	Vaccine form	Vaccine presentation		Storage temperature[1] (°C) (* = +2° to +8°C)		Handling recommendations (°C) (* = +2° to +8°C)		Other (y=yes)		Time frame for use	Additional recommendations and information
	L = Lyophilized powder LS = Liquid or solution S = Suspension	Single-dose V = vial S = pre-filled syringe	Multi-dose vial Y = with preservative N = no preservative	Vaccine	Diluent NI = no information	Reconstituted vaccine[2]	Multi-dose vial after entry[3]	Protect from light	Do not freeze	NI = no information	
IMOVAX® Polio	S	S		*					Y	NI	
IMOVAX® Rabies	L	V		*	*	Use immediately			Y	Use immediately after reconstitution	Diluent: sterile water in syringe
INFANRIX hexa®	L & S	V & S		*	*	• Use promptly • Stable for 8 hr at 21°			Y	• Use promptly • Stable for 8 hr at 21°	• PEDIARIX™ suspension in pre-filled syringe • Lyophilized Haemophilus influenza type b vaccine in vial
INFLUVAC®	S	S		*				Y	Y	NI	
INTANZA	S	S		*					Y	NI	Microinjection system
IXIARO®	S	S		*				Y	Y	NI	
Menactra®	LS	V		*					Y	NI	
Meningitec®	S	S		*					Y	NI	
Menjugate®	L	V		*	*	Use immediately		Y	Y	Use immediately after reconstitution	• Diluent: aluminum hydroxide in vial or syringe • ¶ Alternatively, vaccine can be stored for up to 6 months at +8° to +25°, if unopened
MENOMUNE® (multi-dose)	L		Y	*	*	*	*		Y	35 days after first puncture	Diluent: sterile saline with lactose and thimerosal in vial

	Vaccine form	Vaccine presentation		Storage temperature[1] (°C) (* = +2° to +8°C)		Handling recommendations (°C) (* = +2° to +8°C)		Other (y=yes)		Time frame for use	Additional recommendations and information
	L = Lyophilized powder LS = Liquid or solution S = Suspension	Single-dose V = vial S = pre-filled syringe	Multi-dose vial Y = with preservative N = no preservative	Vaccine	Diluent NI = no information	Reconstituted vaccine[2]	Multi-dose vial after entry[3]	Protect from light	Do not freeze	NI = no information	
MENOMUNE® (single-dose)	L	V		*	*	*			Y	24 hr after reconstitution	Diluent: sterile saline with lactose in vial
Menveo™	L & LS	V		*	*	• Stable for up to 2 hr at or below 25°		Y	Y	• Stable for up to 2 hr at or below 25° after reconstitution	• Lyophilized Men A conjugate in 1 vial • Liquid MenCWY conjugate in 1 vial
M-M-R® II Live	L	V		* or frozen at temperature above –50°	• *or room temp • Do not freeze	*		Y	Y	• Maximum 8 hr at +2° to +8° after reconstitution	• Diluent: sterile water in vial • Maintain vaccine at 10° or colder during shipment. • Protect vaccine from light at all times • Prior to reconstitution, can be used if total cumulative time out of refrigeration, at +8°C to +25°C does not exceed 6 hours. These are not, however, recommendations for storage
NeisVac-C®	S	S		*					Y	NI	Alternatively, can be stored for a single period not exceeding 9 months at room temperature (up to +25°), if unopened

	Vaccine form	Vaccine presentation		Storage temperature[1] (°C) (* = +2° to +8°C)		Handling recommendations (°C) (* = +2° to +8°C)		Other (y=yes)		Time frame for use	Additional recommendations and information
	L = Lyophilized powder LS = Liquid or solution S = Suspension	Single-dose	Multi-dose vial	Vaccine	Diluent NI = no information	Reconstituted vaccine[2]	Multi-dose vial after entry[3]	Protect from light	Do not freeze	NI = no information	
		V = vial S = pre-filled syringe	Y = with preservative N = no preservative								
PEDIACEL®	S	V		*					Y	NI	• Discard if exposed to 0° or lower • Stable at +8° to +25° for a maximum of 72 hr, if unopened4
PNEUMO 23®	LS	S		*					Y	NI	
PNEUMOVAX ® 23 (multi-dose)	LS		Y	*			*			48 hr after first puncture	
PNEUMOVAX ® 23 (single-dose)	LS	V		*						NI	
Prevnar® 13	S	S		*					Y	NI	Prevnar 13 has been shown to be stable at temperatures of up to 25°C for 4 days. Cumulative multiple temperature excursions between 8°C and 25°C are permitted, as long as the total time does not exceed 4 days (96 hours). These data are not recommendations for shipping or storage, but may guide decisions for use in case of temporary temperature excursions 4

	Vaccine form	Vaccine presentation		Storage temperature[1] (°C) (* = +2° to +8°C)		Handling recommendations (°C) (* = +2° to +8°C)		Other (y=yes)		Time frame for use	Additional recommendations and information
	L = Lyophilized powder LS = Liquid or solution S = Suspension	Single-dose V = vial S = pre-filled syringe	Multi-dose vial Y = with preservative N = no preservative	Vaccine	Diluent NI = no information	Reconstituted vaccine[2]	Multi-dose vial after entry[3]	Protect from light	Do not freeze	NI = no information	
PRIORIX® (live)	L	V		*	Room temp	*		Y		• Use as soon as possible • Maximum 8 hr at +2° to +8° after reconstitution	Diluent: sterile water in ampoule
PRIORIX-TETRA® (live)	L	V		*	*	*		Y	Y	• Use as soon as possible • Maximum 8 hr at +2° to +8° after reconstitution	Diluent: sterile water in pre-filled syringe or ampoule
QUADRACEL®	S	V		*					Y	NI	• Discard if exposed to 0°C or lower • Stable at above +8°C and up to +25°C for a maximum of 72 hr, if unopened4
RabAvert®	L	V		*	*	Use immediately		Y		Use immediately after reconstitution	• Diluent: sterile water in vial

	Vaccine form	Vaccine presentation		Storage temperature[1] (°C) (* = +2° to +8°C)		Handling recommendations (°C) (* = +2° to +8°C)		Other (y=yes)		Time frame for use	Additional recommendations and information
	L = Lyophilized powder LS = Liquid or solution S = Suspension	Single-dose V = vial S = pre-filled syringe	Multi-dose vial Y = with preservative N = no preservative	Vaccine	Diluent NI = no information	Reconstituted vaccine[2]	Multi-dose vial after entry[3]	Protect from light	Do not freeze	NI = no information	
RECOMBIVAX HB® (single-dose)	S	V		*					Y	NI	• Can be used if total cumulative time out of refrigeration (between +8° to +25°) before opening does not exceed 72 hr4 • Can be used if total cumulative time between +0° to +2° before opening does not exceed 72 hr4
ROTARIX™ (live)	LS	Oral applicator		*				Y	Y	NI	
RotaTeq® (live)	LS	Oral applicator		*				Y	Y	• Administer as soon as possible • Stable for up to 4 hr at +25° after opening	
Smallpox Vaccine (live)	L		N	° Frozen at -15°C to -25°C	Do not freeze+15°C to+30°C	* Do not freeze	* Do not freeze			Preferably use at once Stable for 6-8 hr at 20-25°C and 30 days at +2° to +8° C after reconstitutions	Supplied with bifurcated needles for percutaneous scarification Diluent: glycerol in McIlvaine buffer with 0.2% v/v phenol

	Vaccine form	Vaccine presentation		Storage temperature[1] (°C) (* = +2° to +8°C)		Handling recommendations (°C) (* = +2° to +8°C)		Other (y=yes)		Time frame for use	Additional recommendations and information
	L = Lyophilized powder LS = Liquid or solution S = Suspension	Single-dose V = vial S = pre-filled syringe	Multi-dose vial Y = with preservative N = no preservative	Vaccine	Diluent NI = no information	Reconstituted vaccine[2]	Multi-dose vial after entry[3]	Protect from light	Do not freeze	NI = no information	
SYNFLORIX® (multi-dose)	S		N	*			*	Y	Y	• Use immediately • Discard if not used within 6 hr after first puncture	Can be administered when vaccine has been at +8°C to +25°C for up to 72 hours before opening. These data are not recommendations for storage.
SYNFLORIX® (single-dose)	S	V or S		*				Y	Y	NI	
Td ADSORBED	S	V		*					Y	NI	
Td POLIO ADSORBED	S	V		*					Y	NI	
TWINRIX®	S	V or S		*				Y	Y	NI	
TYPHERIX®	LS	S		*				Y	Y	NI	
TYPHIM Vi® (multi-dose)	LS		Y	*			* Do not freeze		Y	6h after first puncture	
TYPHIM Vi® (single-dose)	LS	S		*					Y	NI	

