3.11 The control of health with vaccinations

A vaccine is used to prevent you getting a particular illness. Many diseases spread easily between humans. This spread needs to be prevented to stop an epidemic happening. Many people who suffer from a disease make a full recovery but sometimes complications lead to serious damage or even death.

Unit 6: For more on vaccinations and the immune system, see pages XX–XX.

How vaccines work

Vaccines stimulate our immune system to produce antibodies without us having to be infected with the disease. Immunologists use actual pathogens to make vaccines but they have to make sure that the vaccine doesn’t trigger the disease itself.

Producing vaccines

- Using a weakened or attenuated strain of the pathogen by repeatedly growing it to select a strain that doesn’t cause the actual disease
- Extracting the part of the pathogen that causes the immune response
- Killing the pathogen by heating it or adding a chemical

To make the vaccine the pathogen is combined with stabilisers, preservatives to prevent contamination and an adjuvant. This is a substance which increases the body’s immune response.

Activity A

Working in pairs, explain to your partner what a vaccine is.

Immunisation programmes

Immunisation programmes provide people with a vaccination to try to prevent the onset and spread of many diseases. Some currently offered by the NHS include MMR, HPV and BCG vaccinations.

Measles, mumps and rubella (MMR)

MMR is a combined vaccine to protect against measles, mumps and rubella (German measles). It is usually given to 3–5-year-olds and needs two injections.
Activity B
List all vaccinations you have had. Ask your parents/guardian about any you had as a small child.

Human papilloma virus (HPV)
You can get HPV by having unprotected sex with someone who has the virus. Most women who have sex will get infected by HPV at some time in their lives. The virus is usually harmless or can cause genital warts. If the infection lasts for a long time it can damage cells and lead to cancer of the cervix. The HPV vaccine protects against some strains of cervical cancer, but not all. This means women still need regular screening using smear tests throughout their life. The vaccine's protection lasts for up to 6 years.

Activity B
List all vaccinations you have had. Ask your parents/guardian about any you had as a small child.

Bacillus Calmette–Guérin (BCG)
This immunisation protects against tuberculosis (TB), which is highly contagious and easily spread between humans through coughing or sneezing. It used to be given to school children at 13 years of age. Now it is only offered to groups of people at high risk, usually babies or people living in crowded unhygienic conditions.

Unit 3: See page XX for more information on TB.

Assessment activity 3.11
1. Why do we need vaccinations? Create and complete a table to show this. P5 M4 D3
2. Using the Internet and books, do some further research into the diseases above. List three points for each disease explaining how they make you ill. P5 M4 D3
3. Choose two diseases from the list above. How could family and friends be affected by knowing someone with these diseases? D3

Grading tip
For P5 M4 and D3, select at least three different diseases which are treated with vaccinations to include in your assignment. Explain how each disease is caused and how it affects the sufferer in work, at home and socially.

Functional skills
You will be able to use your ICT skills to research the information you need here.

PLTS
Independent enquirer: you can be an independent enquirer as you explore issues from different perspectives when considering the effect of different internal and external factors on human health.

Did you know?
In a UK study, 40% of cervical smears from 20–24-year-old women were positive for HPV DNA. This showed they were infected with human papilloma virus. This proves how important it is to use protection during sex.
### 3.11 The control of health with vaccination: Lesson plan

<table>
<thead>
<tr>
<th>Duration</th>
<th>60 mins</th>
<th>Working towards</th>
<th>P5, M4, D3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student book pages</td>
<td>90–91</td>
<td>Subject specialism</td>
<td>Biology</td>
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**Lesson resources**
- Microphones.
- Voice recorders or computers with recording software installed.
- Internet access or access to textbooks or other materials for research.
- Pens and paper.
- SK4 and SK19.

**Interactive activities and video links**
- Animation on vaccination
- Audio animation on how immunisation works
- Video on Jenner and cowpox
- ActiveTeach 3.11

**Learning Outcomes**
- All learners will be able to...
  - Describe the effects of diseases that are treatable by vaccinations.
  - State the role of vaccinations in preventing disease.
- Most learners will be able to...
  - Explain how diseases that are treatable by vaccinations, can disrupt body systems to cause ill health.
  - Explain how vaccines can protect a person against disease.
- Some learners will be able to...
  - Explain how being affected by a disease, which is treatable by vaccination, could cause social problems.

**Suggested starter activity (10 mins)**
Write a vaccination checklist for a doctor to record the vaccinations received by a person.

**Suggested main activities (40 mins)**
- **Podcast!** Learners research, write and record a podcast of a radio interview with a health visitor, talking about vaccination programmes for children. (AS11 and TT11)

**Suggested plenary activity (10 mins)**
Prepare advertising slogans for vaccinations against each of the diseases. The slogans should include the name of the disease and the vaccination, as well as something about how they work. Each group works on a separate disease.

**Stretch and support**
Less able learners may find understanding vaccination difficult, so ask learners to work in mixed-ability groups when creating the podcast. You could provide staged diagrams of how the immune response to vaccination operates, to enable such learners to focus on construction of the script. It may also be worth providing a writing frame to help them develop their script. More able learners can focus on the social effects of disease.

