Medical knowledge and understanding in the mid C19th
Situation in c.1845:
Causes of disease
Dangers in surgery
Attitudes to women and medicine, nursing and public health provision.
Problems in public health.

Changes in surgery and in understanding the causes of disease
Anaesthetics and antiseptics: the work of Simpson and Lister, early opposition, impact of surgery in the C19th.
The battle against germs: work of Pasteur, Lister, Koch, Ehrlich, Fleming, Florey and Chain. Importance of penicillin.

Changes in hospital treatment and the role of women in medicine
Changes and improvements in nursing: the work of Florence Nightingale and Scutari. The progress of women in medicine: Elizabeth Garrett
Improvements in hospitals. Work of Lister.
Influence of the two world wars on the role of women in medicine.

Developments in public health provision
Impact of cholera. The work of Chadwick and Snow and public health reform in the nineteenth century:

The importance of the two world wars in bringing about change
Importance of the First World War for medicine, surgery, X-rays, blood transfusion and fighting infection.
Importance of Second World War for the development of penicillin, treatment of burns and skin grafts, blood transfusion and public health.
## Changes in Medicine

### Glossary

**Key words and phrases used throughout this topic**

<table>
<thead>
<tr>
<th>Anaesthetics</th>
<th>drugs which cause a loss of sensation (during surgery)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antibiotic</td>
<td>a drug used to kill bacteria that causes infections. Pencillin was the first.</td>
</tr>
<tr>
<td>Antibodies</td>
<td>proteins produced in the blood that fight harmful organisms</td>
</tr>
<tr>
<td>Antiseptics</td>
<td>chemicals used to kill bacteria that cause infection</td>
</tr>
<tr>
<td>Aseptic</td>
<td>germ free</td>
</tr>
<tr>
<td>Bacteria</td>
<td>germs that cause infection &amp; disease</td>
</tr>
<tr>
<td>Blood group</td>
<td>person’s type of blood; blood type to match for blood transfusion</td>
</tr>
<tr>
<td>Blood transfusion</td>
<td>giving blood to a person who has lost blood</td>
</tr>
<tr>
<td>Epidemic</td>
<td>a disease that spreads to many people</td>
</tr>
<tr>
<td>Germ</td>
<td>a micro-organism that cause disease</td>
</tr>
<tr>
<td>Immunise</td>
<td>protection from a disease - using a vaccination</td>
</tr>
<tr>
<td>Immunity</td>
<td>having the ability to resist a disease</td>
</tr>
<tr>
<td>Laissez-faire</td>
<td>the idea that government should not get involved in people’s lives</td>
</tr>
<tr>
<td>Microbe</td>
<td>single cell bacteria</td>
</tr>
<tr>
<td>Midwife</td>
<td>person skilled in childbirth</td>
</tr>
<tr>
<td>Plastic surgery</td>
<td>repair or replace part of the body</td>
</tr>
<tr>
<td>Public health</td>
<td>health of the people includes: clean water; sewers; drains etc</td>
</tr>
<tr>
<td>Remedy</td>
<td>something that cures an illness</td>
</tr>
<tr>
<td>Shrapnel</td>
<td>parts of a bomb, causing injury</td>
</tr>
<tr>
<td>Skin graft</td>
<td>replace skin with another piece of skin from the body</td>
</tr>
<tr>
<td>Sulphonamides</td>
<td>drugs which are used to kill bacteria</td>
</tr>
<tr>
<td>Surgeon</td>
<td>doctor who performs surgery</td>
</tr>
<tr>
<td>Surgery</td>
<td>an operation on a person</td>
</tr>
<tr>
<td>Thermometer</td>
<td>measures a person’s temperature</td>
</tr>
<tr>
<td>Vaccine</td>
<td>a weak dose of germs to make the body produce antibodies to protect itself against disease</td>
</tr>
<tr>
<td>Virus</td>
<td>a particle in the body that causes a disease</td>
</tr>
<tr>
<td>X-rays</td>
<td>pictures that show the inside of the body</td>
</tr>
</tbody>
</table>
Changes in Medicine
Medical knowledge & understanding in the mid C19th

