Child SOT Recommendations (<18m)

Immunization for Children Expecting Solid Organ Transplant Before 18 Months of Age (Accelerated)

Revision Date: June 24, 2024

Rationale for update:

- Updated to incorporate replacement of Pneu-C13 with Pneu-C20 (Prevnar 20™).

Note: These recommendations do not impose mandatory immunization requirements on transplant candidates and recipients, and are not intended to replace the clinical skill, judgement and decisions of the individual's transplant healthcare team. These recommendations are meant to supplement existing recommendations for routine immunization as outlined in the current *Alberta Immunization Policy*. See also Principles of Immunization for Hematopoietic Stem Cell Transplant and Solid Organ Transplant Recipients.

Inactivated vaccines should be given at least 2 weeks before transplantation and live attenuated vaccines should be given at least 4 weeks prior to transplantation. **Consult with an attending physician before providing live vaccines**.(1)

Routine Immunizations – Before Transplant

Age	Vaccine	Comments
2 months	**DTaP-IPV-Hib**	**DTaP-IPV-Hib:** • DTaP-IPV-Hib can be administered as early as six weeks of age.(1) • Four weeks is the minimum interval between subsequent doses of DTaP-IPV-Hib.(1) Note: **Infanrix hexa**® contains only a single dose (10 µg) of Engerix® Hepatitis B vaccine and **is not** indicated for infants and children requiring a double dose (20 µg) of Engerix® vaccine.
	PNEU-C20	**PNEU-C 20:** • Pneu-C 20 can be administered as early as six weeks of age.(1) • Four weeks is the minimum interval between doses 1, 2, and 3 of Pneu-C 20.(2) • Minimum spacing between dose 3 and 4 is eight weeks.(2)
	HBV	**HBV:** • HBV can be administered at birth. • Follow the dosage and schedule for hypo-responsive individuals for Hepatitis B Vaccine.
	MenC-ACYW (Menveo™)(1,3)	**MenC-ACYW (Menveo®):** • MenC-ACYW should not be administered before eight weeks of age.
	Men-B (Bexsero®)	**Men-B (Bexsero®):** • Only for children with asplenia (either anatomical or functional), acquired complement deficiencies, congenital complement, properdin, factor D deficiency or primary antibody deficiencies, or HIV infection.
	Rotavirus	**Rotavirus Vaccine:** • Rotavirus vaccine is to be administered a minimum of four weeks prior to transplant.(3) • Rotavirus vaccine can be administered as early as 6 weeks of age. • Minimum interval between doses is four weeks. • First dose is to be administered before 15 weeks of age with series completed before 8 calendar months of age. If a first dose is inadvertently administered after 15 weeks of age, see the Rotavirus biological page.
	Laboratory Recommendations: Immunity screening after immunization is not recommended for diphtheria, tetanus, pertussis, polio, *haemophilus influenza B*, pneumococcal, meningococcal or rotavirus.	

Age	Vaccine	Comments
3 months	**DTaP-IPV-Hib**	
	PNEU-C 20	• Children who have started a series with Pneu-C13 or Pneu-C15 should complete their series with Pneu-C20.[1] Previous doses will be counted and the series will not be restarted.
	HBV	**HBV:** • Follow the dosage and schedule for hypo-responsive individuals for Hepatitis B Vaccine.
	Rotavirus	**Rotavirus Vaccine:** • Series is to be administered before 8 calendar months of age. • Minimum interval between doses is four weeks.
4 months	**DTaP-IPV-Hib**	
	PNEU-C20	• Children who have started a series with Pneu-C13 or Pneu-C15 should complete their series with Pneu-C20.[1] Previous doses will be counted and the series will not be restarted.
	MenC-ACYW (MENVEO™)[1,3]	
	Men-B (BEXSERO®)	**Men-B (Bexsero®):** • Only for children with either anatomical or functional asplenia, acquired complement deficiencies, congenital complement, properdin, factor D deficiency or primary antibody deficiencies, or HIV infection.
	Rotavirus	**Rotavirus Vaccine:** • First dose is to be administered before 15 weeks of age with series completed before 8 calendar months of age.
6 months	**COVID-19**	**COVID-19** • Refer to Alberta immunization policy | Alberta.ca see COVID-19 vaccine biological products for current schedule.
	MenC-ACYW (MENVEO™)[1,3]	
	MMR[3,4]	**MMR:** • Is to be administered a minimum of four weeks prior to transplant.[1,4] **Laboratory Recommendations:** • Measles and rubella IgG is not recommended after the first dose if there is time pre-transplant for a second dose.[3] • Mumps immunity screening is not recommended after immunization Positive IgG serology following mumps immunization does not necessarily confirm immunity. Ordering serology and interpretation of the result is the responsibility of the transplant physician.
	VZ[3,4]	**VZ:** • Is to be administered a minimum of four weeks prior to transplant.[1,4] • Off-license use of VZ for children younger than 12 months of age. **Laboratory Recommendations:** Varicella IgG is not recommended after the first dose if there is time pre-transplant for a second dose.[3] Ordering serology and interpretation of the result is the responsibility of the transplant physician

