Standard on Immunization Recommendations for Specific Populations (Immunosuppressed and Chronic Health Conditions)

Alberta Health Services
Communicable Disease Control

Section 8	Immunization of Specific Populations	**Standard # 08.305**	
Created and approved by	Provincial Immunization Program		
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Preamble

Primary Care Alberta (PCA) Provincial Immunization Program, Public Health, CDC & Screening provides Public Health and other partners who administer provincially funded vaccines with ongoing and timely information relating to provincial immunization program standards and quality. These standards are based on currently available evidence-based information, Primary and Preventative Health Services policy, and provincial and national guidelines. Immunizers must be knowledgeable about the specific vaccines they administer.

Background

Chronic health conditions and immunosuppression may increase an individual's risk of illness and/or result in more severe disease when vaccine preventable diseases occur. It is important that individuals with these conditions receive all routinely recommended immunizations and immunizations recommended for 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. These recommendations do not impose mandatory immunization requirements and are not intended to replace the clinical skill, judgement and decisions of the individual's healthcare team. These recommendations supplement existing recommendations for routine immunization as outlined in the current Alberta Immunization Policy and PCA Immunization Program Standards Manual. The following are included in this standard:

Section 1: General principles

Section 2: Immunocompromising conditions

- 2.1 Definition of immunocompromised
- 2.2 General information and principles
- 2.3 Acquired complement deficiency
- 2.4 Chimeric antigen receptor (CAR) T-cell therapy
- 2.5 Congenital immunodeficiency states
- 2.6 HIV infection
- 2.7 Immunosuppressive therapy
- 2.8 Malignant hematological disorders
- 2.9 Malignant solid tumours (and on immunosuppressive therapy)

Section 3: Chronic health conditions

- 3.1 Asplenia/hyposplenia (functional or anatomic)
- 3.2 Chronic cardiac disease
- 3.3 Chronic inflammatory disease (autoimmune conditions)

3.4 Cochlear implant candidates and recipients
3.5 Endocrine and metabolic diseases
3.6 Chronic liver disease
3.7 Neurologic conditions
3.8 Non-malignant hematologic disorders (anemias, hemoglobinopathies, bleeding disorders)
3.9 Chronic pulmonary disease
3.10 Chronic renal disease and dialysis
3.11 Individuals who use substances/drugs or those with lifestyle risks

This standard provides general recommendations based only on the identified health condition. Immunization recommendations for specific individuals need to take into consideration each unique situation.

Use this standard in conjunction with:

- Vaccine Biological Pages for detailed information about each vaccine
  - The tables in this standard identify which vaccines to consider for each condition.
  - Consult the vaccine biological pages for all detailed information including age, scheduling, and reinforcing doses.
- Standard on the Contraindications and Precautions Related 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 for details on the administration of vaccines
- Standard For Recommended Immunization Schedules for details on immunization schedules
- Standard for Immunization Record Assessment for details on assessing immunization documentation.

Not included in this standard:

- Solid organ and hematopoietic stem cell transplant recommendations are addressed separately in the Standard for Immunization of Transplant Candidates and Recipients.

  Post-exposure immunization recommendations. See vaccine specific biological pages for post-exposure immunization details.

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

- Immunocompromised: general term encompassing a weakened immune system; may be the result of a health condition or a medication.
- Immunosuppressed: weakened immune system because of medication or treatment.
  - Note: Immunosuppressed and immunocompromised may be used interchangeably.
- Immunodeficiency: weakened immune system because of a condition where the immune system has inherent or acquired defects.
  - Primary immunodeficiency: inherited genetic disorder.
  - Secondary immunodeficiency: acquired immunodeficiency caused by factors such as infection or medical treatment.
- Definitions for chronic conditions are found in the specific sections.

Competency

The Public Health Agency of Canada published the Immunization Competencies for Health Professionals with the 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 principles

Consider individuals with immunosuppression (as per definitions found in Section 2) as high risk for all routine vaccines as well as additional specific vaccines as they may be at higher risk of developing vaccine preventable diseases. If adequate documentation cannot be found, offer these individuals immunization as per the guidelines in the Standard for Immunization Record Assessment.

Consider individuals with chronic health conditions (as listed in Section 3) as high risk for the additional vaccines they are eligible for due to their chronic health condition. If adequate documentation cannot be found, offer these individuals immunization as per the guidelines in the Standard for Immunization Record Assessment.

Individuals with chronic disease and/or immunosuppression may have a reduced immune response to vaccines. Additional or higher doses may be recommended.

- Immune competence for individuals who are immunosuppressed may vary over time, depending on the condition, response to treatment and side effects of treatment. See general information and principles in section 2 for timing considerations when immunizing these individuals.
- Immunize individuals with chronic conditions as early as possible. Immune response generally declines as the chronic condition progresses.
- Consult with the most responsible healthcare provider when necessary or when indicated.

Section 2: Persons with immunocompromising conditions

2.1 Definition of immunocompromised

Numerous conditions and therapies can result in an immunocompromised state. Everyone is unique and must be assessed separately. Consultation with the most responsible healthcare provider may be required to determine if the individual is considered 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 are not included in this standard. The conditions included are those that cause immunosuppression that is significant enough to require special consideration when it comes to immunization.

2.2 General information and principles

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

Case-by-case medical consultation with the most responsible healthcare provider may be recommended to determine the individual's degree of immunosuppression or immunodeficiency, and whether immunization is appropriate. In complex cases, referral to a physician with expertise in immunization and/or immunodeficiency is advised.

