Alberta Health Services	**Standard on the Immunization of Individuals with Chronic Health Conditions and/or Immunosuppression**		
Section 8:	Immunization of Specific Populations		**Standard #: 08.305**
Created by:	Provincial Immunization Program Standards and Quality		
Approved by:	Provincial Immunization Program Standards and Quality		
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Preamble

AHS Provincial Immunization Program Standards and Quality, Provincial Population & Public Health 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, 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. These recommendations do not impose mandatory immunization requirements and are not intended to replace the clinical skill, judgement and decisions of the patient's healthcare team. These recommendations are meant to supplement existing recommendations for routine immunization as outlined in the current Alberta Immunization Policy and AHS Immunization Program Standards Manual. The following are included in this standard:

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, but not limited to, age considerations, 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 Individuals Presenting with Inadequate Immunization Documentation – for details on assessing 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 Principles

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 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, immune competence 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, varicella and influenza 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 terminal complement component 5 (C5) inhibitors (e.g., eculizumab Soliris® and ravulizumab Ultomiris®) or other C5 complement inhibitors 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 conjugate vaccine and *Haemophilus influenzae* type b vaccine.

In order to develop protection before the elevated risk occurs, individuals prescribed a terminal complement C5 inhibitor should receive the recommended doses of Hib, meningococcal and pneumococcal vaccines at least 2 weeks before receiving the first dose 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 the terminal complement C5 inhibitor 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	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.
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 patient's 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, patients will be reimmunized using the standard allogeneic HSCT schedule and guidelines.

See:

- Principles of Immunization for HSCT and SOT Recipients
- Child HSCT
- Adult HSCT

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:

1. Predominantly antibody (B cell) deficiencies
2. Combined T and B cell immunodeficiencies (with or without associated /syndromic features) and Immune dysregulation
3. Phagocytic and neutrophil disorders
4. Complement deficiencies
5. Defects of innate immunity

Notes:

- **Immunology or hematology medical consultation is strongly recommended before proceeding with immunization. If there is uncertainty about the nature of an immune deficiency, do not proceed without seeking expert medical opinion.**

- 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, the provider should seek a medical consultation before proceeding with the administration of a live vaccine.

2.5.1 Predominantly antibody (B cell) deficiencies

Severe X-linked agammaglobulinemia (XLA), common variable immunodeficiency (CVID):

- Most patients with severe defects of antibody production, such as XLA or CVID are not able to mount a significant humoral response. While administration of inactivated vaccines is not harmful, it may be futile. Immunization recommendations will generally be provided by the physician.
- As a general rule, people with severe antibody defects can be protected from many of the vaccine preventable infections with the use of replacement immunoglobulin (IG) therapy or pathogen-specific Ig preparations; however, the level of antibody to specific pathogens in these products may be variable.

Less severe selective immunoglobulin A (IgA) deficiency and specific polysaccharide antibody deficiency (SPAD):

- For those with less severe antibody deficiency and expected 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 inactivated vaccines	Consult with physician	Recommended as per age eligibility and schedule
Hepatitis B	Consult with physician	Recommended due to condition (hyporesponsive dosing)
Meningococcal (Men-B)	Consult with physician	Consult with physician.
Meningococcal C-ACYW	Consult with physician	Recommended as per age eligibility and schedule. (For adults, consult with physician).
Pneumococcal (Pneu-C15)	Consult with physician	This population should be offered 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 *See notes below
MMR-Var	Contraindicated	Contraindicated
Rotavirus	Contraindicated	Generally contraindicated *See notes below

Varicella	Contraindicated	Recommended as per age eligibility and schedule *See notes below

*Notes:
Individuals with:

- Partial B cell defects and known intact T cell immunity (and some ability to produce antibody) who are not receiving IG should receive MMR and univalent varicella vaccines as appropriate for age. MMR-Var has not been evaluated in immunodeficiency. All other live vaccines are contraindicated.
- Selective IgA deficiency who have no concomitant defects in T cell function can receive most live vaccines.
- Documented IgG subclass deficiency with intact T cell function who are not receiving regular IG replacement therapy can receive routine live vaccines although response may be suboptimal.
- 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 particularly susceptible to virtually all viruses and some bacteria.

