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THIS CHAPTER MEETS THE FOLLOWING IMMUNIZATION COMPETENCIES FOR HEALTH PROFESSIONAL (PHAC, 2008): <http://www.phac-aspc.gc.ca/im/pdf/ichp-cips-eng.pdf>

#11: Populations Requiring Special Considerations

- ◆ **Competency:** Recognizes and responds to the unique immunization needs of certain population groups.

1.0 INDIVIDUALS AT HIGH RISK FOR VACCINE PREVENTABLE DISEASES

Individuals who have certain chronic medical conditions or who are immunocompromised related to disease or medical treatments are unable to mount adequate immune responses to vaccines. The cause of the altered immunocompetent state can be primary (inherited) or secondary (acquired), and it can be temporary or permanent. In these individuals, even a less than optimal immune response to a vaccine may provide protective benefits to reduce their high risk of morbidity and mortality from vaccine-preventable diseases.

Chronic medical condition examples:

- Cochlear implant candidate or recipient*
- Congenital or acquired or functional asplenia*
- Liver disease (including hepatitis B and C)
- Malignancies /cancer
- Renal disease

Immunocompromised condition examples:

- Acquired complement deficiency* or congenital immunodeficiency* involving any part of the immune system, including B-lymphocyte (humoral) immunity, T-lymphocyte (cell-mediated) immunity, complement system (properdin, or factor D deficiencies), or phagocytic functions
- Human immunodeficiency virus (HIV)*
- Immunosuppressive treatments (e.g., corticosteroids, chemotherapy, radiation therapy, post-organ-transplant therapy*, certain anti-rheumatic drugs, and drugs used for the management of inflammatory bowel disease)
- Transplant candidate or recipient - islet cell, solid organ* or tissue
- Transplant recipient - haematopoietic stem cell transplantation (HSCT)*

* These individuals have a very high risk of infection from encapsulated bacteria such as *Streptococcus pneumoniae*, *Neisseria meningitidis*, and *Haemophilus influenzae* type b.

1.1 Household Members of an Immunocompromised Person

Immunization of household contacts provides important protection against transmission of disease in the household.

- Assess the immunization status of household contacts. Ensure routine immunizations are up-to-date.
- Ensure that opportunities to immunize are not missed for household contacts.
- Offer yearly influenza vaccine to all household contacts of immunocompromised individuals, regardless of whether or not the individual at high risk has been immunized.
- There are no general contraindications to immunization of household or close contacts of immunosuppressed individuals. Household and close contacts of immunocompromised individuals can be immunized with MMR, varicella, and rotavirus vaccines as the vaccine viruses are rarely transmitted to contacts.
- Wash hands well to prevent possible rotavirus transmission after changing a diaper, etc.
- No special precautions need to be taken post MMR immunization, regardless of whether or not a post-vaccine rash occurs.
- After varicella immunization, no special precautions need to be taken unless the vaccine recipient develops a post - varicella vaccination rash within 42 days of vaccine receipt.
- Vaccine recipients should keep the rash covered. If this is not possible, they should minimize contact with susceptible immunocompromised individuals for the duration of the rash.

1.2 General Principles for Immunization of the Immunocompromised

Maximize benefit while minimizing harm.

- There is potential for serious illness and death in the under-immunization of immunocompromised people and every effort should be made to ensure adequate protection through immunization.

Make no assumptions about susceptibility or protection.

- A history of childhood disease or previous vaccination may be irrelevant.

Immunize at the time when maximum immune response can be anticipated.

- Vaccines may be less effective when administered during the period of altered immunocompetence. Individuals who are fully immunized may remain at risk for vaccine-preventable diseases.
- Immunize early when immunologic decline is predictable.
- Delay immunization if the immunodeficiency is transient (if this can be done safely).
- Primary health care provider may decide to stop or reduce immunosuppressive therapy to permit better vaccine response (if this is appropriate).

Consider the vaccination environment broadly.

- Immunize household contacts (family and caregivers) when individuals need protection (e.g. against influenza).

Avoid live vaccines unless:

- Data are available to support their use.
- The risk of natural infection is greater than the risk of immunization.

Administer routine reinforcements (*booster doses*) as indicated.

- The degree and duration of vaccine-induced immunity are often reduced in immune compromised individuals.

Consider the use of passive immunizing agents. These include:

- Immune globulin (Ig);
- Intravenous immune globulin (IVIg); and
- Pathogen-specific immune globulin preparations (e.g., tetanus immune globulin).

1.3 Immunization with Inactivated Vaccines

There are no general contraindications to immunizing immunocompromised individuals with inactivated vaccines. Specific vaccine formulations (e.g., 40 ug HB vaccine for individuals with chronic renal disease) and/or specific immunization schedules may be recommended for particular conditions.

1.4 Immunization with Live Vaccines

The administration of live vaccines can cause serious adverse events in immunocompromised individuals because of the uncontrollable replication of the virus or bacterium. The decision to immunize an immunocompromised individual with a live vaccine can only be made following consultation with the physician most knowledgeable about the client's current health status, their immunosuppressive disease, and the vaccine. This includes either the primary care physician most familiar with the client's current medical status or a medical specialist.

Determine with the client which physician would be most familiar with their current health status. If the client is uncertain, consult the client's specialist. Consult the most appropriate physician, and obtain a written referral regarding live vaccine administration to any individual whose immune system is compromised as the result of disease or therapy. Physician to physician (e.g., specialist and MHO) discussion and referral may occur, and documentation of recommendations should occur to communicate to public health staff. Refer to [Appendix 7.2: Varicella Immunization Referral Form](#) and [Appendix 7.3: MMR Immunization Referral Form](#).

Many individuals with immunosuppressing conditions are immune to varicella because of earlier immunization or disease. Assess all immune suppressed clients 12 months of age and older for varicella susceptibility prior to immunization. Varicella susceptibility is defined as not having previously received a cohort-based varicella vaccine series; no documented serological evidence of immunity to the varicella zoster virus; or no lab-confirmed documentation of disease (e.g., culture from a pox viral swab).

1.4.1 Consideration for MMR and Varicella Immunization of Immunocompromised Individuals

Consult the most appropriate physician, as described in section 1.4 *Immunization with Live Vaccines* and obtain a written referral regarding live vaccine administration to any individual whose immune system is compromised as the result of disease or therapy.

Haematopoietic Stem Cell Transplant (HSCT) recipient:

- MMR and varicella vaccines may be considered if the client is two or more years post-transplant and there is no graft versus host disease and no immunosuppressive treatment.

High Doses of Oral Corticosteroid Therapy of More than 14 days Duration: (≥ 2 mg/kg per day or ≥ 20 mg of prednisone daily):

- Depending on immunization history, age, and susceptibility, MMR and varicella vaccines may be considered if the client is able to discontinue therapy for one month prior to immunization.

HIV Infection:

- Depending on immunization history, age, and susceptibility, upon consultation, the client's specialist may approve MMR vaccine if no evidence of significant immune system compromise is present.
- Upon consultation, the client's specialist may approve varicella vaccine for susceptible individuals 12 months and older with asymptomatic or mildly symptomatic HIV infection (CDC clinical category N, A or B and immunologic category 1 or 2) and with age-specific CD4 percentages of $\geq 15\%$.
- Varicella and MMR vaccines may be administered at the same visit provided adequate anatomical spacing is used.
- MMRV vaccine is not indicated for use in HIV infected individuals at this time.

Immunosuppressive medical treatments (e.g., chemotherapy, radiation therapy, certain antirheumatic drugs, and drugs used for the management of inflammatory bowel disease):

- Live vaccines are contraindicated during therapy but may be considered if only low doses of immunosuppressive drugs are required and there is significant risk of wild-type infection.
- Depending on immunization history, age, and susceptibility, MMR and varicella vaccines may be considered if three or more months have elapsed since immunosuppressive therapy was discontinued.

Congenital Immunodeficiency

- A family history of congenital immunodeficiency may not be evident in infants less than 12 months of age but may be documented as an overwhelming infection following a natural infection or receipt of a live vaccine in an older sibling or a sibling who may be deceased.
- Assess family history of these types of events prior to administering a live vaccine to an infant less than 12 months of age (e.g., MMR vaccine for an infant travelling to a measles endemic region). If such a history is present, live vaccines are contraindicated.

Isolated Immunodeficiencies (e.g., humoral (IG), neutrophil, or complement deficiency) or acquired complement deficiency:

- Depending on immunization history, age, and susceptibility, MMR and varicella vaccines may not be recommended.

Malignancies / Cancer:

- MMR and varicella vaccines are contraindicated until three or more month's remission has elapsed and immunosuppressive therapy was discontinued.
- For clients with acute lymphocytic leukemia (ALL) – varicella vaccine is recommended if the client's disease has been in remission for 12 or more months, the client's total lymphocyte count is $\geq 1.2 \times 10^9/L$, the client is not receiving radiation therapy, and maintenance chemotherapy can be withheld for 1 week before to 1 week after immunization.
- MMR and varicella vaccines are indicated according to the client's immunization history, age, and susceptibility.

Renal Disease and Dialysis Clients:

- MMR and varicella vaccines are recommended depending on the client's immunization history, age, and susceptibility given the possibility of receiving a kidney transplant in the future.

Transplant Candidate or Recipient – Islet cell, Solid Organ, Tissue:

- MMR and varicella vaccines are recommended for solid organ transplant candidates, depending on the client's immunization history, age, and susceptibility.
- MMR and varicella vaccines are contraindicated for solid organ transplant recipients. MMR vaccine may be considered for seronegative females before pregnancy or two or more years post-transplantation if the individual is taking minimal immunosuppressive therapy.

2.0 CHRONIC MEDICAL CONDITIONS

2.1 Bleeding Disorders

- Individuals with bleeding disorders (e.g., haemophilia, thrombocytopenia) and those receiving anticoagulant therapy have an increased risk of bleeding (e.g., haematoma) after IM injections.
- Individuals who receive low doses of acetylsalicylic acid therapy or long-term anticoagulation (e.g., coumadin, heparin) are not considered to have a high risk of bleeding. However, manufacturers of varicella-containing vaccines (Var, MMRV) recommend that recipients should avoid using salicylates for 6 weeks after receiving a varicella-containing vaccine because of the association between Reye's syndrome, natural varicella infection, and salicylates. **Those 18 years or younger on salicylate therapy must be able to discontinue it for 6 weeks post-vaccination and require a consultation with a medical specialist before receiving a varicella-containing vaccine.**
- Always consult with the child's physician/specialist prior to MMR immunization if they have had an episode of thrombocytopenia in the past, which may or may not have occurred within 6 weeks of a previous MMR/MMRV vaccine.
- MMR-associated ITP is rare, self-limiting and non-life threatening, and susceptible individuals with ITP should be immunized with MMR/MMRV at the recommended ages, after discussion with their physician/specialist. MMR/MMRV vaccination of unimmunized patients with ITP and re-vaccination of patients with previous non-vaccine or vaccine associated ITP, did not lead to recurrence of the thrombocytopenia. Those with either non-vaccine or vaccine-related ITP who have already received one dose of MMR/MMRV vaccine, vaccine titres may be checked to see if a second dose is required.
- If there is concern that the injection may stimulate bleeding, schedule it shortly after the administration of anti-haemophilia therapy. It is advisable to administer the vaccine approximately 3-4 hours after the anti-haemophilia therapy that decreases the risk of bleeding and haematoma. If bleeding does not stop after administering the vaccine, contact the MHO for further assistance (more anti-haemophilia therapy may be needed). Refer to SIM, [Chapter 5, Section 3.5.1, Immune Globulin Preparations or Blood: Timing Intervals for Vaccines Containing Live Measles, Mumps, Rubella, or Varicella Virus](#) for further information.
- If vaccine efficacy is known to be the same for a vaccine whether it is administered SC or IM, administer the vaccine using the SC route.
- A fine gauge needle (23, 25, or 27 G) should be used. Z-track technique may be used to prevent bleeding. Use the rapid injection technique without aspiration. Apply direct pressure (without rubbing) to the injection site for 5 minutes or longer following immunization.
- Although currently available plasma-derived products are routinely tested for viral contamination prior to administration, any patient with a bleeding disorder should still be considered at higher risk of contracting hepatitis A or B and should be offered these vaccines. Even when recombinant therapeutic products are being used, immunization for hepatitis A and/or B is still recommended in case the recombinant supply is unavailable and patients are required to switch to plasma-derived products at short notice.

