Yukon Immunization Program Manual

Section 5 – Immunization of Special Populations

SECTION 5 – IMMUNIZATION OF SPECIAL POPULATIONS

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INDIVIDUALS AT HIGH RISK FOR VACCINE PREVENTABLE DISEASE

All considerations and recommendations are for pre-exposure situations (i.e., before individuals who are members of one or more of these groups are knowingly exposed to a vaccine-preventable disease).

Table 1 Vaccines Recommended for Immunosuppressed Clients provides health care providers with an overview of vaccines to consider when assessing an individual with a health condition that is known to suppress the immune system.

There are a variety of other health conditions that place an individual at increased risk for certain vaccine preventable diseases. Refer to Table 2 Vaccines Recommended for Individuals with Other Health Conditions for an overview of high risk health conditions and recommended vaccines.

There are a few groups of individuals (e.g., healthcare workers, new Canadians) who require special consideration of their immunization status and who are eligible for certain vaccines. Table 3 Vaccines Recommended for Select Populations outlines the immunization needs of members of select populations.

When assessing a high risk individual's eligibility for certain vaccines, it is important to assess overall immunization status and current state of health. Unless contraindicated (i.e., live vaccines for immune-suppressed individual), ensure routine vaccines are included in the client's immunization plan.

When a client presents with an identified health condition or is identified as being a member of a select population:

- Ascertain the details of client's specified health condition (if applicable).
- Assess the client's immunization and communicable disease history.
- Refer to recommendations relating to the client's medical condition or population in this section.
- Ensure routine immunizations are up to date. There is no indication to re - administer a primary immunization series except for HSCT recipients. If this is the case please contact the Immunization Program Manager. Please do not contact the CMOH directly, the immunization program will consult with CMOH as needed.
- Assess the individual's eligibility for additional recommended vaccines.
- Assess for any contraindications to any recommended vaccines.
- For the administration of live vaccines to immunocompromised individuals, consult 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. Refer to Subsection 1.4 Immunization with Live Vaccines

For more information on specific vaccines, refer to Yukon Immunization Program Manual, Section 8, Biological Products.

TABLE 1: VACCINES RECOMMENDED FOR IMMUNOCOMPRIMISED CLIENTS

Note: Only HSCT clients require re-immunization after treatment, following the schedule from the province this treatment was conducted in. This is due to the ablation of hematopoietic cells in the bone marrow pre-transplant. This treatment eliminates the patient's immune memory. All other immunocompromised individuals should be immunized according to past immunization history and review of recommendations within this Section or Section 8. The exception to this is asplenic and congenital immunodeficiency clients ≥5 years of age who should receive one dose of Hib vaccine regardless of their immunization history.

IMMUNOCOMPROMISING CONDITIONS	VACCINES								
	Special Indications							Routine	
	Meningo ❶	Pneumo ❷	Hib	Hep A	Hep B	Influenza ❸	HPV	Inactivated	Live
Asplenia (anatomic or functional), including sickle cell disease	✔	✔	✔			✔		✔	❹
Congenital immunodeficiency (e.g., Complement, properdin, or factor D deficiency)	✔	✔	✔		✔	✔		✔	❺C
Hematopoietic Stem Cell Transplant (HSCT) recipient	**Contact Immunization Program Manager**								
HIV infection		✔	✔	✔	✔	✔	✔	✔	❹
Immunosuppressive therapy		✔	✔			✔		✔	❺C
Kidney disease (chronic) (pre-dialysis and dialysis clients)		✔			✔	✔		✔	❹
Liver disease (chronic)		✔		✔	✔	✔		✔	✔
Hepatitis B (chronic)		✔		✔		✔		✔	✔
Hepatitis C (chronic)		✔		✔	✔	✔		✔	✔
Malignant neoplasm		✔	✔			✔		✔	❺C
Solid organ or islet cell transplant candidate or recipient	✔	✔	✔	liver	✔	✔		✔	❹❺C- post transplant

❶ Meningo = Meningococcal quadrivalent conjugate vaccines (refer to Section 8 for indications)
❷ Pneumo = Pneumococcal conjugate and/or polysaccharide vaccine (refer to Section 8 for indications)
❸ Yearly influenza immunization is indicated for all individuals ≥ 6 months of age or older.
❹ Special considerations exist. Refer to the specific immune-suppressing condition within this Section and Section 8
❺ **C** = Contraindicated

TABLE 2: VACCINES RECOMMENDED FOR INDIVIDUALS WITH OTHER HEALTH CONDITIONS

CONDITIONS	VACCINES❶							
	Special Indications						Routine	
	Meningo ❷	Pneumo ❸	Hib	Hep A	Hep B	Influenza ❻	Inactivated	Live
Infants at high risk for hepatitis B					✔	✔	✔	✔
Bleeding disorders (e.g., hemophilia)				✔	✔	✔	✔	✔
Chronic heart or lung disease		✔				✔	✔	✔
CSF leak (chronic)		✔				✔	✔	✔
Cochlear implant candidate or recipient		✔	✔			✔	✔	✔
Cystic fibrosis		✔				✔	✔	✔
Diabetes		✔				✔	✔	✔
Neurologic Disorders		✔				✔	✔	✔
Pregnancy						✔	✔ ❼	❺C
Prematurity						✔	✔	✔

TABLE 3: VACCINES RECOMMENDED FOR SELECT POPULATIONS

POPULATIONS	VACCINES❶								
	Special Indications							Routine	
	Meningo ❷	Pneumo ❸	Hib	Hep A	Hep B	HPV	Influenza ❻	Inactivated	Live
Healthcare Workers					✔		✔	✔	✔
Childcare Workers							✔	✔	✔
International travellers❹							✔	✔	✔
Men who have sexual contact with men				✔	✔	✔	✔	✔	✔
New Canadians							✔	✔	✔
Unknown or uncertain immunization status							✔	✔	✔

❶ Vaccines that are recommended and provided free are included in this table. Individuals may be eligible for other vaccines if other co-existing health conditions exist.
❷ Meningo = Meningococcal C-conjugate vaccines
❸ Pneumo = Pneumococcal conjugate and/or polysaccharide vaccine, see Section 8 for indications
❹ Additional vaccines may be recommended for international travel. See discussion in International Travellers within this Section and a consultation with a travel health professional is recommended.
❺ C = Contraindicated
❻ Yearly influenza immunization is indicated for all individuals ≥ 6 months of age and older.
❼ Tdap recommended if no Pertussis containing vaccine received in the past five years.

Tables are intended as a guideline only. For specific schedule information regarding individual vaccines, refer to Yukon Immunization Program Manual, Section 8, Biological Products.

1.0 IMMUNOCOMPROMISED INDIVIDUALS

Immunocompromised individuals are unable to mount an adequate immune response. The cause of the altered immunocompetent state can be primary (inherited) or secondary (acquired) and it can be temporary or permanent.

A variety of conditions and treatments can affect the immune system of an individual, making them more vulnerable to a range of communicable diseases. These conditions include:

- Asplenia (functional or anatomic)
- Congenital immunodeficiencies 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
- Hematopoietic stem cell transplantation (HSCT)
- Human Immunodeficiency Virus infection (HIV)
- Immunosuppressive therapy including corticosteroids, chemotherapy, radiation therapy, post-organ-transplant therapy, certain anti-rheumatic drugs, and drugs used for the management of inflammatory bowel disease
- Islet cell transplant (candidate or recipient)
- Chronic kidney disease
- Chronic liver disease (including hepatitis B and C)
- Malignant neoplasms including leukemia and lymphoma
- Solid organ transplant (candidate or recipient)

Individuals with conditions that compromise the effectiveness of their immune system are at particular risk of infection with encapsulated bacteria such as *Streptococcus pneumonia* (pneumococcal), *Neisseria meningitidis* (meningococcal), and *Haemophilus influenzae* type b (Hib).

In some immunocompromised individuals, even a less than optimal response to vaccine may provide important benefit as they may be at high risk of morbidity and mortality due to vaccine-preventable infection.

If your client has had a HSCT please contact the Immunization Program Manager as the client may require re-immunization after treatment, due to the ablation of hematopoietic cells in the bone marrow pre-transplant. This treatment eliminates the patient's immune memory. All other immunocompromised individuals should be immunized according to past immunization history and review of recommendations within this Section and Section 8. The exception to this is asplenic clients > 5 years of age who should receive one dose of Hib vaccine regardless of their immunization history.

1.1 HOUSEHOLD CONTACTS OF IMMUNOCOMPROMISED INDIVIDUALS

Assess the immunization status of household contacts of immunocompromised individuals. Ensure routine immunizations are up-to-date.

There are no contraindications to immunization of a household or close contact of immunosuppressed individuals.

Ensure that vaccination opportunities are not missed for household contacts of individuals with conditions that compromise their immune system.

As the immune response in individuals with compromised immune systems may be suboptimal, the immunization of household contacts provides important protection against transmission of disease in the household.

Offer yearly influenza immunization to all household contacts of immunocompromised individuals, regardless of whether or not the individual at high risk has been immunized.

Household and close contacts of immunocompromised individuals can be immunized with MMR and varicella vaccines as the vaccine viruses are rarely transmitted to contacts.

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. If contact inadvertently occurs, the risk of transmission is low and administration of VarIg is not indicated.

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 infection or previous vaccination may be irrelevant.

Vaccinate 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.
- Vaccinate early when immunologic decline is predictable.
- Delay vaccination if the immunodeficiency is transient (if this can be done safely).
- A medical specialist may decide to stop or reduce immunosuppressive therapy to permit better vaccine response (if this is appropriate).

Consider the vaccination environment broadly.

- Vaccinate family and care givers when individuals need protection (i.e., against influenza).

Avoid live vaccines unless:

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

Administer routine boosters as indicated.

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

Consider the use of passive immunizing agents upon the recommendation of a specialist or MOH.

- **These include:**
  - Immune globulin (Ig)
  - Intravenous immune globulin (IVIg)
  - The several "pathogen-specific" Ig preparations that are available (i.e., varicella zoster Ig, tetanus Ig).

1.3 IMMUNIZATION WITH INACTIVATED VACCINES

For the immunocompromised population, there are no contraindications to immunization using **inactivated vaccines**.

Immunocompromised individuals may not mount an optimal immune response to vaccines. Specific vaccine formulations (e.g., hepatitis B vaccine for individuals with chronic renal disease) and / or specific immunization schedules may be recommended. Whenever possible, contact YCDC, for vaccine recommendations for clients who may be significantly suppressed due to HIV infection for most recent CD4 counts.

