regimen sanitas	Bathing had become less fashionable since the spread of syphilis – people believed that bathing led to diseases. More likely to now keep themselves clean by rubbing themselves down with linen and changing clothes regularly Certain weather conditions or surrounding atmosphere spread disease. More steps were taken to remove miasma – punishment given to minor criminals (picking up rubbish from the streets)

Medical care

Change from the Medieval period	Continuity from the Medieval period
Education increased considerably. Wars were being fought with new technology, new wounds on battlefields meant more surgery was needed. Introduction of iatrochemistry introduced new ingredients into the stores of the apothecaries. Now	Apothecaries continued to mix remedies and surgeons carried out simple operations. Surgeons and apothecaries continued to provide a service for those unable to afford physicians. Physicians continued to be trained at universities –

had to possess licenses to practice their trade New subjects were introduced into the medical curriculum – iatrochemistry/anatomy Doctors inspired to challenge the old teachings and investigate for themselves. Dissection was legalised (previously been banned by the Church) Trainee doctors had much better access to medical textbooks – printing press made these cheap to print Protestantism rejected highly decorated Churches, artists found themselves out of work, so they created detailed drawings for these new medical textbooks. Individual pictures available.	training courses changed very little. Most learning still from books Still very little, practical hands-on training

Caring for the sick

Change from the Medieval period	Continuity from the Medieval period
Hospitals began to change – records suggest that many people went to hospital with wounds and curable diseases and they did not spend long in hospital – got better Good diet whilst in hospital. Visit from a physician twice a day and hospitals started to have their own pharmacies Many hospitals reopened without their religious sponsor Pest houses started to pen – specialised in a particular disease Hospitals now offered a much needed service – traditional hospitals would not admit patients who were contagious	Most sick people still cared for at home Women plated a really important role Women popular as they were cheaper

There were a number of key individuals during the Renaissance period.

Andreas Vesalius:

- Studied medicine in 1533 in Paris (centre for the new humanist ideas about medicine) and he became a lecturer in surgery
- He had a deep interest in the human body, and was keen to share his discoveries
- First publication in 1537 '*Six Anatomical Tables*' 'which showed the different parts of the human body labelled in Latin, Greek, Hebrew and Arabic. 3 of the drawings showed a human skeleton and this was used in lectures

- 1543 '*On the Fabric of the Human Body*' he had been able to carry out a large number of dissections, thanks to a local magistrate allowing him to use the bodies of executed criminals.
- Noted that Galen had made errors in his original theory on the human body. Galen had dissected animals instead of humans. Found 300 mistakes in Galen's work:
    - Lower jaw in 1 part, not 2 parts
    - Vena Cava (vein leading out of the heart) was not next to the liver
    - Men and women had the same number of ribs
    - Human liver did not have five separate lobes
- Vesalius encouraged other doctors to base their work on dissection
- Dissections were vital – this laid the foundation for others to investigate the anatomy of the body in more detail
- Included pictures hoping to present the ideal version of the human body – dissected corpses
- Important as he made the study of anatomy fashionable
- Laid the foundations for future discoveries e.g. Harvey

What was the impact of Vesalius?

- Anatomy became the central part of the study of medicine and doctors were encouraged to carry out dissections for themselves
- His work was heavily copied and appeared in other medical texts
- Work inspired others
- BUT… caused a lot of controversies because he had challenged the ideas of Galen. This angered traditional physicians who argued that the human body had not changed since the ideas of Galen

<u>William Harvey</u>

- Harvey made one of the most important breakthroughs in medical history – blood circulates around the body
- Harvey had a keen interest in dissection and observing the human body, he carried out public dissections, teaching students that it was important to observe the body and believe what they saw
- Idea also followed by Sydenham
- Born in 1578, studied medicine at Cambridge
- 1618 – became a royal doctor
- Harvey had been taught that the veins of the body contained valves – proof that the blood in those veins flowed towards the heard. He used dissected bodies to prove this
- Harvey looked at more detail at the old Galenic theory
- Harvey then cut up cold-blooded animals (slower heartbeat) to observe the movement of their blood whilst still alive. This proved that arteries and veins were linked together in one system
- He tied a tight chord around somebodies arm and cut off the blood flow in the artery leading into the arm. The artery in the arm is deeper than the veins, loosening the cord allowed the blood to flow into the arm, stopped it flowing out meant the veins swelled with blood
- Harvey concluded that blood must pass from arteries to veins through tiny passages – blood vessels – capillaries
- Proved that the heart acted as a pump thanks to the fire engine pumps

How could Harvey make his discovery?

1. INDIVIDUALS AND INSTITUTIONS: Vesalius had proved some of Galen's work wrong which made it easier for other scientists and physicians to do the same. Harvey was employed by Charles I which gave him credibility. More people heard of Harvey's work. Due to the Church declining in power, Harvey became more critical of Galen's teachings

2. SCIENCE AND TECHNOLOGY: fire engines had mechanical pumps to provide water to put out fires, which inspired Harvey to look at how the heart worked. He used modern scientific methods, reading about other scientists work, carrying out experiments and observing the results

3. ATTITUDES IN SOCIETY: More of an interest in science and in solving some of the puzzles of the human body. People began to search for a rational explanation for things. Harvey also wanted to improve Galen's ideas.

4. COMMUNICATION: Harvey had read the work of earlier doctors and used their work to build up his theory

What was the impact of Harvey?

- Beginning of modern physiology
- Encouraged others to experiment
- BUT… understanding the circulation of the blood which had little practical use in medical treatment
- Most doctors ignored/criticised him
- Work only appeared in universities from 1673
- Did not make anybody better

2.3 Case study: the Great Plague, London, 1665

The Great Plague arrived in London from June-November 1665. In September 1665 there were 7000 deaths recorded in one week. Around 20% of Londoners died from the Plague. It was spread by fleas on rats

Causes of the Plague:	• Astrology: unusual alignment of planets between Saturn and Jupiter in October 1664. This could have indicated trouble lay ahead • Punishment from God to clean up the kingdom • Miasma: most popular theory (unlike 1348). Miasma was created by stinking rubbish and dung hills. Vapour was present in the soil – if it was hot the vapour would pour out. It fitted with the pattern of infection • Disease had been spread from person to person (not a popular theory)
Methods to prevent:	• Physician advice was to pray and ask for repentance, quarantine, fast, or diet on sage and garlic. Started to wear special clothing (birdlike masks with sweet smelling herbs which meant the disease left the patient). • Physicians would treat their cloaks with wax so that none of the pus or blood from the patient soaked into it • Healers made recipes for plague water, with some containing native herbs. • Smoking tobacco encouraged miasma to go away
Methods to treat:	• Quarantine – wrapped up in thick woollen cloths and laid by the fire so that the disease could be sweated out • Transference also a popular method – strapping a chicken to a boil would apparently help to draw out the poison and help a patient recover • Recipes for herbal remedies popular • Quack doctors (no medical qualification) mixed remedies selling them as fabulous cures hoping to make easy money • Do not catch it at all

The government and King issued a decree that people should fast regularly and made a list of actions to try and stop the spread of the plague. This was carried out by local government officials of each city. Public meetings, fairs and funerals were banned and theatres were closed. Fires were set to burn on the street corners, cats, dogs and pigeons were killed if they were seen on the streets. Altogether there were 40,000 dogs and 200,000 cats slaughtered. Searchers would go from house to house checking to see if there were any plague victims in each one. Inhabitants infected were either taken to a pest house or quarantined for 28 days with a red cross on the door. Parish officials would take food and other necessities.

Answer these quick fire questions to test your understanding

1) Who came up with the Four Humours theory?

2) What were the Four Humours?

3) Who controlled education during the Middle Ages?

4) Why did the Church lead to little change in medicine c1250-c1500?

5) What would happen if you challenged the Church's teaching?

6) Whose ideas did the Church support?

7) What was the main part of doctors' training?

8) What does it mean to have 'conservative' ideas?

9) Why was there no medical breakthroughs during the Middle Ages?

10) Why were Galen's ideas followed more than Hippocrates during the Middle Ages? What did Galen say needed to happen in order to have an understanding of the body?

11) What is meant by the Renaissance period?

12) Give 2 key ideas that changed from the Middle Ages to the Renaissance period

13) Give 1 key idea that stayed the same from the Middle Ages to the Renaissance period

14) What was the name given to the earliest form of chemistry?

15) What does it mean to have humanist ideas?

16) Who was Thomas Sydenham and how did he change the way of thinking with regards to how diseases and illnesses spread?

17) What was created in 1440 that led to information spreading more quickly and accurately?

18) Who were the Royal Society and how did their work gain credibility?

19) How were more steps taken to remove miasma during the Renaissance period? What started happening for the first time?

20) Why did training improve for doctors and medical professions? What did they have much greater access too?

21) What would happen if you challenged the Church's teaching?

22) Whose ideas did the Church support?

