Title: Ellie learns about vaccine development.

Children learn about what vaccines are and how different people work together to develop a vaccine, from the problem to the final product.

Objectives

- Recognise that germs (harmful micro-organisms) are tiny living things that can sometimes make us ill.
- Know that vaccination is a way to help your body learn how to protect itself from certain diseases.
- Understand the basic stages of vaccine development.
- Recognise that a new vaccine isn't made by just one person. People in different jobs work together so that everyone can stay safe and healthy.

Science vocabulary

Note: Teachers may decide to use the terms germs and micro-organisms interchangeably. Explain to children that we often call harmful micro-organisms, such as bacteria, viruses and fungi, 'germs' because they can sometimes cause disease and make you ill.

- micro-organism – a very tiny living thing, most can only be seen through a microscope.
- vaccine – a medicine designed by scientists to help your body learn to fight certain germs (harmful microorganisms) that can make you ill.
- vaccination – when you get a vaccine, usually by being injected with it.
- pharmaceutical industry – a group of companies and scientists who create, test and make medicines that treat illness and help keep people healthy.

Resources:

per class

- *Ellie learns about vaccination* (ABPI) story book or website.
- You may wish to look for an appropriate short video online which shows 'inside a vaccine factory'.

per group of four children working together

- Activity sheet 3: Vaccine development cards – pre-cut into cards and shuffled.

Safety guidance:

- Be sensitive when discussing disease or illness.

Prior knowledge / experience:

Children should know how good personal hygiene helps to prevent the spread of germs (harmful micro-organisms) and reduce the risk of infections and diseases. It would be useful for children to be familiar with *Ellie's medicine story* prior to this lesson.

Top tips:

Reading or watching Ellie's story helps connect the activity to a real-world context that children can relate to. The vaccine development card sort can then be used as a hands-on activity to further children's understanding of how vaccines are made and the different people involved.

Children may complete this careers-focused activity while simultaneously taking and recording ongoing temperature measurements as part of the practical enquiry in **Ellie Learns About Vaccination Activity 2 (science-focused)**.

Activity notes:

Introduction (20 min)
Read or watch Ellie learns about vaccination. Focus children's attention to the text on **page 5 (2:52 video)** where Ellie's mum says, "There are different **vaccinations** that help protect people from certain diseases," and "Vaccinations also help stop the spread of certain infections." Ask children if they know what a vaccination actually is.

Share children's ideas and explain that a vaccination is when you get a type of medicine called a **vaccine** that is usually injected into your arm or leg with a very small, thin needle. After you have the vaccination, your body starts learning how to protect you from certain illnesses. You could go into more detail to explain that when you get a vaccine, you're given a tiny, safe amount of a germ (**micro-organism** such as bacteria, virus or fungus) or something that looks like it. This small amount cannot make you sick but your body studies it and learns how to fight that germ. Later, if the real germ tries to get into your body, your body remembers what it learned from the vaccine and can stop the germ much faster. This helps keep you from getting seriously ill.

Refer to the story on **page 9 (video 5:36)** where Ellie's mum says, "A vaccine for a certain disease will help your body's immune system get ready to recognise that disease if it comes across it again in the future. Your body can then fight that disease, so you don't get sick." Explain that your immune system is made of many different parts of your body, including your blood, bones and skin. They work together to detect germs (harmful micro-organisms) in your body and try to stop them from making you ill.

Ask children if they have had any vaccinations at school, hospital or a doctor's surgery. Can they remember what the vaccination was for and what it was like?

The development of a vaccine: card sort (20 min)
Ask children to think about where vaccines and other types of medicines come from. Discuss children's initial ideas.

Explain that vaccines and other medicines are initially created by scientists working in the **pharmaceutical industry**, often in special laboratories within carefully designed factories. Discuss how scientists need to mix the right amounts of the correct ingredients together and then test the new medicines carefully to make sure they work. Tell children that it takes years to make a new vaccine because scientists have to make sure that, before anyone can use it, it is safe for everyone and that it stops people from becoming ill. Ask children if they think people in other job roles are involved in vaccine development. Make a list of suggested careers including what their job would be as part of this process.

Divide the children into small groups and give each group a set of printed, shuffled, *vaccine development* cards from activity sheet 3. Invite children to read and discuss the information on each card, then work together to arrange the cards in the order they believe the steps of developing a new vaccine take place, from first to last.

Class discussion (15 min):

Go through each stage of 'making a new vaccine' one by one. Ask a group to read out their card for that stage and explain their reasoning. Emphasise who does each job and discuss why everyone plays an important role.

Note the correct order of cards is:

- Scientists ask questions and try out different ideas to create a new vaccine.
- Scientists test the new vaccine many times on tiny living things in the labs.
- Scientists test the new vaccine many times with small groups then large groups of different people.
- Doctors, nurses and safety experts watch the tests closely to make sure the vaccine does its job and there are no problems.
- Engineers and machine operators work together to make lots of doses of the vaccine in their factories.
- Transport planners, drivers and pilots send the vaccine across the world.
- Doctors, nurses and pharmacists give the vaccine to people to help to protect them and everyone around them.

Questions for thinking

Use these questions to encourage discussion and check understanding:

- Why do you think it is important that vaccines are tested many times over many years before people can use them?
- Why can't just one person make a new vaccine on their own?
- Why is it helpful for your body to 'learn' about a germ (harmful micro-organism) before you meet the real one?
- How do vaccines help protect not just you, but the people around you?

Taking it further (at home or school)

- Read the story on **page 7 (video: 4:07)** where Ellie's mum mentions different diseases including, "measles, diphtheria, mumps, tetanus, polio, whooping cough, rotavirus and

meningitis B." Carry out your own research about harmful micro-organisms that can cause some of these diseases, how they can be passed on and what the signs of illness are.

- Try to find out what vaccinations you have had since birth. Do you have a record of vaccinations at home? Will you be needing any other vaccinations soon?
- Read the story on **page 9 (video: 5:18)** that '*Vaccination has saved more lives and prevented more serious diseases than any advance in recent medical history.*' Try to find out more about the history of vaccine development. You could start with the story of English doctor, Edward Jenner, and how he created the first successful modern vaccine in 1796.

Industry links and ambassadors

- Find out if there are any pharmaceutical industries in your local area, including companies that research, create, test and deliver new vaccines and medicines. To find out more about the range of jobs involved in developing new medicines you could try to set up an online call with them or arrange a tour.
- Find out more about the ABPI (Association of the British Pharmaceutical Industry) and explore how it works with other organisations to anticipate potential shortages of vaccines or medicines and to ensure a steady, reliable supply.
- Contact STEM Ambassadors and/or local university outreach teams to speak to the class or record a short video. Local ambassadors could talk about what their job involves, how their work helps keep people healthy, why teamwork is important in medicine development and what skills helped them when they were at school

ACTIVITY SHEET 3: Vaccine development cards

Scientists ask questions and try out different ideas to create a new vaccine.

Scientists test the new vaccine many times on tiny living things in the labs.

Scientists test the new vaccine many times with small groups then large groups of different people.

Doctors, nurses and safety experts watch the tests closely to make sure the vaccine does its job and there are no problems.

Engineers and machine operators work together to make lots of doses of the vaccine in their factories.

Transport planners, drivers and pilots send the vaccine across the world.

Doctors, nurses and pharmacists give the vaccine to people to help to protect them and everyone around them.