2.1A: Publicly Funded Vaccines¹ - Bleeding Disorders

All routine vaccines	<ul style="list-style-type: none"> • Immunize according to routine schedule • Live attenuated influenza vaccine (LAIV e.g. FluMist®) is contraindicated for those on long-term aspirin or salicylate therapy.
HA	Non-immune individuals with bleeding disorders and others who receive repeated infusions of blood or blood products or plasma-derived replacement clotting factors.
HB	Non-immune individuals with bleeding disorders and others who receive repeated infusions of blood or blood products or plasma-derived replacement clotting factors.

¹ For specific vaccine information, refer to SIM, [Chapter 10, Biological Products](#).

2.2 Cardiac Disease

Individuals with cardiac disease are at higher risk of influenza related complications and hospitalization, including pneumococcal infection and potentially the exacerbation of their underlying disease.

2.2A: Publicly Funded Vaccines¹ - Cardiac Disease

All routine vaccines	<ul style="list-style-type: none"> Complete a Pneu-C-13 series for medically high risk children 1 dose for Pneu-C-13 naïve children 60 months up to and including 17 years of age.
Pneu-P-23	<ul style="list-style-type: none"> 1 dose for those 2 years and older

¹ For specific vaccine information, refer to SIM, [Chapter 10, Biological Products](#).

2.3 Cochlear Implant

Cochlear implant recipients are at increased risk of developing bacterial meningitis, most commonly caused by *Streptococcus pneumoniae* bacteria. Cochlear implant candidates should be immunized at least 2 weeks prior to the cochlear implant.

2.3A: Publicly Funded Vaccines¹ - Cochlear Implant

All routine vaccines ²	<ul style="list-style-type: none"> Complete a Pneu-C-13 series for medically high risk children 1 dose for Pneu-C-13 naïve children 60 months up to and including 17 years of age.
Pneu-P-23	<ul style="list-style-type: none"> 1 dose for those 2 years and older
Men-C-ACYW-135	<ul style="list-style-type: none"> Complete an age-appropriate primary series.
Hib	<ul style="list-style-type: none"> Immunization with an age-appropriate primary series should be completed for children less than 5 years. 1 dose Hib for people 5 years and older regardless of Hib immunization or Hib disease history

¹ For specific vaccine information, refer to SIM, [Chapter 10, Biological Products](#).

² A high-risk child 12 months of age and older, or an adult who is cohort eligible for a Men-C-C, does not required Men-C-C vaccine when they are eligible to receive Men-C-ACYW-135 vaccine.

2.4 Asplenia – Congenital, Acquired or Functional

A number of conditions may lead to functional asplenia (e.g., sickle cell disease, thalassemia major, celiac disease, inflammatory bowel disease, rheumatoid arthritis and other anemias and hemoglobinopathies). Individuals with any of these conditions need further investigation to determine whether their pre-existing condition is compromising their spleen function.

Asplenic individuals are at increased risk for infection from pathogens, particularly those caused by encapsulated bacteria (e.g., pneumococcal, meningococcal, and Hib). For example, children who have sickle cell disease or have had a splenectomy are at increased risk for fulminant pneumococcal sepsis associated with high mortality rates. This risk continues throughout their lifespan.

Unimmunized individuals who have had a splenectomy in the past or who have functional hyposplenism should be immunized as soon as their condition is identified. Individuals undergoing an elective splenectomy should receive immunizations at least 2 weeks prior to surgery. In the case of an emergency splenectomy, administer all of the necessary vaccines two weeks after the splenectomy. If the individual is discharged earlier and there is a concern that he/she might not return, vaccination should be given before discharge.

2.4: Publicly Funded Vaccines¹ - Asplenia – Congenital, Acquired, or Functional

All routine inactivated and live vaccines including influenza	<ul style="list-style-type: none"> • Complete a Pneu-C-13 series for medically high risk children • 1 dose for Pneu-C-13 naïve children 60 months up to and including 17 years of age.
Pneu-P-23	<ul style="list-style-type: none"> • For those 2 years and older • Eligible for only 1 publicly funded reinforcement dose 5 years after the first dose.
Men-C-ACYW-135 ²	<ul style="list-style-type: none"> • Complete an age-appropriate primary series. • Revaccination: <ul style="list-style-type: none"> ○ If vaccinated at 6 years of age or younger, give a booster dose 3-5 years after the last dose, and then give a booster dose every 5 years thereafter. ○ If vaccinated at 7 years of age and older, give a booster dose not less than 5 years after the last dose, and then give a booster dose every 5 years thereafter.
Hib	<ul style="list-style-type: none"> • Immunization with an age-appropriate primary series should be completed for children less than 5 years old. • 1 dose Hib for people 5 years and older regardless of Hib immunization or Hib disease history.
Men-B4C	<ul style="list-style-type: none"> • Complete an age-appropriate primary series.

¹ For specific vaccine information, refer to SIM, [Chapter 10, Biological Products](#).

² A high-risk child 12 months of age and older, or an adult who is cohort eligible for a Men-C-C, does not require Men-C-C vaccine when they are eligible to receive Men-C-ACYW-135 vaccine.

2.5 Cerebrospinal Fluid Disorders

These individuals (usually from a congenital malformation, skull fracture or neurologic procedure) are at increased risk of invasive infections.

2.5A: Publicly Funded Vaccines¹ - Cerebrospinal Fluid Disorders

All routine vaccines	<ul style="list-style-type: none"> Complete a Pneu-C-13 series for medically high risk children 1 dose for Pneu-C-13 naïve children 60 months up to and including 17 years of age.
Pneu-P-23	<ul style="list-style-type: none"> 1 dose for those 2 years and older
Men-C-ACYW-135 ²	<ul style="list-style-type: none"> Complete an age-appropriate primary series.

¹ For specific vaccine information, refer to SIM, [Chapter 10, Biological Products](#).

² A high-risk child 12 months of age and older, or an adult who is cohort eligible for a Men-C-C, does not require Men-C-C vaccine when they are eligible to receive Men-C-ACYW-135 vaccine.

2.6 Cystic Fibrosis

Abnormal mucous is produced in the lungs of individuals with CF. It interferes with their breathing and they are more prone to serious lower respiratory tract and lung infections.

2.6A: Publicly Funded Vaccines¹ - Cystic Fibrosis

All routine vaccines	<ul style="list-style-type: none"> Complete a Pneu-C-13 series for medically high risk children 1 dose for Pneu-C-13 naïve children 60 months up to and including 17 years of age.
Pneu-P-23	<ul style="list-style-type: none"> 1 dose for those 2 years and older

¹ For specific vaccine information, refer to SIM, [Chapter 10, Biological Products](#).

2.7 Diabetes Mellitus

Individuals with diabetes mellitus type 1 or 2 are at high risk of influenza related complications, including pneumonia. In addition, individuals with longstanding diabetes mellitus often have complications such as cardiovascular, renal, and other organ dysfunction.

2.7A: Publicly Funded Vaccines - Diabetes Mellitus¹

All routine vaccines	<ul style="list-style-type: none"> Complete a Pneu-C-13 series for medically high risk children 1 dose for Pneu-C-13 naïve children 60 months up to and including 17 years of age.
Pneu-P-23	<ul style="list-style-type: none"> 1 dose for those 2 years and older

¹ For specific vaccine information, refer to SIM, [Chapter 10, Biological Products](#).

2.8 Liver Disease

Individuals with liver disease (including alcoholism, cirrhosis, hepatitis B, hepatitis C) are at increased risk for fulminant hepatitis A or more severe acute hepatitis B infection should infection occur. Chronic hepatitis C (HCV) infection develops in 70% - 80% of those infected. Chronic HCV may progress to cirrhosis, end-stage liver disease, and hepatocellular carcinoma. Individuals with chronic liver disease are at increased risk of developing pneumococcal infection and severe pneumococcal disease and its complications. Immunization should be done early in the course of disease, as the immune response may be suboptimal in advanced liver disease.

2.8: Publicly Funded Vaccines¹ - Liver Disease

All routine inactivated and live vaccines, including influenza	<ul style="list-style-type: none"> Complete a Pneu-C-13 series for medically high risk children 1 dose for Pneu-C-13 naïve children 60 months up to and including 17 years of age.
Pneu-P-23	<ul style="list-style-type: none"> For those 2 years and older Eligible for only 1 publicly funded reinforcement dose 5 years after the first dose.
HA	Individuals who are non-immune to HA
HB	Individuals who are non-immune to HB

¹ For specific vaccine information, refer to SIM, [Chapter 10, Biological Products.](#)

2.9 Lung Disease

Individuals with lung disease (excluding asthma unless on high dose oral corticosteroid therapy) are at higher risk of influenza related complications and hospitalization, including pneumococcal infection and potentially the exacerbation of their underlying disease.

2.9A: Publicly Funded Vaccines¹ - Lung Disease

All routine vaccines	<ul style="list-style-type: none"> Complete a Pneu-C-13 series for medically high risk children 1 dose for Pneu-C-13 naïve children 60 months up to and including 17 years of age.
Pneu-P-23	<ul style="list-style-type: none"> 1 dose for those 2 years and older

¹ For specific vaccine information, refer to SIM, [Chapter 10, Biological Products.](#)

2.10 Malignancies / Cancer

These individuals are at increased risk of vaccine-preventable diseases because of their underlying condition and medical treatment (e.g., chemotherapy, radiation therapy). There is a broad spectrum in the potential immunologic impact of cancer depending on cancer type and treatment used. Specific malignancies (e.g., Hodgkin and non-Hodgkin lymphomas) are associated with significant deficits in cell-mediated immunity, which can persist even after cure. Other malignancies such as multiple myeloma and B-cell chronic lymphocytic leukemia are associated with deficiencies in humoral immunity and susceptibility, particularly to infection with encapsulated bacteria. For most cancers, the main period of immune suppression is during or immediately following chemotherapy and/or radiation therapy when neutropenia and mucosal injury may be present. Refer to [Section 3.7 Medical Treatment](#) for immunization recommendations for the individual who is currently undergoing treatment.

***Please note that individuals who present as ‘cancer-free’ in the future do not qualify for additional vaccine doses (i.e., a second dose of Pneu-P-23) as their risk is the same as everyone else.**

2.10A: Recommended Vaccines¹ – Malignancies / Cancer

All routine inactivated vaccines, including influenza	<ul style="list-style-type: none"> Complete a Pneu-C-13 series for medically high-risk children 1 dose for Pneu-C-13 naïve children 60 months up to and including 17 years of age.
Pneu-P-23	<ul style="list-style-type: none"> For those 2 years and older. Eligible for only 1 publicly funded reinforcement dose 5 years after the first dose if they are not cancer-free*.
Hib	<ul style="list-style-type: none"> Immunization with an age-appropriate primary series should be completed for children less than 5 years old 1 dose Hib for people 5 years and older regardless of Hib immunization or Hib disease history
Var	Specialist consultation required. Refer to Appendix 7.2: Varicella Immunization Referral Form.
MMR	Specialist consultation required. Refer to Appendix 7.2: Varicella Immunization Referral Form.

¹ For specific vaccine information, refer to SIM, [Chapter 10, Biological Products.](#)

2.11 Neurological Conditions that Impede the Clearance of Respiratory/Oral Secretions

Individuals with neurological conditions that impair the clearance of respiratory/oral secretions may be at higher risk of morbidity and mortality from bacterial and viral respiratory diseases and their sequelae. Those with neurologic disorders may be divided into two categories: those with a pre-existing neurologic condition prior to immunization, and those who developed symptoms of a new neurologic condition following immunization. Disorders that usually begin in infancy (e.g., cerebral palsy, spina bifida, seizure disorders, neuromuscular diseases and inborn errors of metabolism) may have symptoms identified before administration of the routine infant vaccines. Other disorders often appear later in childhood or adulthood (e.g., autism spectrum disorders, acute demyelinating encephalomyelitis, transverse myelitis, multiple sclerosis) and may appear coincidentally before or after administration of vaccines. There has been no causal relationship identified between any routine immunizations and autism spectrum disorders (MMR vaccine) or demyelinating disorders such as multiple sclerosis (hepatitis B vaccine).