- The decision to recommend for or against immunization will depend on a careful analysis of the risks and benefits.
    - There is potential for serious illness and death if individuals who are immunocompromised are under-immunized, and every effort should be made to ensure adequate protection through immunization.
    - The inappropriate use of live vaccines can cause serious adverse events in some individuals who are immunocompromised because 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.

- Before planned immunosuppression due to treatment or medications, administer:
    - Non-live vaccines at least two weeks before planned immunosuppression
    - Live vaccines at least four weeks before planned immunosuppression.

- Non-live vaccines may be administered to individuals who are immunocompromised; however, the magnitude and duration of the vaccine-induced immunity are reduced.
- Live vaccines are not generally recommended for people that are immunocompromised due to the risk of disease caused by the vaccine strains. For some individuals who are less severely immunocompromised, the benefits of live vaccines may outweigh the risks. Obtain approval from the individual's most responsible healthcare provider 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.
- Post-immunization antibody titres to determine the immune response and guide reimmunization and post-exposure management, can be considered if serologic testing is available and there is a clear antibody correlation of protection. See vaccine-specific biological pages for specific recommendations.

Use the following principles to help make decisions when immunizing individuals who are immunocompromised:

- Maximize benefit while minimizing harm.
- Susceptibility or level of protection vary according to the degree of immune suppression. There may not be adequate 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.
    - Delay immunization if the immunodeficiency is transient (if this can be done safely).
    - In consultation with the most responsible healthcare provider, stop or reduce immunosuppression to permit better vaccine response, if appropriate.
- Consider the immunization environment broadly.
    - Household contacts of individuals who are immunocompromised should receive all routine immunizations, including measles, mumps, rubella, rotavirus, varicella and influenza vaccines. Refer to vaccine-specific biological pages.
    - Encourage up-to-date immunization, including annual influenza vaccine, for all healthcare workers providing care to individuals who are immunocompromised.
- Avoid live vaccine unless:
    - Immunosuppression is mild and data are available to support their use.
    - The risk of natural infection is greater than the risk of immunization.
        - Consult with the most responsible healthcare provider.
- The magnitude and duration of vaccine-induced immunity are often reduced/suboptimal in individuals who are immunocompromised. 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). Acquired complement deficiency includes individuals receiving terminal complement component 5 (C5) inhibitors such as eculizumab (Soliris) and ravulizumab (Ultomiris) or other C5 complement inhibitors for conditions such as paroxysmal nocturnal hemoglobinuria. These individuals are at an increased risk of serious infections, especially from encapsulated bacteria.

- Offer the recommended vaccines at least two weeks before receiving the first dose of the complement C5 inhibitor whenever possible. This allows time for the individual to develop protection from the vaccines before the elevated risk occurs. If this is not possible, the individual may still receive the vaccine, but the immune response may be diminished.
- Offer booster doses of meningococcal conjugate ACYW and meningococcal B every three to five years to individuals who remain on the terminal complement C5 inhibitor.

Recommended immunization for individuals with ACQUIRED COMPLEMENT DEFICIENCY Consult with physician before proceeding with immunization. Refer to vaccine-specific biological pages for more detailed information.	
All age-appropriate non-live vaccines	Recommended as per age eligibility and schedule
Haemophilus influenzae type b	Recommended due to condition
Meningococcal (Men-B)	Recommended due to condition
Meningococcal (MenC-ACYW)	Recommended due to condition
Pneumococcal (Pneu-C20)	Recommended due to condition
Live vaccines	
Measles Mumps Rubella	Recommended as per age eligibility and routine schedule Contraindicated if on immunosuppressive therapy
Measles Mumps Rubella Varicella (MMR-Var)	Contraindicated
Rotavirus	Recommended as per age eligibility and routine schedule Contraindicated if on immunosuppressive therapy
Varicella	Recommended as per age eligibility and routine schedule Contraindicated if on immunosuppressive therapy

2.4 Chimeric antigen receptor (CAR) T-cell therapy

CAR T-cell therapy involves using the individuals' own chimeric antigen receptor T-cells that have been manipulated to target their cancer.

Research into immunity post CAR T-cell therapy is evolving. In the interim, individuals will be reimmunized using the standard allogeneic HSCT schedule and guidelines.

See:

- Standard for Immunization of Transplant Candidates and Recipients
- Immunization for Adult HSCT Transplant Recipients
- Immunization for Child HSCT Transplant Recipients

2.5 Congenital immunodeficiency states (inborn errors of immunity – primary immunodeficiency)

The following are broad categories of congenital immunodeficiency conditions (inborn errors of immunity) for which specific immunization recommendations apply:

- Predominantly antibody (B cell) deficiencies (see 2.5.1)
- Combined T and B cell immunodeficiencies (with or without associated /syndromic features) and immune dysregulation (see 2.5.2)
- Phagocytic and neutrophil disorders (see 2.5.3)
- Complement deficiencies (see 2.5.4)
- Defects of innate immunity (see 2.5.5).

Immunology or hematology medical consultation is recommended before proceeding with immunization. Do not proceed without seeking expert medical opinion if there is uncertainty about the nature of an immune deficiency.

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. Seek medical consultation before proceeding with administration of a live vaccine if the child has other than first-degree relatives with congenital immunodeficiency conditions (inborn errors of immunity) or if multiple neonatal or infant deaths occurred within the child's immediate family.