	Vaccine form	Vaccine presentation		Storage temperature[1] (°C) (* = +2° to +8°C)		Handling recommendations (°C) (* = +2° to +8°C)		Other (y=yes)		Time frame for use	Additional recommendations and information
	L = Lyophilized powder LS = Liquid or solution S = Suspension	Single-dose V = vial S = pre-filled syringe	Multi-dose vial Y = with preservative N = no preservative	Vaccine	Diluent NI = no information	Reconstituted vaccine[2]	Multi-dose vial after entry[3]	Protect from light	Do not freeze	NI = no information	
VAQTA®	S	V		*					Y	NI	• Can be used if total cumulative time out of refrigeration (between +8° to +25°) before opening does not exceed 72 hr4 • Can be used if total cumulative time between +0° to +2° before opening does not exceed 72 hr4
VARILRIX® (live)	L	V		*	* or +8° to +25°	*				Up to 8 hr at +2° to +8°C or Up to 90 min at +25°C after reconstitution	• Lyophilized vaccine not affected by freezing • Diluent: sterile water in pre-filled syringe or ampoule
VARIVAX® III (live)	L	V		*or Frozen at above -50°	• * or +8° to +25° • Do not freeze	Do not freeze		Y		Up to 90 min at +20° to +25°C after reconstitution	• Prior to reconstitution, can be used if total cumulative time out of refrigeration, at +8° to +25°, does not exceed 6hr4
VAXIGRIP® (multi-dose)	S		Y	*			*	Y	Y	7 days after first puncture	
VAXIGRIP® (single-dose)	S	Ampoule or S		*				Y	Y	NI	

	Vaccine form	Vaccine presentation		Storage temperature[1] (°C) (* = +2° to +8°C)		Handling recommendations (°C) (* = +2° to +8°C)		Other (y=yes)		Time frame for use	Additional recommendations and information
	L = Lyophilized powder LS = Liquid or solution S = Suspension	Single-dose	Multi-dose vial	Vaccine	Diluent NI = no information	Reconstituted vaccine[2]	Multi-dose vial after entry[3]	Protect from light	Do not freeze	NI = no information	
		V = vial S = pre-filled syringe	Y = with preservative N = no preservative								
ViVAXIM®	S & LS	S		*		Use immediately after mixing			Y	Use immediately after mixing	• Syringe contains 2 components in separate chambers: hepatitis A vaccine suspension and typhoid vaccine solution • Mix contents of double chamber syringe just before administration
Vivotif® (live)	L	Oral capsule		*				Y	Y	NI	• May be out of refrigeration during a reasonable transit time from clinic to home • Can be used if out of refrigeration at 25° for up to 12 hr on one occasion only • Protect from moisture or high humidity
YF-VAX® (live, multi-dose)	L		N	*	* Do not freeze	*	*		Y	60 min after reconstitution	Diluent: sterile saline in vial
YF-VAX® (live, single-dose)	L	V		*	* Do not freeze	*			Y	60 min after reconstitution	Diluent: sterile saline in vial
ZOSTAVAX® (live)	L	V		Frozen at -15° to -50°	• * or +20° to +25° • Do not freeze	• 30 min at room temp • Do not freeze		Y		30 min after reconstitution	Diluent: sterile water in vial

Table developed from information contained in manufacturer's product monographs accessed April 2013 at Health Canada's *Drug Product Database*. (http://www.hc-sc.gc.ca/dhp-mps/prodpharma/databasdon/index-eng.php) Product monographs are continually updated; it is a best practice to consult the current product monographs available at Health Canada's *Drug Product Database*. (http://www.hc-sc.gc.ca/dhp-mps/prodpharma/databasdon/index-eng.php) Additional information regarding stability of vaccines is available from the *World Health Organization*. (http://www.who.int/biologicals/vaccines/stability_of_vaccines_ref_mats/en/index.html)

[1] In general, do not use vaccines that should be stored at +2°C to +8°C if they have been frozen. Do not use diluent which has been frozen.
[2] Reconstitute or withdraw single-dose vaccines immediately before administration. Discard single-dose vaccines if the vaccine has been withdrawn or reconstituted and subsequently not used within the time frame specified by the manufacturer or jurisdictional guidelines.
[3] Maintain multi-dose vials under appropriate storage conditions and remove from the refrigerator only to withdraw the required dose. Observe strict aseptic technique when using multi-dose vials.
[4] In cases of temporary temperature excursions only; not a storage or shipping recommendation

[ ] = not applicable
hr = hours

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PART 1

TIMING OF VACCINE ADMINISTRATION

GENERAL CONSIDERATION

To provide optimal protection, recommended immunization schedules should be followed as closely as possible. However, it is not always possible to keep to the immunization schedule. People may not come for their scheduled appointment, or people may come just before a vaccine is needed or may not be available when a vaccination is due. This chapter identifies the considerations that need to be taken into account in situations in which a vaccine provider may want to give a vaccine either sooner or later than the recommended interval, or before the recommended age of vaccination.

DELAYED IMMUNIZATION SCHEDULES

One of the most common breaches of the immunization schedule occurs when people miss an appointment, resulting in a longer than recommended interval between doses of a vaccine. Delays generally do not result in a reduction in final antibody concentrations for most multi-dose products. However, maximum protection may not be attained until the complete vaccine series has been administered.

In general, interruption of a vaccine series does not require restarting the series, regardless of the time between doses. Exceptions include the vaccine for oral cholera and travellers' diarrhea. The vaccine dose should be repeated if more than 6 weeks elapses between doses of the primary series or if more than 5 years have passed since the primary series or last booster dose.

The vaccination schedule for rabies post-exposure prophylaxis should be adhered to as closely as possible and it is essential that all recommended doses of vaccine be administered. If a dose of vaccine is delayed, it should be given as soon as possible and the schedule resumed. If the vaccination schedule has been altered creating doubt about an appropriate immune response, post-vaccination serology should be obtained 7 to 14 days after completing the rabies vaccination series.

Table 1 provides recommended and minimum dose intervals for routine childhood vaccines. Refer to Immunization of Immunocompromised Persons in Part 3 for dosing interval recommendations for immunocompromised persons.

ACCELERATED IMMUNIZATION SCHEDULES

When people get behind in a multi-dose series, consideration is generally given on how quickly the subsequent doses can be given as "catch-up". When considering this issue, it is important to know the minimum interval between doses, which may be less than the recommended interval. For example, the first two doses of the childhood immunization series of diphtheria, tetanus, acellular pertussis and inactivated polio has a recommended interval of 8 weeks, but has a minimum interval of 4 weeks, allowing for more rapid catch-up if needed.

In other circumstances, such as immunisation for travel or for rapid protection, shorter than recommended intervals between doses of vaccine may be required or vaccine may be administered at an age younger than usually recommended. When considering this issue, it is important to know the minimum age of each dose, which may be less than the recommended age.

DOSES GIVEN BEFORE THE RECOMMENDED MINIMUM AGE

Minimum age recommendations for receipt of vaccines are based on the youngest age group at risk for the disease and for which vaccine safety and efficacy have been demonstrated, Doses given before the recommended minimum age may lead to a less than optimal immune response (e.g. the minimum age for influenza vaccine is six months, and the vaccine works poorly in infants who are younger)..

There may be circumstances in which receiving a vaccine a few days early may be appropriate to avoid missing an opportunity for vaccination (e.g., administering a vaccine a few days early to a child who reaches the minimum age for the vaccine on the upcoming weekend). A vaccine may also be given earlier if needed for international travel or if there is an imminent risk of disease such as during an outbreak.

However, generally, if a vaccine dose is given before the minimum age, the dose should be repeated on or after the date when the person reaches the minimum age in accordance with the vaccine specific minimum recommended interval between doses. For example, MMR vaccine may be given as early as 6 months of age for children travelling outside of North America; however, two additional doses of measles-containing vaccine must be administered after the child is 12 months old to ensure long lasting immunity to measles.

Table 1 provides the recommended, minimum and maximum ages for routine childhood vaccines. Refer to vaccine specific chapters in Part 4 for additional information on recommended ages and intervals for vaccine administration. Refer to Immunization of Travellers chapter in Part 3 for detailed information about accelerated immunization schedules.