2.11.A: Publicly Funded Vaccines¹ - Those with Neurological Conditions that Impede the Clearance of Respiratory/Oral Secretions

All routine vaccines	<ul style="list-style-type: none"> Complete a Pneu-C-13 series for medically high risk children 1 dose for Pneu-C-13 naïve children 60 months up to and including 17 years of age.
Pneu-P-23	<ul style="list-style-type: none"> 1 dose for those 2 years and older

¹ For specific vaccine information, refer to SIM, [Chapter 10, Biological Products](#).

2.11.1 Development of a New Neurological Condition at Any time After Immunization

Neurologic events that occur in the 8-12 weeks following immunization are temporally associated with immunization. Temporal association alone is not evidence that the vaccine caused the neurologic condition. Children who experience hypotonic-hyporesponsive events or prolonged crying after receiving a vaccine(s) may receive the next dose of vaccine according to schedule.

Individuals who develop encephalopathy or encephalitis within 7 days following immunization should be investigated. Continue to immunize according to routine schedule those individuals whose condition is found to have a different etiology and those who recover fully by the next scheduled immunization. Individuals with encephalopathy that persists and who have no alternative etiology should be referred to a specialist for further consultation. Continue with routine immunization schedule if their condition is stable and found not to relate to immunization.

2.11.2 Guillain-Barré Syndrome

A MHO should be consulted before immunizing an individual who has a history of Guillain-Barré syndrome (GBS) related or unrelated to immunization. Influenza and tetanus toxoid-containing vaccines are contraindicated for individuals who developed GBS within 6 weeks of a dose of these vaccines without any other cause being identified. Individuals who have developed GBS outside this interval or who have a different etiology confirmed may receive subsequent doses of tetanus and/or influenza vaccines upon consultation with the regional MHO.

2.12 Renal Disease

Renal disease includes predialysis, hemodialysis or peritoneal dialysis clients, those with nephrotic syndrome, and candidates for or recipients of a kidney transplant. Formulate immunization strategies early in the course of progressive kidney disease, particularly if transplantation and/or long term immunosuppressive therapy are being considered. All predialysis, hemodialysis, and peritoneal dialysis clients in hospital, community, home or self-care settings are eligible for this program. Vaccine administration should occur at the dialysis facility; however, in small communities the local health unit may arrange it.

Viral and bacterial infections are a major cause of morbidity and mortality in those who have chronic kidney disease or who are undergoing dialysis. Several issues put these individuals at increased risk of vaccine-preventable diseases:

- Vascular access catheters.
- Long-term peritoneal dialysis catheters.
- Immunosuppression prior to transplantation.
- Immune system compromise due to uremic state.
- Lower seroconversion rates to vaccines.
- Lower peak antibody titres following immunization.
- More rapid decline of antibody levels following immunization.

2.12A: Publicly Funded Vaccines¹ - Renal Disease

All routine inactivated and live vaccines, including influenza	<ul style="list-style-type: none"> • Complete a Pneu-C-13 series for medically high risk children • 1 dose for Pneu-C-13 naïve children 60 months up to and including 17 years of age.
Pneu-P-23	<ul style="list-style-type: none"> • For those 2 years and older • Eligible for only 1 publicly funded reinforcement dose 5 years after the first dose.
HB	Refer to Appendix 7.4: Hepatitis B Immunization Algorithm for Clients with Renal Disease

¹ For specific vaccine information, refer to SIM, [Chapter 10, Biological Products](#).

2.13 Sickle Cell Disease

Sickle cell disease may lead to functional asplenia. They are at increased risk for infection from pathogens, particularly those caused by encapsulated bacteria (e.g., pneumococcal, meningococcal, and Hib). Those who have sickle cell disease are at increased risk for fulminant pneumococcal sepsis associated with high mortality rates. This risk continues throughout their lifespan.

2.13A: Publicly Funded Vaccines¹ – Sickle Cell Disease

All routine inactivated and live vaccines including influenza	<ul style="list-style-type: none"> • Complete a Pneu-C-13 series for medically high risk children • 1 dose for Pneu-C-13 naïve children 60 months up to and including 17 years of age.
Pneu-P-23	<ul style="list-style-type: none"> • For those 2 years and older • Eligible for only 1 publicly funded reinforcement dose 5 years after the first dose.
Men-C-ACYW-135 ²	<ul style="list-style-type: none"> • Complete an age-appropriate primary series. • Revaccination: <ul style="list-style-type: none"> ○ If vaccinated at 6 years of age or younger, give a booster dose 3-5 years after the last dose, and then give a booster dose every 5 years thereafter. ○ If vaccinated at 7 years of age and older, give a booster dose not less than 5 years after the last dose, and then give a booster dose every 5 years thereafter.
Hib	<ul style="list-style-type: none"> • Immunization with an age-appropriate primary series should be completed for children less than 5 years old. • 1 dose Hib for people 5 years and older regardless of Hib immunization or Hib disease history.
Men-B4C	<ul style="list-style-type: none"> • Complete an age-appropriate primary series.

¹ For specific vaccine information, refer to SIM, [Chapter 10, Biological Products](#).

² A high-risk child 12 months of age and older, or an adult who is cohort eligible for a Men-C-C, does not require Men-C-C vaccine when they are eligible to receive Men-C-ACYW-135 vaccine.

3.0 IMMUNOCOMPROMISED CONDITIONS

3.1 Congenital Immunodeficiency

3.2 Acquired Complement Deficiency

Immunization of those with suspected or significant immunodeficiency should be performed only in consultation with medical experts. Congenital immunodeficiency includes disorders of B-lymphocyte (humoral) immunity, T-lymphocyte (cell) mediated immunity, complement component deficiency (C₅-C₉, properdin, factor H, factor D), or phagocytic functions. Acquired complement immunodeficiency includes treatment with the terminal complement inhibitor eculizumab Soliris™. Upon medical specialist consultation, inactivated and component vaccines may be safely administered to individuals with all of these conditions, keeping in mind that many of the vaccine recipients will not develop an adequate immune response. Consider use of IVIg or pathogen-specific Ig if individual is exposed to vaccine-preventable disease. Live bacterial vaccines (e.g., oral typhoid vaccine, BCG) are contraindicated.

3.2A: Publicly Funded Vaccines¹ - Congenital Immunodeficiency; Acquired Complement Deficiency

All routine inactivated vaccines including influenza	<ul style="list-style-type: none"> Complete a Pneu-C-13 series for medically high-risk children. 1 dose for Pneu-C-13 naïve children 60 months up to and including 17 years of age.
Hib	<ul style="list-style-type: none"> Immunization with an age-appropriate primary series should be completed for children less than 5 years old. 1 dose Hib for people 5 years and older regardless of Hib immunization or Hib disease history.
HPV-9	<ul style="list-style-type: none"> 3-dose schedule: 0.5 mL IM at 0, 2, and 6 months for females and males aged 9 up to and including 26 years of age with the following risk factors (ineligible at 27th birthday): <ul style="list-style-type: none"> Immunocompromised – Acquired complement deficiency Immunocompromised – Congenital immunodeficiency Immunocompromised – HIV Immunocompromised – Related to Disease Immunocompromised – Treatment – Specify
Men-C-ACYW-135 ²	<ul style="list-style-type: none"> Complete an age-appropriate primary series. Revaccination: <ul style="list-style-type: none"> If vaccinated at 6 years of age or younger, give a booster dose 3-5 years after the last dose, and then give a booster dose every 5 years thereafter. If vaccinated at 7 years of age and older, give a booster dose not less than 5 years after the last dose, and then give a booster dose every 5 years thereafter.
Men-B4C	Complete an age-appropriate primary series.
Pneu-P-23	<ul style="list-style-type: none"> For those 2 years and older. Eligible for only 1 publicly funded reinforcement dose 5 years after the first dose.
Rotavirus	Contraindicated.
Var	Specialist consultation required. Refer to Appendix 7.2: Varicella Immunization Referral Form.
MMR	Specialist consultation required. Refer to Appendix 7.3: MMR Immunization Referral Form.

¹ For specific vaccine information, refer to SIM, [Chapter 10, Biological Products.](#)

² A high-risk child 12 months of age and older, or an adult who is cohort eligible for a Men-C-C, does not require Men-C-C vaccine when they are eligible to receive Men-C-ACYW-135 vaccine.

3.3 Human Immunodeficiency Virus

The ability of these individuals to respond to vaccine antigens is related to the degree of immunosuppression at the time of immunization and may be inadequate. Immune response may be positively affected by the antiretroviral therapy an individual with HIV is receiving. These persons could be susceptible to vaccine-preventable diseases, even after appropriate immunization, unless a recent serological test demonstrates adequate antibody concentrations. **It is recommended to consult with the regional Medical Health Officer or an Infectious Disease (ID) specialist before administering live vaccines.** Refer to [Appendix 7.2: Varicella Immunization Referral Form](#) and [Appendix 7.3: MMR Immunization Referral Form](#).

HIV Immunodeficiency is defined as follows:

1. Severely immunocompromised: This includes persons with a current CD4 count of less than 200, those with a history of AIDS defining illness, or persons with clinical manifestations of symptomatic HIV.
2. Limited immune deficits: Asymptomatic HIV infection, persons with CD4 counts between 200 -500.
3. **Not considered immunocompromised:** Persons with HIV with a current CD4 count greater than 500.

NOTE: Always confirm the client's state of immunosuppression with their specialist before proceeding with immunization.

Inactivated Vaccines

- There are no contraindications to the use of inactivated vaccines in these symptomatic and asymptomatic individuals at any time. However, the immune response to inactivated vaccines is suboptimal (depending on level of immunodeficiency). Incidence and severity of adverse reaction are not increased in these individuals.
- Post-immunization titres should be done one month after completing a primary hepatitis B or rabies series. Should the person not have mounted protective levels, further doses should be administered. The optimal timing of reinforcement (booster) doses for immunocompromised individuals who are at continued risk of HBV exposure and have mounted an initial response is not known. Periodic monitoring of anti-HBs may be considered, and booster doses provided if needed.

Live Attenuated Viral or Bacterial Vaccines

- As the client's illness progresses, the immune system weakens and the effectiveness of immunization decreases while the risk associated with administering live vaccines increases.
- Those with HIV infection are at increased risk for complications from varicella and herpes zoster. Monovalent varicella vaccine should be considered for certain asymptomatic and mildly symptomatic HIV infected children 12 months of age and older. **Consult with an Infectious Disease (ID) specialist before administering varicella vaccine to HIV infected individuals.** Refer to [Appendix 7.2: Varicella Immunization Referral Form](#).
- For those that received regular doses of intravenous immunoglobulin (IGIV), receipt of MMR and varicella vaccines should be considered approximately 14 days prior to the next scheduled dose of IGIV. Refer to SIM, [Chapter 5, Section 3.5.1, Immune Globulin Preparations or Blood: Timing Intervals for Vaccines Containing Live Measles, Mumps, Rubella, or Varicella Virus](#).
- MMRV and live attenuated influenza (LAIV) vaccines are contraindicated in the HIV client regardless of the degree of immunosuppression.
- Persons with HIV infection are at increased risk for severe complications from measles. MMR vaccine is recommended for those 12 months of age and older who are not considered severely immunocompromised. Eligible persons should receive two doses of MMR vaccine with a minimum 4 week interval separating the doses. **Consult an Infectious Disease (ID) specialist before administering MMR vaccine to HIV infected individuals.** Refer to [Appendix 7.3: MMR Immunization Referral Form](#).