Age	Vaccine	Comments
6 months (cont.)	**HBV**	**HBV**: • Follow the dosage and schedule for hypo-responsive individuals for Hepatitis B Vaccine. **Laboratory Recommendations:** HBV: Screen for anti-HBs at 1 – 6 months after the initial series. If antibody levels are less than 10 IU/L, repeat the series once and retest anti-HBs at 1 – 6 months after the repeat series. Be aware that a positive antibody result for children younger than 12 months can be due to passive immunity from maternal antibodies. Periodic screening as recommended by the attending transplant physician taking into account the severity of the immunocompromised state and whether or not the risk of hepatitis B is still present.(1)
	INFLUENZA (Inactivated)	**INFLUENZA**: • 2 doses with a minimal interval of four weeks between doses. Note: Influenza vaccine may be offered one month post-transplant at the discretion of the transplant physician.(3)
	HAV	**HAV**: • Only for those considered high risk (chronic liver disease; liver transplantation, individuals receiving repeated plasma–derived clotting factors; household or close contacts of children adopted from hepatitis A endemic countries; populations or communities at risk of hepatitis A outbreaks or in which hepatitis A is highly endemic.(1) • Off-license use of HAV for children younger than 12 months of age **Laboratory Recommendations:** HAV: Immunity screening after HAV immunization is not routinely recommended.(1) Ordering serology and interpretation of the results is the responsibility of the transplant physician.
7 months	**COVID-19**	• Refer to Alberta immunization policy | Alberta.ca see COVID-19 vaccine biological products for current schedule.
9 months	**COVID-19**	• Refer to Alberta immunization policy | Alberta.ca see COVID-19 vaccine biological products for current schedule.
	MMR(3)	**MMR:** • Is to be administered a minimum of four weeks prior to transplant.(1,4) **Laboratory Recommendations** • Check for seroconversion (measles and rubella) four to six weeks after the vaccines are administered.(3) • Ordering serology and interpretation of the result is the responsibility of the transplant physician.
	VZ(3)	**VZ:** • Is to be administered a minimum of four weeks prior to transplant.(1,4) • Off-license use of VZ for children younger than 12 months of age. **Laboratory Recommendations** • Check for seroconversion four to six weeks after the vaccines are administered.(3) • Ordering serology and interpretation of the result is the responsibility of the transplant physician.
12 months	**COVID-19**	• Refer to Alberta immunization policy | Alberta.ca see COVID-19 vaccine biological products for current schedule.
	DTaP-IPV-Hib(1)	**DTaP-IPV-Hib:** • 12 months of age or older and at least six months after third dose.(1)
	PNEU-C20(1)	**PNEU-C 20:** • 12 months of age or older and at least eight weeks after the third dose.(1) • Children who have started a series with Pneu-C13 or Pneu-C15 should complete their series with Pneu-C20.(1) Previous doses will be counted and the series will not be restarted.

