The Medical Letter®
on Drugs and Therapeutics
Adapted for Canada

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Expanded Table: Some Vaccines for Adults

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Vaccine	Dose	Schedule	General Recommendations[1]	Some Adverse Effects	Comments/Recommendations for Special Populations[1,2]	US Cost[3]/ CAN Cost[21]
Tetanus, Diphtheria (Td)						
Tetanus and Diptheria Toxoids *Tenivac* (Sanofi) *TdVax* (Grifols) *Td ABSORBED* (Sanofi)	0.5 mL IM	3 doses (0, 1, and 6-12 mos; in Canada: 0, 2, and 6 mos) 3 doses (0, 8 wks, 6-12 mos)	▸ Primary series recommended for all adults without history of vaccination ▸ 1 booster of Td or Tdap every 10 yrs	▸ Injection-site reactions, such as erythema and induration, are common ▸ Arthus-type reactions can occur rarely	▸ Inactivated vaccine ▸ **Pregnancy:** Tdap during each pregnancy ▸ **Special Populations:** recommended	$37.90/N.A.C. 27.20/N.A.C. N.A./$24.80
Tetanus, Diphtheria, Acellular Pertussis (Tdap)						
Adacel (Sanofi) *Boostrix* (GSK)	0.5 mL IM	1 dose	▸ 1 dose for adults, regardless of interval since last Td or as part of primary series ▸ 1 booster of Td or Tdap every 10 yrs	▸ Injection-site reactions, such as erythema and induration, are common ▸ Fever and injection-site pain more common than with Td ▸ Arthus-type reactions can occur rarely	▸ Inactivated vaccine ▸ *Adacel* is not FDA-approved for use in adults ≥65 years old, but ACIP recommends use of either *Adacel* or *Boostrix* in this age group; in Canada, *Adacel* is approved in persons ≥4 yrs old ▸ **Pregnancy:** a dose during each pregnancy during the early part of gestational weeks 27 through 36 ▸ **Special Populations:** recommended	50.50/39.60 44.80/32.40
Measles, Mumps, Rubella (MMR)						
M-M-R II (Merck) *Priorix* (GSK)	0.5 mL SC	1-2 doses (at least 28 days apart);[4] 1 additional dose recommended for adults with a risk of acquiring mumps during an outbreak	▸ Adults born during or after 1957 without evidence of immunity (documentation of vaccination or laboratory evidence)	▸ Injection-site pain and erythema, fever, rash, and transient arthralgias are common ▸ Anaphylactic reactions and thrombocytopenic purpura are rare	▸ Live-attenuated vaccine ▸ **Pregnancy:** contraindicated ▸ **Special Populations:** Contraindicated in adults with severe immunodeficiency[5,6]	87.30/37.30 85.10/29.60[23]
Varicella (VAR)						
Varivax III; Varivax in US (Merck) *Varilrix* (GSK)	0.5 mL SC	2 doses (0, 4-8 wks) 2 doses (0, 6 wks)	▸ Adults born during or after 1980 without evidence of immunity (documentation of vaccination, laboratory evidence, or history of varicella or herpes zoster diagnosed by a healthcare provider) ▸ In Canada, adults ≤49 yrs without evidence of immunity and known seronegative adults ≥50 yrs	▸ Injection-site reactions such as soreness, erythema, and swelling are common ▸ Fever and varicella-like rash (injection site or generalized) can occur ▸ Spread of vaccine virus to susceptible contacts is rare	▸ Live-attenuated vaccine ▸ Persons born in the US before 1980 are considered immune ▸ Immunity after vaccination is probably permanent ▸ **Pregnancy:** contraindicated ▸ **Special Populations:** contraindicated in adults with severe immunodeficiency[5,6]	151.00/88.90 N.A./65.70