3.3A: Publicly Funded Vaccines and Immune Globulins ¹– Human Immunodeficiency Virus

All routine inactivated vaccines	<ul style="list-style-type: none"> • Replace Men-C-C with Men-C-ACYW-135 at 12 months of age. • To receive inactivated influenza vaccine.
Pneu-C-13	<ul style="list-style-type: none"> • Complete a Pneu-C-13 series for medically high-risk children as per age recommendations. • 1 dose for Pneu-C-13 naïve children 60 months up to and including 17 years of age. • 1 dose for Pneu-C-13 naïve adults ≥ 18 years.
HPV-9 3-dose schedule	<p>For females and males aged 9 up to and including 26 years of age with the following risk factors (ineligible at 27th birthday):</p> <ul style="list-style-type: none"> ○ Immunocompromised – Acquired complement deficiency ○ Immunocompromised – Congenital immunodeficiency ○ Immunocompromised – HIV ○ Immunocompromised – Related to Disease ○ Immunocompromised – Treatment – Specify
Men-B (4CMenB) Adults 18 years and older ineligible	<ul style="list-style-type: none"> • Complete an age appropriate series for children up to and including 17 years of age only.
Men-C-ACYW-135 ² Adults 18 years and older ineligible	<ul style="list-style-type: none"> • Complete an age appropriate series for children up to and including 17 years of age only. • Revaccination: <ul style="list-style-type: none"> ○ If vaccinated at 6 years of age or younger, give a booster dose 3-5 years after the last dose, and then give a booster dose every 5 years thereafter. ○ If vaccinated at 7 years of age and older, give a booster dose not less than 5 years after the last dose, and then give a booster dose every 5 years thereafter.
Pneu-P-23	<ul style="list-style-type: none"> • For those 2 years and older. • Eligible for only 1 publicly funded reinforcement dose 5 years after the first dose.
Hib	<ul style="list-style-type: none"> • Immunization with an age-appropriate primary series should be completed for children less than 5 years old. • 1 dose Hib for people 5 years and older regardless of Hib immunization or Hib disease history.
HB	<ul style="list-style-type: none"> • For HIV infected persons, refer to SIM chapter 10: Hepatitis B Vaccine Dosage and Formulation Options for HIV Infected Adults and Children <ul style="list-style-type: none"> ➤ 40µg dose for adults 18 years and older. ➤ Double dose for children up to and including 17 years of age.
Var	Specialist consultation required. Refer to Appendix 7.2: Varicella Immunization Referral Form.
MMR	Specialist consultation required. Refer to Appendix 7.3: MMR Immunization Referral Form.
Varlg	A symptomatic HIV-infected person, without either a history of chickenpox or demonstrable varicella antibody, who experiences a significant exposure to varicella or to zoster, should receive varicella-zoster immune globulin (Varlg) within 96 hours following contact.
Ig	HIV-infected children, regardless of immunization history, should receive immune globulin after a recognized exposure to measles. Ig may be considered if individual is a case contact of hepatitis A.

¹ For specific vaccine information, refer to SIM, [Chapter 10, Biological Products.](#)

² A high-risk child 12 months of age and older, or an adult who is cohort eligible for a Men-C-C, does not require Men-C-C vaccine when they are eligible to receive Men-C-ACYW-135 vaccine.

3.4 Transplant Candidate or Recipient – Islet Cell

- Consult with the jurisdictional transplant program coordinating things for the patient and to follow whatever schedule is requested even if their recommendations differ from Saskatchewan guidelines. The type of transplant, medical history, current medical condition, and immunosuppressive drugs are important factors when determining immunization regimens for post-transplant patients.
- Decisions about which vaccines to give will be made by the transplant team and the vaccines provided by the Ministry of Health. **Public Health must administer the assigned immunization schedule provided by the transplant agency.**
- Islet cell transplants are done out of province. All transplant candidates who will have their transplant out of province should have their pre-transplant immunizations recommended by that transplant program. The recommended immunization and scheduling may be administered by Public Health in Saskatchewan.
- **Ideally, these recipients should receive all recommended vaccines before transplantation occurs.** However, many children undergo transplantation before completion of their immunization schedule. Immunization should begin or resume at least 6 – 12 months after transplantation. Assess previous immunizations and offer vaccines to complete routine schedule. Re-immunization is NOT indicated for these clients.
- Islet cell recipients usually receive lifelong immunosuppressive therapy and have higher risks for contracting vaccine-preventable diseases. Generally, live vaccine series administered before the transplant must be completed at least 6 weeks before transplantation. Live vaccines are contraindicated following transplantation except in certain circumstances.

3.5 Transplant Candidate or Recipient – Solid Organ/Tissue

- Consult with the jurisdictional transplant program coordinating things for the patient and to follow whatever schedule is requested even if their recommendations differ from Saskatchewan guidelines.
- The type of transplant, medical history, current medical condition, and immunosuppressive drugs are important factors when determining immunization regimens for post-transplant patients.
- Decisions about which vaccines to give will be made by the transplant team and the vaccines provided by the Ministry of Health. **Public Health must administer the assigned immunization schedule provided by the transplant agency.**
- In Saskatchewan, the only solid organ transplants performed are adult kidney transplants. All other adult and pediatric solid organ and tissue transplants are done out of province. All transplant candidates who will have their transplant out of province should have their pre-transplant immunizations recommended by that transplant program. The recommended immunization and scheduling may be administered by Public Health in Saskatchewan.
- **Ideally, these recipients should receive all recommended vaccines before transplantation occurs.** However, many children undergo transplantation before completion of their immunization schedule. Immunization should begin or resume at least 6 – 12 months after transplantation. Assess previous immunizations and offer vaccines to complete routine schedule. Re-immunization is NOT indicated for these clients.
- Solid organ recipients usually receive lifelong immunosuppressive therapy and have higher risks for contracting vaccine-preventable diseases. Generally, live vaccine series administered before the transplant must be completed at least 6 weeks before transplantation. Live vaccines are contraindicated following transplantation except in certain circumstances.

3.6 Transplant Recipient – Haematopoietic Stem Cell Transplant (HSCT)

- **Consult with the jurisdictional haematology/blood & bone marrow transplant program transplant physician for recommended immunizations. The type of transplant, medical history, current medical condition and immunosuppressive agents are important factors when determining immunization requirements for HSCT clients.**
- Decisions about which vaccines to give will be made by the transplant team and the vaccines provided by the Ministry of Health. **Public Health must administer the assigned immunization schedule provided by the transplant agency.**
- Refer to [Appendix 7.6: Publicly Funded Immunization Schedule for Adult Post-Hematopoietic Stem Cell Transplant Recipients](#) (all types) for recommended schedule for SK residents.

Hematopoietic stem cell transplantation (HSCT) results in immunosuppression from:

- Hematopoietic ablative therapy preceding transplant;
- Medications used to prevent or treat graft – versus – host disease (GVHD); and
- In some cases, the disease process necessitating the transplantation.

HSCT generally involves the ablation of the bone marrow followed by reimplantation of the person's own stem cells (autologous HSCT) or stem cells from a donor (allogeneic HSCT). Recipients of allogeneic grafts from donors who are not closely matched siblings are at substantially greater risk for GVHD, suboptimal graft function, and delayed capability for immune system memory.

Depending on the pre-ablation immune status of the client in autologous HSCT or on the immune status of the donor in allogeneic HSCT, there may be some immunity to vaccine-preventable diseases following transplantation. However, antibody levels to vaccine preventable diseases decline 1 - 4 years after HSCT if the recipient is not re-immunized, regardless of whether the transplant was autologous or allogeneic. In the case of allogeneic HSCT, if possible, complete all appropriate vaccines and reinforcement doses for the donor at least 14 days before the procedure.

All clients registered with a provincial HSCT programs should be provided with a letter recommending both the vaccines and schedule of administration required. MHO consultation is recommended prior to immunizing these individuals. Post-HSCT clients should receive all indicated vaccines regardless of immunization history because ablation of stem cells prior to the procedure will affect client's post-transplant immunity. Immunization with inactivated vaccines is generally started 6 - 12 months post HSCT, except inactivated influenza vaccine, which can be administered 4-6 months post HSCT.

Live vaccines must not be administered until 24 months post HSCT. Specialist consultation is required prior to immunization with live vaccines. Refer to [Appendix 7.2: Varicella Immunization Referral Form](#) and [Appendix 7.3: MMR Immunization Referral Form](#). Live bacterial vaccines (e.g., oral typhoid vaccine, BCG) are contraindicated.

3.7 Medical Treatment

Immunosuppression may result from or be implemented before the following (non-exhaustive) medical treatments

- Long-term/high dose corticosteroids
- Cancer chemotherapies
- Radiation therapies
- Immunosuppressants (immunologic modulators, anti-rheumatic drugs (including tumour necrosis factor blockers), monoclonal antibody medications)
- Post-transplant – solid organ, islet cell or hematopoietic stem cell. For more information on transplant candidates and recipients refer to SIM chapter 7 sections 3.4, 3.5, and 3.6.

Individuals immunized appropriately before receiving chemotherapy or radiation therapy are thought to retain immune memory after treatment and re-immunization is not necessary.

Inactivated Vaccines

Although inactivated vaccines can be safely administered any time before, during or after immunosuppression, inactivated vaccines should be administered at least 14 days before initiation of immunosuppressive therapy to optimize immunogenicity. If immunization cannot be completed prior to initiation of immunosuppressive therapy, generally a period of at least 3 months should elapse between therapy cessation and the administration of inactivated vaccines. If the therapy cannot be stopped, inactivated vaccines should be given when the therapy is at its lowest.

Except for inactivated influenza vaccine, immunization during chemotherapy or radiation therapy should be avoided if possible because antibody response might be suboptimal. Patients vaccinated within 14 days before starting immunosuppressive therapy or while receiving immunosuppressive therapy should be considered unimmunized and should be revaccinated at least 3 months after their therapy is discontinued providing their immune competence has been restored (CDC (2011), <https://www.cdc.gov/mmwr/preview/mmwrhtml/rr6002a1.htm>). A MHO referral is not required to re-immunize a client with inactivated vaccines according to above statement only.

Live Vaccines

Live vaccines are generally contraindicated during immunosuppressive therapy. Live vaccines should be administered at least 4 weeks before immunosuppressive therapy is started to reduce the risk of disease caused by the vaccine strain. An analysis of immunization risk versus benefit may be necessary if only low doses of therapy are required and there is significant risk of developing wild-type infection. In this case, consult with the individual's specialist before immunization. If this cannot be done safely, delay immunization for at least 3 months after immunosuppressive therapy has stopped.

Infants whose mothers took monoclonal antibody medications while pregnant are contraindicated from receiving rotavirus vaccine (Appendix 8.2 in Chapter 8).

3.7A: Publicly Funded Vaccines ¹ - Medical Treatment

All routine inactivated vaccines, including influenza	<ul style="list-style-type: none"> • Complete a Pneu-C-13 series for medically high-risk children. • 1 dose for Pneu-C-13 naïve children 60 months up to and including 17 years of age.
HPV-9	<ul style="list-style-type: none"> • 3-dose schedule: 0.5 mL IM at 0, 2, and 6 months for females and males aged 9 up to and including 26 years of age with the following risk factors (ineligible at 27th birthday): <ul style="list-style-type: none"> ○ Immunocompromised – Acquired complement deficiency ○ Immunocompromised – Congenital immunodeficiency ○ Immunocompromised – HIV ○ Immunocompromised – Related to Disease ○ Immunocompromised – Treatment – Specify
Pneu-P-23	<ul style="list-style-type: none"> • For those 2 years and older. • Eligible for only 1 publicly funded reinforcement dose 5 years after the first dose.
Hib	<ul style="list-style-type: none"> • Immunization with an age-appropriate primary series should be completed for children less than 5 years old. • 1 dose Hib for people 5 years and older regardless of Hib immunization or Hib disease history.
Varicella	Specialist consultation required. Refer to Appendix 7.2: Varicella Immunization Referral Form.
MMR	Specialist consultation required. Refer to Appendix 7.3: MMR Immunization Referral Form.

¹ For specific vaccine information, refer SIM, [Chapter 10, Biological Products.](#)

3.7.1 High Dose Corticosteroid Therapy

Only oral high dose systemic steroids interfere with vaccine induced immune responses (e.g., consider persons receiving ≥ 2 mg/kg per day or ≥ 20 mg daily of prednisone **for more than** 14 days duration to be immune-suppressed). At least 1-3 months should elapse between high dose corticosteroid therapy administered for more than 2 weeks and administration of both inactivated vaccine (to ensure immunogenicity) and live vaccine (to reduce the risk of dissemination).

The following types of corticosteroid therapy will not cause immunosuppression and live vaccines can be administered to persons receiving such therapy:

- < 2 mg/kg/day or < 20 mg/day for less than 14 days;
- prescribed as alternate day treatment or rapidly tapering with short-acting preparations;
- administered topically (skin, eyes, respiratory) or by intra-articular, intraocular, bursal, aerosol, rectal or tendon injection; or
- Children with adrenogenital syndrome and those receiving physiologic replacement doses (< 2 mg/kg of prednisone per day) of glucocorticoids should receive all routine immunizations on schedule.

