

1) Meet the Experts

Your group need to write 4 questions to ask each of the expert speakers.

You need to ensure that they have some questions that they can ask if the speakers come to you first.

Suggest that the group can think of more questions as they go on but they do need some questions straight away in case they meet the experts first.

If you are given a time slot to meet the experts, you should try to ensure that your group keeps within the time.



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2) What is an Infectious Disease?

Explain the term **infectious disease** - see fact box overleaf.

Ask two students to write down a definition and place it on the wall. Then ask the students to write down as many infectious diseases as they can.

Lay out the *patient cards* on the table or stick them on the wall. Give each student a *disease card* and ask them to match the patients' symptoms to a disease. There is information on the back of the cards that may help them.

Extension Task: Ask the students if they know what causes disease. Prompt with "what is in dirt?" or "what's a bug/germ" etc. Introduce them to the different types of infectious organisms shown in the fact box overleaf.



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Fact Box

Infectious Disease: an infection of the body due to an organism that causes damage. The infection can usually be passed on or transmitted.

Virus: the smallest and simplest infectious agent that can only reproduce inside a host cell. They have genetic material inside a protective protein coat that has a very high mutation rate, making it harder for their hosts to develop immunity. A viral infection cannot be treated with antibiotics.

Bacteria: larger than viruses but still tiny one-celled organisms. Bacteria that cause infections multiply very rapidly attacking tissues and releasing poisons (toxins) into the body. Bacterial infections can be treated with antibiotics but can become resistant to them.

Fungus: a type of organism that has similar cells to our own. They can be single-celled (e.g. yeast) or multicellular. Some types of fungi can cause infections like athletes foot.

Protozoa: single-celled organism with similar structure to our own. Many protozoa are free-living but some can cause disease. The protozoa *Plasmodium* causes malaria.

Worms: Some types can live in the intestines of humans.

Parasite: Lives off another organism offering nothing in return. An obligate parasite (e.g. all viruses) cannot survive unless it lives inside another organism (host).



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Answer Card

Task 2 - What is an Infectious Disease?

Patient	Disease	Name
C	Measles	Measles virus
E	Mumps	Mumps virus
G	Tapeworm	Worm <i>Taenia saginata</i>
H	Tetanus	Bacteria <i>Clostridium tetani</i>
J	Malaria	Protozoan <i>Plasmodium falciparum</i>
I	Whooping Cough	Bacteria <i>Bordetella pertussis</i>
D	Meningitis	Viral or bacterial. Common causes of bacterial meningitis are: <i>Neisseria meningitides</i> <i>Streptococcus pneumoniae</i>
F	Ringworm	Fungal <i>Tinea barbae</i>
A	Diphtheria	Bacteria <i>Corynebacterium diphtheriae</i>
B	Hepatitis A	Hepatitis A virus

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3) What is a Vaccine?

Give out the 3 information cards to students in your group.

Ask them to read out each card to the group and show everyone the pictures on the card.

Check that the students understand the information.

Worksheet

Give each student a worksheet and ask them to use seven shapes to design their own disease in the disease part of the sheet.

Each student should then create 3 shapes that would work as antibodies for their disease. Remind students that an antibody need only fit part of the disease.

Ask each student to find 3 shapes that would act as a suitable vaccine. It should 'match' the shape of the antibodies. So, if the disease is a star shape, the antibody could be a 'Y' shape, and the vaccine could be a triangle.

If students have extra time they can draw further antibodies and vaccines.



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4) Vaccination Scenarios

Encourage the group to put the 2 sets of *vaccination scenario cards* in order - one person has no vaccine and the other has been vaccinated. There may be more than one outcome for them to consider.

Answers overleaf.

