HPV Vaccines: Expanding the power of prevention

Family Practice Oncology
CME Day
November 18 2017

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Conflicts of interest: I have no affiliation (financial or otherwise) with a commercial or other industry interest.
<table>
<thead>
<tr>
<th></th>
<th>Quadrivalent HPV</th>
<th>Bivalent HPV</th>
<th>Nonavalent HPV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strain coverage</td>
<td>6,11,16,18</td>
<td>16,18 Cross protection to 31, 33, 45, and 51</td>
<td>6/11/16/18/31/33/45/52/58</td>
</tr>
<tr>
<td>Approved indications:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-sex</td>
<td></td>
<td>females 9-45 years</td>
<td>females 9-45 years</td>
</tr>
<tr>
<td>-age</td>
<td></td>
<td>males 9-26 years</td>
<td>males 9-26 years</td>
</tr>
<tr>
<td>-prevention of:</td>
<td></td>
<td>genital warts</td>
<td>genital warts</td>
</tr>
<tr>
<td></td>
<td></td>
<td>cervical cancer and CIN</td>
<td>cervical cancer and CIN</td>
</tr>
<tr>
<td></td>
<td></td>
<td>vulvar and vaginal IN</td>
<td>vulvar and vaginal IN</td>
</tr>
<tr>
<td></td>
<td></td>
<td>anal cancer and IN</td>
<td>anal cancer and IN</td>
</tr>
<tr>
<td>Adjuvant, route</td>
<td>Aluminum, IM</td>
<td>Aluminum+ASO4, IM</td>
<td>Aluminum, IM</td>
</tr>
<tr>
<td>Schedule</td>
<td>0,2,6 months; 0+6&lt;15 yr</td>
<td>0,1,6 months; 0+6 or 12&lt;15 yr</td>
<td>0,2,6 months; 0+6&lt;15 yr</td>
</tr>
<tr>
<td>Efficacy (CIN 1-2)</td>
<td>High 90s</td>
<td>High 90s</td>
<td>High 90s</td>
</tr>
<tr>
<td>Able to prevent X% of:</td>
<td>90% of genital warts</td>
<td>70% of cervical cancer</td>
<td>90% of cervical cancer</td>
</tr>
<tr>
<td></td>
<td>70% of cervical cancer</td>
<td></td>
<td>80% of cervical precancer</td>
</tr>
<tr>
<td></td>
<td>96% of anal cancer</td>
<td></td>
<td>75+% of vulvar, vaginal, anal cancer and precancers</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>90% of genital warts</td>
</tr>
<tr>
<td>Duration of protection data</td>
<td>&gt;12 years</td>
<td>&gt;9.4 years</td>
<td>&gt;5 years</td>
</tr>
</tbody>
</table>
HPV vaccines: Health Canada approvals

HPV4

• Health Canada approved 2007: HPV 4-valent (6,11,16,18) for cervical cancer and genital warts
  – Initial indication 9-26 year old females; supported by NACI recommendations
  – 2008 BC program for girls in grades 6 and 9, 3 dose series (born 1994 and later; grade 9 program ran for 3 years)
  – 2014 BC: 2 dose series for girls in grade 6 (and this is the current schedule for both sexes when starting series before 15th birthday; NACI statement 2015)
  – 2010 Health Canada indication for males against infection (4 strains) and warts to age 26
  – 2011 Health Canada indication for females to age 45
  – 2011 Health Canada indication against anal cancer both sexes

NACI statements are at:
HPV vaccines: Health Canada approvals of bivalent and 9-valent

• 2010: HPV 2-valent (16,18)
  – 2012 BC catch-up program for young women to age 26 at series commencement, 3 dose series; 80,000 doses distributed

• 2015: HPV 9-valent (5 additional oncogenic strains)
  – Females to 45 (warts, cervical, vaginal, anal cancers) and males to 26 (genital warts and anal cancer)
  – 90% coverage of cervical cancer types; comparable immunogenicity and safety to HPV4-valent; swelling at injection site 48% vs 36%
BC expansions beyond grade 6 girls