4.0 POST-EXPOSURE

4.1 Infant Born to HBsAg Positive Mother or High Risk for HB \geq 2000g

4.2 Infant Born to HBsAg Positive Mother or High Risk for HB < 2000g

Infants born to mothers who are HBsAg positive during pregnancy have a risk of contracting HB infection. Without intervention, this risk is estimated to be 90% if the mother is HBeAg positive and 5-20% if the mother is HBeAg negative. Infants who contract HB infection have a 90-95% risk of developing chronic HB infection potentially leading to cirrhosis and hepatocellular carcinoma. All women should be screened for the presence of HBsAg during every pregnancy. If she is HBsAg positive or has an unknown status but she is considered to be at high risk for HB infection (e.g. intravenous drug use, sex trade worker), protocols are in place to ensure that the infant is immunized with HBIg and HB vaccine as soon as possible after delivery.

When HBIg and HB vaccine is provided within 12 hours after birth, the risk of HB infection in the infant is reduced by 90% (CIG). Ideally, HBIg should be given immediately after birth, along with one dose of HB vaccine. Give HB vaccine and HBIg at the same time using separate syringes and separate limbs. The HB vaccine series for these infants should be completed at 6 months of age (refer to chart below). It is recommended that these infants be tested for HBsAg and anti-HBs when they are at least 9 months old, and at least 1 month but no more than 4 months after their HB series is complete (CIG).

Prior to discharge, [Appendix 7.5: Prophylactic Record Referral Form for Infants at High Risk of Hepatitis B](#) should be completed and referred to the appropriate health care practitioners.

4.2.1 Hepatitis B Infant Immunoprophylaxis Protocol 1, 2 (Whose Mothers are HBsAg positive or are at High Risk of HB Infection and Their Status is Unknown and STAT Order Testing Cannot be Obtained Within 12 Hours After Delivery).

Birth weight	Give < 12 hours after birth	Give at 1 month of age	Give at 2 months of age	Give at 6 months of age ³
\geq 2000g	<ul style="list-style-type: none"> • HBIg 0.5 mL IM • 1st HB vaccine 0.5 mL IM • Give at different sites 	2 nd HB vaccine 0.5 mL IM	N/A	3 rd HB vaccine 0.5 mL IM
< 2000g	<ul style="list-style-type: none"> • HBIg 0.5 mL IM • 1st HB vaccine 0.5 mL IM • Give at different sites 	2 nd HB vaccine 0.5 mL IM	3 rd HB vaccine 0.5 mL IM	4 th HB vaccine 0.5 mL IM

¹ For specific vaccine information, refer to SIM, [Chapter 10, Biological Products](#).

² Refer to SIM, [Chapter 5, Section 2.1, Minimum Intervals for Specific Vaccine Series](#) for more information.

³ Child must be 24 weeks of age or older to receive this dose.

5.0 SPECIAL POPULATION

5.1 Men who have Sex with Men¹

HA	2 doses given 6 -12 months apart
HB	Age-appropriate series

¹ For specific vaccine information, refer to SIM, [Chapter 10, Biological Products](#).

5.2 Pregnancy

“Benefits of vaccinating pregnant women usually outweigh potential risks when the likelihood of disease exposure is high, when infection would pose a risk to the mother or fetus, and when the vaccine is unlikely to cause harm”. (Plotkin, Orenstein, & Offit, 2008, p. 99).

5.2.1 Pregnancy

Pregnancy is a time when a healthy woman may have more contact with the medical system than at any other time. All pregnant women should be evaluated for immunity to rubella and varicella and be tested for the presence of HBsAg at the first prenatal visit. It is an opportune time to assess her immunization status and administer any appropriate vaccines that will provide protection for both her and her child against vaccine-preventable diseases. There are no data to indicate that any of the currently approved vaccines are teratogenic or embryotoxic, result in specific adverse pregnancy outcomes, or result in inadequate antibody responses when given to pregnant women.

5.2.1.1 Inactivated Vaccines

Inactivated vaccines may safely be given to pregnant women when indicated (e.g., seasonal influenza vaccines, Td/Tdap for wound management).

5.2.1.2 Live Vaccines

MMR, Var, and LAIV vaccines are indicated only for pre-conception and post-partum (including breastfeeding) women. Live, attenuated viral and live bacterial vaccines pose a theoretical risk to the developing fetus and are generally contraindicated during pregnancy. There are occasions when administration of a live vaccine during pregnancy may be considered (e.g., travel to a yellow fever endemic region), when the risk of disease outweighs any risk from receiving the vaccine.

Suggested guidelines before immunizing females of childbearing age with live vaccines include:

- Asking women if they are pregnant or might become pregnant in the next 1 month;
- Defer immunizing women who state they are pregnant or are planning a pregnancy in the next month;
- Explaining the theoretical risk to the fetus if live vaccines are given during pregnancy;
- Advise women to avoid becoming pregnant for 1 month after receiving a live vaccine;
- If a woman is pregnant and inadvertently immunized or becomes pregnant within 1 month of receiving a live vaccine, she should be counselled about the theoretical risk to the fetus;
- Live vaccine manufacturers monitor such incidents and can be contact as follows:
 - GlaxoSmithKline (Varilrix, Priorix) medical information line: 1-800-387-7374.
 - Merck Frosst (Varivax III, MMR II) medical services line: 1-800-567-2594.
- Immunization with live vaccines during pregnancy should not be a reason to terminate a pregnancy.

5.2.A: Publicly Funded Vaccines ¹ - Pregnancy

<p>Tdap</p> <p>Refer to Appendix 7.7: Tdap Immunization Decision Chart for Pregnant Women</p>	<ul style="list-style-type: none"> Offered Tdap at or after 27 weeks gestation (CIG, NACI). If Tdap is administered to a pregnant woman before 27 weeks gestation, she does not need another Tdap after 27 weeks gestation or post-delivery. A Tdap vaccine should be routinely offered to all pregnant women in every pregnancy, irrespective of their immunization history. One dose of Tdap vaccine should ideally be provided between 27 and 32 weeks of gestation. Earlier immunization between 13 and 26 weeks of gestation may also be considered in some situations (e.g. in case of an increased risk of preterm delivery or travel) to allow for longer placental exposure to higher antibody levels and maximization of antibody transfer. While it is preferable that immunization is administered at least 4 weeks before birth to allow optimal transfer of antibodies and direct protection of the infant against pertussis, it should be considered until the end of pregnancy as it has the potential to provide partial protection. Women who previously received Tdap anytime as an adult or during their current pregnancy do not require Tdap post-delivery.
<p>Inactivated influenza</p>	<p>Any trimester during seasonal influenza campaigns.</p>
<p>HB</p>	<p>As indicated for risk group.</p>
<p>HA</p>	<p>As indicated for risk group.</p>
<p>Pneu-P-23</p>	<p>As indicated for high risk individuals.</p>
<p>Men-C-C or Men-C-ACYW-135</p>	<p>In an outbreak situation as per the Saskatchewan <i>Communicable Disease Control</i> manual.</p>
<p>MMR ²</p>	<p>Contraindicated during pregnancy.</p>
<p>Var ³</p>	<p>Contraindicated during pregnancy.</p>

¹ For specific vaccine information, refer to SIM, [Chapter 10, Biological Products](#).

² MMR vaccine is recommended post-partum or pre-conception for susceptible women. If a woman's serology indicates that she is non-immune or has inadequate antibodies, the following applies:

- If there is no previous history of rubella immunization, provide 2 doses of MMR 4 weeks apart.
- If there is a history of 1 previous dose of rubella-containing vaccine, give 1 dose of MMR.
- If there is a history of two previous doses of rubella-containing vaccines, further MMR vaccines is not to be administered.
- Advise women who are immunized to avoid pregnancy for one month following immunization.
- When Rh immune globulin (RhIg) and MMR vaccine are given concurrently postpartum, check rubella antibody status at 3 months postpartum and re-vaccinate if the result is negative. No testing is required after the second dose.

³ Women of childbearing age who do not have ANY of the following are considered susceptible to varicella (adapted from the Canadian Immunization Guide, 2012):

- Serological evidence of VZV IgG antibodies; or
- Documented evidence of immunization with two doses of a varicella-containing vaccine.
- Advise women who are immunized to avoid pregnancy for one month following immunization.

According to the CIG, (2012 Evergreen Ed., accessible at <http://www.phac-aspc.gc.ca/publicat/cig-gci/p01-10-eng.php#meas>) the first varicella vaccine dose should be given in the immediate post-partum period, before discharge from hospital unless they have received Rh immune globulin [RhIg]. To optimize response to vaccine, varicella-susceptible women who receive RhIg in the peri-partum period should generally wait 3 months before being vaccinated with varicella vaccine. The risk of lowered vaccine efficacy needs to be weighed against the need for protection. However, if there is a risk of exposure to varicella, a risk of recurrent pregnancy in the 3-month post-partum period, or a risk that vaccines may not be given later, monovalent varicella vaccines may be given prior to discharge. In that context, serologic testing for varicella should be done 3 months later and non-immune women should be revaccinated with two Var doses given at appropriate intervals from the initial post-partum dose (NOTE: they may receive 3 vaccine doses in total). In the event that a post-partum woman receives varicella vaccine prior to receiving RhIg within 72 hours post-delivery, serologic testing for varicella should be done 3 months later and the woman revaccinated if non-immune with two Var doses given at appropriate intervals from the initial post-partum dose (NOTE: they may receive 3 vaccine doses in total).

5.2.1.3 Passive Immunizing Agents and Blood Products during Pregnancy

Pregnant women may receive immune globulin preparations (e.g., Rablg, Varlg) and blood products when indicated. No known risk exists for the fetus from passive immunization of pregnant women with any immunoglobulin preparations.

Susceptible women that are eligible to receive MMR or Var vaccines should be immunized as soon as possible post-partum. If they have received any immunoglobulin or blood products during pregnancy or the post-partum period, specific time intervals must be adhered to before administering live viral vaccines. Refer to SIM, [Chapter 5, Section 3.5.1, Immune Globulin Preparations or Blood: Timing Intervals for Vaccines Containing Live Measles, Mumps, Rubella, or Varicella Virus](#) for further information on recommended timing of vaccines and biological and immunoglobulin products. Refer to the footnotes in SIM Chapter 7 section 2.3.1A for specific vaccine guidance. If an immune globulin is given more than 14 days after MMR or varicella vaccine, neither vaccine needs to be repeated.

5.2.2 Breastfeeding

- Breastfeeding mothers should receive all recommended immunizations according to schedule.
- Inactivated and live vaccines administered to breastfeeding women do not affect the safety of breastfeeding for women and infants, or maternal immune responses.
 - Exceptions:
 - Yellow fever (YF) vaccine should be avoided in breastfeeding women because of a risk of transmission of the virus in breastmilk. If travel to an endemic area is required, then immunizing breastfeeding women with YF vaccine is a lesser risk than that of acquiring the disease.
 - Although rubella vaccine virus might be excreted in human milk, rarely does the virus infect the infant. If infection does occur in the infant, it is well tolerated because the rubella virus is attenuated.

6.0 OCCUPATION

Best Practice Guidelines

The following guidelines constitute advice on best practices to facilitate/ensure consistent procedures and policies regarding employee immunizations. It is the responsibility of every employer to:

1. Assess the immunization/immunity status of each worker at the time of initial employment as per [Section 6.5, Publicly Funded Vaccines - Healthcare - AHA/SHA/SCA/CC/FNJ Workers and Students](#) as a guideline.
2. Obtain an immunization history, including documentation of the vaccines and doses received, and dates of administration.
3. Offer or refer for immunizations at the earliest opportunity to employees who do not have documented evidence of immunization or adequate immunity.
4. Maintain records of all immunizations provided, serologic, and tuberculin skin test results. The employee should also be provided with a copy of these records.
5. Institute an immunization recall system to ensure immunization series are completed.

Healthcare Worker Information

HCWs have the potential for exposure to patients and/or to infectious materials (e.g., body substances, contaminated medical supplies and equipment, contaminated environmental surfaces and air). HCWs are at risk of exposure to communicable diseases (diagnosed or undiagnosed) because of their contact with patients or material from infectious patients. The level of exposure risk and/or transmission of pathogens and diseases should be considered in conjunction with the specific vaccines recommended, as exposure circumstances may vary in facilities. A HCW may have varying levels of risk if they change positions or work environments, therefore assessment of their potential risk should be ongoing. Should a HCW become exposed, infected, or knowingly have an increased risk of exposure (e.g. needle stick incident) their immunization schedule would be determined by the circumstances involved. Maintenance of HCW immunity against vaccine-preventable diseases is an integral part of a health care facility's occupational health program. Optimal usage of immunizations among HCWs will not only safeguard the health of staff members but may also protect patients from becoming infected by HCWs.

