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|  | Hippocrates | Galen | Vesalius | Harvey | Sydenham | Pasteur | Koch | Jenner | Nightingale | Simpson | Lister | Chadwick | Fleming | Florey and Chain | Watson and Crick |
| Time period | C1250 – C1500 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| What they did: | Created theory of 4 humours |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Role of Individuals |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Religion | The church supported his book and allowed his ideas to be spread. |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Government | They had the same role as the government in this time period. |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Attitudes | Because he was so respected nobody spoke out against him. |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Science and Technology | Believed the body was made up of 4 liquids and their imbalance made you sick. |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| War | N/A |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Chance | N/A |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Short Term Impact | His ideas were very influential because of the church for a long time after he died. |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Long Term Impact | In the renaissance era Doctors like Vesalius & Harvey were starting to speak out against his ideas and soon they were no longer accepted in the 17th century. |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

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| Individuals | When? | Who? | **Why Important?** | **Factors in their success** | **Problems** |
| Hippocrates | 5th or 4th Century BC | Greek Doctor – The Father of Medicine | Believed and taught that Medicine was a natural, not supernatural.  Developed the ideas of clinical observation (watching the patient and recording the symptoms) and the theory of the 4 humours. | Writing – Hippocrates and his followers published the Hippocratic Collection, which contained his views on medicine and different recorded illnesses. These spread through the Greek world and later through Asia due to Alexander the Great’s success. | Idea of 4 humours was wrong. |
| Claudius  Galen | 2nd C | Doctor in Ancient Rome | Took Hippocrates’ ideas to Rome.  Developed the theory of opposites – his view of medicine was unchallenged for centuries.  Also developed knowledge of anatomy by dissecting animals. | Fame – he became doctor for the Emperor and his ideas spread across the Roman Empire which reached across Europe and into Asia and Africa.  Religion – Rome became the centre of Christianity and they adopted Galen’s theories which were accepted without question until the Renaissance. | 4 Humours and therefore Theory of Opposites was wrong. Animals have different anatomies. |
| Andreas Vesalius | 16th C | Professor of Surgery (University of Padua, Italy.) | Carried out own dissections, finding faults in Galen’s theories.  Published illustrated textbook *Fabric of the Human Body* (1543) that challenged/corrected Galen’s earlier mistakes on Anatomy.  Led to further research and understanding of the human body. | Renaissance led to freedom to experiment and to challenge previous ideas.  Padua was a renowned school of learning that allowed dissection of human corpses.  Printing made ideas easier to communicate (e.g. three editions of *Compendosia* published between 1545-1559 – popular in England, esp. with Barber Surgeons).  Able to build on the much earlier works of Galen. | A better understanding of anatomy didn’t help with identifying causes, preventions & treatments of disease. Blood-letting still common. |
| Ambroise Pare | 16th C | French Surgeon | Developed new ways of dealing with battlefield wounds – cream of rose oil, egg white and turpentine (in 1537) – less painful & less prone to infection than cauterization with hot oil.  Introduced ligatures as a less painful way of sealing severed blood vessels. Developed ‘crows beak clamp’ to stop bleeding whilst the ligature was being applied. | Chance: He ran out of hot oil during a battle and had to find a new way to deal with gunshot wounds.  Education – Used knowledge of previous treatments to develop new ones.  Communication: printing press made his ideas easier to communicate. | No knowledge of germs so ligatures carried infection into the wound. Early resistance to ideas. Research was published in French, so couldn’t be read by many surgeons elsewhere. |