1.4 IMMUNIZATION WITH LIVE VACCINES

The inappropriate use of live vaccines can cause serious adverse events in some immunocompromised individuals as a result 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, as described above, and obtain a written referral regarding live vaccine administration to any individual whose immune system is compromised as the result of disease or therapy. Administration of live vaccines in an immunocompromised individual will be assessed on a case by case basis with discussion of a medical specialist (ie Infectious Disease specialist), CMOH, and Immunization Program Manager.

1.5 SPECIFIC CONDITIONS

1.5.1 *Anatomic or Functional Asplenia*

Recommended vaccines for those with anatomic or functional asplenia❶❷	
All routine immunizations	Immunize according to routine schedule.
Hib vaccine	All individuals ≥ 5 years of age require one dose regardless of immunization history❸
Meningococcal vaccine	Meningococcal quadrivalent conjugate vaccine for those 2 months of age and older. (This vaccine to be given in place of meningococcal C conjugate vaccine in the routine childhood immunization schedule). Reinforcement dose(s) are recommended. ❹
Pneumococcal vaccine	Conjugate and/or polysaccharide vaccine depending on age. Requires once only revaccination with polysaccharide vaccine.
Influenza vaccine	Immunize yearly (all those 6 months of age and older). Inactivated influenza vaccine should be used.
MMR vaccine❺	Referral required see 1.4 Immunization with Live Vaccines. ❻
Varicella vaccine❺	Referral required see 1.4 Immunization with Live Vaccines. ❻ Separate doses by 12 weeks.
Rotavirus	Refer to subsection 1.4 Immunization with Live Vaccines.

❶ For specific vaccine schedule information, refer to Yukon Immunization Manual, Section 8, Biological Products.

❷ To maximize vaccine response, vaccine(s) should be given at least 14 days prior to elective splenectomy, or if not possible 14 or more days post-splenectomy. However, administration of vaccines within 14 days of splenectomy is not contraindicated. If there is concern that the patient may not present later for immunization, give vaccine(s) before discharge. Confirm immunization schedule with medical specialist prior to immunization.

❸ With the exception of Hib vaccine, where one dose is recommended regardless of immunization history, asplenic individuals do not require re-immunization.

❹ If individual was previously vaccinated at ≥ 7 years of age: give 5 years after previous dose. If individual was previously vaccinated at 6 years of age and under: give 3 years after previous dose. Re-immunize every 5 years as long as medical condition exists.

❺ MMR and varicella vaccines are recommended depending on immunization history, age, and susceptibility. Use separate MMR and varicella vaccines and separate by 4 weeks. MMRV vaccine is contraindicated in this population.

❻ If client had splenectomy following a traumatic injury many years previously and no longer has a medical specialist, obtain referral for immunization with MMR and varicella vaccines from client's family physician, or the Medical Officer of Health.

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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.

Asplenia or hyposplenism may be congenital, surgical, or functional. A number of conditions may lead to functional asplenia (e.g., sickle cell anemia, thalassemia major, essential thrombocytopenia, celiac disease, inflammatory bowel disease, and rheumatoid arthritis). Individuals with any of these conditions need further investigation to determine whether their pre-existing condition is compromising their spleen function.

The spleen plays an important role in the body's immune system, including:

- Filtering antigen - antibody complexes and bacteria
- Site for immunoglobulin M (IgM) production, antigen presentation to T cells and memory B cell differentiation
- Production site for a peptide that promotes phagocytosis.

The individual with decreased or no spleen function is at increased risk for infection from a variety of pathogens, particularly those caused by encapsulated polysaccharide bacteria (e.g., pneumococcal, meningococcal, and Hib bacteria).

Children who have sickle cell disease or have had a splenectomy are at increased risk for fulminant pneumococcal sepsis associated with high mortality.

1.5.2 Congenital Immunodeficiency States

Recommended vaccines for those with congenital immunodeficiency states❶❷	
All routine inactivated vaccines	Immunize according to routine schedule for inactivated vaccines.
Pneumococcal vaccine	Conjugate and/or polysaccharide vaccine depending on age. Requires once only revaccination with polysaccharide vaccine.
Meningococcal quadrivalent conjugate vaccine	Meningococcal quadrivalent conjugate vaccine for those 2 months of age and older. (This vaccine to be given in place of meningococcal C conjugate vaccine in the routine childhood immunization schedule). Reinforcement dose(s) are recommended.❸
Hepatitis B vaccine	Requires Hepatitis B Vaccine Higher Dose Schedule. Post-immunization serology for anti-HBs is recommended (provide second series if response is <10 IU/L).
Hib vaccine	All individuals 5 years of age and older require 1 dose regardless of immunization history.
Influenza vaccine	Immunize yearly (all those 6 months of age and older). Inactivated influenza vaccine should be used.
MMR vaccine❹❺	Referral required see Subsection 1.4 Immunization with Live Vaccines.
Varicella vaccine❹❺	Referral required see Subsection 1.4 Immunization with Live Vaccines. Separate doses by 12 weeks.
Rotavirus vaccine❹	This vaccine is contraindicated for infants diagnosed with Severe Combined Immunodeficiency (SCID). ❻ Infants with a known or suspected immunocompromising condition should not receive rotavirus vaccine without consultation with a physician specialist or CMOH, see Subsection 1.4 Immunization with Live Vaccines.

❶ Congenital immunodeficiency states are generally inherited. Examples include disorders of B-lymphocyte (humoral immunity), T-lymphocyte (cell-mediated immunity), complement system (including Properdin or factor D deficiencies), or phagocytic functions.

❷ For specific vaccine schedule information, refer to Yukon Immunization Manual, Section 8,Biological Products.

❸ If individual was previously vaccinated at 7 years of age and older: give 5 years after previous dose. If individual was previously vaccinated at 6 years of age and under: give 3 years after previous dose. Re-immunize every 5 years as long as medical condition exists.

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1.5.2 Congenital Immunodeficiency States (continued)

❹ Live vaccines:
- may be considered for those individuals with antibody defects if they are not receiving regular Ig replacement therapy.
- may be considered for individuals with phagocytic defects.
- may be considered for individuals with complement deficiency.
- are **contraindicated** for individuals with T cell, natural killer and mixed cell-mediated antibody defects.
- Live bacterial vaccines (e.g., oral typhoid vaccine) are **contraindicated**.

❺ MMR and varicella vaccines are recommended depending on immunization history, age, and susceptibility. Use separate MMR and varicella vaccines and separate by 4 weeks. MMRV vaccine is contraindicated in this population.

❻ SCID includes a group of rare, life-threatening disorders caused by at least 15 different single gene defects that result in profound deficiencies in T- and B- lymphocyte function. In a minority of cases there is a known family history of SCID.

Inactivated and component vaccines can be safely administered to individuals with congenital immunodeficiencies, 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.

1.5.3 *Human Immunodeficiency Virus (HIV) Infection*

Recommended vaccines for those with HIV infection❶	
All routine inactivated vaccines	Immunize according to routine schedule.
Hib vaccine	Incompletely immunized individuals 5 years of age and older require 1 dose.
Hepatitis A vaccine	Immunize according to routine dosing schedule
Hepatitis B vaccine	Clients newly diagnosed, requires Hepatitis B Vaccine Higher Dose Schedule. Post-immunization serology for anti-HBs is recommended (provide second series if response is < 10 IU/L).
HPV vaccine	Immunize using three dose schedule
Pneumococcal vaccine	Conjugate and polysaccharide vaccine depending on age. Requires once only revaccination with polysaccharide vaccine. ❸
Influenza vaccine	Immunize yearly (all those 6 months of age and older).
MMR vaccine ❷	**Contraindicated** (unless risk of wild type infection exists and immune status supports immunization). Referral required see Subsection 1.4 Immunization with Live Vaccines.
Varicella vaccine❷	**Contraindicated** (unless risk of wild type infection exists and immune status supports immunization). Referral required see Subsection 1.4 Immunization with Live Vaccines.
Rotavirus vaccine	Referral required see Subsection 1.4 Immunization with Live Vaccines. Consult with appropriate specialist care provider or CMOH. (follow age indication)

❶ For specific vaccine schedule information, refer to Yukon Immunization Program, Section 8, Biological Products. Contact YCDC, for vaccine recommendations for clients whom are HIV positive to verify recommendations and most recent CD4 counts.

❷ Consult with YCDC for immunological status.

❸ The age appropriate pneumococcal conjugate vaccine (PCV) series should be administered first, followed by pneumococcal polysaccharide vaccine (PPV23) at 2 years of age and older and at least 8 weeks after the last dose of PCV. If PPV23 has already been administered, PCV should be administered at least one year later.

There are no contraindications to the use of inactivated vaccines at any time.

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.

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1.5.3 Human Immunodeficiency Virus (HIV) Infection (continued)

Consider passive immunoprophylaxis or chemoprophylaxis after exposure to vaccine-preventable diseases even if the person previously has received the recommended vaccines. Contact the Immunization Program Manager or CMOH as appropriate.

MMR, oral cholera, and yellow fever vaccines may be given to an HIV positive client if the client's immune system is not significantly compromised and the risk of disease outweighs the risk of vaccination. Consult YCDC, the CMOH and the appropriate physician prior to immunizing (i.e., either the primary care physician most familiar with the client's current medical status or a medical specialist).

Oral typhoid and BCG vaccines are contraindicated in the HIV client regardless of the degree of immunosuppression.

The ability of HIV infected individuals to respond to vaccine antigens is related to the degree of immunosuppression at the time of immunization and may be inadequate. These persons could be susceptible to vaccine-preventable diseases, even after appropriate immunization, unless a recent serological test demonstrates adequate antibody concentrations. When possible, contact YCDC to verify the client's current CD4 counts and timing of vaccination in regards to the client's current immune function and local disease epidemiology.

1.5.4 *Immunosuppressive Therapy*

Recommended vaccines❶ for those on Immunosuppressive Therapy	
All routine inactivated vaccines	Immunize according to routine schedule for inactivated vaccines.
Pneumococcal vaccine	Conjugate and/or polysaccharide vaccine depending on age. Requires once only revaccination with polysaccharide vaccine.
Hib vaccine	Unimmunized individuals 5 years of age and older require 1 dose.
Influenza vaccine	Immunize yearly (all those 6 months of age and older). Inactivated influenza vaccine should be used.
MMR vaccine	**Contraindicated** (unless significant risk of wild type infection exists and client is receiving only low doses of immunosuppressive medications). Referral required see Subsection 1.4 Immunization with Live Vaccines.
Varicella vaccine	**Contraindicated** (unless significant risk of wild type infection exists and client is receiving only low doses of immunosuppressive medications). Referral required see Subsection 1.4 Immunization with Live Vaccines.
Rotavirus	Referral required see Subsection 1.4 Immunization with Live Vaccines. (follow age indication)

❶ For specific vaccine schedule information, refer to Yukon Immunization Program, Section 8, Biological Products.