23) What was the main part of doctors' training?

24) What does it mean to have 'conservative' ideas?

25) Why was there no medical breakthroughs during the Middle Ages?

26) Why were Galen's ideas followed more than Hippocrates during the Middle Ages? What did Galen say needed to happen in order to have an understanding of the body?

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35) How were more steps taken to remove miasma during the Renaissance period? What started happening for the first time?

36) Why did training improve for doctors and medical professions? What did they have much greater access too?

37) What year did the Plague hit London?

38) How many people roughly died (%)?

39) What was the most popular cause of the Great Plague?

40) Give one new method of trying to treat the symptoms of the Plague?

41) How did people try and prevent the Plague

42) Give two ways in which the government/king tried to help

Key topic 3: The Industrial Revolution 1700-1900

3.1 Ideas about the causes of disease and illness

Overview

- Four Humours was no longer widely believed
- Bleeding/purging were common treatments
- Apothecaries still sold herbal remedies, women carried out treatments at home
- Epidemics like the plague disappeared, but smallpox was a very common illness
- In 1900 germs were discovered, which altered the ideas about the causes of disease and illness
- Jenner developed the first vaccination
- Surgery was less dangerous – hospitals became cleaner
- Scientific revolution was happening alongside the Enlightenment – society was changing, cities started o grow
- The Enlightenment – idea people could think for themselves, and the Church could not control everyday life
- People still believed in miasma, but it was becoming less popular

Spontaneous generation theory

This had developed as the alternative to the Theory of the Four Humours. Microscopes had improved so that scientists could see microbes (a living organism, included bacteria) on decaying matter. This led some scientists to develop the theory of the spontaneous generation theory in the early eighteenth century. They argued that the microbes were a product of the decay, rather than the cause of it, and that they spread by miasma.

Louis Pasteur – Germ Theory (a breakthrough)

In 1861, Louis Pasteur published his discovery of the Germ Theory. He proved that germs were causing liquids to decay. This disproved the spontaneous generation theory. This discovery led him to the theory that germs might cause disease in the human body.

Microscopes had improved even more so it was possible to magnify substances to a higher level and keep the image clear enough to see. Pasteur observed unwanted microbes in wine and vinegar, which turned both liquids bad. He came to some key conclusions:

- Air contains living microorganisms
- Microbes were killed by heating them
- Microbes in the air cause decay
- Microbes not evenly distributed in the air

Pasteur therefore proved that spontaneous generation theory was wrong. He concluded that as germs were causing the decay in liquids they may also cause disease in the human body. He did not publish his 'Germ Theory of Infection' until 1878.

What was the impact of Pasteur?

Positive impact	Limited impact
A British scientist, Joseph Lister, read Pasteur's work and linked it to the infection problems his surgical patients had experienced John Tnydall – concluded that small organic particles in the air. He lectured in January 1870 linking Pasteur's work and Lister. He concluded that dust particles carried the germs that caused diseases	Pasteur was not a doctor and so people were reluctant to accept his ideas His work was on decay and rotting food and not illness Spontaneous generation was important until the 1870s Examining under microscopes caused an issue as healthy people had microbes – seemed impossible

	that microbes caused diseases too Limited impact due to attitudes among doctors

Breakthrough number 2 – Robert Koch and microbes

Robert Koch developed the work of Pasteur by successfully identifying the different microbes that caused common individual diseases. He identified:

- 1876: discovered the bacteria causing anthrax
- 1882: bacteria causing tuberculosis and typhoid
- 1883: discovered cholera – a year later found that it spread in water supplies (in India), thus proving Snow's work

Koch made it easier for other scientists to study bacteria by developing a new method of growing them – agar jelly in a petri dish. This made it easier to study bacteria under a microscope. He inspired other scientists, and over the next two years other scientists proved that microbes were responsible for other diseases like diphtheria, pneumonia, meningitis, and tetanus.

What was the impact of Koch?

Positive impact	Limited impact
Enormous breakthrough as the disease itself was not studied rather than the symptoms Managed to identify the causes of diphtheria (cough/fever), helping people immensely Koch made it easier to see microbes by developing a dye that would stain them Inspired other scientists Won the Nobel Prize in 1905 for his contributions to bacteriology By the end of the 19th century, the mystery about what caused illness and disease had been solved. It was now time to start looking for new treatments based on new science.	The discovery of germs and different bacteria alone did not have an impact on medical treatment. It took time for cures and vaccines to be developed Initially the British government rejected the idea of the Germ Theory. They continued to believe in miasma Progress in treatment and prevention using the Germ Theory was slow

3.2 How did treatment and prevention methods develop during the 18th and 19th centuries?

There was CHANGE in the way people were cared for and treated	There was CONTINUITY in the way people were cared for and treated
People started to realise infection was everywhere – dirty clothes, medical instruments and unwashed hands. Government was more willing to take steps to prevent disease spreading	Took a while for medical science to catch up with the new ideas of causes Still not a good understanding of how to remove germs Old herbal remedies continued to be popular Prevention was the most important aspect – more widespread

What were hospitals like in the 18th century?

- Most of England's hospitals had been closed down when Henry VIII dissolved the monasteries. By 1700, there were 5 hospitals (London)
- New hospitals began appearing from the 18th century as wealthy people donated money towards them
- Attitudes were changing – hospitals were becoming placed were sick people were treated as opposed to places where people could rest and pray
- Apothecaries, doctors and surgeons based on site
- Hospitals were still not places you would go too if you could afford to avoid them. For example, rich people would receive treatment and surgery in their own homes as it was cleaner
- Patients that were admitted were the 'deserving poor' – respectable, working class people who could not afford to pay their medical bills. Poor people had access to doctors
- Hospitals became more popular, but their conditions did not improve. They were not clean. Doctors went from ward to ward without washing hands or changing clothes, which meant that diseases spread quickly. The dirtier a doctors outer garments, the more experience they were said to have.

Who was Florence Nightingale and how did she change hospitals?

- Florence Nightingale went to the Crimean War (1854-1956) after she read news reports that said hospitals were not fit for soldiers to be treated in. There were no nurses or bandages available to soldiers.
- She made changes to the care of wounded soldiers – got 300 scrubbing brushes to get rid of dirt near where the patients were treated
- Organised to treat nearly 2000 wounded soldiers
- Ensured they had clean bedding and good meals
- Mortality rate dropped from 40% to 2%
- Gained credibility, so started to make changes in Britain

Impact of Nightingale in Britain

- Created different wards separating surgical patients and infectious patients
- Cleanliness was really important – tiles on hospital floors and painted walls and ceilings so that all surfaces could be easily cleaned
- Rigorous training for nurses – turned nursing into a profession
- Encouraged women to sign up, thus improving the numbers of women training

- Wrote 'Notes on Nursing' (1859) setting out the key role of nurses
- Sick were now treated

<u>What improvements in surgery were there?</u>

In the 18th century, surgery was dangerous because of three big problems.

1. Bleeding
2. Infection
3. Pain

There was no anaesthetic, and so patients could go into shock and die.

Surgery had to be performed quickly before patients 'bled' out. Surgery was usually performed in the patient's home with the surgeon wearing the same clothes they arrived in. There were two big developments in the 19th century that helped surgery:

1. Anaesthetics – put patients to sleep, solving the issue of pain
2. Antiseptics – prevented infection

Development of anaesthetics

- Early experiment with laughing gas proved quite successful for small operations such as pulling teeth
- The chemical ether had been discovered and used in America, but it caused patients to vomit and the gas irritated the lungs, causing coughing. It was also very flammable, so was a dangerous chemical to keep around.
- James Simpson discovered the benefits of chloroform. He gathered a group of friends together, inhaled the vapours of various chemicals, they sniffed chloroform, and passed out, which he concluded would make an excellent anaesthetic
- Queen Victoria used chloroform during the birth of her son in 1853, which made it more popular
- Simpson was knighted for his services to medicine, more surgery took place that was more complicated and lengthier
- BUT… the dose had to be carefully controlled because it was easy to overdose and kill a patient
- Cocaine was used as the first local anaesthetic in 1884. In 1905 a less addictive version – novocaine – was used as a general anaesthetic

Tackling infection: antiseptic surgery

- Historically, due to a lack of understanding about germs, surgeons did not keep surroundings clean, would wear their most stained coat to show off experience
- Instruments were not washed
- It was common to survive surgery but die after due to sepsis
- Joseph Lister studied infected wounds and concluded that flesh rotted. Compared results with Pasteur and concluded that perhaps microbes caused flesh to rot
- In 1865 he operated on a patient with a broken leg, and added a bandage soaked in carbolic acid. The wound healed nicely
- He published a series of steps to ensure that wounds did not become infected – sprayed carbolic acid in the air during surgery BUT… his ideas did not catch on quickly

What was the impact of chloroform and antiseptic surgery?