HCWs for which immunizations are contraindicated should have a medical exemption issued by their treating medical physician or nurse practitioner and reviewed by the facility Occupational Health and Safety Consultant and/or regional Medical Health Officer for validation of true contraindications. Such exemptions should be reviewed as appropriate (e.g., during influenza disease outbreaks).

HCWs who received HB vaccine in years prior to enrolment as a student in a healthcare profession or years prior to employment as a health care worker may be tested to determine protective status for hepatitis B. If the anti-HBs titre is < 10 IU/L (but detectable), provide one dose of vaccine and retest 4 weeks after this dose. If level is ≥ 10 following this dose, no further vaccine is required. When anti-HBs is < 10 IU/L after this one dose, complete the second vaccine series and retest 4 weeks after the last dose. Status as a non-responder must be documented on the employee health record.

6.1 Child Care

Maintenance of an up-to-date immunization status is vital to protect the health of both childcare workers and the children in their care. Persons who will be providing direct childcare should have written proof of vaccinations previously received. Employers are responsible to ensure that their employees are fully immunized. Refer to SIM, [Chapter 5, Immunization Schedules](#) for further information.

6.2 Health Care Worker – Eligible for Publicly Funded Vaccines

The Saskatchewan Ministry of Health defines a AHA/SHA/SCA/CC/FNJ HCW as a clinical and/or non-clinical individual employed (paid) by AHA/SHA/SCA/CC/FNJ **and their respective affiliates**, and includes individuals who have been appointed as Practitioner Staff (e.g., midwives). This includes special care and long-term care facilities. Healthcare students have the potential for the above listed exposures and are considered HCWs. Post-secondary HCW students are eligible to receive the same vaccines. Refer to the table in section [Health Care Worker – Eligible for Publicly Funded Vaccines](#).

An HCW who is not employed by AHA/SHA/SCA/CC/FNJ and their respective affiliates is eligible for routine adult vaccines as noted in [Chapter 5, Immunization Schedules](#).

6.3 Publicly Funded Vaccines Health Care Worker – Eligible for Publicly Funded Vaccines

Refer to [Chapter 10, Biological Products](#) for specific vaccine information.

Vaccine	Immunity Criteria	Recommendations
Td/Tdap	<ul style="list-style-type: none"> Documentation of a 3-4 dose primary series, with last dose given < 10 years ago. 	<ul style="list-style-type: none"> Td vaccine recommended every 10 years after primary series. Adults 18 years and older are eligible for one Tdap vaccine to replace a Td vaccine.
IPV	<ul style="list-style-type: none"> Documentation of a 3-dose primary series given by any route with at least one dose received at 4 years of age or older. 	<ul style="list-style-type: none"> Reinforcement (booster) doses are not publicly funded or recommended after a primary series for HCWs.
HB	<ul style="list-style-type: none"> Documentation of an age-appropriate 2 or 3 dose HB series and adequate serologic antibodies at least 4 weeks post immunization; or Serological evidence of previous HB infection (anti-HBs+ & anti-HBc+; or HBsAg+ & Anti HBc IgM). 	<ul style="list-style-type: none"> If titres are < 10 IU/L any time after the completion of a primary HB series, refer to Chapter 7 Section 6.0 Occupation for recommendations. Non-responders that have completed two HB immunization series are unlikely to benefit from further HB immunization and are considered indefinitely susceptible to HB virus. They must receive two doses of HBIG one month apart if exposed.
Influenza	<ul style="list-style-type: none"> None. 	<ul style="list-style-type: none"> Annual immunization.
Varicella	<ul style="list-style-type: none"> Serological evidence of VZV IgG antibodies; or Documentation of two doses of a varicella -containing vaccine. 	<ul style="list-style-type: none"> Contraindicated during pregnancy. Counsel women to avoid pregnancy for 1 month post-immunization.
Measles	<ul style="list-style-type: none"> Serological evidence of measles IgG antibodies; or Documentation of two doses of a measles-containing vaccine. 	<ul style="list-style-type: none"> MMR vaccine is publicly funded for HCWs. Refer to Chapter 5, Appendix 5.2: Adult Eligibility for Publicly Funded MMR Vaccine to assess MMR dose eligibility. Contraindicated during pregnancy. Counsel women to avoid pregnancy for 1 month post-immunization
Mumps	<ul style="list-style-type: none"> Serological evidence of mumps IgG antibodies; or Documentation of two doses of a mumps-containing vaccine. 	<ul style="list-style-type: none"> MMR vaccine is publicly funded for HCWs. Refer to Chapter 5, Appendix 5.2: Adult Eligibility for Publicly Funded MMR Vaccine to assess MMR dose eligibility. Contraindicated during pregnancy. Counsel women to avoid pregnancy for 1 month post-immunization.
Rubella	<ul style="list-style-type: none"> Serological evidence of rubella IgG antibodies; or Documentation of one dose of a rubella-containing vaccine. <p>NOTE: Although a second dose of rubella is not considered necessary for immunity, it is not harmful and may benefit the 1% to 5% of people who do not respond to primary immunization (CIG).</p>	<ul style="list-style-type: none"> MMR vaccine is publicly funded for HCWs. Refer to Chapter 5, Appendix 5.2: Adult Eligibility for Publicly Funded MMR Vaccine to assess MMR dose eligibility. Contraindicated during pregnancy. Counsel women to avoid pregnancy for 1 month post-immunization.

7.0 OTHER POPULATIONS

7.1 Premature Birth

A premature infant whose health is assessed by their physician to be clinically satisfactory should be immunized at the same chronological age as full-term infants, according to the routine immunization schedule. Antibody response to immunization is generally a function of chronological age rather than maturity and vaccine efficacy is high in premature infants. Low rates of adverse events are similar to those of full-term infants.

Premature infants have lower maternal antibodies titres and shorter duration of maternal antibody protection. The severity of vaccine preventable illnesses may be greater in preterm and low birth weight infants. Preterm birth is associated with increased risk of complications and death from pertussis in infancy. Preterm infants are at greater risk of developing complications from influenza. All preterm infants 6 months of age and older and their household contacts should be immunized yearly with (publicly funded) influenza vaccine.

Premature infants and other children at risk of contracting respiratory syncytial virus (RSV) may be eligible to receive palivizumab (SYNAGIS®). SYNAGIS® is a passive immunization product, but does not interfere with the immune response of vaccines (refer to SIM, [Chapter 5, Immunization Schedules, Section 3.5, Spacing of Live Vaccines, Blood Products and Immune Globulin Preparations](#)). A provincial RSV registry (based at Royal University Hospital in Saskatoon) exists to coordinate this service outside of public health.

Publicly Funded Vaccines¹ – Premature Birth

All routine vaccines	Immunize according to routine schedule as appropriate for age
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¹ For specific vaccine information, refer to SIM, [Chapter 10, Biological Products](#).

7.2 Individuals Recently New to Canada

Immunization of children and adults, including foreign students, who have newly arrived in Canada is challenging because:

- Documented Immunization records may not exist or be suspect.
- Refer to [Appendix 7.8 Publicly Funded Immigrant and Refugee Immunization and Serology Recommendations](#) when assessing individuals recently new to Canada.
- For specific vaccine eligibility information, refer to SIM, [Chapter 5 Immunization Schedules](#). All immunization recommendations in chapter 5 are for routine immunizations. Individuals may be eligible for additional vaccines based on health conditions or other risk factors.
- For specific vaccine information, refer to SIM [Chapter 10 Biological Products](#).
- Records that do exist may be difficult to interpret because of language barriers. Refer to [Appendix 14.4 Immigrant Immunization Resources](#) for translation aids.
- Immunization schedules and products may differ from those used in Canada.
- Translation of foreign terms for immunization products can be found at <http://www.cdc.gov/vaccines/pubs/pinkbook/downloads/appendices/B/foreign-products-tables.pdf>
- Information on vaccination schedules in other countries can be found at <http://www.who.int/vaccines/GlobalSummary/Immunization/ScheduleSelect.cfm>

Only written documentation of immunizations should be considered valid evidence of prior immunization history. The potency of vaccines administered in other countries can be generally assumed adequate. Immunizations received outside Canada can be considered valid if the written documentation indicates the vaccine antigen types, administration dates, number of doses, intervals between doses, and the age of the client at time of immunization are comparable with the current Saskatchewan recommendations. Re-immunize any child immunized outside of Canada, if any question exists about whether vaccines were administered or were immunogenic. In some situations, use of serologic testing may be useful in determining which vaccines are needed. If a child experiences a significant local reaction after one dose of tetanus and diphtheria-containing vaccine, consider serologic testing for antibodies to diphtheria and tetanus toxoids.

Internationally adopted children from orphanages may differ from refugee children in terms of their access to medical care and treatment before arrival in Canada. Immunization records for certain children, especially children from orphanages, may not be accurate (e.g., MMR may be recorded but the actual product administered may be missing one of the antigens). Refugee children may have resided in refugee processing camps for months before resettlement in Canada and may have had access to medical care and immunization in the camp. The following vaccines are in limited use in the developing world and, therefore, individuals from such areas are unlikely to have received them.

- Meningococcal conjugate
- Pneumococcal conjugate
- Hib
- HPV
- Hepatitis B
- Varicella
- Mumps and rubella (measles vaccine alone is often given)

The epidemiology of different diseases varies in other countries:

- Compared with temperate climates, in the tropics a higher proportion of varicella disease occurs in adults, meaning that children, adolescents and young adults from those areas are more likely to be susceptible to varicella.
- Hepatitis A immunity is more common in individuals from endemic countries and regions.
- Individuals born in developing countries are more likely to be hepatitis B carriers, necessitating the need for assessment and immunization of their sexual and household contacts.

Ask the following questions when assessing the immunization status of an individual who is new to Canada:

- What country has the individual come from or lastly resided in?
- Were they in an orphanage or refugee camp?
- When did they arrive in Canada?
- Which immunizations were given prior to arrival and when?
- Were the immunizations comparable to Canadian recommendations, particularly:
 - Vaccine type;
 - Dates of administration;
 - Numbers of doses;
 - Intervals between doses; and
 - Age of client at time of immunization.

- What diseases were endemic in the country of previous residence?
 - If a client assessment is done, the following tests are particularly relevant in determining the need for some vaccines or contraindications to vaccination:
- Hepatitis B surface antigen (HBsAg), hepatitis B surface antibody (anti-HBs), and hepatitis B core antibody (anti-HBc): To identify current or chronic infection, past resolved infection, or evidence of immunization. Should any member of the family test positive for HBsAg, assess and immunize all susceptible sexual and household contacts.
- Hepatitis C antibody: If anti-HCV is positive in children < 18 months (may be due to circulating maternal antibodies), order hepatitis C PCR. Offer hepatitis A and B vaccines to individuals with hepatitis C infection.
- Human immunodeficiency virus (HIV): If individual is from a country with high rates of HIV and HIV status is unknown, testing should be encouraged. Routine HIV testing is done during the immigration medical examination for everyone > 15 years of age and certain children (those who received blood products, those whose mother was known to be HIV positive). If anti-HIV is positive in children 18 months or younger (may be due to circulating maternal antibodies), order HIV PCR.
- In the context of a complete clinical assessment in which no signs or symptoms consistent with advanced HIV/AIDS are identified, immunization with live vaccines may proceed when HIV tests are not yet available. Live vaccines are contraindicated for individuals with advanced HIV infection. Refer to [Chapter 7, Section 1.0, Immunocompromised Individuals](#).
- Families new to Canada may return to their country of origin to visit friends and relatives or may receive visitors from their country of origin. Encourage such families to visit a travel health professional for consultation and immunization with appropriate vaccines, particularly HA and HB vaccines.

7.3 Unknown or Uncertain Immunization Status/Inadequate Immunization Records

Refer to [Chapter 5, Section 4.1 Unknown or Uncertain Immunization Status](#) for Canadians, foreign-born adult, and child **immunization directives**.