| William Harvey | 17th C | Successful London Doctor | Discovered that the heart works like a pump.  Worked out blood is circulated around the body.  Published his findings – *On the Motion of the Heart and Blood in Animals (1628)*  Long-Term significance allows for blood transfusions, blood tests to check for disease & heart transplants. | Prior Learning – He worked on the theories already developed by his predecessors at Padua.  Experimentation and recording of findings (scientific method).  Influential contacts – he treated the King.  Printing – made his ideas easier to communicate. | Capilliaries weren’t discovered until Malpighi 1661 (stronger microscope) so couldn’t explain findings.  Understanding of circulation didn’t help develop short term understanding of disease. |
| Individuals | When? | Who? | **Why Important?** | **Factors in their success** | **Problems** |
| John  Hunter | 18th C | English Surgeon | Trained hundreds of surgeons in his scientific approach to anatomy after admitted to the Company of Surgeons (1768).  Experimented on himself to prove that gonorrhea and syphilis were different diseases.  Successful work on aneurisms – tied artery to restrict blood flow to aneurism. (1785)  Surgical development. | Scientific method – experimentation & observation led to new discoveries.  Communication – published numerous books which were widely read (e.g. *On Venereal Disease (1786)* and *Blood inflammation & gunshot wounds* (published after death & ended theory that gunshot wounds were poisonous). Trained other surgeons.  Individual – dedicated his wealth to research. | Anatomical and surgical developments do not improve understanding of causes, preventions or treatments for disease. Some resistance to work. |
| Edward Jenner | 18th & 19th C | English Country Doctor | 1796 – experimented on 8 year old boy to prove Cowpox would prevent Smallpox.  1798 – published findings (*An Inquiry into the Causes and Effects of the Varioae Vaccinae, Or Cow-Pox*).  1802 - £10,000 awarded by the Gov’t & a further £20,000 in 1807.  1853 – smallpox vaccination made compulsory.  1980 –World Health Organisation (WHO) declared Smallpox eradicated worldwide. | Science – Doctors training had dramatically improved.  Individual - A willingness to experiment and record his findings scientifically.  Government – funding for development of research & vaccination made compulsory.  Communication – published his findings after extending upon the research of another doctor who failed to pursue the connection. | Public fear of deformities due to lack of understanding.  Many doctors made huge profits from inoculations so resisted the idea.  Lack of Govt. enforcement in compulsory vaccination.  Jenner couldn’t explain why his vaccine worked – open to criticism when other doctors made errors that led to death.  Anti-Vaccination League established in response to compulsory vaccinations & published anti-vaccination material. |
| Ignaz Semmelweiss | 19th C | Hungarian Hospital Director | Realised that women who were attended to by midwives when giving birth were less likely to die than those attended to by doctors who had come from performing autopsies.  Realised that washing before a medical procedure reduced the risk of infection.  Reduced death rates in his hospital by enforcing cleanliness in medical students before they examined patients. | Scientific method - He tested his theory across two wards and lectured on the findings (1847-50).  Communication - He lectured on his theory and published a book in 1861. | He was ignored. Doctors didn’t want to accept they caused death and claimed washing took too much time. |
| Individuals | When? | Who? | **Why Important?** | **Factors in their success** | **Problems** |
| James Simpson | 19th C | Edinburgh Surgeon | Discovered the use of Chloroform as an anaesthetic. (1847)  Campaigned for increased use of anaesthetics in surgery and childbirth.  Queen Victoria used it as one of his patients during the birth of her 8th child.  More popular alternative to Nitrous Oxide and Ether, which was highly flammable. | Chemistry allowed the development of new drugs. Previous work on anaesthetics by Humphrey Davey and others first.  Chloroform had already been developed for other purposes.  Attitudes - as doctor to the Queen, his ideas became popular. | Opposition to his new ideas – many in army thought patients should heroically accept pain.  Surgery could take longer = more death.  Overdose = death (Hannah Greener – toe) |