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Answers

Task 4 - Vaccination Scenarios

Person does not get vaccine

There are no preformed antibodies

Exposure to infectious disease

*Battle between immune system & infection

*Body produces antibodies in response to exposure

*Body is infected and symptoms may appear

Outcome: Death

Outcome: Full recovery and protection

Outcome: Recovery and Protection with some consequences, e.g. deafness

Person gets vaccine

Production of antibodies in response to vaccine

*Exposure to infectious disease

*Battle between immune system & infection

*Pre-formed antibodies fight infection straight away

No or mild symptoms appear

Outcome: Full recovery and protection

*the order of these cards can be switched if the students explain why they have put them where they have.



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5) Vaccination Timeline

Ask students to arrange the *timeline cards* to make the vaccination timeline.

Ask the group when they might receive other vaccinations (examples include for travel and at-risk groups).

See Answer Card overleaf

BUT please note there have been recent policy changes:

BCG

The policy on BCG (TB vaccination) changed in 2005. Prior to 2005 all secondary school students were vaccinated. New policy is that at risk babies are vaccinated soon after birth. Secondary school children will only be vaccinated if at risk and not previously vaccinated.

Vaccinations for Babies

New policy introduced SEPTEMBER 2006

Prior to the new policy at 2,3 & 4 months babies were given Diphtheria, Tetanus, Whooping cough (pertussis), Polio & Hib (all in one vaccine) and Meningitis C.

Pneumococcal vaccine was not given at 2, 4 or 13 months.

12 month olds were not given Hib & Meningitis C.

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Answers

Task 5 - Vaccination Timeline

When to immunise	What vaccine to be given
At birth	TB (BCG) - if at risk Hepatitis B if mother infected
2 nd month	Diphtheria, tetanus, whooping cough (pertussis), polio and Hib Pneumococcal
3 rd month	Diphtheria, tetanus, whooping cough (pertussis), polio and Hib Meningitis C
4 th month	Diphtheria, tetanus, whooping cough (pertussis), polio and Hib Meningitis C Pneumococcal
12 months old	Hib & Meningitis C
13 months old	Measles, mumps and rubella Pneumococcal
3-5 years old	Diphtheria, tetanus, whooping cough (pertussis) and polio Measles, mumps and rubella
13-18 years old	Tetanus, diphtheria and polio
Adults	Tetanus booster if injured Meningitis C Hepatitis B - healthcare workers
All ages and those at risk i.e. serious heart, chest, kidney problems	Flu Pneumococcal

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6) The Smallpox Story

The Background

Smallpox or *Variola* is a highly contagious disease that only humans can get. It is a virus that has two strains - *Variola major* and *Variola minor*. The first is the more deadly form and a typical mortality rate is between 20-40% of those infected. Between 1900 and 1980 approximately 300-500 million people died from the disease.

In 1796 an English country doctor by the name Edward Jenner developed the smallpox vaccine. He noticed that milkmaids working with cows and who caught the cowpox virus, did not catch smallpox. Cowpox, in this case, was acting as a vaccine. The term vaccination was created from the Latin word *vacca* meaning cow as a result of Jenner's discovery.

The smallpox vaccine was the first successful vaccine and today remains the only effective preventive treatment for the deadly smallpox disease.

Following Jenner's discovery, a vaccine was developed and began to successfully treat the disease. In modern times the World Health Organisation coordinated a global vaccination programme to stem the spread of



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the disease. As a result the last naturally occurring case of smallpox was seen in Somalia in 1977. In 1979 the World Health Organisation declared that smallpox had been eradicated.

Groups will act out one of four different aspects of the smallpox story

- Life before vaccination
- The Edward Jenner Story
- Implementation of a global vaccination programme
- Herd Immunity

These will be performed for the rest of the group

See individual task cards for more information



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7) Who Pays

Prepare the students to participate in a role-play. Tell the group that you are taking on the role of the Prime Minister and they will take on the role of various Government departments.

Explain to the group that the departments will be examining a number of issues surrounding funding of vaccinations, prior to making recommendations to the Prime Minister (you).

There are 5 task cards. At least 2 people need to work on each task so for groups of less than 10 students you should give out fewer task cards. E.g. for a group of 7 give out 3 task cards (a, b, & c).

