HPV Vaccination among Adolescents in the United States

Dr. Kayoll Galbraith Gyan, PhD, RN
Assistant Professor
Northeastern University
Bouvé College of Health Sciences
School of Nursing

Northeastern University

1

Overview

- What is HPV?
- HPV transmission, risk factors, and symptoms of HPV infection
- The burden of HPV infection in the United States
- HPV associated cancers and HPV cancer disparities
- HPV vaccination recommendations and timeline
- Factors influencing HPV vaccination among adolescents
- Recommendations for clinical practice

2

What is HPV?

- Human Papillomavirus (HPV) is the most common sexually transmitted infection (STI) globally and in the US
  - Over 100 types of HPV strains
  - 40 strains transmitted to genitals, mouth and throat
- Categorized as
  - Low risk- Leads to genital warts
  - High risk-Leads to 6 strains of cancers affecting women and men

(Chelimo et al. 2013; Marks et al., 2010; Hariri et al., 2011

3

HPV Transmission, Risk Factors & Symptoms

- Transmitted through skin-to-skin contact

Risk Factors

- Sexual activity
- Early sexual debut
- High Numbers of sexual partners
- Multiple sexual partners
- Lack of condom use
- Compromised immune system (i.e. HIV infection, smoking)

Symptoms: Asymptomatic, unless progresses to genital warts or cancer

HPV usually cleared by immune system within 1-2 years, but persistent infection can lead to genital warts or cancers.

(Chelimo et al. 2013; Marks et al., 2010; Hariri et al., 2011)

4

Adolescence and HPV Infection

- A particularly vulnerable time period for exposure to HPV
  - 55% of male and female teens have had intercourse by aged 18 years old
- Sexually active adolescents have the highest HPV prevalence rate,
  - 50-80% adolescents get HPV within 2-3 years of sexual activity
- Within one year of becoming sexually active, >25% of females may acquire HPV infection from first partner

Abma & Martinez, 2017; McQuillan et al., 2017; Moscicki,2007; Winer, 2005

5

Burden of HPV in the United States

- Prevalence: 79 million males and females in the US (CDC 2019)
- Incidence: 14 million annually in the US (CDC 2019)
- Persistent Infection with high risk HPV causes 6 types of cancers affecting males and females

Women	Men	Everyone
Cervical, vaginal, vulvar	Penile	Anal, oropharyngeal

Virtually ALL sexually active person will be exposed to HPV in their lifetime

https://www.cdc.gov/cancer/hpv/statistics/cases.htm

6

HPV Associated Cancers

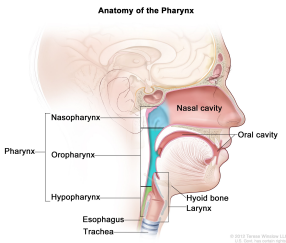
HPV infection is associated with:

- Cervical cancer- 91% of cases-Virtually all cases
- Anal cancer- > 91% of cases
- Vaginal and vulvar cancers- ~ 70% of cases
- Penile Cancer- ~ 63% of cases
- Oropharyngeal cancer- 60% - 70% of cases

	Average # of cancers per year in sites HPV often found	% Probably caused by any HPV	Estimated number of cancers caused by HPV annually
Total	43,999	79%	34,800
Female	24,886	83%	20,700
Male	19,113	74%	14,100

https://www.cdc.gov/cancer/hpv/statistics/cases.htm 7

Oropharyngeal Cancer



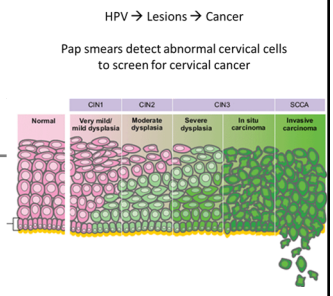
- **Most Common HPV associated cancer overall**
  - Incidence: 53,260 new cases in 2020
  - Mortality: 10,700 deaths in 2020
  - Men are 2xs more likely to be diagnosed than women
  - Highest incidence rate in NHW men
  - NH Black men have highest mortality rate than all races (4.5 vs 3.9 per 100,000 persons)
  - 5-year survival rate 66.2%

https://seer.cancer.gov/statfacts/html/oralcav.html; Chaturvedi et al., 2011; Howlander et al., 2017 8

Cervical Cancer

Most common HPV associated cancer among women

- **Incidence**: 13,800 new cases in 2020
  - 53% greater among Hispanic women
  - 25% greater among NH Black women
- **Mortality**: 4,290 deaths in 2020
  - 95% greater among NH Black women
  - 41% greater among Hispanic women
  - Highest among women living in the Southern US



