

PedsCases Podcast Scripts

This is a text version of a podcast from PedsCases.com on “**Childhood Immunizations Part 3**” These podcasts are designed to give medical students an overview of key topics in pediatrics. The audio versions are accessible on iTunes or at www.pedsCases.com/podcasts.

Childhood Immunizations Part 3: Addressing Vaccine Hesitancy

Developed by Kristen Timm and Dr. Sarah Forgie for PedsCases.com.
September 13, 17

Introduction:

Hello, my name is Kristen Timm and I am a medical student at the University of Alberta. This PedsCases podcast was developed with Dr. Sarah Forgie, a pediatric infectious disease specialist at the Stollery Children’s Hospital in Edmonton and professor of Pediatrics at the University of Alberta.

Welcome to Part 3 of this PedsCases podcast series on pediatric immunizations. Today we will be addressing some frequently asked questions about vaccines and common reasons for vaccine hesitancy. If you missed Part 1 or 2 of this series, I encourage you to listen to them first. Part 1 provides background information about how immunizations work and types of vaccines and Part 2 is a review of routine immunizations given in Canada.

Learning Objectives

At the end of this podcast the listener should be able to:

1. Understand the importance of herd immunity
2. Recognize that there are many different reasons for vaccine hesitancy
3. Address common misconceptions about vaccine safety
4. Explain how vaccine safety is monitored in Canada
5. Understand why parents should not be complacent about vaccine-preventable diseases

The Importance of Herd Immunity

We have already covered how immunizations can protect an individual by gearing up their immune system to fight particular pathogens without the individual getting sick in the first place. Immunized children are protected against a number of life threatening diseases. The benefits of immunization, however, can reach beyond immunized individuals and offer protection against contagious diseases to other community members. This concept is referred to as “herd immunity.” When the majority of community members are immunized, there is less chance of a disease outbreak, and the herd is protected. This is especially important for people who are unable to receive

Developed by Kristen Timm and Dr. Sarah Forgie for PedsCases.com
September 13, 2017.

certain vaccines, which we'll explain in a minute. Because routine vaccinations can prevent whole communities from acquiring disease and prevent deaths, it is important to communicate clearly with parents who question whether vaccines are in their children's best interests.

Vaccine Hesitancy

Vaccine hesitancy is a term that describes the delay in acceptance or refusal of available vaccines. This describes a wide spectrum of parents from those who accept vaccines but with concern about their safety, to those who delay vaccines, to those who completely refuse all vaccines and actively campaign to eliminate vaccines for all children. Vaccine hesitancy is related to a number of factors including a lack of confidence in vaccine safety, misunderstandings about possible adverse events and side effects, and complacency about vaccine-preventable diseases.

Now let's look at some questions that you might be asked by vaccine hesitant parents and information that you can use to answer these questions.

FAQs

Q: Doctor, I've heard that vaccines contain dangerous additives like toxic metals and formaldehyde. How could these possibly be safe?

A: Some parents may be concerned about various vaccine components and their implication on vaccine safety.

Let's talk about aluminum first. Aluminum is a chemical element that is naturally present in our water, soil, air, and fruits and vegetables. Aluminum salts are added in small quantities as an *adjuvant* to many vaccines including DTap, PCV 13, Men C, and Hep B. Adjuvants are agents that we add to vaccines to augment the immune system's response to the antigen. While high levels of aluminum can be dangerous, the amount of aluminum in vaccines is comparable to the amount that is present in breast milk and infant formula.

In regards to mercury, some parents might be concerned about mercury exposure because they have heard warnings about eating fish that contain mercury and that mercury levels can build up in the body. None of the routine immunizations in Canada contain mercury except for some influenza vaccines. The influenza vaccine contains a compound called thimerosal, which does contain mercury. However, this form of mercury is different than the type of mercury that can accumulate in fish and it is cleared quickly from the human body. Thimerosal is used in low doses to prevent the growth of pathogens that could potentially contaminate the vaccine. The most common side-effect of thimerosal is minor redness and swelling of the skin at the injection site. In some very rare cases, someone may have a true allergy to thimerosal.

As for formaldehyde, it is used early in the vaccine production process to inactivate viruses or to denature toxins to make them harmless antigens. The formaldehyde is removed after the pathogen is inactivated so that only trace amounts remain in the end product. An infant's body naturally contains about ten times more formaldehyde than there is in a vaccine.

Although some of the chemicals found in vaccines such as aluminum and formaldehyde may sound frightening to people who are not familiar with them, vaccines are carefully

studied to ensure that they are safe for use. The manufacturing of vaccines is carefully supervised in Canada and years of research take place before a vaccine is approved by Health Canada. Once approved, we have multiple ways of monitoring for adverse events that may be related to vaccines. There is a passive surveillance program overseen by the Public Health Agency of Canada (PHAC) called the Canadian Adverse Events Following Immunization Surveillance System (CAEFISS), which tracks adverse events as reported by health care providers. There is also an active surveillance program called IMPACT, or the Immunization Monitoring Program ACTIVE, that involves 12 pediatric centers across the country where they investigate adverse events associated with vaccines, vaccine failures, and cases of vaccine-preventable disease. With all these measures, vaccine safety is closely monitored in Canada.

