Take Your Best Shot At Vaccination: Update for Pharmacists

Carolyn Whiskin, RPh, BScPhm, NCMP
Carolyn Whiskin has received honoraria for the preparation, review and presentation of continuing education programs from the following companies:

Abbvie, Amgen, Janssen, Merck, Lilly, Pfizer,
Immunication program is hailed as one of the greatest achievements in medicine

- Improved the lives of every Canadian

- Saved more Canadian lives over the last 50 years, than any other health intervention

- The success of childhood immunization programs have led to record or near-record low levels of vaccine preventable diseases


Pharmacists to Provide Travel Vaccinations to Ontario Patients

More pharmacy-based options improve patients’ access to the vaccines they need to stay healthy at home and abroad

TORONTO (December 1, 2016) - The Ontario Pharmacists Association (OPA) is extremely pleased with today’s announcement by Dr. Eric Hoskins, Minister of Health and Long-Term Care, allowing Ontario patients to access a wider variety of vaccines through their local pharmacy.
“Ontario is building on the success and popularity of the pharmacy-based flu shot program. Since that program was introduced in 2012, more than 1.8 million flu shots have been given in Ontario Pharmacies.”

“Starting on December 15, 2016, trained pharmacists in participating pharmacies will be able to provide patients with access to vaccines to protect against 13 preventable diseases. These include common travel-related vaccines (such as Hepatitis A and B, typhoid, meningococcal disease, pneumococcal disease, yellow fever, rabies and Japanese encephalitis vaccines). Pharmacists will also be able to administer human papillomavirus (HPV) and herpes zoster (shingles) vaccines to Ontarians who are not eligible for these publicly-funded vaccination programs.”
What vaccines do you personally need?
Use the checklist now!!
<table>
<thead>
<tr>
<th>Vaccine</th>
<th>Which Adults Should Receive It</th>
<th>How Often?</th>
<th>Public Health Funded in Ontario</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tetanus/Diphtheria (Td)</td>
<td>Everyone</td>
<td>Every 10 years</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Tetanus/Diphtheria/Pertussis (Tdap)</td>
<td>Everyone</td>
<td>Once in adulthood</td>
<td>Yes</td>
<td>Will replace one regular tetanus/diphtheria shot.</td>
</tr>
<tr>
<td>Influenza</td>
<td>Everyone</td>
<td>Annually</td>
<td>Yes</td>
<td>Especially needed for people at high risk of infection or those who are in close contact with high risk people.</td>
</tr>
<tr>
<td>Pneumococcal Conjugate (PCV13)</td>
<td>• All high risk patients (asthma, COPD, diabetes, chronic lung, kidney, and heart disease as well as immunocompromised).</td>
<td>Once</td>
<td>Yes</td>
<td>PCV13 first followed by PPSV23 (at least eight weeks later).</td>
</tr>
<tr>
<td>Pneumococcal Polysaccharide (PPSV23)</td>
<td>• All high risk patients as above. • Everyone age 65-years + over</td>
<td>Once</td>
<td>Yes (immunocompromised patients 50-years + over).</td>
<td>If PPSV23 has already been given, wait 12-months then give PCV13.</td>
</tr>
<tr>
<td>Herpes Zoster (Live Vaccine)</td>
<td>Age 60-years + over (may be given ages 50-59)</td>
<td>Once</td>
<td>Yes (age 65-70).</td>
<td>Effective for 5-10 years. Need for Booster NOT yet established.</td>
</tr>
<tr>
<td>Hepatitis B</td>
<td>People with medical, occupation or lifestyle risk and anyone who wants protection from Hepatitis B.</td>
<td>3 doses (0, 1, 6 months) 4 doses for rapid schedule (0, 7, 21d, &amp; 1-year)</td>
<td>• Hep B: Boys &amp; Girls in grade 7. • Hep A &amp; B high risk adults (liver disease, drug abuse, MSM*) (not for travel).</td>
<td>Hepatitis A &amp; B combination vaccine suggested for travel outside NA. (If received Hepatitis B vaccine in grade 7, give Hepatitis A alone). Hepatitis B antibodies decline rapidly over the first year. However, immune memory offers long term protection.</td>
</tr>
<tr>
<td>Hepatitis A</td>
<td>People with medical, occupation or lifestyle risk and anyone who wants protection from Hepatitis A.</td>
<td>0, 6 months</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Meningococcal ACYW-135</td>
<td>People with specific medical conditions and people living in residential accommodation including students and military personnel.</td>
<td>1 dose</td>
<td>Adults with asplenia, HIV, cochlear implants, specific complement/antibody deficiencies.</td>
<td>Conjugate vaccine, 18-55 years. Polysaccharide vaccine ≥ 56 years.</td>
</tr>
<tr>
<td>Measles, Mumps, Rubella (Live Vaccine)</td>
<td>People who have not had the vaccine or disease.</td>
<td>Adults may receive a booster based on childhood immunizations &amp; risk.</td>
<td>Yes</td>
<td>At risk: healthcare workers, post-secondary students, everyone aged 18-25 and travelers.</td>
</tr>
<tr>
<td>HPV</td>
<td>Women ages 9-45 years old Men ages 9-26 years old</td>
<td>3 doses (ages 14 and over) 0, 2, 4 months</td>
<td>Boys &amp; girls in grade 7. Catch-up until grade 12 available through public health. Up to 26yo MSM*.</td>
<td>NACI suggest no upper age limit for vaccination.</td>
</tr>
<tr>
<td>Travel Vaccines</td>
<td>Varies by destination – consult a travel health clinic, your doctor, nurse, local public health office or <a href="http://www.travelhealth.gc.ca">www.travelhealth.gc.ca</a>.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
# Vaccination Cheat Sheet - Non-Prescription Vaccines

