Alberta Health Services	Standard on the Immunization of Individuals with Chronic Health Conditions and/or Immunosuppression		
Section : 8	Immunization of Special Populations		**Standard #: 08.305**
Created by:	Province-wide Immunization Program, Standards and Quality		
Approved by:	Province-wide Immunization Program, Standards and Quality		
Approval Date:	June 1, 2015	**Revised:**	August 1, 2020

Preamble

AHS Province-wide Immunization Program Standards and Quality, Population, Public and Indigenous Health Division provides Public Health and other partners who administer provincially funded vaccines with ongoing and timely information relating to province-wide immunization program standards and quality. These standards are based on currently available evidence based information, Alberta Health (AH) policy, and provincial and national guidelines. Immunizers must be knowledgeable about the specific vaccines they administer.

Background

Chronic diseases and immunosuppression may increase an individual's risk of acquiring illness and/or result in more severe disease when vaccine preventable diseases occur. Therefore, it is important that individuals with these conditions receive all routinely recommended immunizations and immunizations recommended because of their specific health conditions unless contraindicated.

Purpose

The purpose of this standard is to outline which vaccines are recommended for individuals with specific chronic health conditions and/or immunosuppression. Only health conditions where special vaccines are recommended in addition to routine immunization recommendations are included in this standard. These are:

Not included in this standard:

- Solid organ and hematopoietic stem cell transplants. These are addressed separately in the *Standard for Immunization of Transplant Candidates and Recipients*.
- Post-exposure recommendations. This standard only includes pre-exposure immunization recommendations.

This standard is intended to provide general recommendations based only on the health condition. Immunization recommendations for specific individuals need to take into consideration each unique situation and set of circumstances.

This standard is not intended to stand alone. It should be used in conjunction with:

- *Vaccine Biological Pages* - for detailed information about each vaccine. The tables in this standard identify only which vaccines should be considered for each of the conditions. The vaccine biological pages should then be consulted for all detailed information including age considerations, scheduling, and reinforcing doses.
- *Standard for Contraindications and Precautions to Immunization* - for immunization precautions and/or contraindications that are due to these and other health conditions as well as other factors.
- *Standard for the Administration of Immunizations.*
- *Standard for Recommended Immunization Schedules.*
- *Standard for Individuals Presenting with Inadequate Immunization Documentation.*

Applicability

This standard applies to all immunizers providing provincially funded vaccine to members of the public with the health conditions covered in this standard.

Definitions

Definitions for chronic conditions and immunosuppression have been included in the specific sections.

Competency

In November 2008 the Public Health Agency of Canada published the Immunization Competencies for Health Professionals with a goal of promoting safe and competent practices for immunization providers. The following competencies outlined in that document are applicable for this standard:

- Populations Requiring Special Considerations – Recognizes and responds to the unique immunization needs of certain population groups.

Section 1: General Considerations

Individuals with the chronic health conditions listed in section 3 should be considered as high risk for the **additional vaccines** that are specially recommended as a result of the health condition. If adequate documentation cannot be found for the additional vaccines, these individuals should be offered re-immunization as per the guidelines in the *Standard for Individuals Presenting with Inadequate Immunization Documentation*.

Individuals with immunosuppression, as per section 2, should be considered high risk for **all recommended vaccines** including those routinely recommended. If adequate documentation of previously received immunizations cannot be found, they should be offered re-immunization as per the guidelines in the *Standard for Individuals Presenting with Inadequate Immunization Documentation*.
Individuals with chronic disease and/or immunosuppression may have a reduced immune response to vaccines. As a result, additional doses or higher doses may be recommended for some vaccines.

- For those who are immunosuppressed, immunecompetence may vary over time, depending on the condition, response to treatment, and side effects of treatment. See general principles in section 2 for timing considerations for immunization of immunocompromised individuals.
- In general, for individuals with chronic conditions, immune response generally declines as the disease progresses so it is best to immunize as early in the disease as possible.

Section 2: Persons with Immunocompromising Conditions

2.1 Definition of Immunocompromised

Numerous conditions and therapies can result in an immunocompromised state. Each individual is unique and must be assessed separately. Consultation with the treating physician may be required to determine if the client is considered to be immunocompromised. Immunocompromised states may be permanent or temporary and may vary over time.

Although many factors including aging, malnutrition, and stress may have an adverse effect on how well the immune system functions, these have not been included for the purposes of this standard. The conditions included in this standard are only those that cause immunosuppression that is considered significant enough to require special consideration when it comes to immunization.

2.2 General Information and Principles

The safety and effectiveness of vaccines in immunocompromised individuals are determined by the type of immunodeficiency and the degree of immunosuppression. The relative degree of immunodeficiency is variable depending on the underlying condition and can vary over time in many individuals.

Case-by-case medical consultation with the individual's attending physician may be recommended in order to determine the individual's degree of immunosuppression or immunodeficiency, and whether or not immunization is appropriate for the individual. In complex cases, referral to a physician with expertise in immunization and/or immunodeficiency is advised.

The decision to recommend for or against any particular vaccine will depend upon a careful analysis of the risks and benefits. There is potential for serious illness and death if immunocompromised individuals are under-immunized and every effort should be made to ensure adequate protection through immunization; however, the inappropriate use of live vaccines can cause serious adverse events in some immunocompromised individuals as a result of the uncontrolled replication of the vaccine virus or bacterium.

Recommendations for immunization may vary according to the severity of disease and the interval since the last treatment.

If possible, administer immunization at least 2 weeks (inactivated vaccines) or 4 weeks (live vaccine) before planned immunosuppression due to treatment or medications.

Inactivated vaccines may be administered to immunocompromised individuals if indicated, however the magnitude and duration of the vaccine-induced immunity are reduced.

Live vaccines are not generally recommended due to the risk of disease caused by the vaccine strains. However, in some less severely immunocompromised individuals, the benefits of live vaccines may outweigh the risks. Approval from the individual's attending physician must be obtained before proceeding with live vaccines.

- Children with a known or suspected family history of congenital or hereditary immunodeficiency that is a contraindication to immunization with live vaccines should not receive a live vaccine until their immune competence has been established. If the child has other than first-degree relatives with congenital immunodeficiency conditions or if multiple neonatal or infant deaths occurred within the child's immediate family, the provider should seek a medical consultation before proceeding with the administration of a live vaccine.

If serologic testing is available and there is a clear antibody correlate of protection, post-immunization antibody titres to determine the immune response and guide re-immunization and post-exposure management should be considered. See vaccine-specific biological pages for specific recommendations.