Continued on next page

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Zoster						
Shingrix (RZV; GSK)	0.5 mL IM 0.65 mL SC	2 doses (0, 2-6 mos) 1 dose	▸ Adults ≥50 yrs old, including those with a previous episode of herpes zoster or previous use of ZVL[22] ▸ Adults ≥19 yrs old who are or will be immunodeficient or immunocompromised because of disease or therapy	▸ Injection-site pain, redness, and swelling, myalgia, fatigue, headache, fever; more frequent and more severe with RZV than with ZVL	▸ Inactivated recombinant vaccine ▸ Licensed by the FDA for persons ≥50 yrs old and those ≥18 yrs old with immunodeficiency or immunosuppression ▸ **Pregnancy:** safety and efficacy are not established ▸ **Special Populations:** recommended	$171.60/$137.30
Zostavax II (Merck)	0.65 mL SC	1 dose	▸ In Canada, immuno-competent adults ≥50 yrs old if RZV contraindicated, unavailable, or inaccessible			N.A./197.80
Human Papillomavirus (HPV)						
Gardasil 9 (Merck) *Cervarix* (GSK)	0.5 mL IM	3 doses (0, 1-2, and 6 mos; minimum interval between doses 1 and 2 is 4 wks, between doses 2 and 3 is 12 wks, and between doses 1 and 3 is 5 mos [6 mos in Canada])[7]	▸ Previously unvaccinated persons through age 26 ▸ May be considered for adults 27-45 yrs old who might be at risk of acquiring new HPV infections ▸ In Canada, *Gardisil 9* is recommended in previously unvaccinated **persons** through the age of 26; *Cervarix* is recommended in previously unvaccinated **women** through age 26.	▸ Injection-site pain, swelling, and erythema ▸ Syncope; patients should be seated or lying down during vaccine administration and observed for 15 minutes after injection	▸ 9-valent inactivated vaccine ▸ Quadrivalent *(Gardasil)* and bivalent *(Cervarix)* vaccines are no longer available in the US; a schedule begun with one of these can be completed with the 9-valent *(Gardasil 9)* vaccine ▸ Duration of immunity appears to be at least 8-10 years ▸ **Pregnancy:** not recommended, but no evidence that the vaccine is harmful ▸ **Special Populations:** recommended	253.60/180.30 N.A./106.20
Pneumococcal						
Prevnar20 (PCV20; Pfizer) *Vaxneuvance* (PCV15; Merck) *Prevnar 13* *Pneumovax 23* (PPSV23; Merck)	0.5 mL IM 0.5 mL IM 0.5 mL IM 0.5 mL IM or SC	1 dose 1 dose 1 dose 1-3 doses[8,24]	▸ **Vaccine-naive:** PCV20 **OR** PCV15 followed by PPSV23 ≥1 yr later[9] for adults ≥65 yrs old and for those <65 yrs old with specific risk factors[10,11] ▸ **Previous PPSV23 only:** PCV20 or PCV15 x 1 dose ≥1 yr after PPSV23 ▸ **Previous PCV13 but not all doses of PPSV23:** ≥65 yrs: PPSV23[12] ≥1 yr[9] after PCV13 19-64 yrs with risk factors[10]: PPSV23[12] ≥1 yr[9] after PCV13[8] ▸ In Canada, NACI recommends PPSV23 for previously unvaccinated adults ≥65 yrs and PCV13 followed by PPSV23 ≥8 wks later for previously unvaccinated immunocompromised adults ≥18 yrs	▸ Mild to moderate soreness and erythema at the injection site, headache, fatigue, and myalgia are common	▸ PCV20, PCV15, and PPSV23 are inactivated vaccines ▸ PPSV23 induces attenuated antibody production after repeat doses ▸ **Pregnancy:** no recommendation; PPSV23 has been used in the second and third trimesters with no evidence of increased risk ▸ **Special Populations:** Recommended (specific recommendation based on vaccination status, age, and risk factors)	249.00/115.90 216.00/105.40 N.A./105.40 117.10/31.30