<table>
<thead>
<tr>
<th>Vaccination Disease</th>
<th>Vaccine</th>
<th>Trade Name(s)</th>
<th>Route</th>
<th>Type of Vaccine</th>
<th>Potential Allergens*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Meningococcal</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Monovalent (Men-C-C)</td>
<td>NeisVac-C*</td>
<td>IM</td>
<td>Inactive</td>
<td>Tetanus toxoid carrier protein</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Menjugate*</td>
<td>IM</td>
<td>Inactive</td>
<td>Latex in tip cap of syringe Diphtheria CRM197 toxoid carrier protein</td>
</tr>
<tr>
<td></td>
<td>Quadrivalent (Men-C-ACYW)</td>
<td>Nimenrix*</td>
<td>IM</td>
<td>Inactive</td>
<td>Diphtheria Toxoid carrier protein</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Menvax*</td>
<td>IM</td>
<td>Inactive</td>
<td>Diphtheria CRM197 toxoid carrier protein</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Menactra*</td>
<td>IM</td>
<td>Inactive</td>
<td>Diphtheria Toxoid carrier protein</td>
</tr>
<tr>
<td></td>
<td>Quadrivalent (Men-P-ACYW)</td>
<td>Menomune*</td>
<td>IM</td>
<td>Inactive</td>
<td>Latex in stopper</td>
</tr>
<tr>
<td></td>
<td>Multicomponent (4CMenB)</td>
<td>Bexero*</td>
<td>IM</td>
<td>Inactive</td>
<td>Latex in the tip cap of syringe</td>
</tr>
<tr>
<td></td>
<td>Pneumococcal Disease</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Polysaccharide Conjugate</td>
<td>Prevnar 13*</td>
<td>IM</td>
<td>Inactive</td>
<td>Diphtheria CRM197 toxoid carrier protein</td>
</tr>
<tr>
<td></td>
<td>Polysaccharide</td>
<td>Pneumovax23*</td>
<td>IM SC</td>
<td>Inactive</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Human Papillomavirus</td>
<td>Gardasil*</td>
<td>IM</td>
<td>Inactive</td>
<td>Yeast Protein</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Cervarix*</td>
<td>IM</td>
<td>Inactive</td>
<td>Latex in plunger stopper of pre-filled syringe</td>
</tr>
<tr>
<td></td>
<td>Haemophilus influenza type b (Hib)</td>
<td>Act-Hib*</td>
<td>IM</td>
<td>Inactive</td>
<td>Tetanus toxoid carrier protein</td>
</tr>
</tbody>
</table>

*Consider other components in the vaccine listed in the monograph

** When administering more than one live vaccine, they must be administered the same day or 4 weeks apart
# Vaccination Cheat Sheet - Prescription Vaccines

<table>
<thead>
<tr>
<th>Vaccine</th>
<th>Trade Name(s)</th>
<th>Route</th>
<th>Vaccine Type</th>
<th>Potential Allergens*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Combined Typhoid and Hepatitis A</td>
<td>ViVaxin®</td>
<td>IM</td>
<td>Inactive</td>
<td>Neomycin</td>
</tr>
<tr>
<td>Hepatitis A</td>
<td>Havrix®</td>
<td>IM</td>
<td>Inactive</td>
<td>Neomycin</td>
</tr>
<tr>
<td></td>
<td>Avaxim®</td>
<td>IM</td>
<td>Inactive</td>
<td>Neomycin</td>
</tr>
<tr>
<td></td>
<td>Vaga®</td>
<td>IM</td>
<td>Inactive</td>
<td>Neomycin Latex in vial stopper</td>
</tr>
<tr>
<td>Hepatitis B</td>
<td>Enervix-B®</td>
<td>IM</td>
<td>Inactive</td>
<td>Neomycin</td>
</tr>
<tr>
<td></td>
<td>Recombivax HB®</td>
<td>IM</td>
<td>Inactive</td>
<td>Neomycin Latex in vial stopper Yeast Protein</td>
</tr>
<tr>
<td>Hepatitis A and B</td>
<td>Twinrix®</td>
<td>IM</td>
<td>Inactive</td>
<td>Neomycin Yeast Protein</td>
</tr>
<tr>
<td></td>
<td>Twinrix Jr®</td>
<td>IM</td>
<td>Inactive</td>
<td>Neomycin Yeast Protein</td>
</tr>
<tr>
<td>Herpes Zoster (Shingles)</td>
<td>Zostavax®</td>
<td>SC</td>
<td>Live**</td>
<td>Neomycin Porcine gelatin</td>
</tr>
<tr>
<td>Japanese Encephalitis</td>
<td>Ixiaro®</td>
<td>IM</td>
<td>Inactive</td>
<td>Neomycin Polygeline (gelatin)</td>
</tr>
<tr>
<td>Rabies</td>
<td>RabAvert®</td>
<td>IM</td>
<td>Inactive</td>
<td>Neomycin Amphotericin B Chick Protein; Egg Protein Chlortetracycline Neomycin Polygeline (gelatin)</td>
</tr>
<tr>
<td>Typhoid</td>
<td>Typhium Vi®</td>
<td>IM</td>
<td>Inactive</td>
<td>Neomycin Gelatin</td>
</tr>
<tr>
<td></td>
<td>Typherix®</td>
<td>IM</td>
<td>Inactive</td>
<td>Neomycin Gelatin</td>
</tr>
<tr>
<td></td>
<td>Vivotif®</td>
<td>PO</td>
<td>Live**</td>
<td>Neomycin Gelatin</td>
</tr>
<tr>
<td>Varicella</td>
<td>Varilrix®</td>
<td>SC</td>
<td>Live**</td>
<td>Neomycin Porcine gelatin</td>
</tr>
<tr>
<td></td>
<td>Varivax III®</td>
<td>SC</td>
<td>Live**</td>
<td>Neomycin Porcine gelatin</td>
</tr>
<tr>
<td>Yellow Fever</td>
<td>YF-Vax</td>
<td>SC</td>
<td>Live**</td>
<td>Chick protein and Egg protein Gelatin, latex in stopper of diluent</td>
</tr>
</tbody>
</table>
National committee of recognized experts in the fields of pediatrics, infectious diseases, immunology, medical microbiology, internal medicine and Public Health