1. Causes of disease: 1845

1.1 Medicine before 1845

1.2 Causes of disease lasted for 1500 years:
- Four Humours
- Punishment
- Bad Air

Churches taught these ideas as being true

Changing ideas could be very difficult

NOT KNOW CAUSES OF DISEASE

Greeks: Hippocrates
Roman: Galen

BELIEFS

Four Humours
Body made from:
- Blood, phlegm, yellow bile & black pile

Sick: when humours are imbalanced

Remedy: Get rid of excess humours e.g. blood letting

1.3 Dangers in surgery: 1845

- Pain: unbearable, patient not known: alcohol, drugs (opium) used
- Infection: after surgery many wounds got infected & often resulted in death
- Blood loss: blood loss caused many deaths if surgeons were not quick
- Nursing: not a profession

Surgeons: surgeons were not regarded as doctors, the best ones were the quickest - less blood lost ...

1.4 Attitudes to women: 1845

- University: women not allowed to go to university so not doctors
- Home: women tended to look after family members
- Natural: women often had knowledge of herbal remedies
- Churches: nuns looked after patients in convents
- Midwives: usually women until C17th when richer people thought it more fashionable to have a man

Problems in public health: 1845

- Cities: pollution (coal), overcrowding (spread disease), poor water supplies, poor sanitary etc
- Laissez-faire: belief that people should sort out their own problems
governments not care enough as often affected the poor more
- Money: government not want to spend the money to improve public health - not want to increase taxes to pay for it
- Knowledge: lack of understanding of the causes - believed in miasma
Changes in Medicine

Changes in surgery & understanding causes of disease

2.1 Changes in surgery: anaesthetics

Humphrey Davy 1799
- tested ‘laughing gas’ (nitrous oxide) & suggested it could be used in surgery

Horace Wells 1844
- used laughing gas in dental work

Discoveries of chemicals available to scientists & doctors
- nitrous oxide
- ether
- chloroform

James Simpson 1847
- leading surgeon, leading=championed
- used chloroform in childbirth & surgery

Acceptance
- Queen Victoria
  - Simpson used chloroform on Queen for birth of her 8th child
- Simpson’s work better than previous, new age of medicine
- opposition from those who believed that birth pain was natural, a law of nature, and man should not intervene
- anaesthetics did not always work, either not enough or too much, and the patient died

Opposition
- germ theory
  - some people still did not believe the germ theory
  - extra work
    - some doctors did not like the extra work involved in washing hands & cleaning instruments etc
  - unpleasant
    - carbolic acid was unpleasant to use

2.2 Anaesthetics

Improvements?
- less pain
  - patients experienced less pain
- less deaths
  - with anaesthetics there was less surgery & more complicated surgery - died from blood loss & infection

Science & technology

2.3 Nurses

- trained nurses helped with using anaesthetics & antiseptics

2.4 Antiseptics

Improvements?
- reduced deaths
  - less wounds became septic
- more complications
  - more deaths as more difficult surgery was performed

Acceptance
- reduced deaths
  - immediate improvement in death rate helped convince people
  - within 15 years
    - by the end of the 1880s most surgeons were using antiseptics

Opposition
- germ theory
  - some people still did not believe the germ theory
- extra work
  - some doctors did not like the extra work involved in washing hands & cleaning instruments etc
- unpleasant
  - carbolic acid was unpleasant to use
Changes in Medicine
Changes in surgery & understanding causes of disease

2.6 The battle against germs after 1845

Old Beliefs

Supernatural Theories
- god or the stars & planets caused illness

Spontaneous Generation Theory
- decaying matter creates microbes & eggs & maggots

Bad air
- bad air & bad smell caused illness & diseases (miasma)