Severe -– T cell defects may be severe e.g., severe combined immunodeficiency (SCID), complete DiGeorge syndrome:

- Those with severe defects will not respond to any vaccines.
- For individuals with severe combined immunodeficiency, administration of inactivated vaccines is not harmful, but will not provide protection and is not recommended. The majority of these infants are managed with immunoglobulin replacement to provide passive immunity.
- All live vaccines are contraindicated.
- Alberta screens all infants for Severe Combined Immune Deficiency (SCID) and metabolic screen results can be reviewed if there is a concern.
    - However, 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.

Partial -– e.g., DiGeorge syndrome, Wiskott-Aldrich syndrome, ataxia telangiectasia, hyper IgM syndrome, STAT3 deficiency, X-linked lymphoproliferative disease, familial predisposition to hemophagocytic lymphohistiocytosis):

- Those with partial defects may have some response to vaccines.
- Live vaccines are also 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 inactivated 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
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 (e.g., congenital neutropenia, cyclic neutropenia, leukocyte adhesion and migration defects, chronic granulomatous disease (CGD), myeloperoxidase deficiency and Chediak-Higashi syndrome) are at increased risk for bacterial infections.

Inactivated vaccines:

- should be administered.

Live vaccines:

- Rotavirus, MMR, varicella, MMR-Var should be given according to routine schedules to persons with neutropenia or CGD.
- All are contraindicated with leukocyte adhesion defect (LAD), Chediak-Higashi syndrome and other defects in cytotoxic granule release, and in any other undefined phagocytic cell defect.

Recommended Immunization for Individuals with **PHAGOCYTIC AND NEUTROPHIL DISORDERS** Refer to vaccine-specific biological pages for more detailed information.		
All age appropriate inactivated 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		
	• **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
MMR-Var	Contraindicated	Contraindicated
Rotavirus	Recommended as per age eligibility and schedule	Contraindicated
Varicella	Recommended as per age eligibility and schedule	Contraindicated

2.5.4 Complement deficiencies

For complement subunits, properdin, factor D or B or mannan-binding lectin deficiency:

- These individuals are particularly susceptible to infections with *N. meningitidis* but also susceptible to other encapsulated bacteria such as *S. pneumoniae* and *Haemophilus influenzae.*
- In general, response to vaccines is expected to be normal and there are no contraindications.
- Should receive all routine live vaccines.

Recommended Immunization for Individuals with **COMPLEMENT DEFICIENCIES** Refer to vaccine-specific biological pages for more detailed information.	
All age appropriate inactivated vaccines	Recommended as per age eligibility and schedule
Haemophilus influenzae type b	Recommended due to condition
Hepatitis B	Recommended due to condition (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
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

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

- All routine inactivated vaccines should be given.
- A specialist should be consulted before giving live vaccines to persons with innate immune defects of cytokine generation or response or cellular activation defects.
- Live vaccines are contraindicated in patients 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 inactivated vaccines	Recommended as per age eligibility and schedule	
Pneumococcal (Pneu-C20)	Recommended due to condition	
Live Vaccines		
	• **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
MMR-Var	Consult with physician	Contraindicated
Rotavirus	Consult with physician	Contraindicated
Varicella	Consult with physician	Contraindicated