7.4 Travelers

Generally, vaccines for travellers are not publicly funded but there are some exceptions. Travellers to regions where measles, mumps or rubella are endemic qualify for publicly funded MMR. Tetanus-containing vaccines for reinforcement are also publicly funded. Booster doses of IPV are not publicly funded.

Advise individuals considering international travel to make an appointment for a full consultation with a travel health provider. Refer clients to the following websites for travel health information:

- Canadian Immunization Guide (2012), Immunization of Travellers section, available at:
<http://www.phac-aspc.gc.ca/publicat/cig-gci/p03-10-eng.php>
- Public Health Agency of Canada - Travel Health section of the web site: available at
<http://www.travelhealth.gc.ca>
- U.S. Centers for Disease Control and Prevention - Traveler's Health, available at:
<http://wwwn.cdc.gov/travel/default.aspx>
- World Health Organization - International Travel and Health, available at:
<http://www.who.int/ith/en>

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9.0 APPENDICES

Appendix 7.1: Publicly Funded Vaccine Recommendations for Specific Populations by Risk Factor Category

Vaccine forecasting for publicly funded vaccines for specific populations are activated using “Risk Factors” in Panorama. These risk factors (eligibility criteria) were standardized using the following preface categories to ensure consistent practice and application:

- | | |
|------------------------------|-----------------------|
| 1. Chronic Medical Condition | 5. Post-exposure |
| 2. Contact | 6. Special Population |
| 3. Immunocompromised | 7. Travel |
| 4. Occupation | 8. Treatment |

This appendix contains selected risk factor groups and is not inclusive of all risk factors identified in Panorama. For more information about vaccine eligibility, consult SIM chapter 10 Biological Products

Chronic Medical Conditions	H i b	H A	H B	H P V	Men-C- ACYW- 135	Men B	Pneu- C-13 ⁶	Pneu- P-23	M M R	V A r	Rota
Bleeding disorders		•	•								
Cardiac disease							• ⁶	•			
Cochlear implant	•				• ⁸		• ⁶	•			
Asplenia – Congenital, functional or acquired ⁵	•				• ⁸	•	• ⁶	•			
Cerebrospinal fluid disorders					• ⁸		• ⁶	•			
Cystic fibrosis							• ⁶	•			
Diabetes mellitus							• ⁶	•			
Liver disease		•	•				• ⁶	•			
Lung disease							• ⁶	•			
Malignancies / Cancer	•						• ⁶	•			
Neurological conditions that impede the clearance of respiratory / oral secretions							• ⁶	•			
Renal disease ²			•				• ⁶	•			
Sickle cell disease	•				• ⁸	•	• ⁶	•			
Immunocompromised Conditions	H i b	H A*	H B*	H P V	Men-C- ACYW- 135	Men B	Pneu- C-13 ⁶	Pneu- P-23	MM R	Var	Rota
Acquired complement deficiency	•			•	• ⁸	•	• ⁶	•	C ⁴	C ⁴	C
Congenital immunodeficiency	•			•	• ⁸	•	• ⁶	•	C ⁴	C ⁴	C
HIV	•		• ⁷	•	• ⁹	• ⁹	• ⁶	•	C ⁴	C ⁴	
Transplant candidate or recipient - Solid organ / tissue ³	•	• liver	• liver, kidney	•	•		• ⁶	•	C ⁴	C ⁴	
Transplant recipient - HSCT ^{3,4}	•	•	•	•	• ⁸		•	•	C ⁴	C ⁴	
Immunosuppressive medical treatment	•			•			• ⁶	•	C ⁴	C ⁴	

Post-exposure	H i b	H A	H B	H P V	Men-C- ACYW- 135	Men B	Pneu- C-13 ⁶	Pneu- P-23	M M R	V A r	Rota
Infant born to HBsAg+ mother or high risk for HB			• & HBIG								
Special Population	H i b	H A	H B	H P V	Men-C- ACYW- 135	Men B	Pneu- C-13 ⁶	Pneu- P-23	M M R	V A r	Rota
MSM		•	•								

C – CONTRAINDICATION

¹ For more information on specific vaccines, refer to SIM, [Chapter 10, Biological Products](#).

² Refer to [Appendix 7.4: Hepatitis B Immunization Algorithm for Clients with Renal Disease](#) for appropriate dosages and products appropriate for client's age.

³ Province of surgery transplant physician/team or specialist and SK MHO to determine immunizations.

⁴ Medical consultations are required; refer to [Appendix 7.2: Varicella Immunization Referral Form](#) and [Appendix 7.3 MMR Immunization Referral Form](#). Refer to the specific immune-suppressing condition in SIM, [Chapter 7, Special Populations](#) and specific vaccine in SIM, [Chapter 10, Biological Products](#).

⁵ Includes sickle cell disease, thalassemia major and other anemias and hemoglobinopathies, celiac disease, and inflammatory bowel disease).

⁶ **Children only!** 1 dose for Pneu-C-13 naïve children 60 months up to and including 17 years of age.

⁷ 40 µg for those ≥ 18 years; double dose for those birth up to and including 17 years of age.

⁸ A high-risk child 12 months of age and older, or an adult who is cohort eligible for a Men-C-C, does not required Men-C-C vaccine when they are eligible to receive Men-C-ACYW-135 vaccine.

⁹ Children up to and including 17 years of age only.

Appendix 7.2: Varicella Immunization Referral Form

VARICELLA IMMUNIZATION OF IMMUNOCOMPROMISED CLIENTS REQUIRES PHYSICIAN APPROVAL*

Patient's name: _____ Gender: M F
Patient's DOB: _____ Health Services #: _____

Varicella vaccine is available for susceptible immunocompromised persons listed below.^{1,2}
Please check the appropriate bullet for your patient.

<p>Children and adults with:</p> <p><input type="checkbox"/> Acute lymphocytic leukemia in remission for at least 12 months (Varilrix only) (total lymphocyte count must be $\geq 1.2 \times 10^9$ /L and client not receiving radiation therapy at the time of immunization. If clients are still receiving maintenance chemotherapy, it should be withheld for at least 1 week before to 1 week after immunization). Asymptomatic HIV, CD4 $\geq 25\%$ for age.</p> <p><input type="checkbox"/> Chronic kidney disease/dialysis</p> <p><input type="checkbox"/> Other: _____</p> <p>Isolated immune deficiency</p> <p><input type="checkbox"/> Humoral (IG) deficiency diseases</p> <p><input type="checkbox"/> Neutrophil deficiency disorders</p> <p><input type="checkbox"/> Complement deficiency diseases</p>	<p><input type="checkbox"/> Child and adult candidates for solid organ transplant. Administer last dose of vaccine 6 weeks before transplantation, providing the client is not receiving immunosuppressive treatment.</p> <p><input type="checkbox"/> 2 or more years after HSCT transplant (providing there is minimal immunosuppression, and no graft vs. host disease). No need to test for VZV IgG prior to immunization.</p> <p><input type="checkbox"/> 3 or more months after remission of a malignant disease and the end of immunosuppressive treatment.</p> <p><input type="checkbox"/> 1 month after completion of high doses (> 2 mg/kg or > 20 mg daily) oral corticosteroid therapy more than 14 days duration.</p>
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* Primary care physician most familiar with the client's current medical status or a medical specialist.

¹Varicella susceptible is defined as:

- Lack of documented evidence of serological of VZV IgG antibodies; or
- Lack of documented evidence of immunization with 2 doses of a varicella-containing vaccine.
- **NOTE:** verbal history of disease is unreliable and is not acceptable as of evidence of immunity for those born since January 1, 2003.

²Give 2 doses ≥ 3 months apart to immunocompromised persons ≥ 1 year old.

To be completed by physician* and sent to the local Public Health Centre

1) VZV IgG test result: _____ Date of test: _____
2) I have verified that as of the following date of _____ (yyyy/mm/dd) this patient has no medical contraindications to the receipt of live attenuated varicella vaccine. I understand that persons 13 years of age and older require a second dose given 1 to 3 months after the first dose, and verify that this patient's condition is sufficiently stable to permit receipt of both doses, if age appropriate.
Physicians signature: _____ Clinic: _____
Physician's phone #: _____ Fax #: _____

To be completed by Public Health Nurse and faxed back to physician*:

Varicella Immunization(s) (2 doses if ≥ 13 years of age or if indicated):
Date: _____ Lot #: _____ Site _____ Initials: _____
Date: _____ Lot #: _____ Site _____ Initials: _____
Public Health Nurse's name (print): _____
Public Health Nurse's phone #: _____

Appendix 7.3: MMR Immunization Referral Form

MMR IMMUNIZATION OF IMMUNOCOMPROMISED CLIENTS REQUIRES PHYSICIAN APPROVAL*

Patient's name: _____ Gender: M F

Patient's DOB: _____ Health Services #: _____
(yyyy/mm/dd)

MMR vaccine is available for susceptible immunocompromised persons listed below. Please check the appropriate bullet for your patient.

- HSCT recipient (provided no GVHD, no suppressive treatment): **2 doses 6 – 12 months apart**¹
- Chronic kidney disease/dialysis: **2 doses minimum 4 weeks apart**²
- HIV/AIDS (if no significant compromise): **2 doses minimum 4 weeks apart**²
- Solid organ transplant candidate: **2 doses minimum 4 weeks apart**²
- Asplenia / hyposplenia (congenital, surgical removal or functional): **2 doses minimum 4 weeks apart**²
- Isolated immune deficiency: **(2 doses minimum 4 weeks apart)**²
 - Humoral (Ig) deficiency diseases
 - Neutrophil deficiency diseases
 - Complement deficiency diseases
- 3 or more months after being cured of a malignant disease and the end of immunosuppressive treatment: **2 doses minimum 4 weeks apart**²
- 1 or more month after completion of high doses (> 2 mg/kg or > 20 mg daily) oral corticosteroid therapy: **2 doses minimum 4 weeks apart**²
- Other: _____

* Primary care physician most familiar with the client's current medical status or a medical specialist.

¹ HSCT clients require re-immunization (2 doses) due to hematopoietic ablative therapy pre-transplant.

² Immunize according to age and past immunization history (e.g., if 1 dose previously received, give 1 more dose).

To be completed by physician* and sent to the local Public Health Centre

I have verified that as of the following date of _____ (yyyy/mm/dd) this patient has no medical contraindications to the receipt of live attenuated MMR vaccine. I understand verify that this patient's condition is sufficiently stable to permit receipt of two doses.

Physicians signature: _____ Clinic: _____

Physician's phone #: _____ Fax #: _____

To be completed by Public Health Nurse and faxed back to physician*:

MMR Immunization(s) (2 doses if indicated):