Q: My older daughter is allergic to eggs, and I'm afraid that my younger son might be too. I've heard that vaccines contain egg protein, so wouldn't it be better to avoid these vaccines in case they cause a bad allergic reaction?

A: Some vaccines do contain some egg proteins. These include DTaP, MMRV, and influenza vaccines. However, an allergy to eggs is not a contraindication to these routine vaccinations. The Canadian Pediatric Society released a position statement in 2014 stating that "administration of inactivated trivalent or quadrivalent influenza vaccine is now believed to be safe for individuals with an egg allergy. Unless children have experienced an anaphylactic reaction to a previous influenza vaccine, they can and should be immunized with a full dose of trivalent or quadrivalent inactivated vaccine... Live attenuated influenza vaccine has not yet been evaluated in egg-allergic children and is not recommended at this time."

Even if a child does have an allergic or anaphylactic reaction to a vaccine, there is no way of knowing which component the child is reacting to. All vaccines should be administered in clinics that are equipped to deal with anaphylaxis. An anaphylactic reaction to any vaccine is a contraindication for repeat doses of that same vaccine. While an egg allergy is not a contraindication to any of the routine childhood immunizations, the Yellow Fever vaccine is an exception. This is a live vaccine that is not routinely given to all children in Canada, but it is indicated for people planning to travel to certain parts of Africa or South America. The Yellow Fever vaccine should not be given to patients with egg allergies, but if high risk travel is imminent, Yellow Fever vaccination may be possible after careful evaluation from an allergist and skin testing and graded challenge or desensitization.

Q: I've heard that vaccines might cause autism. What are some of the other possible side effects of vaccines?

A: There is no scientific evidence to suggest that vaccines cause autism; in fact, there is research showing that there is no link between vaccines and autism. The most common symptoms that children experience after an immunization are local symptoms around the site of injection including redness, pain, and swelling. Usually these symptoms are mild and they resolve after a couple of days. Severe allergic reactions are rare and occur at a rate of one in a million. While there are some other extremely rare side effects, the benefits of immunization outweigh the risks. For example, 500 out of ten

thousand children will have a febrile seizure by the age of five, but only eight out of ten thousand will have a febrile seizure after receiving the MMRV vaccine.

Q: What's the big deal about preventing all these diseases? I had chicken pox when I was a kid and it did not seem like a big deal.

A: Chicken pox is caused by the varicella virus. In some cases, chicken pox might be limited to an itchy and annoying skin rash, but in other cases chicken pox can actually cause serious complications including necrotizing fasciitis, pneumonia, sepsis, encephalitis, or death. In fact, chicken pox is the number one risk factor for necrotizing fasciitis in children.

Q: Okay, so maybe it is worthwhile immunizing against something like the chicken pox, but there are vaccines for diseases that do not exist in Canada. My family is not planning on travelling anywhere outside the country, so why do we have to immunize against so many rare diseases?

A: Many vaccine-preventable diseases that were once common are now rare thanks to the advances of vaccines. However, people can still be exposed to these diseases, even in Canada. Until these diseases are eradicated worldwide, Canadians continue to be at risk. For example, in the early 1950's, before vaccines for measles were available, there were over 60,000 cases of the measles in Canada in a single year. In 2013, there were 750 cases of the measles in Canada. People who remain unimmunized not only put themselves at risk but also put others at risk by compromising herd immunity. We live in a global society with easy transportation and many outbreaks of disease, such as measles, are started by an infected traveler from another part of the world.

Q: Maybe it is not so bad to give a vaccine if it just contains a protein or a small part of a bacteria or virus, but live vaccines sound dangerous. Will a live vaccine give my child the disease that it is supposed to prevent?

A: Before we introduce a live virus to the immune system in the form of a vaccine, the virus is *attenuated*, meaning that it is weakened using heat or chemicals. This means that a vaccinated child's immune system has the chance to develop a response against the virus without giving the virus a chance to cause a serious illness.

Rotavirus, for example, is a pathogen that can cause severe gastroenteritis that can require hospitalization. Administration of the live attenuated rotavirus vaccine may be associated with some mild vomiting, diarrhea, or flatulence; however, these symptoms will be much milder than a child might experience if he or she were exposed to the natural virus and developed natural infection.

Live vaccines are very safe for most people, but we do have to be more cautious with children who are immunocompromised. The rotavirus and MMRV vaccines are contraindicated in children with either primary or acquired immunodeficiency. If you expect a child to become immunosuppressed, for example, a child who requires an organ transplant, live vaccines should be administered at least 4 weeks prior to the planned immunosuppression.