2.6 Human Immunodeficiency Virus (HIV)

Medical consultation with attending physician is recommended before proceeding with immunization to determine optimal timing of immunization in order for the individual to receive an optimal response to the vaccine(s). There is no contraindication to the use of inactivated 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 immune suppression varies widely among HIV-infected individuals, reflecting disease stage and response to antiretroviral therapy. Immune suppression is approximately predicted by a recent CD4 count and CD4 percentage. Having 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 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 and Mpox) if immune function is normal. MMR-Var, BCG, smallpox, and oral live typhoid vaccines are contraindicated and LAIV is not recommended. If immune suppression is already advanced at diagnosis, live vaccines should be deferred 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 vaccine (MMR):
    - Asymptomatic HIV-infected children 12 months of age and older, without severe immunosuppression, (that is, CD4 ≥ 15% and CD4 cell count ≥ 500 × 10^6/L for at

least 6 months in children 1 through 5 years old and ≥ 15% and CD4 cell count ≥ 200 × 10^6/L for at least 6 months in those 6 through 13 years of age)) may receive two doses of MMR vaccine 3 - 6 months apart.

  - For susceptible HIV-infected adolescents and adults with CD4 cell count ≥200 x 10^6/L and CD4 percentage ≥15%, immunization with two doses of MMR vaccine administered three months apart may be considered.
  - MMR vaccine is contraindicated in persons with advanced HIV/AIDS.
- Univalent varicella vaccine:
  - Asymptomatic HIV-infected children 12 months of age and older without severe immunosuppression, (that is, CD4 ≥ 15% and CD4 cell count ≥ 500 × 10^6/L for at least 6 months in children 1 through 5 years old and ≥ 15% and CD4 cell count ≥ 200 × 10^6/L for at least 6 months in those 6 through 13 years of age) may receive two doses of univalent varicella vaccine 3 - 6 months apart.
  - For susceptible HIV-infected adolescents and adults there are no published data on the use of varicella vaccine. 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. (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 immune globulin as prophylaxis against infection. The immune globulin may interfere with their antibody response to live vaccines.
- Individuals 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. The immune globulin may interfere with their antibody response to live vaccines. 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.

Recommended Immunization for Individuals with HIV INFECTION Refer to vaccine-specific biological pages for more detailed information.	
All age appropriate inactivated vaccines	Recommended as per age eligibility and routine schedule
Haemophilus influenzae type b	Recommended due to condition
Hepatitis B	Recommended due to condition (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 ID specialist.	
MMR	Usually recommended only if within acceptable clinical and immunologic categories
MMR-Var	Contraindicated
Rotavirus	Recommended if not significantly immunocompromised
Varicella	Usually recommended only if within acceptable clinical and immunologic categories

2.7 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 high-dose steroids, cancer chemotherapy, radiation therapy (including total body irradiation), cytotoxic drugs, calcineurin inhibitors, and certain medications.
- 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:
  - 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 or until such therapy is at the lowest possible level. 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.
  - Routine immunization is recommended as well as pneumococcal conjugate vaccine.

    - 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:
    - 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.

Survivors of Childhood Cancer who have been Treated with Chemotherapy and/or Radiation:

- At the request of the oncology team, 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
- 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 is not recommended for these individuals.
- Any missed immunizations and/or re-immunizations (boosters) should be administered at least 6 months after the completion of cancer therapy.
- This recommendation does not apply to individuals who are 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 refer to biological modifying agents that target specific pathways in the immune system for immunosuppression).

	Infant whose mother was on anti-TNF alpha therapy *Infliximab, Adalimumab, Golimumab Certolizumab pegol,* *Etanercept* **during pregnancy**	**Infant whose mother was on *Rituximab* or any other biologic(s) agents during pregnancy**	**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	Recommended as appropriate for age and eligibility
Live vaccines: Rotavirus	Recommended as appropriate for age and eligibility	Consult with MOH or Special Immunization Clinic for immunologic testing[1]	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	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

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

- 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 vaccines that are administered after one year of age (e.g., MMR or MMR-Var vaccine) are not considered to be affected by in 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.
    - 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. Home - UpToDate® Lexidrug™ 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	
Mycophenolate mofetil	CellCept®
Radiation - current or recent	
Rituximab	RITUXAN®
Sirolimus	Rapamune®
Tacrolimus	Prograf®