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Table 1: Routine childhood vaccines (except influenza), primary series, healthy children – recommended, minimum, and maximum ages for vaccine doses; recommended and minimum intervals between vaccine doses

Vaccine(s) (brand name)	Recommended age for this dose	Recommended time[1] for this dose	Minimum age for this dose	Maximum age for this dose	Recommended interval to next dose	Minimum interval to next dose
Diphtheria, tetanus, acellular pertussis, inactivated polio, *Haemophilus influenzae* type b (PEDIACEL®) **Diphtheria, tetanus, acellular pertussis, hepatitis B, inactivated polio, *Haemophilus influenzae* type b** (INFANRIX hexa®)	2 months of age		6 weeks	Less than 7 years	8 weeks	4 weeks
	4 months of age		10 weeks		8 weeks	4 weeks
	6 months of age		14 weeks		6 - 12 months	6 months[2]
	12 - 23 months of age[3,4]		12 months		-	-
Hepatitis B (ENGERIX®-B, RECOMBIVAX HB®)		Month 0[7]	birth[5,6]	-	4 weeks	4 weeks
		Month 1	4 weeks		20 weeks	8 weeks[5,6]
		Month 6	16 weeks		-	-
Human papillomavirus bivalent (CERVARIX®)		Month 0	9 years[8]	-	4 weeks	4 weeks
		Month 1			20 weeks	20 weeks
		Month 6			-	-
Human papillomavirus quadrivalent (GARDASIL®)		Month 0	9 years[8]	-	8 weeks	4 weeks
		Month 2			16 weeks	12 weeks
		Month 6			-	-
Meningococcal conjugate monovalent (Meningitec®, Menjugate®, NeisVac-C®)	12 months of age[9]		2 months	Less than 24 years	-	-

Vaccine(s) (brand name)	Recommended age for this dose	Recommended time[1] for this dose	Minimum age for this dose	Maximum age for this dose	Recommended interval to next dose	Minimum interval to next dose
Meningococcal conjugate quadrivalent (Menactra®)	12 years		24 months	Less than 24 years	-	-
Meningococcal conjugate quadrivalent (Menveo™)	12 years		2 months[10]	Less than 24 years	-[10]	-[10]
Measles, mumps, rubella (M-M-R® II, PRIORIX®)	12 - 15 months of age		6 months[11]	-	3 – 6 months	4 weeks
	18 months of age or older[12]		13 months		-	-
Measles, mumps, rubella, varicella (PRIORIX-TETRA®)	12 - 15 months of age		12 months	Less than 13 years	3 months	6 weeks
	18 months of age or older[12]		13.5 months		-	-
Pneumococcal conjugate 13-valent[13] (Prevnar® 13)	2 months of age		6 weeks of age	Less than 5 years	8 weeks	8 weeks
	4 months of age		14 weeks of age		8 weeks	8 weeks
	6 months of age[14]		22 weeks of age[14]		6 months	8 weeks[15]
	12 months of age[14, 15]		12 months of age[15]		-	-
Rotavirus monovalent (ROTARIX™)	2 months of age		6 weeks	Less than 14 weeks and 6 days[16]	8 weeks	4 weeks
	4 months of age		10 weeks	Less than 8 months	-	-
Rotavirus pentavalent (RotaTeq®)	2 months of age		6 weeks	Less than 14 weeks and 6 days	8 weeks	4 weeks
	4 months of age		10 weeks	Less than 7 months	8 weeks	4 weeks
	6 months of age		14 weeks	Less than 8 months	-	-
Tetanus, diphtheria (reduced),		Month 0	7 years[17]	-	8 weeks	8 weeks
		Month 2			12 months	6 months

Vaccine(s) (brand name)	Recommended age for this dose	Recommended time for this dose	Minimum age for this dose	Maximum age for this dose	Recommended interval to next dose	Minimum interval to next dose
acellular pertussis (reduced), inactivated polio (ADACEL®-POLIO, BOOSTRIX®-POLIO)		Month 8 - 14			-	-
Varicella (chickenpox) (VARILRIX®, VARIVAX® III)	12 - 15 months of age		12 months	Less than 13 years	3 months	6 weeks
	18 months of age or older[12]		13.5 months		-	-
		Month 0	13 years	-	6 weeks	6 weeks
		Week 6			-	-

1 first dose = month 0; recommended time is calculated from first dose

2 must be administered at or after 12 months of age for sustained immunity

3 generally given at 18 months of age

4 INFANRIX hexa® may be given at 2, 4, 6 and 12 - 23 months of age but the fourth dose is unlikely to provide significant additional hepatitis B protection and will increase cost. Alternative schedules may be used. Refer to Diphtheria Toxoid in Part 4 for additional information.

5 If accelerated schedule for ENGERIX®-B vaccine is used (day 0, 7 and 21), a fourth dose (booster dose) is required at 12 months after first dose (month 12)

6 interval of at least 4 weeks between the first and second dose, 2 months between the second and third dose and 4 months between the first and the third dose

7 a 2-dose schedule (months 0 and 6 for ENGERIX®-B; months 0 and 4-6 for RECOMBIVAX HB®) may be used for adolescents 11 - 15 years of age

8 HPV vaccine may be considered in children less than 9 years of age who are at risk of exposure to HPV (e.g., those who are sexually active, have a history of sexual abuse or have been diagnosed with a sexually transmitted infection)

9 may begin meningococcal immunization earlier depending on provincial/territorial schedules

10 for infants and children (2 - 23 months of age) receiving Menveo™ for non-routine reasons (such as travel or specific medical conditions) refer to Meningococcal Vaccine in Part 4 for schedule information. Additional dose(s) of vaccine are recommended.

11 MMR may be given as early as 6 months of age; however, two additional doses of measles-containing vaccine must be administered after the child is 12 months old to ensure long lasting immunity to measles

12 generally 4 - 6 years of age before school entry

13 the number of doses pneumococcal conjugate 13-valent (Pneu-C-13) vaccine required varies with age at first dose: 12 - 23 months of age at first dose – 2 doses, at least 8 weeks apart. 24 - 59 months of age (fifth birthday) at first dose – 1 dose. Pneu-C-13 vaccine is not recommended for healthy children 5 years of age and older.

14 a 2-dose schedule and a booster (2, 4 and 12 months of age) of Pneu-C-13 may be considered for healthy infants

15 for infants receiving a three dose schedule (2, 4 and 6 months of age) of Pneu-C-13, a fourth dose (booster) should be administered at least 8 weeks after the third dose at 12 - 15 months of age

16 If catch-up is needed, the first dose of ROTARIX™ may be given up to 20 weeks of age

17 Tdap-IPV may be used as a primary series for previously unimmunized children 7 years of age and older and as booster dose for previously immunized children 4 years of age and older

SIMULTANEOUS ADMINISTRATION OF VACCINES

When someone is behind in their immunization schedule, simultaneous administration of vaccine may be a catch up strategy. In general, all vaccine doses for which a recipient is eligible should be administered at a single visit to increase the probability that the person will be fully immunized. Simultaneous administration of vaccines is particularly important for persons preparing for travel or if it is uncertain that the person will return for additional immunization. Most routine vaccines can be safely and effectively administered at the same visit.

Some vaccines are provided as a combination product, allowing more than one vaccine to be given in a single injection. In general, oral, intranasal and parenteral vaccines may be administered at the same visit with consideration of the minimum age and interval between doses.

INACTIVATED VACCINES

In general, inactivated vaccines may be administered concomitantly with or at any time before or after other inactivated vaccines or live vaccines. Exceptions include:

- different formulations of vaccine that protect against the same disease should be separated in time (e.g., pneumococcal conjugate and pneumococcal polysaccharide vaccine or meningococcal conjugate and meningococcal polysaccharide vaccine) at the same visit; a minimum interval should elapse between administration of the two types of vaccines. Refer to vaccine specific chapters in Part 4 for additional information.
- oral cholera vaccine (inactivated) and oral typhoid vaccine (live) should be administered at least 8 hours apart.

Different injection sites and separate needles and syringes should be used for concomitant parenteral injections.

LIVE VACCIN

Live vaccines given by the parenteral route may be administered concomitantly with all other vaccines during the same visit, using different injection sites and separate needles and syringes. In general, if two live parenteral vaccines are not administered concomitantly, there should be a period of at least 4 weeks before the second live parenteral vaccine is given. Exceptions are varicella-containing vaccines:

- doses of varicella-containing vaccine should be administered at least 3 months apart for children 1 to 12 years of age. If rapid, complete protection against varicella is required, a minimum interval of 6 weeks between 2 doses may be used for children 1 to 12 years of age.
- doses of varicella-containing vaccine should be administered at least 6 weeks apart for adolescents and adults 13 years of age and older.
- doses of univalent varicella vaccine should be administered at least 3 months apart for vaccine-eligible groups of immunocompromised persons.
- varicella-containing vaccines should be not administered with smallpox vaccine; varicella-containing vaccine or herpes zoster vaccine should be administered at least 4 weeks before or after.