Positive impact	Negative impact
Long term – attitudes began to change, and surgery eventually became safer and cleaner Surgeons realised that performing safe surgery was their duty	Not all surgeons were willing to use carbolic acid as they did not believe that the air was full of germs Carbolic acid dried the skin out and left behind an odd smell

By 1900 instruments were steam cleaned, operating theatres scrubbed spotless and rubber gloves/gowns introduced	Opposition to change and therefore in the short-term surgery did not really change The death rate actually increased and anaesthetics were seen as bad Victorians believed that pain relief interfered with God's plan – childbirth was meant to be painful Took a long time for doctors to accept germs caused infection

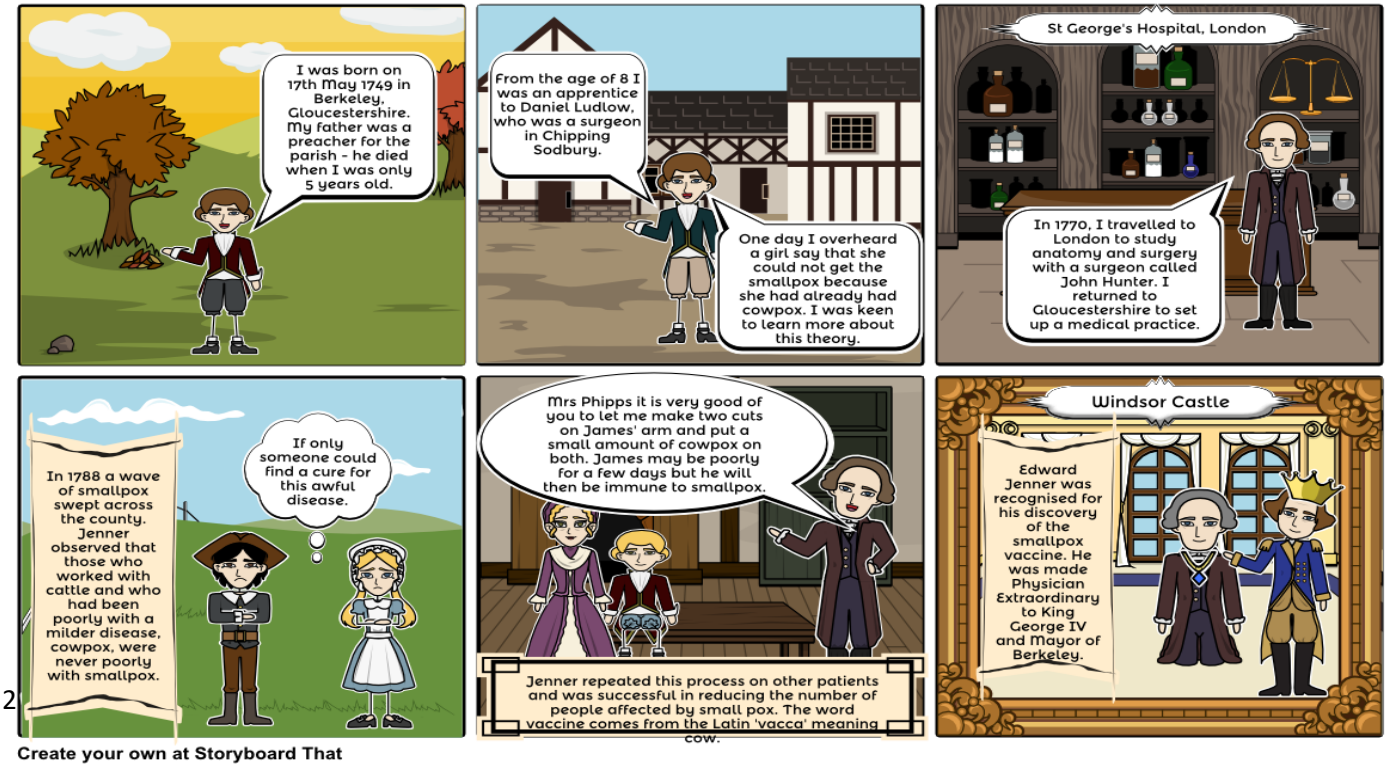
<u>New approaches to prevention: vaccination</u>

Smallpox was a terrible threat to the health of the population. There had been nationwide epidemics in 1722, 1723 and 1740. In London in 1796 there had been 11 epidemics killing 3548 people.

It had been noted that if you caught a mild form of smallpox and then recovered, you did not catch it again. Some people decided to inoculate themselves against smallpox by deliberately catching a mild dose. Pus from a smallpox scab was rubbed into a cut on the patient being inoculated by a doctor. Some died as disease did not affect everyone in the same way. Inoculation was seen as the best chance of survival, but it was expensive, and only the rich could afford it. The doctors could make a fortune (charging around £10,000)

Edward Jenner – the first vaccination

- Jenner was interested in inoculations – he gathered evidence of 1000 cases where smallpox inoculation had failed
- Dairy farms in the area where Jenner worked – treated dairy maids for cowpox (red blisters on skin, transmitted from cows to humans), when there was a smallpox epidemic. Those who had cowpox did not get it – made a connection
- Jenner treated a local boy, Jams Phipps, in 1796 with cowpox. 6 weeks later he tried to infect James with smallpox, but he did not catch it
- In 1798, he wrote up his findings, and named the technique 'vaccination' – Latin for cow is vacca
- He ensured his instructions were very detailed so that a doctor could follow them
- He wanted other people to use the vaccination to prevent smallpox from spreading



How did people react?

- Took time for people to accept – he had not explained how or why it worked which made people suspicious
- The Church was against it – using animal infection in human medical trials was against Gods will
- Inoculators found their businesses destroyed so they used to media to pint negative things against the vaccination
- The Royal Society refused to publish anything about vaccinations
- The government started to favour the new method of vaccination from the first half of the 19th century, as it was safer and more reliable than inoculation

What was the impact of Jenner's vaccination? Was it a significant breakthrough in preventing disease and illness?

It was a major breakthrough	It was not a major breakthrough
Jenner's vaccination was the first time a specific disease could be effectively prevented. The only development in the prevention of disease before Jenner's vaccination was during the eighteenth century, when inoculation was used, but this had many problems, so it was not a major breakthrough. Jenner's vaccination succeeded in preventing one of the major killer diseases of the period, so that by 1900 it was no longer the threat it had been in 1700. Jenner was willing to offer free vaccinations so that all groups within society could receive protection from smallpox. More people were encouraged to experiment because Jenner had shown the value of scientific methods Saved many people's lives. By 1800, 100,000 people around the world had been vaccinated. Napoleon had his entire French army vaccinated Number of smallpox cases fell dramatically from 1872 after it had been introduced as a compulsory vaccination	Many people resisted Jenner's vaccination because they disliked the idea of using a disease linked to animals or because vaccination was sometimes incorrectly applied and seemed to fail; it therefore had limited effect until it was made compulsory and enforced by the government in 1853 and 1871. Preventive measures against disease did not change – during the cholera epidemics of the nineteenth century, local authorities ordered barrels of tar to be burned, based on the idea of miasma. No one understood how or why the vaccination worked, and so this technique could not be applied to other major killer diseases such as cholera which appeared as a new threat in the nineteenth century. The application of Jenner's vaccination depended on the chance link between smallpox and cowpox; even if the link was understood, it could not be replicated for other diseases. Only after the work of Pasteur and Koch in the late nineteenth century could vaccination be understood and others developed. One-off discovery Some doctors mixed up smallpox and cowpox samples or reused needles, which discouraged people Stopping smallpox was not new – inoculation Did not lead to other major breakthroughs

<u>What other preventive measures where there?</u>

- People still generally believed that the best way to avoid dying from a disease was not catching it at all

- Pasteur published his case for the 'germ theory of infection' in 1878 which stated that microorganisms were responsible for diseases. Realised that vaccines could only be developed once the germs causing the specific diseases had been identified
- Pasteur – chicken cholera, anthrax and rabies = worked on vaccines involved producing a weakened version of the culture and then treating patients with it. He created an immune response – the body fought off the weakened disease, created antibodies preventing the individual from suffering that disease if the microorganism was encountered again. BUT… work focused on animals

The First Public Health Act, 1848

- Government moving away from the laissez-faire attitude
- 1800s more men had the right to vote, so the government had to pass laws that were appealing to the mases
- When cholera arrived the belief that it was spread in dirty water was backed up by Pasteur's discovery of microorganisms in 1861
- In London in 1865 there were 1300 miles of sewers built
- In Birmingham slums were abolished
- More people began to recognise that it was everybody's responsibility
- The aim of this act was to improve sanitary conditions of towns by encouraging cities to set up boards of health and provide clean water supplies

The Second Public Health Act, 1875

- City authorities had to follow the rules it set out
- Provided clean water to stop diseases
- Dispose of sewage
- Public toilets
- Better quality housing to stop overcrowding
- Provide public parks for exercise
- Street lighting

The government had therefore taken solid steps to prevent the spread of disease

3.3 Case study: How did the government tackle the cholera epidemic of the 19th century?

Overview

- Cholera was a terrible disease causing diarrhoea and sickness – the victims would die 2-6 days later
- As they became dehydrated, their blood became thicker which ruptured the blood vessels under the skin, which turned them blue – nicknamed the blue death
- Spread person-to-person
- Arrived in Britain in 1831, in London in February 1832 where there were 5275 deaths
- It affected the poorest people; there were lots of cases in slum dwellings
- Doctors found it impossible to treat – just like the plague
- In 1831/1832 = 21,882 deaths; 1848/1849 = 53,293 deaths; 1853/54 = 20,097 deaths; 1865/66 = 14378 deaths
- Belief was that miasma and rotting material caused the disease – tried to clean up the streets
- The government encouraged cities to set up boards of health and provide clean water supplies but this had no effect, due to living conditions being so poor

What did John Snow find?