2.8

New theory
- Germs cause disease

Individuals

Louis Pasteur
Professor of Chemistry in Lille, France

Old beliefs
- 1861 published his results & now others could repeat his experiment

Work
- working for a local brewer whose sugar beet was decaying

Robert Koch
Doctor & researcher in Germany

Experiment
- look for microbes in diseased animals & people

Proved (1890)
- identified microbes that caused 21 different diseases

Proved (1878)
- microbes caused wounds to go septic

Germ Theory

Germs caused disease in humans

Experiment
- stained specific microbes to identify them under a microscope

Louis Pasteur
- scientist now able to see microbes

Bad air & bad smell caused illness & diseases (miasma)

science & technology

Individuals

teamwork
Changes in Medicine
Changes in surgery & understanding causes of disease

2.9 The battle against germs after 1845

Vaccines

How it worked for Pasteur

Injected with weak chicken cholera

Chicken lives

Injected with strong chicken cholera

Chicken dies

Vaccinations

- Typhoid 1896
- Tuberculosis 1906
- Tetanus 1927
- Whooping Cough 1952
- Polio 1954

Louis Pasteur

in competition: France v Germany

Rivalry

Anthrax 1881
- public demonstration

Rabies 1884
- using another’s work

Pasteur in competition: France v Germany

Work

- team including Chamberlain to look for anthrax & chicken cholera microbes

Emil von Behring

Aunt of Koch

Individuals

Anti-toxins to cure diseases

Provided

- took anti-toxins from animals & injected it into humans

Experiment

- found some animals that produced their own anti-toxins (serums) to fight the poisons

Science & technology

Science & technology

Previews
Changes in Medicine
Changes in surgery & understanding causes of disease

2.12 The battle against germs after 1845

Paul Ehrlich
a student of Behring

Penicillin
Making penicillin work
in Oxford 1940

Howard Florey
seeing the potential of Fleming's penicillin
they worked on purifying it to make it usable.

Ernst Chain
one of the team used freeze drying
to purify penicillin

Problem
could not make enough penicillin

Want to treat injured soldiers in WWII

2.14 Penicillin

Paul Ehrlich
a student of Behring

Making penicillin work

Penicillin 1928
A chance discovery in 1928
He noticed that on some old cultures he had left out, staphyococcal was not growing around mould.

Experiment
Further work showed that the mould produced pencillin, which was killing the bacteria.

Penicillin: the first antibiotic

Gerhard Domagk 1932
one dye could kill several diseases
French scientists realised it was one of a group of chemicals called "sulphonamides"

Fleming, Florey & Chain
awarded Nobel Prize in 1945

US Govt. gave $80 million to drug companies when the USA joined the war in 1941.

By 1944 penicillin was in mass production, able to kill a variety of germs inside the body inc. blood poisoning in war wounds

Fleming, Florey & Chain
awarded Nobel Prize in 1945

13 Penicillin

Wanted to treat injured soldiers in WWII

Problem
could not make enough penicillin

Want to treat injured soldiers in WWII

Government
US Govt. gave $80 million to drug companies when the USA joined the war in 1941.

Science & technology

Teamwork

Science & technology

Work
Noticed that many soldiers in WWI died from septic wounds caused by the bacteria staphyococcal.

Chance discovery
In 1928 he noticed that on some old cultures he had left out, staphyococcal was not growing around mould.