2.5.1 Predominantly antibody (B cell) deficiencies

Includes **severe** antibody (B cell) deficiencies such as X-linked agammaglobulinemia (XLA) and common variable immunodeficiency (CVID):

- Most individuals with severe defects of antibody production, such as XLA or CVID are not able to mount a significant humoral response. While administration of non-live vaccines is not harmful, it may be futile.
- Individuals with severe antibody defects can be protected from many of the vaccine preventable diseases with the use of replacement immunoglobulin (IG) therapy or pathogen-specific IG preparations. The level of antibody to specific pathogens in these products varies.

Also includes **less severe** antibody (B cell) deficiencies such as selective immunoglobulin A (IgA) deficiency and specific polysaccharide antibody deficiency (SPAD):

- For those with less severe antibody deficiency and ability to mount some antibody response, especially selective IgA deficiency, immunization may be recommended to increase the level of protection.

Recommended immunization for individuals with PREDOMINANTLY ANTIBODY (B CELL) DEFICIENCIES Consult with physician as indicated in chart. Refer to vaccine-specific biological pages for more detailed information.		
	Severe antibody (B cell) deficiencies	**Less severe antibody (B cell) deficiencies**
All age-appropriate non-live vaccines	Consult with physician	Recommended as per age eligibility and schedule
Hepatitis B	Consult with physician	Recommended due to condition (use hyporesponsive dosing)
Meningococcal (Men-B)	Consult with physician	Consult with physician.
Meningococcal (MenC-ACYW)	Consult with physician	Recommended as per age eligibility and schedule. For adults, consult with physician.
Pneumococcal (Pneu-C15)	Consult with physician	Offer Pneu-C15 vaccine. Recommendation for Pneu-C20 will be provided by specialist during the diagnostic process.
Pneumococcal (Pneu-C20)	Not recommended	For adults, consult with physician
Live vaccines	**Severe antibody (B cell) deficiencies**	**Less severe antibody (B cell) deficiencies**
Measles Mumps Rubella	Contraindicated	Recommended as per age eligibility and schedule*
Measles Mumps Rubella Varicella (MMR-Var)	Contraindicated	Contraindicated
Rotavirus	Contraindicated	Generally contraindicated*
Varicella	Contraindicated	Recommended as per age eligibility and schedule*

*Note:

- Offer MMR and univalent varicella vaccine as appropriate for age to individuals with partial B cell defects and known intact T-cell immunity who are not receiving IG.
  - MMR-Var has not been evaluated in immunodeficiency.
  - All other live vaccines are contraindicated.

- Individuals with selective IgA deficiency who have no concomitant defects in T-cell function can receive most live vaccines.
- Offer routine live vaccines to individuals with documented IgG subclass deficiency with intact T-cell function who are not receiving regular IG replacement therapy. Response may be suboptimal.
- Individuals with isolated specific polysaccharide antibody deficiency (SPAD) may receive all live vaccines.

2.5.2 Combined T and B cell immunodeficiencies (with or without associated/syndromic features) and immune dysregulation

Individuals with mixed (combined immunodeficiency) and T-cell defects are susceptible to virtually all viruses and some bacteria. This includes severe and partial combined immunodeficiencies.

Severe

T-cell defects may be severe such as severe combined immunodeficiency (SCID) and complete DiGeorge syndrome.

- Those with severe defects will not respond to vaccines.
- Administration of non-live vaccines is not harmful for individuals with severe combined immunodeficiency but will not provide protection and is not recommended. Most of these infants are managed with immunoglobulin replacement to provide passive immunity.
- All live vaccines are contraindicated.
- In Alberta all infants are offered screening for Severe Combined Immune Deficiency (SCID) and metabolic screen results can be reviewed if there is a concern.
    - 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, consult with immunology prior to giving live vaccines.

Partial

Examples include DiGeorge syndrome, Wiskott-Aldrich syndrome, ataxia telangiectasia, hyper IgM syndrome, STAT3 deficiency, X-linked lymphoproliferative disease and familial predisposition to hemophagocytic lymphohistiocytosis.

- Those with partial defects may have some response to vaccines.
- Live vaccines are generally contraindicated for Wiskott-Aldrich syndrome, ataxia telangiectasia, X-linked lymphoproliferative disease, or familial predisposition to hemophagocytic lymphohistiocytosis.
- Live vaccines may be considered for partial T-cell defects after assessment of immune competence.

Recommended immunization for individuals with

COMBINED T AND B CELL IMMUNODEFICIENCIES (WITH OR WITHOUT ASSOCIATED/SYNDROMIC FEATURES) AND IMMUNE DYSREGULATION

Consult with physician as indicated in chart.

Refer to vaccine-specific biological pages for more detailed information.

	Severe combined immunodeficiencies	**Partial combined immunodeficiencies**
All age-appropriate non-live vaccines	Not recommended	Consult with physician
Haemophilus influenzae type b	Not recommended	Consult with physician
Hepatitis B	Not recommended	Consult with physician
Meningococcal (Men-B)	Not recommended	Consult with physician
Meningococcal (MenC-ACYW)	Not recommended	Consult with physician
Pneumococcal (Pneu-C20)	Not recommended	Consult with physician
Live vaccines	**Severe combined immunodeficiencies**	**Partial combined immunodeficiencies**
Measles Mumps Rubella	Contraindicated	Consult with physician before proceeding with immunization

Measles Mumps Rubella Varicella (MMR-Var)	Contraindicated	Contraindicated
Rotavirus	Contraindicated	Consult with physician before proceeding with immunization
Varicella	Contraindicated	Consult with physician before proceeding with immunization

2.5.3 Phagocytic and neutrophil disorders

Individuals with phagocytic and neutrophil disorders are at increased risk for bacterial infections. Examples include congenital neutropenia, cyclic neutropenia, leukocyte adhesion and migration defects, chronic granulomatous disease (CGD), myeloperoxidase deficiency and Chediak-Higashi syndrome.