If live parenteral vaccines are given too close together, the immune response to the second dose may be affected by the first dose and is considered invalid; it should be repeated at the recommended interval.

Oral and intranasal vaccines can be given at the same time as, or any time before or after any other live or inactive vaccine, regardless of the route of administration of the other vaccine.

Refer to Varicella Vaccine and Herpes Zoster (Shingles) Vaccine in Part 4 for additional information.

Refer to Vaccine Administration Practices in Part 1 for additional information about administration of multiple injections.

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PART 1

BLOOD PRODUCTS, HUMAN IMMUNE GLOBULIN AND TIMING OF IMMUNIZATION

This chapter provides guidance on the timing of administration of live vaccines and human immune globulin (Ig) preparations and blood products.

GENERAL CONSIDERATIONS

Blood products of human origin contain significant amounts of antibodies to infectious agents that are prevalent in the general population, such as measles virus and varicella zoster virus (VZV); these antibodies are present either because of natural disease or following vaccination. Therefore, administration of Ig preparations and certain blood products can interfere with the immune response to parenteral live virus vaccines if given concomitantly with or shortly before or after the vaccine. The duration of the interference with the immune response to the vaccine is related to the amount of antibody in the Ig preparation or blood product. Exceptions are respiratory syncytial virus monoclonal antibody (RSVAb) and transfusion of washed red blood cells (which is infrequently used). These products do not interfere with live vaccines because RSVAb contains only antibody to respiratory syncytial virus and washed red blood cells contain a negligible amount of antibody.

There is minimal or no interaction between blood products or Ig preparations, and:

- inactivated vaccines
- live oral vaccines (rotavirus, oral typhoid vaccines)
- live intranasal vaccine (live attenuated influenza vaccine)
- Bacille Calmette-Guerin (BCG) vaccine
- yellow fever vaccine

These vaccines may be given concomitantly with, or at any time before or after, an Ig preparation or blood product has been administered. If a parenteral vaccine and intramuscular Ig are given concomitantly, administer the vaccine and Ig preparation at different anatomic injection sites, using separate needles and syringes.

Refer to Passive Immunizing Agents in Part 5 and vaccine specific chapters in Part 4 for additional information.

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MEASLES-MUMPS-RUBELLA (MMR), MEASLES-MUMPS-RUBELLA-VARICELLA (MMRV) AND UNIVALENT VARICELLA VACCINS

Guidelines for the interval between administration of Ig preparations or blood products and MMR, MMRV or univalent varicella vaccines have been developed because of the potential for reduced effectiveness of the vaccine if Ig is administered with, or shortly before or after the vaccine; it should be noted that there are no additional safety concerns if Ig is inadvertently administered with, or shortly before or after the vaccine. For an optimum immune response to MMR, MMRV or univalent varicella vaccine, the vaccine should be administered at least 14 days prior to administration of an Ig preparation or blood product, or the vaccine administration delayed until the antibodies in the Ig preparation or blood product have degraded (refer to Table 1). If the interval between the administration of any of these vaccines and subsequent administration of an Ig preparation or blood product is less than 14 days, or if these vaccines are administered before the antibody has degraded, repeat the vaccine dose after the recommended interval. The recommended interval between administration of Ig preparation or blood product and subsequent vaccination varies, depending on the Ig preparation or blood product (refer to Table 1). The recommended intervals between live parenteral vaccines should also be respected when repeating vaccine doses.

Individuals with chronic conditions requiring continuous subcutaneous Ig therapy should not be immunized with MMR, MMRV or univalent varicella vaccine (refer to footnote 1 in Table 1). Individuals who have undergone cardiac surgery with cardiopulmonary bypass would have received packed red blood cells and platelets and may have received frozen plasma. They may have received subsequent blood products in the ICU after their surgery. They should delay receiving MMR, MMRV or univalent varicella vaccine until 7 months after the date they were discharged from the ICU

Table 1: Guidelines for the interval between administration of immune globulin (Ig) preparations or blood products and measles-mumps-rubella (MMR), measles-mumps-rubella-varicella (MMRV) or univalent varicella vaccine to maximize immunization effectiveness

Immune globulin or blood product	Dose, route	Interval between receipt of Ig or blood product and subsequent administration of MMR, MMRV or univalent varicella vaccine (months)
Standard immune globulin (human) [1]		
Immune globulin (Ig)	0.02 - 0.06 mL/kg, IM	3
	0.25 mL/kg, IM	5
	0.50 mL/kg, IM	6
Intravenous immune globulin (IVIg)	300 - 400 mg/kg, IV	8
	1,000 mg/kg, IV	10
	2,000 mg/kg, IV	11
Blood transfusion products		
Plasma and platelet products	10 mL/kg, IV	7

Immune globulin or blood product	Dose, route	Interval between receipt of Ig or blood product and subsequent administration of MMR, MMRV or univalent varicella vaccine (months)
Whole blood	10 ml/kg, IV	6
Packed red blood cells	10 mL/kg, IV	5
Reconstituted red blood cells	10 mL/kg, IV	3
Washed red blood cells[2]	10 mL/kg, IV	0
Specific immune globulin (human)		
Cytomegalovirus immune globulin (CMVIg)	150 mg/kg, IV	6
Hepatitis B immune globulin (HBIg)	0.06 mL/kg, IM	3
Rabies immune globulin (RabIg)	20 IU/kg, IM	4
Rh immune globulin (RhIg)	300 mcg, IM	3[3]
Tetanus immune globulin (TIg)	250 units, IM	3
Varicella immune globulin (VarIg)	125 IU/10 kg, IM	5
Specific immune globulin (humanized monoclonal antibody)		
Respiratory syncytial virus monoclonal antibody (palivizumab) (RSVAb)	15 mg/kg/4 weeks, IM	0

[1] Ig can also be administered subcutaneously (SCIg). SCIg is primarily indicated as life-long replacement therapy in patients with primary antibody deficiencies for whom immunization with live vaccines is contraindicated. However, potential alternative indications for SCIg therapy may result in temporary use and discontinuation of therapy. Because pharmacokinetic properties of Ig G following SCIg administration have been shown to resemble those following IVIg administration, the recommended interval between the administration of SCIg and MMR, MMRV or univalent varicella vaccines should be considered equivalent to the recommended interval after the corresponding IVIg monthly dosing.

[2] washed red blood cells are infrequently used

[3] refer to *Rh immune globulin* for additional information

Rh IMMUNE GLOBULIN (RhIg)

A risk-benefit assessment is needed for post-partum women who have received RhIg and require MMR or univalent varicella vaccine. The risk of lowered vaccine efficacy due to potential interference from the RhIg needs to be weighed against the need for protection against the vaccine preventable disease. To optimize response to vaccine, rubella-, measles- or varicella-susceptible women who receive RhIg in the peri-partum period should generally wait 3 months before being vaccinated with MMR or varicella vaccine.

However, if there is a risk of: exposure to rubella, measles, or varicella; recurrent pregnancy in the 3 months post-partum period; or a risk that vaccines may not be received later, either MMR or univalent

varicella vaccine or both may be given prior to discharge. In this context, serologic testing for antibodies to the vaccine antigens should be done 3 months after vaccination and non-immune women should be revaccinated. In the event that a post-partum woman receives either MMR or varicella vaccine or both vaccines in the 14 days prior to receiving RhIg, serologic testing for MMR or varicella should be done 3 months later and the woman revaccinated if non-immune.

HERPES ZOSTER VACCINE

Although no safety or efficacy data are available for the administration of herpes zoster vaccine to individuals who have recently received Ig preparations or other blood products, the vaccine is known to be immunogenic in adults with pre-existing antibody to VZV. In theory, administration of Ig should not interfere with the vaccine response; therefore, some experts do not consider recent administration of Ig or blood products as a reason to delay the administration of herpes zoster vaccine.

YELLOW FEVER VACCINE

The background antibody level for yellow fever is low in North America; therefore, an Ig or blood product produced from blood donated in Canada or the United States is unlikely to interfere with vaccination with yellow fever vaccine.

SELECTED REFERENCES

Centers for Disease Control and Prevention. *General recommendations on immunization: recommendations of the Advisory Committee on Immunization Practices (ACIP).* MMWR Morb Mortal Wkly Rep 2011;60(RR-02):1-61.

Centers for Disease Control and Prevention. *Health Information for International Travel 2012. The Yellow Book.* Accessed August 2012 at: http://wwwnc.cdc.gov/travel/page/yellowbook-2012-home.htm

PART 1

IMMUNIZATION RECORDS

Immunization records are a crucial component of the immunization process that allow monitoring of provided immunizations and help to optimize protection from vaccine preventable diseases. This chapter provides information and guidance about the use of immunization records and their contents.