Experiment
Further work showed that the mould produced pencillin, which was killing the bacteria.
3.2 Changes & improvements in nursing

Florence Nightingale

- born in 1820 to rich parents
- 1844 decided to be a nurse - parents argued
- 1851 training in Germany
- 1852 Nursing & Hospital Management in Paris

Before 1845

- Florence Nightingale
- born in 1820 to rich parents
- 1844 decided to be a nurse - parents argued
- 1851 training in Germany
- 1852 Nursing & Hospital Management in Paris

Nursing

- Effects
  - doctors opposed at first
  - death rate fell from 42% to 2%
  - Florence became a heroine
  - public raised money for a 'School of Nursing'

Importance

- Crimean War 1854
  - volunteered to nurse in the war but was rejected (possibly racism)
  - paid her own way there
  - tended to wounded soldiers

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Changes in hospital treatment & the role of women in medicine

Role of Women

Before 1845

- Role of women in medicine very restricted:
  - limited to home care of the family
  - no university open to women to become doctors

However women had a good reputation for the knowledge of natural herbal remedies

- women were nurses but it was a profession with a very low standing.
- hospitals were for the poor, as the rich got treated at home when they were ill.

Mary Seacole

- Jamaican nurse
- learnt nursing from her mother who ran a house for wounded soldiers in Jamaica
- set up 'British Hotel' - a group of buildings for a hospital, shop & canteen for soldiers
- no work for her after the war in England - but newspaper stories about her work
- wrote an autobiography
- raised profile of nursing

- Crimean War 1854
  - volunteered to nurse in the war but was rejected (possibly racism)
  - paid her own way there
  - tended to wounded soldiers
Changes in Medicine
Changes in hospital treatment & the role of women in medicine

3.5 Women as doctors

Elizabeth Blackwell
an American teacher

Background
. taught herself science & saved enough for medical school

Career
. Set-up a successful New York clinic mainly for poor women & children
. travelled to Europe to speak on behalf of women wanting to be doctors

First female doctor
. not always work, anaesthetics did not always work, either not enough or too much, and the patient died

Training
. colleges refused her entry, a college in NY state gave her a place after asking the students if they would accept her

Elizabeth Garrett Anderson
rich English woman

Background
. having met Dr Blackwell wanted to follow in her footsteps
. Father eventually agreed to support her

Anti-toxins
to cure diseases

Female doctor
. proved diseases in plants & animals caused by germs

Training
. worked as a nurse & went to medical lectures & took private lessons & passed her exams
. Under legal threat the Society of Apothecaries accepted her
. Still no college would accept her in Britain so she learnt French & went to Paris University where she qualified as medical doctor in 1870.

Things did not change for the better straight away even after Elizabeth Garrett’s success.

1874
Six women studied medicine at Edinburgh University, but then they would not graduate them. They went to Zurich & Dublin to complete their medical degrees.

1876
British Parliament passed a law to say all medical degrees were open to women.

Still a number of restrictions on women doctors for many years.

1992
Women only 24% of doctors in England & Wales

Over 90% nurses are female.
Changes in Medicine
Changes in hospital treatment & the role of women in medicine

3.7 Wars & the role of women in medicine

Staff shortages
- at the start of WWI there was a shortage of trained staff
- medical colleges admitted more women

Non nurses
- Many rich ladies, who were use to running larges houses with many servants had the confidence to run military hospitals
- Other women also volunteered to help as the number of injured soldiers grew
- Many volunteered to help as part of the Red Cross in France

Women's roles increased
- Women wanted to help, nurses in military hospitals in Britain
- painters and architects
- doctors not allowed on the front were posted to 'quieter locations'
- Many professional nurses did not like these untrained 'nurses' as they felt it undervalued their roles.

Doctors
- numbers training increased from 2,000 in 1938 to 2,900 in 1945
- women mainly in hospitals
- former retired and married women caring for civilians, injured due to bombing

Home front
- Women ambulance drivers & first aiders treated people injured by bombing

Queen Alexandra Imperial Military Nursing Service 1902
- nurses served in every area where there were soldiers
- nurses in military hospitals in Britain after 1941 were given ranks that fitted with the army from Lieutenant to Brigadier
- nurses were on the frontline, captured & some killed

Women at War
After WWI
Even after everything that nurses did during WWI they were still not a legal group.
- Women got paid less than men doing the same jobs in hospitals etc
- Women doctors were forced to give up their jobs in public health when they got married.
- Discrimination against women continued after WWI.

