

This is a text version of a podcast from PedsCases.com on “**Childhood Immunizations Part 2.**” 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.pedcases.com/podcasts](http://www.pedcases.com/podcasts).

## **Childhood Immunizations Part 2: Vaccines Routinely Used in Canada for Childhood Immunizations**

Developed by Kristen Timm and Dr. Sarah Forgie for PedsCases.com.  
September 9, 2017

### **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 2 of this PedsCases podcast series on pediatric immunizations. We will be reviewing the routine childhood immunizations used in Canada. There are variations in vaccine schedules across the country, but there are many similarities between each province and territory, so this podcast will provide you valuable information no matter where you live and practice in Canada. If you missed Part 1 of this series, I encourage you to listen to that podcast first, as it will provide you with some background information about how immunizations work and about the types of vaccines that we use.

### **Learning Objectives**

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

1. List the immunizations used routinely in Canada
2. Know at which ages these immunizations are normally given
3. Know some common and rare but serious vaccine side-effects

### **Canadian Immunization Schedule**

Routine immunizations are scheduled for infants at 2, 4, 6, 12, and 18 months. There are also vaccines for preschool children aged 4 to 6 years old and for school-aged children in grades five through nine. Additionally, children should receive annual influenza vaccinations.

At the age of 2, 4, 6 and 18 months the **DTaP-IPV-Hib vaccine** is given. This is a combination vaccine that targets 5 diseases: diphtheria, tetanus, pertussis, polio, and *Haemophilus influenzae* type B. This combination vaccine includes different vaccine

Developed by Kristen Timm and Dr. Sarah Forgie for PedsCases.com.  
September 9, 2017

types. The first D stands for diphtheria and is a toxoid component. The T stands for tetanus and is another toxoid component. The aP stands for acellular pertussis and contains protein-based subunit components of the bacterium including pertussis toxin. IPV is the inactivated polio virus vaccine. Finally, Hib is the *Haemophilus influenzae* type B vaccine, which is a bacterial capsular polysaccharide attached or conjugated to a protein. As you can see, this multi-component vaccine contains almost all the vaccine types that were discussed in the previous podcast. The exception is that there are no live components. Because there are no live components, the immune system does not react as strongly to the first dose given at 2 months of age, so additional doses of this vaccine will be given at 4, 6, and 18 months for a total of four doses. The DTaP-IPV-Hib vaccine is administered as an intramuscular (IM) injection initially in the thigh, and doses at 18 months are administered in the deltoid. Side effects may include tenderness or swelling at the injection site, irritability and crying, drowsiness or fever. Other more serious side effects are very rare, occurring in less than 1% of vaccine recipients, but may include allergic reactions, hypotonia or hypotonic/hyporesponsive episodes.

The **PCV 13 vaccine** protects against 13 strains of the *Streptococcus pneumoniae* bacteria, which can cause pneumonia, acute otitis media, and other infections. This vaccine is a bacterial polysaccharide-protein conjugate type of vaccine. Provincial schedules vary between 3 or 4 doses. For a three-dose schedule, immunize at 2, 4, and 12 months. For a four-dose schedule immunize at 2, 4, and 6 months with a booster dose given at 12-15 months of age. The PCV-13 vaccine is administered as an intramuscular injection in the thigh. Side effects may include tenderness or swelling at the injection site, irritability and crying, decreased appetite, vomiting and diarrhea, or fevers. Other more serious side effects are very rare, occurring in less than 1% of vaccine recipients, but may include allergic reactions, utricular skin rash, hypotonia, or febrile seizures.

**Rotavirus vaccine** is a live attenuated vaccine that protects against rotavirus infection. Vaccinations may be commenced at 2 months of age. There are two formulations used in Canada – the pentavalent vaccine, which requires 3 doses 4-10 weeks apart, or the monovalent vaccine, which requires 2 doses at least 4 weeks apart. The rotavirus vaccine is administered as an oral suspension, which the child must swallow. Parents should be cautioned against possible side effects such as diarrhea and/or vomiting, flatulence, abdominal pain, fever, irritability, and loss of appetite. Rare side effects include anaphylaxis, gastroenteritis with severe diarrhea, and transmission of vaccine virus from recipient to non-vaccinated children. Some versions of the rotavirus vaccine are contraindicated in infants with uncorrected congenital malformations of the GI tract that would predispose an infant for intussusception (such as a Meckel diverticulum) or a previous history of intussusception.