- Snow was a surgeon who moved to Soho in 1836, became London's leading anaesthetist – he gave Queen Victoria chloroform during her labour
- Observed cholera during the epidemic of 1848/49 and came the following conclusion – cholera could not be transmitted by miasma as it affected the guts and not the lungs.
- Drinking water was being contaminated by the cholera-ridden faeces being disposed of in the drains – cholera had to be transmitted by dirty drinking water
- In August 1854 cholera broke out in Soho. Snow created a spot map to show where the deaths occurred in the area around Golden Square/Broad Street. Saw a pattern occurring. The number of deaths seemed to be entered around the water pump on Broad Street
- Water pump was the source of infection – removed the handle from the pump to prevent locals from pumping water. The cholera outbreak went
- Found the pump was less than 1 metre away from a cesspit – waste from the cesspit was leaking into the well and spreading cholera

What was the impact of Snow and his findings?

Positive impact	Negative impact
Positive impact in Soho as the number of deaths from cholera reduced dramatically In the longer-term, Snow's work helped make the link between dirty water and disease, leading to the Public Health Act in 1875 when cities' authorities were finally forced to provide clean water	1855 presented his findings to a House of Commons committee – cholera was transmitted by dirty water. Recommended that the government make massive improvements in the sewer system in London. Government did agree to invest in a new sewer system, planned by Joseph Bazzlegate, but it was not completed until 1875 (triggered after the Great Stink) Many people rejected is work pointing out cases still occurred among people living far from the pump Germ Theory did not emerge until 1861 so people did not believe that germs could be transmitted in dirty water

	Board of Health still clung to the theory of miasma. Admitting Snow's work was right would be costly for the government Outside of Soho, his work was very limited

Overview: Why were there so many medical breakthroughs during the 19th century?

1. INDIVIDUALS: there were a number of key individuals in this period that allowed for medical breakthroughs. Each one worked together using each other's work to develop and investigate how to explain the causes of disease. Koch had developed Pasteur's work on Germ Theory, and then when Koch published his work on bacteriology, John Snow's work made sense and the government accepted it. Jenner was willing to experiment thus allowing him to make the first vaccination

2. GOVERNMENT: more willing to spend money to improve public health because more people had the vote, and therefore they had to appeal to the wider audiences. The 1848 and 1875 Public Health Acts were landmark years as the government took responsibility for public health. The 1875 Public Health Act was more significant because it forced local councils to improve public health facilities. The government also gave Jenner £30,000 to develop his work on vaccinations in 1802 and 1807. They made vaccinations compulsory and enforced fines for failing to vaccinate children, which led to a steep fall in the number of smallpox cases

3. TECHNOLOGY: The Industrial Revolution was an exciting period of change and developments in medicine were greatly helped by improvements in technology that resulted from the Industrial Revolution. Many pieces of scientific and medical equipment improved because industries developed the ability to create more precise equipment. The most significant development was the microscope which allowed scientists to see and identify bacteria for the first time. Lister developed a microscope that magnified things 1000 times. The sewer system was also built in London – required machinery powered by steam engines.

4. ATTITUDES: starting to change – there had to be a scientific explanation for why people were getting ill. Fitted in with the ideas of the Enlightenment. Doctors were increasingly trained to use scientific methods and doctors were trained more professionally.

Answer these quick fire questions to test your understanding

1) Who was the first person to develop vaccinations?

2) What was discovered in 1900?

3) What did people still believe caused disease and illnesses?

4) Which individual discovered Germ Theory?

5) Give one reason why Germ Theory had a positive impact in Britain?

6) Give one reason why Germ Theory had a negative impact in Britain?

7) What did Robert Koch discover?

8) What was Koch awarded in 1905?

9) Why did Koch's discovery have a positive impact?

10) How did the government react to Germ Theory?

11) Which pair of individuals laid the foundations for the understanding of the causes of disease and illness for 500 years?

12) Which individual is known as the 'English Hippocrates?'

13) What was Vesalius most famous for?

14) Why did some physicians criticise Vesalius?

15) Which individual proved that germs were causing liquids to decay?

16) In what year did this individual publish the 'germ theory of infection?'

17) Who received the Nobel Peace Prize in 1905 and why?

18) Why did this individual have limited impact in the short-term?

19) What did John Snow conclude about cholera?

20) Why was Snow's work not 'life-changing?'

21) Who was sent to the Crimean to improve conditions in which soldiers were treated in?

22) Give two ways in which this individual helped the soldiers

23) What impact did this person have on hospitals in Britain?

24) Who made the link between smallpox and cowpox?

25) Briefly describe this persons discoveries

26) Give two positive impacts of the vaccination

27) Give two negative impacts of the vaccination

28) How did the government start taking more responsibility for people's health?

29) Why did they do this?

30) What did James Simpson discover that helped improve surgery?

31) Why was Joseph Lister significant in helping improve surgery?

Key topic 4: Modern medicine, 1900-present

4.1 Ideas about the causes of disease and illness

Overview

- By 1900, Germ Theory had been around for nearly 40 years
- Microbes had been linked to outbreaks of disease e.g. cholera/diphtheria
- 20th century = no longer referring to miasma, the Four Humours or supernatural causes when diagnosing illnesses
- Now had solid, evidence-based knowledge
- During the 20th century, move towards laboratory medicine – more examination of samples (e.g. skin/blood/biopsies), examined by the labs, using microscopes and technology
- Patients could be x-rayed to allow doctors to see what was going on inside the body
- Diagnosis was now much more accurate – exact microbe could be identified and targeted
- Biggest change of diagnosis in the 20th century was that t was now based on medical testing

The influence of genetic factors on health

The science of genetics	1900, clear that microbes did not cause all illnesses and diseases. Some babies were both with conditions that appeared to have developed in the womb. Missing piece in the puzzle – it related to the way that children inherited certain traits from their parents, how that then related to hereditary diseases
Early research into genetics	1900, German scientist, Mendel, theorised that genes came in pairs, one is inherited from each parent (fundamental laws of inheritance). He did not have scientific proof that his laws were correct 1951 – scientists knew that characteristics were passed down from their parents to children, as children look like their parents. Substance in human cells passed on this information from one-person to the next 1953 – missing piece of the puzzle found = DNA (deoxyribonucleic acid – carrying genetic information from one living thing to another)
Watson and Crick – human gene	James Watson and Francis Crick worked at Cambridge University, both had a strong interest in researching and finding out more about human biology. Looked at x-rays and built a model of DNA – able to solve the puzzle of the structure of DNA. Discovered it was shaped as a double helix, could unzip and make several copies. Published their paper in April 1953 – Crick suggested that they had discovered the secret of life – understanding the shape of DNA meant they could begin to look at its structure and identify the parts causing hereditary diseases
The mapping of the human genome	Structure was understood, could now begin to break it apart to understand how it worked. All the information that builds a person is stored in their DNA. Understanding that information was vital to helping scientists understand the cause of genetic diseases Human Genoe Project launched in 1990 – led by James Watson originally. For 10 years, 18 teams of scientists all over the world worked together to decode and map the human genome. Did not complete first draft until 2000. Once the human genoe was mapped, it then became possible for scientists to use this blueprint of human DNA to look for mistakes or mismatches in the DNA of people suffering from hereditary diseases. Scientists have been able to identify a gene sometimes present in women

	who suffer from breast cancer. Cannot use it to treat breast cancer, but can use it to prevent the disease e.g. Angelina Jolie

What factors helped the development of genetics?