Non-live vaccines

- Can be administered.

Live vaccines

- May be administered as per chart below depending on underlying condition.

Recommended immunization for individuals with PHAGOCYTIC AND NEUTROPHIL DISORDERS Refer to vaccine-specific biological pages for more detailed information.		
All age-appropriate non-live vaccines	Recommended as per age eligibility and schedule	
Haemophilus influenzae type b	Recommended due to condition	
Pneumococcal (Pneu-C20)	Recommended due to condition	
Live vaccines	**Vaccine Recommended:**	**Vaccine Contraindicated:**
	• Neutropenia • Chronic granulomatous disease	• Leukocyte adhesion defect • Chediak-Higashi syndrome • Other defects in cytotoxic granule release, and • Any other undefined phagocytic cell defect
Measles Mumps Rubella	Recommended as per age eligibility and schedule	Contraindicated
Measles Mumps Rubella Varicella (MMR-Var)	Recommended as per age eligibility and schedule	Contraindicated
Rotavirus	Recommended as per age eligibility and schedule	Contraindicated
Varicella	Recommended as per age eligibility and schedule	Contraindicated

2.5.4 Complement deficiencies

Individuals with complement deficiencies are susceptible to infections with N. meningitidis and other encapsulated bacteria such as S. pneumoniae and *Haemophilus influenzae*. Examples include complement subunits, properdin, factor D or B or mannan-binding lectin deficiency.

- In general, response to vaccines is expected to be normal and there are no contraindications.
- Can receive all routine non-live and live vaccines.

Recommended immunization for individuals with COMPLEMENT DEFICIENCIES Refer to vaccine-specific biological pages for more detailed information.	
All age-appropriate non-live vaccines	Recommended as per age eligibility and schedule
Haemophilus influenzae type b	Recommended due to condition
Hepatitis B	Recommended due to condition (use hyporesponsive dosing)
Meningococcal (Men-B)	Recommended due to condition
Meningococcal (MenC-ACYW)	Recommended due to condition
Pneumococcal (Pneu-C20)	Recommended due to condition
Live vaccines	
Measles Mumps Rubella	Recommended as per age eligibility and schedule
Measles Mumps Rubella Varicella (MMR-Var)	Recommended as per age eligibility and schedule
Rotavirus	Recommended as per age eligibility and schedule
Varicella	Recommended as per age eligibility and schedule

2.5.5 Defects of innate immunity

Includes innate immune defects of cytokine generation or cellular activation, such as defects of the interferon-gamma/interleukin-12 axis and toll-like receptor signaling pathway deficiencies such as IRAK4 and MyD88 deficiency.

- All routine non-live vaccines can be given.
- Consult a specialist before giving live vaccines to individuals with innate immune defects of cytokine generation or response or cellular activation defects.
- Live vaccines are contraindicated in individuals with defects in alpha/beta or gamma interferon production and in nuclear factor kappa B pathway defects.

Recommended immunization for individuals with DEFECTS OF INNATE IMMUNITY **Consult with physician as indicated in chart.** Refer to vaccine-specific biological pages for more detailed information.		
All age -appropriate non-live vaccines	Recommended as per age eligibility and schedule	
Pneumococcal (Pneu-C20)	Recommended due to condition	
Live vaccines	**Vaccine may be recommended:**	**Vaccine contraindicated:**
	• Innate immune defects of cytokine generation or response or • Cellular activation defects	• Defects in alpha/beta or gamma interferon production and in nuclear factor kappa B pathway defects
Measles Mumps Rubella	Consult with physician	Contraindicated
Measles Mumps Rubella Varicella (MMR-Var)	Consult with physician	Contraindicated
Rotavirus	Consult with physician	Contraindicated
Varicella	Consult with physician	Contraindicated

2.6 Human immunodeficiency virus (HIV)

Consult the most responsible healthcare provider before proceeding to determine optimal timing of immunization. This is to ensure the individual receives an optimal response to the vaccine(s). There is no contraindication to the use of non-live vaccines at any time.

- Screening for HIV infection is not necessary prior to immunization.

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 varies widely among individuals with HIV, reflecting disease stage and response to antiretroviral therapy. Immunosuppression is approximately predicted by a recent CD4 count and CD4 percentage. Lower CD4 counts and elevated viral loads may diminish the effectiveness of some vaccines although this is not a reason to delay immunization.

Infants born to a mother who is HIV positive are at risk for immunodeficiency in the first year of life. Consult with an infectious disease specialist when immunizing these infants, children with HIV, and adults with HIV.