GENERAL CONSIDERATIONS

RECORDING IMMUNIZATIONS

Vaccine providers should record vaccines administered to an individual in three locations (either on paper or electronically):

1. the **personal immunization record** held by the vaccinee, or his or her parent or guardian
2. the **record maintained by the health care provider** who administered the vaccine
3. the local or provincial/territorial **immunization registry** (if one has been established)

IMMUNIZATION RECORD CONTENTS

Vaccine providers should include the following information in each of the above locations:

- the trade name of the administered product
- date of administration (time, day, month and year)
- dose administered (by volume, i.e., mL)
- anatomical site of administration
- route of administration
- lot number of the product and expiry date
- name and professional designation of the person administering the product (this information may not be required in provincial/territorial immunization registries)

Vaccine providers should record additional relevant information, such as rubella and hepatitis B serology or tuberculin skin test results, in the personal immunization record, as well as the record maintained by the health care provider.

Product manufacturers are encouraged to provide peel-off labels and to provide bar codes for products to facilitate recording of product information. Pharmacists who dispense vaccines should consider providing peel-off labels if these are not provided by the manufacturer.

PERSONAL IMMUNIZATION RECORDS

Each vaccinee should be provided with a permanent personal immunization record. Vaccine recipients, or their parents or guardians, should be instructed to keep the record in a safe place and to present it at each health care visit so that it can be updated. If the personal immunization record is not available at the time of vaccination, the provider should ensure that adequate information is given so that the recipient or

parent can update the personal immunization record with the information outlined above (see immunization record contents). Parents should maintain these records on behalf of their children and give them to their children at the appropriate time, such as when they are leaving home. An example of an adult personal immunization record is available from Immunize Canada. (http://immunize.ca/en/learn/records.aspx) Initiatives for electronic immunization record keeping that allow online access by vaccinees and health care providers are under development and their use should be encouraged as they become available.

Immunization records may be required for children to attend school or child care centres. Adults may be required to provide immunization records to be able to work in certain professions, such as health care, teaching or occupations requiring foreign travel.

Refer to National Guidelines for Immunization Practices in Part 1 for additional information about personal immunization records.

HEALTH CARE PROVIDER RECORDS

Health care providers must maintain a record of all vaccinations administered and ensure that all vaccinations are accurately and completely recorded and updated. In addition to information about vaccinations given (refer to Immunization record contents), vaccine providers should:

- include all relevant serologic data (e.g., rubella serologic results, hepatitis B surface antibody titres),
- document adverse events following immunization, and
- record contraindications, exemptions, or reasons for deferring vaccination in the health care provider's record.

Electronic medical records used by health care providers should have the capacity to record, collect and easily retrieve all information outlined in immunization record contents, and should permit production of line listings of persons who received a specific vaccine in the event that the vaccine is recalled.

At each immunization visit, information should be sought regarding serious adverse events that may have occurred following previous doses in an immunization series. Health care providers should fully document the adverse event in the medical record at the time of the event or as soon as possible thereafter. Contraindications to vaccinations should be kept up to date.

Providers should maintain easily retrievable summaries of the vaccination records to permit regular checking and updating of the individual's immunization status, as well as the identification and recall of patients, especially children, who are delayed in the recommended immunization schedule. It is useful to record all the information in a single sheet or section of the vaccinee's chart. Immunization information should be readily available and should not be archived in a medical record.

Providers should facilitate the transfer of information in the immunization record to other providers and to appropriate agencies in accordance with requirements, such as compliance with provincial legislation. When a provider who does not routinely vaccinate or provide care to an individual administers a vaccine to that individual, the regular provider should be informed.

Refer to National Guidelines for Immunization Practices in Part 1 for additional information about the use and maintenance of immunization records.

IMMUNIZATION REGISTRIES

Immunization registries are centralized, confidential, electronic information systems that record doses of vaccine administered and maintain vaccination histories to help ensure accurate and timely immunizations. All provinces/territories should develop and maintain electronic immunization registries. A comprehensive local or provincial/territorial immunization registry system contributes to:

- facilitating timely, accurate recording of all relevant immunization information, regardless of where and by whom vaccines are administered
- preventing duplication of immunizations already given by another health care provider
- identifying persons who are overdue for immunizations and generating reminders and recalls for these individuals
- allowing health care providers to review the individual's immunization status at each encounter in a confidential, secure manner
- providing data for public health officials to assess immunization rates and coverage, and to plan and evaluate targeted interventions for populations with less than optimal immunization rates
- assisting with planning upcoming immunization visits
- assisting with inventory management of vaccine products or immunizing agents

Where immunization registries exist, vaccine providers should be aware of legislative or other requirements to report immunization information to these registries because incomplete information can significantly decrease the benefits derived from an immunization registry.

SELECTED REFERENCES

Health Canada. *Functional standards and minimum (core) data sets for a National Immunization Registry Network and Vaccine Associated Adverse Event Surveillance System*. Can Commun Dis Rep 2002;28(S6):1-38.

Public Health Agency of Canada. *Canadian Immunization Registry Network (CIRN)*. Accessed July 2012 at: http://www.phac-aspc.gc.ca/im/cirn-rcri/index.html

PART 1

RECOMMENDED IMMUNIZATION SCHEDULES

GENERAL RECOMMENDATIONS

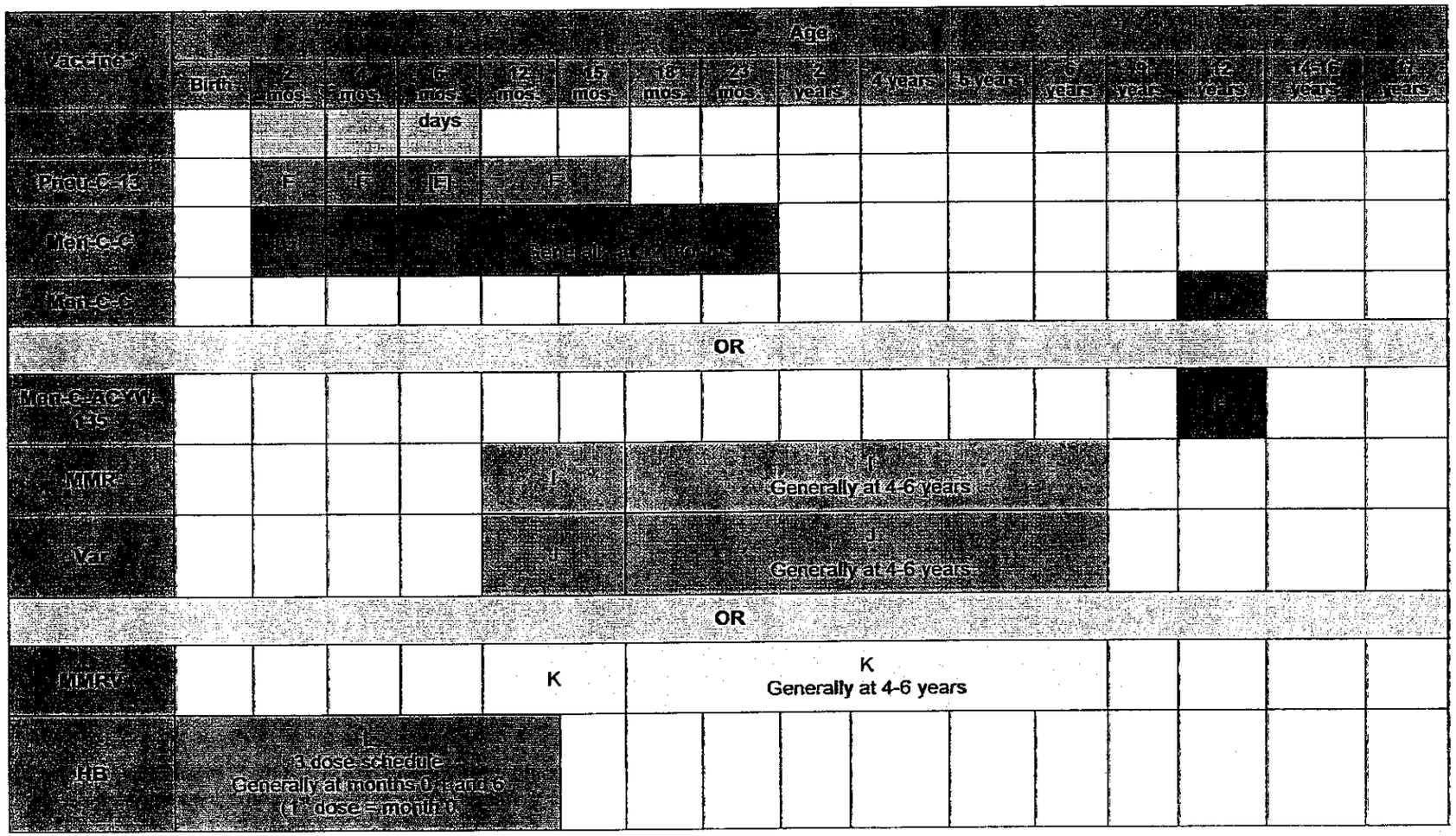
Administration of vaccines in accordance with the immunization schedules summarized in the following tables will provide optimal protection from vaccine-preventable diseases for most individuals. However, modifications of the recommended schedule may be necessary due to missed appointments or illness. In **general, interruption of an immunization series does not require restarting the vaccine series, regardless of the interval between doses. Individuals with interrupted immunization schedules should be vaccinated to complete the appropriate schedule for their *current* age.** Refer to Timing of Vaccine Administration in Part 1 and vaccine-specific chapters in Part 4 for additional information.