The following general principles can be used to help make decisions when immunizing immunocompromised individuals:

- Maximize benefit while minimizing harm.
- Susceptibility or degree of protection vary according to the degree of immune suppression. There may not be complete protection even when there is a history of childhood infection or previous immunization.
- Immunize at a time when maximum immune response can be anticipated.
  - Immunize early, before immunodeficiency begins, if possible.
  - Delay immunization if the immunodeficiency is transient (if this can be done safely).
  - In consultation with the treating physician, stop or reduce immunosuppression to permit better vaccine response, if appropriate.
- Consider the immunization environment broadly.
  - Household contacts of immunocompromised individuals should receive all routine immunization as appropriate, including measles, mumps, rubella, rotavirus and varicella vaccines. For more detailed information, refer to vaccine-specific biological pages.
  - Strongly encourage up-to-date immunization, including annual influenza vaccine, for all health care workers providing care to immunocompromised individuals.
- Avoid live vaccine unless:
  - Immunosuppression is mild and data are available to support their use. Consult with treating physician.
  - The risk of natural infection is greater than the risk of immunization.
- The magnitude and duration of vaccine-induced immunity are often reduced/suboptimal in immunocompromised individuals and therefore more frequent booster doses may be necessary.
- The immune response to vaccines may be suboptimal and the individual may remain susceptible despite appropriate immunization.

2.3 Acquired Complement Deficiency

Complement deficiency can be primary or secondary (acquired). Individuals receiving eculizumab (Soliris®), a terminal complement inhibitor, for conditions such as paroxysmal nocturnal hemoglobinuria are an example. These individuals are at increased risk of serious infections especially with encapsulated bacteria and should receive inactivated and live vaccines following routine immunization schedules as well as meningococcal vaccines (meningococcal conjugate ACYW and meningococcal B), pneumococcal vaccines (conjugate and polysaccharide) and haemophilus influenza type B vaccine.

In order to develop protection before the elevated risk occurs, individuals prescribed eculizumab (Soliris®), should receive the recommended doses of Hib, meningococcal and pneumococcal vaccines at least 2 weeks before receiving the first dose of Soliris® whenever possible. If this is not possible the individual may still receive the vaccine but the immune response may be diminished. Individuals who remain on eculizumab (Soliris®) should receive a booster of meningococcal conjugate ACYW and meningococcal B every 3 to 5 years.

Note: Medical consultation is recommended before proceeding with immunization.

Recommended Immunization for Individuals with ACQUIRED COMPLEMENT DEFICIENCY Refer to vaccine-specific biological pages for more detailed information.	
All age appropriate inactivated vaccines (diphtheria, tetanus, pertussis, polio, *Haemophilus influenzae* type b)	Recommended as per routine schedule.
Haemophilus influenzae type b	Recommended. Additional doses may be required, refer to vaccine biological page.
Hepatitis B	Recommended as per age eligibility and schedule.
HPV	Recommended as per age eligibility and schedule.
Influenza	Recommended routinely- inactivated vaccine only.
Meningococcal	Men-B and MenC-ACYW recommended.
Pneumococcal	PNEU-C13 and PNEUMO-P recommended. Refer to vaccine biological page for age eligibility and schedule.
Live Vaccines	
Measles Mumps Rubella	Recommended as per routine schedule. Contraindicated if on immunosuppressive therapy.
MMR-Var	Contraindicated
Rotavirus	Recommended as per routine schedule. Contraindicated if on immunosuppressive therapy.
Varicella	Recommended as per routine schedule. Contraindicated if on immunosuppressive therapy.

2.4 Congenital (Primary) Immunodeficiency States

- Medical consultation is recommended before proceeding with immunization.
- Generally inherited and include defects in antibody production (e.g., agammaglobulinemia, isotype and IgG subclass deficiencies, and common variable immunodeficiency), complement deficiencies, defects in one or more aspects of cell-mediated immunity, and mixed deficits (combined immunodeficiency).
- Individuals with defects in antibody and complement are highly susceptible to encapsulated bacteria such as Streptococcus pneumonia, Haemophilus influenza type b, and Neisseria meningitidis.
- Individuals with mixed (combined immunodeficiency) and T cell defects are particularly susceptible to virtually all viruses and some bacteria.
- Replacement immune globulin (IG) or pathogen-specific IG preparations may be used for individuals with antibody defects to provide protection from many vaccine-preventable infections but immunization is still recommended when possible, and not contraindicated. IG may interfere with the immune response to measles or varicella-containing vaccines.
- Inactivated vaccines should be administered according to routine schedules. Additionally, hepatitis B, Hib and pneumococcal (conjugate and polysaccharide) vaccines are recommended.
- Individuals with complement, properdin, factor D or primary antibody deficiencies should also receive meningococcal vaccines (MenC-ACYW and Men-B). See Biologicals for specific vaccines.
- Generally, live vaccines are contraindicated (particularly for individuals with T cell, natural killer T cell and mixed cellular and antibody defects (e.g., Severe Combined Immune Deficiency [SCID]), although some exceptions exist as indicated below:
    - **X-linked agammaglobulinemia**
        - All live vaccines are contraindicated.

- **Common Variable Immunodeficiency** (and known intact T cell immunity).
  - MMR and univalent varicella vaccines may be considered although regular immune globulin replacement therapy may affect the efficacy of the vaccines.
  - All other live vaccines (e.g., rotavirus, BCG, live attenuated influenza vaccine and oral typhoid) are contraindicated.
- **IgA deficiency with no concomitant defects in T cell function** can receive most live vaccines.
  - Live mucosal vaccines (rotavirus, LAIV, oral typhoid) are likely safe though there may be a lack of mucosal response. Some experts may prefer to use inactivated vaccines if available (e.g., inactivated influenza vaccine, parenteral typhoid vaccine).
  - Individuals with IgG subclass deficiencies can receive live vaccines although the response may be suboptimal. In addition, regular IG replacement therapy may diminish the vaccine response.
- People with **phagocytic and neutrophil disorders** (e.g. congenital neutropenia, leukocyte adhesion and migration defects, chronic granulomatous disease) may be vaccinated with MMR, rotavirus, univalent varicella, herpes zoster, LAIV or yellow fever vaccine, if indicated. Live bacterial vaccines (BCG and oral typhoid vaccine) are contraindicated.
  - Individuals with isolated neutropenia can receive live virus vaccines.
  - Individuals with neutropenia AND on immune suppressants or with concurrent cellular immune defects should not receive live virus vaccines.
- Individuals with **complement deficiency** (e.g., properdin or factor D deficiency) may receive any live vaccine if indicated.

Alberta is now screening newborns for Severe Combined Immune Deficiency (SCID) and metabolic screen results can be reviewed if there is a concern.