- If immune function is normal, there are no contraindications to the use of MMR, VZ, rotavirus and Mpox.
- MMR-Var, BCG, smallpox, and oral live typhoid vaccines are contraindicated and LAIV is not recommended.
- If immunosuppression is already advanced at diagnosis, defer live vaccines pending potential immune recovery with treatment.
- Consensus thresholds based on immunologic categories have been determined for the use of MMR and univalent varicella as follows:

  Measles-mumps-rubella (MMR) vaccine

  - Asymptomatic children with HIV 12 months up to and including 5 years of age without severe immunosuppression, (that is, CD4 ≥ 15% and CD4 cell count ≥ 500 × 10^6/L for at least 6 months) may receive two doses of MMR vaccine 3 – 6 months apart.
  - Asymptomatic children with HIV 6 years up to and including 13 years of age without severe immunosuppression, (that is, CD4 ≥ 15% and CD4 cell count ≥ 200 × 10^6/L for at least 6 months) may receive two doses of MMR vaccine 3 – 6 months apart.
  - Susceptible adolescents and adults with HIV without severe immunosuppression (that is, CD4 cell count ≥200 x 10^6/L and CD4 percentage ≥15%), may consider two doses of MMR vaccine administered 3 months apart.
  - MMR vaccine is contraindicated in persons with advanced HIV/acquired immunodeficiency syndrome (AIDS).

  Univalent varicella vaccine

  - Asymptomatic children with HIV 12 months up to and including 5 years of age without severe immunosuppression, (that is, CD4 ≥ 15% and CD4 cell count ≥ 500 × 10^6/L for at least 6 months) may receive two doses of univalent varicella vaccine 3 – 6 months apart.
  - Asymptomatic children with HIV 6 years up to and including 13 years of age without severe immunosuppression, (that is, CD4 ≥ 15% and CD4 cell count ≥ 200 × 10^6/L for at least 6 months) may receive two doses of univalent varicella vaccine 3 – 6 months apart.
  - There are no published data on the use of varicella vaccine for adolescents and adults with HIV. Based on expert opinion, immunization with two doses of univalent varicella vaccine administered 3 months apart may be considered for susceptible adolescents and adults with HIV without evidence of immunity with CD4 cell count ≥200 x 10^6/L
  - 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.
- Individuals with symptomatic HIV/AIDS sometimes receive intramuscular immunoglobulin as prophylaxis against infection. The immunoglobulin may interfere with their antibody response to live vaccines.
- Offer immunoglobulin if individuals with symptomatic HIV infection (that is, a low CD4 count or presence of opportunistic infection) are exposed to measles, even if they have received MMR vaccine. Consult with the most responsible healthcare provider for immunoglobulin when an individual is measles IgG positive and HIV symptomatic.
- **Rotavirus vaccine:** Infants born to a mother with HIV can safely receive rotavirus vaccine. Offer 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, consult with a specialist.

Recommended immunization for individuals with HIV INFECTION Refer to vaccine-specific biological pages for more detailed information.	
All age-appropriate non-live vaccines	Recommended as per age eligibility and routine schedule
Haemophilus influenzae type b	Recommended due to condition
Hepatitis B	Recommended due to condition (use hyporesponsive dosing)
Meningococcal (Men-B)	Recommended due to condition
Meningococcal (MenC-ACYW)	Recommended due to condition
Pneumococcal (Pneu-C20)	Recommended due to condition
Live vaccines are generally contraindicated with the following exceptions which may be given under the direction of the attending infectious disease specialist.	
Measles Mumps Rubella	Usually recommended only if within acceptable clinical and immunologic categories
Measles Mumps Rubella Varicella (MMR-Var)	Contraindicated
Rotavirus	Recommended if not significantly immunocompromised
Varicella	Usually recommended only if within acceptable clinical and immunologic categories

2.7 Immunosuppressive therapy

Consult with the most responsible healthcare provider 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 high-dose steroids, cancer chemotherapy, radiation therapy (including total body irradiation), cytotoxic drugs, calcineurin inhibitors, and certain medications.

Long-term immunosuppressive therapy is used for organ transplantation and a range of chronic infections and inflammatory conditions, such as inflammatory bowel disease, psoriasis and systemic lupus erythematosus. These therapies have their greatest impact on cell-mediated immunity, although T-cell dependent antibody production can also be adversely affected.

Main classes of immunosuppressive therapies:

- anti-B cell therapies (monoclonal antibodies targeting CD19, CD20 and CD22)
- high-dose systemic corticosteroids
- alkylating agents
- antimetabolites
- tumor necrosis factor (TNF) inhibitors
- other biologic agents that are significantly immunosuppressive

Consult the most responsible healthcare provider for individuals taking the above classes of immunosuppressive therapies, except as noted below.

The following corticosteroid therapies generally do **not** 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 such as for joint injection.

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.

Hydroxyurea is an antimetabolite and is not considered to be significantly immunosuppressive.

Methotrexate used for conditions such as rheumatoid arthritis is generally not a high enough dose to cause immunosuppression. Clients taking up to and including 25 mg of methotrexate per week are not considered to be immunosuppressed.

Review immunization status prior to the initiation of immunosuppressive therapy. Administer any age-appropriate recommended vaccines prior to the initiation of immunosuppressive therapy, when possible, to support achieving optimal immunity.

- Non-live vaccines:
  - Administer at least 14 days before the initiation of immunosuppressive therapy to optimize immunogenicity, or delay until at least 3 months after immunosuppressive medications have stopped or until such therapy is at the lowest possible level. Although non-live immunizations can be administered safely at any time before, during or after immunosuppression, make every effort to time immunization so that optimal immunogenicity will be achieved.
    - A longer interval of 6 to 12 months may be required for anti-B cell therapies.
  - Vaccines may be administered 4 weeks after discontinuation of high-dose systemic steroids.
  - Consult with MOH/most responsible healthcare provider before proceeding with immunization for post-exposure or outbreak management.
- Live vaccines:
  - Administer at least 4 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 3 months after the immunosuppressive medications have been discontinued.
    - A longer interval of 6 to 12 months may be required for anti-B cell therapies.
  - High-dose systemic steroids (for example 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 4 weeks after discontinuation of high-dose systemic steroids.
  - Consult with MOH/most responsible healthcare provider before proceeding with immunization for post-exposure or outbreak management.