1) TECHNOLOGY: Discovering the shape of DNA, and then napping the individual genes has been made possible through improvements in technology. Advances in microscopes and the ability to produce higher-powered images enabled scientists to identify the DNA and then start to examine how it is formed.
   Electron microscope first developed in 1931 by a German physicist, Ernst Ruska, electrical engineer, Max Knoll. Built a model that was able to magnify more than any of the optical microscopes that scientists had been using up to that point

2) SCIENCE: Understanding DNA required a lot of collaboration on the part of the scientific community. The Human Genome Project was an example of a new king of 'big science' – thousands of scientists working together to solve the same puzzles

The impact of science of genetics

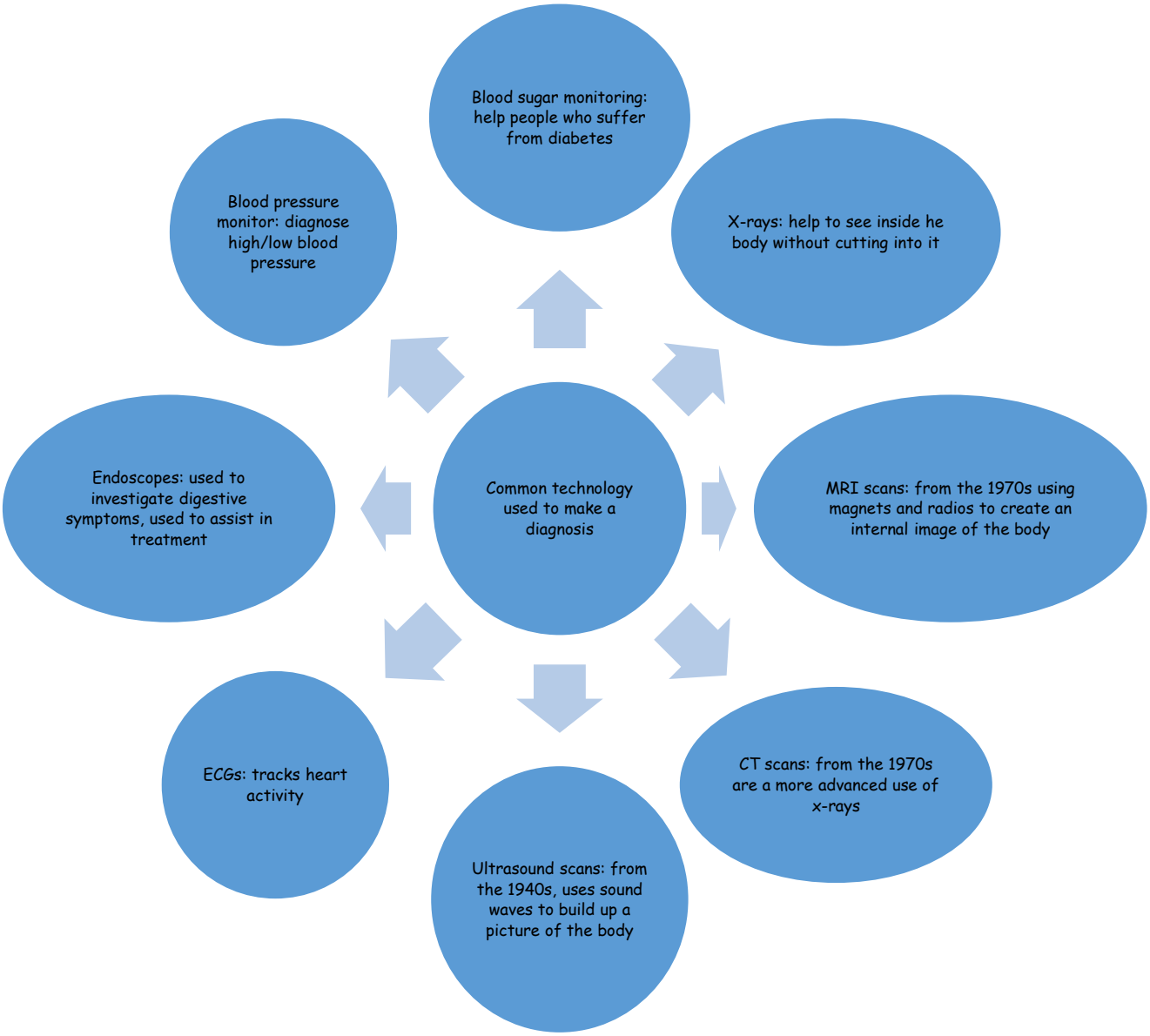
- Better understanding of DNA and how each part of the genome affects the body, helped scientists to recognise genetic disorders
- Disorders caused by missing information in the genome – if that information can be put back in by scientists, this could theoretically lead to a treatment in some cases
- Not a current treatment – good understanding of genetics has helped doctors to better understand what causes diseases and illnesses, but the science is not yet at the stage where treatments of this nature are widely available for man diseases

Lifestyle and health and its impact on health

Smoking	Became popular in the 1920s. By the 1950s, doctors started to notice a worrying rise in the number of men suffering from lung cancer, and this was linked with smoking. Doctors now recognise that smoking is associated with an enormous variety of diseases (high blood pressure, cancer, heart disease, gum disease and tooth decay). Smoking is the biggest cause of preventable diseases in the world. Causes problems if inhaled second-hand – government introduced laws to prevent adults smoking in cars when under 18s are present
Diet	Due to the Four Humours, our medieval ancestors believed that what we ate had a huge impact on your health – we now recognise what you eat and how much of it, has a huge impact on your health – but in very different ways to what was suggested in the Middle Ages. Most people are familiar with the usual advice about a healthy diet – plenty of fresh fruits and vegetables, most other things in moderation. Two importance substances when it comes to health are sugar and fat – too much sugar can cause type two diabetes and too much fat can lead to heart disease
Alcohol	Drinking too much alcohol can lead to liver/kidney problems and disease
Sharing bodily fluids	Through intravenous drug taking or unprotected sex can lead to certain diseases
Tanning	Naturally or on sun beds has led to an increase in the number of cases of skin cancer

What new methods have been used to diagnose disease and illness?

- Development of machines and computers has enabled doctors to have a better understanding of a patient's symptoms
- X-rays and CT scans mean doctors no longer have to use surgery to diagnose all disease
- Enormous leap forward in technology since 1900 has made diagnosing disease much more accurate
- This has allowed for doctors to be able to treat patients



4.2 Approaches to prevention and treatment

Treatments

- Magic bullet was created – a chemical cure attacking the microbes in the body causing disease, at the same time, leaving the body unharmed
- Ore microbes were responsible for specific diseases being discovered. This meant scientists could search for substances to attack and destroy these microbes
- Now an understanding that the body produced antibodies to fight diseases, previously infecting it = proof that vaccines work
- Wanted to find an artificial/chemical antibodies working in the same way, attacking the infection without harming the body

Breakthrough – the first Magic Bullet: Salvarsan 606

Paul Elrich, who worked with Robert Koch reasoned that, if certain dyes could stain bacteria, perhaps certain chemicals could kill them. Elrich said this would be like a Magic Bullet. The chemical would 'shoot' the infection, not the patient.

Elrich set up a private laboratory and a team of scientists and by 1914 they had discovered several 'magic bullets' – compounds (chemical mixtures) that would target and kill specific bacteria.

The most effective and well known compound was Salvarsan 606 (it was 606th attempt). It could now be used to treat the STD syphilis. It was the first treatment of disease using chemicals.

It was important because it was a major step in the progress of medicine as it was the first chemical that could be used to kill an infection inside the body. BUT…as Salvarsan 606 was made from arsenic, it was poisonous.

The second Magic Bullet: Prontosil

In 1932 Gerhard Domagk found the second magic bullet after years of research. This was a red dye called Prontosil and killed the bacteria causing blood poisoning. At first he trialled on mice which proved to be a success.

Domagk soon had the chance to trial it on a human – his own daughter who had blood poisoning which could not be cured. He injected her with Prontosil and she recovered. Doctors discovered that sulphonamide was the key ingredient which attacked disease and were able to then create new drugs which cured gonorrhoea, pneumonia and scarlet fever. This helped mothers dying from post-natal infection drop from 20% to 5% - a huge impact

The NHS was launched in 1948 by the government aiming to produce medical care for the entire population. There were two different phases to the setting up of the NHS.

