**Trends in U.S. Vaccination Rates: Ages 13-17 Yrs**

**Abbreviations:** Tdap = tetanus, diphtheria, acellular pertussis vaccine; MenACWY = meningococcal conjugate vaccine; HPV-1 = human papillomavirus vaccine, ≥1 dose; HPV-3 = human papillomavirus, ≥3 doses.

* Tdap and MenACWY vaccination recommendations were published in March and October 2006, respectively.
† HPV vaccination recommendations were published in March 2007.

* Females; adolescent male vaccination 1.4%
Implications of Current US HPV Vaccination Rates

• Current vaccine uptake in the US is probably too low for herd immunity against the HPV types targeted by the vaccine

• CDC Advisory Committee on Immunization Practices is likely to vote (Oct. 25) on whether to upgrade its recommendation for male vaccination from “permissive” to “routine”
  – Current male vaccination rate: 1.4%
  – In December, 2010, the FDA approved Gardasil (Merck) for a cancer prevention indication (anal cancer) in males; in 2009, it was approved for prevention of genital warts
  – The incidence of HPV-positive oropharyngeal cancer, which predominantly affects males, is increasing in the US, and may soon surpass the incidence of cervical cancer in the US
One or two vaccine doses (Cervarix, GSK) can induce 4 years of protection against persistent (6 months) HPV infection with HPV16/18

<table>
<thead>
<tr>
<th>Number of doses</th>
<th>Vaccine arm</th>
<th>Number of women</th>
<th>Number of events</th>
<th>Rate per 100 women</th>
<th>HPV vaccine efficacy % (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 doses</td>
<td>Control</td>
<td>3010</td>
<td>229</td>
<td>7.6%</td>
<td>84 (77-88)</td>
</tr>
<tr>
<td></td>
<td>HPV</td>
<td>2957</td>
<td>37</td>
<td>1.3%</td>
<td></td>
</tr>
<tr>
<td>2 doses</td>
<td>Control</td>
<td>380</td>
<td>24</td>
<td>6.3%</td>
<td>81 (63-94)</td>
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<tr>
<td></td>
<td>HPV</td>
<td>422</td>
<td>5</td>
<td>1.2%</td>
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<tr>
<td>1 dose</td>
<td>Control</td>
<td>188</td>
<td>15</td>
<td>8.0%</td>
<td>100 (79-100)</td>
</tr>
<tr>
<td></td>
<td>HPV</td>
<td>196</td>
<td>0</td>
<td>0.0%</td>
<td></td>
</tr>
</tbody>
</table>

- Similar protection was seen against 12 month persistent infection
- It is unknown whether these results can be extrapolated to Gardasil

Kreimer et al, J Natl Cancer Inst, on-line September 9, 2011
Vaccine costs and doses

• Developing world: the full 3 dose schedule is:
  – expensive (even with tiered pricing)
  – logistically complicated (lack of adolescent vaccine platform)

• Two doses partially overcomes both problems
  – Long-term duration of protection?

• Gardasil is already being given in a two dose schedule in parts of Canada, Mexico
  – based on strong immune responses to two doses in young adolescents