Survivors of childhood cancer who have been treated with chemotherapy and/or radiation

- An additional dose of the following vaccines may be offered to survivors of childhood cancer who have been treated with chemotherapy and/or radiation and who were up to date for immunization prior to treatment.
  - Diphtheria
  - Tetanus
  - Acellular pertussis
  - Polio
  - *Haemophilus influenzae* type b
  - Hepatitis B
  - Pneumococcal conjugate
  - Meningococcal conjugate (group C)
  - Meningococcal conjugate (groups A, C, Y, W)
  - Human Papillomavirus
  - Measles
  - Mumps

- Rubella
- Varicella

- Offer an additional dose of all vaccines previously received.
- Administer immunizations at least six months after the completion of cancer therapy.
- If the client was not up to date with routine immunization prior to chemotherapy and/or radiation, complete the recommended age-appropriate immunizations at least six months after completion of cancer therapy.
  - Additional doses of vaccines are not indicated if the recommended age-appropriate immunizations are administered after completion of cancer therapy.
- It has been demonstrated that some of these individuals lose or have low protective antibodies post treatment to some or all vaccine preventable diseases. Serology for antibodies and/or titres prior to immunization is not recommended for these individuals.
- This recommendation does not apply to individuals who are HSCT/CAR T-cell therapy recipients. For HSCT/CAR T-cell therapy recipients see the Immunization for Adult HSCT Transplant Recipients and Immunization for Child HSCT Transplant Recipients.

Summary table for immunizations when on biologics

In this context, biologics refers to biological modifying agents that target specific pathways in the immune system for immunosuppression.

	Infant born to a mother that was on anti-TNF alpha therapy (listed below), or biologic(s) that do not directly impair immune function, during pregnancy • Infliximab • Adalimumab • Golimumab • Certolizumab pegol • Etanercept	**Infant born to a mother that was on anti-B cell therapy (such as rituximab) or any other biologic(s) agents that severely inhibit immune function during pregnancy (refer to drug product monograph)**	**Infant who is being fed breast milk and their lactating mother is on biologic(s)**	**Individual is on biologic(s)**
All non-live vaccines	Recommended as appropriate for age and eligibility	Recommended as appropriate for age and eligibility	Recommended as appropriate for age and eligibility	Recommended as appropriate for age and eligibility
Live vaccines: Rotavirus	Recommended as appropriate for age and eligibility	Contraindicated unless cleared based on immunologic testing[1] completed (if available).	Recommended as appropriate for age and eligibility	Contraindicated
Live vaccines: MMR, Varicella, MMR-Var (12 months of age or older)	Recommended as appropriate for age and eligibility *Infants exposed to monoclonal antibodies in utero who can receive rotavirus vaccine, may proceed with early MMR if indicated.	Generally, not applicable as maternal biologics only persist for 6 months in the infant *If MMR is required/recommended under 1 year of age consult with MOH	Recommended as appropriate for age and eligibility *May receive early MMR if indicated	Contraindicated

[1] Rotavirus vaccine can be given if immunologic testing suggests no abnormalities.

- Immune responses to live vaccines such as MMR or MMR-Var administered after one year of age are not considered to be affected by in utero exposure to monoclonal antibodies.

- Infants exposed to monoclonal antibodies in utero who can receive rotavirus vaccine, may proceed with early MMR if indicated.
- Infants exposed to monoclonal antibodies in utero can receive all non-live vaccines according to routine schedule.
- Monoclonal antibodies administered to a person who is lactating and feeding their milk to an infant 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 broken down in the infant's gastrointestinal tract.
    - Immunize infants receiving milk of a person who is lactating and receiving monoclonal antibody treatment with both live and non-live vaccines.

Recommended immunization for individuals on IMMUNOSUPPRESSIVE THERAPY Consult with physician as indicated in chart. Refer to vaccine-specific biological pages for more detailed information.	
All age-appropriate non-live vaccines	Recommended as per routine schedule
Hepatitis B	Recommended due to conditions for individuals with inflammatory bowel disease or other chronic inflammatory conditions who will be on long-term immunosuppressive medications
Pneumococcal (Pneu-C20)	Recommended due to condition
Tuberculin Skin Test	Recommended prior to starting immunosuppressive therapy
Live vaccines	
Measles Mumps Rubella	Generally contraindicated. Consultation with physician recommended.
Measles Mumps Rubella Varicella (MMR-Var)	Contraindicated
Rotavirus	Generally contraindicated if on immunosuppressive therapy. Consultation with physician recommended.
Varicella	Generally contraindicated. Consultation with physician recommended.

2.8 Malignant hematologic disorders

Consult with the most responsible healthcare provider before proceeding with immunization.

Individuals with leukemia, lymphomas or other malignant neoplasms affecting the bone marrow or lymphatic systems (for example, leukemia, lymphoma, Hodgkin's disease, multiple myeloma) are immunocompromised due to their underlying condition. They may also be immunosuppressed due to treatments such as chemotherapy and/or radiation therapy. The amount of immunosuppression varies depending on the type of cancer and the 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 bacterial infections.
- During and soon after active chemotherapy, antibody responses are impaired. Ensure that at least three months have passed since the completion of chemotherapy before immunizing.
    - If individuals have received anti-B cell therapy (such as rituximab), wait at least six months before immunizing.
    - Non-live vaccine doses administered during cancer chemotherapy should be repeated once no longer immunosuppressed, 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.