| Edwin Chadwick | 19th C | English Lawyer and Public Health Report writer | Reported on the effect of poverty and poor living conditions on health in *Sanitary Conditions of the Labouring Population of Great* Britain (1842)  Recommended a reform of public health to, which led to the Public Health Act (1848). | Chance: Cholera Epidemics in 1837 & 1838 led to government action.  Government: gave Chadwick the job of investigating sanitation, eventually leading to the Public Health Act (1848) after another cholera epidemic that year.  Communication: 10,000 copies of Chadwick’s report were distributed to politicians, journalists and writers; 20,000 copies distributed to the public. | Chadwick believed that it was miasma that was causing illness (yet the report still led to cleaner streets & water supplies).  1848 Act was mainly voluntary and many towns ignored it. Some changes were reversed later. |
| John Snow | 19th C | London Doctor | Proved Cholera was water-bone by disabling the Broad Street pump during the 1854 epidemic.  Plotted deaths on a map to help see patterns in his investigation (700 people died on Broad Street in 10 days).  Designed a mask to administer chloroform – used on Queen Victoria during childbirth. | Scientific Method: investigated and recorded findings to prove theories. Link between cholera and water reinforced need for improved public health.  Attitudes: personal doctor to Queen Victoria during the birth of her 8th and 9th children earned him respect and led to the acceptance of Chloroform. | He couldn’t prove why the illness spread and it didn’t lead to better water generally.  Miasma theory prevailed. |
| Florence Nightingale | 19th C | English Nurse | Use of first pie chart showed correlation between unsanitary hospitals and high mortality for soldiers in the Crimean War.  Professionalised nursing and improved conditions in hospitals, in Crimea and UK.  Started a training school for nurses at St Thomas’ Hospital in London and wrote *Notes on Nursing* both in 1860. | Religion: Felt that God called her to work.  Government: Asked her to go to Scutari and supported her efforts for change.  War: Crimean War success made her famous and allowed ideas to spread.  Individual: pie chart easily represented data; raised the £44,000 for the training school in St Thomas’. | Believed that miasma was the cause of illness. |
| Individuals | When? | Who? | **Why Important?** | **Factors in their success** | **Problems** |
| Louis Pasteur | 19th C | French Scientist | Germ Theory published in 1861 – proved germs held in air led to decomposition.  Built on Koch’s work with microbes to develop vaccines for chicken cholera, anthrax and rabies.  Successfully tested rabies vaccine on a human in 1885. | **Factors for Pasteur & Koch overlap:**  War: Franco-Prussian War led to rivalry between Pasteur & Koch; both gov’ts fund medical research to improve health of soldiers.  Government: funded laboratory and team of scientists to help both with research.  Technology: microscope = see microbes.  Individual: both determined & hardworking – continued to build on & defend ideas.  Communication: Pasteur demonstrated anthrax vaccine in front of an audience (1881) & news of success was spread by telegraph. Koch’s work was spread in scientific articles & at conferences.  Chance: Pasteur’s chickens were accidentally injected with weakened microbes & were more resistant.  Teamwork: Pasteur’s rabies vaccine developed with help from other scientists; rivalry between Pasteur and Koch meant their teams built on each other’s work.  Scientific Method: both recorded findings in detail to allow others to build on work. (e.g. Lister developed antiseptic Carbolic Acid method after reading Pasteur’s Germ Theory). | He was a chemist, not a doctor, so was not able to link Germ Theory to humans.  Germ theory was not immediately accepted. |
| Robert Koch | 19th C | German Doctor | Discovered the actual microbes that caused diseases such as anthrax, cholera and tuberculosis.  Found a way to stain individual microbes that caused disease so they could be studied.  Inspired other doctors and scientists to find new ways of treating & preventing diseases (e.g. Koch’s staining method helped Ehrlich develop the magic bullet). | Work on microbes allows for development of preventions of diseases, but does not provide cures/treatments. However, Koch’s work was instrumental in leading the way for the first cure (Salvarsan 606). |
| Joseph Lister | 19th C | Professor of Surgery – Glasgow | Read Pasteur’s germ theory; began using carbolic acid as an antiseptic (1865-67).  Soaked bandages & surgical instruments in carbolic acid; hands washed in it.  Deaths due to infection initially reduced from 47% to 15%. Post-operative mortality rate later cut to 5%. | Communication: read Pasteur’s research.  Scientific Method: trained by other surgeons & used observation & experimentation to test & record his hypothesis & findings. Regularly worked to improve his methods.  Individual: had observed in frogs that broken legs healed better when the skin was unbroken. Worked hard to prove hypothesis. | Opposition to ideas:  - Carbolic acid irritated the skin, eyes & lungs of surgeons.  - Germ theory was not yet widely accepted.  - Antiseptic chemicals used since early 1860s so ideas weren’t new. |