The development of antibiotics

- An antibiotic is a treatment that destroys/limits the growth of bacteria in the human body – the first one was penicillin
- Different to a magic bullet because it was created using microorganisms, not chemicals
- Fleming (a British doctor) was working in London, interested in bacteriology
- During the First World War, Fleming worked in battlefield hospitals trying to improve treatment for wounded soldiers
- 1920s he researched substances that may be effective in combating these simple infections.
- In 1928, he noticed something unusual about his dirty petri dishes – one of them had developed mould
- The mould killed off the harmful staphyloccus bacteria growing in the dish
- He tested the mould and identified it as penicillin – from the Middle Ages people were ware that mouldy bread had healing properties (Lister had used it in 1871)

- BUT… Fleming did not believe penicillin could work to kill bacteria in living people. First experiments with the mould showed it became ineffective when mixed with blood in test tubes in the laboratory, so Fleming did not pursue or perform further tests on the mould

Florey and Chain

- Came across Fleming's findings and decided mould should be tested further
- Chain grew the mould in his lab, and used extracts of it in tests for treatment
- 1940 tested their extracted penicillin on infected mice and it killed the infection
- Difficult to produce penicillin in large quantities
- The active ingredient in the liquid produced by the mould only represented one part per two million – needed to grow a great deal of mould before it was possible to get started on a human trial
- Tried to grow as much penicillin as possible (milk churns, bed pans, bath rubs)
- Used it on a policeman who had got septicaemia (blood poisoning), he showed signs of recovery, extract penicillin from urine and he kept recovering. He eventually died
- The significance of this though was that it proved to be an effective fighting infection in the human body

Mass production of penicillin

- Needed a large-scale factory where the penicillin could be grown and extracted on an industrial scale
- Florey approached British pharmaceutical companies for assistance, but it was during the Second World War, and companies were busy producing materials for the war effort
- June 1941, Florey visited the USA and persuaded them to help. After 1 year, there was enough penicillin to treat 10 people
- US government funded 21 pharmaceutical companies to mass produce it, British companies then got involved.
- By June 1944 (D-Day), there was enough penicillin to treat all Allied casualties

Medical care – the improvements in caring for the sick

In 1948 the government set up the National Health Service (NHS). The idea came from the 1942 Beveridge Report that said treatment should be available to the rich and the poor. The NHS provides medical care for all of the population, paid for by the British taxes. The NHS is responsible for over 2500 hospitals and GPs surgeries in the UK.

Phase one: improved access to care

The government were going to pay for the improvements to medical care through National Insurance contributions – it was the largest government intervention in terms of medical care.

There were three separate parts comprising the NHS:

1) Hospitals
2) General Practitioners (GPs/doctors) – primary care (before hospital)
3) Additional services (ambulances)

The government aimed to provide the same level of service for everyone, no matter how rich or poor they were – something that had never happened. However, hospitals had not changed much since Nightingale's changes due to there being no money to spend on medical care. The government were now responsible for 1,143 voluntary hospitals, and 1,545 city hospitals. The hospitals desperately needed updating, as did GP surgeries. GP surgeries were behind the times, and the NHS made the problem worse because more and more people began visiting GPs for their illnesses. Waiting times increased, whilst time spent with a GP in an appointment decreased. Access had improved, but provision had not in the short-term. During the 1960s, the government implement changes to improve the NHS. In 1966, a GPs charter was introduced, encouraging GPs to work in group practices, and the government gave incentives to keep up with medical developments.

Phase two: high-tech medical and surgical treatments

Once the three major problems of surgery had been solved, doctors were able to carry out more daring and intrusive surgery. Hundreds of high-tech medical and surgical treatments are being carried out.

- Advanced x-rays: e.g. radiotherapy that can shrink tumours
- Smaller cheaper machines: helps provide dialysis to those patients who need it, as well as allowing heart bypasses.
- Robotics: prosthetic limbs which have helped people of bomb attacks, war injuries as well as road traffic injuries
- Microsurgery: reattach tiny nerve endings and blood vessels
- Keyhole surgery: surgeons can operate through tiny incisions – quicker healing, less trauma, quicker recovery time
- Robotic surgery: brain surgery – smaller cuts, computers to control instruments

<u>How much has changed in the care, treatment and prevention of illnesses and diseases of the population?</u>

<u>Treatment</u>	<u>Improved access to care</u>
• Sydenham dreamed each disease would have its own treatment • 1900 25% deaths caused by infectious disease, 1990 1% deaths caused by infectious disease • Still herbal treatments e.g. Beechams – just improved • Medicines matching diseases they treat • Difficult to develop vaccines against some viruses e.g. flu • New diseases keep appearing • Lifestyle factors caused an increase in heart disease and cancers • Drug-resistant bacteria e.g. MRSA/Tuberculosis • Alternative treatments still used e.g. acupuncture which is still very commonly used	• 1900 – most sick still cared for by women (e.g. most nurses are women) • Doctors had to be paid, so were only used for serious illnesses • Situation improved slowly during the first half of the 20th century. • 1919 – government set up the Ministry of Health to help determine the level of health care across the country • Rapid improvements in the availability of care outside the home from 1948 onwards • NHS made medical services free at the point of service, giving everybody access to medical care and treatment • Hospitals were now just for treating the sick, rather than places to rest • Up until the end of WW2, elderly people with no family had often lived out their last days in hospitals – this was obviously no longer possible
<u>Preventing disease</u>	<u>Prevention – mass vaccinations</u>
• By 1900 the government took responsibility	• Diptheria (1942), 3000 children per year died

for providing clean water and waste • More people were given the vote, so the government had to pay attention to what people wanted • No longer a laissez-faire attitude • Government now understood the causes of diseases and could now test the best methods of prevention • Compulsory vaccinations • Pass laws such as the Clean Air Acts and adding fluoride to toothpaste to prevent tooth decay • Communicating health risks, charities contribute to health lifestyle e.g. Cancer Research, British Heart Foundation	• During WW2, the government introduced a national campaign to immunise all children against diphtheria – infection rates plummeted • Polio (contagious disease causing paralysis), 1950s as many as 8,000 cases reported each year. Vaccination was developed by Jonas Salk (USA), and introduced to the UK in 1956. A more effective vaccination came in 1962. Infection rates plummeted, and the last case was in 1984 • Some vaccines aimed at protecting future generations – rubella (German measles) is not a life-threatening disease for most people – can be dangerous if pregnant women catches it • HPV – protects women against infection from an STD linked to cervical cancer • Some people resent government intervention and choose not to vaccinate their children – a lack of trust in the medical profession has led to fears that vaccines are unsafe. • Vaccination can be the best way to prevent the spread of dangerous diseases, there is still freedom of choice to reject this method

4.3 Case study: the fight against lung cancer

Overview of lung cancer

- Second most common cancer in the UK
- Common in 40+ and 70-74 year olds
- Most lung cancers are caused by external factors e.g. 85% of cases are people who smoke or have smoked. Also caused by radon gas
- In the 19th century, records were kept at the University of Dresden (Germany). Here it was recorded that 1% of all cancers caused by lung tumours, by 1918 this had increased to 10%, and by 1927, 14%
- 1950 – British Medical Research Council showed conclusively the rise in lung cancer was linked to smoking
- By 1973, there were 26,000 deaths due to lung cancer
- Death rate among women rose until the 1990s

Use of science and technology in diagnosing lung cancer

- By the time lung cancer is detected it is usually very advanced.
- There is no national screening for lung cancer, no routine testing like breast cancer (mammograms) or cervical cancer (smear tests)
- Tests are not always accurate enough to outweigh the negative effects of the screening (exposed to radiation(
- Before, lung cancer was diagnosed using an x-ray machine – lung abscesses could be mistaken for cancer, or cancer could be mistaken for something less threatening

Patients are given a CT scan, creating a detailed picture of inside the body. They are possibly injected with a dye before the scan which helps lungs show clearly

If the CT scan shows possible cancer, doctors can do one of two things

Cancer not very advanced, gives a PET-CT scan = small amount of radioactive material injected which can identify cancerous cells

Patients given a bronchoscopy, which collects a sample of the cells for testing

Doctors can then identify the type of cancer, how advanced it is, and then come up up with a treatment plan to attack the cancer

How do you treat lung cancer?

There are several different ways to treat lung cancer, depending on the type and how early it is caught.

1. If caught early, then doctors can perform an operation to remove the tumour and the infected part of the lung. Can range from the removal of a small piece, to the entire lung. It is possible to breath with just one lung

2. Transplants: replace lungs with a transplanted healthy donor, although this raises ethical questions – should you be allowed a second chance if you have ruined your original lungs

3. Radiotherapy: concentrated waves aimed to shrink the tumour. If it is a small tumour, this means it is likely that no surgery would be needed, if it is a large tumour, it can prevent it becoming bigger.

4. Chemotherapy: injection of drugs to either shrink the tumour before surgery, prevent it reoccurring or to provide relief from symptoms if surgery is not possible.

5. Genetic research: cannot use genetics to treat but can test tumours as some chemotherapy drugs work better in lung patients whose tumours have certain genetic mutations.

How have the government tried to prevent lung cancer?

Government has been slow to respond to the evidence that smoking is linked to lung cancer – the evidence was first published in 1950. By 1985, smoking-related deaths cost the NHS £165 million a year (although they earnt 4 billion from tobacco tax)>

Changing behaviour	Influencing behaviour
• 2007 government banned all smoking in all workplaces, including pubs, cafes, restaurants and offices • 2015 the ban was extended to cars • 2007 the age to buy tobacco increased from 16 to 18 • Increased taxation on tobacco products	• Ban on tobacco advertising starting with cigarette advertising in 1965 • Banned cigarette advertising entirely in 2005 • Campaigns to show the dangers • All cigarette products in shops removed from display

Comparing government action against cholera and lung cancer

Cholera	Lung cancer
• Slow responding initially – Snow presented his findings in 1855, took until 1875 for the sewage system to be implemented to make a difference • More direct response in late 19th century – 1875 Public Health Act forced cities to be cleaner to stop the spread of cholera	• Slow responding initially – first evidence published in 1950, government did not intervene until death rates too high • More direct response in early 21st century – government tried to both force and influence change in smoking behaviour – smoking bans introduced in 2007 and changes made on how tobacco could be advertised

Answer these quick fire questions to test your understanding

1) What was the biggest change that took place in diagnosing disease and illness in the modern period? What was diagnosis now not based on?