We should also note that children with immunodeficiency may require extra doses of other vaccines. For example, high-risk children should be given a total of four doses of PCV13. Conditions that put children at high risk for developing invasive pneumococcal disease include various causes of immunocompromise such as HIV infection, asplenia, organ transplant candidate or recipient status, or congenital immunodeficiency. Other conditions considered high-risk include chronic cardiac or pulmonary disease, chronic kidney disease, diabetes, asthma, and cochlear implants.

Q: My baby is only two months old, and he still seems so young and small and I just do not think his immune system is mature enough to handle all these immunizations. Wouldn't it be better if we spaced out the vaccines a little more and waited until he was older and stronger before we vaccinate?

A: Vaccinations have been studied at specific ages and the routine immunization schedule is designed so that children receive their immunizations at the best possible times. In general, we want to give vaccinations early in life so that we offer the greatest protection against disease. A baby's immune system is ready and equipped to respond to antigens. In fact, babies are exposed to thousands of antigens every day in the environment. Also, having multiple immunizations on the same day as recommended in the immunization schedule will not compromise the effectiveness of the vaccines. However, if there has been a delay in vaccinations, there is a catch-up schedule available to ensure that the child receives all the recommended vaccines as efficiently as possible. This catch-up schedule is available on the Government of Canada's website healthy Canadians.gc.ca.

In rare cases, we might choose to delay administration of a vaccine. For example, if a child has recently had passive intravenous immunoglobulin (IVIG) treatment for certain indications such as Kawasaki disease, a live vaccination such as MMRV should be delayed for 11 months. This is not because it would be unsafe to give the vaccine, but because the vaccine would be less effective. The passively-acquired immune globulin in the child's body from the treatment would interfere with immune system's response to the MMRV active immunization.

Summary

While there are many questions that parents might ask about vaccinations, we hope that you have learned some information in this podcast that will help you discuss vaccine hesitancy concerns. In this podcast, we have addressed vaccine safety, possible vaccine side-effects, benefits of vaccination, and some contraindications for vaccines. When discussing these things with parents, remember that they want what is best for their child, so be empathetic to their concerns. Be honest and never try to answer a question if you do not know the answer, but tell the parent that you will find out and then follow up. If parents decide they are not ready to immunize their child, let them know you are always available for further discussion. Also, try to end every conversation about vaccine hesitancy by driving home the key message that vaccines are a safe way to prevent illness and save lives.

References

- Canadian Immunization Guide. Government of Canada website. <http://healthycanadians.gc.ca/publications/healthy-living-vie-saine/1-canadian-immunization-guide-canadien-immunisation/index-eng.php?page=13#p1c12a4> Updated September 1, 2016. Accessed December 1, 2016.
- Common Questions About Vaccine Safety. Alberta Health Services website. <http://immunizealberta.ca/> Published 2016. Accessed September 14, 2016.
- Dube E, Gagnon D, Nickels E, et al. Mapping vaccine hesitancy – Country-specific characteristics of a global phenomenon. *Vaccine*. 2014; 32(49):6649-6654. doi: 10.1016/j.vaccine.2014.09.039
- Increasing the use of influenza vaccines in children with egg allergy. Canadian Paediatric Society website. <http://www.cps.ca/en/documents/position/influenza-vaccines-children-with-egg-allergy> Published December 5, 2014. Accessed November 29, 2016.
- Infectious Disease—The Never-ending Threat. Public Health Agency of Canada website. <http://www.phac-aspc.gc.ca/cphorsphc-respcacsp/2013/imm-vac-eng.php> Updated October 23, 2013. Accessed November 29, 2016.
- Influenza Vaccine. Canadian Paediatric Society Caring for Kids website. http://www.caringforkids.cps.ca/handouts/influenza_vaccine Updated July 2015. Accessed September 30, 2016.
- Priorix-tetra drug monograph. GlaxoSmithKline Inc. <http://ca.gsk.com/media/591336/priorix-tetra.pdf> Published October 24, 2014. Accessed September 30, 2016.
- Routine Immunization Schedule. Alberta Health website. <http://www.health.alberta.ca/health-info/imm-routine-schedule.html> Published October 2, 2005. Accessed October 28, 2016.
- Surveillance. Canadian Paediatric Society. <http://www.cps.ca/en/impact> Published 2016. Accessed October 6, 2016.
- Thimerosal in Vaccines. Centers for Disease Control and Prevention website. <http://www.cdc.gov/vaccinesafety/concerns/thimerosal/> Updated October 27, 2015. Accessed October 5, 2016.
- Vaccine Knowledge Project. University of Oxford website. <http://vk.ovg.ox.ac.uk/> Published 2015. Accessed September 29, 2016.
- Vaccine Safety Basics. World Health Organization website. <http://vaccine-safety-training.org/> Published 2016. Accessed September 29, 2016.