At the end of the session, ask the students to describe:

- The task that they were working on
- What they decided
- The reasons for their decisions

You can then ask the other government departments to comment.



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If you have time you can get the students to discuss what they might do with a limited overall budget.

What would they spend the government's money on?

E.g. If there was a flu pandemic would you stop paying for childhood vaccines so you could cover the cost of the flu vaccines?

Some additional information is provided on the real costs involved - you may use this if you wish.



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8) MMR

Give out the *headline cards* to the students. Ask each student to read the headlines and think about some of the following issues:

- Where did the article come from?
- Who wrote the article?
- Why was it written?
- Is it an independent or biased article?

The students will need to consider the impact of the individual articles. They have a list of suggestions on their task card.

Lead the group in a discussion about the role the media has to play in the public understanding of vaccination programmes and the wider public understanding of science. Should they be regulated? If so, why?

Continued overleaf..



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MMR Case Study

Give out copies of the two BBC documents "Mothers lose MMR Battle" and "Should the MMR Vaccine be Compulsory"

Lead the group in a discussion of the following issues:

- Compulsory vaccination - should the case have gone to court? What do they think of the outcome?
- Human rights - Who has the right to decide if you get vaccinated?
- Herd Immunity - Do we have a responsibility to society?
- Practicalities of compulsory vaccination - Who pays? How is it administered? What if someone refuses?

Ask the students to choose which quote or headline most agrees with the way they feel about MMR.



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9) Compulsory Vaccination

Make sure the group knows what is meant by compulsory vaccination.

Vaccination Quotes

Get the group to read and sort the quotes into categories

- “For Compulsory Vaccination”
- “Against Compulsory Vaccination”

Add “Don’t Know” category if you need

Get them to put the quotes on a sliding scale

Discuss who might have made these comments?
(no right answers)

Ask the group what their own opinions on compulsory vaccination are. You might like to get them to put themselves on the sliding scale with the quotes.

Do they think a compulsory vaccination policy could be justified in order to achieve herd immunity?



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10) Policy Making & Presentation

Students need to create a policy that answers the question “Should vaccinations ever be compulsory?”

Encourage students to consider the results of previous tasks to help them.

Every member of the group must agree with the policy.

They may find it easier to start by writing a set of guidelines for who should get vaccines and when and then summarising it to get their policy statement.

Presentation of Policy

- Should be less than five minutes long
- All members should take part in producing &/or presenting.
- Should include work from at least three other tasks

Try to encourage the students to come up with interesting & original ways of presenting their results - there are some ideas on their task sheet.



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Optional Task - What is an Immune Response?

Make sure the group is split evenly. If group B has less people you may want to give them more time to make the “pre-formed” antibodies (after card 2).

Give card 1 to each team.

When both teams are ready, hand them card 2 at the same time.

Time 2 minutes then give card 3 to each team.

Time for a further 4 minutes and then stop. Count the number of antibodies produced by each team. You can be strict about the size of paper and badly drawn shapes!

Ideally the “vaccinated” group (B) should have produced more antibodies

Get the group to discuss what instructions they had and what they did. What result would they expect to see and did this match the observed result - if not why not? (extra people, better teamwork etc).



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Discussion: Each group was acting as the immune system of a body. Group B was “vaccinated” i.e. they were given the shape of the virus before the other group and started making antibodies. When both groups were “infected” group B had a head start because they already had lots of antibodies to fight the virus. This is how a vaccine works.

Explain that, in reality, there are many ways the body attacks a virus e.g. **phagocytes** that eat virus cells, mast cells that release chemicals.

Then explain what happens when you have been vaccinated. There will be antibodies present already, and your body will have a memory of the virus shape and can respond more quickly.

Fact Box

When a foreign microorganism attacks your body it triggers an **immune response**. Your body produces special cells and antibodies to fight the virus. If it produces enough, then it will overcome the infection.