- The screening for SCID does not pick up all cases of significant combined immune deficiencies, therefore if there is a concern due to family history or symptoms, review by immunology should be pursued prior to giving live vaccines.
- If the child has other than first-degree relatives with congenital immunodeficiency conditions or if multiple neonatal or infant deaths occurred within the child's immediate family, the provider should seek a medical consultation before proceeding with the administration of a live vaccine.

Note: Medical consultation is recommended before proceeding with immunization.

Recommended Immunization for Individuals with CONGENITAL IMMUNODEFICIENCY STATES Refer to vaccine-specific biological pages for more detailed information.	
All age appropriate inactivated vaccines (diphtheria, tetanus, pertussis, polio, *Haemophilus influenzae* type b)	Recommended as per routine schedule.
Haemophilus influenzae type b	Recommended. Additional doses may be required; refer to vaccine biological page.
Hepatitis B	Recommended
HPV	Recommended as per age eligibility and schedule.
Influenza	Recommended routinely - inactivated vaccine only.
Meningococcal	Men-B and MenC-ACYW recommended only for individuals with complement, properdin, factor D or primary antibody deficiencies.
Pneumococcal	PNEU-C13 and PNEUMO-P recommended. Refer to vaccine biological page for age eligibility and schedule.
Live Vaccines	
Measles Mumps Rubella	Contraindicated for individuals with B cell deficiency with X-linked agammaglobulinemia T-cell, natural killer T-cell and mixed cellular or primary antibody deficiencies. Should be considered for other congenital immunodeficiencies. Consultation with specialist required.
MMR-Var	Contraindicated
Rotavirus	Recommended as per age eligibility and routine schedule. Contraindicated for individuals with B cell deficiency with X-linked agammaglobulinemia and Common Variable Immunodeficiency. Contraindicated for individuals with T cell, natural killer T-cell mixed cellular or primary antibody deficiencies.
Varicella	Contraindicated for individuals with B cell deficiency with X-linked agammaglobulinemia, T-cell, natural killer T-cell and mixed cellular or primary antibody deficiencies. Should be considered for other congenital immunodeficiencies. Consultation with specialist required.

2.5 Human Immunodeficiency Virus (HIV)

HIV infects multiple cells in the body, but its main target is the CD4 lymphocyte, also called the T-cell or CD4 cell. The degree of immunosuppression of individuals with HIV infection can vary widely depending on disease progression and response to treatment. A recent CD4 count and CD4 percentage reflects an approximate prediction of the level of immunosuppression. Elevated viral loads may diminish the effectiveness of some vaccines although this is not a reason to delay immunization.

Screening for HIV infection is not necessary prior to immunization. For optimal response to immunization, individuals with HIV infection should be immunized as early in the course of disease as possible; however there is no contraindication to the use of inactivated vaccines at any time. Live vaccines should be given only in consultation with the infectious disease specialist/immunologist.

Timing of immunization is important in order for the individual to receive an optimal response to the vaccines. Response to immunization may be inadequate and passive immunoprophylaxis or chemoprophylaxis should be considered after exposure to vaccine preventable diseases even if appropriately immunized. Medical consultation with attending physician is recommended before proceeding with immunization.

Infants born to HIV positive mothers are at risk for immunodeficiency in the first year of life. These infants and HIV-infected children and adults should be immunized in consultation with an infectious disease specialist.

There are no contraindications to the use of some live vaccines (MMR, VZ, rotavirus) early in the course of the illness. BCG, small pox, and oral live typhoid vaccines are contraindicated and LAIV is not recommended. As the disease progresses, the risk of using live vaccines increases and consensus "cut-offs" based on clinical and immunologic categories have been determined for the use of MMR and univalent varicella vaccines as follows:

- Measles-mumps-rubella vaccine (MMR): HIV-infected children 12 months of age and older, and with Centers for Disease Control and Prevention (CDC) clinical category N, A or B and immunologic category 1 or 2 (i.e., CD4 counts ≥15%) may receive two doses of MMR vaccine 3 - 6 months apart. Immunization with two doses of MMR vaccine administered three months apart may be considered for susceptible HIV-infected adolescents and adults with CD4 cell count ≥200 x 10^6/L and CD4 percentage ≥15%. MMR vaccine is contraindicated in persons with advanced HIV/AIDS
- Univalent varicella vaccine: HIV-infected children 12 months of age and older, and with CDC clinical category N, A or B and immunologic category 1 or 2 (i.e., CD4 percentage ≥15%) may receive two doses of univalent varicella vaccine 3 - 6 months apart. There are no published data on the use of varicella vaccine in susceptible HIV-infected adolescents and adults. Based on expert opinion, immunization with two doses of univalent varicella vaccine administered three months apart may be considered for HIV-infected adolescents and adults without evidence of immunity with CD4 cell count ≥200 x 10^6/L and CD4 percentage ≥15%. (Evidence of immunity includes: two documented doses varicella containing vaccine, lab evidence of varicella immunity, or lab confirmation of varicella disease). Varicella vaccine is contraindicated in persons with advanced HIV/AIDS
- Children with symptomatic HIV/AIDS sometimes receive intramuscular immune globulin as prophylaxis against infection. The immune globulin may interfere with their antibody response to live vaccines; therefore, it may be advisable to delay administration of vaccines as long as possible after immune globulin receipt. This situation should be discussed with the child's physician(s) and parents.
- Children with symptomatic HIV infection (i.e. low CD4 count or presence of opportunistic infection) should receive immune globulin if exposed to measles, even if they have received MMR vaccine. Children who have received immune globulin intravenously within two weeks of exposure to measles do not require additional passive immunization. Unimmunized children who receive immune globulin for measles exposure should not receive measles immunization for six months following the administration of immune globulin. Consult with physician for immune globulin when measles IgG positive and HIV symptomatic.
- Rotavirus vaccine: Infants born to HIV positive mothers can safely receive rotavirus vaccine and should receive rotavirus vaccine according to the routine schedule. The majority (>99%) of these infants will not be infected with HIV. If they become infected, they do not become significantly immunocompromised until later in infancy (after rotavirus vaccine has been administered). If the infant is known to have severe immunodeficiency, consultation with a specialist is still recommended.

Note: Medical consultation with attending physician is recommended before proceeding with immunization.