Similar, but not identical, vaccines may be available from different manufacturers; therefore; it is useful to review the relevant chapters in the *Canadian Immunization Guide* as well as the manufacturer's product leaflet or product monograph before administering a vaccine. Refer to Principles of Vaccine Interchangeability in Part 1 for information about the interchangeability of similar vaccines from different manufacturers. Product monographs are continually updated; it is a best practice to consult the product monographs for vaccines authorized by Health Canada found in Health Canada's *Drug Product Database* (http://www.hc-sc.gc.ca/dhp-mps/prodpharma/databasdon/index-eng.php).

TABLE 1: ROUTINE CHILDHOOD IMMUNIZATION SCHEDULE, INFANTS AND CHILDREN (BIRTH TO 17 YEARS OF AGE)

- **For children at-risk due to underlying medical conditions,** refer to *Table 4* for additional recommendations for immunization.
- [ ] = dose(s) may not be required depending upon age of child and/or vaccine used (refer to the relevant vaccine-specific chapter in Part 4 and provincial/territorial schedule).
- Refer to vaccine-specific chapters in Part 4 for additional information.

Vaccine	Age															
	Birth	2 mos.	4 mos.	6 mos.	12 mos.	15 mos.	18 mos.	23 mos.	2 years	4 years	5 years	6 years	9 years	12 years	14-16 years	17 years
DTaP-IPV-Hib		A	A	A	A Generally at 18 months											
OR																
DTaP-IPV-Hib *followed by* DTaP-IPV-Hib		B	B	B	A Generally at 18 months											
DTaP-IPV or Tdap-IPV										C						
Tdap															D	
Rota		E	E	[E] Complete series by 8 months + 0												


Vaccine
Age
Birth
2 mos.
4 mos.
6 mos.
12 mos.
15 mos.
18 mos.
23 mos.
2 years
4 years
5 years
6 years
9 years
12 years
14-16 years
65 years
days
Prevnar-13
Men-C-C
Men-C-C
OR
Men-C-ACYW-135
MMR
Generally at 4-6 years
Var
Generally at 4-6 years
OR
MMRV
K
Generally at 4-6 years
HB
3-dose schedule
Generally at months 0, 1 and 6
("1" dose = month 0

Vaccine	Age															
	Birth	2 mos.	4 mos.	6 mos.	12 mos.	15 mos.	18 mos.	23 mos.	2 years	4 years	5 years	6 years	9 years	12 years	14-16 years	17 years
OR																
HB													M 2 or 3 dose schedule			
HPV													N 3 dose schedule			
Influenza				O Recommended annually									O Encouraged annually			
				1 or 2 dose schedule									1 dose			

* Refer to *Table 8* for abbreviations and brand names for vaccines.
mos. = months

A. **Diphtheria toxoid- tetanus toxoid acellular pertussis inactivated polio *Haemophilus influenzae* type b** (DTaP-IPV-Hib): for infants and children beginning primary immunization at 7 months of age and older, the number of doses of Hib vaccine required varies by age.
B. **Diphtheria toxoid, tetanus toxoid, acellular pertussis, hepatitis B-inactivated polio, *Haemophilus influenzae* type b** (DTaP-HB-IPV-Hib): an alternative schedule may be used at 2, 4 and 12 to 23 months of age with DTaP-IPV-Hib vaccine at 6 months of age.
C. **Diphtheria toxoid, tetanus toxoid, acellular pertussis, inactivated polio** (DTaP-IPV) *or* **tetanus toxoid-reduced diphtheria toxoid-reduced acellular pertussis-inactivated polio** (Tdap-IPV).
D. **Tetanus toxoid, reduced diphtheria toxoid, reduced acellular pertussis** (Tdap): 10 years after last dose.
E. **Rotavirus**: Rot-5 vaccine - 3 doses, at least 4 weeks apart; Rot-1 vaccine- 2 doses, at least 4 weeks apart. Give first dose between 6 weeks and 14 weeks and 6 days of age. Do not initiate series in infants aged 15 weeks or older. Administer all doses by age 8 months plus 0 days.
F. **Pneumococcal conjugate 13-valent**: healthy infants, consider a 3 dose schedule - 2, 4 and 12 months of age. Infants beginning primary immunization at 7-11 months of age - 2 doses, at least 8 weeks apart followed by a third dose after 12 months of age, at least 8 weeks after the second dose.
G. **Meningococcal conjugate monovalent**: healthy children, 1 dose at 12 months of age. Meningococcal immunization may begin in infancy depending on provincial/territorial schedule; schedule for infants depends on age at first dose and vaccine used. If Men-C-C first received at less than 12 months of age, give a booster dose at 12-23 months of age. If Men-C-C first received at 12 months of age or older, only 1 dose required until adolescence. Refer to *Table 4* for alternate recommended meningococcal immunization for children considered at-risk.
H. **Meningococcal conjugate monovalent or quadrivalent**: early adolescence (around 12 years of age) - 1 dose, even if meningococcal conjugate vaccine received at a younger age. Vaccine chosen depends on local epidemiology and programmatic considerations.

I. **Measles-mumps-rubella**: first dose at 12-15 months of age; second dose at 18 months of age or anytime thereafter, typically before school entry.
J. **Varicella:** first dose at 12-15 months of age; second dose at 18 months of age or anytime thereafter, typically before school entry.
K. **Measles-mumps-rubella-varicella**: first dose at 12-15 months of age; second dose at 18 months of age or anytime thereafter, typically before school entry.
L. **Hepatitis B**: preferred schedule - months 0, 1 and 6 (first dose = month 0) with at least 4 weeks between the first and second dose, 2 months between the second and third dose, and 4 months between the first and third dose. Alternatively, HB may be routinely administered in infancy as DTaP-HB-IPV-Hib vaccine, with first dose at 2 months of age. Refer to *Table 4* for recommended HB immunization for newborns considered at-risk.
M. **Hepatitis B**: 9-17 years of age - preferred 3 dose schedule, months 0, 1 and 6 (first dose = month 0) with at least 4 weeks between the first and second dose, at least 2 months between the second and third dose, and at least 4 months between the first and third dose; 11-15 years of age - 2 dose schedule (months 0 and 4-6, depending on the vaccine product used).
N. **Human papillomavirus**: Girls - HPV2 vaccine – months 0, 1 and 6 (first dose = month 0) *or* HPV4 vaccine – months 0, 2 and 6 (first dose=month 0). Boys - HPV4 vaccine – months 0, 2 and 6 (first dose= month 0).
O. **Influenza**: recommended annually for children 6-59 months of age (fifth birthday) and encouraged for older children. Children (6 months-8 years of age, previously immunized with Inf) and children (9 years of age and older) - 1 dose. Children (6 months-less than 9 years of age, receiving Inf for the first time) - 2 doses, at least 4 weeks apart.

TABLE 2: RECOMMENDED IMMUNIZATION SCHEDULE, CHILDREN (LESS THAN 7 YEARS OF AGE), NOT PREVIOUSLY IMMUNIZED AS INFANTS

- **For children at-risk due to underlying medical conditions**, refer to *Table 4* for additional recommendations for immunization.
- [ ] = dose(s) may not be required depending upon age of child and/or vaccine used (refer to the relevant vaccine-specific chapter in Part 4 and provincial/territorial schedule).
- Refer to vaccine-specific chapters in Part 4 for additional information.