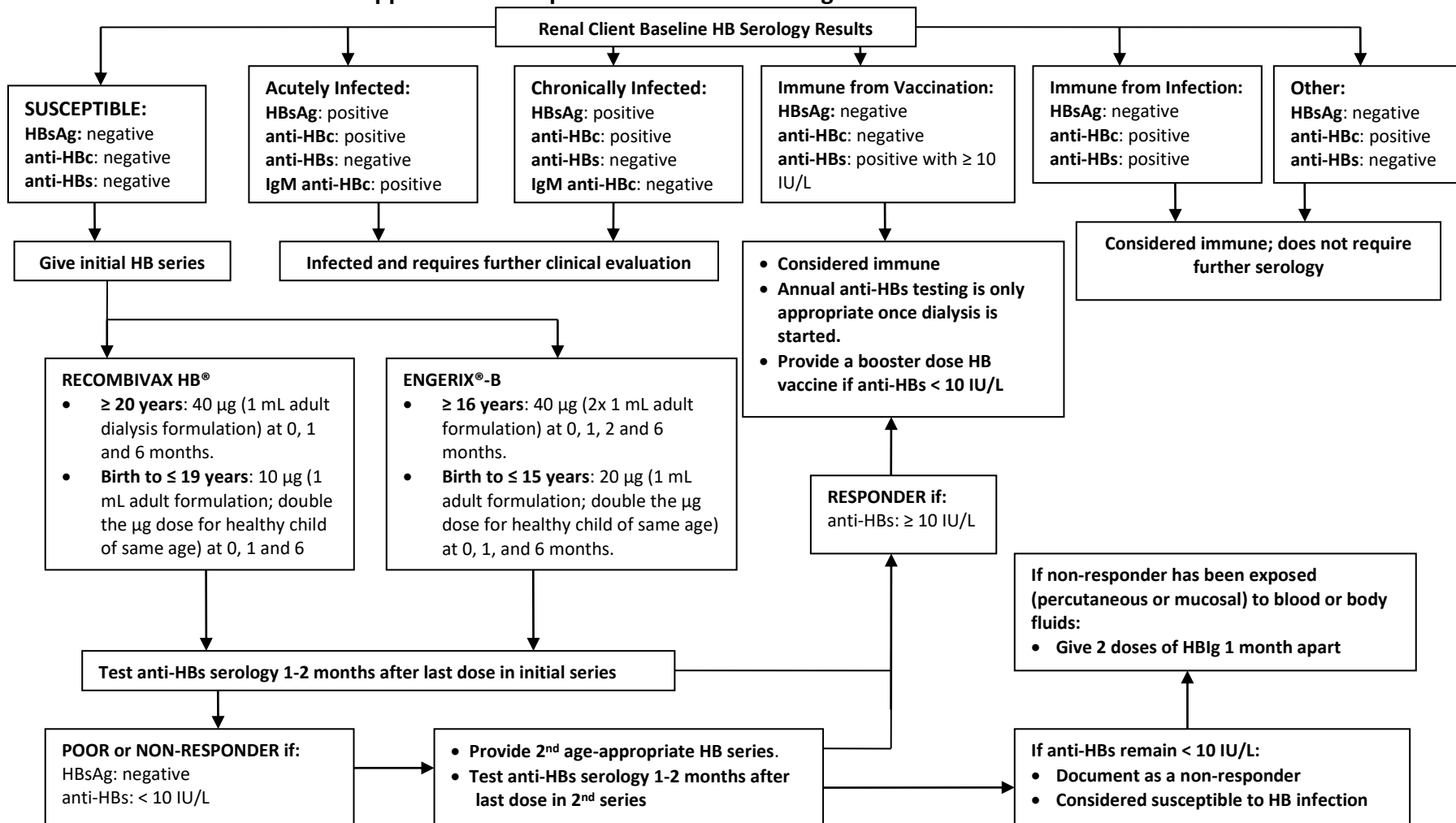
Date: _____ Lot #: _____ Site _____ Initials: _____

Date: _____ Lot #: _____ Site _____ Initials: _____

Public Health Nurse's name (print): _____

Public Health Nurse's phone #: _____

Appendix 7.4: Hepatitis B Immunization Algorithm for Clients with Renal Disease



Appendix 7.5: Infant Hepatitis B Prophylaxis Record Referral Form

Note to physician/midwife/nursing staff delivering infant:

After giving the first injection of HB vaccine, please complete and return this form to the Regional Public Health or First Nations Inuit Health office of the parent/guardian's region of residence. Regional health authority contact information is available <http://www.saskatchewan.ca/residents/health/accessing-health-care-services/immunization-services#immunization-forms-and-fact-sheets>

INFANT INFORMATION

Name _____
Last Name _____ First _____ Health Services Number _____

Date of Birth _____ Sex _____ Birth Weight _____ grams
yyyy/mm/dd

HOSPITAL/SITE OF DELIVERY _____

Physician/midwife Name _____

Address _____

BIRTH MOTHER INFORMATION

Name _____
Last Name _____ First _____ Middle _____

Date of Birth _____ PHN _____
yyyy/mm/dd

Address _____ Postal Code _____

Phone _____

Immunization	Date (YY/MM/DD)	Lot Number	Panorama entered?
HBIG 0.5 mL IM			
#1 HB 0.5 mL IM			

Infant's Family Physician or Pediatrician:

Name _____

Address _____

Postal Code _____ Phone _____

If placed for Adoption:

Parent(s) Name(s) _____ Phone _____

Address _____

OR

Child and Family Services Social Worker:

Name _____

Address _____ Phone _____

NOTES: _____

Appendix 7.6: Publicly Funded Immunization Schedule for Adult Post-Hematopoietic Stem Cell Transplant Recipients (autologous and allogeneic)

NOTE: This immunization schedule has been set by the Saskatchewan Cancer Agency (SCA) and has been adapted by the Ministry of Health. **The SCA endorses that this schedule is to be strictly followed by healthcare providers at the determined intervals.** When questions or concerns arise that are related to the SCA's HSCT immunization schedule, please direct them to SCA or the regional Medical Health Officer.

Vaccines	Months post-transplant									
	≥ 4	≥ 6	7	8	12	14	18	20	≥ 24	36
Influenza ¹ (inactivated)	•									
Pneu-C-13 ^{2,3}		•	•	•			•			
Tdap ^{3,5,6}					•	•			•	
IPV ^{3,5}					•	•			•	
Hib ^{3,5}					•	•			•	
HA ^{3,5}					•				•	
HB ^{3,5,9}					•	•			•	
Men-C-ACYW-135 ^{3,5}					•					
Pneu-P-23 ^{2,7}								•		
MMR ^{3,4,8}									•	•
Varicella ¹⁰	Contraindicated									

¹ SCA states *influenza A* vaccine every fall starting at least 4 months after transplant regardless of graft versus host disease (GVHD) or immunosuppressant therapy. Close household contact should also be immunized. **The Ministry of Health recommends that patients receive an inactivated seasonal influenza vaccine every year.**

² Preferably stable GVHD.

³ No GVHD.

⁴ No immunosuppressant therapy in preceding 6 months (alemtuzumab, cyclosporine, tacrolimus (FK506), dexamethasone, prednisone, methylprednisolone, azathioprine, lenalidomide, thalidomide, rituximab, infliximab, chemotherapy (excluding interferon), Atgam®, Thymoglobulin).

⁵ May consider giving if on stable/small doses of cyclosporine/tacrolimus and minimal GVHD.

⁶ Tdap booster every 10 years.

⁷ One Pneu-P-23 booster after 5 years.

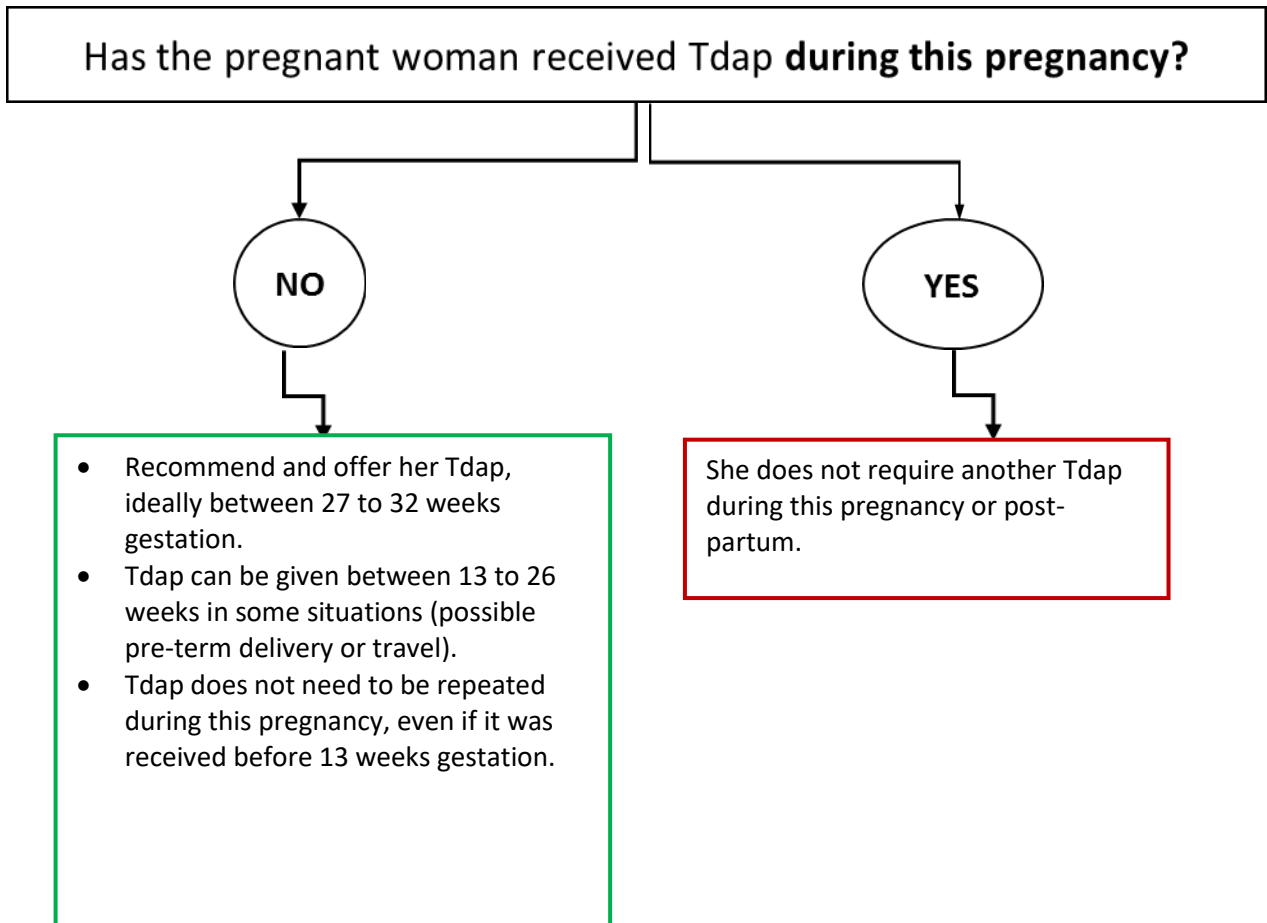
⁸ Requires a physician's order.

⁹ SCA does not specify a specific HB dosage; **a 40 µg 3-dose series is recommended by the Ministry of Health.**

¹⁰ Contraindicated in SCA HSCT schedule.

Reference: *Immunization of Adult Blood and Marrow Transplant Patient (Autologous & Allogeneic) Policy (2012)*. Courtesy of the SCA.

Appendix 7.7: Tdap Immunization Decision Chart for Pregnant Women



Appendix 7.8: Publicly Funded Immigrant and Refugee Immunization and Serology Recommendations*

- Refer to [Chapter 10, Biological Products](#) for specific vaccine information.

Antigen	Serology	0-17 years of age	≥ 18 years of age
HA	Not recommended	Refer to Publicly Funded HA Vaccine Indications	Refer to Publicly Funded HA Vaccine Indications
HB	HBsAg, anti-HBs, and anti-HBc¹	•	•
HC	Anti-Hep C²	•	•
Varicella	Varicella IgG for: <ul style="list-style-type: none"> Males and females born since 1994 who are ≥ 13 years old Women of childbearing age born before 1994 	• ³ Refer to Appendix 5.4: Publicly Funded Varicella Immunization Eligibility	Refer to chapter 7 section 5.2.A: Public Funded Vaccines – Pregnancy
Measles	Not recommended	•	Refer to Appendix 5.2: Adult Eligibility for Publicly Funded MMR Vaccine
Mumps			
Rubella			
Tetanus	Not recommended	•	•
Diphtheria			
Pertussis			
Polio	Not recommended	•	•
Hib	Not applicable	•	•
HPV	Not applicable	•	•
Influenza	Not applicable	•	•
MenB	Not applicable	•	•
Men-C-ACYW-135	Not applicable	•	•
Men-C-C	Not applicable	•	•
Pneu-C-13	Not applicable	•	Not applicable
Pneu-P-23	Not applicable	•	•
Rotavirus	Not applicable	•	Not applicable

*Individuals may not have documented immunization records and should be referred to Public Health

¹ Defer vaccination until serological results received for those ≥ 18 years of age. Screen adults and children from countries where the seroprevalence of chronic HB infection is ≥2% for all 3 markers (Pottie et al., 2011). Go to map at: <http://wwwnc.cdc.gov/travel/yellowbook/2016/infectious-diseases-related-to-travel/hepatitis-b#4621>.

➤ HB vaccine is free for **all** non-immune household contacts to an individual with a positive HBsAg to reduce the risk of transmission of HB to household members.

² Recommended if HC prevalence in country of origin is >3.5%. If HC positive then automatic testing for HA & HB immunity done at SDCL. Go to map at: <http://wwwnc.cdc.gov/travel/yellowbook/2016/infectious-diseases-related-to-travel/hepatitis-c#4627>.

³ Defer vaccination until serological results received for those ≥ 18 years of age. **Do not** defer vaccination until serological results received for those 13-17 years of age.