Long-term immunosuppressive therapy includes, but is not limited to:

- Long-term corticosteroids
- Cancer chemotherapy
- Radiation therapy
- Therapeutic monoclonal antibodies – a.k.a ("Biologics")

Immunosuppressive therapy may be used for treatment of cancer, organ transplantation and an increasing range of chronic illnesses and inflammatory conditions (i.e., inflammatory bowel disease, psoriasis, systemic lupus erythematosus, rheumatoid arthritis, and collagen vascular disease.

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1.5.4 Immunosuppressive Therapy (continued)

Long term immunosuppressive therapies alone or in combination have their greatest impact on cell-mediated immunity, although T cell-dependent antibody production can also be reduced.

Administer all appropriate vaccines/boosters to individuals undergoing such therapy at least 14 days before the initiation of therapy. If this cannot be done safely, delay vaccination until at least 3 months after immunosuppressive therapy has been stopped. The exception to this is influenza immunization, which is recommended for all immunosuppressed individuals.

If immunosuppressive therapy cannot be stopped, inactivated vaccines should be given when therapy is at the lowest possible level.

In some situations, titer levels post immunization may be warranted for individuals undergoing immunosuppressive therapy. This will be assessed on a case by case basis. Please contact the Immunization Program Manager for further discussion.

Individuals immunized before chemotherapy or radiation therapy are thought to retain immune memory after treatment and re-immunization is not necessary. The exception is a recipient of hematopoietic stem cell transplant.

Live vaccines are contraindicated during immunosuppressive therapy. An analysis of risk vs. benefit may be necessary if only low doses of therapy are needed and there is significant risk of wild-type infection. In this case, consult with the individual's specialist before immunization. Administration of live vaccines in an immunocompromised individual will be assessed on a case by case basis with discussion of a medical specialist, CMOH and Immunization Program Manager.

1.5.4.1 Corticosteroid Therapy

Only high dose systemic steroids interfere with vaccine induced immune responses (i.e., consider persons receiving ≥ 2 mg/kg per day or ≥ 20mg daily of prednisone for more than 14 days duration to be immune-suppressed).

Topical, inhaled and locally injected steroids do not have an impact on vaccines unless there is clinical or laboratory evidence of immunosuppression from such therapy.

A period of at least 4 weeks 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).

Children with adrenogenital syndrome and those receiving physiologic replacement doses (< 2mg/kg of prednisone per day) of glucocorticoids should receive all routine immunizations on schedule.

1.5.4.2 Infants Born to Mothers on Immunosuppressive Medication

Certain immunosuppressive medications which may be used in pregnancy to treat conditions such as autoimmune disorders (rheumatoid arthritis, Crohn's disease) and some malignancies may cross the placenta and be detectable in the infant for 6 to 8 months, especially if given late in pregnancy. These include biological disease modifiers such as monoclonal antibodies (e.g., rituximab).

There is one case report of a fatal outcome in a BCG vaccinated infant of a mother who received infliximab during pregnancy, and it is recommended that BCG vaccine not be given to such infants.

Rotavirus vaccine can be administered to infants born to mothers on immunosuppressive medication. There are no systematic assessments of safety of the use of rotavirus or other live vaccines in such infants. Some experts recommend B cell enumeration in such infants prior to administration of rotavirus vaccine, or withholding the vaccine altogether. However, the risk of receipt appears to be based on theoretical consideration without evidence of harm, and such infants are not known to experience severe disease following wild-type rotavirus infection. The infant's physician may be consulted if there are particular concerns about the infant's health status.

Infants of breastfeeding mothers receiving monoclonal antibody treatment can be immunized with both live and inactivated vaccines according to routine schedules. The transfer of these medications through breast milk is limited, and the minimal quantities that are ingested are likely to be broken down in the infant's gastrointestinal tract.

1.5.4.3 Rheumatoid Arthritis

Compatibility Chart for Vaccinations When Taking DMARDs or Biologics				
Routine Vaccines				
Vaccine	**Type**	**Frequency**	**On MTX/LEF**	**On Biologic**
Influenza	FluMist (LIVE)		Contraindicated	
Influenza	Inactivated influenza vaccine	Every year	OK	OK see ❶ for ideal administration
Pneumococcus	Prevnar 13 (conjugated), followed by: Pneumovax (PPV-23) (polysaccharide)	Once Give 8 weeks later	OK	
	Pneumovax only (PPV-23)	Booster 5-6 years later	OK	
Tetanus	Td, Tdap (Pertussis at least once as adult)	Every 10 years	OK	
Haemophilus Influenza type B	HIB	Once	OK	
Childhood Vaccinations (must be up-to-date)				
MMR	MMR-II or Priorix (LIVE)	If born >1970, no dose recorded	OK	Contraindicated❷❸
HPV ❹	Gardasil (HPV4/HPV9 – men & women)	Age 9-26y, if at risk >26y	OK	
Varicella	Varilrix or Varivax III (LIVE)	Check titre/hx of chicken pox 2 doses if <50y	Contraindicated❷❸	
Meningococcal	MEN-C-ACYW-135 (quadrivalent conjugate)	Grade 9 only	OK	OK see ❶ for ideal administration
Non-Publically Funded Vaccines❹				
Hepatitis A Hepatitis B	Twinrix (HAV+HBV) Recombivax, Engerix-B (HBV only)	0, 6-36 months 0,1,6 months	OK	OK see ❶for ideal administration
Meningococcal	Men-C-ACYW-135 (quadrivalent conjugate)	Travel or At Risk 0, 8 wks. booster every 5 years	OK	OK see ❶ for ideal administration
Cholera	Dukoral (oral)	Travel	Unnecessary – Give antibiotics for treatment PRN	
Typhoid	Typherix or Typhim Vi Vivotif (LIVE)	Travel	OK	
			Live vaccine contraindicated❷❸	
Japanese Encephalitis	Ixiaro	Travel	OK	
Yellow Fever	YF-Vax (LIVE)	Travel	Absolutely Contraindicated❷❸ Provide Waiver or delay travel	
Zoster	Zostavax	Age 60	OK	Contraindicated❷❸

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1.5.4.3 Rheumatoid Arthritis (continued)

Vaccinations when taking DMARDs or Biologics

❶ Ideally, provide ≥14 days before biologic initiation or wait ≥3 half-lives (as specified by specialist) after stopping biologic therapy.
❷ Administer ≥4 weeks before biologic initiation or wait ≥3 half-lives after stopping biologic therapy.
❸ To ensure minimal immunosuppression (reduce risk of infection) and optimal vaccine response: recommend waiting ≥3 half-lives (as specified by specialist) after stopping biologics to give live vaccines.
❹ Non-publically funded vaccines:

- Hepatitis A: travel to, immigrants from, or residence in endemic countries of HAV; occupational exposure (i.e. health care professionals); infected family member or contacts; illicit drug users; men who have sex with men; chronic liver disease.
- Hepatitis B: residents, immigrants, travelers, or close contact with individuals from HBV endemic areas; illicit drug users; persons engaging in risky sexual behaviours/history of sexually transmitted infection; men who have sex with men; chronic liver disease; occupational exposure (i.e. health care professionals); frequent blood transfusions.
- HPV vaccine are not publically funded except for certain indications see Section 8 – HPV – p. 22.
- Meningococcal vaccine for travel

1.5.5 Chronic Kidney Disease

Chronic kidney disease clients include predialysis, hemodialysis or peritoneal dialysis clients, and candidates for or recipients of a kidney transplant.

Recommended vaccines ❶ for those with chronic kidney disease	
All routine vaccines	Immunize according to routine schedule. **Exception**: live vaccines when significant immunosuppression is present pre- or post- transplantation❷
Pneumococcal vaccine	Conjugate and/or polysaccharide vaccine depending on age. Requires once only revaccination with polysaccharide vaccine.
Influenza vaccine	Immunize yearly (all those 6 months of age of age and older).
Hepatitis B vaccine	If vaccine is indicated, always use renal formulation. See Table 6 in this section p. 22
MMR vaccine	Referral required see Subsection 1.4 Immunization with Live Vaccines.
Varicella vaccine	Referral required see Subsection 1.4 Immunization with Live Vaccines.

❶ For specific vaccine schedule information, refer to Section 8, Biological Products.
❷ Administration of live vaccines will be assessed on a case by case base with discussion of a medical specialist, CMOH, and Immunization Program Manager.

Bacterial and viral infections are a major cause of morbidity and mortality in individuals with chronic kidney disease or who are undergoing chronic 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 titers following immunization
- More rapid decline of antibody levels following immunization.

Formulate immunization strategies early in the course of progressive kidney disease, particularly if transplantation and / or long term immunosuppressive therapy are being considered.

Pay particular attention to ensuring there is adequate protection against hepatitis B, influenza, pneumococcal, and varicella diseases. Hepatitis B Immunization should occur within the client's dialysis facility whenever possible.

(continued on next page)

1.5.5 Chronic Kidney Disease

Hepatitis B:

- Hepatitis B immunization may be more effective in individuals before the initiation of dialysis therapy.
- Seroconversion rates following hepatitis B immunization in the hemodialysis population are poor when compared with the general population.
- Protective antibody titers are defined as 10 IU/L or greater.
- In immunocompetent individuals, effective immunity after hepatitis B immunization is sustained even when anti-HBs levels drop to below 10 IU/L. In dialysis patients, protection against hepatitis B infection is lost when titers drop below this level. Subsequent exposure to hepatitis B virus may then lead to acute disease, and possibly a subsequent carrier state.
- Test annually for the presence of anti-HBs. Administer booster dose of hepatitis B vaccine as necessary. See Table 6 Hepatitis B Vaccination Guidelines for Patients with Chronic Kidney Disease.
- Persons who do not respond to the vaccine should be tested for the presence of HBsAg.
    - If HBsAg positive, test sexual contacts and immunize if indicated.
    - If HBsAg negative, counsel the client that they are at risk for hepatitis B infection and need to obtain HBIg post-exposure prophylaxis for any known or likely parenteral exposure to HBsAg positive blood.