The **Men C vaccine** protects against *Neisseria meningitidis* type C, one serotype of meningococcus, which can cause meningitis and sepsis. This is a bacterial polysaccharide-protein conjugate type of vaccine. Most provinces recommend a single

dose of this vaccine, often at 12 months of age, but there are exceptions. For example, children in Alberta receive a first dose at 4 months of age and a second dose at 12 months of age. The Men C vaccine is administered intramuscularly to the thigh in infants and to the deltoid in older children. Side effects may include tenderness or swelling at the injection site, irritability and crying, fever, drowsiness, decreased appetite, vomiting, or diarrhea. Other more serious side effects are very rare, occurring in less than 1% of vaccine recipients, but may include allergic reactions or seizures.

A vaccine given at approximately 12 months of age is the **MMR or MMRV vaccine**. MMR stands for mumps, measles, and rubella, and V stands for varicella. This is a combination vaccine that contains just MMR or MMR plus varicella. Each of the four components is a live attenuated virus. A second dose is required, which is usually given as a preschool vaccination. The vaccine is administered as a subcutaneous injection over the thigh or upper arm or an intramuscular injection to the deltoid. Side effects may include pain, redness, swelling, or bleeding over the injection site; fever; irritability; drowsiness; a skin rash; vomiting and diarrhea, or rhinorrhea. Other rare but serious side effects include allergic reactions, seizures, aseptic meningitis, atypical measles, Guillain-Barre Syndrome, Stevens-Johnson Syndrome, or thrombocytopenia.

The **Hep B vaccine** protects against Hepatitis B. It is an inactivated component vaccine that uses the hepatitis B surface antigen (HBsAg), a protein found on the surface of the virus. This HBsAg protein is produced in labs using yeast cells and then the proteins are purified for use in the vaccine. The vaccine is administered as an intramuscular injection in 2 or 3 separate doses. Usually this is done between the grades of 5 and 7; however, in some provinces and territories, hepatitis B vaccine is given to infants at 0, 1 and 6 months. Hepatitis B vaccine is also given to infants at increased risk of perinatal hepatitis B, such as a mother who is Hepatitis B positive.

The **HPV vaccine** protects against human papilloma virus, which can cause genital warts and cervical cancer. A quadrivalent version of the vaccine protects against four strains of HPV and requires 3 doses that are given at an interval of 0, 2, and 6 months. The doses are administered as intramuscular injections. Some provinces are using the nonavalent (HPV9) that protects against additional strains of HPV. Schedules differ between provinces and between females and males. Most provinces provide this vaccination at some point between Grades 4 and 7, with some provinces offering a catch-up program in Grade 9 for children who missed the vaccine at a younger age.

The **Tdap vaccine** is a combination vaccine that protects against tetanus, diphtheria, and pertussis. The components used are similar to what was administered in the primary series of DTaP-IPV-Hib vaccines; however, the doses of both the diphtheria toxoid and acellular pertussis protein-subunits are lower than in the primary series to reduce adverse events such as swelling and redness at the site of immunization. The Tdap vaccine is given to children between 14 and 16 years of age or between the grades of 7 to 12 depending on the province. It is administered as an intramuscular injection. We should note here that booster shots are needed every ten years for people

who have previously received their primary series, so a tetanus and diphtheria (Td) vaccine should be given every 10 years throughout adulthood. The booster series are due to waning immunity and outbreaks of illnesses.

The **MCV4 vaccine** is a quadrivalent vaccine that protects against Meningococcus types A, C, Y, and W135. It is similar to the Men C vaccine, but offers broader coverage against other strains of *Neisseria meningitides*. It is administered as an intramuscular injection to children between the grades of 4 and 12.

The **influenza vaccine** is recommended annually by the Canadian Pediatric Society and the National Advisory Committee on Immunization (NACI) for all children over 6 months of age. This vaccine is the same as the “flu shot” that many adults receive every year. These immunizations are normally available annually from October to January. Currently, there are two options available for this vaccine – live attenuated intranasal influenza vaccine and the injectable inactivated influenza vaccine. At 6 months of age, babies are only eligible for the inactivated influenza virus vaccine. The composition of live attenuated and inactivated vaccine varies each year, depending on the influenza strains circulating in the southern hemisphere, but both vaccines will contain antigens for two types of influenza A and one or two types of influenza B.

### **Summary**

This brings us to the end of this podcast on vaccines that are used routinely for Canadian children. We have reviewed several vaccines including DTap-IPV-Hib, PCV 13, rotavirus, Men C, MMRV, DTap-IPV, Hep B, HPV, Tdap, MCV4, and the influenza vaccine.

It is important to note that there are other non-routine indications for certain immunizations, but these are not included in the scope of this podcast. If you work with any pediatric patients who have asplenia, HIV, sickle cell disease, or chronic diseases or immune deficiencies, they will likely require special considerations not discussed here.

To view your province or territory’s routine immunization schedule, please visit the website for the Public Health Agency of Canada.

Thank you for listening to this PedsCases podcast. Please join us in Part 3 of this podcast series for an overview of frequently asked questions about immunizations and vaccine safety.

## **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](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.