Choose Your Own Adventure: Give Vaccines A Shot!	Grades 4-8

Information Sheet

Vaccine Anxiety and the CARD Method for Reducing it

Anxiety is a normal part of life, and we have tools to help students reduce their vaccine-related anxiety. One way to start is to identify what makes the student nervous. Maybe it's a fear of needles; maybe they don't know what vaccines they need or how many they will have to get.

A scientifically proven method for reducing vaccine-related anxiety is the CARD method, which stands for Comfort, Ask, Relax, and Distract (see lesson plan for a link to more resources). To stay comfortable, students should sit upright, relax their arms, etc. Asking questions can involve the student asking themselves questions, like what will make them feel more comfortable, or questions can be directed to a trusted authority like a nurse, doctor, etc. To relax before the vaccine, it is best to take deep breaths to stay calm. Distractions like looking at a phone/tablet, talking to someone, playing music, etc., can be an excellent way to take the focus off the needle.

Some other common anxiety-inducing concerns that students might have are:

- I don't know what the needle will feel like.
    - You might feel slight pressure or a pushing sensation where they get the vaccine. This bothers some people, but others are not bothered.
- I don't know what's going to happen on vaccination day.
    - You will be getting a vaccine to keep you healthy. A nurse will come to the school, and everyone will get a vaccine. They will give you an injection using a small needle in your arm. You can choose which arm.
- I might be sore after getting the vaccine
    - You may have some swelling, redness or tenderness where you got the vaccine. This won't last long and shouldn't stop you from doing any of your everyday activities. You may feel a little under the weather, but this is a good sign that the vaccine is working to prepare your immune system.
- I might panic while getting the shot.
    - The nurse will help to keep you calm. The best thing you can do is make a plan to keep yourself calm using the CARD technique.

What are Vaccines? Are They Safe? Which Ones Do I Need?

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Vaccines are the simplest, safest and most effective way to protect you against harmful, vaccine-preventable diseases before you encounter them. Vaccines train the immune system to recognize and fight a germ that causes a disease. This helps your immune system act quickly if the germ you are vaccinated against tries to infect you. Therefore, vaccines help you avoid infections and, if you do get infected, avoid serious illness recover faster.

Vaccines protect us from disease-causing germs, also known as pathogens. This includes bacteria, viruses, protozoa, parasites and fungi. However, most vaccines protect against different viruses and bacteria.

We know that vaccines are safe because experts and scientists rigorously test and regulate vaccines before they are approved. Health Canada regulates vaccines in Canada. Once a vaccine is approved, we continuously monitor its performance to ensure it is still safe and effective.

Different vaccines are made in different ways, but each vaccine has a harmless ingredient that will help your immune system recognize a germ and practice fighting it. Some have a weak or inactive version of a germ. Some have parts of germs, and others contain inactive toxins made by germs. Some new vaccines have instructions for the cells in your body to make parts of the germ.

The vaccine requirements in schools differ by province and territory. See the resources section in the lesson plan for a link to a breakdown of the different school-administered vaccines.

How Vaccines Work

Vaccines work by helping the cells in your immune system recognize the germs that are trying to infect you. The faster your immune cells recognize a dangerous germ, the faster they can have an immune response to stop that germ, and the less chance there is of serious illness. It takes up to two weeks for your immune system to have a strong immune response and stop a new germ.

One of the best physical defences our body has is the skin; it keeps germs out of our bodies. If the skin is broken, germs can get in, and the immune system jumps into action. The rapid response team, also known as the innate immune system, detects the damage to your skin. The innate immune system defends against all types of germs that enter the body. The neutrophils are the first on the scene and use your bloodstream as a highway. Neutrophils eat germs, shoot out germ-killing chemicals and web-like germ traps. Neutrophils call in other responders, like macrophages, using chemical signals. Macrophage means big eater, and they swallow up whole germs, dead germs and parts of germs. The innate immune system deals with germs indiscriminately.

If the first responders can't contain the incoming germs, they call in backup. This is when your immune system's special forces, or adaptive immune system, get activated. Each member, or cells, in the special

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forces are trained to deal with a specific germ. Helper T cells act like the team commander. B cells make antibodies; the secret weapon of the immune system that neutralize germs. Killer T cells are also part of the special forces. They kill infected cells, stopping the infection from spreading.

