HPV Update
What's up with "that" vaccine?

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Objectives

- 1. Understand HPV transmission, risk factors, & its impact on the development of certain cancers
- 2. Understand the mechanism of action of the HPV vaccine, including immunogenicity
- 3. Describe current HPV vaccine recommendations for adolescents and young adults
- 4. Describe the pros/cons of the HPV vaccine, in regards to discussion with patients/parents

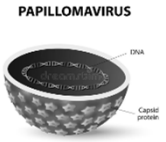
HPV Basics

- **Most common** sexually transmitted infection
  - 80% infected in their lifetime
  - So that means "everyone"
- Affects the skin & mucosa of the anogenital tract, oral cavity, oropharynx & larynx
- Asymptomatic
- Cleared in most cases

Harder

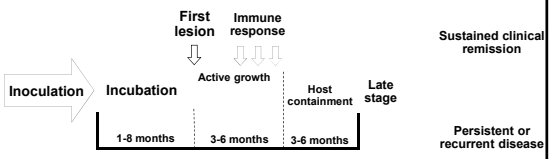
HPV

- Over 200 types
  - High risk=16/18
  - Low risk=6/11
- 12 HR types implicated in cancer
  - 16, 18, 31, 33 35, 39, 51, 52, 56, 58, 59, 68
- Those at increase risk
  - MSM
  - HIV+
  - Immunosuppression



Harder

Natural History of HPV Infection



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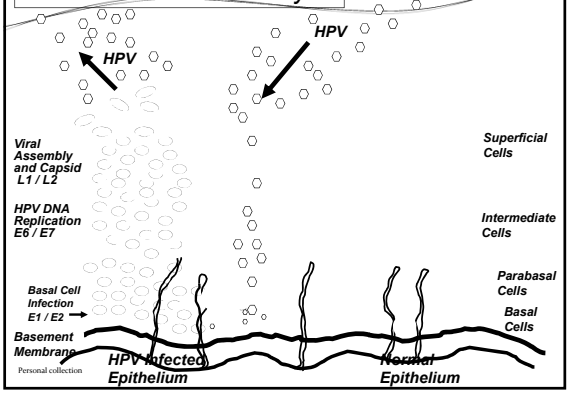
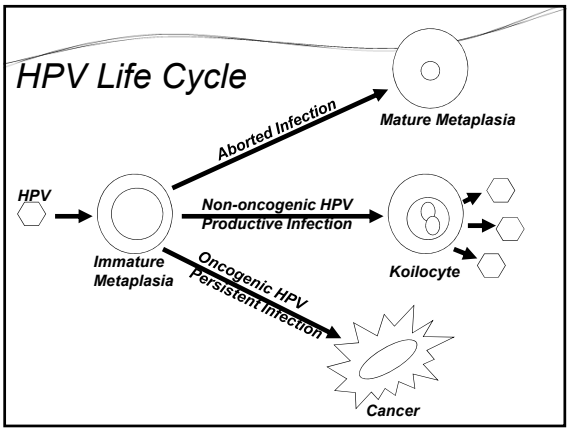
HPV Infection and Life Cycle



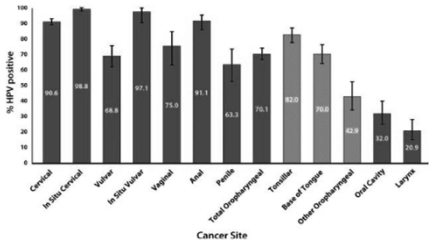
Personal collection



HPV and its' relationship to cancers

- Females
  - Cervical Ca=nearly 100%
- Males
  - Penile Ca=33%
  - Anal Ca=90%
  - Oral Ca=22.4%
  - Oropharyngeal Ca=4.4%
  - Larynx Ca=3.5%