Makes recommendations for the use of vaccines currently or newly approved for use in humans in Canada, including the identification of groups at risk for vaccine-preventable disease for whom vaccine programs should be targeted
A COALITION OF NATIONAL NON-GOVERNMENTAL, PROFESSIONAL, HEALTH, CONSUMER, GOVERNMENT AND PRIVATE SECTOR ORGANIZATIONS WITH A SPECIFIC INTEREST IN PROMOTING THE UNDERSTANDING AND USE OF VACCINES AS RECOMMENDED BY THE NATIONAL ADVISORY COMMITTEE ON IMMUNIZATION.
LETS TAKE A LOOK AT:

- Tdap Vaccine
- Influenza Vaccine
- Pneumococcal Vaccine(s)
- Shingles (Zoster) Vaccine
- HPV Vaccine
- MMR

Case Studies!!!
**PERTUSSIS: CLINICAL PHASES**

**TYPICAL COURSE OF PERTUSSIS***

- Paroxysmal Cough
  - Cough
  - Cough Paroxysmal
  - Cough Whooping
  - Vomiting
  - Cyanosis
  - Apnea

**Catarrhal:**
- Mild cough
- Runny nose
- Mild fever
- Apnea in infants

**Convalescent:**
- Cough
- Less paroxysmal
- Disappears in weeks

*The illness can be milder and the typical "whoop" absent in children, teens, and adults who have been vaccinated with a pertussis vaccine.*
**Major* Complications Adults**

- Pneumonia
- Rib Fracture
- Loss of consciousness
- Hernias
- Urinary Incontinence
- Weight Loss

**In older children and adults, the disease is less serious and complications are rare.**
ROUTINE PERTUSSIS IMMUNIZATION FOR ADULTS

Adults who have not previously received Tdap (Adacel) vaccine in adulthood should receive

1 dose of Tdap vaccine

Tdap can be administered regardless of the interval since the last dose of tetanus and diphtheria toxoid-containing vaccine.
WHAT IS INFLUENZA?

Respiratory infection caused by influenza A or B viruses

Signs and Symptoms – **sudden onset of:**

- Headache
- Fever
- Chills
- Cough
- Loss of appetite
- Muscle soreness
- Fatigue
- Eye redness
- Sore Throat
- Watery eyes
- Throat irritation
- Nausea, vomiting and diarrhea may occur – especially in children

MORBIDITY AND MORTALITY OF INFLUENZA

Annually in Canada:

- 10-20% of the population will contract influenza
- Highest infection rates in children (aged 5-9)
- Highest morbidity and mortality in children < 2 years and adults > 65 years and patients with underlying conditions
- Estimated 12,200 hospitalizations and approx. 3,500 deaths

Underestimation of the actual burden of disease

### Individuals at High risk of complications:

<table>
<thead>
<tr>
<th>✓ Nursing home residents</th>
<th>✓ Chronic medical Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>✓ People aged ≥ 65 years</td>
<td>✓ Aboriginal patients</td>
</tr>
<tr>
<td>✓ Pregnant</td>
<td>✓ Morbid Obesity (BMI ≥ 40)</td>
</tr>
<tr>
<td>✓ Children 6 to 59 months of age</td>
<td></td>
</tr>
</tbody>
</table>

### Serious complication:
- Viral Pneumonia
- Secondary bacterial pneumonia
- Worsening of underlying medical conditions
Trivalent Vaccine (TIV)
- An A/Michigan/45/2015 (H1N1)pdm09;
- an A/Hong Kong/4801/2014 (H3N2)-like virus;
- a B/Brisbane/60/2008-like virus.

Quadrivalent Vaccine (QIV) - contains additional Influenza B strain
- B/Phuket/3073/2013-like

Formulations of Influenza Vaccines
- Inactivated (TIV and QIV)
- Inactivated TIV - Adjuvanted
- Live Attenuated Influenza Vaccine (LAIV)
<table>
<thead>
<tr>
<th>Everyone aged ≥ 6 months of age</th>
<th>Why?</th>
<th>High Risk Groups</th>
</tr>
</thead>
</table>
| **Those at high risk of complications** | • nursing home  
• ≥ 65 years  
• children 6-59 months  
• pregnant  
• Aboriginal patients  
• morbid obesity (BMI ≥ 40)  
• those with chronic medical conditions | |
| **Risk of Spreading** | • HCPs  
• household contacts of < 6 mths  
• provide care to children ≤ 59 months | |
<p>| <strong>Essential community services</strong> | Police, fire, ambulance, infrastructure | |</p>
<table>
<thead>
<tr>
<th>Recipient by age group</th>
<th>Vaccines types available for use</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Children 6-23 months of age</td>
<td>TIV, QIV, ATIV</td>
<td>QIV should be used because of burden of influenza B disease</td>
</tr>
<tr>
<td>Children 2-17 years of age</td>
<td>TIV, QIV, LAIV</td>
<td>QIV → TIV LAIV should <strong>not</strong> be used in children with immune compromising conditions</td>
</tr>
<tr>
<td>Adults 18-59yo</td>
<td>TIV, QIV, LAIV</td>
<td>TIV and QIV for adults with chronic conditions LAIV <strong>not</strong> for health care workers LAIV <strong>not</strong> for adults with immune compromising conditions</td>
</tr>
<tr>
<td>Adults 60-64yo</td>
<td>TIV or QIV</td>
<td></td>
</tr>
<tr>
<td>Adults 65 +yo</td>
<td>TIV, QIV, ATIV, High dose TIV</td>
<td>High dose TIV is expected to give superior protection vs standard dose TIV Burden is higher in A(H3N2)</td>
</tr>
<tr>
<td>Pregnant women</td>
<td>TIV, QIV</td>
<td>LAIV <strong>not</strong> recommended because of theoretical risk to the fetus</td>
</tr>
</tbody>
</table>
INFLUENZA VACCINE CONSIDERATIONS

