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Adult Immunization in 2025

Angel Chu, MD

Introduction

Immunization represents one of the most significant achievements in medicine. Over the past 50 years, vaccines have prevented more deaths in Canada than any other public health intervention.[1] Routine childhood immunization programs have dramatically reduced the incidence of highly transmissible infections, such as measles, mumps, rubella, and varicella. Furthermore, vaccination efforts have led to the global eradication of smallpox and the near elimination of poliomyelitis.[1] However, declining vaccination coverage has facilitated the re-emergence of vaccine-preventable diseases, as evidenced by the ongoing resurgence of measles outbreaks worldwide.[2]

Vaccination is the most effective and durable intervention for the prevention of numerous infectious diseases.[1] Immunization programs provide substantial benefits for patients and communities from potentially life-threatening infectious diseases. Early-life vaccination is essential for children to develop robust immunity. Furthermore, immunization remains a critical preventive measure in older adults who exhibit increased vulnerability to infection and a higher likelihood of severe outcomes, including complications, hospitalizations, and deaths. The objective of this review is to provide information on immunization across all age groups and at-risk populations.

Pneumococcal Vaccines

Streptococcus pneumoniae is a bacterium that colonizes the nasopharynx.[3] Transmission occurs primarily via direct contact or respiratory droplets, although indirect exposure through contaminated respiratory secretions is also possible. This pathogen remains the leading cause of community-acquired pneumonia in adults. However, in addition to non-invasive disease, *Streptococcus pneumoniae* can cause invasive infections such as meningitis or bacteremia, oftentimes associated with high mortality rates.[3]

Children, older adults, and individuals with underlying medical, social, behavioural, or environmental risk factors represent populations at increased risk for pneumococcal disease[3] (**Figure 1**). In Canada, two recently authorized pneumococcal conjugate vaccines, Pneu-C-20 and Pneu-C-21, are recommended for adult immunization.[3] Additional pneumococcal vaccines currently available include Pneu-C-13, Pneu-C-15 and Pneu-P-23.[3] These vaccines differ in their serotype coverage,[3] which has implications for clinical decision making regarding these vaccines.

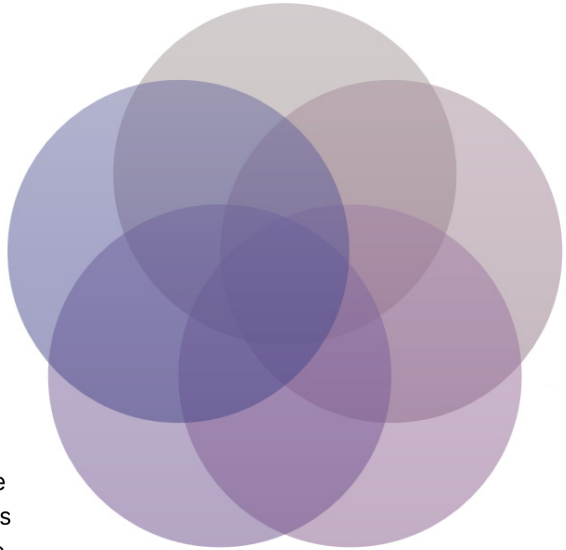
According to current Canadian guidelines, a single dose of either Pneu-C-20 or Pneu-C-21 is recommended for all adults aged >65 years as well as for adults aged <65 years who are at increased risk of invasive pneumococcal disease regardless of prior pneumococcal vaccination history.[3] In adults aged >65 years who have previously

Risk factors for pneumococcal disease in adults

Immunocompromised Individuals

- HIV
- Cancer (solid, hematologic)
- Solid organ transplantation
- Autoimmune diseases
- Immunosuppressive therapy, corticosteroids
- Primary immunodeficiency

Age ≥65 years



Medical comorbidities

- Chronic heart disease
- Chronic lung disease
- Diabetes
- Functional or anatomic asplenia
- Chronic liver disease
- Cerebrospinal fluid leak
- Cochlear implants
- Chronic renal failure, nephrotic syndrome*

Behavioural

- Smoking
- Alcohol abuse
- Homelessness
- Illicit drug use

External

- Socioeconomic
- Environmental
- Prior viral respiratory infection (e.g., influenza)
- Long-term care resident

	Serotypes in pneumoccal vaccines																														
Vaccine	**1**	**4**	**6B**	**9V**	**14**	**18C**	**19F**	**23F**	**5**	**7F**	**3**	**6A**	**19A**	**22F**	**33F**	**8**	**10A**	**11A**	**12F**	**15B**	**2**	**9N**	**17F**	**20**	**15A**	**16F**	**20A**	**23B**	**24F**	**31**	**35B**
PNEU-C-10	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓																					
PNEU-C-13	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓																		
PNEU-C-15	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓																
PNEU-C-20	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓											
PNEU-C-21										✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓		✓	✓	✓	✓	✓	✓	✓
PNEU-C-23	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓							

Figure 1. Pneumococcal vaccines: Canadian Immunization Guide; *courtesy of* ***Canada.ca***.