**Functional Skills**
- English – communicating information and ideas
- ICT – research information using a variety of websites and present findings

**PLTS**
- Team workers
- Creative thinkers
- Independent enquirers

**HSW**
- 3
- 11
- 13

**Keywords**
- Vaccine, antibodies, pathogens, adjuvant

**Links to other subjects**
- Unit 6 – Health applications of life sciences
- Unit 10 – The living body
- Unit 14 – Science in medicine
- Unit 20 – Biotechnology procedures and applications
- Ethical, social and cultural issues

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**Sample pages from BTEC Level 2 First Applied Science. These are draft pages and subject to final approval.**

See more sample pages at: www.pearsonfe.co.uk/appliedscience

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Podcast!

You are a health visitor and have been asked by your local radio station to talk about vaccination programmes, so that parents can understand them.

Aim

You will write a script to record a podcast, explaining how vaccines work. You should also talk about the physical symptoms and how the disease could affect their family and friends.

Before you start

You will need:

- microphone
- recording device or computer with recording software installed
- textbooks and/or access to the Internet for research

What you need to do

1. Research how diseases that are preventable by vaccinations (including MMR, HPV and BCG) can disrupt body systems to make you unwell, and how they can cause social problems. You also need to be able to explain how vaccines work in general.
2. As well as using the textbook you can do your own research on the diseases mentioned, or include extra diseases.

Using the evidence

1. Plan the key points of your podcast. Your talk should include how vaccines work, the symptoms of each of the diseases and why it is important to have vaccinations.
2. Think carefully about the structure of what you’re going to say and remember to include a brief introduction when you start recording and a summary at the end.
3. Write a script for your recording, drawing on the textbook and your research. You may want to start by making a list of bullet points rather than writing out the script word for word. Reading from one bullet point to the next will make it seem more natural.
4. Record your podcast!

Extension

Write the script for a follow-up interview on the social effects of the diseases and how they would affect a patient’s family and friends.
Podcast!

Aim

Learners are placed in the context of a health visitor preparing a presentation on vaccination programmes and preventable disease. Learners will develop an understanding of how diseases can affect human health, and the impact of vaccination on those diseases. They will also understand how being affected by a disease, which is treatable by vaccination, may have a social impact.

Equipment

- microphone
- recording device or computer with recording software installed (e.g. see hotlink to audacity)
- textbooks and/or access to the Internet or other materials for research

Running the activity

1. Prior to the activity, you will need to set up voice recorders or computers with recording software installed. Free recording software can be found at the audacity hotlink. Test the microphones before the lesson starts.
2. Learners will require access to textbooks and to materials for research, which may include connection to the Internet.
3. Learners should focus on MMR, HPV and BCG, but can consider other vaccinations in addition as appropriate.

Expected outcomes

All learners should be able to record a podcast about vaccination and vaccination programmes, as well as symptoms of those diseases which can be prevented by vaccination. Most learners will explain the mechanism by which vaccination can prevent disease. Some learners will need annotated diagrams to help them understand the process. Some learners will use their own research and integrate it into their script. More able learners should also focus on the social effects of those diseases.

Links to other units within BTEC

Disease links to Units 6, 10, 14 and 20, and to ethical, social and cultural issues.

Other resources

Skills sheet 4 (Web searches) and 19 (Writing frame: Research).

PLTS and Functional Skills

TW, CT, IE, English and ICT.
Web searches

The World Wide Web (Internet) is a very useful source of information, but to make sure you get only the information you really want you must ask yourself these questions before you start:

Where can I find the information I am looking for?

One of the best ways is by using a search engine. Choose the one that works best for you and keep its address in your favourites folder.

How can I make sure the search engine finds what I am looking for?

Describe the information you want really carefully. Think of at least three words that will describe what you are looking for. For example, if you want to find out about the atmosphere on Mars try the words Mars, planet and atmosphere.

A search engine will display the names of any websites or pages containing any of the words that you have used for your search. But you will only want pages containing all the words you have listed. There may be a menu that allows you to specify what you want it to match.

Otherwise use the word 'and'. So you would use Mars and planet and atmosphere to make sure the search engine looked for all the words.

Select a search method:
- Intelligent default
- An extract phrase match
- Matches on all words (AND)
- Matches on any word (OR)

How can I use the information I get?

Anyone can put information onto the Internet so you need to be careful about what you choose to read. A page written by NASA will be very reliable for information about planets but might be too complicated. NASA For Kids would be simpler to understand.

Sometimes people put information that is silly or incorrect on their web pages. You should always try to avoid sites with the words ‘alternative’, ‘alt’ or ‘unofficial’ in their address. Remember, you must choose the sites with care and do not believe everything you read on the Internet!

Never use information in your work that you do not understand. Always read the information carefully and then answer your question in your own words. Copying someone else’s work could land you in a lot of trouble, and not only with your teacher!

What should I do with the information?

Always remember to ‘surf’ sensibly and safely. Never give your e-mail address or password to anybody on the Internet without first checking with your teacher.

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Writing frame: Research

Be an excellent researcher

When you use any resources, such as books, CD-ROMs and the Internet, you will often find a lot more detail than you were looking for. You don’t have to use it all. In fact, it is better to use less information but use a small amount of research properly.

Try not to write down things that you don’t understand. Ask for help if you need it. Look for something else you do understand on the same subject. Most importantly, write in your own words the information you are presenting from your research.

The topic I am researching is …

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<th>Questions I need to answer are …</th>
<th>Answers</th>
<th>Extra details</th>
<th>Source</th>
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