World War One
- The British Army only allowed nurses from the QAIMNS in 1914, others went to help soldiers in France & Belgium
- Many volunteers became part of the Red Cross in France

World War Two
- Many professional nurses did not like these untrained 'nurses' as they felt it undervalued their roles.
- Unlikely in WWI women were conscripted in 1941. Most women went to work in the factories and on the land as well as supporting the military in a variety of roles.

Women in war
- First Aid Nursing Yeomanry 1907
- Voluntary Aid Detachment 1909
- military nurses went to the front in 1915
- Queen Alexandria Imperial Military Nursing Service 1902
- nurses served in every area where there were soldiers
- nurses in military hospitals in Britain after 1941 were given ranks that fitted with the army from Lieutenant to Brigadier
- nurses were on the frontline, captured & some killed

RAMC, RAMC
- Royal Army Medical Corps
- women served for the first time in limited numbers in 1914, others went to help soldiers in France & Belgium
- nurses in military hospitals in Britain after 1941 were given ranks that fitted with the army from Lieutenant to Brigadier
- nurses were on the frontline, captured & some killed
Changes in Medicine

Changes in hospital treatment & the role of women in medicine

3.10 Improvements in hospitals in C19th

- **Blood pressure**: device to measure blood pressure in 1881
- **Stethoscopes**: modern version in 1860
- **Thermometer**: clinical thermometer could take a temperature reading in 5 minutes in 1866
- **Microscopes**: by mid C19th could magnify x 1000
- **New Technology**: proved diseases in plants & animals caused by germs
- **Antitoxins**: to cure diseases

3.11 Role of individuals

- **Nightingale**: improvements in nursing & cleanliness
- **Lister**: antiseptic conditions, improve cleanliness

3.12 Change of attitudes & beliefs

- **Science & technology**: more scientific approach to finding solutions to problems
- **Social Reform**: C19th movement to helping the poor, pressure on the government to help
- **Government**: To do more, less laissez-faire, money provided on a local level NOT by central govt

**Other factors**

- **Government**
- **Town councils**: built hospitals & trained doctors, asylums for the mentally ill

**Workhouses**

- Supposed to be for the unemployed but full of the very poor, old, sick & disabled.
- Campaigners wanted better help for these people.

**Church & Charities**

- Built hospitals & cared for the poor

**Middle class**

- Pay into a doctor's sick club every week to get treatment when needed

**Rich**

- Pay for a doctor & be treated at home inc. surgery

**By 1900**

- Situation improved with local councils & towns paying for hospitals
- Still thousands of people in the workhouse rather than a hospital

Quality vary across the country
Changes in Medicine

Developments in public health provision

**Industrialisation**

Cities
- in the C19th cities in Britain grew rapidly.
- Overcrowding, poor sanitation (no sewers), pollution etc.

Diseases
- Infectious diseases were common & they spread quickly:
  - smallpox
  - tuberculosis
  - typhoid fever
  - cholera

Laissez-faire
- Governments believed in leaving things as they were - that it was not their business to get involved.

This attitude slowly changed over time as research showed the need for government intervention.

As people got the right to vote, governments were forced to listen to what people wanted.

Diseases increasingly affected the rich & the poor, so that helped change the rich people's attitude to public health.

**Impact of cholera**

- **Cholera**
  - Painful disease: vomiting, fever
  - Killed quickly: within 24 hours
  - High death rate: up to 60% died

- **Effected everyone**
  - Cholera killed everyone rich & poor

- **Impacted**
  - 1831-2 killed: 32,000
  - 1848 killed: 40,000
  - 1853-4 killed: 20,000
  - 1866-7 killed: 14,000

**Improvements in public health** before the Germ Theory

- Laissez-faire governments believed in not getting involved.
- John Snow worked for the government.
- Koch discovered the germ theory in 1883.
- Edwin Chadwick worked for the government before germ theory, so not always believed.