- NH Black women and Hispanic women have highest cervical cancer screening rates, yet
- NH Black women and Hispanic women diagnosed at later stages than non-Hispanic white women
- 5-Year survival rate 66.1%

Howlander et al., 2017

9

ACS 2012 Cervical Cancer Screening Guidelines

Population	Test or Procedure	Recommendation
Women, aged < 21 y	No screening	
Women, aged 21-29 y	Pap test alone (Cytology)	Screening begin at age 21y. Done q 3 years w/ conventional or liquid-based Pap test
Women, aged 30-65 y	Pap test and HPV DNA test "contesting" every 5 y (preferred)	Or every 3 y w/ Pap test alone (acceptable)
Women, aged 66+	Pap test and HPV DNA test	women with ≥3 consecutive negative Pap tests or ≥2 consecutive negative HPV and Pap test w/in 10 y, with the most recent test occurring the last 5 y, should stop CC screening
>66	No screening following adequate negative prior screening	Women with total hysterectomy should stop cervical cancer screening; women with Hx of CIN2 or more severe Dx should cont. routine screening for at least 20 y

Saslow, et al., (2012), American Cancer Society, American Society for Colposcopy and Cervical Pathology, and American Society for Clinical Pathology screening guidelines for the prevention and early detection of cervical cancer. CA: A Cancer Journal for Clinicians, 62: 147-172. doi:10.3322/caac.21139

10

Timeline of HPV Vaccine Recommendations in US 2006-2016

Table 1
Timeline of FDA approvals and ACIP recommendations for the HPV vaccine in the United States.

Year	Month	Agency	Vaccine	Recommendation/Approval
2006	June	FDA	4vHPV	Approved vaccine for use in females 9–26 years of age
	June	ACIP	4vHPV	Recommended routine vaccine for females 11–12 years; catch-up 13–26 years; can be started at age 9
2009	October	FDA	2vHPV	Approved vaccine for use in females 10–25 years of age
	October	ACIP	2vHPV	Recommended vaccination for females 11–12 years; catch-up 13–26 years; can be started at age 9
	October	FDA	4vHPV	Approved vaccine for use males 9–26 years of age
	October	ACIP	4vHPV	Recommended vaccination may be given to males age 9–26 years – did not recommend routine vaccination
2011	October	ACIP	4vHPV	Recommended routine vaccination for males 11–12 years; catch-up 13–21 years and catch-up 22–26 years for men who have sex with men (MSM) or are immunocompromised; can be started at age 9
2014	December	FDA	9vHPV	Approved use in females 9–26 years of age
			9vHPV	Approved use in males 9–15 years of age
2015	February	ACIP	9vHPV	Recommended routine vaccination for females 11–12 years; catch-up 13–26 years; can be started at age 9
			9vHPV	Recommended routine vaccination for males 11–12 years; catch-up 13–21 years and catch-up 22–26 years for MSM and men who are immunocompromised; can be started at age 9
	December	FDA	9vHPV	Approved use in males 16–26 years of age
2016	October	FDA	9vHPV	Approved use of a two-dose option for males and females 9–14 years
	December	ACIP	9vHPV	Recommended two-dose option for males and females 9–14 years


Papillomavirus Research

The feminization of HPV: How science, politics, economics and gender norms shaped U.S. HPV vaccine implementation

Ellen M. Daley[a,*], Cheryl A. Vamos[a], Erika L. Thompson[a], Gregory D. Zimet[b], Zeev Rosberger[c], Laura Merrell[a], Nolan S. Kline[a]

Human Papillomavirus Vaccination

Recommendations of the Advisory Committee on Immunization Practices (ACIP)

Lauri E. Markowitz[1]
Eileen F. Dunne[1]
Mona Saraiya[2]
Harrell W. Chesson[1]
C. Robinette Curtis[3]
Julianne Gee[4]
Joseph A. Bocchini, Jr[5]
Elizabeth R. Unger[6]

[1]Division of STD Prevention, National Center for HIV/AIDS, Viral Hepatitis, STD and TB Prevention, CDC
[2]Division of Cancer Prevention and Control, National Center for Chronic Disease Prevention and Health Promotion, CDC
[3]Immunization Services Division, National Center for Immunization and Respiratory Diseases, CDC
[4]Immunization Safety Office, National Center for Emerging and Zoonotic Infectious Diseases, CDC
[5]Louisiana State University Health Sciences Center, Shreveport, Louisiana
[6]Division of High-Consequence Pathogens and Pathology, National Center for Emerging and Zoonotic Infectious Diseases, CDC

Summary

This report summarizes the epidemiology of human papillomavirus (HPV) and associated diseases, describes the licensed HPV vaccines, provides updated data from clinical trials and postlicensure safety studies, and compiles recommendations from CDC's Advisory Committee on Immunization Practices (ACIP) for use of HPV vaccines.