**Allergies**
- Not contraindicated for egg allergy - no need for influenza vaccine skin test
- Severity of other allergy(s) will dictate administration recommendation

**Vaccine Co-administration**
- Influenza vaccine (including LAIV) can be given at the same time as other inactivated or live vaccines

NOTE: If a live vaccine was given less than 4 weeks prior – wait a complete 4 weeks to administer the LAIV or consider Inactivated Influenza Vaccine if appropriate

**Pregnant Women**
- TIV or QIV vaccine recommended
- Avoid LAIV

**Reaction to previous vaccine dose**
- Refer to physician

# Influenza Vaccines Licensed in Canada (2017/18)

## Trivalent Inactivated Vaccine (TIV)

<table>
<thead>
<tr>
<th>Vaccine</th>
<th>Influvac®</th>
<th>Agriflu®</th>
<th>Vaxigrip®</th>
<th>Fluviral®</th>
<th>Fluzone®</th>
<th>Fluzone® High-Dose</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dosage</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.5 ml</td>
</tr>
<tr>
<td><strong>Route of Administration</strong></td>
<td></td>
<td></td>
<td>Intramuscular (IM)</td>
<td></td>
<td></td>
<td>IM</td>
</tr>
<tr>
<td><strong>Indicated</strong></td>
<td>≥18 years</td>
<td></td>
<td>≥6 months</td>
<td></td>
<td></td>
<td>≥65 years</td>
</tr>
<tr>
<td><strong>Package Description</strong></td>
<td>Single dose syringe</td>
<td>5 ml multi-dose</td>
<td>5 ml multi-dose and Single dose</td>
<td>5 ml multi-dose</td>
<td>5 ml multi-dose and Single dose</td>
<td>Single dose syringe</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Vaccine</th>
<th>Fluad®</th>
<th>Fluad Ped™</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adjuvant</td>
<td>MF59</td>
<td></td>
</tr>
<tr>
<td>Dosage</td>
<td>0.5ml</td>
<td>0.25 ml</td>
</tr>
<tr>
<td>Route of</td>
<td>Intramuscular (IM)</td>
<td></td>
</tr>
<tr>
<td>Administration</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indicated</td>
<td>≥ 65 years</td>
<td>6-23 months</td>
</tr>
<tr>
<td>Package</td>
<td>Single dose syringe</td>
<td></td>
</tr>
<tr>
<td>Description</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: Fluad Not publicly funded in Ontario this year for LTC homes

NACI RECOMMENDATION: USE OF LIVE ATTENUATED INFLUENZA VACCINE IN CHILDREN 2–17 YEARS OF AGE

1. In children without contraindications to the vaccine, any of the following vaccines can be used: quadrivalent live attenuated influenza vaccine (LAIV), quadrivalent inactivated influenza vaccine (QIV) or trivalent inactivated influenza vaccine (TIV).
   - For individuals with egg allergies: NACI has concluded that the full dose of LAIV may be used without prior vaccine skin test and in any setting where vaccines are routinely administered.

2. The current evidence does not support a recommendation for the preferential use of LAIV in children and adolescents 2–17 years of age.
   - NACI continues to recommend that a quadrivalent formulation of influenza vaccine be used in children and adolescents 2–17 years of age. If a quadrivalent vaccine is not available, TIV should be used.
STREPTOCOCCUS PNEUMONIAE IS A LEADING CAUSE OF CAP, MENINGITIS AND BACTEREMIA

- At least 90 serotypes of *S. pneumoniae* have been identified\(^1,2\)
  - Serotypes are not equally pathogenic
- Antibiotic resistance in *S. pneumoniae* is a global concern\(^1,2\)
  - Serotypes found to be antibiotic resistant include 6A, 6B, 9V, 14, 19A, 19F and 23F\(^3,4\)
- A human pathogen commonly carried in the nasopharynx\(^1\)

CAP = community-acquired pneumonia

Pneumococcal disease can be broadly grouped into categories of invasive disease and noninvasive (also termed *mucosal*) disease\(^1\).

Noninvasive forms of disease may become invasive (eg, pneumonia when accompanied by bacteremia)\(^2\).

Serotype is associated with disease severity and invasiveness\(^3\).

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11.4% of hospitalized adults with CAP died within 30 days

Major cardiac complications (including heart failure, acute coronary syndrome and cardiac arrhythmia) occur in a substantial proportion of patients with CAP.¹

Incident cardiac complications are associated with increased short-term mortality.²

Cardiac Complications in Hospitalized CAP Patients¹

- Overall: 18%
- Incident heart failure: 14%
- Acute coronary syndrome: 5%
- Incident cardiac arrhythmia: 4%

CAP = community-acquired pneumonia
COMORBIDITIES CAN INCREASE PNEUMOCOCCAL PNEUMONIA RISK IN ADULTS

Rates of Pneumococcal Pneumonia, by Age and Comorbidity Claims Data

- None
- Alcoholism
- Asthma
- Chronic heart disease
- Chronic liver disease
- Chronic lung disease
- Chronic use of oral steroids
- Diabetes
- Neuro-muscular/seizure disorders
- Rheumatoid arthritis/Crohn’s/lupus
- Smokers

MULTIPLE UNDERLYING MEDICAL CONDITIONS FURTHER INCREASE PNEUMOCOCCAL PNEUMONIA RISK IN ADULTS

Estimated annual incidence of pneumococcal pneumonia in the United States in adults, by number of comorbidities

Persons with ≥2 at-risk conditions accounted for 9%–32% of all at-risk adults, depending on age

Note: At-risk—immunocompetent with ≥1 selected chronic condition, including alcoholism, asthma, chronic heart disease, chronic liver disease, chronic lung disease, diabetes, neuromuscular/seizure disorders, and smoking.