Recommended Immunization for Individuals with HIV INFECTION Refer to vaccine-specific biological pages for more detailed information.	
All age appropriate inactivated vaccines (diphtheria, tetanus, pertussis, polio, *Haemophilus influenzae* type b)	Recommended as per routine schedule.
Haemophilus influenzae type b	Recommended. Additional doses may be required, refer to vaccine biological page.
Hepatitis A	Recommended only if ongoing lifestyle risks of infection for hepatitis A.
Hepatitis B	Recommended (hyporesponsive dose/schedule). Refer to vaccine biological page for recommendations for age eligibility and schedule.
HPV	Refer to biological page for recommendations for age eligibility and schedule.
Influenza	Recommended routinely - inactivated vaccine only.
Meningococcal	Men-B and MenC-ACYW recommended.
Pneumococcal	PNEU-C13 and PNEUMO-P recommended. Refer to vaccine biological page for recommendations for age eligibility and schedule.
Tuberculin Skin Test	Recommended
Live Vaccines are generally contraindicated with the following exceptions which may be given under the direction of the attending ID specialist.	
MMR	May be considered depending on level of immunosuppression. Must be given under the direction of the Infectious Diseases (ID) specialist. MMR is contraindicated in persons with advanced HIV/AIDS.
MMR-Var	Contraindicated
Rotavirus	If not significantly immunocompromised.
Varicella	May be considered depending on level of immunosuppression. Must be given under the direction of the Infectious Diseases (ID) specialist. VZ is contraindicated in persons with advanced HIV/AIDS.

2.6 Immunosuppressive Therapy

- Medical consultation with the individual's physician(s) is recommended regarding the appropriateness of immunization for individuals whose immune status may be suppressed within the past three months by immunosuppressive therapy (such as, long-term steroids, cancer chemotherapy, radiation therapy, total body irradiation, azathioprine, cyclosporine, cyclophosphamide and infliximab).
- The following corticosteroid therapies do not generally result in immunosuppression that would contraindicate immunization:
  - Short-term therapy (less than 14 days)
  - Low to moderate dose of prednisone or equivalent (less than 2 mg/kg/day) or less than 20 mg/day if weight is greater than 10 kg.
  - Long-term, alternate-day treatment with short-acting preparations.
  - Maintenance physiologic replacement therapy.
  - Administered topically, inhaled, or locally injected (e.g., joint injection).

- Long-term immunosuppressive therapy is used for organ transplantation and a range of chronic infections and inflammatory conditions (e.g., inflammatory bowel disease, psoriasis, systemic lupus erythematosis). These therapies have their greatest impact on cell-mediated immunity, although T-cell dependent antibody production can also be adversely affected.
- Immunization status should be reviewed prior to the initiation of immunosuppressive therapy and any age-appropriate vaccines recommended should be administered prior to the initiation of immunosuppressive therapy so that optimal immunity is achieved.
- Inactivated vaccines:
    - Inactivated vaccines should be administered at least 14 days before the initiation of immunosuppressive therapy, when possible, to optimize immunogenicity or delayed until at least three months after immunosuppressive medications have stopped. Although they can be administered safely at any time before, during or after immunosuppression every effort should be made to time immunization so that optimal immunogenicity will be achieved. Immunization should be delayed until at least three months after immunosuppressive drugs have been stopped or until such therapy is at the lowest possible level.
    - Active verification of immune status and aggressive re-immunization may be important for some individuals.
    - Routine immunization is recommended as well as pneumococcal (conjugate and polysaccharide) vaccines.
    - Vaccines may be administered four weeks after discontinuation of high-dose systemic steroids. If needed for post-exposure or outbreak management consultation with physician is recommended before proceeding with immunization.
- Live vaccines:
    - Live vaccines should be administered at least four weeks before immunosuppressive therapy begins to reduce the risk of disease caused by the vaccine strain. Live vaccines are generally contraindicated during and for at least three months after the immunosuppressive drugs have been discontinued.
    - Generally only high-dose systemic steroids (e.g., 2 mg/kg or more per day for a child or 20 mg or more of prednisone or its equivalent per day for an adult) can interfere with vaccine-induced immune responses.
    - Vaccines may be administered four weeks after discontinuation of high-dose systemic steroids. If needed for post-exposure or outbreak management consultation with physician is recommended before proceeding with immunization.
- Some chronic cancer therapies are hormonal (such as tamoxifen, gonadotropin release inhibitors) and have no significant immunologic effects. Some therapies for inflammatory conditions (such as hydroxychloroquine, sulfasalazine, or auranofin) are not considered immunosuppressive.
- Hepatitis B vaccine should be offered to individuals with inflammatory bowel disease anticipating the initiation of long term (greater than 14 days) immunosuppressive therapies.
- Summary Table for Immunizations when on Biologics (in this context refer to monoclonal anitbodies or small molecule proteins that target specific pathways in the immune system for immunosuppression. Often they end in the suffix –mab,-cept or –kin.

	Infant whose mother was on biologic(s) during pregnancy (Especially rituximab)	Infant who is being breast fed and their mother is on biologic(s)	Individual is on biologic(s)
All Inactivated vaccines	Recommended as appropriate for age and eligibility	Recommended as appropriate for age and eligibility	Recommended as appropriate for age and eligibility
Live vaccines: Rotavirus Rotavirus can be given if immunologic testing suggests no abnormalities.	Consult with MOH or Special Immunization Clinic for immunologic testing	Recommended as appropriate for age and eligibility	Contraindicated
Live vaccines: MMR, Varicella, MMR-V (12 months of age or older)	Generally not applicable as maternal biologics only persist for 6 months in the infant *if MMR is required/recommended for travel under 1 year of age consult with MOH	Recommended as appropriate for age and eligibility	Contraindicated

- Monoclonal antibodies:
  - Are laboratory-produced substances that can bind to specific molecules with the purpose of modulating or inhibiting immune responses.
  - As with other immunosuppressive therapy, immunization should be administered prior to beginning the therapy or delayed until at least 3 months after the therapy has ended. Consultation with physician is recommended.
  - Infants, who have been exposed to rituximab, during pregnancy, should have a medical consultation with child's physician prior to immunization.
  - Immune responses to live vaccine that are administered after one year of age (e.g. MMR or MMRV vaccine) are not considered to be affected by utero exposure to monoclonal antibodies. Infants exposed to monoclonal antibodies in utero should receive all inactivated vaccines according to routine schedule.

    NOTES from CIG:
    - Rituximab taken during pregnancy is associated with B cell depletion in both mother and fetus. A longer interval of 6-12 months should be observed following rituximab therapy.
    - Infliximab can be detected in infants up to 6 months after birth.
    - Palivizumab which is specific for the prevention of respiratory syncytial virus (RSV) infection; will not interfere with the response to a live vaccine.

Monoclonal antibodies administered to the mother during breastfeeding are thought to have very little or no impact on the infant. Transfer of monoclonal antibodies through breast milk is limited, and the minimal quantities that are ingested are likely to be broken down in the infant's gastrointestinal tract. Infants of breastfeeding women receiving monoclonal antibody treatment should therefore be immunized with both live and inactivated vaccines according to routine schedules.