Influenza:

- Patients on dialysis are at greater risk for influenza mortality.

MMR:

- Viral diseases are a major cause of morbidity and mortality in clients who have renal disease or who are undergoing chronic dialysis.

Pneumococcal:

- Mortality rates after pneumonia in dialysis patients are up to 14-16 times higher than in the general population.
- Dialysis patients are also at increased risk of cardiovascular events after pneumonia.

Varicella:

- Varicella disease is a significant risk factor for immunosuppressed kidney transplant recipients. Complications of varicella infection in transplant recipients include disseminated disease, allograft rejection, and death.

Refer to Table 6 Hepatitis B Vaccination Guidelines for Patients with Chronic Kidney Disease and Table 7 Algorithm for Hepatitis B Vaccine for Clients with Chronic Kidney Disease for assistance with decision making regarding hepatitis B immunization based on serology results.

TABLE 6: Hepatitis B Vaccine Program for Chronic Kidney Disease Clients

Chronic hemodialysis clients are at high risk for HBV infection because the process of hemodialysis requires vascular access for prolonged periods. In an environment where multiple clients receive dialysis concurrently, repeated opportunities exist for person-to-person transmission of infectious agents, directly or indirectly via contaminated devices, equipment and supplies, environmental surfaces or hands of personnel. Furthermore, hemodialysis clients are immunosuppressed, which increases their susceptibility to infection.

ELIGIBILITY

All predialysis, hemodialysis and peritoneal dialysis clients in hospital, community, home or self-care settings are eligible for this program. **Vaccine administration and Anti HBs monitoring often occurs at the dialysis facility; please verify if this has occurred prior to immunization and enter the appropriate immunization records into Panorama.**

PRE-DIALYSIS AND DIALYSIS CLIENTS ❶ ❷						
	Recombivax HB®			Engerix®-B		
Age	Dose	Volume	Schedule	Dose	Volume	Schedule
≥ 20 years	40 mcg ❸	1.0 ml	0, 4 and 24 weeks	40 mcg	2.0 ml	0, 4, 8 and 24 weeks
7 – 19 years	10 mcg❹	1.0 ml	0, 4 and 24 weeks	20mcg	1.0 ml	0, 4, 8 weeks and 12 months
Birth – 6 years	5 mcg ❺	0.5 ml	0, 4 and 24 weeks	20 mcg ❺	1.0 ml	0, 4, 8 weeks and 12 months

Post-vaccination serology: measure anti-HBs 1 month after completion of a primary series. If anti-HBs is < 10 IU/L, the client is a non-responder. Provide a second vaccine series and assess anti-HBs. If anti-HBs is < 10 IU/L, the client, as a non-responder to 2 vaccine series, is susceptible to hepatitis B. **There is no benefit to further vaccination. If an exposure to blood or body fluids occurs, the client will require post-exposure prophylaxis.**

❶ All doses of hepatitis B vaccine should be administered in the deltoid by the **IM** route, or for infants <12 months of age, in the vastus lateralis.

❷ Pre-dialysis clients and dialysis clients receive the same dose volume of hepatitis B vaccine because there is no discrete level of renal function that correlates well with vaccine immunogenicity.

❸ Special formulation for adult dialysis clients.

❹ Use adult formulation (10mcg/1.0ml).

❺ Use thimerosal-free RecombivaxHB® or pediatric Engerix®-B formulation. Dosage for this age group is based on NACI guidelines.

NOTE: If a client has received Engerix®-B vaccine as dose 1, the client will require a **4 dose series** regardless of which vaccine is used to complete the series. If a client has received RecombivaxHB® vaccine as dose 1, the client will only require a **3 dose series** regardless of which vaccine is used to complete the series.

TABLE 7: Hepatitis B Vaccination Guidelines for Patients with Chronic Kidney Disease ❶❷

	HBsAG	Anti-HBs (IU/L)	Total Anti-HBc	Clinic Scenario	Interpretation ❶	Vaccination Protocol
1.	Negative	< 10	Negative	No prior immunization or incomplete immunization	Susceptible to Hepatitis B	Immunize with primary (3 dose) series. Test 1 month after last dose.
2.	Negative	≥ 10	Negative	Results after primary series	Immunity to Hepatitis B	Monitor annually
3.	Negative	< 10	Negative	Results after primary series	Inadequate response to primary series	Provide 2nd vaccine series. Test anti-HBs 1 month after last dose. If anti-HBs remains < 10, no further immunization. Document as a non-responder.❷
4.	Negative	≥ 10	Negative	Results of annual testing	Immunity to Hepatitis B	Monitor annually
5.	Negative	1 to < 10	Negative	Results of annual testing	Possibly susceptible to Hepatitis due to falling titres	Give a second vaccine series as in **(3).** above if client has not had second series. If second series has been given previously, provide a booster dose.
6.	Negative	< 1	Negative	Results of annual testing	Susceptible to Hepatitis B	Document as a non-responder. ❷

Following initial vaccine or second vaccine series and a protective response (anti-HBs ≥ 10), continue annual testing. Results of annual testing may indicate a need for 1 booster dose, or completion of a second series of vaccine if not received previously. Provide no more than two complete vaccine series. A booster dose may be provided annually as long as the client continues to mount an antibody response (1 to < 10).

❶ For interpretation of test results that include a positive HBsAg and/or a positive anti -HBc, refer to the Yukon Communicable Disease Control manual, Chapter 1, Hepatitis B.

❷ Test HBsAg annually in non-responders. A non-responder exposed to blood or body fluids and at risk for Hepatitis B infection should be given 2 doses of HBIg, 1 month apart.

❸ **Vaccine administration and Anti HBs monitoring often occurs at the dialysis facility; please verify if this has occurred prior to immunization and enter the appropriate immunization records into Panorama.**

1.5.6 Chronic Liver Disease❶

Recommended vaccines for those with chronic liver disease❶❷	
All routine vaccines	Immunize according to routine schedule.
Hepatitis A vaccine	Provided free for individuals who are previously unimmunized, are anti-HAV IgG negative.
Hepatitis B vaccine	Provided free for individuals who do not have past or current evidence of hepatitis B infection. ❸❹ Post-immunization serology for anti-HBs is recommended (provide second series if response is <10 IU/L).
Pneumococcal vaccine	Polysaccharide and/or conjugate vaccine depending on age. Requires once only revaccination with polysaccharide vaccine.
Influenza vaccine	Immunize yearly (all those 6 months of age and older).

❶ Clients with chronic liver disease include those with chronic hepatitis B infection and those who are anti-HCV positive.

❷ For specific vaccine schedule information, refer to Yukon Immunization Program, Section 8, Biological Products.

❸ Pre-vaccination testing for HBsAg, anti-HBc and anti-HBs is recommended to identify those already infected or immune.

❹ Standard hepatitis B vaccine dosing is recommended for those with chronic liver disease. Those with advanced liver disease (e.g., cirrhosis, physician-diagnosed advanced liver disease related to hepatitis C infection) who are non-responsive to the initial hepatitis B vaccine series (standard dosing), should be immunized as per the 'Hepatitis B Vaccine Higher Dose Schedule' for the second series.

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, including hepatitis C infection, may not be at increased risk of infection with hepatitis A or B viruses but are at increased risk for fulminant hepatitis A or more severe acute hepatitis B infection should infection occur.

Immunization should be done early in the course of disease as the immune response may be suboptimal in advanced liver disease.

Individuals with chronic liver disease (e.g., cirrhosis) and alcoholism are at increased risk of developing pneumococcal infection and severe pneumococcal disease and its complications. Individuals with chronic liver disease experience some degree of immunosuppression. They are at increased risk of influenza-related complications.

1.5.7 Adults with Malignant Neoplasm (including leukemia and lymphoma)

Recommended vaccines for those with a malignant neoplasm❶❷	
All routine inactivated vaccines	Immunize according to routine schedule for inactivated vaccines.
Pneumococcal vaccine	Conjugate and/or polysaccharide vaccine depending on age. Requires once only revaccination with polysaccharide vaccine.
Hib vaccine	Incompletely immunized individuals 5 years of age and older require one dose. If treatment includes irradiation of the spleen or splenectomy, provide one dose regardless of immunization history.❸
Influenza vaccine	Immunize yearly (all those 6 months of age and older). Inactivated influenza vaccine should be used.
Meningococcal quadrivalent conjugate vaccine	Only if treatment includes irradiation of the spleen or splenectomy.❸ Re-immunize every 5 years.
MMR vaccine	**Contraindicated** in persons with immunosuppression due to leukemia, lymphoma, generalized malignancy or immunosuppressive therapy. Referral required see Subsection 1.4 Immunization with Live Vaccines. If recommended based on authorization from most responsible care provider or CMOH based on oncologist or GPO.❷❺
Varicella vaccine❹	**Contraindicated** in persons with immunosuppression due to leukemia, lymphoma, generalized malignancy or immunosuppressive therapy. Referral required see Subsection 1.4 Immunization with Live Vaccines. If recommended based on authorization from most responsible care provider or CMOH based on oncologist or GPO.❷❺

❶ For specific vaccine schedule information, refer to Yukon Immunization Program, Section 8 Biological Products.

❷ For clients currently undergoing treatment, refer to Section 5, 1.5.4 Immunosuppressive Therapy for additional recommendations.

❸ Refer to Section 5, 1.5.1 Anatomic or Functional Asplenia.

❹ For clients with acute lymphocytic leukemia (ALL) – varicella vaccine is recommended if the client's disease has been in remission for ≥ 12 months, the client's total lymphocyte count is ≥ 1.2 X 10^9/L, the client is not receiving radiation therapy, and maintenance chemotherapy can be withheld for at least 1 week before to 1 week after immunization.

❺ Vaccination may be considered if there is significant risk of wild type infection and the client is not significantly immunosuppressed and/or is receiving only low doses of immunosuppressive medications. Consultation with the primary oncologist is required.

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1.5.7 Adults with Malignant Neoplasm (including leukemia and lymphoma) (continued)

Individuals with a malignant neoplasm are at increased risk of vaccine-preventable diseases as a result of both their underlying condition and their 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.

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 1.5.4 Immunosuppressive therapy for immunization recommendations for the individuals who are currently undergoing treatment.