## Two Types of Pneumococcal Vaccines Licensed for Adults in Canada

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
<th>Options</th>
<th>Serotypes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pneumococcal conjugate vaccine (PCV)</td>
<td>Polysaccharide antigens joined to a protein (conjugated)</td>
<td>PCV13*</td>
<td>Antigens of 13 pneumococcal serotypes: 1, 3, 4, 5, 6B, 7F, 9V, 14, 18C, 19A, 19F, 23F, 6A**</td>
</tr>
</tbody>
</table>

*PCV13 replaced the previous version of PCV, known as PCV7, which included 7 pneumococcal serotypes.  
**6A is unique to PCV13

### 15 Serotypes Cause the Majority of Disease.

## COMPARISON OF POLYSACCHARIDE VACCINES AND CONJUGATE POLYSACCHARIDE VACCINE

<table>
<thead>
<tr>
<th>Polysaccharide vaccines</th>
<th>Conjugate polysaccharide vaccines</th>
</tr>
</thead>
<tbody>
<tr>
<td>No booster Effect</td>
<td>Can be boosted</td>
</tr>
<tr>
<td>Immunity – 3 to 8 years</td>
<td>Stronger and longer lasting immunity</td>
</tr>
<tr>
<td>Limited</td>
<td></td>
</tr>
<tr>
<td>No mature memory cells</td>
<td>Memory cells are produced</td>
</tr>
<tr>
<td>Limited impact on nasopharyngeal carriage</td>
<td>Reduced nasopharyngeal carriage</td>
</tr>
</tbody>
</table>

Lazarus R, et al. *Clin Infect Dis*
A large proportion of CAP is preventable based on the circulating serotypes.

Active Surveillance for Community-acquired Pneumonia and Invasive Pneumococcal Disease among Hospitalized Canadian Adults 2011-2013: A PCIRN Serious Outcomes Surveillance (SOS) Network Study
Adults 18 Years of Age and Older:

Prevnar 13 is indicated for active immunization of adults 18 years of age and older for the prevention of pneumonia and invasive pneumococcal disease (including sepsis, meningitis, bacteraemic pneumonia, pleural empyema and bacteraemia) caused by Streptococcus pneumoniae serotypes 1, 3, 4, 5, 6A, 6B, 7F, 9V, 14, 18C, 19A, 19F and 23F.
Recommendation 1:
NACI concludes that there is good evidence, on an individual basis, to recommend in immunocompetent adults aged 65 years and older not previously immunized against pneumococcal disease, the use of PNEU-C-13 vaccine followed by PNEU-P-23, for the prevention of CAP and IPD caused by the 13 pneumococcal serotypes included in the conjugate vaccine. (NACI recommendation grade A).

For immunization of individuals who have previously received PNEU-P-23 vaccine, NACI recommends administration of PNEU-C-13 at least one year after any previous dose of PNEU-P-23 vaccine, due to the theoretical potential for decrease in antibody titers following immunization with PNEU-P-23 vaccine.

Recommendation 2:
NACI concludes that, based on circulating serotypes, there is fair evidence to recommend the use of PNEU-P-23 vaccine in routine immunization programs for adults aged 65 years and older (NACI recommendation grade B)

For complete details, please refer to the source document
National Advisory Committee on Immunization Update on the use of 13-valent pneumococcal conjugate vaccine (PNEU-C-13) in addition to 23-valent pneumococcal polysaccharide vaccine (PNEU-P-23) in immunocompetent adults 65 years of age and older – Interim Recommendation (June 2016)
National Advisory Committee on Immunization Update on the use of 13-valent pneumococcal conjugate vaccine (PNEU-C-13) in addition to 23-valent pneumococcal polysaccharide vaccine (PNEU-P-23) in immunocompetent adults 65 years of age and older – Interim Recommendation (June 2016)
## SUMMARY OF NACI RECOMMENDATIONS FOR USE OF PNEU-C-13 IN ADULTS (AS OF JUNE 2016)

<table>
<thead>
<tr>
<th>Risk groups</th>
<th>Pneu-C-13</th>
<th>Pneu-P-23</th>
<th>Revaccination with Pneu-P-23</th>
</tr>
</thead>
<tbody>
<tr>
<td>Immunocompetent adults 65 years of age and over¹</td>
<td>✔</td>
<td>✔</td>
<td></td>
</tr>
<tr>
<td>Adults 18 years of age and over with immunocompromising conditions²*</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
</tbody>
</table>

* For detailed list of conditions and corresponding recommendations please refer to the NACI Statement on the Use of Conjugate Pneumococcal Vaccine – 13 valent in Adults (Pneu-C-13)

¹National Advisory Committee on Immunization Update on the use of 13-valent pneumococcal conjugate vaccine (PNEU-C-13) in addition to 23-valent pneumococcal polysaccharide vaccine (PNEU-P-23) in immunocompetent adults 65 years of age and older – Interim Recommendation (June 2016)

²National Advisory Committee on Immunization Statement on the Use of Conjugate Pneumococcal Vaccine – 13 valent in Adults (Pneu-C-13) (2013)
HERPES ZOSTER (HZ)

HZ is the clinical manifestation of latent VZV reactivation. 90-95% of the adult population in Canada is seropositive for VZV and this population is aging. Approximately 20-30% of the adult population will experience HZ; by age 85, 50% of people will have experienced an episode of HZ. There are approximately 130,000 HZ cases/year in Canada (42% in people ≥60 years of age). 13% of those who have HZ will experience PHN, a neuropathic pain syndrome.

VZV = varicella zoster virus; PHN = postherpetic neuralgia
ZOSTER VACCINE

- Same preparation used in the varicella vaccine but at a higher dose (14-fold greater)

- Vaccine is effective:
  - 51.3% decrease in incidence
  - 66.5% decrease in post-herpetic neuralgia

- Well-tolerated
  - Injection site adverse effects – erythema, pain, swelling, itching

- Live vaccine

WHO SHOULD BE CONSIDERED?