Immunosuppressive Medications/Treatment Please note that this list is not exhaustive. If uncertain whether a specific medication or treatment is immunosuppressive, the product monograph and/or the treating physician should be consulted. AHS Provincial Drug Formulary may be referenced for more information.	
Generic Name	**Examples of Trade Names**
6-mercaptopurine	PURINETHOL®
Abatacept	Orencia™
Adalimumab	Humira®
Alemtuzumab	MabCampath®
Anti-thymocyte globulin	Anti-thymocyte globulin
Azathioprine	IMURAN
Basiliximab	SIMULECT™
Cancer Chemotherapies (except tamoxifen and hydroxyurea)	
Corticosteroids - high dose systemic (2 mg/kg per day for children under 10 kg or 20 mg/day for adults and children over 10 kg or more of prednisone or its equivalent) for 14 days or more.	
Cyclophosphamide	PROCYTOX, CYTOXAN
Cyclosporine	NEORALT™
Etanercept	Enbrel®
Infliximab	REMICADE®
Leflunomide	ARAVA®
Methotrexate	
Mitoxantrone	
Mycophenolatemofetil	CellCept®
Radiation- current or recent	
Rituximab	RITUXAN®
Sirolimus	Rapamune®
Tacrolimus	Prograf®

Note: For Eculizumab (Soliris®) - refer to *Acquired Complement Deficiency* section.

Exceptions to the above recommendations:
Exceptions may occur during notifiable disease and outbreak management situations and on a case-by case basis in consultation with the MOH.

Recommended Immunization for Individuals on IMMUNOSUPPRESSIVE THERAPY Refer to vaccine-specific biological pages for more detailed information.	
All age appropriate inactivated vaccines (diphtheria, tetanus, pertussis, polio, *Haemophilus influenzae type b*)	Recommended as per routine schedule.
Hepatitis B	Recommended as per age eligibility and schedule
Influenza	Recommended routinely - inactivated only.
Pneumococcal	PNEU-C13 and PNEUMO-P recommended. Refer to vaccine biological page for age eligibility and schedule.
Tuberculin Skin Test	Recommended.
Live Vaccines	
Measles Mumps Rubella	Generally contraindicated. Consultation with specialist required.
MMR-Var	Contraindicated
Rotavirus	Generally contraindicated if on immunosuppressive therapy. Consultation with specialist required.
Varicella	Generally contraindicated. Consultation with specialist required. If authorized, use Varilrix® only.

2.7 Malignant Hematologic Disorders

Individuals with leukemia, lymphomas or other malignant neoplasms affecting the bone marrow or lymphatic systems (e.g., leukemia, lymphoma, Hodgkin's disease, multiple myeloma), are immunosuppressed as a result of their underlying condition. They may also be immunocompromised as a result of treatments such as chemotherapy and/or radiation therapy. The amount of immunosuppression varies greatly depending on the type of cancer and treatment used.

Some malignancies such as Hodgkin's and, to a lesser degree, non-Hodgkin's lymphomas can have a significant impact on cell-mediated immunity which can persist even after cure. Other malignancies such as multiple myeloma and B-cell chronic lymphocytic leukemia are associated with humoral immunity deficiencies and individuals with these conditions are more susceptible to encapsulated bacteria.

During active chemotherapy and shortly thereafter, antibody responses are impaired; therefore, ensure that at least three months have passed since the completion of chemotherapy before immunizing. If individuals have received rituximab it is recommended to wait at least 6 months before immunizing. Inactivated vaccine doses administered during cancer chemotherapy should not be considered valid doses unless there is documentation of a protective antibody response.

Live vaccines are contraindicated for individuals with severe immunodeficiency due to blood dyscrasias, lymphomas, leukemias of any type or other malignant neoplasms affecting the bone marrow or lymphatic systems and those undergoing immunosuppressive treatment for malignancy.

Generally, individuals who are more than 3 years post therapy and no longer on immunosuppressive medications would be considered healthy and should be assessed for immunizations as per the general population.

Individuals, including children, in remission from Acute Lymphocytic Leukemia (ALL) for at least 12 months may be considered for MMR vaccine and/or varicella vaccine. Consultation with physician is recommended.

Individuals who are recipients of Hematopoietic Stem Cell Transplants (HSCT) require special consideration. Refer to Standard *for Immunizing Clients Who Have Had or Will be Having a Transplant*.

Note: Medical consultation is recommended before proceeding with immunization.

Recommended Immunization for Individuals with MALIGNANT HEMATOLOGIC DISORDERS Refer to vaccine-specific biological pages for more detailed information.	
All age appropriate inactivated vaccines (diphtheria, tetanus, pertussis, polio, *Haemophilus influenzae* type b)	Recommended as per routine schedule.
Haemophilus influenzae type b	Recommended. Additional doses may be required; refer to vaccine biological page.
Hepatitis B	Recommended as per age eligibility and schedule.
HPV	Recommended as per age eligibility and schedule.
Influenza	Recommended routinely- inactivated vaccine only.
Meningococcal	Men-B and Men-ACYW recommended only if asplenic
Pneumococcal	PNEU-C13 and PNEUMO-P recommended. PneuC13 Recommended as per age eligibility and schedule
Tuberculin Skin Test	Recommended
Live Vaccines	
Measles Mumps Rubella	Contraindicated.
MMR-Var	Contraindicated.
Rotavirus	Contraindicated.
Varicella	Contraindicated.

2.8 Malignant Solid Tumours (and on immunosuppressive therapy)

Inactivated vaccines should be administered according to routine immunization schedules. Pneumococcal vaccines (conjugate and polysaccharide) are recommended before individuals begin immunosuppressive therapies. Refer to the Biological Product pages – Pneumococcal vaccines.

Live vaccines are contraindicated in people undergoing immunosuppressive treatment for any malignant solid tumours.

In general, if an individual is 3 months post-chemotherapy and the cancer is in remission, the person is no longer considered immunocompromised.

Note: Medical consultation is recommended before proceeding with immunization

Recommended Immunization for Individuals with MALIGNANT SOLID TUMOURS (and on immunosuppressive therapy) Refer to vaccine-specific biological pages for more detailed information.	
All age appropriate inactivated vaccines (diphtheria, tetanus, pertussis, polio, *Haemophilus influenzae* type b)	Recommended as per routine schedule.
Hepatitis B	Recommended as per age eligibility and schedule.
HPV	Recommended as per age eligibility and schedule.
Influenza	Recommended routinely - inactivated vaccine only.
Pneumococcal	PNEU-C13 and PNEUMO-P recommended. Refer to vaccine biological page for recommendations for age eligibility and schedule.
Tuberculin Skin Test	Recommended.
Live Vaccines	
Measles Mumps Rubella	Contraindicated.
MMR-Var	Contraindicated.
Rotavirus	Contraindicated.
Varicella	Contraindicated.