Vaccines are one of the greatest tools our immune system has. After we stop an infection, antibodies linger in our blood. Some of the B cells and T cells will become memory cells, and these memory cells will be ready to act if the same germ tries to infect us again. Their response will be much stronger and faster the second time they encounter a germ. Instead of taking 15 days to make enough antibodies to contain the infection, it only takes five days, and they produce 100X more antibodies.

Therefore, the adaptive immune system remembers and learns from past infections. Vaccines can give our immune system a practice run with a harmless version of a germ to build up immunity before a germ infects us. The vaccine can't give you the disease, but it can trigger your body's natural defences to fight the "fake" germ and build up memory.

Why Vaccines are Important

Even if you are young and healthy, getting your vaccines is still extremely important. Not only do they make sure you stay healthy from vaccine-preventable diseases, but they also keep others around you safe. If enough people get vaccinated against a disease, it will be tough for the germ that causes that disease to find someone to infect. This is called herd or population immunity and is very important to protect vulnerable people who can't be vaccinated.

Some people can't get vaccinated because they have a weak immune system, like someone getting cancer treatment. Other people's immune systems are weak because of their old age, and babies are left unprotected until they are old enough to be vaccinated.

The diseases that vaccines prevent are rare because we have vaccines. The germs that cause these diseases are still out there and can spread if not enough people get vaccinated.

An example illustrating the power of vaccines is smallpox caused by the variola virus. People with smallpox might start with a sore throat, headache and fever. Then they would develop a raised rash all over their face and body. Eventually, if the people survived the first two weeks of illness, scabs would form and fall off. Almost 30% of people with the major type of variola virus ended up dying. It is estimated that 300 million people died of the disease in the 1900s. If people did survive, because smallpox caused a raised rash, most of the disease's survivors would be left with permanent scarring. The scarring was likely on the face, and survivors may have lost part of their lips, nose or ears. If they had scarring on the clear part of their eyes, it could have left them blind after the infection.

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Different cultures tried to find ways to build immunity to this deadly disease at many points in history. Many sources describe how people protected themselves against smallpox in China and India. They would take the scabs of infected people, grind them up, and blow them up the nostrils of uninfected people. They also might have scratched some smallpox sore materials into their skin. Some African people developed a similar way of using variolation techniques to protect against smallpox.

In North America, smallpox swept through Boston, Massachusetts, in 1721. An enslaved African person named Onesimus had introduced the concept of variolation to a Boston minister. During the 1721 epidemic, a doctor variolated 248 people. The chance of dying after getting variolated was 3%, but the likelihood of dying after getting smallpox was 14%. Although variolation was risky, it was much safer than catching smallpox naturally.

The most significant breakthrough in developing a safer way to protect yourself from smallpox was based on a study by a man named Edward Jenner. He tested a statement he heard from a milkmaid that said she wouldn't get smallpox because she had had cowpox before. Cowpox is from the same family of viruses as smallpox, but it is a much milder disease and spreads to humans from cows.

To test if this was true, Edward Jenner took matter from the sores of a person infected with cowpox and scraped the skin of a boy named James Phipps to introduce the matter into his system. James felt a little sick for a few days but quickly got better. Then, Edward Jenner did the same procedure, but with smallpox instead of cowpox. If James got sick, that meant getting cowpox wouldn't protect him from getting smallpox. But if he didn't get sick, we would know that getting the milder disease cowpox would protect you from smallpox. James did not get sick after Jenner deliberately inoculated him with smallpox, thus demonstrating Jenner was correct in that inoculating using cowpox can protect against smallpox.

Edward Jenner called this new technique vaccination. We developed newer and safer vaccines as time went on. Eventually, once more people got vaccinated, smallpox started to disappear. The World Health Organization started a Smallpox Eradication Programme to eliminate smallpox from the world. The last case of smallpox was in 1977, in someone who hadn't been vaccinated. They recovered from the infection and went on to be an advocate for vaccines.

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