Vaccine	1st visit	Time after 1st visit					6–12 months after last dose	4–6 years of age
		4 weeks	8 weeks	6 months	4 months	6 months		
DTaP-IPV-Hib or DTaP-IPV	A		A		A		A	
DTaP-IPV or Tdap-IPV								[B]
Pneu-C-13	[C]		[C]					
Men-C-C	D							
MMR	E	E Generally at 4–6 years						
Var	F			F				
OR								
MMRV	G			G Generally at 4-6 years				

Vaccine*	1st visit	Time after 1st visit					6-12 months after last dose	45 years of age
		4 weeks	8 weeks	3 months	4 months	6 months		
HBV	[H]	[H]				[H]		
Inf								

* Refer to *Table 8* for abbreviations and brand names for vaccines.
† Refer to Timing of Vaccine Administration and Vaccine Administration Practices in Part 1 regarding administration of multiple injections.

A. **Diphtheria toxoid, tetanus toxoid, acellular pertussis, inactivated polio, *Haemophilus influenzae* type b** (DTaP-IPV-Hib) *or* **diphtheria toxoid, tetanus toxoid, acellular pertussis, inactivated polio combination vaccine** (DTaP-IPV): the number of doses of Hib-containing vaccine required varies by age at first dose. If first visit at 12-14 months of age: 1 dose of Hib-containing vaccine at first visit and booster dose at least 2 months after the previous dose. If first visit at 15 months to less than 5 years of age: 1 dose of Hib-containing vaccine. If first visit at 60 months of age (5 years of age) or older, Hib-containing vaccine is not required.
B. **Diphtheria toxoid, tetanus toxoid, acellular pertussis, inactivated polio** (DTaP-IPV) *or* **tetanus toxoid, reduced diphtheria toxoid, reduced acellular pertussis, inactivated polio** (Tdap-IPV): omit the dose at 4-6 years of age if the fourth dose of DTaP-IPV vaccine was given after the fourth birthday.
C. **Pneumococcal conjugate 13-valent**: 12-23 months of age at first visit - 2 doses, at least 8 weeks apart. 24-59 months of age (fifth birthday) at first visit - 1 dose.
D. **Meningococcal conjugate monovalent**: 12 months to less than 5 years of age – 1 dose; 5-11 years of age – consider 1 dose. Refer to *Table 4* for alternate recommended meningococcal immunization for children considered at-risk.
E. **Measles-mumps-rubella**: 2 doses, at least 4 weeks apart.
F. **Varicella**: 2 doses, at least 3 months apart. A minimum interval of 6 weeks between doses may be used if rapid, complete protection is required.
G. **Measles-mumps-rubella-varicella**: 2 doses, at least 3 months apart. A minimum interval of 6 weeks between doses may be used if rapid, complete protection is required.
H. **Hepatitis B**: preferred 3-dose schedule - months 0, 1 and 6 (first dose = month 0) with at least 4 weeks between the first and second dose, 2 months between the second and third dose, and 4 months between the first and third dose.
I. **Influenza**: recommended annually for children 6-59 months of age (fifth birthday) and encouraged for older children. Children (6 months to less than 9 years of age receiving Inf for the first time) - 2 doses, at least 4 weeks apart.

TABLE 3: RECOMMENDED IMMUNIZATION SCHEDULE, CHILDREN (7 TO 17 YEARS OF AGE), NOT PREVIOUSLY IMMUNIZED

- **For children at-risk due to underlying medical conditions,** refer to *Table 4* for additional recommendations for immunization.
- [ ] = dose(s) may not be required depending upon age of child and/or vaccine used (refer to the relevant vaccine-specific chapter in Part 4 and provincial/territorial schedule).
- Refer to the vaccine-specific chapters in Part 4 for additional information.

Vaccine	First visit	Time after first visit					6–12 months after last dose	10 years after last dose	9–11 years of age	12 years of age	13–17 years of age
		4 weeks	5 weeks	8 weeks	3 months	6 months					
Tdap-IPV	A			A			A				
Tdap								B			
Men-C-C	C										
Men-C-C										D	
OR											
Men-C-ACYW-135										D	
MMR	E	E									
Var	F		F								
OR											
MMRV	G				G						
HB	H	[H]				H					

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Vaccine*	Time after first visit										
	1st visit	4 weeks	6 weeks	8 weeks	3 months	6 months	6-12 months after last dose	≥10 years after last dose	9-13 years of age	14 years of age	15-17 years of age
HPV									I 3 dose schedule		
Inf	J Encouraged annually 1 or 2 dose schedule										

* Refer to *Table 8* for abbreviations and brand names for vaccines.
† Refer to *Timing of Vaccine Administration* and *Vaccine Administration Practices* in Part 1 regarding administration of multiple injections.

A. **Tetanus toxoid, reduced diphtheria toxoid, reduced acellular pertussis, inactivated polio**: 2 doses, 8 weeks apart; third dose 6-12 months after second dose.
B. **Tetanus toxoid, reduced diphtheria toxoid, reduced acellular pertussis:** 10 years after last dose.
C. **Meningococcal conjugate monovalent**: 5-11 years of age – consider 1 dose.
D. **Meningococcal conjugate monovalent or quadrivalent**: early adolescence (around 12 years of age) - 1 dose, even if meningococcal conjugate vaccine received at a younger age. Vaccine chosen depends on local epidemiology and programmatic considerations. Refer to *Table 4* for alternate recommended meningococcal immunization for children considered at-risk.
E. **Measles-mumps-rubella**: 2 doses, at least 4 weeks apart.
F. **Varicella:** 7-12 years of age - 2 doses, at least 3 months apart. A minimum interval of 6 weeks between doses may be used if rapid, complete protection is required. 13 years of age and older - 2 doses, at least 6 weeks apart; immunity should be evaluated prior to vaccination.
G. **Measles-mumps-rubella-varicella**: 7-12 years of age - 2 doses, at least 3 months apart. A minimum interval of 6 weeks between doses may be used if rapid, complete protection is required.
H. **Hepatitis B**: preferred 3-dose schedule - months 0, 1 and 6 (first dose = month 0) with at least 4 weeks between the first and second dose, 2 months between the second and third dose, and 4 months between the first and third dose. 11-15 years of age - 2 dose schedule (months 0 and 4-6, depending on the vaccine product used).
I. **Human papillomavirus:** Girls, 9 years of age and older - HPV2 vaccine – months 0, 1 and 6 (first dose = month 0) or HPV4 vaccine – months 0, 2 and 6 (first dose=month 0). Boys, 9 years of age and older – HPV4 vaccine – months 0, 2 and 6 (first dose=month 0).
J. **Influenza**: encouraged annually for all children. Children (6 months-8 years of age, previously immunized with Inf) and children (9 years of age and older) - 1 dose. Children (6 months-less than 9 years of age, receiving Inf for the first time) - 2 doses, at least 4 weeks apart.

TABLE 4: ADDITIONAL RECOMMENDED IMMUNIZATIONS, CHILDREN (BIRTH TO 17 YEARS OF AGE), CONSIDERED AT-RISK DUE TO UNDERLYING MEDICAL CONDITIONS

- [ ] = dose(s) may not be required depending upon age of child and/or vaccine used (refer to vaccine-specific chapter in Part 4 and provincial/territorial schedule).
- Refer to Immunization of Travellers and Immunization of Workers in Part 3 for additional information about vaccines recommended for travellers and workers.
- Refer to Immunization of Immunocompromised Persons and Immunization of Persons with Chronic Diseases in Part 3 for additional condition-specific recommendations.

<table>
<tr><th rowspan="2">Vaccine</th><th colspan="10">Age</th></tr>
<tr><th>Birth</th><th>2 months</th><th>4 months</th><th>6 months</th><th>12 months</th><th>15 months</th><th>18 months</th><th>24 months</th><th>2 years</th><th>3 years</th><th>5–17 years</th></tr>
<tr><td>Hib</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td colspan="2">A
1 dose</td></tr>
<tr><td>Pneu-P-23</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td colspan="3">B
1 dose + 1 booster dose for highest risk</td></tr>
<tr><td>Pneu-C-13</td><td></td><td></td><td></td><td>C</td><td></td><td></td><td></td><td></td><td colspan="2">C</td></tr>
<tr><td>Men-C-ACYW-135</td><td></td><td colspan="9">D
2, 3 or 4 dose schedule + booster dose</td></tr>
<tr><td>HA</td><td></td><td></td><td></td><td></td><td colspan="7">E
2 dose schedule</td></tr>
<tr><td>HB</td><td colspan="10">F
3 or 4 dose schedule</td></tr>
<tr><td colspan="11">OR</td></tr>
<tr><td>HA+B</td><td></td><td></td><td></td><td></td><td colspan="7">G
2 or 3 dose schedule</td></tr>
</table>

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Vaccine	Age									
	Birth	2 months	6 months	12 months	5 months	18 months	23 months	2 years	3 years	>= 7 years
Inf										

* Refer to *Table 8* for abbreviations and brand names for vaccines.