2) What had German scientists theorised by 1900 about genes?

3) What was discovered in 1953 that helped explain hereditary diseases?

4) Which pair of individuals claimed they had discovered the secret of life?

5) How does lifestyle and health factors contribute towards causing diseases and illnesses?

6) What is a magic bullet?

7) Which individual experimented with petri dishes and discovered penicillin by chance?

8) Which pair of individuals then tried to mass-produce penicillin?

9) What year was the NHS launched?

10) Why was this a significant breakthrough in the treatment and care of the population?

11) In what ways have the government helped prevent disease? Give two examples

12) What is the second most common cancer in the UK?

13) How is this cancer diagnosed?

14) How have the government tried to change people's behaviour with regards to preventing this cancer?

15) What similarities are there between cholera and this case study with regards to how the government reacted?

Section B: Medicine in Britain, c1250-present

Question 3: Explaining similarities or differences between two time periods (4 marks – 5 minutes)

This first question tests you on your knowledge and understanding of Medicine from 1250 to present. You have to identify and support your answer with specific details. Examples of questions:

Explain one way in which ideas about the cause of disease and illness were similar in the 14th and 17th centuries

Explain one way in which ideas about the treatment of disease were similar in the 17th century from ideas in the 13th century

Explain one way in which ideas about the treatment of disease were different in the 17th century from ideas in the 13th century

Explain one way in which ideas about preventing the plague were different in the 14th and 17th centuries

Explain one way in which ideas about preventing the plague were similar in the 14th and 17th centuries

Explain one way in which people's reaction to plague were similar in the 14th and 17th centuries

Explain one way in which ideas about the causes of disease were similar in the 14th and 17th centuries

Explain one way in which understanding of the causes of disease and illness was different in c1750 from the present day

Explain one way in which understanding of the causes of disease and illness was similar in c1750 from the present day

Explain one way in which people's responses to the 1665 Great Plague in London were similar to the way that people reacted to the Black Death in Britain

Explain one way in which understanding of the causes of illness was different in the late nineteenth and twentieth centuries

Explain one way in which the methods used by doctors to diagnose illness during the medieval period (c1250–1500) were different from the methods used during the modern period (c1900–present).

Model answers:

3 Explain one way in which people's reactions to the plague in Britain were similar in the fourteenth and seventeenth centuries.

One way in which reactions were similar to both outbreaks of plague were the focus on religion. In the fourteenth century people responded by fasting, praying and even flagellation to show beg forgiveness to God who they believed had sent the plague to punish their sins. In the seventeenth century people also responded by fasting, praying and painting the sign of the cross on their door to show God that they were sorry for their sins.

Question 4 – 16 + 4 SPAG marks: approximately 25 minutes

STATEMENT: '……' How far do you agree? Explain your answer. [16 marks + SPAG = 20 marks]

1. ULTRA, ULTRA BRIEF INTRODUCTION!
I agree / disagree with the statement that …. The criteria that led to this judgment is …..

2. Support the statement with reasons. *[Evidence to support the statement - make sure you make reference to your criteria and use at least three examples]*	Useful phrases *It can be argued that… The statement is accurate because… This was important because… For example… This led to…. As a result of… This is shown by… This evidence suggests/demonstrates/illustrates…*	Useful words irrelevant… negligible… trivial… minor… indirect… major… substantial… fundamental… crucial… decisive… pivotal… accelerated… hindered… exacerbated… indicated… highlighted… reflected…

3. Counter the statement with an alternative suggestion. *[Evidence to counter the statement - make sure you make reference to your criteria and use at least three examples]*	Useful phrases *However… on the other hand…. conversely… compared to… Alternatively… It could be argued that…*	Useful words irrelevant… negligible… trivial… minor… indirect… major… substantial… fundamental… crucial… decisive… pivotal… accelerated… hindered… exacerbated… indicated… highlighted… reflected…

4. Counter the statement with another alternative view *[Evidence to counter the statement - make sure you make reference to your criteria and use at least three examples]*	Useful phrases *However… on the other hand…. conversely… compared to… In addition…*	Useful words irrelevant… negligible… trivial… minor… indirect… major… substantial… fundamental… crucial… decisive… pivotal… accelerated… hindered… exacerbated… indicated… highlighted… reflected…

5. Reach an overall conclusion	1) *State judgment* 2) *Acknowledge strength of alternative view* 3) *Repeat your most persuasive piece of evidence and explain how it fits your criteria.*	Useful phrases *In conclusion… finally… on balance… in summary… overall… to conclude*

"Hospital treatment in England in the period from 1250 to 1500 was very rare."

How far do you agree? Explain your answer (charity hospitals; care in the home)

"Individuals had the biggest impact on medical training in the 16th and 17th centuries."

How far do you agree? Explain your answer (Vesalius; the printing press)

"There was rapid change in ideas about the causes of illness and disease in the period c1700-c1900"

How far do you agree? Explain your answer (Spontaneous generation; Louis Pasteur)

"Louis Pasteur's publication of the Germ Theory was the biggest turning point in medicine in the period c1700-c1900"

How far do you agree? Explain your answer (Edward Jenner; Robert Koch)

"Treatment of diseases and care of the sick completely changed after c1800."

How far do you agree with this statement? Explain your answer (magic bullets; the NHS)

"Vesalius's work on anatomy was a major breakthrough in medical knowledge during the period 1500-1700"

How far do you agree with this statement? Explain your answer (Vesalius; printing press)

"Simpson's use of chloroform as an anaesthetic was a major breakthrough in surgery during the period 1700-1900"

How far do you agree? Explain your answer (chloroform; antiseptics)

"Jenner's vaccination against smallpox was a major breakthrough in the prevention of disease in Britain during the period c1700-c1900"

How far do you agree? Explain your answer (cowpox; cholera)

"John Snow's work linking water with the spread of cholera led to major breakthroughs in preventing the spread of disease."

How far do you agree? Explain your answer (the Broad Street Pump; the Public Health Act, 1875)

"Medical treatments and preventions during the Medieval period were based on religion and superstition."

How far do you agree? Explain your answer (Bloodletting and purging; praying and fasting)

Model answers:

Jenner's vaccination against smallpox was a major breakthrough in the prevention of disease in Britain during the period c1700-1900.' How far do you agree? Explain your answer.

I disagree with the statement that Jenner's vaccination against smallpox was a major breakthrough in the prevention of disease. The criteria that led to this judgment is that the discovery had little short or long term impact on understanding of prevention of disease.

The statement could be argued as accurate because the vaccination against the smallpox was the first time in recorded medical history where a specific disease could be prevented effectively. For example, before Jenner's discovery the most celebrated development was the practice of inoculation yet this was unreliable and had many problems so cannot be considered a breakthrough. As a result of the development of the vaccination the death rate for smallpox declined dramatically and many lives were saved which would otherwise have been lost to a previously fatal disease.

However, it could also be argued that the statement is inaccurate as it over states the significance of the breakthrough for prevention of disease in Britain. For example, the discovery did not lead to a widespread implementation of vaccination as a method of preventing disease. This was because many people were resistant to the idea of being injected with a disease associated with an animal plus there were several cases where the incorrect application of the vaccination led to the perception that the vaccination was ineffective. As a result of this preventative methods against disease stayed much the same including local authorities promoting the belief that burning tar could counteract the 'miasma' which was widely believed to be responsible for the cholera outbreaks of the nineteenth century. This demonstrates that far from a major breakthrough, Jenner's vaccination had minimal impact on approaches to disease prevention.

A further reason why the statement can be challenged is the lack of transferable knowledge resulting from the breakthrough. For example, although vaccination of smallpox proved successful it was based on a chance discovery relating to a specific disease. Jenner could not explain why his discovery worked meaning it had little impact in furthering understanding of how diseases could be prevented. As a result of this when cholera emerged as a new threat in the nineteenth century, there was nothing that could be applied from Jenner's discovery to prevent new diseases. It was not until the publication of germ theory by Pasteur in 1861 and subsequent developments in bacteriology by Robert Koch that a true breakthrough was achieved in the fight against disease.

In conclusion, it is clear that the statement overstates the significance of Jenner's discovery. In isolation it was undoubtedly an important development that saved many lives, however the fact that it did not further medical understanding of disease meant it was of little short or long term consequence for medical capacity to prevent the spread of disease.