- Individuals who are more than three years post therapy and no longer on immunosuppressive medications are considered healthy. Assess for immunizations as per the general population.
- Children with Acute Lymphocytic Leukemia (ALL) in remission for at least 12 months may be considered for MMR vaccine and/or varicella vaccine. Consult with the most responsible healthcare provider prior to immunizing.
- Individuals who are recipients of Hematopoietic Stem Cell Transplants (HSCT) require special consideration. Refer to Standard for Immunization of Transplant Candidates and Recipients.

Recommended immunization for individuals with MALIGNANT HEMATOLOGIC DISORDERS Consult with physician as indicated in chart. Refer to vaccine-specific biological pages for more detailed information.	
All age-appropriate non-live vaccines	Recommended as per routine schedule
Haemophilus influenzae type b	Recommended due to condition
Pneumococcal (Pneu-C20)	Recommended due to condition
Tuberculin Skin Test	Recommended due to condition
Live vaccines	
Measles Mumps Rubella	Generally contraindicated. Consult with physician.
Measles Mumps Rubella Varicella (MMR-Var)	Contraindicated
Rotavirus	Generally contraindicated. Consult with physician.
Varicella	Generally contraindicated. Consult with physician.

2.9 Malignant solid tumours (and on immunosuppressive therapy)

Consult with the most responsible healthcare provider before proceeding with immunization.

If an individual is three months post-chemotherapy and the cancer is in remission, the person is no longer considered immunocompromised.

Non-live vaccine doses administered during cancer chemotherapy should be repeated once no longer immunosuppressed, unless there is documentation of a protective antibody response.

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 non-live vaccines	Recommended as per routine schedule
Pneumococcal (Pneu-C20)	Recommended due to condition
Tuberculin Skin Test	Recommended due to condition
Live vaccines	
Measles Mumps Rubella	Contraindicated
Measles Mumps Rubella Varicella (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 anatomic)

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.

The spleen plays an important role in the body's immune system. When the spleen is absent or is not functioning properly, there is an increased risk of fulminant bacteremia, associated with a high mortality rate. This is caused by a variety of pathogens, particularly encapsulated bacteria such as pneumococcal, meningococcal, and *Haemophilus influenzae* type b. Risk is highest in the first two years following splenectomy but remains elevated for life.

Several conditions may lead to functional asplenia such as sickle cell anemia, thalassemia major/intermedia or hemoglobin H disease.

- Consider individuals with sickle cell anemia as hyposplenic and immunize accordingly.
- When there is the potential for altered splenic function related to other underlying conditions, consult the most responsible healthcare provider about whether splenic function is compromised.
- Thalassemia carrier and thalassemia trait do not lead to functional asplenia.

Timing of immunization

When splenectomy surgery is planned, administer vaccines at least two weeks before surgery whenever possible. Case by case consultation with the most responsible healthcare provider 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, administer vaccines two weeks after the splenectomy for optimal vaccine response. If the individual is discharged earlier and there is a significant concern that they may not present to Public Health for immunizations, vaccines can be initiated before discharge with follow-up by Public Health for additional doses.

Recommended immunization for individuals with ASPLENIA/HYPOSPLENIA (FUNCTIONAL AND ANATOMIC) Refer to vaccine-specific biological pages for more detailed information.	
All age-appropriate non-live vaccines	Recommended as per age eligibility and schedule
Haemophilus influenzae type b	Recommended due to condition
Hepatitis B	Recommended if receiving blood products repeatedly
Meningococcal (Men-B)	Recommended due to condition
Meningococcal (MenC-ACYW)	Recommended due to condition
Pneumococcal (Pneu-C20)	Recommended due to condition
Live vaccines	
All age-appropriate live vaccines	Recommended as per age eligibility and schedule

3.2 Chronic cardiac disease

Recommended immunization for individuals with CHRONIC CARDIAC DISEASE Refer to vaccine-specific biological pages for more detailed information.	
All age-appropriate non-live vaccines	Recommended as per age eligibility and schedule
Pneumococcal (Pneu-C20)	Recommended due to condition
Live vaccines	
All age-appropriate live vaccines	Recommended as per age eligibility and schedule

3.3 Chronic inflammatory disease (autoimmune conditions)

Includes individuals with:

- Inflammatory arthropathies such as systemic lupus erythematosus (SLE) and rheumatoid or juvenile arthritis

- Inflammatory dermatological conditions such as psoriasis, severe atopic dermatitis and eczema
- Inflammatory bowel disease such as Crohn's disease and ulcerative colitis.

Individuals with chronic inflammatory diseases who are **not** on immunosuppressive medications are not considered significantly immunocompromised. They can receive all recommended routine immunizations. Rheumatic disease modifying agents, such as hydroxychloroquine, 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 recommendations and immunization indications for these individuals.

Recommended immunization for individuals with CHRONIC INFLAMMATORY DISEASE (AUTOIMMUNE CONDITIONS) Refer to vaccine-specific biological pages for more detailed information.	
All age-appropriate non-live vaccines	Recommended as per age eligibility and schedule
Live vaccines	
All age-appropriate live vaccines	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 and past implant recipients are considered at risk. Immunize with Hib and pneumococcal vaccines at least two weeks prior to cochlear implant surgery so there is time to develop protection before the elevated risk occurs. If this is not possible, immunization may be provided at any time before or after surgery.