Age	Vaccine	Comments
		Note: • Children who previously completed a series with another pneumococcal conjugate vaccine are eligible for one dose of Pneu-C20 if they have not received Pneu-C20 vaccine.[1] • It is recommended that this dose be given at least 8 weeks after the last pneumococcal conjugate vaccine.[1]
	MenC-ACYW (Menveo™)[1,3]	**MenC-ACYW (MENVEO™):** • This dose is to be administered in second year of life (12 to 23 months of age).[1]
	Men-B (BEXSERO®)	**Men-B (Bexsero®):** • Only for children with asplenia (either anatomical or functional), acquired complement deficiencies, congenital complement, properdin, factor D deficiency or primary antibody deficiencies, or HIV infection.
	MMR[3]	**MMR** • Is to be administered a minimum of four weeks prior to the transplant.[1,4] • If seroconversion for measles or rubella (i.e., a negative then a positive) is demonstrated following the dose at nine months, this dose is not required. However, it is recommended to provide age appropriate MMR vaccine if time allows pre-transplant. **Laboratory Recommendations** • Annual screening of immunity for measles and rubella is not recommended. • Ordering serology and interpretation of the results is the responsibility of the transplant physician.
	VZ[3]	**VZ** • Is to be administered a minimum of four weeks prior to the transplant.[1,4] • If seroconversion for varicella is demonstrated following the dose at nine months, this dose is not required. However, it is recommended to provide age appropriate varicella vaccine if time allows pre-transplant. **Laboratory Recommendations** • Annual screening of immunity for varicella is not recommended. • Ordering serology and interpretation of the results is the responsibility of the transplant physician.
	HAV	**HAV**: • Only for those considered high risk (chronic liver disease; liver transplantation, individuals receiving repeated plasma–derived clotting factors; household or close contacts of children adopted from hepatitis A endemic countries; populations or communities at risk of hepatitis A outbreaks or in which hepatitis A is highly endemic.[1]
14 months	**MMR**	**MMR** • Is to be administered a minimum of four weeks prior to the transplant.[1,4] • If seroconversion for measles, or rubella has been demonstrated following a dose of MMR, this dose is not required. However, it is recommended to provide age appropriate MMR if time allows pre-transplant. **Laboratory Recommendations:** The transplant physician needs to be consulted before proceeding with second dose of MMR-containing vaccine even if serology is negative. This will allow assessment as to whether or not the patient can be on hold for the transplant for another four weeks.
15 months	**VZ**	**VZ** • Is to be administered a minimum of four weeks prior to the transplant.[1,4] • If seroconversion for varicella has been demonstrated following a dose of varicella vaccine, this dose is not required. However, it is recommended to provide age appropriate varicella vaccine if time allows pre-transplant. • It is preferred that the second dose of varicella-containing vaccine be at least three months after the first dose of varicella-containing vaccine. However, the interval between doses may be shortened to four[1] weeks if rapid complete protection is required.

Age	Vaccine	Comments
		Laboratory Recommendations: The transplant physician needs to be consulted before proceeding with second dose of varicella-containing vaccine even if serology is negative. This will allow assessment as to whether or not the patient can be on hold for the transplant for another four weeks.

1. Ongoing Recommendations after transplantation for children younger than 18 months of age

Immunization may resume once the child is on baseline immunosuppression, usually 6 to 12 months after transplant[1] and as determined appropriate by the child's attending transplant physician. If immunizations were not completed prior to transplant, complete the series for inactivated vaccines as previously indicated.

Refer to Immunization for Children Expecting Solid Organ Transplant (SOT) after 18 Months of Age (Catch-up and Ongoing Schedule) for children 18 months of age and older for ongoing immunization recommendations, third dose varicella indications, and travel vaccine information.

Live vaccines are contraindicated after transplant.

Exception:

The use of live univalent varicella vaccine has been shown to be safe and effective in **carefully selected pediatric renal and liver transplant recipients >1 year post-transplant** receiving minimal immune suppression. **In consultation with the transplant team (transplant/infectious disease physician),** univalent varicella vaccine may be administered to select pediatric renal and liver transplant recipients without recent graft rejection and receiving minimal immune suppression **who were not optimally immunized prior to transplant.**[1,3]

References

1. National Advisory Committee on Immunization. Canadian Immunization Guide (Evergreen ed.). Ottawa, Public Health Agency Canada [Internet]. Available from: https://www.canada.ca/en/public-health/services/canadian-immunization-guide.html.
2. Ryan Gierke;, Wodi; AP, Miwako Kobayashi. Pinkbook: Pneumococcal Disease in Epidemiology and Prevention of Vaccine-Preventable Diseases (14th ed.) [Internet]. Centers for Disease Control and Prevention. 2021. Available from: https://www.cdc.gov/vaccines/pubs/pinkbook/pneumo.html.
3. Expert opinion of Alberta Infectious Disease and Solid Organ Transplant program physicians. (2013, 2015, October 2017, November 2019, November 2023).
4. Rubin LG, Levin MJ, Ljungman P, Davies EG, Avery R, Tomblyn M, et al. 2013 IDSA clinical practice guideline for vaccination of the immunocompromised host. Clin Infect Dis. 2014;58(3).