- **Miasma theory**
  - Government still believed in miasma cause wrong BUT
  - To clean the air they built sewers & improved water supplies
  - (Deaths from cholera dropped)

- **Germ Theory**
  - Koch discovered the germ that caused cholera in 1883

- **Public Pressure**
  - Town councils cleared away rubbish
  - Provided clean water
  - Improved sewers & drains
  - Medical officer for each town
  - Taxes to pay for these things

- **Science**
  - Laissez-faire attitudes slowly changed over time as research showed the need for government to get involved.

- **Individuals**
  - People forced to vote & governments forced to listen.

- **Government**
  - Improved water supplies
  - Improved sewers & drains
  - Medical officer for each town
  - Taxes to pay for these things

- **Preventive measures**
  - Hand washing
  - Sanitary conditions

- **Preventative measures**
  - Cholera killed everyone rich & poor

- **Preventative measures**
  - Before germ theory, so not always believed.
Joseph Bazalgette

Appointed to design a sewer system for London.

Difficult to get the money needed until the:

- **Great Stink 1858**
  - The River Thames was next to Parliament.
  - The smell was overwhelming.
  - The MPs now granted Bazalgette the money he needed.
  - The London Sewers were completed in 1866.

**Vaccinations**

Smallpox vaccinations were available for free, but still not everyone trusted it.

So in 1852 the government made vaccinations compulsory.

**Public Health Acts**

- **Public Health Act 1848**
  - only recommendations
  - towns & cities did not have to improve public health

- **Public Health Act 1875**
  - compulsory
  - towns & cities now had to provide:
    - rubbish removal
    - clean water
    - sewers & drains
    - each town have a medical officer
    - taxes should pay for these things

**John Snow 1854**

- dirt water = disease

**Big Stink’ 1858**

- resulted in sewers being built across London

By 1900 the death rates in most towns & cities had dropped.

**Science & Technology**

- Improvements in technology helped Bazalgette as he needed large engines to pump water through the sewers (they lasted nearly 100 years!).

**Industrialisation**

- Joseph Bazalgette
  - appointed to design a sewer system for London.
  - difficult to get the money needed until the: **Great Stink 1858**
  - the river thames was next to parliament.
  - the smell was overwhelming.
  - the MPs now granted Bazalgette the money he needed.
  - Bazalgette got the money he needed for the London sewer system.
Improvements included:
- clean water supplies
- sewerage
- drains
- rubbish collection
- vaccinations

Laissez-faire had come to an end.
The government were now expected to improve the health of the people.

Further reforms NOT public health but improved the standard of living for people, therefore improve their health & well being...

Boer War 1899
- 66% of the men who volunteered for war were not fit enough for the army

Reasons for change 1901
- John Rowntree's survey found that 28% did not have enough money to live on at some point in their lives:
  - young,
  - old,
  - sick,
  - unemployed.

Trade Unions
- Trade union workers sometimes went on strike wanting higher standards of living

Trade Unions represented workers in all sorts of jobs. They wanted better working conditions, increase in pay etc.

Laborers also pushed hard for these reforms
- Labour party getting support as it wanted to help workers more
- Liberals also wanted to help workers
- Labour & liberals joined together to continue with reforms

Children
- Free school meals 1906
  - children from poor backgrounds got free meals at schools
- School Medical Service 1907
  - check the health of school children
- Children & Young People Act 1908
  - illegal to treat children badly

Workmen's Compensation Act 1896
- worker, employer & govt. all paid contributed to a fund (National Insurance Contributions)
- workers then got free medical treatment (not for families)
- payment when they were sick

Workers Old Age Pensions 1908
- for people over 70 years who did not have enough money

Old People
- Old Age Pensions 1908
  - for people over 70 years who did not have enough money

Old people cried when they first got their pensions & said: 'God bless Lloyd George' BUT: only if you had worked did you get a pension
Changes in Medicine

Importance of World War One & World War Two in medicine

5.2 Importance of World War One

By 1914

World War I developments
Few medical developments were new in World War I. Existing knowledge & inventions were often improved upon or used on a large scale for the first time.