Persistent infection with oncogenic HPV types can cause cervical cancer in women as well as other anogenital and oropharyngeal cancers in women and men. HPV also causes genital warts. Two HPV vaccines are licensed in the United States. Both are composed of type-specific HPV L1 protein, the major capsid protein of HPV. Expression of the L1 protein using recombinant DNA technology produces noninfectious virus-like particles (VLPs). Quadrivalent HPV vaccine (HPV4) contains four HPV type-specific VLPs prepared from the L1 proteins of HPV 6, 11, 16, and 18. Bivalent HPV vaccine (HPV2) contains two HPV type-specific VLPs prepared from the L1 proteins of HPV 16 and 18. Both vaccines are administered in a 3-dose series.

ACIP recommends routine vaccination with HPV4 or HPV2 for females aged 11 or 12 years and with HPV4 for males aged 11 or 12 years. Vaccination also is recommended for females aged 13 through 26 years and for males aged 13 through 21 years who were not vaccinated previously. Males aged 22 through 26 years may be vaccinated. ACIP recommends vaccination of men who have sex with men and immunocompromised persons (including those with HIV infection) through age 26 years if not previously vaccinated.

As a compendium of all current recommendations for use of HPV vaccines, information in this report is intended for use by clinicians, vaccination providers, public health officials, and immunization program personnel as a resource. ACIP recommendations are reviewed periodically and are revised as indicated when new information and data become available.

Morbidity and Mortality Weekly Report

Use of 9-Valent Human Papillomavirus (HPV) Vaccine: Updated HPV Vaccination Recommendations of the Advisory Committee on Immunization Practices

Emiko Petrosky, MD[1,2], Joseph A. Bocchini Jr, MD[3], Susan Hariri, PhD[2], Harrell Chesson, PhD[2], C. Robinette Curtis, MD[4], Mona Saraiya, MD[5], Elizabeth R. Unger, PhD, MD[6], Lauri E. Markowitz, MD[2] (Author affiliations at end of text)

During its February 2015 meeting, the Advisory Committee on Immunization Practices (ACIP) recommended 9-valent human papillomavirus (HPV) vaccine (9vHPV) (Gardasil 9, Merck and Co., Inc.) as one of three HPV vaccines that can be used for routine vaccination (Table 1). HPV vaccine is recommended for females aged 11 or 12 years and for males aged 11 or 12 years (1). Vaccination also is recommended for females aged 13 through 26 years and for males aged 13 through 21 years who were not vaccinated previously. Males aged 22 through 26 years may be vaccinated. ACIP recommends vaccination of men who have sex with men and immunocompromised persons (including those with HIV infection) through age 26 years if not previously vaccinated. As a compendium of all current recommendations for use of HPV vaccines, information in this report is intended for use by clinicians, vaccination providers, public health officials, and immunization program personnel as a resource. ACIP recommendations are reviewed periodically and are revised as indicated when new information and data become available. This report summarizes evidence considered by ACIP in recommending 9vHPV as one of three HPV vaccines that can be used for vaccination and provides recommendations for vaccine use.

The New York Times

HPV Vaccine Expanded for People Ages 27 to 45

Sources: www.cdc.gov/vaccines/hcp/acip-recs/vacc-specific/hpv.html; www.nejm.org; www.nytimes.com

Published in final edited form as:
J Infect Dis. 2017 September 01; 216(5): 594–603. doi:10.1093/infdis/jix244.

Prevalence of Human Papillomavirus Among Females After Vaccine Introduction—National Health and Nutrition Examination Survey, United States, 2003–2014

Sara E. Oliver[1], **Elizabeth R. Unger**[2], **Rayleen Lewis**[1], **Darius McDaniel**[1], **Julia W. Gargano**[1], **Martin Steinau**[2], and **Lauri E. Markowitz**[1]

Results—Among 14- to 19-year-olds, 4vHPV-type prevalence decreased from 11.5% (95% confidence interval [CI], 9.1%–14.4%) in 2003–2006 to 3.3% (95% CI, 1.9%–5.8%) in 2011–2014, when ≥1-dose coverage was 55%. Among 20- to 24-year-olds, prevalence decreased from 18.5% (95% CI, 14.9%–22.8%) in 2003–2006 to 7.2% (95% CI, 4.7%–11.1%) in 2011–2014, when ≥1-dose coverage was 43%. Compared to 2003–2006, 4vHPV prevalence in sexually active 14- to 24-year-olds in 2011–2014 decreased 89% among those vaccinated and 34% among those unvaccinated. Vaccine effectiveness was 83%.