*Unless immunosuppressed by long-term corticosteroids. PHAC. Canadian Immunization Guide. October 2016.

received pneumococcal vaccines, administration of Pneu-C-20 or Pneu-C-21 should occur at least one year after the most recent dose of Pneu-C-13, Pneu-C-15, or Pneu-P23.[3] When Pneu-C-20 or Pneu-C-21 are unavailable or inaccessible, an alternate schedule consisting of Pneu-C-15 followed by Pneu-P-23, separated by at least 8 weeks, may be used.[3]

Respiratory Syncytial Virus Vaccines

Respiratory syncytial virus (RSV) is a major cause of lower respiratory tract infection in infants, young children, and older adults.[4] In Canada, RSV activity typically begins in late fall and continues until early spring.[4] For optimal protection, RSV vaccines should be administered just before the onset of the RSV season. The highest disease burden occurs among infants and older adults, especially those with underlying comorbidities.[4] In older adults, RSV infection is associated with increased rates of hospitalization, intensive care unit admission, and death.[4]

Currently, three vaccines are available for preventing RSV in adults >60 years: RSVPreF3 (Arexvy), RSVpreF (Abrysvo™), and mRNA-1345 (mRESVIA®).[4] Additionally, RSVpreF is indicated for adults 18 to 59 years of age at increased risk for RSV disease and pregnant individuals 32 to 36+6 weeks gestation for infant RSV protection from birth to 6 months.[5] RSVPreF3 is indicated for adults 50 to 59 at increased risk for RSV disease (**Table 1**).[4]

Current Canadian recommendations advise RSV immunization for adults aged ≥75 years, particularly those at increased risk of severe RSV disease (**Table 2**), as well as for adults aged ≥60 years who reside in nursing homes or other chronic care facilities.[4] For adults aged 50 to 74 years, vaccination may be considered on an individual basis following consultation with a health care provider. In this age group, a single dose of RSVPreF3, RSVpreF, or mRNA-1345 may be administered to adults aged 60 to 74 years.[4] At present, the need for a subsequent RSVpreF, RSVPreF3, and mRNA-1345 vaccine dose in adults aged ≥50 years, as well as an optimal strategy for booster administration, are not yet clear. Furthermore, adults who live in or are part of certain First Nations, Métis, and Inuit communities might consider RSV vaccination at a younger age, given the evidence for an increased burden of illness due to social, environmental, and economic factors rooted in historical and systemic inequities.[4]

Shingles Vaccine

The National Advisory Committee on Immunization (NACI) continues to recommend the recombinant zoster vaccine (RZV) for all adults aged ≥50 years who do not have contraindications. However, NACI now strongly recommends that individuals aged >18 years who are, or will become, immunocompromised receive two doses of RZV to prevent herpes zoster and its associated complications[6] (**Table 3**). For an optimal immune response, the two-dose RZV series should ideally be completed at least 14 days before the start of immunosuppressive therapy.[6]

For those who are or will be at an increased risk of herpes zoster due to immunodeficiency or immunosuppression may benefit from an accelerated schedule, the second dose can be administered at a minimum interval of at least 4 weeks following the first dose.[6]

COVID Vaccines

COVID vaccine recommendations continue to evolve; however, for 2025 through summer 2026, vaccination is recommended for both those previously vaccinated and unvaccinated individuals who are at increased risk of SARS-CoV-2 infection or severe COVID-19 disease.[7] This includes all adults aged ≥65 years, as well as those aged ≥6 months of age and older who meet one or more of the following criteria[7]:

- Residents in long-term care homes and other congregate living settings
- Individuals with underlying medical conditions that place them at higher risk of severe COVID-19, including children with complex health needs
- Pregnant women and individuals who are pregnant
- Individuals with membership in or who are from First Nations, Métis, and Inuit communities
- Belonging to racialized or other equity-denied populations
- Employment as health care workers or other care providers in institutional facilities or community settings

Measles Vaccine

Measles is among the most highly transmissible infectious diseases, with secondary attack rates approaching 90% in susceptible individuals.[8] In late 2023, a global increase in

	RSVPreF3 (Arexvy)	RSVpreF (Abrysvo)	mRNA-1345 (mRESVIA)
Type of vaccine	Recombinant adjuvanted RSVPreF3 (RSV-A)*	Recombinant RSVPreF A and preF B (bivalent)	mRNA encoding for stabilized prefusion F protein (RSV-A)*
Adjuvanted?	Yes	No	No
Administration	Single dose, IM Fridge stable	Single dose, IM Fridge stable	Single dose, IM Frozen
Indications	60+ 50–59yo at increased risk	60+ 18-59yo at increased risk Pregnant individuals 32–36+6wks	60+
RSV targets	RSV-A, RSV-B	RSV-A, RSV-B	RSV-A, RSV-B
Amount of antigen delivered per dose	120 µg RSVPreF3 (RSV-A)*	60 µg RSVPreF-A 60 µg RSVPreF-B	N/A

Table 1. RSV Vaccines Approved in Canada; *information derived from respective product monographs.*
J. S. McLellan et al. Structure of RSV fusion glycoprotein trimer bound to a prefusion-specific neutralizing antibody. Science 240, 1113-1117 (2013).