Section 3: Persons with Chronic Health Conditions

Chronic health conditions may increase an individual's risk of infection and/or increase the risk of severe infection.

3.1 Asplenia/Hyposplenia (functional or anatomical)

Individuals with functional or anatomic asplenia/hyposplenia have no spleen (congenital or surgical) or a medical condition that results in absent or poor splenic function. A number of conditions can lead to functional asplenia (e.g., sickle-cell anemia, thalassemia major/intermedia or hemoglobin H disease). (Note: thalassemia carrier and thalassemia trait does not lead to functional asplenia.)

The spleen plays an important role in the body's immune system. When the spleen is absent or not functioning properly, there is an increased risk of fulminant bacteremia, associated with a high mortality rate, caused by a variety of pathogens, particularly encapsulated polysaccharide bacteria (e.g., pneumococcal, meningococcal, and Hib bacteria). Risk is highest in the first 2 years following splenectomy, but remains elevated for life.

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). However, many of these conditions do not require the additional vaccines recommended for asplenia/hyposplenia.

- Individuals with sickle cell anemia should be considered hyposplenic and immunized accordingly.
- When there is the potential for altered splenic function related to other underlying conditions, the treating physician or specialist should be consulted about whether or not splenic function is compromised.

Parents of children with asplenia and adults with asplenia should be aware that all febrile illnesses are potentially serious for those with asplenia and immediate **medical attention for ALL febrile events, including those following immunization, should be sought**.

Timing of immunization:

When splenectomy surgery is planned, vaccines should be administered at least 2 weeks before surgery whenever possible. Case by case consultation with the treating physician and MOH is recommended if there will be less than 14 days between vaccine administration and splenectomy.

In the case of an emergency splenectomy, or when vaccines have not been given prior, vaccines should be given 2 weeks after the splenectomy for optimal vaccine response. If the individual is discharged earlier and there is a significant concern that he/she might not present to Public Health, vaccines can be initiated before discharge, with follow-up by Public Health for additional doses recommended.

Recommended Immunization for Individuals with ASPLENIA (Functional and Anatomical) Refer to vaccine-specific biological pages for more detailed information.	
All age appropriate inactivated vaccines (diphtheria, tetanus, pertussis, polio, *Haemophilus influenzae* type b)	Recommended as per routine schedule.
Haemophilus influenzae type b	Recommended
Hepatitis B	Recommended for individuals receiving repeated infusions of blood/blood products (e.g., sickle cell disease). Refer to vaccine biological page for recommendations for age eligibility and schedule.
HPV	Refer to vaccine biological page for recommendations for age eligibility and schedule.
Influenza	Recommended routinely.
Meningococcal	Men-B and MenC-ACYW recommended. Refer to vaccine biological page for age eligibility and schedule.
Pneumococcal	PNEU-C13 and PNEUMO-P recommended. Refer to vaccine biological page for age eligibility and schedule.
Live Vaccines	
All age appropriate live vaccines (measles, mumps, rubella, varicella, rotavirus)	Recommended as per routine schedule. If needed, two doses of varicella-containing vaccine should be administered with an interval of at least three months between doses instead of six weeks apart as routinely recommended for adolescents and adults.

3.2 Chronic Cardiac Disease

Individuals with chronic heart disease should receive pneumococcal vaccine (conjugate followed polysaccharide for children and polysaccharide for adults) as well as routinely recommended vaccines.

Recommended Immunization for Individuals with Cardiac Disease (chronic) Refer to vaccine-specific biological pages for more detailed information.	
All age appropriate inactivated vaccines (diphtheria, tetanus, pertussis, polio, *Haemophilus influenzae* type b)	Recommended as per routine schedule.
Hepatitis B	Recommended as per age eligibility and schedule.
Human Papillomavirus	Recommended as per age eligibility and schedule.
Influenza	Routinely recommended
Pneumococcal	PNEU-C13 and PNEUMO-P recommended. Refer to vaccine biological page for age eligibility and schedule.
Live Vaccines	
All age appropriate live vaccines (measles, mumps, rubella, varicella, rotavirus)	Recommended as per routine schedule.

3.3 Chronic Inflammatory Diseases

Includes individuals with inflammatory arthropathies (e.g. systemic lupus erythematosus (SLE), rheumatoid or juvenile arthritis etc.), inflammatory dermatological conditions (e.g. psoriasis, severe atopic dermatitis and eczema); and inflammatory bowel disease (e.g. Crohn's disease, ulcerative colitis).

Individuals with chronic inflammatory diseases not being treated with immunosuppressive drugs are not considered significantly immunocompromised and can receive all recommended routine immunization. Rheumatic disease modifying agents, such as hydroxycholoroquine, sulfasalazine, or auranofin are not generally identified as immunosuppressive.

If being treated with immunosuppressive therapy, ensure routine immunizations are up-to-date. Refer to Immunosuppressive therapy section for guidelines and immunization indications.

If possible, individuals should receive all routinely recommended vaccines and pneumococcal vaccine (conjugate and polysaccharide) prior to starting immunosuppressive therapy.

- Live vaccines are generally contraindicated for individuals on immunosuppressive therapy. Live vaccines should be administered at least 4 weeks prior to initiation of immunosuppressive therapy to reduce the risk of disease caused by the vaccine strain. Consult with individual's physician prior to giving live vaccines when immunosuppressive therapy is planned.
- Inactivated vaccines should be given at least 14 days prior to the start of immunosuppressive therapy so that optimal immunogenicity is achieved. However, when this is not possible inactivated vaccines can be safely administered at any time before, during or after immunosuppression.

Recommended Immunization for Individuals with Chronic Inflammatory Diseases Refer to vaccine-specific biological pages for more detailed information.	
All age appropriate inactivated vaccines (diphtheria, tetanus, pertussis, polio, *Haemophilus influenzae* type b)	Recommended as per routine schedule.
Hepatitis B	Recommended as per age eligibility and schedule.
HPV	Recommended as per age eligibility and schedule.
Influenza	Routinely recommended.
Pneumococcal	PNEU-C13 recommended due to condition if starting on immunosuppressive therapy. Refer to vaccine biological page for age eligibility and schedule. PNEUMO-P recommended. Refer to vaccine biological page for age eligibility and schedule.
Live Vaccines	
All age appropriate live vaccines (measles, mumps, rubella, varicella, rotavirus)	Generally contraindicated if on immunosuppressive therapy.

3.4 Cochlear Implants

A cochlear implant is an electronic prosthetic device designed to provide hearing to individuals with profound deafness. Part of the device is implanted surgically into the inner ear and stimulates the auditory nerve directly, and part of the device is worn externally.

Individuals approved for cochlear implant surgery as well as past implant recipients should be considered at risk for bacterial meningitis. They should receive all routine immunizations and Hib and pneumococcal vaccines (conjugate followed by polysaccharide).