HPV Associated Cancers



NCI NIH

HPV-related cancers

- 1. Cervical cancer--2nd most common female cancer in developing countries; 7th in developed countries
  - 80% occur in developing countries
    - Improved with screening
    - HPV types 16/18 responsible for ~70% of all cervical cancers
- 2. Vulvar cancer--90% are squamous
  - Basaloid type=younger women, HR+
  - Keratinizing type=HPV neg

Grulich

HP-related cancer (cont)

- 3. Vaginal cancer-rare
  - Older women; assoc with HPV
- 4. Penile-rare with circumcision
  - Squamous; older men
- 5. Anal-transition zone
  - Area of metaplasia (squamous/adenocarcinoma)

Grulich

HPV Risk Factors

- 1. # partners—Lottery/BINGO
- 2. early coitarch
- 3. behavior of male partners—partners/risky behavior
- 4. smoking-nicotine metabolites
- 5. increased with pregnancy
- 6. long term OCP use-metaplasia
- 7. poor diet
- 8. other STDs
- 9. poverty/education
- 10. immunosuppression—HIV/transplant/cancer

Grulich

HPV vaccine

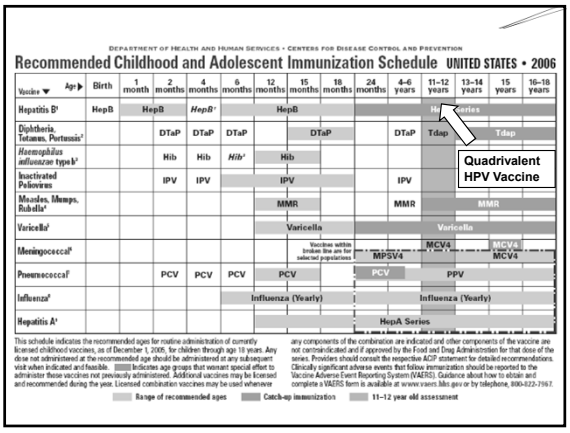
- Quadrivalent vaccine (Merck) 2006 for females 9-26
  - (Gardasil®)
- Quadrivalent vaccine (Merck) 2009 for males 9-26
  - (Gardasil®)
- Bivalent vaccine (GlaxoSmithKline) 2009, females 9-45
  - (Cervarix®) (not available in the US)
- Nonvalent vaccine (Merck) 2014 for males & females 9-26
  - (Gardasil® 9)

HPV Recommendations

- Advisory Committee on Immunization Practices (ACIP)
- World Health Organization (WHO)
- American Cancer Society (ACS)
- American Academy of Family Physicians (AAFP)
- American Academy of Pediatrics (AAP)
- American College of Obstetricians & Gynecologists (ACOG)
- Center for Disease Control (CDC)
- Immunization Action Coalition (IAC)

Vaccination Recommendations (ACIP)

- 9-14 boys & girls—2 doses
  - Day 0 and Mo 6-12
- 15-26 boys & girls or those immunocompromised -3 doses
  - Day 0, Mo 1-2, Mo 6
- 9HPV may be used to complete a vaccination series
- If vaccinated with 4HPV, no recommendation to administer the 9HPV vaccine



How Does the Vaccine Work?

- VLPs are NOT infectious; lack DNA
- Produce antibodies that bind the virus, preventing the virus from infecting cells
- They "resemble" the natural virus & have activity against the virus
- Produce HIGH levels of immunogenicity
- Do NOT treat HPV infections/diseases, or make them go away.