Although inactivated vaccines can be safely administered at any time, in order to optimize immunogenicity, administer all appropriate vaccines/boosters at least 14 days before the initiation of therapy. If this cannot be done, delay vaccination until at least 3 months after immunosuppressive therapy has been stopped. For individuals whose treatment regimen includes anti-B-cell antibodies (e.g., rituximab), delay vaccination for at least 6 months. The exception to this is influenza immunization, which is recommended for all immunosuppressed individuals.

Specific malignancies, particularly lymphoid malignancies (e.g.; Hodgkin lymphoma, non-Hodgkin lymphoma) are associated with significant deficits in cell-mediated and humoral. These patients have an increased susceptibility to infection, particularly with atypical organisms and encapsulated bacteria. These immune deficits can persist long after therapy completion.

Zoster Vaccine: The client's cancer care provider, e.g. BC Cancer Agency, may recommend immunization with zoster vaccine for select patients; however, zoster vaccine is not currently publicly funded in Yukon. If the patient is assessed by their oncologist to **not be significantly immune suppressed** by their disease process, and **if zoster vaccine can be given at least 4 weeks prior to initiation of immunosuppressive treatment**, the benefit in terms of prevention of future shingles may outweigh the potential risk associated with the use of attenuated live-virus vaccines in this population (expert opinion BC Cancer Agency). If the vaccine cannot be given 4 weeks prior to treatment, delay until 3 months after completion of treatment. For individuals whose treatment regimens included anti-B-cell antibodies (e.g., rituximab), the vaccine should be delayed at least 6 months post treatment. While a prescription is not required to obtain this vaccine, it is recommended that the oncologist provide the patient with a note indicating their diagnosis and that the current level of immune suppression is appropriate to receive this attenuated live-virus vaccine.

1.5.8 Candidate for or Recipient of Solid Organ or Islet Cell Transplant

Re-immunization is NOT indicated for these clients. Assess previous immunizations and offer vaccines to complete routine schedule.

Recommend vaccines for candidate or recipient of solid organ or islet cell transplant ❶	
All routine inactivated vaccines, including inactivated polio vaccine (IPV)	Immunize according to routine schedule. **Exception:** Children expected to be transplanted before 18 months of age (follow schedule for which procedure will take place). Consult the Vaccine Program Manager for CMOH recommendation.
Hib vaccine	Unimmunized individuals 5 years of age and older require 1 dose.
Pneumococcal vaccine	Conjugate and/or polysaccharide vaccine depending on age. Requires once only revaccination with polysaccharide vaccine.
Meningococcal quadrivalent conjugate vaccine	Meningococcal quadrivalent conjugate vaccine for those 2 months of age and older. (This vaccine to be given in place of meningococcal C conjugate vaccine in the routine childhood immunization schedule). Reinforcement doses are recommended.❷
Hepatitis A vaccine	Immunize liver transplant candidates and recipients.
Hepatitis B vaccine	Requires Hepatitis B Vaccine Higher Dose Schedule (see Section 8, Biological Products, Hepatitis vaccines). Kidney transplant candidates and recipients require the renal formulation. Post-immunization serology for anti-HBs is recommended (provide 2nd series if response is < 10 IU/L).❸
Influenza vaccine	Immunize yearly (all those 6 months of age and older). **LAIV is contraindicated after transplantation**.
MMR vaccine	Recommended before transplantation according to routine schedule. Referral required see Subsection 1.4 Immunization with Live Vaccines. If recommended based on authorization from most responsible care provider or CMOH.
Varicella vaccine	Recommended before transplantation for susceptible individuals according to routine schedule. Separate doses by 12 weeks. Referral required see Subsection 1.4 Immunization with Live Vaccines. If recommended based on authorization from most responsible care provider or CMOH.
Rotavirus vaccine	Referral required see Subsection 1.4 Immunization with Live Vaccines. Last dose of rotavirus vaccine must be given at least 4 weeks prior to transplantation. **Contraindicated after transplantation.**

❶ For specific vaccine schedule information, refer to Section 8 – Biological Products.

❷ If individual as previously vaccinated at 7 years of age and older: give 5 years after previous dose. If individual was previously vaccinated at 6 years of age and under: give 3 years after the previous dose. Re-immunize every 5 years as long as medical condition exists.

❸ Candidates for or recipients of a kidney transplant should be tested annually as per Chronic Kidney Disease, see Hepatitis B Vaccination Guidelines for Patients with Chronic Kidney Disease (Section 8 – Hepatitis vaccines).

2.0 OTHER CONDITIONS

2.1 INFANTS AT HIGH RISK FOR HEPATITIS B

Infants born to mothers who are positive for HBsAg during pregnancy have a 90-95% risk of developing Hepatitis B infection and becoming chronic carriers of the disease.
All pregnant women should be screened for the presence of HBsAg during every pregnancy. If found to be positive, protocols are in place to ensure the infant is immunized with hepatitis B vaccine and HBIg as soon as possible after delivery.
Included are:

- Perinatal protocols for hepatitis B
- Prophylaxis record for infants at high risk of hepatitis B

2.1.1 Perinatal Protocols for Hepatitis B

BCCDC Laboratory Services provide prenatal screening for Hepatitis B to Yukon. Approximately 40,000 specimens from BC and YT are submitted yearly, with <1% testing positive for HBsAg. All positive specimens are tested for HBeAg, a marker of infectivity.

Results of positive tests are forwarded to the requesting provider, the expected hospital of delivery, and YCDC. Results are identified as **Prenatal Assessment**, and the expected date of delivery is included, if available.

At birth, the infant is given HBIg and the first dose of hepatitis B vaccine. This information is recorded on the discharge notice sent to the responsible Health Centre.

Infants identified as at risk of hepatitis B (mother is high risk for hepatitis B, but negative {possible window period} or unknown for HBsAg) will also be given HBIg and the first dose of vaccine in hospital, and the information will be recorded on the discharge notice. The Prophylaxis Record for Infants at High Risk of Hepatitis B is faxed to the Health Centre in the parent's area of residency.

Enter HBIg and hepatitis B vaccine administered in hospital in the infant's electronic Panorama record.

Immunize infant with complete series of Infanrix hexa® vaccine as per routine schedule.

Ensure post vaccination testing (i.e., HbsAg and anti-Hbs) is completed, 1 month after (and no longer than 6 months after) vaccine series completion.

2.1.2 Prophylaxis Record for Infants at High Risk Of Hepatitis B (Sample)

Hospital case room: Please complete this form ❶ and fax to the Health Unit office in parent's area of residency.

INDICATIONS	PROPHYLAXIS	Check (√) indication
1. Mother is hepatitis B surface antigen (HBsAg) positive.	1. Give HBIg 0.5 ml **immediately after birth** along with dose 1 of hepatitis B vaccine (0.5 ml IM).	1.
2. Mother is high risk **(i.e., IV drug user and/or sex trade worker)** for hepatitis B, but **negative** (possible window period) or **unknown** for HBsAg.	2. Give HBIg 0.5 ml **immediately after birth** along with dose 1 of hepatitis B vaccine (0.5 ml IM).	2.
3. Primary care giver or other household contact (e.g., father, nanny, etc) of infant has chronic hepatitis B.	3. Give dose 1 of hepatitis B V vaccine 0.5 ml IM **immediately after birth**. **DO NOT GIVE HBIg**	3.
4. If mother is at high risk for hepatitis B **(other than IDU and STW)** and her status is unknown or negative	4. Give dose 1 of hepatitis B vaccine 0.5 ml IM **immediately after birth** **DO NOT GIVE HBIg.**	4.
5. If father or other primary care giver is at high risk for hepatitis B and their status is unknown or negative.	5. Give dose 1 of hepatitis B vaccine 0.5 mL IM **immediately after birth.** **DO NOT GIVE HBIg.**	5.

MOTHER'S NAME: _____ DOB: _____
LAST NAME FIRST NAME YYYY/MM/DD

ADDRESS: _____
STREET CITY POSTAL CODE

PHONE NUMBER:_____ PHN: _____

MOTHER'S PHYSICIAN: _____

BABY'S NAME: _____ DOB: _____
LAST NAME FIRST NAME YYYY/MM/DD

HEPATITIS B IMMUNE GLOBULIN GIVEN: _____ _____
YYYY/MM/DD LOT#

HEPATITIS B VACCINE GIVEN: _____ _____
YYYY/MM/DD LOT#

HOSPITAL:_____DATE:_____

❶ For use when prenatal testing indicates mother is HBsAg positive, or there is no record of prenatal testing for hepatitis B status or there are other factors that indicate a need for hepatitis B prophylaxis at birth.

2.2 INDIVIDUALS WITH BLEEDING DISORDERS

Recommended vaccines❶ for those with bleeding disorders	
All routine vaccines	Immunize according to routine schedule. Administer vaccine via recommended route (e.g., SC or IM).
Hepatitis A vaccine	Provided free for individuals with hemophilia A or B receiving plasma-derived clotting factors and testing negative for anti HAV-IgG.
Hepatitis B vaccine	Provided free for hemophiliacs and others receiving repeated infusions of blood or blood products.
❶ For specific vaccine schedule information, refer to Yukon Immunization Program Manual, Section 8, Biological Products.	

Individuals who are receiving low doses of acetylsalicylic acid therapy or long term anticoagulation with either warfarin (Coumadin®) or heparin are not considered to be at higher risk of adverse events following immunization.

Although currently available plasma-derived products are all tested for viral contamination prior to administration, consider all individuals with a bleeding disorder to be at higher risk of contracting hepatitis A and B.

Immunize on schedule, including SC and IM injections. When the efficacy is known to be the same for a vaccine whether it is administered SC or IM, administer the vaccine using the SC route.

If there is concern that the injection may stimulate bleeding, schedule it shortly after the administration of anti-hemophilia therapy.

Apply direct pressure to the injection site for 5 minutes following immunization.

2.3 INDIVIDUALS WITH CHRONIC HEART OR LUNG DISEASE

Recommended vaccines❶ for those with chronic heart or lung disease	
All routine vaccines	Immunize according to routine schedule.
Pneumococcal vaccine	Polysaccharide and/or conjugate vaccine depending on age.
Influenza vaccine	Immunize yearly (all those 6 months of age and older).
❶ For specific vaccine schedule information, refer to Yukon Immunization Program, Section 8, Biological Products.	

Individuals with chronic heart or lung disease are at higher risk of influenza related complications, including pneumococcal infection and potentially the exacerbation of their underlying disease. People at high risk of influenza related complications are more likely to require hospitalization.