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Vaccine	Dose	Schedule	General Recommendations[1]	Some Adverse Effects	Comments/Recommendations for Special Populations[1,2]	US Cost[3]/ CAN Cost[21]
Hepatitis A (HepA)						
Havrix (GSK) *Vaqta* (Merck)	1 mL IM 1 mL IM	2 doses (0 and 6-12 mos) 2 doses (0 and 6-18 mos)	▸ Previously unvaccinated adults with medical, occupational, or behavioral risk factors[13] ▸ Adults who lack a risk factor but want protection	▸ Injection-site pain is common; swelling and erythema can occur ▸ Mild systemic complaints such as headache, low-grade fever, and fatigue can occur	▸ Both are inactivated vaccines ▸ Antibodies reach protective levels 2-4 wks after the first dose ▸ A series started with one HepA vaccine can be completed with another ▸ **Pregnancy:** recommended only for women with specific risk factors[13] ▸ **Special Populations:** recommended for adults with chronic liver disease and for MSM	$76.70/$52.50 74.50/55.70
Hepatitis B (HepB)						
Heplisav-B (Dynavax) *Engerix-B* (GSK)	0.5 mL IM 1 mL IM Hemodialysis: 2 mL	2 doses (0 and 1 mo) 3 doses (0, 1, and 6 mos; minimum interval between doses 1 and 2 is 4 wks, between doses 2 and 3 is 8 wks, between doses 1 and 3 is 16 wks) **Alternative schedules:** 4 doses (0, 1, 2, and 12 mos) Health Canada- and FDA-approved for recent exposures and travelers to high-risk areas; 3 doses (0, 1, and 4 mos or 0, 2, and 4 mos) recommended by ACIP; NACI recommends a schedule of 0, 1, and 6 months **Hemodialysis:** 4 doses (0, 1, 2, and 6 mos)	▸ All persons ≤59 yrs old ▸ Previously unvaccinated adults ≥60 yrs old with medical, occupational, or behavioral risk factors[14,25] ▸ Should also be offered to adults ≥60 yrs old who lack a risk factor	▸ Injection-site pain (more common with *Heplisav-B* than with *Engerix-B*) ▸ Fatigue, headache, fever	▸ All are recombinant inactivated vaccines ▸ If possible, the same vaccine should be used for all doses of a HepB series[15] ▸ **Pregnancy:** women who are at risk should be vaccinated[15] ▸ **Special Populations:** recommended for adults with HIV infection, ESRD on HD, chronic liver disease, or diabetes, and for healthcare workers and MSM	134.20/N.A.C. 64.30/25.60
Recombivax HB (Merck)	1 mL IM Hemodialysis: 40 mcg/mL (dialysis formulation)	3 doses (0, 1, and 6 mos; minimum interval between doses 1 and 2 is 4 wks, between doses 2 and 3 is 8 wks, between doses 1 and 3 is 16 wks) **Alternative schedule:** 3 doses (0, 1, and 4 mos or 0, 2, and 4 mos) recommended by ACIP **Hemodialysis:** 3 doses (0, 1, and 6 mos); can also be considered for immunocompromised persons				62.30/25.20
PreHevbrio (VBI)	1 mL IM	3 doses (0, 1, and 6 mos)				64.80/N.A.C.

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Hepatitis A/B (HepA/HepB)						
Twinrix (GSK)	1 mL IM	3 doses (0, 1, and 6 mos; minimum interval between doses 1 and 2 is 4 wks, between doses 2 and 3 is 5 mos) **Accelerated schedule:** 4 doses (0, 7, 21-30 days [21 days in Canada], and 12 mos) is also Health Canada- and FDA-approved	▸ Adults who require both HepA and HepB vaccine	▸ See HepA and HepB vaccines	▸ Inactivated vaccine ▸ Contains the same hepatitis A component as in *Havrix*, but half the dose	$116.80/56.00
serogroup ACWY (MenACWY) *Menveo* (GSK) *MenQuadfi* (Sanofi) *Niminrix* (Pfizer) **serogroup B (MenB)** *Bexsero* (GSK) *Trumenba* (Pfizer)	 0.5 mL IM 0.5 mL IM 0.5 mL IM 0.5 mL IM 0.5 mL IM	 1 or 2 doses (≥8 wks apart); whether to administer 1 or 2 doses depends on risk factors[17] 1-2 doses 2 doses (≥1 mo apart) 2-3 doses[18]	▸ **MenACWY** is recommended for previously unvaccinated adults with specific risk factors[17] ▸ Revaccinate with MenACWY every 5 yrs for those who remain at high risk ▸ **MenB** is recommended for all persons ≥10 years old with specific risk factors[19]; may be administered to persons 16-23 yrs old (preferred age 16-18 years) not at increased risk[26] ▸ Revaccinate with same MenB vaccine 1 yr after completing primary series and every 2-3 yrs thereafter for those who remain at high risk[27]	▸ **MenACWY:** headache, fatigue, malaise, and injection-site reactions (pain, redness, induration); rates are similar to those with tetanus toxoid ▸ **MenB:** fatigue, headache, myalgia, injection-site reactions (pain, erythema, induration)	▸ All are inactivated vaccines ▸ MenACWY vaccines are FDA-approved for adults ≤55 years old; Health Canada-approved for 2 mos-55 yrs old *(Menveo)*, 6 wks-55 yrs old *(MenQuadfi)*, ≥12 mos old *(Nimenrix)* ▸ MenB vaccines are FDA-approved for persons 10-25 years old; Health Canada-approved for 2 mos-25 yrs old *(Bexsero)*, 10-25 yrs old *(Trumenba)* ▸ *Bexsero* and *Trumenba* are not interchangeable ▸ **Pregnancy:** MenACWY may be used if otherwise indicated; MenB should be deferred unless the benefits are considered to outweigh the risks ▸ **Special Populations:** MenACWY is recommended for adults with HIV infection; MenACWY and MenB are recommended for those with asplenia/complement deficiencies	 144.20/$111.40 146.70/49.40[23] N.A./105.00 201.30/115.70 168.20/111.50