Cancer

HPV Vaccine Development

Internet photo

Vaccine Effectiveness

Endpoint	n	Number of Cases	Person-Years at Risk	Incidence Rate per 100 Person-Years at Risk (95% Confidence Interval)	Vaccine Effectiveness (%)
Human papillomavirus 6/11/16/18-related CIN, vulvar cancer, and vaginal cancer	2274	1	15242.4	0.0 (0.0, 0.0)	100

Vaccine Effectiveness Against Human Papillomavirus (HPV) 6/11/16/18-Related Cervical Intraepithelial Neoplasia, Vulvar Cancer, and Vaginal Cancer Among Women Receiving Quadrivalent HPV Vaccine at the Start of the Baseline Study: Per-Protocol Efficacy Population

Kjaer, 2018

Vaccine Cons

- 2014 data—67million doses/92.4% non-serious reactions
  - Syncope
  - Local site reactions
  - Dizziness
  - Nausea
  - Headache
- Serious reactions????
  - Death (no common patterns)
  - Unusual neurological illness (variants of ALS)
  - Increased reporting of syncope & PE, compared to other vaccines (90% were taking OCPs)

Adverse Events

- Common
- Severe

Arana, 2018

Vaccine Cost

- Affordable Care Act (ACA) requires most private insurances to cover recommended preventable services with no copay/deductible
- Medicaid covers up to 21 years of age
- Vaccines for Children program covers Medicaid eligible, uninsured, underinsured and those receiving vaccines through a Federally Qualified Health Center, Rural Health Center or are Alaskan American or Native American

Cancer

HPV Vaccine Cost

- Nonvalent
  - $429/dose (case price)
  - ~$200/dose (coupon cost)
- CDC Cost
  - $168
- Private sector cost
  - $205
- If given in office, add injection fee and visit fee
  - $20 admin fee
  - $55 office visit

GA Public Health

Why Vaccinate?

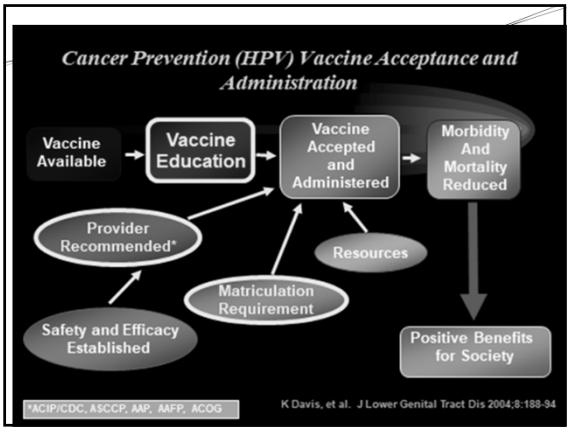
- Prevent cancer (cervix, vagina, vulva, anal, oropharyngeal, penile)
- Reduce burden of disease/tx
  - Cost to treat/psychological
- Herd immunity
- Required by law
- Physician recommendation

Current Vaccination Rates

- 2007
  - 5.9% in girls aged 13-17
  - 1.3% in boys aged 13-7
- 2013
  - 37.6% for girls
  - 13.9% for boys

Why are parents NOT vaccinating?

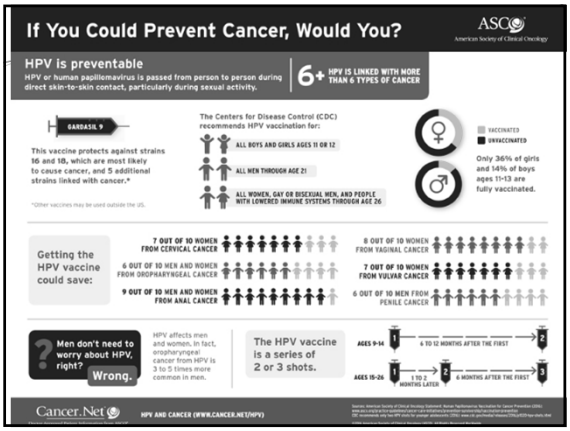
- Gateway to initiation of sex
- Not sexually active & don't need it
- Lack of knowledge about the vaccine
- Fear
- Religious beliefs
- Physician did not recommend



Other Thoughts?

- Vaccinating those who already have HPV?
- Vaccinating those who are immunocompromised?
- Vaccinating those outside the age bracket?
- Does NOT TREAT already present HPV
- First vaccine know to PREVENT a cancer

- What will you tell your patients/parents?



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