In order to develop protection before the elevated risk occurs, individuals should receive recommended Hib and Pneumococcal vaccines at least 2 weeks prior to cochlear implant surgery whenever possible. If this is not possible, immunization may be provided at any time before or after surgery if the individual meets the fit to immunize criteria.

Recommended Immunization for Individuals who are CANDIDATES/ RECIPIENTS OF COCHLEAR IMPLANTS Refer to vaccine-specific biological pages for more detailed information.	
All age appropriate inactivated vaccines (diphtheria, tetanus, pertussis, polio, *Haemophilus influenzae* type b)	Recommended as per routine schedule.
Haemophilus influenzae type b	Recommended. Additional doses may be required; refer to vaccine biological page.
Hepatitis B	Recommended as per age eligibility and schedule.
HPV	Recommended as per age eligibility and schedule.
Influenza	Recommended routinely.
Pneumococcal	PNEU-C13 and PNEUMO-P recommended. Refer to vaccine biological page for age eligibility and schedule.
Live Vaccines	
All age appropriate live vaccines (measles, mumps, rubella, varicella, rotavirus)	Recommended as per routine schedule.

3.5 Endocrine and Metabolic Disease

Individuals with diabetes should receive pneumococcal vaccine (Children should receive conjugate followed by polysaccharide vaccine and adults should receive polysaccharide).

Recommended Immunization for Individuals with Endocrine and Metabolic diseases Refer to vaccine-specific biological pages for more detailed information.	
All age appropriate inactivated vaccines (diphtheria, tetanus, pertussis, polio, *Haemophilus influenzae* type)	Recommended as per routine schedule.
Haemophilus influenzae b	Recommended as per age eligibility and schedule.
Hepatitis B	Recommended as per age eligibility and schedule.
Human Papillomavirus	Recommended as per age eligibility and schedule.
Influenza	Routinely recommended.
Pneumococcal	PNEU-C13 and PNEUMO-P recommended. Refer to vaccine biological page for age eligibility and schedule.
Live Vaccines	
All age appropriate live vaccines (measles, mumps, rubella, varicella, rotavirus)	Recommended as per routine schedule.

3.6 Chronic Liver Disease

Individuals with chronic liver disease include those infected with Hepatitis C (including those who are anti-HCV positive), Hepatitis B carriers, those with hepatic cirrhosis, and persons with chronic liver graft versus host disease.

Persons with chronic liver disease are at an increased risk for fulminant hepatitis A or more severe acute hepatitis B infection should infection occur. Persons with chronic liver disease also have impaired phagocyte function and defects in opsonizing antibody. If liver disease is severe, individuals may have splenic dysfunction. Those with ascites have an altered immunoglobulin production and distribution.

Immunization should be done early in the course of disease as the immune response may be suboptimal in advanced liver disease. Higher vaccine doses and re-immunization may be required.

Recommended Immunization for Individuals with CHRONIC LIVER DISEASE Refer to vaccine-specific biological pages for more detailed information.	
All age appropriate inactivated vaccines (diphtheria, tetanus, pertussis, polio, *Haemophilus influenzae* type b)	Recommended as per routine schedule.
Hepatitis A	Recommended. Refer to vaccine biological page for age eligibility and schedule.
Hepatitis B	Recommended. Refer to vaccine biological page for age eligibility and schedule.
Influenza	Recommended routinely.
Pneumococcal	PNEU-C13 and PNEUMO-P recommended. Refer to vaccine biological page for age eligibility and schedule.
Live Vaccines	
All age appropriate live vaccines (measles, mumps, rubella, varicella, rotavirus)	Recommended as per routine schedule.

3.7 Neurologic Conditions

Individuals with pre-existing neurological disorders should receive all routinely recommended immunizations with the exception of repeat doses of any vaccine administered within six weeks of the onset of GBS.

Individuals with chronic cerebrospinal fluid (CSF) leak should receive all routine immunizations and pneumococcal vaccines (conjugate and polysaccharide). Those with neurologic conditions that may impair clearance of oral secretions should receive all routine immunizations and pneumococcal vaccines (conjugate followed by polysaccharide vaccine for children and polysaccharide for adults).

Immunization should be deferred for 24 hours following significant head injury to avoid confusion between head trauma symptoms and AEFI.

Recommended Immunization for Individuals with Neurologic Conditions Refer to vaccine-specific biological pages for more detailed information.	
All age appropriate inactivated vaccines (diphtheria, tetanus, pertussis, polio, *Haemophilus influenzae* type b)	Recommended as per routine schedule.
Hepatitis B	Recommended as per age eligibility and schedule.
Human Papillomavirus	Recommended as per age eligibility and schedule.
Influenza	Routinely recommended.
Pneumococcal	PNEU-C13 recommended for individuals with a CSF leak and for individuals under 18 years of age with neurologic conditions impairing oral secretions. Refer to vaccine biological page for age eligibility and schedule. PNEUMO-P recommended. Refer to vaccine biological page for age eligibility and schedule.
Live Vaccines	
All age appropriate live vaccines (measles, mumps, rubella, varicella, rotavirus)	Recommended as per routine schedule.

3.8 Non-Malignant Hematologic Disorders: Anemias, Hemoglobinopathies, Bleeding Disorders

Non-malignant hematologic disorders include:

- **Anemias** - a blood condition in which an individual either has a shortage of red blood cells (RBCs) or has RBCs that do not function properly.
- **Hemoglobinopathy** - an inherited blood disease resulting from structural differences in hemoglobin produced by the body (e.g., sickle cell disease, thalassemia).
- **Bleeding disorders** - a blood disorder resulting in an inability of blood to clot properly.

For individuals with sickle cell disease, refer to the asplenia section for vaccine recommendations.

Individuals with anemia, hemoglobinopathies, and bleeding disorders are at increased risk for complications from some vaccine preventable diseases due to their disease and exposure to blood products.

Plasma-derived products are tested and treated for viral contamination prior to administration. However, the solvent-detergent method used to prepare all the present plasma-derived factor VIII and some factor IX concentrates does not reliably inactivate hepatitis A virus since the virus does not have an envelope. For this reason, those receiving factor VIII and factor IX may be eligible for hepatitis A vaccine.

Before immunizing individuals with bleeding disorders, the *Standard for the Administration of Immunizations;* Special Considerations; Bleeding disorders section should be consulted for administration techniques and guidelines.

- Intramuscular vaccines should be administered with a small gauge needle (23 gauge or smaller) with firm pressure applied to the injection site for 5 – 10 minutes following the injection.
- Individuals receiving long-term anticoagulation therapy with warfarin or heparin are not considered to be at higher risk of bleeding complications following immunization.