Recommended immunization for individuals who are CANDIDATES/ RECIPIENTS OF COCHLEAR IMPLANTS Refer to vaccine-specific biological pages for more detailed information.	
All age-appropriate non-live vaccines	Recommended as per age eligibility and schedule
Haemophilus influenzae type b	Recommended due to condition
Pneumococcal (Pneu-C20)	Recommended due to condition
Live vaccines	
All age-appropriate live vaccines	Recommended as per age eligibility and schedule

3.5 Endocrine and metabolic diseases

Routine immunization is important for individuals with endocrine and/or metabolic disorders.

Individuals with diabetes can have defects in phagocytic and neutrophil function. In addition, they often have complications of diabetes such as cardiovascular, neurovascular, renal and other end-organ dysfunction and are at greater risk of complications from infection.

Recommended immunization for individuals with ENDOCRINE AND METABOLIC DISEASES Refer to vaccine-specific biological pages for more detailed information.	
All age-appropriate non-live vaccines	Recommended as per age eligibility and schedule
Pneumococcal (Pneu-C20)	Recommended due to condition
Live vaccines	
All age-appropriate live vaccines	Recommended as per age eligibility and schedule

3.6 Chronic liver disease

Includes individuals who are hepatitis B carriers, anti-HCV positive, or who have biliary atresia, fatty liver, hepatic cirrhosis and those 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. 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 altered immunoglobulin production and distribution.

Immunize early in the course of disease as the immune response may be suboptimal in advanced liver disease. Higher vaccine doses and reimmunization may be necessary.

Recommended immunization for individuals with CHRONIC LIVER DISEASE Refer to vaccine-specific biological pages for more detailed information.	
All age-appropriate non-live vaccines	Recommended as per age eligibility and schedule
Hepatitis A	Recommended due to condition
Hepatitis B	Recommended due to condition (except for individuals who are chronic hepatitis B carriers)
Pneumococcal (Pneu-C20)	Recommended due to condition
Live vaccines	
All age-appropriate live vaccines	Recommended as per age eligibility and schedule

3.7 Neurologic conditions

Includes individuals with neurological conditions such as epilepsy, seizure disorder or cerebral palsy. Offer individuals with pre-existing neurological disorders all routinely recommended immunizations.

Recommended immunization for individuals with neurologic conditions Refer to vaccine-specific biological pages for more detailed information.	
All age-appropriate non-live vaccines	Recommended as per age eligibility and schedule
Pneumococcal (Pneu-C20)	Recommended due to condition (CSF leak and those with neurologic conditions impairing oral secretion)
Live vaccines	
All age-appropriate live vaccines	Recommended as per age eligibility and schedule

3.8 Non-malignant hematologic disorders: anemias, hemoglobinopathies, bleeding disorders

Non-malignant hematologic disorders include:

- Anemias are blood conditions in which an individual either has a shortage of red blood cells (RBCs) or has RBCs that do not function properly.
- Hemoglobinopathies are inherited blood diseases resulting from structural differences in hemoglobin produced by the body such as sickle cell disease and thalassemia.
- Bleeding disorders are blood disorders that result in an inability to clot blood 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 blood products are tested and treated for viral contamination prior to administration. 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 are eligible for hepatitis A vaccine.

Consult the special considerations bleeding disorders section in the Standard for the Administration of Immunizations before immunizing individuals with bleeding disorders for information on administration techniques and guidelines.

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 non-live vaccines	Recommended as per age eligibility and schedule
Hepatitis A	Recommended due to condition if receiving plasma derived clotting factors repeatedly
Hepatitis B	Recommended due to condition if receiving blood products repeatedly
Pneumococcal (Pneu-C20)	Recommended due to condition (hemoglobinopathy only)
Live vaccines	
All age-appropriate live vaccines	Recommended as per age eligibility and schedule

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.

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

Recommended immunization for individuals with CHRONIC PULMONARY DISEASE Refer to vaccine-specific biological pages for more detailed information.	
All age-appropriate non-live vaccines	Recommended as per age eligibility and schedule
Pneumococcal (Pneu-C20)	Recommended due to condition
Live vaccines	
All age-appropriate live vaccines	Recommended as per age eligibility and schedule

3.10 Chronic renal disease and dialysis

Includes individuals with chronic renal disease, those who are pre-dialysis (progressive renal insufficiency) and those who are on hemodialysis or peritoneal dialysis.

Immunize individuals who are candidates for or recipients of a kidney transplant according to the Standard for Immunization of Transplant Candidates and Recipients.

Bacterial and viral infections are a major cause of morbidity and mortality in individuals with chronic renal disease, nephrotic syndrome, those on dialysis (hemodialysis or peritoneal dialysis) or renal transplant. Individuals with chronic renal disease on dialysis may have mild defects in T-cell function and may experience a less-than-optimal response to vaccine. Urinary loss of antibody may occur in individuals with nephrotic syndrome. 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 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 non-live vaccines	Recommended as per age eligibility and schedule
Hepatitis B	Recommended due to condition (hyporesponsive dosing)
Pneumococcal (Pneu-C20)	Recommended due to condition
Tuberculin Skin Test	Recommended due to condition
Live vaccines	
All age-appropriate live vaccines	Recommended as per age eligibility and schedule

3.11 Individuals 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 non-live vaccines	Recommended as per age eligibility and schedule
Hepatitis A	Recommended due to condition
Hepatitis B	Recommended due to condition
Pneumococcal (Pneu-C20)	Recommended due to condition
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	Recommended as per age eligibility and schedule

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