

Quintonal — an industrial hazard

Contents: A simulation role-play exercise concerning industrial safety.

Time: 2 to 3 periods.

Intended use: GCSE Chemistry, Biology and Science. Links with work on disease, and the effect of chemicals on cells.

Aims:

- To complement work on disease and the effect of chemicals on cells
- To develop awareness of some of the problems of industrial safety, and the idea of an acceptable level of risk
- To show that there may be conflicting interests where industrial safety problems are concerned
- To provide an opportunity to practise communications skills, in particular assembling and presenting an argument, and to provide experience of speaking formally in front of others.

Requirements: Students' worksheets No.1002. General Briefing (Sheets GB) — one copy per student. Role cards (see below).

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There are eight roles, representing the different people attending the meeting at Wilsons Plastics Company. They are:

John/Joanne Wilson, Managing Director
Frances/Frank Taylor, Trade union shop steward
Jackie/Jack Hilton, Company Safety Officer
Dr Barbara/Brian Rose, Local GP
Pauline/Paul Jones, Company nurse
Sally/Sam Green, Local councillor
Dr Anne/Alan Arnold, Industrial chemistry consultant
Tracey/Trevor Graham, representative of local tenants association

The role notes are in the students' worksheets and can be reproduced on card or paper, and cut up into individual role cards.

It is best to have *two* students per role if possible. Students can then prepare the role together, share in presenting their point of view, and confer before answering questions.

If there are more students in the group than are needed to fill the roles, there are a number of possible procedures:

- Have only 16 students playing roles; the remainder can be a participating audience.
- Have more than two students per role.
- Devise additional roles, for example, factory worker, trade union safety officer, etc.

Background to the simulation

The simulation exercise is based on a meeting at Wilsons Plastics Company.

Wilson's employ 350 people and make plastic food containers. Quintonal is a chemical used during the manufacturing process. No trace of quintonal is left on the finished product, due to reactions that have taken place.

The following item has just appeared in the local newspaper.

DANGEROUS CHEMICAL USED AT WILSONS

This month's edition of an American medical journal carries an article linking the chemical quintonal with bladder cancer. Scientists found that 80% of the rats given large doses of quintonal developed bladder cancer. More research is being carried out but Dr Armit, one of the report's authors, said 'There is increasing evidence that quintonal may cause bladder cancer. We can't be 100% sure yet but the results point that way'. Quintonal is used by the Wilsons Plastic Company of Broadoak Road. A company representative said that there was no cause for concern but some workers have expressed worries about their health. A meeting is taking place at Wilsons this afternoon and will be followed by a press statement.

Note The issues addressed in this unit are important but can be sensitive and a little difficult to handle. Cancer can be an emotive topic, and the question of carcinogenic chemicals is one where there are many unknowns and it is difficult to prove links between cause and effect.

Procedure

- 1 Give the students the background information sheet on cancer. This could usefully be read for homework before the exercise is to be carried out.
- 2 Tell the students the background to the simulation as described above, and read out the newspaper item.
- 3 Explain that they will be simulating the meeting to be held at Wilsons to decide what action, if any, needs to be taken.
- 4 Distribute the role-play cards.
- 5 Tell participants to prepare their roles by making notes or writing out a speech. Encourage them to *develop* the role by adding relevant points and information.
- 6 Hold the meeting. This can be done in a number of ways. One good way is to let the participants speak in turn and after each speech allow questions. On concluding the discussion, take a vote (in role) on possible proposals (for example, to halt production immediately, to step up safety measures) to see if there are at least some areas of agreement.
- 7 After the meeting discuss what happened (out of role). Some questions could include:
 - (a) What did you think of the character you were playing?
 - (b) Which point of view did you most/least agree with?
 - (c) What do you think should be done in such situations in real life?
 - (d) What scientific information is needed on which to base opinions and decisions about these matters?
How can this information be obtained?
 - (e) Did all the characters get their facts right?

QUINTONAL — an industrial hazard

General Briefing: Background information notes on cancer

What is cancer?

Cancer occurs when some of the cells in the body become abnormal and act in an uncontrolled way. Normally, cells divide to create new cells to carry out growth and repairs. Occasionally something goes wrong and some cells begin to multiply uncontrollably.

The body is made up of many different types of cell. Any of these types of cell may go wrong, so there are many different types of cancer. It not a single disease. For example, there is cancer of the lung, stomach cancer, breast cancer, bone cancer.

The group of abnormal cells is called a growth. The cells do not work properly as part of the organ or tissue where they began to grow. As cells multiply they take up more room, and the group of abnormal cells may invade nearby parts of the body, and prevent them from working properly. This is called *local invasion*. Often cancer cells break away and travel, for example, through the blood-stream, to other parts of the body where they may form new groups of abnormal cells. These groups are called *secondary growths* or *metastases*. They too can prevent the organs where they are growing from working properly.

How many people die of cancer in the UK?

In 1984, 157 884 people died of cancer in the United Kingdom. This was 24 per cent of the people who died in the UK that year.