Recommended Immunization for Individuals with NON-MALIGNANT HEMATOLOGIC DISORDERS (Anemias, Hemoglobinopathies, Bleeding disorders) Refer to vaccine-specific biological pages for more detailed information.	
All age appropriate inactivated vaccines (diphtheria, tetanus, pertussis, polio, *Haemophilus influenzae* type b, hepatitis B)	Recommended as per routine schedule.
Hepatitis A	Only recommended for individuals with Hemophilia A or B who are receiving or have the potential to receive plasma-derived replacement clotting factors.
Hepatitis B	Only recommended for individuals receiving repeated infusions of blood/blood products. Recommended as per age eligibility and schedule.
HPV	Recommended as per age eligibility and schedule.
Influenza	Recommended routinely.
Pneumococcal	PNEU-C13 and PNEUMO-P recommended for individuals with hemoglobinopathy. PNEU-C13 and PNEUMO-P. Refer to vaccine biological page for age eligibility and schedule.
Live Vaccines	
Measles Mumps Rubella	Recommended as per routine schedule. (Consult *Standard for Recommended Immunization Schedules*, Section 7 for spacing between blood products and live vaccines.)
MMR-Var	Recommended as per age eligibility and schedule.
Rotavirus	Recommended as per routine schedule.
Varicella	Recommended as per routine schedule. (Consult *Standard for Recommended Immunization Schedules*, Section 7 for spacing between blood products and live vaccines.)

3.9 Chronic Pulmonary Disease

Individuals with chronic lung diseases such as asthma, chronic obstructive pulmonary diseases (COPD) or cystic fibrosis are at increased risk of complications from influenza and invasive pneumococcal disease. As well as routine immunizations, these individuals should receive pneumococcal vaccines (conjugate followed by polysaccharide vaccines for children and polysaccharide for adults).

Individuals with cystic fibrosis are at increased risk of complications from varicella infection.

Recommended Immunization for Individuals with Pulmonary Disease (chronic) Refer to vaccine-specific biological pages for more detailed information.	
All age appropriate inactivated vaccines (diphtheria, tetanus, pertussis, polio, *Haemophilus influenzae* type b)	Recommended as per routine schedule.
Hepatitis B	Recommended as per age eligibility and schedule.
Human Papillomavirus	Recommended as per age eligibility and schedule.
Influenza	Routinely recommended.
Pneumococcal	PNEU-C13 recommended for individuals under 18 years of age. Refer to vaccine biological page for age eligibility and schedule. PNEUMO-P recommended Refer to vaccine biological page for age eligibility and schedule.
Live Vaccines	
All age appropriate live vaccines (measles, mumps, rubella, varicella, rotavirus)	Recommended as per routine schedule.

3.10 Chronic Renal Disease and Dialysis

Individuals with chronic renal disease, those who are pre-dialysis (progressive renal insufficiency), and those who are on hemodialysis or peritoneal dialysis are included in this category.

Individuals who are candidates for or recipients of a kidney transplant, should be immunized according to the *Standard for Immunization of Transplant Candidates and Recipients* rather than using this section.

Bacterial and viral infections are a major cause of morbidity and mortality in individuals with chronic renal disease or who are undergoing chronic dialysis. People with chronic renal disease on dialysis may have mild defects in T cell function and may experience a less than optimal response to vaccine. In people with nephrotic syndrome, urinary loss of antibody may occur. These individuals are also in frequent contact with the health care system and thus, at greater risk of infection from vaccine preventable diseases.

It is important to immunize early in the course of progressive kidney disease, particularly if transplantation and/or long term immunosuppressive therapy are being considered.

Recommended Immunization for Individuals with CHRONIC RENAL DISEASE/DIALYSIS Refer to vaccine-specific biological pages for more detailed information.	
All age appropriate inactivated vaccines (diphtheria, tetanus, pertussis, polio, *Haemophilus influenzae* type b)	Recommended as per routine schedule.
Hepatitis B	Recommended (hyporesponsive dose/schedule). Refer to vaccine biological page for recommendations for age eligibility and schedule.
Influenza	Recommended routinely.
Pneumococcal	PNEU-C13 recommended Refer to vaccine biological page for age eligibility and schedule. PNEUMO-P recommended. Refer to vaccine biological page for age eligibility and schedule.
Tuberculin Skin Test	Recommended
Live Vaccines	
All age appropriate live vaccines (measles, mumps, rubella, varicella, rotavirus)	Recommended as per routine schedule

3.11 Persons who use Substances/Drugs or those with Lifestyle Risks

Recommended Immunization for Individuals who use substances/drugs OR those with lifestyle risks Refer to vaccine-specific biological pages for more detailed information.	
All age appropriate inactivated vaccines (diphtheria, tetanus, pertussis, polio, *Haemophilus influenzae* type b)	Recommended as per routine schedule.
Hepatitis A	Recommended as per age eligibility and schedule.
Hepatitis B	Recommended as per age eligibility and schedule.
Human Papillomavirus	Recommended as per age eligibility and schedule.
Influenza	Routinely recommended.
Pneumococcal	Pneumo-P recommended. Refer to vaccine biological page for age eligibility and schedule.
Tuberculin Skin Test	Recommended ONLY if a resident (> 3 months) of a treatment facility AND have a risk factor for progression from LTBI to active TB.
Live Vaccines	
All age appropriate live vaccines (measles, mumps, rubella, varicella, rotavirus)	Recommended as per routine schedule.

References

1. Alberta Health, Public Health and Compliance (2019, July 14). *Alberta Immunization Policy- Immunization of Specific Populations*. Edmonton, Alberta.
2. Alberta Health, Acute Care and Population Health Division, *Adverse Events Following Immunization (AEFI) Policy for Alberta Health Services Public Health* (2014, January).
3. BC CDC Immunization Manual (2011) http://www.bccdc.ca/dis-cond/comm-manual/CDManualChap2.htm (accessed 12 May 2014)
4. National Advisory Committee on Immunization. (2020). *Canadian Immunization Guide* (Evergreen Edition.). Ottawa, ON: Public Health Agency of Canada. http://www.phac-aspc.gc.ca/publicat/cig-gci/index-eng.php
5. American Society of Hematology. Hematology Glossary (For patients). http://www.hematology.org/Patients/Basics/Glossary.aspx.
6. Canadian Academy of Audiology. https://canadianaudiology.ca/about-caa/contact/
7. Immune Deficiency Foundation. http://primaryimmune.org
8. British Society for Immunology. http://www.immunologyexplained.co.uk/ImportanceImmuneSystem.aspx.
9. AIDS.gov. https://www.aids.gov/hiv-aids-basics/just-diagnosed-with-hiv-aids/hiv-in-your-body/hiv-lifecycle/.