Traditional Risk Factors For HZ:
- Age 50 years plus
- Race
- Gender
- Immunosuppression (diseases or meds)
- Trauma

Newer Data:
- Family History
- Diabetes And COPD, and NOW, Asthma
- Statin use

Should be vaccinating all aged > 60 and consider vaccinating aged 50-59.
Immunization with HZ vaccine for *immunocompetent* adults

- Vaccine is recommended for adults ≥ 60 years of age:
- Vaccine may be used in adults 50-59 years of age
- Vaccine may be administered to individuals ≥ 50 years old with a prior history of HZ. Based on expert opinion, it is recommended that the vaccine be given at least one year following the last episode of HZ

  - Annual recurrence rate in immunocompetent adults has varied across studies/methods:
    - Yawn et al 2011: 5.7% recurrence rate over 8 years (and 12% in immunocompromised adults)

See supplementary slides for more detailed NACI recommendations.
National Advisory Committee on Immunization (NACI) 2014. PHAC Publication 130536.
Immunization with HZ vaccine for immunosuppressed adults:

- **Individuals on low-dose immunosuppressive therapy**
  - It is reasonable to consider HZ vaccine in patients on lower doses of immunosuppressive agents: prednisone < 20 mg/day; methotrexate ≤ 0.4 mg/kg/week, azathioprine ≤ 3.0 mg/kg/day; 6-mercaptopurine ≤ 1.5 mg/kg/day

- **Individuals on anti-TNF biologics**
  - HZ vaccine may be used; on a case-by-case basis after review with an expert in immunodeficiency

See supplementary slides for more detailed NACI recommendations.
National Advisory Committee on Immunization (NACI) 2014. PHAC Publication 130536.
How you qualify

- To get the free shingles vaccine, you must be 65 to 70 years old.

https://www.ontario.ca/page/get-free-shingles-vaccine
1,350 new cases and 390 deaths from cervical cancer in 2012

HPV causes almost every case of cervical cancer

Highest rates of HPV infections in women < 20 years of age

Risk of HPV infection continues throughout adulthood

- 1,610 Columbian women with normal cytological results at baseline

- 5 year cumulative risk of HPV Infection:
  - 42.5% for women aged 15-19
  - 30.0% for women aged 25-29
  - 21.9% for women aged 30-44

Money D, Provencher D. *Journal of Obstetrics and Gynaecology Canada*. 2007;29(8 Suppl 3)
Estimated HPV Contribution in Cancer

- Cervix: > 99%
- Anus: 84.2%
- Vagina: 69.9%
- Penis: 47.0%
- Vulva: 40.4%
- Oropharynx: 70%
- Oral cavity: 23.5%

Most common sexually transmitted infection
Does NOT require penetrative intercourse for transmission
HPV infects epithelial cells but does not induce cell death
Does not cause viremia and does not induce a significant immune response
- Natural exposure to the virus may not confer a high enough or sustained antibody response. Previously HPV infection may NOT prevent future infections
Most patients (80%) will clear HPV over 8-14 months
- Not clear of the reason some patients have persistence of high risk HPV

HPV VACCINES

2v HPV Vaccine¹
- 16
- 18

High-risk genotypes

4v HPV Vaccine²
- 16
- 18
- 6
- 11

Low-risk genotypes
(anogenital warts and recurrent respiratory papillomatosis)

O: original to 4v HPV vaccine
N: new in 9v HPC vaccine

9v HPV Vaccine²
- 16
- 18
- 6
- 11
- 31
- 33
- 45
- 52
- 58

O: original to 4v HPV vaccine
N: new in 9v HPC vaccine
### WORLDWIDE BURDEN OF HPV DISEASE

HPV 6, 11, 16, 18, 31, 33, 45, 52, and 58 are 9 of the most common types in HPV-related cancers and diseases in males and females\(^1-\)\(^6\)

<table>
<thead>
<tr>
<th>Disease Cases</th>
<th>4 HPV types cause: (6, 11, 16, and 18)</th>
<th>9 HPV types cause a total of: (6, 11, 16, 18, 31, 33, 45, 52, and 58)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cervical cancer cases</td>
<td>70(^%)(^1)</td>
<td>90(^%)(^1)</td>
</tr>
<tr>
<td>Vulvar cancer cases(^a)</td>
<td>75(^%)(^2)</td>
<td>90(^%)(^2)</td>
</tr>
<tr>
<td>Vaginal cancer cases(^a)</td>
<td>65(^%)(^3)</td>
<td>85(^%)(^3)</td>
</tr>
<tr>
<td>Anal cancer cases(^a)</td>
<td>85(^%)(^4)</td>
<td>90%–95(^%)(^4)</td>
</tr>
<tr>
<td>High-grade cervical precancers(^a,(^b)</td>
<td>50(^%)(^5)</td>
<td>80(^%)(^5)</td>
</tr>
<tr>
<td>Low-grade cervical lesions(^a)</td>
<td>25(^%)(^5)</td>
<td>50(^%)(^5)</td>
</tr>
<tr>
<td>Genital warts cases</td>
<td>90(^%)(^6)</td>
<td>90(^%)(^6)</td>
</tr>
</tbody>
</table>

\(^a\)Not all cervical precancers and lesions, and vulvar, vaginal, and anal cancer cases are caused by HPV. Approximately 90\(^%\) of high-grade cervical precancers,\(^7\) 75\(^%\) of low-grade cervical lesions,\(^7\) 30\(^%\) of vulvar cancer cases,\(^2\) 70\(^%\) to 75\(^%\) of vaginal cancer cases,\(^3\) and 85\(^%\) to 90\(^%\) of anal cancer cases\(^4\) are HPV related.

\(^b\)High-grade cervical precancers defined as cervical intraepithelial neoplasia (CIN) 2/3.

