History, Medicine through time

Lesson 24 of 30

Worksheet:
How has the use of science and technology changed ideas around the treatment and prevention of lung cancer?

Mr Prudden

Lung cancer

- Lung cancer is the second most common cancer in the UK.
- It mainly affects people over 40.
- Diagnosis is higher among people aged 70-74.
- Over 40,000 people are diagnosed with it each year.
- The death rates peaked in 1973 when 26,000 deaths occurred due to lung cancer.
- It was extremely rare 150 years ago. So why has its frequency increased so greatly since the early 1900s?

Causes of lung cancer

- Most lung cancers are caused by external factors. Around 85% of cases are people who smoke, or have smoked.
- However, a small number of people can develop lung cancer for no apparent reason.
- In **1950**, the **British Medical Research Council** published a study that showed conclusively that the rise of lung cancer was linked to cigarette smoking.
- Advertising by tobacco companies since World War One led to a huge rise in the number of smokers.
- However, like with **John Snow's** findings linking dirty water and **cholera** in the 19th century, the government did not directly intervene following the evidence linking smoking and lung cancer until death rates were too high to ignore.

Science and technology in diagnosis

- The problem with lung cancer, and the reason it is so hard to treat, is because it is extremely difficult to diagnose in its early stages, and so once it is diagnosed it is usually too advanced to treat. Patients often mistake their symptoms for other diseases.
- There is no **national screening programme** for lung cancer – this means people are not routinely tested to see if they have it. This is because the tests are not accurate enough to outweigh the negative effects of being exposed to radiation during an **x-ray** scan during screening.
- Before more advanced technology had been discovered, lung cancer was diagnosed using an **X-ray** machine. But **X-rays** were not detailed enough to accurately diagnose cancer.

Science and technology in diagnosis

- Patients are given a **CT scan**. This creates a detailed picture of the inside of the body. Usually patients are injected with a **dye** before the scan which helps the lungs show up more clearly in the scan.
- If the cancer does not look very advanced, the patients will be given a **PET-CT scan**. This is similar to a **CT scan** except a small amount of **radioactive material** is injected into the body. This helps doctors to identify cancerous cells in the body.
- Or the patient will be given a **bronchoscopy**. This used a tool like an **endoscope**, called a **bronchoscope**. The **bronchoscope** is passed down into the patient's lungs, where it collects a sample of the cells for testing.
- The doctor will be able to determine what type of cancer the patient has and how advanced it is. This makes it possible to draw up a treatment plan to attack the cancer.

Science and technology in diagnosis

Patients given a CT scan.

If the cancer does not look very advanced: the patients will be given a PET-CT scan.

Or the patient will be given a bronchoscopy.

The doctor will be able to determine what type of cancer the patient has and how advanced it is and create a treatment plan.

Science and technology in treatment

Surgical removal (since the 1930s)

If diagnosed early, doctors can operate to remove the cancer and the infected portion of lung. This can be an entire lung, and it is possible to breathe normally with one lung. Modern surgery uses remote-controlled micro-instruments and cameras which have far less impact on the body and help a speedy recovery.

Transplants

It is possible to replace cancerous lungs with a transplant from a healthy donor.

Science and technology in treatment

Radiotherapy

Concentrated waves of radiation are aimed at the cancer to try and shrink it. Small cancers tend to be treated this way rather than surgery. Larger cancers can be prevented from growing bigger. Sometimes, a small piece of radioactive material is placed directly next to the cancer using a very small tube called a **catheter**.

Chemotherapy (since the 1970s)

Patients are injected with powerful chemical medicine to attack the cancerous cells. These either shrink the cancer before surgery, prevent the cancer from recurring, or provide relief from the symptoms of lung cancer when surgery is not an option.

Science and technology in treatment

Lung cancer patients are more likely to be treated using a range of these strategies. For example, surgery to remove the cancer and then **radiotherapy** and **chemotherapy** to tackle any remaining cancerous cells.

Immunotherapy

Cancers are able to resist the body's **immune system's** attempts to block their growth. Trials have been taking place to boost the **immune system** and to stop the cancer cells from resisting it.

The government, through the **NHS (National Health Service)**, have invested large sums of money in improved treatments and research.

Government prevention

Although slow to respond, the government have passed laws and launched major campaigns to prevent people from developing lung cancer.

One of the reasons for slow action from the government was because they earned around £4 billion from tobacco tax. There were also thousands of workers employed by the tobacco industry.

But by 1985, smoking-related deaths cost the **NHS** £165 million a year.

The death rate and costs were too high for the government to do nothing and eventually the government took proactive steps to prevent lung cancer.

Government prevention

The government passed laws

- In 2007, the government banned smoking in all workplaces or pubs, cafes and restaurants.
- In 2007 the government raised the legal age for buying tobacco from 16-18 to reduce the numbers of teenagers who smoked.
- In 2015, the government banned smoking in cars carrying children under the age of 18 because of evidence that **second-hand smoke** (breathing in the smoke from people's cigarettes) impacted on health, especially to children.
- The government increased taxation on tobacco products to encourage people to stop smoking because buying cigarettes was consequently more expensive.

Government prevention

<u>The government has tried to change behaviour</u>

- The government banned tobacco advertising on TV in 1965 and then tobacco advertising entirely in 2005.
- They have produced many campaigns to warn about the dangers of smoking. For example, the impact of smoking on pregnant women, children and the chemicals included in cigarette smoke.
- They have also used schools to teach awareness of the dangers of smoking to school children.
- The **Tobacco Display Ban** came into effect in 2012 for large stores, and 2015 for smaller stores. These regulations mean that it is now illegal to display tobacco products in store.

Glossary

- **Cholera** An infectious and often fatal bacterial disease, typically contracted from infected water supplies and causing severe vomiting and diarrhoea.
- **Endoscope** An instrument which can be introduced into the body to give a view of its internal parts.
- **Immune system** The body’s defence system against infections, bacteria, etc.

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Comprehension Questions

1. Which organisation published the 1950 study linking smoking with lung cancer?
2. How are the following used to diagnose lung cancer?

   a) CT scan

   b) PET-CT scan

   c) Bronchoscopy
3. Describe three methods by which lung cancer is treated.
4. Can you explain how three government strategies aimed to prevent lung cancer?
5. Challenge Q: Why could we say that the government's reaction to cholera in the 19th century and lung cancer in the 20th century was similar? **Hint**: *Think about government responses to John Snow and the publication in 1950 linking smoking with lung cancer.*