2.4 CHRONIC CEREBROSPINAL FLUID (CSF) LEAK

Recommended vaccines❶ for individuals with Chronic CSF leak	
All routine vaccines	Immunize according to routine schedule.
Pneumococcal vaccine	Polysaccharide and/or conjugate vaccine depending on age.
❶ For specific vaccine schedule information, refer to Yukon Immunization Program, Section 8, Biological Products	

Individuals with a CSF leak (usually from a congenital malformation, skull fracture or neurologic procedure) are at increased risk for pneumococcal infection.

2.5 COCHLEAR IMPLANT

Recommended vaccines❶ for Cochlear Implant candidate or recipient	
All routine vaccines	Immunize according to routine schedule with the exception of the vaccines listed below.
Pneumococcal conjugate vaccine	Children identified for a cochlear implant before 1 year of age should be immunized according to the high risk schedule for pneumococcal conjugate vaccine. Children identified after 1 year of age who have completed an age-appropriate schedule, do not require an additional dose. (See Yukon Immunization Program, Section 8, Biological Products.)
Pneumococcal polysaccharide vaccine	Individuals should receive 1 dose of pneumococcal polysaccharide vaccine at 2 years of age or older, and at least 8 weeks after their final dose of pneumococcal conjugate vaccine (if applicable).
Hib vaccine	Incompletely immunized individuals 5 years of age and older require 1 dose.
❶ For specific vaccine schedule information, refer to Yukon Immunization Program, Section 8, Biological Products	

Children with cochlear implants are at increased risk of developing bacterial meningitis, most commonly caused by *streptococcus pneumoniae* (pneumococcus). There is no evidence that children with cochlear implants are more likely to get meningococcal meningitis than children without cochlear implants.
Some children who are candidates for cochlear implants may have factors that increase their risk of meningitis even before they receive a cochlear implant.

2.6 CYSTIC FIBROSIS

Recommended vaccines❶ for individuals with Cystic fibrosis	
All routine vaccines	Immunize according to routine schedule
Pneumococcal vaccine	Polysaccharide and/or conjugate vaccine depending on age.
Influenza vaccine	Immunize yearly (all those 6 months of age and older). LAIV may be used if not contraindicated (e.g., immune suppression).
❶ For specific vaccine schedule information, refer to Yukon Immunization Program, Section 8, Biological Products.	

Cystic Fibrosis (CF) is an inherited life-limiting disorder. It causes thick mucus to build up in the lungs, digestive system (and pancreas) and other organs. Most people with CF get recurrent respiratory infections and are at increased risk of respiratory complications. They also have problems digesting their food and, as a result, they may not gain weight as well as they should.

Individuals with CF are not considered immunosuppressed based on their CF diagnosis alone. However, some individuals may be immunosuppressed due to prolonged corticosteroid use. They are at increased risk to develop liver disease and may be considered for solid organ transplant (lung or liver). Refer to the following subsections as appropriate: 1.5.4 Immunosuppressive therapy, 1.5.6 Chronic Liver Disease and 1.5.8 Candidate for or recipient of solid organ or islet cell transplant.

2.7 DIABETES MELLITUS

Recommended vaccines❶ for individuals with Diabetes	
All routine vaccines	Immunize according to routine schedule.
Pneumococcal vaccine	Polysaccharide and/or conjugate vaccine depending on age.
Influenza vaccine	Immunize yearly (all those 6 months of age and older).
❶ For specific vaccine schedule information, refer to Yukon Immunization Program, Section 8, Biological Products.	

Individuals with diabetes mellitus 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 end-organ dysfunction. For these reasons, pneumococcal and annual influenza immunizations are highly recommended.

2.8 INDIVIDUALS WITH NEUROLOGIC DISORDERS

For the purposes of immunization, people with neurologic disorders may be divided into two categories: those with a pre-existing neurologic condition and those who developed symptoms of a new neurologic condition following immunization.

2.8.1 Pre-Existing Neurologic Conditions

Recommended vaccines❶ for those with pre-existing neurologic conditions	
All routine vaccines	Immunize according to routine schedule.
Influenza vaccine	Yearly immunization of those adults and children 6 months of age and older whose neurologic condition compromises clearance of respiratory secretions.
❶ For specific vaccine schedule information, refer to Yukon Immunization Program, Section 8, Biological Products.	

Disorders that usually begin in infancy (e.g., cerebral palsy, spina bifida, seizure disorder, 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 Guillain-Barré syndrome) 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 or demyelinating disorders such as multiple sclerosis.

Neurologic conditions whose onset clearly precedes immunization are not contraindications to subsequent immunization.

2.8.2 Those who Develop Symptoms of a New Neurologic Condition at any Time After Immunization

Neurologic events that occur in the 8 weeks following immunization are said to be temporally associated with immunization. This temporal association alone is not evidence that the vaccine caused the neurologic condition.

Children who experience hypotonic-hyporesponsive events or prolonged crying after receiving vaccine(s) may receive the next dose of vaccine according to schedule.

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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 upon direction of a medical specialist or CMOH.

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.

Guillain-Barré syndrome (GBS)

Individuals who developed GBS within 6 weeks of a previous dose of tetanus toxoid or influenza vaccine should **not** be re-immunized with that product. 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. A history of GBS is a relative contraindication to Menactra® vaccine. Assess the current and ongoing risk of meningococcal disease for individuals who have had an episode of GBS in the past and for whom Menactra® is indicated. Conduct a risk-benefit analysis and consider immunization if the risk of exposure is very high and the benefit clearly outweighs the risk of a recurrent episode of GBS. Consult the Immunization Program Manager.

2.9 WOMEN WHO ARE PREGNANT OR PLANNING A PREGNANCY

Recommended vaccines❶ during pregnancy	
All routine inactivated vaccines	May immunize according to routine schedule, taking into consideration risk of potential exposure during pregnancy (e.g., in an outbreak situation). The exception is HPV vaccine which is **contraindicated during pregnancy.**
Tdap vaccine❷	Tdap vaccine is recommended for pregnant people in every pregnancy, ideally between 27-32 weeks of gestation. Tdap should be provided irrespective of previous pertussis containing immunization history.
Influenza vaccine	Inactivated influenza vaccine is recommended at any stage of pregnancy. Live attenuated influenza vaccine is **contraindicated during pregnancy.**
MMR vaccine❸❺	**Contraindicated during pregnancy.**
Varicella vaccine❹❺	**Contraindicated during pregnancy.**

❶ For more information regarding specific vaccines during pregnancy refer to Canadian Immunization Guide, Part 3: Vaccination of Specific Populations, Immunization in Pregnancy and Breastfeeding or Yukon Immunization Program Manual, Section 8, Biological Products.

❷ NACI recommends immunization with Tdap vaccine should be offered in every pregnancy, irrespective of previous Tdap immunization history. Immunization with Tdap vaccine should ideally be provided between 27 and 32 weeks of gestation. Immunization between 13 and 26 weeks of gestation may also be considered in some situations (e.g. pregnancies with an increased risk of preterm delivery) to allow for longer placental exposure to higher antibody levels and maximization of antibody transfer. While it is preferable that immunization is administered in sufficient time before birth (i.e. 4 weeks) 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. If immunization was provided early in pregnancy (e.g. prior to recognition of pregnancy), it is not necessary to re-immunize after 13 weeks of gestation.

❸ MMR vaccine: is recommended postpartum or preconception for susceptible women. Advise women who are immunized to avoid pregnancy for 1 month following immunization. Rubella infection during pregnancy may cause congenital rubella syndrome (CRS), which can cause miscarriage, stillbirth, and fetal malformations. The highest risk of damage to the fetus following maternal infection occurs during the first trimester.

❹ Varicella vaccine: is recommended postpartum or preconception for susceptible women. Advise women who are immunized to avoid pregnancy for one month following immunization.

❺ Rh Immune Globulin (Rhlg): Women who receive Rhlg postpartum and are eligible for MMR and/or varicella vaccine should generally wait 3 months before being vaccinated with these vaccines. However, if there is a risk of exposure to measles, mumps, rubella, or varicella, a risk of pregnancy in the 3-month postpartum period, or a risk that vaccines may not be given later, MMR and/or varicella vaccines may be given prior to discharge with a second dose at the recommended interval if indicated. If MMR or varicella vaccine is given within 3 months of receipt of Rhlg, serologic testing for rubella or varicella should be done 3 months postpartum and at least 1 month after the final dose. Women who have not mounted an antibody response should be revaccinated.

Women Who Are Pregnant or Planning a Pregnancy

Pregnancy is a time when a healthy woman may have more contact with the medical system than at any other time. It is therefore an opportune time to assess her immunization status and administer any appropriate vaccines that will provide protection for both her and the neonate.
Although pregnancy is an immunologically altered state, there are no data to support an inadequate response to vaccines.

There are no data to indicate that any of the currently approved vaccines are teratogenic or embryotoxic, or have resulted in specific adverse pregnancy outcomes.

There are data to support the benefits of antenatal vaccines on the prevention of disease in the neonate. It is well documented that transplacental transfer of maternal antibodies (particularly IgG) occurs during pregnancy, mainly during the final trimester. Maternal IgG has a half-life of about 3-4 weeks in the newborn, waning during the first 24 weeks-12 months of life. Routine infant immunization schedules take into account the potential effect of circulating antibody in the infant.

Inactivated viral and bacterial vaccines, including toxoids, are considered safe during pregnancy and should be administered when indicated. When vaccines are administered in pregnancy there does not appear to be any evidence of increased risk of adverse events following immunization.

Live attenuated vaccines pose a theoretical risk to the fetus. There are occasions when administration of a non-routine live vaccine during pregnancy may be considered (e.g., pregnant traveler to a yellow fever endemic region). If a live vaccine is given inadvertently during pregnancy, termination of the pregnancy is not recommended.

Immunize women who plan to become pregnant or are pregnant, with special attention to those who will be in their third trimester of pregnancy during the influenza season (typically spanning November to April). Serious maternal morbidity (namely hospitalization) during seasonal influenza supports a recommendation for the immunization of healthy pregnant women, since rates of influenza-associated hospitalization increase with increasing length of gestation after the first trimester.

All pregnant women should be evaluated for immunity to mumps, measles, rubella and varicella, and in every pregnancy be tested for the presence of HBsAg.

There are no known risks to the fetus if a woman is given Ig preparations during pregnancy.