### HPV9 Update May 2017

- **Females** age 9-45
  - no upper limited suggested by NACI
- **Males** 9-26

<table>
<thead>
<tr>
<th>Healthy – male and female (Immunocompetent, non-HIV infected)</th>
<th>9-14 years of age</th>
<th>2 or 3 doses (0, 5 – 13 mths) (0, 2, 6 mths)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>≥ 15 years</td>
<td>3 doses (0, 2, 6 mths)</td>
</tr>
<tr>
<td>Immunocompromised individual and immunocomponent HIV-infected individuals - male and female</td>
<td>9-14 years of age</td>
<td>3 doses (0, 2, 6 mths)</td>
</tr>
<tr>
<td></td>
<td>≥ 15 years</td>
<td>3 doses (0, 2, 6 mths)</td>
</tr>
</tbody>
</table>

*National Advisory Committee on Immunization 2016 and 2017*
NACI UPDATE ON HPV9 - APRIL 2016

- Re-immunization for those that receive HPV4:
  Not recommended at population-level, but permissive at individual-level for those who wish to take advantage of the additional protection provided by HPV9 vaccine

- Interchangeability of HPV Vaccine Brands:
  Mixed regimen/interchangeability studies have not performed. When possible, one brand should be used to complete series (if vaccine type known). Only HPV4 and HPV9 vaccines protect against HPV types 6 and 11. Only HPV9 vaccine protects against HPV 31, 33, 45, 52, 58.
HPV VACCINE PROGRAM (ONTARIO)

- **Grade 7 (HPV9)**
  - Girls & Boys
  - **Catch up:** until Grade 12 for girls
  - **Schedule:** 2-dose (age 9-14, immune-competent); 3-dose (>14, immunocompromised)

- **MSM (up to age 26)**
  - Series must be completed before 27th birthday.
  - Gay, bisexual, trans people who identify as MSM.
  - **Schedule:** 2-dose (age 9-14, immune-competent); 3-dose (>14, immunocompromised)

(2) [http://www.simcoemuskokahealth.org/Libraries/JFY_Health_Care_Professionals/160825_Expansion_of_the_HPV_Vaccine_Program.sflb.ashx](http://www.simcoemuskokahealth.org/Libraries/JFY_Health_Care_Professionals/160825_Expansion_of_the_HPV_Vaccine_Program.sflb.ashx)
MEASLES, MUMPS and RUBELLA (MMR) Routine Immunization Schedule – 2 doses of MMR or MMRV (after the 1\textsuperscript{st} birthday)

<table>
<thead>
<tr>
<th>Presumed acquired natural immunity</th>
<th>Regardless of year born</th>
<th>Born in or after 1970</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 dose</td>
<td>2 doses (at least 4 mo. apart)</td>
<td>1 dose</td>
</tr>
<tr>
<td>• Students in post secondary education setting</td>
<td>• Healthcare workers Military Personnel</td>
<td>• Adults</td>
</tr>
<tr>
<td>• Travelers outside North America</td>
<td></td>
<td>• Children and Adolescents</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Travelers outside North America</td>
</tr>
</tbody>
</table>
HEPATITIS B VACCINE

Booster doses and re-immunization
Routine boosters are not recommended for immunocompetent persons. Absence of a protective antibody titre in a healthy person who has previously demonstrated an adequate anti-HBs titre does not mean lack of protection because immune memory persists. Evidence shows that immunity is long lasting even though antibody may be undetectable. People immunized as an infant, child or adolescent who are at risk of exposure to HB virus (e.g., health care workers, those with other occupational risks, men who have sex with men, injection drug users, contacts of carriers etc.) should have serology testing for anti-HBs to ensure response to vaccination

Canadian Immunization Guide Retrieved October 14, 2016
Dan is 40 years old. He is healthy and ready to travel Europe to find that special someone.

1. Influenza Vaccine
2. MMR (travelling outside North America)
3. Adacel (TdaP) or Td
Frank is 68 years old, has COPD and was previously vaccinated with PPSV23 five years ago.

He is asking if there is any other vaccines he should receive.

1. **Prevnar 13** – he is over 65 yr old and it has been ≥ 1 year after PPSV23

2. **Influenza Vaccine**

3. **Shingles Vaccine** – over 60 yrs old

4. **Adacel (TdaP) or Td**
Judy is 38 years old has been diagnosed with rheumatoid arthritis and is starting on a biologic. She is a healthcare worker.

What vaccines would you discuss with her?

1. Prevnar 13 and eight weeks later – PPSV23 (she is considered Immunocompromised)
2. Annual Influenza Vaccine
3. Adacel (TdaP) or Td
4. HPV consideration (NACI suggests no upper age limit)
5. MMR vaccine (she is healthcare worker – she requires two doses)
Janice is 21 years old and looking forward to starting University. She is healthy. She is studying to be a nurse and hoping to do a semester in Africa.

She has come to the pharmacy to pick-up her birth control pills.

What vaccines would you recommend for her?

1. Make sure her routine vaccinations are up-to-date: Tdap, MMR (2 doses)
2. Annual Influenza Vaccine
3. HPV 9 – 3 doses
4. Meningococcal Vaccines (ACYW-135 & B)
5. Remind her of getting travel vaccines prior to her semester abroad
# TIPS AND TRICKS: COMMUNICATION

| A | Acknowledge your client’s concerns  
Clarify to understand your client’s needs |
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>“I hear what you are saying, that’s a common question I get from client’s. Tell me more about what you have heard.”</td>
</tr>
</tbody>
</table>
| S | Steer your conversation  
Refute the myth(s) and continue your conversation |
|   | “Actually, that’s a common myth. Unfortunately, the internet can have inaccurate information depending on where you look” |
| K | Knowledge – Know the Facts Well!  
Provide further knowledge, tailored to your client’s needs |
|   | Knowledge transfer – offer the correct information |
|   | Close, reinforce discussion – “Vaccination is the best way to protect you and your family from serious diseases. Have I answered all your questions? Would you like a list of good immunization websites to read more?” |
Ask the client what works for them. Offer suggestions.