*Since the F proteins of RSV-A and RSV-B are about 90% similar, the immune system largely does not distinguish between them. Therefore, the current RSV-A pref vaccines are able to generate antibodies to both subtypes.

Abbreviations: IM: intramuscular, **RSV:** respiratory syncytial virus; **RSVpref:** respiratory syncytial virus prefusion F; **UK:** United Kingdom; **USA:** United States of America.

Chronic Health Conditions In Older Adults that Lead to Increased Risk for Severe RSV Disease
• Cardiac or pulmonary disorders (includes chronic obstructive pulmonary disease [COPD], asthma, cystic fibrosis, and conditions affecting ability to clear airway secretions)
• Diabetes mellitus and other metabolic diseases
• Moderate and severe immunodeficiency (refer to the list of immunocompromising conditions developed for COVID-19)
• Chronic renal disease
• Chronic liver disease
• Neurologic or neurodevelopmental conditions (includes neuromuscular, neurovascular, neurodegenerative [e.g., dementia], neurodevelopmental conditions, and seizure disorders, but excludes migraines and psychiatric conditions without neurological conditions)
• Class 3 obesity (defined as BMI of 40 kg/m^2 and over)

Table 2. Respiratory syncytial virus (RSV) vaccines: Canadian Immunization Guide; *courtesy of* ***Canada.ca***.

Immunocompromising Conditions to Consider for RZV Vaccination
• Primary immunodeficiencies affecting innate, humoral, and T-cell-mediated immunity
• HSCT
• SOT
• Hematological malignancies
• Solid tumour malignancies on immunosuppressive treatment
• HIV infection
• Chronic or ongoing immunosuppressive therapy: ◦ Immunosuppressive chemotherapy ◦ Immunosuppressive radiation therapy ◦ Calcineurin inhibitors ◦ Cytotoxic medications ◦ Anti-metabolites ◦ Immune effector cell therapies (e.g., CAR T-cell therapy) ◦ Biological response modifiers, targeted therapies and antibodies that target lymphocytes and immune pathways (e.g., anti-CD20, ant-TNF-α, JAK inhibitors, etc.) ◦ Long-term, high-dose systemic corticosteroids (prednisone equivalent of ≥ 2 mg/kg/day, or 20 mg/day if weight >10 kg, for ≥14 days)

Table 3. Immunocompromising Conditions to Consider for RZV Vaccination; *courtesy of Angel Chu, MD.*

Abbreviations: CAR T: chimeric antigen receptor T-cell therapy; **HIV:** human immunodeficiency virus; **HSCT:** hematopoietic stem cell transplantation; **JAK:** Janus kinase; **SOT:** solid organ transplantation; **TNF-α:** Tumour necrosis factor alpha

measles activity was reported, including a more than 30-fold increase in cases in Europe since 2022.[8] In Canada, immunization coverage has declined below the threshold needed to sustain herd immunity, resulting in localized measles outbreaks across the country.[8]

Individuals with prior infection, those born before 1970 in Canada, or those who have completed the recommended measles immunization series are generally considered to have adequate protection against measles.[8]

For susceptible adults born in or after 1970, a single dose of measles-mumps-rubella (MMR) vaccine is recommended.[8] However, those who are at the greatest risk of measles exposure (travellers to destinations outside of Canada, health care workers, students in post-secondary educational settings, and military personnel) should receive two doses of MMR vaccine, administered at least 4 weeks apart.[8]

Conclusion

Maintaining high immunization coverage is essential to protect vulnerable populations from highly transmissible diseases such as *Streptococcus pneumoniae*, measles, RSV, and to mitigate the threat of COVID-19 in communities at increased risk. The global resurgence of measles and declining herd immunity in Canada highlights the urgent need for robust vaccination strategies tailored to at-risk groups, including health care workers, immunocompromised individuals, and certain demographic populations. Evidence-based public health initiatives, ongoing surveillance, and targeted outreach can collectively strengthen immunization rates and reduce morbidity and mortality. Continued vigilance is essential to prevent outbreaks and safeguard population health across all age groups.

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A.C: Merck, Pfizer, Sanofi Pasteur, Astra Zeneca, Moderna, AVIR, Invivyd, Ferring

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