2.10 INFANTS BORN PREMATURELY

Recommended vaccines❶ for infants born prematurely	
All routine vaccines	Immunize according to routine schedule.
Influenza immunization	Immunize Yearly if infant is ≥ 6 months of age. Immunization of household contacts is especially important if infant is < 6 months of age.
Pneumococcal conjugate vaccine	Infants born at 32 weeks gestation or less are at risk of impaired lung function and should be assessed for the need for a 4-dose schedule of pneumococcal conjugate vaccine. Consider pneumococcal polysaccharide vaccine at 2 years of age if there is evidence of ongoing lung impairment.

❶ For specific vaccine schedule information, refer to Yukon Immunization Program Manual, Section 8 Biological Products.

Premature infants whose clinical condition is satisfactory should be immunized with age-appropriate doses of vaccine at the same chronological age and according to the same schedule as full term infants, regardless of birth weight. Antibody response to immunization is generally a function of chronological age rather than maturity and vaccine efficacy is high in premature infants.

As most of the transfer of maternal IgG antibody occurs during the third trimester of pregnancy, infants born prematurely have lower maternal antibody titers 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. All infants and children < 2 years of age are considered to be at high risk of significant morbidity and mortality from influenza. This includes infants born prematurely and is especially significant for those infants with chronic complications of preterm birth.

Preterm and low birth weight infants tolerate immunizations well. Low rates of adverse events are similar to those of full-term infants.

Premature and very low birth weight infants (i.e., 1500gm) still hospitalized at time of immunization may experience a transient increase or recurrence of apnea and bradycardia following immunization. This resolves within 48 hours and does not alter the overall clinical progress of the child. It is recommended that hospitalized premature infants have continuous cardiac and respiratory monitoring for 48 hours after their first immunization.

2.11 RSV PREVENTION PROGRAM

Respiratory Syncytial Virus (RSV) monoclonal antibody (Palivizumab) is indicated for certain premature infants. In the Yukon the full cost of the drug Palivizumab is covered to prevent a serious lower respiratory tract infection caused by the Respiratory Syncytial Virus (RSV) in infants who are less than two years of age at the start of the RSV season and who are at high risk for RSV disease. Refer to https://www.canada.ca/en/public-health/services/publications/vaccines-immunization/palivizumab-respiratory-syncitial-virus-infection-infants.html for more information on RSV protection.

Synagis® is only administered to at risk children who have received approval to be enrolled in the program. To request Synagis®, **a physician in the Yukon must** complete the Yukon RSV Immunoprophylaxis Program Application Form. This must be completed each year of the program. Once approved, the Immunization Program will notify the responsible health center so arrangements can be made for date and time of the first or subsequent injection.

Each health center is responsible for advising their community physician that Synagis® has been approved for their client.

- Synagis® comes in a vial that must be kept refrigerated. The dose must be calculated based on 15 mg/kg body weight by IM injection.
- Dosage calculation = patient weight (kg) X 15 mg/kg ÷100 mg/ml. Round off dose to the nearest 5 mg.
- Second dose is administered in 21-28 days later. Subsequent doses are administered 28-30 days later.
- Synagis® is administered during the RSV season only (typically Nov - April). The end of the RSV prevention program will be conveyed to facilities by the Immunization Program.
- Synagis® does not interfere with any other immunization.

2.11.1 SYNAGIS® ADMINISTRATION PROCEDURE

1) Upon arrival to the health facility, weigh the infant
2) Calculate appropriate dose to be administered based on step 1
3) Administer appropriate dose as per product monograph
4) Enter SYNAGIS® in Panorama
5) Observe client with same procedure as any immunization (15 Minutes)
6) Set date for next injection

7) Advise Immunization Program at immunizationprogram@yukon.ca that Synagis® was administered. Include the following information: Panorama client ID, weight, dose given, and date of next appointment.

2.11.2 YUKON SYNAGIS® ACQUISITION PROCESS

1. The referral form is online at https://yukon.ca/en/immunization-manual under Section 5.

2. **Client is born out of territory:** RSV coordinator in designated jurisdiction completes RSV forms for Yukon infants in their care and who will be returning to Yukon during RSV season. RSV Program will send the referral to the clients' Health Centre and to the Yukon Immunization Program immunizationprogram@yukon.ca. The Yukon Immunization Program will then communicate with the Health Centre and plan for additional doses that may be required in territory if client is expected to return during the RSV season.

3. **Clients that are in territory:**
    a. **Eligible infant identified by physician:**
        i. Physician completes the referral and sends form to immunizationprogram@yukon.ca or fax (867)393-4357
        ii. Yukon Immunization Program notifies the responsible Health Centre
    b. Eligible infant identified by Health Centre:
        i. The responsible Health Centre sends the referral form to client's physician to complete.
            - *If a client does not have a physician indicate this on the referral form and send to immunizationprogram@yukon.ca for review by CMOH/MOH.*

4. RSV Forms requiring a further review are sent to the CMOH/MOH who will approve or deny application. The Immunization Program will advise the physician and health centre of outcome.

5. Immunization Program completes RSV order form. Approved RSV Program Forms forwarded to WGH Pharmacy and responsible Health Centres are advised.

6. WGH places order for SYNAGIS and distribution to the Health Centre is arranged. The Responsible Health Centre will be prepositioned with enough Synagis for at least 3 doses at a time based on the client's current weight.

- For facilities onboarded to Panorama Inventory, YIP will create the **initial Panorama requisition for the pre-positioned quantity** of Synagis on their behalf. Facilities are then responsible to receive and close initial order requisitions upon delivery.

7. The responsible Health Centre administers SYNAGIS as scheduled, See 2.11.1 SYNAGIS® Administration Procedure and documents in Panorama.

8. The Responsible Health Centre arranges follow-up with the client and advises the Immunization Program immunizationprogram@yukon.ca of the date for the next injection.

9. The Responsible Health Centre orders additional Synagis for any further doses as required including the date of the next injection and clients' current weight (weight within 2 weeks of next injection) to the Yukon Immunization Program immunizationprogram@yukon.ca by routine monthly ordering procedures (i.e., either by Panorama Inventory if the facility is onboarded or by email if not).

2.11.3 Dosing Schedule

The interval between the 1st and 2nd dose should be 21-28 days. The intervals between the 2nd and subsequent doses should be 28-30 days. Refer to Yukon Immunization Manual Section 8 for detailed product information.

Start of Season/First Dose: October 23, 2023
Yukon Immunization Program recommends that the first dose be administered to eligible infants on or after the week of October 23, 2023.

3.0 SELECT POPULATIONS

3.1 HEALTH CARE WORKERS

Recommended vaccines❶ for healthcare workers	
All routine vaccines	• Tetanus-diphtheria (Td) every 10 years, Tetanus-Dipheria-acellular Pertussis (Tdap) should be substituted for one of these doses, if acellular Pertussis was not previously received as an adult, varicella, MMR
Polio vaccine	• Primary immunization is recommended for all health care workers (HCW). • Those who have not completed a full primary series should have the series completed, regardless of the interval since the last dose.
Hepatitis B vaccine ❷	• Recommended and provided free to CN and YCDC personnel • EMS personnel- paid for by EMS
Influenza vaccine	• Immunize yearly.

❶ For specific vaccine schedule information, refer to Yukon Immunization Program Manual, Section 8, Biological Products.

❷ Individuals who received hepatitis B vaccine should be tested to determine protective status for hepatitis B. If anti-HBs is < 10IU/L but is detectable, provide one dose of vaccine and retest 1 month 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 1 month after the last dose.

Health care workers (HCWs) include persons who provide health care to patients or work in institutions that provide patient care. This includes individuals critical to the COVID-19 response.

Examples include: physicians, nurse practitioners, nurses, emergency medical personnel, pharmacists, dental professionals, allied health professionals such as PTs, RMTs, laboratory technicians; medical, dental, nursing and laboratory technician students; hospital volunteers; and administrative and support staff in health-care institutions.

HCWs are at risk of exposure to communicable diseases because of their contact with patients or material from patients with infections, both diagnosed and undiagnosed.

Maintenance of immunity against vaccine-preventable diseases is an integral part of a health care facility's occupational health program. Optimal usage of immunizing agents in hospital staff will not only safeguard the health of staff members but may, in some instances, also protect patients from becoming infected by hospital employees.

Hepatitis B Vaccine
Individuals are considered immune if they have completed a series of hepatitis B vaccine and one documented laboratory test that shows they have developed sufficient antibodies.
Childcare workers are **not** considered to be at increased risk of hepatitis B; immunization is not indicated for them except in exceptional circumstances where direct contact with infected blood or body fluids is a likely and ongoing risk.

Measles, Mumps, Rubella Vaccine
Although there is differing information available regarding the need for each of the antigens contained in MMR vaccine (based on birth year, previous illness and previous immunization), the only vaccine available and provided in YT is the combination product, MMR. There are no data indicating an increase in adverse events related to additional doses of MMR vaccine.
Administer the appropriate number of doses of MMR vaccine to any individual requiring protection against any of the antigens. See Section 8, Biological Products.

Influenza Vaccine
Influenza vaccination of HCWs has been shown to reduce the mortality and morbidity of patients under their care in long-term settings and to reduce worker illness during the influenza season.

Varicella Vaccine
Assess varicella susceptibility before immunization. A varicella susceptible individual is defined as an individual:

- with a history of varicella disease at < 12 months of age
- with no history of varicella disease at > 12 months of age, no history of herpes zoster, and no history of varicella immunization.

For persons ≥ 13 years of age with negative or unknown history of prior varicella infection, have serology done for VZV IgG to determine susceptibility.

Hepatitis A Vaccine
Prevention of hepatitis A transmission within a hospital or childcare facility should be based on the use of good hygiene practices and patient/childcare techniques, especially proper hand washing and management of potentially infected materials.

BCG Vaccine
Comprehensive application of infection control practices remains the primary strategy to protect health care workers from infection with *M. tuberculosis*.

3.2 INTERNATIONAL TRAVELERS

"The goal of a foreign travel consult is to assess the traveler's health risks while they are traveling and offering health education and vaccines to lower their risk."
Ideally, an international travel consultation should be commenced 8 weeks to 12 weeks in advance of travel to allow sufficient time for optimal immunization schedules to be completed. Even when there is insufficient time to complete immunizations prior to travel a consultation may be beneficial to the client.

Immunizations are often recommended for travel, but are not a part of the routine Yukon Immunization Program. If the client is not eligible for free vaccination because they are not in a high risk group, (ie Hep A or Hep B) or the immunization is never publicly funded (ie JEV, Typhoid, Zostavax) then the cost of the vaccine must be paid by the client, before the vaccines are ordered/administered.