• September 2015, for high risk males starting series up to age 26
• August 2016, HPV9 for HIV positive females to age 26
• September 2016, HPV9 for grade 6 girls:
  – HPV 9 valent: replaced HPV4, given in 2-dose series
  – by May 2017 HPV9 replaced all use of HPV4 in BC programs
• September 2017: HPV9 for grade 6 boys (born 2006 and later); transgender to age 26
Current BC eligibility and recommendations for HPV9 vaccine

Human Papillomavirus Vaccine [Nonavalent (types 6, 11, 16, 18, 31, 33, 45, 52, and 58)]
GARDASIL®9

INDICATIONS:
- Individuals born on or after January 1, 1995
- Unimmunized or incompletely immunized females born in 1994-2003
- HIV positive individuals 9-26 years of age (inclusive) who have not received a complete series of HPV vaccine
- Males 9-26 years of age (inclusive) at the time of series commencement who are:
  - men who have sex with men (including those who are not yet sexually active and are questioning their sexual orientation)
  - street involved
- Males 9-18 years of age (inclusive) in the care of the Ministry of Children and Family Development (MCFD)
- Males in youth custody services centres
- Transgender individuals 9-26 years of age (inclusive)

RECOMMENDED BY THE NATIONAL ADVISORY COMMITTEE ON IMMUNIZATION BUT NOT PROVIDED FREE IN BC:
- Women 45 years of age and younger born prior to 1994
- Males 9-26 years of age (who are not indicated above)
- Males 27 years of age and older who are men who have sex with men

‘Once eligible, always eligible’….for HPV vaccine until 26 yo. Using 1994 birth cohort as the oldest to have been eligible in BC, in 2017 (minus1994) = 23 yo; in 2020 it will be 26
8. Can HPV9 be given to a person who has started or completed a series with HPV4, to get protection against the 5 additional HPV types?

Yes, however the following points should be considered:

- At this time, HPV9 is only publicly funded in BC for girls in grade 6 starting in the 2016/17 school year, and females 9-26 years of age who are HIV positive. All other individuals will need to purchase HPV9 from a pharmacy or travel clinic.
- A complete series of HPV9 is recommended to ensure protection against the additional five HPV types.
- Available data show no serious safety concerns in persons who were vaccinated with 9-valent HPV vaccine after having received a 3-dose series of quadrivalent HPV vaccine at least 12 months earlier.
Anti-HPV 6 antibodies by age in years
HPV4 vaccine, 3 dose series

Efficacy Cohorts

Immunogenicity Bridging

Age at Enrollment (Years)

GMT, \( t = 7 \) months
Effectiveness of vaccine programs

• 2015 multi-country meta-analysis:
  – significant reductions in HPV infection, genital warts and cervical intraepithelial neoplasia (CIN)
  – herd protection of males and unvaccinated women in populations with sufficient coverage e.g., Australia

• BC ecological data based on Pap test results in vaccinated age cohort compared to older than vaccinated cohort
  – Comparing rates before and after introduction of the vaccine program, IRR for CIN2+ in young women 15–17 years was significantly reduced overall for all categories of cervical dysplasia, compared to 18-22 year olds
  – QUEST study fully enrolled (BC AB QU ATL) 2 vs 3 dose recipients effectiveness

Ogilvie Int.J.Cancer 2015; 137, 1931–1937
≥30% of BC girls are not completing a series while in grade 6
Series completion rates vary in BC at the HSDA level

Grade 6 Females with Up-to-date Immunizations, 2017*

Human Papillomavirus

Health Service Delivery Area

Percent Coverage

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

EK KB OK TCS FE FN FS RMD VAN NSCG SVI CVI NVI NW NI NE
Series completion rates vary in BC at the school level