Continued on next page

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Vaccine	Dose	Schedule	General Recommendations[1]	Some Adverse Effects	Comments/Recommendations for Special Populations[1,2]	US Cost[3]/ CAN Cost[21]
***Haemophilus Influenzae* type b (Hib)**						
ActHIB (Sanofi) *PedvaxHIB* (Merck) *Hiberix* (GSK)	0.5 mL IM	1 or 3 doses[20]	▸ Previously unvaccinated adults with functional or anatomic asplenia or scheduled for elective splenectomy and for hematopoietic stem cell transplant recipients	▸ No data in adults; in children, erythema, pain, and swelling at the injection site, mild fever, irritability, vomiting, and diarrhea have occurred	▸ All are inactivated vaccines ▸ Not Health Canada- or FDA-approved for use in adults ▸ **Pregnancy:** no recommendation	$18.20/49.50 28.10/N.A.C. 12.00/40.70

ESRD on HD = end-stage renal disease on hemodialysis; HAV = hepatitis A virus; MSM = men who have sex with men; N.A.C. = not available in Canada; N.A. = not available in the US

1. Based on recommendations from the US Advisory Committee on Immunization Practices (ACIP): age ranges may differ from FDA-approved age ranges for some vaccines.
2. Special populations that need additional considerations include persons with asplenia/complement deficiencies, immunocompromising conditions (HIV infection, leukemia, lymphoma, Hodgkin's Disease, multiple myeloma, generalized malignancy, chronic renal failure, nephrotic syndrome, solid organ transplant, diseases requiring immunosuppressive drugs), HIV infection, chronic diseases (ESRD on HD, heart or lung disease, alcoholism, chronic liver disease, diabetes), healthcare workers, and MSM.
3. Approximate private sector cost (including excise tax) for 1 dose as of July 1, 2022, according to the CDC Vaccine Price List. Available at: www.cdc.gov/vaccines/programs/vfc/awardees/vaccine-management/price-list/index.html.
4. One to 2 doses for no evidence of immunity to measles and mumps (one dose for most adults; 2 doses recommended for adults previously vaccinated with killed measles vaccine [1963-1967]; students in postsecondary educational institutions; international travelers; household contacts of immunocompromised persons) and 1 dose for no evidence of immunity to rubella.
5. Persons with leukemia, lymphoma, or other malignancies in remission with no recent history (≥3 months) of chemotherapy are not considered severely immunocompromised for the purpose of receiving live-virus vaccines.
6. Wait at least 1 month after discontinuing long-term administration of high-dose corticosteroids before giving a live-virus vaccine. High-dose corticosteroid therapy is usually defined as ≥20 mg/day of prednisone or its equivalent for ≥14 days. Short-term (<2 weeks) treatment, low to moderate doses, long-term alternate day treatment with short-acting preparations, maintenance physiologic doses (replacement therapy), or steroids administered topically, by aerosol, or by intra-articular, bursal, or tendon injection are not considered contraindications to live-virus vaccines.
7. A 3-dose series is recommended for previously unvaccinated persons 15-26 years old. For those who started a series at age 9-14 years, but only received 1 dose or 2 doses <5 months apart, 1 additional dose is recommended.
8. Additional doses of PPSV23 (≥5 yrs apart) are recommended for some persons: 1 dose at ≥65 yrs for those with an underlying medical condition or a CSF leak or cochlear implant; 1 dose at <65 yrs and 1 at ≥65 yrs for those with immunocompromising conditions.
9. In adults with immunocompromising conditions (see footnote 11), cochlear implant, or CSF leak, PPSV23 may be administered ≥8 weeks later.
10. Risk factors include certain underlying medical conditions (alcoholism, chronic heart/liver/lung disease, cigarette smoking, diabetes) or immunocompromising conditions (HIV infection, leukemia, lymphoma, Hodgkin's disease, multiple myeloma, generalized malignancy, chronic renal failure, nephrotic syndrome, solid organ transplant, or diseases requiring treatment with immunosuppressive drugs), functional or anatomic asplenia, cochlear implants, or cerebrospinal fluid leaks.
11. If vaccine is given before age 65, no additional doses are required at ≥65 years.
12. PCV20 may be used if PPSV23 is not available; if PCV20 is used, no additional doses of PPSV23 are needed.
13. Travel to or work in countries with high or intermediate hepatitis A endemicity; MSM; injection or noninjection drug use; work with HAV in laboratory or with primates infected with HAV; clotting factor disorders; chronic liver disease; close contact with an international adoptee; persons experiencing homelessness; healthy adults ≤40 years old recently exposed to HAV (adults >40 years old if hepatitis A immunoglobulin cannot be obtained).