"There is no single schedule for the administration of immunizations to travellers. Each schedule must be personalized. The immunization recommendations for travellers will vary according to the traveller's age, immunization history, existing medical conditions, countries to be visited, the duration and nature of travel (whether the traveller is staying in urban hotels or visiting remote rural areas), the legal requirements for entry into countries being visited and the amount of time available before departure." (CIG, http://www.phac-aspc.gc.ca/publicat/cig-gci/p03-10-eng.php). As a result of this complexity and the ever changing nature of disease epidemiology, the health care provider must access the most up to date resources prior to giving travel immunization recommendations.

Refer to individual vaccine information included in Section 8, Biological Products of the Yukon Immunization Program Manual, and approved online travel reference sites for the most up to date immunization recommendations. These references can be further augmented by the Canadian Immunization Guide (current edition) and International Travel and Health (current edition) for more in depth information on the subject.

Clients from Kwanlin Dun Health Centre and YCDC will receive all foreign travel vaccines at the Whitehorse Health Centre.

Contact Whitehorse Health Centre for current foreign travel clinic dates and times.

Yukon Guidelines take precedence over any guideline found in the Canadian Immunization Guide or other printed material distributed for reference, including the product monograph.

Complete the International Travel Planning Form for travel related immunizations; see Appendix A, for the form and completion instructions. See Section 9, Documentation Guidelines.

3.2.1 Tenants of International Travel Planning

Planning ahead is important

Set up a schedule for immunization that will allow the optimal use of time and vaccine. More than one vaccine can be given at the same time if different sites are used

Unless your health unit is dealing regularly with vaccines for foreign travel, these vaccines will not be routinely stocked. Thus, additional time is needed to order and receive these vaccines from Whitehorse General Hospital Pharmacy as required. Complete routine ordering process.

Obtain the client's immunization history if no or incomplete records are in Panorama. The client should provide a signed consent for request of the release of records from their last known place of immunization. See Section 9, Document Guidelines for entry of historic records into Panorama.

Refer clients that require malaria prophylaxis to a physician.

Vaccination against Traveler's diarrhea & cholera (ie Dukorol) are available over the counter at major pharmacies in Whitehorse.

Contact Whitehorse Health Centre by faxing a copy of the client's International Travel Planning form for assistance locating appropriate resources for discussing travel immunizations and planning for your client.

If convenient for the client, a foreign travel consult can be arranged at the Whitehorse Health Centre by appointment.

Advertise at a local travel agent, within the health facility and the community to indicate the need for up to date and special immunization for foreign travel and where the traveler can get this service.

3.2.2 *Approved International Travel References*

Travel Health Information
http://wwwnc.cdc.gov/travel/default.aspx
http://www.phac-aspc.gc.ca/tmp-pmv/index-eng.php

Advisories & Reports: International Travel
http://www.phac-aspc.gc.ca/tmp-pmv/pub-eng.php

Outbreaks
http://www.phac-aspc.gc.ca/ccdrw-rmtch/index-eng.php

Travel Health Clinics
http://www.phac-aspc.gc.ca/tmp-pmv/travel/clinic-eng.php

CATMAT Committee To Advise on Tropical Medicine and Travel
http://www.phac-aspc.gc.ca/tmp-pmv/catmat-ccmtmv/index-eng.php

WHO International Travel and Health
http://www.who.int/ith/en/
http://www.voyage.gc.ca/

3.2.3 *Yellow Fever*

Immunization against Yellow Fever can only be given at WHO approved vaccination centres, usually located at ports of exit and entry to a country. **Whitehorse Health Centre is the only Yellow Fever WHO approved centre in Yukon**. Yellow fever vaccine is given **by appointment only**, at Whitehorse Health Centre. If appropriate, fax the completed travel planning sheet to Whitehorse Health Centre to facilitate the International Travel Planning appointment. Contact Whitehorse Health Centre for dates & times available for clients to receive this immunization- specify the appointment is for Yellow Fever and/or other travel immunizations.

3.3 MALES WHO HAVE SEXUAL CONTACT WITH OTHER MALES

Recommended vaccines❶ for males who have sexual contact with other males	
All routine vaccines	Immunize according to routine schedule.
Hepatitis A vaccine	Immunize according to recommended schedule. Provided free, see high risk target groups
Hepatitis B vaccine	Immunize according to recommended schedule. Provided free, see high risk target groups
Human Papilloma Virus vaccine ❷	Provided free for those 9-26 years of age.
Influenza	Provided free for those 6 months of age and older.

❶ For specific vaccine schedule information, refer to Yukon Immunization Program Manual, Section 8, Biological Products.

❷ NACI recommends HPV vaccine (Gardasil®) for males who have sexual contact with other males who are 27 years of age and older, however it is not provided for free in Yukon.

3.4 INDIVIDUALS NEW TO CANADA

Recommended vaccines❶❷❹ for individuals new to Canada	
Diphtheria, tetanus, acellular pertussis, polio, hepatitis B, and Hib containing vaccine	• Individuals < 7 years of age. • Immunize according to routine schedule.
Tetanus, diphtheria, acellular pertussis vaccine (Tdap) IPV	• Individuals 7 to 18 years of age. • Complete routine series according to routine schedule.
Tetanus, diphtheria vaccine	• Individuals ≥ 18 years of age. • One dose of Tdap followed by 2 doses of Td.
IPV	• Individuals ≥ 18 years who may have contact with other refugees / immigrants from areas of countries where wild polioviruses are circulating (e.g., countries in Indian subcontinent and West Africa).
Hepatitis B vaccine	• All individuals ≤ 19 years. • Other individuals with specific health conditions or risk factors.
Meningococcal vaccine	• Individuals ≥ 12 months (1 dose). • Infants < 12 months of age: one dose at presentation and one dose at 12 months of age (at least 2 months after first dose).
MMR vaccine	• All individuals who are ≥ 12 months of age at time of presentation (2 doses one month apart).
Pneumococcal vaccine	• Conjugate vaccine: all individuals 2 months to 59 months of age. • Polysaccharide vaccine: all individuals ≥ 65 years of age and all individuals ≥ 2 years of age with certain health conditions.
Varicella vaccine	• All susceptible❸ individuals ≥ 12 months of age (≥ 12 months to 12 years of age, one dose; ≥ 13 years of age, two doses 6 weeks apart).

❶ For specific vaccine schedule information, refer to Yukon Immunization Program Manual, Section 3, Immunization Schedules and Section 8, Biological Products.

❷ All immunization recommendations are for routine immunizations. Individuals may be eligible for additional vaccines based on health conditions or other risk factors. Live vaccines may be contraindicated (i.e., if client is HIV positive or has another immunosuppressing condition).

❸ Assess varicella susceptibility before immunization. A varicella susceptible individual is defined as an individual:

- with a history of varicella disease at < 12 months of age
- with no history of varicella disease at > 12 months of age, no history of herpes zoster, and no history of varicella immunization.

For persons ≥ 13 years of age with negative or unknown history of prior varicella infection, have serology done for VZV IgG to determine susceptibility.

❹Any dose(s) of oral polio vaccine (OPV) received on or after April 1, 2016 will not be considered as a valid dose within the routine Yukon immunization schedule. For more information, see Section 8, Biological Products, Polio Vaccine

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Immunization of individuals who have newly arrived in Canada is challenging because:

- Immunization records may not exist
- Records that do exist may be difficult to interpret because of language barriers
- 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

Although the potency of vaccines administered in other countries can be generally assumed to be adequate, immunization schedules vary and the age at immunization, number of doses, and intervals between doses should be reviewed in determining the need for additional doses of vaccines.

Immunizations received outside Canada can be considered valid if the written documentation indicates the vaccine types, dates of administration, number of doses, intervals between doses, and age of the client at time of immunization are comparable with the current Canadian recommendations.

Only written documentation of immunization should be considered valid evidence of prior immunization. If you need assistance determining the validity of the immunizations or entering the record into Panorama, please contact the Immunization Program Manager.

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 components).

Internationally adopted children typically differ from refugee children in terms of their access to medical care and treatment before arrival in Canada. Many 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.

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.

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The following vaccines are in limited use in the developing world and, therefore, individuals from such areas are unlikely to have received them:

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

Information on vaccination schedules in other countries can be found at http://www.who.int/vaccines/GlobalSummary/Immunization/ScheduleSelect.cfm

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 hepatitis A endemic countries.
- 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(s) come from?
- Were they in an orphanage or refugee camp?
- When did they arrive in Canada?
- What 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
  - Age of client at time of immunization?
- What diseases were endemic in the country of previous residence?

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As part of the assessment, 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), depending on your scope of practice, see Clinical Practice Guidelines, order hepatitis C PCR or arrange for follow-up with a physician. Offer hepatitis A and B vaccines to individuals with hepatitis C infection.
- Human immunodeficiency virus (HIV): If an individual is from a country with high rates of HIV and HIV status is not known, 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 (may be due to circulating maternal antibodies), arrange for follow-up with a physician.

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. See 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 hepatitis A and B vaccines.

Tuberculin skin testing
Refer to:
YCDC TB Control - Tuberculosis Manual (2014).
Canadian Tuberculosis Standards, 7th ed,. (2014).

3.5 UNKNOWN OR UNCERTAIN IMMUNIZATION STATUS / INADEQUATE IMMUNIZATION RECORDS

In every instance, an attempt should be made to obtain the child's immunization records from the previous health care provider. Written documentation of immunization is preferred. Parental verbal reports of prior immunization correlate poorly with actual immunity and should not be accepted as evidence of immunization.
Routine serologic testing of children and adults without records to determine immunity is not practical. Instead, the following approach is recommended:

- Start all children and adults lacking written documentation of immunization on a primary immunization schedule as appropriate for their age.
- If indicated, give MMR, polio, Hib conjugate, pneumococcal polysaccharide and conjugate, meningococcal conjugate, varicella, hepatitis B and A, and influenza vaccines, without concern about prior receipt of these vaccines. An increase in adverse events following repeated vaccination with these antigens has not been demonstrated.
- There is no increase in adverse events following immunization of an individual previously infected with the antigen.
- Assess individuals who experience a serious local adverse event after administration of vaccines containing diphtheria, tetanus and pertussis. Contact Immunization Program Manager for further discussion.

For specific vaccine schedule information, refer Yukon Immunization Program, Section 8, Biological Products.

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