Vancouver Coastal 2015/6 Grade 6

<table>
<thead>
<tr>
<th>Local Health Area</th>
<th>School Name</th>
<th>HBV</th>
<th>MENC</th>
<th>VARICELLA</th>
<th>HPV</th>
<th>ZERO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Westside</td>
<td>SUBTOTAL</td>
<td>93%</td>
<td>83%</td>
<td>83%</td>
<td>64%</td>
<td>2%</td>
</tr>
<tr>
<td></td>
<td>BAYVIEW COMMUNITY ELEMENTARY</td>
<td>79%</td>
<td>64%</td>
<td>68%</td>
<td>35%</td>
<td>NR</td>
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<tr>
<td></td>
<td>CARNARVON COMMUNITY ELEMENTARY</td>
<td>92%</td>
<td>84%</td>
<td>84%</td>
<td>83%</td>
<td>NR</td>
</tr>
<tr>
<td></td>
<td>CROFTON HOUSE</td>
<td>93%</td>
<td>77%</td>
<td>79%</td>
<td>72%</td>
<td>0%</td>
</tr>
<tr>
<td></td>
<td>DR R E MCKECHNIE ELEMENTARY</td>
<td>98%</td>
<td>90%</td>
<td>90%</td>
<td>75%</td>
<td>NR</td>
</tr>
<tr>
<td></td>
<td>EATON ARROWSMITH SCHOOL</td>
<td>75%</td>
<td>50%</td>
<td>50%</td>
<td>NA</td>
<td>NR</td>
</tr>
<tr>
<td></td>
<td>ECOLE JULES QUESNEL ELEMENTARY</td>
<td>92%</td>
<td>87%</td>
<td>89%</td>
<td>63%</td>
<td>NR</td>
</tr>
<tr>
<td></td>
<td>FRASER ACADEMY</td>
<td>95%</td>
<td>77%</td>
<td>73%</td>
<td>38%</td>
<td>NR</td>
</tr>
<tr>
<td></td>
<td>GENERAL GORDON ELEMENTARY</td>
<td>92%</td>
<td>87%</td>
<td>82%</td>
<td>73%</td>
<td>NR</td>
</tr>
<tr>
<td></td>
<td>HENRY HUDSON ELEMENTARY</td>
<td>92%</td>
<td>90%</td>
<td>90%</td>
<td>65%</td>
<td>NR</td>
</tr>
<tr>
<td></td>
<td>IMMACULATE CONCEPTION SCHOOL</td>
<td>96%</td>
<td>89%</td>
<td>89%</td>
<td>47%</td>
<td>0%</td>
</tr>
<tr>
<td></td>
<td>KERRISDALE ELEMENTARY</td>
<td>97%</td>
<td>87%</td>
<td>89%</td>
<td>65%</td>
<td>NR</td>
</tr>
</tbody>
</table>

HPV vaccines safety

• Reviewed by multiple medical authorities and regulatory agencies globally:
  – World Health Organisation; Global Advisory Committee on Vaccine Safety
  – US Food and Drug Administration
  – European Medicines Agency
  – International Federation of Gynaecology & Obstetrics
  – Country specific bodies such as:
    • Medicines & Healthcare Products Regulatory Agency of the UK
    • Therapeutic Goods Administration of Australia
    • Health Canada
    • Centres for Disease Control, USA
• All have endorsed as safe and effective
• No evidence for neurological or autoimmune diseases; no deaths directly attributed to HPV vaccination
To improve vaccine uptake, every study shows that:

- Recommendation from a physician is the KEY factor in the decision to be vaccinated
  - Trusted, knowledgeable
  - Basic information
  - Address specific concerns raised
Interactive Electronic Immunization Infographic
For Health Care Providers

There is a wealth of credible and important immunization resources. This tool collates and highlights information and key national and provincial immunization resources for health care providers.

How to use the infographic:
Select the immunization topic of interest. This will display an array of applicable subcategories and corresponding resources. Select the resource of interest to you.

www.bccdc.ca
Resources on

www.bccdc.ca