Vaccine. 2013 Dec 17; 32(1): 26–32.
doi: 10.1016/j.vaccine.2013.10.085
PMCID: PMC3898718
PMID: 24211166

Reduction in HPV 16/18 prevalence in sexually active young women following the introduction of HPV immunisation in England☆

D. Mesher,[a,*] K. Soldan,[a] R. Howell-Jones,[a] K. Panwar,[b] P. Manyenga,[b] M. Jit,[c] S. Beddows,[b] and O.N. Gill[a]

Results

A total of 4664 eligible specimens were collected and 4178 had a valid test result. The post-immunisation prevalence of HPV 16/18 infection was lowest in this youngest age group (16–18 years) and increased with age. This increase with age was a reversal of the pattern seen prior to immunisation and was inversely associated with estimates of age-specific immunisation coverage (65% for 16–18 year olds). The prevalence of HPV 16/18 infection in the post-immunisation survey was 6.5% amongst 16–18 year olds, compared to 19.1% in the similar survey conducted prior to the introduction of HPV immunisation.

Healthy People 2020 Objectives

C-10 Reduce invasive uterine cervical cancer **Revised**

Baseline:	8.0 new cases of invasive uterine cancer per 100,000 females were reported in 2007 (age adjusted to the year 2000 standard population)
Target:	7.2 new cases per 100,000 females

IID-11.4 Increase the vaccination coverage level of 3 doses of human papillomavirus (HPV) vaccine for females by age 13 to 15 years **Revised**

Baseline:	16.6 percent of females aged 13 to 15 years had received at least 3 doses of human papillomavirus (HPV) vaccine in 2008
Target:	80.0 percent

C-15 Increase the proportion of women who receive a cervical cancer screening based on the most recent guidelines

Baseline:	84.5 percent of females aged 21 to 65 years received a cervical cancer screening based on the most recent guidelines in 2008 (age adjusted to the year 2000 standard population)
Target:	93.0 percent

Source: http://www.healthypeople.gov/2020/topics-objectives

15

HPV Vaccination Coverage Rates among Adolescents 13-17 years, by Gender

	2018 (N=18,700)	2017 (N=20,949)
All Adolescents		
UTD	51.1	48.6
≥1 DOSE	68.1	65.5
Females		
UTD	53.7	53.1
≥1 DOSE	69.9	68.6
Males		
UTD	48.7	44.3
≥1 DOSE	66.3	62.6

HPV UTD includes those with ≥3 doses, and those with 2 doses when the first HPV vaccine dose was initiated at age <15 years, and there was at least 5 months minus 4 days between the first and second dose. This update to the HPV recommendation occurred in December 2016 (https://www.cdc.gov/mmwr/volumes/65/wr/mm6549a5.htm).

Walker TY, et al. 2019. (https://www.cdc.gov/mmwr/volumes/68/wr/mm6833a2.htm#T1_down)

16

HPV Vaccination Coverage Rates among Adolescents 13-17 years by Race/Ethnicity, 2017

HPV vaccination could prevent about 32,100 cases of cancer annual

About 66% of all adolescents ages 13-17 received ≥1 dose of the HPV vaccine, and 49% received all recommended doses.

	Whites	African Americans	Hispanics	American Indian/ Alaska Native	Asians	Multiracial
≥1 dose	60.0	70.0**	74.5**	60.2	70.4**	65.1**
HPV UTD	44.7	50.2**	56.4**	50.0	52.5**	44.5

Adolescents living below the federal poverty level initiate and complete the HPV vaccine series at higher rates than those above the poverty level.