A. ***Haemophilus influenzae* type b**: 5 years of age and older with increased risk of invasive Hib disease -1 dose regardless of prior history of Hib vaccination and at least 1 year after any previous dose.

B. **Pneumococcal polysaccharide 23-valent**: 2 years of age or older, at high risk of invasive pneumococcal disease - 1 dose. If Pneu-C-13 is also required, give Pneu-C-13 first followed by Pneu-P-23, at least 8 weeks later. Re-immunize children at highest risk of IPD – give 1 booster dose after 3 years if first vaccinated with Pneu-P-23 at 10 years of age or younger, give 1 booster dose after 5 years if first vaccinated with Pneu-P-23 at 11 years of age and older.

C. **Pneumococcal conjugate 13-valent**: infants at high risk of invasive pneumococcal disease – in addition to the routine doses at 2, 4, and 12 months of age, give an extra dose at 6 months to make a 4-dose primary series. Children aged 3 and older at high risk of invasive pneumococcal disease who have not previously received Pneu-C-13 - 1 dose.

D. **Meningococcal conjugate quadrivalent**: children at high risk of invasive meningococcal disease: 2-11 months of age - 2 or 3 doses of Menveo™, 8 weeks apart with another dose between 12-23 months of age and at least 8 weeks after the previous dose; 12-23 months of age – 2 doses of Menveo™, 8 weeks apart; 24 months of age and older - 2 doses of either Men-C-ACYW-135 vaccine, 8 weeks apart. Give a booster dose every 3 to 5 years if vaccinated at less than 7 years of age and every 5 years if vaccinated at 7 years of age and older.

E. **Hepatitis A**: 12 months of age and older in high risk groups - 2 doses, given 6-36 months apart (depending on vaccine product used).

F. **Hepatitis B**: higher dose of monovalent HB vaccine recommended for certain immune compromising or chronic conditions. Premature infants weighing less than 2,000 grams at birth vaccinated because born to HB infected mothers - 4 doses.

G. **Hepatitis A-hepatitis B**: combined vaccine preferred for children 12 months of age and older if both HA and standard dosage HB vaccines are recommended – 2 or 3 dose schedule.

H. **Influenza**: recommended annually for children at risk of influenza-related complications. Children (6 months-8 years of age, previously immunized with Inf) and children (9 years of age and older) - 1 dose. Children (6 months-less than 9 years of age, receiving Inf for the first time) - 2 doses, at least 4 weeks apart.

TABLE 5: RECOMMENDED IMMUNIZATION SCHEDULE, ADULTS (18 YEARS OF AGE AND OLDER), NOT PREVIOUSLY IMMUNIZED

- **For adults considered at-risk,** refer to *Table 7* for additional recommendations for immunization.
- Refer to Immunization of Travellers and Immunization of Workers in Part 3 for additional information about vaccines recommended for travellers and workers.
- [ ] = dose(s) may not be required depending upon age of vaccinee and/or vaccine used (refer to vaccine-specific chapter in Part 4 and provincial/territorial schedule).
- Refer to vaccine-specific chapters in Part 4 for further information.

Vaccine	1st visit	Time after 1st visit				6–12 months after last dose	10 years after last dose
		4 weeks	6 weeks	8 weeks	6 months		
Tdap-IPV *followed by* Td-IPV	A			B		B	
Td							
MMR	[D]						
Var	[E]		[E]				
OR							
Zos	[F]						
Prot-P-23	[G]						
Menc-C							
OR							

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Vaccine*	1st visit	Time after 1st visit				6–12 months after last dose	10 years after last dose
		4 weeks	6 weeks	8 weeks	6 months		
MenC-ACYW-135							
HPV	3 dose schedule						
Inf	J Annually						

* Refer to *Table 8* for abbreviations and brand names for vaccines.

A. **Tetanus toxoid, reduced diphtheria toxoid, reduced acellular pertussis, inactivated polio** (Tdap-IPV): 1 dose for pertussis protection.
B. **Tetanus toxoid, reduced diphtheria toxoid, inactivated polio** (Td-IPV): first dose, 8 weeks after the dose of Tdap-IPV; second dose, 6-12 months after the previous dose.
C. **Tetanus toxoid, reduced diphtheria toxoid** (Td): 10 years after last dose.
D. **Measles-mumps-rubella**: adults born ***in 1970 or later*** - 1 dose, except - travellers to destinations outside of North America, health care workers, students in post-secondary educational settings, and military personnel - 2 doses, at least 4 weeks apart. Adults born ***before 1970*** can be assumed to have acquired natural immunity to measles and mumps and do not need MMR vaccination except - non-immune military personnel or health care workers (2 doses, at least 4 weeks apart), non-immune travellers (1 dose), non-immune students in post-secondary educational settings (consider 1 dose). Rubella-susceptible adults, regardless of age – 1 dose.
E. **Varicella**: adults 18-49 years of age - 2 doses, at least 6 weeks apart; immunity should be evaluated prior to vaccination. Adults 50 years of age and older are generally presumed to be immune.
F. **Herpes zoster**: adults 50-59 years of age – may receive 1 dose; adults 60 years of age and older – 1 dose.
G. **Pneumococcal polysaccharide 23-valent**: adults 65 years of age and older – 1 dose.
H. **Meningococcal conjugate monovalent or quadrivalent:** adults less than 25 years of age – 1 dose (vaccine chosen depends on local epidemiology). Refer to *Table 7* for alternate recommended meningococcal immunization for adults considered at-risk.
I. **Human papillomavirus**: recommended for women up to 26 years of age, may be given to women 27 years of age and older at ongoing risk of exposure - HPV2 vaccine - months 0, 1 and 6 (first dose = month 0) or HPV4 vaccine - months 0, 2 and 6 (first dose = month 0). Recommended for men to 26 years of age, may be given to men 27 years of age and older at ongoing risk of exposure - HPV4 vaccine – months 0, 2 and 6 (first dose = month 0).
J. **Influenza**: adults at high risk of influenza-related complications (including pregnant women, adults 65 years of age and older); adults capable of transmitting influenza to individuals at high risk; adults who provide essential community services – 1 dose annually. Encouraged for all adults.

TABLE 6: RECOMMENDED IMMUNIZATIONS, ADULTS (18 YEARS OF AGE AND OLDER), PREVIOUSLY IMMUNIZED

- **For adults considered at-risk**, refer to *Table 7* for additional recommendations for immunization.
- Refer to Immunization of Travellers and Immunization of Workers in Part 3 for additional information about vaccines recommended for travellers and workers.
- [ ] = dose may not be required.
- Refer to vaccine-specific chapters in Part 4 for additional information.

Vaccine*	Age				
	18-26 years	27-49 years	50-59 years	60 years	65 years and older
Td	A 1 booster dose every 10 years				
Tdap	B 1 dose				
PneuP-23					C 1 dose
Zos			[D] 1 dose	[D] 1 dose	
Inf	E Annually				E Annually

* Refer to *Table 8* for abbreviations and brand names for vaccines.

A. **Tetanus toxoid, reduced diphtheria toxoid** (Td): 1 booster dose every 10 years.
B. **Tetanus toxoid, reduced diphtheria toxoid, reduced acellular pertussis** (Tdap): 1 dose in adulthood for pertussis protection regardless of interval from last dose of Td.
C. **Pneumococcal polysaccharide 23-valent**: adults 65 years of age and older – 1 dose.
D. **Herpes zoster**: 50-59 years of age and older – may receive 1 dose; 60 years of age and older – 1 dose. If dose given before 60 years of age, additional dose at 60 years of age or older is not currently recommended.
E. **Influenza**: adults at high risk of influenza-related complications (including pregnant women, adults 65 years of age and older); adults capable of transmitting influenza to individuals at high risk; adults who provide essential community services – 1 dose annually. Encouraged for all adults.

TABLE 7: ADDITIONAL RECOMMENDED IMMUNIZATIONS, ADULTS (18 YEARS OF AGE AND OLDER), CONSIDERED AT-RISK

- Refer to Immunization of Travellers and Immunization of Workers in Part 3 for information about vaccines recommended for travellers and workers.
- Refer to Immunization of Immunocompromised Persons and Immunization of Persons with Chronic Diseases in Part 3 for additional condition-specific immunization recommendations.
- Refer to vaccine-specific chapters in Part 4 for additional information.

Vaccine	Age
	18 years of age and older
Hib	A 1 dose
IPV	B 1 booster dose
MMR	C Second dose
Pneu-P-23	D 1 dose + 1 booster dose for highest risk
Men-C-ACWY-135	
HA	F 2 dose schedule
HB	G 3 or 4 dose schedule