Can cancer be cured?

Many forms of cancer can be cured, especially if the disease is detected at an early stage. However, the success rate for complete cure is not very good among many of the most common cancers.

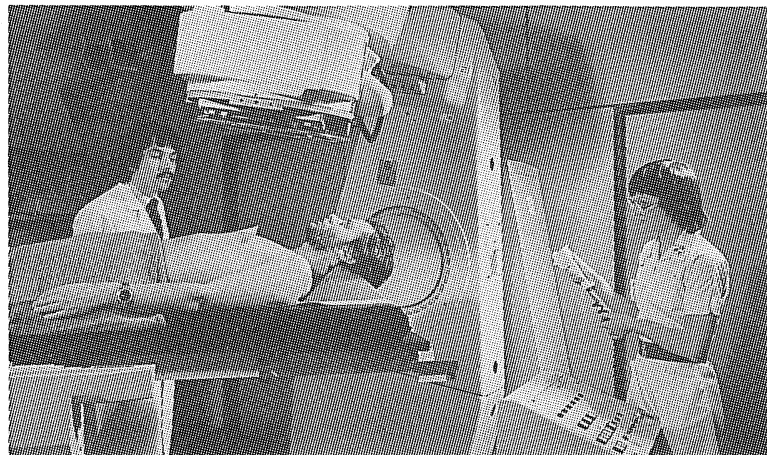


Figure 1 Treating cancer using radiation

How is cancer treated?

Three main types of treatment are used:

- 1 Surgery — where cancerous cells are cut away.
- 2 Radiotherapy — radiation treatment to try to destroy cancerous cells.
- 3 Chemotherapy — treatment with drugs to try to destroy cancerous cells.

The type of treatment used will depend on the type of cancer and the person involved. All three treatments can lead to very unpleasant side-effects.

What causes cancer?

Cancers sometimes take many years to develop. This makes it difficult to know exactly what causes cancer.

We know some of the things that cause cancer:

- *Cigarette smoking* causes several types of cancer, particularly lung cancer. It is the most important cause of cancer in Britain, and is responsible for about a third of all cancer deaths.
- *Several chemicals* are known to cause cancers. Cancer-causing chemicals are called **carcinogens**.
- *Radiation* can cause cancer (as well as being used to treat some forms of cancer). Radiation includes X-rays and the rays from radioactive elements.
- *UV light* can cause skin cancer. This may affect people who sunbathe for long periods.

Two other suspected causes are:

- *Viruses* are suspected of causing some cancers. They work in a complex way, often with other factors involved as well. You cannot 'catch' cancer by contact with a cancer patient.
- *Unhealthy diet* is thought to cause some cancers, though this is not proved. Many doctors suspect diets which are high in fat and low in fibre, fruit and vegetables.

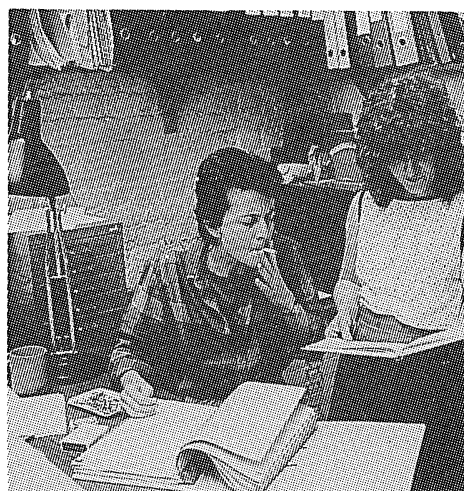


Figure 2

Cancer in industry

A number of chemicals used in industry have been connected with cancer. The table below gives some examples.

<i>Chemical</i>	<i>Type of cancer</i>
Vinyl chloride	liver
Arsenic	skin, lung
Refining of nickel	lung and nose
Manufacture of some chromium compounds	lung
Some tars and soots	skin, lung
Asbestos	lung
Some chemical dyestuffs	bladder

Most *known* industrial carcinogens have either been withdrawn or controlled, but there are many industrial chemicals which have not yet been tested. Some of these *maybe* carcinogenic but we do not yet know.

Role card 1**John/Joanne Wilson, Managing Director**

You are very worried that the problem could lead to bad publicity for your company. You want to avoid risking the health of your workforce, but do not want to halt production just because quintonal *could* be harmful.

The company is already having financial difficulties. Cheap imports are being subsidised by foreign governments. The imports are being sold in Britain at prices below those at which Wilsons have been selling in the past. If this problem is not handled carefully the company might not recover. If it is closed many workers would lose their jobs.

Safety precautions are already in force for all chemicals used in the factory, including quintonal, but you are willing to look into improved safety precautions and training. The necessary measures will be taken by the company but workers must follow the safety rules.

You want everyone to keep calm about the situation. They should not panic just because some scientists have given large doses of quintonal to rats and some rats have developed cancer. You are seeking expert advice and are consulting the Health and Safety Executive. Your records show no cases of bladder cancer among employees.