**Pharmacological Interventions**
- Topical Anesthetics may be applied before vaccine injection
- Vapocoolants may be applied before the vaccine injection

**Order of Vaccines Administered**
- Save the most painful vaccine to the end if you are administering more than one vaccine

**For infants**
- Breastfeeding during immunization
- Use of a sugar solution for babies
**TIPS AND TRICKS: REDUCING PAIN**

**Body Position**
- Sitting upright can help you feel more relaxed
- Keep arm loose – “Shake it out” before injection
- If someone has a history of fainting – have them lay down or tense up an part of their body – for example: their stomach or leg

**Distraction and Relaxation**
- Distraction can help – bring a friend, listen to music or look at a smartphone
- Breath – deep breaths, exhaling slowly
- Tap their foot
- Relax their arm – “Shake it around” before the infection
- Do not look at the injection – do not draw up the vaccine in front of the client
GENERAL TIPS

- IM – 25 gauge -1 inch (gets vaccine in quicker and allows for a viscous solution)
- SC – 25 gauge- 5/8 inch
- Roll vial rather than shaking- less foaming, less irritating to sensitive vaccines, warmth for injection comfort
- Inject any diluent towards the side of vaccine vial rather than directly onto the powder
- Never have to restart a vaccine series, give booster dose at any point if regular timing has been missed
- “Bookmark” Canadian Immunization Guide- on your computer- online tips on all aspects of vaccination.
- Involve technicians and have consent forms ready; Tyson Smith
- Post a fee schedule- OPA Fee Guide
Bilingual resources for health care providers and the public, including:

- Pocket Guide for Immunizers
- Facts about Immunization
- Education and Training for Health Care Providers
- Immunization Counselling Points
- And so much more!

FOR MORE INFORMATION, CONTACT: IMMUNIZE@CPHA.CA
# Vaccination Cheat Sheet - Non-Prescription Vaccines

<table>
<thead>
<tr>
<th>Vaccine</th>
<th>Trade Name(s)</th>
<th>Route</th>
<th>Type of Vaccine</th>
<th>Potential Allergens*</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Meningococcal</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Monovalent (Men-C-C)</td>
<td>NeisVac-C*</td>
<td>IM</td>
<td>Inactive</td>
<td>Tetanus toxoid carrier protein</td>
</tr>
<tr>
<td></td>
<td>Menjugate*</td>
<td>IM</td>
<td>Inactive</td>
<td>Latex in tip cap of syringe Diphtheria CRM197 toxoid carrier protein</td>
</tr>
<tr>
<td>Quadrivalent (Men-C-ACYW)</td>
<td>Nimecfix*</td>
<td>IM</td>
<td>Inactive</td>
<td>Diphtheria Toxoid carrier protein</td>
</tr>
<tr>
<td></td>
<td>Menveo*</td>
<td>IM</td>
<td>Inactive</td>
<td>Diphtheria CRM197 toxoid carrier protein</td>
</tr>
<tr>
<td></td>
<td>Menactra*</td>
<td>IM</td>
<td>Inactive</td>
<td>Diphtheria Toxoid carrier protein</td>
</tr>
<tr>
<td>Quadrivalent (Men-P-ACYW)</td>
<td>Menomune*</td>
<td>IM</td>
<td>Inactive</td>
<td>Latex in stopper</td>
</tr>
<tr>
<td>Multicomponent (4CMenB)</td>
<td>Bexero*</td>
<td>IM</td>
<td>Inactive</td>
<td>Latex in the tip cap of syringe</td>
</tr>
<tr>
<td><strong>SCHEDULE II</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No Prescription Required</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Pneumococcal Disease</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Polysaccharide Conjugate</td>
<td>Prevnar 13*</td>
<td>IM</td>
<td>Inactive</td>
<td>Diphtheria CRM197 toxoid carrier protein</td>
</tr>
<tr>
<td>Polysaccharide</td>
<td>Pneumovax23*</td>
<td>IM</td>
<td>Inactive</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Human Papillomavirus</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gardasil*</td>
<td></td>
<td>IM</td>
<td>Inactive</td>
<td>Yeast Protein</td>
</tr>
<tr>
<td>Cervarix*</td>
<td></td>
<td>IM</td>
<td>Inactive</td>
<td>Latex in plunger stopper of pre-filled syringe</td>
</tr>
<tr>
<td><strong>Haemophilus Influenza type b (Hib)</strong></td>
<td>Act-Hib*</td>
<td>IM</td>
<td>Inactive</td>
<td>Tetanus toxoid carrier protein</td>
</tr>
</tbody>
</table>

*Consider other components in the vaccine listed in the monograph

** When administering more than one live vaccine, they must be administered the same day or 4 weeks apart
Drug Interchangeability and Dispensing Fee Act regulation requires:

4. (1) A person who dispenses a drug pursuant to a prescription shall provide a receipt to the person to whom the drug is supplied at the same time that the drug is supplied that sets out the amount being charged in respect of, (a) a dispensing fee; (b) the cost of the drug; and (c) the total price of the prescription. R.R.O. 1990, Reg. 936, s. 4 (1).

(2) Subsection (1) does not apply to a drug that does not require a prescription. R.R.O. 1990, Reg. 936, s. 4 (2); O. Reg. 205/96, s. 4.
PHARMACIST ACTION PLAN

- Provide an Adult Vaccination Checklist to each patient while waiting for their flu shot or during a MedsCheck

- Next steps:
  - Ask patient to take the list to their family MD to discuss
  - Send a pharmaceutical opinion to suggest vaccines that are not public health funded
  - May sell and inject OTC vaccines
  - Offer injection service when dispensing prescribed vaccines
  - Consider a vaccine consult service including travel

- Always inform the family physician of vaccines administered in the clinic

- Advise patients to update their vaccine record (Immunize Canada)