Note: For Eculizumab (Soliris®) or Ravulizumab (Ultomiris®) - 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 **Consult with physician as indicated in chart.** Refer to vaccine-specific biological pages for more detailed information.	
All age appropriate inactivated vaccines	Recommended as per routine schedule
Pneumococcal (Pneu-C20)	Recommended due to condition
Tuberculin Skin Test	Recommended prior to start of immunosuppressive therapy
Live Vaccines	
Measles Mumps Rubella	Generally contraindicated. Consultation with physician recommended.
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

Medical consultation is recommended before proceeding with immunization.

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.

Children, with Acute Lymphocytic Leukemia (ALL) in remission 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 08.304 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 inactivated 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. Consultation with physician is recommended.
MMR-Var	Contraindicated
Rotavirus	Generally contraindicated. Consultation with physician is recommended.
Varicella	Generally contraindicated. Consultation with physician is recommended.

2.9 Malignant Solid Tumours (and on immunosuppressive therapy)

Inactivated vaccines should be administered according to routine immunization schedules. Pneumococcal conjugate vaccine is recommended before individuals begin immunosuppressive therapies.

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	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
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 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/intermedia or hemoglobin H disease).
Note: thalassemia carrier and thalassemia trait does not lead to functional asplenia.

- 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 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 they should seek immediate medical attention for all febrile events.

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 Anatomic) Refer to vaccine-specific biological pages for more detailed information.	
All age appropriate inactivated vaccines	Recommended as per age eligibility and schedule
Haemophilus influenzae type b	Recommended due to condition
Hepatitis B	Recommended due to condition if receiving repeated blood products
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

Individuals with chronic heart disease should receive pneumococcal conjugate vaccine 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	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 (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 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.

If possible, individuals should receive all routinely recommended vaccines 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 Disease (Autoimmune Conditions) Refer to vaccine-specific biological pages for more detailed information.	
All age appropriate inactivated vaccines	Recommended as per age eligibility and schedule
Hepatitis B	Recommended due to condition for individuals with Inflammatory Bowel Disease who will be on long term immunosuppressive medications.
Pneumococcal (Pneu-C20)	Recommended due to condition if immunosuppressive therapy is planned or if receiving immunosuppressive therapy
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 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.

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	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 Disease

Individuals with diabetes should receive all routine vaccines and pneumococcal conjugate vaccine.

Recommended Immunization for Individuals with Endocrine and Metabolic diseases Refer to vaccine-specific biological pages for more detailed information.	
All age appropriate inactivated 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

Individuals with chronic liver disease, including hepatitis B carriers, anti-HCV positive individuals, biliary atresia, fatty liver, hepatic cirrhosis and those with chronic liver graft versus host disease should receive hepatitis A, hepatitis B and pneumococcal conjugate vaccines.

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	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
Live Vaccines	
All age appropriate live vaccines	Recommended as per age eligibility and 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 Guillain Barré Syndrome.

Individuals with chronic cerebrospinal fluid (CSF) leak and with neurologic conditions that may impair clearance of oral secretions should receive all routine immunizations and pneumococcal conjugate vaccine.

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	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** - 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 are 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.

- If a bleeding disorder is present, it should be optimally managed prior to immunization to minimize the risk of bleeding. For example, hemophiliacs may receive clotting factor concentrates to optimize their clotting factor level before they receive a parenteral vaccine or a passive immunizing agent.
- 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	Recommended as per age eligibility and schedule
Hepatitis A	Recommended due to condition if receiving repeated plasma derived clotting factors
Hepatitis B	Recommended due to condition if receiving repeated blood products
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. As well as routine immunizations, these individuals should receive pneumococcal conjugate vaccine.

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	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

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.

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. 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	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 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	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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