| Joseph Bazalgette | 19th C | Engineer | Designed and supervised construction of a new sewage system (1856-66) that carried waste to treatment plants.  No further cholera epidemics in London.  End of Laissez Faire (working class vote).  Continues to treat London’s waste today. | Chance: ‘Great Stink’ (1858) = gov’t action.  Government: dedicated £3m (£1bn today) to building of new sewerage system.  Technology: Hydraulic pumps used to pump sewage into Thames at high tide so the river could carry it out to sea. Steam power used to operate drills to construct tunnels. | Plans for sewer made 3 years before, but not acted on due to cost – gov’t only acted due to Great Stink (impact on wealthy), but soon see value in appealing to poor vote. |
| Individuals | When? | Who? | **Why Important?** | **Factors in their success** | **Problems** |
| Paul  Erhlich | 19th & 20th C | German Physician | Developed Koch’s work: used chemicals to target microbes causing disease without harming healthy tissue.  First cure – Salvarsan 606 for syphilis (called the ‘magic bullet’).  Beginning of chemotherapy treatments.  Development of many other ‘magic bullets’ for other diseases (e.g. TB). | Teamwork: worked on Koch’s team & learnt from him. Later assisted by his own team.  Individual: was persistent – tested 605 failed chemical compounds before Salvarsan 606.  Technology: advanced microscopes and chemical understanding = new of cure. | Magic bullet was not universal – each disease had to be specially researched, which took time and resources.  No magic bullet for staphylococcus (a bacteria causing infection). |
| Alexander Fleming | 20th C | Research Scientist | He identified and published the discovery of penicillin, an anti-biotic mold that killed bacteria (1928). | Chance: mold was discovered after he had failed to clean up a petri dish that contained bacteria when going on holiday.  Technology: strong microscope allowed him to see & identify bacteria & mold type.  Communication: published findings in scientific journals. | Although he published his findings, he did not investigate further.  Partly due to lack of interest for funding.  Did not realise it was an anti-biotic (no testing). |
| William Beveridge | 20th C | British Economist | Report about ways to fight the 5 ‘Giant Evils’; ‘Want, Disease, Ignorance, Squalor and Idleness’(1942).  Argued gov’t should ‘take charge of social security from the cradle to the grave’.  Led to NHS (1948) and Welfare State after WWII. | Government: Wartime coalition government asked for the report on how Britain should be rebuilt after the war. The 1945 Labour government introduced the measures.  War: WW2 and people’s hardship built support for the suggested reforms. Evacuees raised awareness of urban poverty. | Still some opposition to cost of public welfare & NHS. Cost of NHS continues to be high as the UKs population ages & grows. |
| Ernest Chain and Howard Florey | 20th C | Medical Scientists from Oxford University | Recognised antibiotic potential of penicillin and turned their offices into laboratories (with mostly home-made equipment) to produce enough penicillin to test 8 mice. Following success, further tested on a human, Albert Alexander.  Received US government funding (1941) to mass produce penicillin for use on soldiers in WWII.  By 1945, 250,000 British & US soldiers treated.  Penicillin still used as an antibiotic and has saved countless lives to date.  Led to development of other antibiotics over the next decade. | Communication: research on germ killing substances led them to Fleming’s article.  War: WW2 and especially the US involvement provided the funding to develop penicillin in large quantities. US drug companies provided facilities.  Scientific Method: methodically experimented on mice & humans to prove and record their findings.  Government: US government agreed to pay chemical companies to mass produce; later assisted by British gov’t.  War: to treat injured soldiers with infection. | War initially hindered production – only received £25 from British gov’t in 1939 due war – early production is slow.  Bacteria have changed in response to antibiotic use = antibiotic resistant bacteria (e.g. MRSA – meticillin resistant Staphyloccocus aureus); these superbugs are a huge threat in modern medicine. |