Thomas Splint
. invented before the war by Hugh Owen Thomas

X-rays
. discovered in 1895 by Wilhelm Roentgen

Blood transfusions
. blood groups were discovered in 1901 by Karl Landsteiner an Austrian. In 1907 Reuben Ottenburg in New York did the first blood transfusion. Had no way of storing the blood without it clotting.

Plastic surgery
. French & German doctors had been developing skin graft techniques before WWI

Surgery
. surgeons gained experience very quickly due to improvisation & difficult circumstances in field hospitals

Blood transfusions
. blood storage improved. Luis Agote & Albert Hustin added sodium citrate to stop it clotting. Citrate glucose added helped the blood last longer. The British set-up blood banks in 1917 for blood type O. (Can be given to anyone)

Developments in World War I

Splints
. used extensively by the surgeon Sir Robert Thomas
. 1914: 80% with broken thighs died
. 1918: 80% survived

Prosthetic limbs
. with 1000s of soldiers losing arms & legs, lighter better designed prosthetic limbs were developed from light metal

Heavy shelling resulted by large numbers with broken limbs

Pedicle tubes is a skin graft. A skin flap is rolled into a tube & is left to grow, then is used to cover the scarred area.

Science & technology

Government
. focussed on the war, including wounded & injured. Public pressure to look after wounded soldiers
Changes in Medicine

Importance of World War One & World War Two in medicine

Before 1945

Blood plasma
- used of plasma first suggested in 1918
Tetanus
- anti tetanus serum first used in WWI
- vaccine developed in 1924
Plastic surgery
- developed from WWI & the work of Gillies
Penicillin
- discovered in 1928, but not able to make penicillin in large enough quantities, until WWII

Public pressure

Beveridge Report 1942
- people wanting good quality life for everyone, inc. medical care
- National Health Service free to everyone, paid for by National Insurance Contributions
- doctors & nurses etc paid by the govt.
- sick pay, pensions & unemployment benefit for everyone

5.5 Importance of World War Two

Numbers of wounded
- Large numbers of wounded created in war - pushed for solutions to medical problems
Governments
- Governments now funded research & production of drugs

Bombing of cities
- affected everyone
- Govt. gave free medical treatment to the children who were evacuated from the children in the countryside (poor diet)

Plastic surgery
- Archibald McIndoe (worked with Gillies in WWI)
- developed better techniques

Mobile hospitals
- understood the need to get injured people into hospitals (for surgery)
- quickly (within an hour)
- field hospitals were close to the front line & station hospitals further back

Tetanus vaccine
- largest scale of vaccinations given to troops prior to fighting
- of 17,000 troops injured at Dunkirk none got tetanus

Penicillin
- during the war several strains of penicillin were developed
- it was 20 x more potent
- mass produced in the USA then Britain

Morphine
- used as a pain killer, injected into the patient

Blood plasma
- 'Blood for Britain' campaign in the USA led by Dr. Charles Drew
- collected in New York then sent to Britain
- Drew developed mass production of dried plasma

5.6 Developments in World War II

Sulphonamides
- discovery of Sulphonamide & M+B 760 which was effective against several infections

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- use of plasma first suggested in 1918
Tetanus
- anti tetanus serum first used in WWI
- vaccine developed in 1924
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- used as a pain killer, injected into the patient

Blood plasma
- 'Blood for Britain' campaign in the USA led by Dr. Charles Drew
- collected in New York then sent to Britain
- Drew developed mass production of dried plasma

Tetanus vaccine
- largest scale of vaccinations given to troops prior to fighting
- of 17,000 troops injured at Dunkirk none got tetanus