(Walker et al., 2017) 17

HPV Vaccination and Sons

Parental decisions predominantly shaped by the perceived

- Benefits of the vaccine
- Perceived risk of sons contracting the HPV infection
- HCP recommendation
- Fear of side effects and uncertainty about vaccine effectiveness
- Cost
- Lack of medical home

Radisic et al., 2016

18

Factors Associated with HPV Vaccination Uptake

Strongest predictor: Health care provider recommendation

- Missed clinical opportunities for HCP to recommend vaccine

Coupling HPV vaccination w/other adolescent recommended vaccines effective

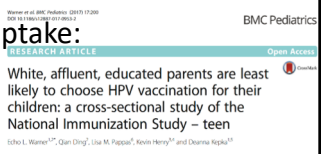
Reverse disparity in HPV vaccination uptake

Social determinants positively associated with HPV vaccination uptake:

- Having unmarried mother
- Employer/union sponsored health (public) insurance
- Being of minority ethnicity/race

Social determinants negatively associated with HPV vaccination uptake:

- Mothers with some college education
- Non-Hispanic white
- Private insurance


BMC Pediatrics

RESEARCH ARTICLE Open Access

White, affluent, educated parents are least likely to choose HPV vaccination for their children: a cross-sectional study of the National Immunization Study – teen

19

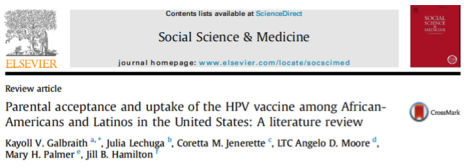
Factors associated with HPV Vaccination Uptake among Black and Hispanic Adolescents

Facilitators:

1. Health care provider recommendation
2. Access to a Healthcare provider/ medical home
3. Parental awareness and awareness
4. Increased parental acceptance/Positive parental perceptions

Barriers:

1. Low HPV knowledge
   - Awareness and knowledge of HPV patterned by race/ethnicity, SES.
   - African Americans have greater HPV knowledge gaps compared to NHW
2. Concerns about safety and side effects
3. Dissatisfied w/ quality of healthcare provider recommendation


Contents lists available at ScienceDirect

Social Science & Medicine

journal homepage: www.elsevier.com/locate/socscimed

Review article

Parental acceptance and uptake of the HPV vaccine among African-Americans and Latinos in the United States: A literature review

Kayoll V. Galbraith [a,*], Julia Lechuga [b], Coretta M. Jenerette [c], LTC Angelo D. Moore [d], Mary H. Palmer [a], Jill B. Hamilton [a]

Blake et al., 2015; Ojeaga et a., 2017; Galbraith-Gyan et al., 2018)

20

Cultural Factors and HPV Vaccination among African American Mothers

Historical mistrust towards research, & health care system (i.e Tuskegee Syphilis Experiment)

- Still held positive perceptions of HPV vaccination r/t cancer prevention benefits.

Stigmatization of HPV vaccine r/t to STI and age of recommendation

- Religious beliefs r/t no sexual activity outside of marriage

For most, HPV vaccination decisions based on information received and their perceptions of benefits:

"The only way my religious beliefs affect me would be that I know the Bible says you should not have sex until you are married. Do I think that's realistic in this day and age? Hardly…So no my religious belief would not hinder me or encourage me to do this [HPV vaccination]. This is going to be a decision I make based on what I see and what I hear and what I read." (mother aged 44)

ETHNICITY & HEALTH, 2017
https://doi.org/10.1080/13557858.2017.1332758
Taylor & Francis
Taylor & Francis Group
Check for updates

HPV vaccine acceptance among African-American mothers and their daughters: an inquiry grounded in culture

Kayoll V. Galbraith-Gyan [a], Julia Lechuga[b], Coretta M. Jenerette[c], Mary H. Palmer[d], Angelo D. Moore[e] and Jill B. Hamilton[f]

21

Misconceptions: Sexual Risk-Taking Behavior

HPV vaccination does not lead to increase in sexual risk-taking behavior (Leidner *et al. 2019)*

Belief that is does is one barrier in parents to getting the HPV vaccine for their children (Holman *et al.* 2014)

Condoms reduce risk of HPV transmission, but do not eliminate it (Winer *et al.* 2006)

Because HPV is transmitted through skin-to-skin contact

HPV vaccine is most effective prophylaxis (for the types it covers)

22

Recommendations for Clinical Practice

- Use simple and clear language
- Provide accurate information
- Consider building partnerships with trusted community partners
- Be strategic with how you frame the issue based on your audience

Galbraith-Gyan, et al. *In press*. Community stakeholders' perspectives on introducing HPV vaccination and biobanking evidence-based programs within medically underserved communities: A community-engaged approach. *International Quarterly of Community Health Education*.

23

Contact Information:

Kayoll Galbraith Gyan, PhD, RN
Northeastern University Bouvé College of Health Sciences
School of Nursing
Boston, MA
K.gyan@northeastern.edu

Northeastern University

24