Role card 2**Frances/Frank Taylor, trade union shop steward**

A lot of workers you represent work on a productivity scheme on the production line. This means they have to work very quickly to earn enough bonus to get a decent wage. You believe this puts them under so much pressure that it is not possible to keep to all the safety rules. For safety's sake the productivity scheme should end and workers should be paid a decent basic wage.

You are a heavy smoker.

You have held a well attended meeting of union members in the factory. That meeting wanted:

- 1 An immediate halt in production until the risk is fully dealt with. In the meantime the workforce should receive full pay.
- 2 No workers to be put at risk at any time.
- 3 All workers to have a medical examination immediately and any necessary treatment given.
- 4 The problem to be dealt with at source. It is not enough for workers to wear protective clothing.
- 5 The company to find a safe substitute for quintonal.

Role card 3**Jackie/Jack Hilton, Company Safety Officer**

You have worked at Wilsons for over thirty years, starting off as a messenger. You believe the company has improved its safety standards over the years but there is still a lot to be done. Workers do not, in your view, take safety seriously enough. They do not always put the safety guards on the machines or wear the goggles and gloves that are provided. Safety precautions need to be stepped up and regulations must be obeyed.

With regard to quintonal you believe people should not panic. If people obey the safety rules and the company looks into the purchase of better protective clothing, there should be no health risk. To make doubly sure you have asked the local University Department of Community Medicine to try to find out whether there has been any risk of bladder cancer in the workforce. Quintonal has been in use at Wilsons for over twenty years and your records show no cases of bladder cancer among employees. Quintonal worries you but so do many other safety problems, and so would the consequences of the factory closing.

Role card 4**Dr Barbara/Brian Rose, local GP**

Your practice is near the factory and a lot of your patients work at Wilsons. Some of them have come to you for your opinion about quintonal. You are worried about quintonal and want strict safety measures, including use of protective clothing, regular medicals and rotation of jobs which involve close contact with the chemical. You also feel present and past workers should be checked for bladder cancer.

However, you have had very few patients with bladder cancer but a lot with lung cancer. The main cancer threat is smoking. You are very against smoking and feel smoking is a great threat to smokers and non-smokers alike. Many of the Wilsons workers smoke. Why don't the company ban smoking in the factory and canteen? It is all very well to deal with quintonal, but if it is people's health we are concerned about all steps must be taken to stop smoking.

Role card 5**Pauline/Paul Jones, company nurse**

You are worried about the long-term health risk of quintonal but feel it is part of a larger health and safety problem involving use of machinery, electrical equipment and general hygiene and safety. You feel this very strongly because you *see* what can happen: you have to treat people who are injured working at Wilsons. You do not know much about quintonal itself but you feel a lot could be done by stepping up normal safety arrangements. Protective clothing (coats, goggles and gloves) is provided but often not used by workers. If safety rules were obeyed any threat from quintonal could be minimised.

You want everyone at the factory to go on a half-day health and safety training course to make sure rules are understood and followed. At least the problem of quintonal might make people take safety seriously. It is about time they did. One last point: people should bear in mind the stress and strain that workers could suffer during any period of closure of the factory.

Role card 6**Sally/Sam Green, local councillor**

You represent the area in which the factory is. You are very concerned about the workers' safety but feel no rash decisions should be taken. Quintonal has been used for a number of years and there does not seem to be a lot of ill health among the workforce. Your advice is to keep working normally, with proper safety precautions, while the problem is investigated. The area cannot stand losing any more jobs. Many local families are already without a breadwinner. There is growing unemployment and poverty in the area and the closure of Wilsons would be a disaster for local people. The company's economic difficulties and the health risks of poverty must be taken into account.

Role card 7**Dr Anne/Alan Arnold, consultant industrial chemist**

You are familiar with quintonal. It has been used for a number of years without its safety being questioned. People should not panic about it now. The first thing to be done is to check the American study. For example, were the animal experiments properly carried out? What is the new research? Is any other information available?

The rats were given large doses of quintonal. Workers at Wilsons only come into contact with the chemical in small quantities. Wherever possible the company should tighten the safety regulations over quintonal. However, you do not see any reason why work should halt.

No firm decision can be made until more information is available. You will make immediate enquiries to see if there is any other evidence about quintonal. You will seek expert advice about the results of the American experiments. You will be making an estimate of the risk to the workers. If you find evidence that quintonal is harmful you will ask the company to stop using it.

Role card 8**Tracey/Trevor Graham, representative of local tenants association**

You do not work at Wilsons but you live just along the road. Members of your association who work at Wilsons have told you about their worries over quintonal. You want to know whether it could affect the local community. Can it get out of the factory into the community? You have contacted the local Environmental Health Office and asked them to make measurements to see if any quintonal has escaped from the factory. The results are not available yet.

Some of your members want production halted immediately until there is a guarantee that there is no danger. Other local people are concerned about the loss of jobs if the factory closes. You believe that your association will want to organize its members to protest if Wilsons does not do something quickly.