14. Chronic liver disease; HIV infection; percutaneous or mucosal risk of exposure to blood; risk of sexual exposure; receive care in settings where a high proportion of adults have risks for hepatitis B infection; travel to countries with high or intermediate hepatitis B endemicity.
15. If the same vaccine is not available, a different vaccine can be used to complete the series. Minimum intervals between doses must be observed. Two doses of *Heplisav-B* should be given after a single dose of another vaccine; one dose of *Heplisav-B* can be given as part of a 3-dose series.
16. Approximate WAC for 1 dose. WAC = wholesaler acquisition cost or manufacturer's published price to wholesalers; WAC represents a published catalogue or list price and may not represent an actual transactional price. Source: AnalySource® Monthly. September 5, 2022. Reprinted with permission by First Databank, Inc. All rights reserved. ©2022. www.fdbhealth.com/policies/drug-pricing-policy.
17. **Should receive 2 doses**: Functional or anatomic asplenia (including sickle cell disease and other hemoglobinopathies); HIV infection; persistent complement component deficiencies; eculizumab use. **Should receive 1 dose**: Travel to or live in countries where meningococcal disease is hyperendemic or epidemic (including African meningitits belt or during the Hajj); at risk from a meningococcal disease outbreak; microbiologists routinely exposed to *Neisseria meningitidis*; military recruits; first-year college students living in dormitories.
18. Healthy young adults 16-23 years old not at increased risk for meningococcal disease may receive a 2-dose series (0 and 6 months) of *Trumenba*. Those with specific risk factors should receive a 3-dose series (0, 1-2, and 6 months). In Canada, healthy adults not at increased risk of meningococcal disease may receive a 2-dose series (0 and 6 months). Those with specific risk factors should receive a 3-dose series (0, 1, and 6 months).
19. Functional or anatomic asplenia (including sickle cell disease); persistent complement component deficiency; eculizumab use; at risk from a meningococcal disease outbreak; microbiologists routinely exposed to *Neisseria meningitidis*. In Canada, functional or anatomic asplenia, sickle cell disease, combined T and B cell immunodeficiencies, congenital or acquired complement or antibody deficiency, HIV infection (especially if congenital), those at risk from a meningococcal outbreak attributed to serogroup B, occupational exposure, travellers to endemic areas, and military personnel during recruit training and on certain deployments.
20. One dose for previously unvaccinated asplenic persons and those undergoing elective splenectomy (preferably ≥14 days before the procedure). Three doses (at least 4 weeks apart) for all recipients of hematopoietic stem cell transplants (beginning 6-12 months after transplant), even if previously vaccinated.
21. Approximate WAC for 1 dose, based on prices in Canadian dollars from a national wholesaler (prices in Ontario, September 2022).
22. In Canada, recommended in adults ≥50 years old, including those with a previous episode of herpes zoster or previous use of the live-attenuated vaccine *(Zostavax)*. NACI does not make a recommendation regarding younger immunocompromised adults but the vaccine is Health Canada-approved in adults ≥18 years who are or will be at increased risk of herpes zoster due to immunodeficiency or immunosuppression caused by known disease or therapy.
23. Price from manufacturer.
24. In Canada, the usual dose/schedule is 1-2 doses.
25. In Canada, NACI recommends vaccination in all previously unvaccinated adults with medical, occupational, or behavioral risk factors and in all adults who lack a risk factor but want protection.
26. In Canada, NACI recommends vaccination in adults with risk factors (see footnote 19); may also be considered on an individual basis in any adult up to 24 years, not at increased risk, depending on the individual preferences, regional serogroup B epidemiology and strain susceptability. NACI acknowledges that the vaccines are approved up to 26 years but consider use appropriate above the authorized ages.
27. At this time, NACI has not made recommendations regarding booster doses.
28. One dose for unimmunized asplenic persons and those undergoing elective splenectomy. Three doses (at least 4 weeks apart) for all recipients of hematopoietic stem cell transplants (beginning 6-12 months after transplant), even if previously vaccinated.