'There was little progress in medicine during the Renaissance period (c1500 - c1700).' (16+4 SPAG)

Firstly, it can be argued that there was little progress in medicine during the Renaissance period because public health did not improve. In order to judge that progress has been made there would need to be evidence that people in the Renaissance were healthier than their predecessors. The statement is accurate because there was no improvement in average life expectancy when compared to the medieval period which preceded it.

Secondly, ideas about cause of disease were still dominated by inaccurate belief in miasma and the continued acceptance of the four humours as a theory. It is true that as the importance of the church declined this was a period of pivotal change in terms of searching for new ideas about medicine yet these ideas were slow to be accepted

and had no direct use in improving treatment or preventing disease. For all the exciting new experimentation, the discoveries of Vesalius and Harvey had little impact in improving understanding of the causes of disease.

Finally, medical care progress was limited as training continued to be based on learning from textbooks rather than practical experience. A good example was dissection; where despite its legalisation it took until after the Renaissance for the practice to become commonplace. As a result of the slow adoption of new ideas bloodletting and purging continued to be a widespread practice throughout the period. The response to the Great Plague of 1665 illustrates the lack of progress in medicine as neither old ideas such as prayer and fasting or new ideas like the theory of transference had any basis in medical fact for dealing with the epidemic.

However, it can be argued that the Renaissance was a period of fundamental change in medicine where major progress was achieved. For example, ideas about causation progressed from an acceptance of religious ideas to a wide rejection of supernatural explanations and the popularity of rational theories such as seeds in the air. The decline in church control over medical research and the embrace of scientific approaches in itself represents significant progress. People were now searching for new explanations for disease rather than believing that disease was caused by God. Thomas Sydenham was a key figure in leading progression in understanding of causation as his promotion of direct observation and examination replaced astrology and urine charts for the purpose of diagnosis.

Furthermore, compared to the medieval period it was far easier to communicate medical discoveries and theories as a result of the invention of the printing press. For example, in 1665 the newly established Royal Society was able to publish a journal Philosophical Transactions in which scientists could share their work and ideas. This meant that doctors and scientists could study, challenge and build on each other's research dramatically accelerating progress in medicine. A culture was created of scientific exploration with communication between practitioners enabling rapid development of understanding as demonstrated by Harvey's discovery of blood circulation as a result of developing the research of Vesalius.

In addition, progress was also significant in treatment; apothecaries and surgeons now needed a licence which could only be gained by training and new ideas from scientists like Vesalius and Harvey were transmitted through books and inspired physicians to become more practical and experimental. For example, by 1700 Harvey's work was being taught in medical schools and his methods of observation and dissection were copied by others. Galen's ideas were now discredited and far less influential. The response to the Great Plague of 1665 provides evidence of progress in ideas of appropriate treatment and prevention. For example, streets were regularly cleaned, public gatherings were banned and infected households were quarantined for 28 days which had the effect of reducing the level of mass infection that was evident in 1348.

In conclusion, it is inaccurate to characterise the Renaissance as a period of little progress in medicine. Although the outdated beliefs and treatments such as miasma and bloodletting continued this can be countered by the fundamental changes in the culture of scientific exploration and experimentation through the establishment of Royal Society, the seismic impact of the printing press in communicating new discoveries and the integration of scientific discoveries into the training of medical practitioners. In summary, although there was limited evidence of measurable progress at the time, the Renaissance was a period of immense progress in human understanding of medicine.

Glossary of key terms

Amputation	Removal of a limb by surgery
Anaesthetics	A drug or drugs given to produce unconsciousness before and during surgery.
Anatomy	The science of understanding the structure and make-up of the body
Anthrax	An infectious disease mostly affecting animals and occasionally people
Antibiotic	A drug made from bacteria that kill other bacteria and so cure an infection or illness
Antibodies	A substance produced in the body to counter infections
Antiseptics	Chemicals used to destroy bacteria and prevent infection

Apothecary	A pharmacist/chemist
Astrology	The study of planets and how they might influence the lives of people
Bacteria	A tiny living organism, too small to be seen by the naked eye, that causes diseases
Battalion	Between 800-1000 men fighting in WW1
Biochemistry	The study of chemical processes that occur in living things
Bleed/bleeding	The treatment of opening a vein or applying leeches to draw blood from the patient. Also means the loss of blood caused by damage to the blood vessels
Cell	The basic unit of life that makes up the bodies of plants, animals and humans. Billions of cells are contained in the human body
Cesspit	A place for collecting and storing sewage
Chemotherapy	Treatment of a disease, such as cancer, by the use of chemicals
Chloroform	A liquid whose vapour acts as an anaesthetic and produces unconsciousness.
Contagion	The passing of disease from one person to another
Cranium	The skull
Dispensary	A place where medicine is given out
Dissection	The cutting up and examination of the body
DNA	Deoxyribonucleic acid – the molecule that genes are made of
Dysentery	A severe infection causing frequent bowel movements
Epidemic	Widespread outbreak of a disease
Excision	Cutting out
Faeces	Waste material from the stomach and digestive system
Four Humours	The Ancient Greeks believed the body was made up of the Four Humours of liquid – black bile, yellow bile, blood and phlegm
Gangrene (gas)	The infection of dead tissue causing, in the case of gas gangrene, foul-smelling gas
Gene	Part of a cell that determines how our bodies look and work. Passed from parents to children
Germ	A micro-organism that causes disease
Germ Theory	The theory that germs cause disease, often by infection through the air
Gene therapy	Medical treatment using normal genes to replace defective ones
Herbal remedy	A medicine made up from a mixture of plants, often containing beneficial ingredients
Immune system	The body's defence system again infections and bacteria
Immunotherapy	A method of treating disease by stimulating the body's immune system to work more effectively
Infection	The formation of disease-causing germs or micro-organisms
Inoculation	Putting a low dose of a disease into the body to help it fight against a more serious attack of the disease
Leeches	Blood-sucking worms used to drain blood from a wound
Ligature	A thread used to tie a blood vessel during an operation
Miasma	Smells from decomposing material were believed to cause disease
Microbe	Another name given for bacteria or micro-organisms
Passive smoking	Involuntary inhaling of smoke
Patent medicines	A medicine usually sold for a profit.
Penicillin	The first antibiotic drug produced from the mould of penicillium to treat infections
Physician	A doctor of medicine who has trained at university
Physiology	The study of how the body works
Plague	A serious infectious disease spread to humans by fleas from rats and mice
Public health	Refers to the well-being of the whole community
Pus	A pale yellow or green fluid found where there is infection in the body
Quarantined	Separated from the rest of the local community because of illness
Radiotherapy	Treatment of a disease, such as cancer, by the use of radium

Remedy	A drug or treatment that cures or controls the symptoms of a disease
Smallpox	A dangerous disease causing fever that was a major cause of death until it was beaten by vaccination
Sterilise	To kill all living micro-organisms from surfaces and surgical instruments
Superstition	An unreasonable belief based on ignorance/fear
Syphilis	An STI that was common from the late 15th century
Tetanus	A disease in which muscles go rigid or into spasm which can lead to death
Transfusion	The transfer of blood from one person to another
Tumour	A swelling caused by cells reproducing at an increased rate or an abnormal growth of cells that may or may not be cancerous
Vaccination	The injection into the body of killed or weakened organisms to give the body resistance against disease
Virus	A tiny micro-organism, smaller than bacteria, responsible for infections like cold and flu
Wise woman	A woman who was believed to be skilled in magic or local customs

Revision resource: thinking quilt – colour co-ordinate under the different categories

Thinking Quilt: Medicine Through Time	Anaesthetics	Herbal Remedies	Cholera	Transplants	Trepanning	Black Death	James Simpson	Position the planets
Miasma	Apothecaries	God	Wise Women	Purging	Spontaneous Generation	Florence Nightingale	DNA	National Insurance
Attitudes	Government	NHS	Edwin Chadwick	Public Health Acts	Claudius Galen	William Harvey	Archibald McIndoe	Doctors
Thomas Sydenham	Louis Pasteur	The Four Humours	Robert Koch	War	Hospitals	John Snow	Anti-Septics	Hippocrates
Florey & Chain	The heart is a pump	Chloroform	Germ Theory	Penicillin	Blood Loss	Plastic Surgery	Individual Genius	Blood Transfusions
Crick & Watson	Barber Surgeons	Aneurin Bevan	Magic Bullets	X-Rays	Science	TB	Theory of Opposites	Vaccinations
Technology	Herbalists	Religion	Edward Jenner	Carbolic Acid	William Beveridge	Joseph Lister	Dissection	Clinical Observation
Great Plague	Hippocratic Oath	Roger Bacon	Amputation	Andres Vesalius	Urine Chart	Chance	Bleeding	Alexander Fleming

Ancient Medicine	Medieval Medicine	Renaissance Medicine	Industrial Age	Modern Age
Key People	Medical Theories	Factors	Treatments	Healers