HPV: Here, There, Everywhere

Denise Rizzolo PhD, MPH, PA-C

Clinical Professor

Pace University

Heather Isola MPAS, PA-C

Vice President
Physician Assistant Services

Mount Sinai Health System

Jonathan Baker MPAS, PA-C

Operations Director of
Clinical Research

Laser Surgery Care

Learning Objectives

At the conclusion of the session participants should be able to:

- Understand current knowledge of HPV epidemiology, including cervical, anogenital, and oropharyngeal
- Describe sociocultural dynamics of HPV infection
- Identify current prevention, testing, and treatment strategies
- List future challenges and directions

The History of HPV
Viruses as Emerging Cause of Cancer

- 1842 association between sexual activity and cervical cancer
- 1940's Cervical pap smears begin
- 1980's gay men have increased rates of anal cancer
  - 1990's people living with HIV survive long enough to develop anal cancer
- 1983 HPV identified in 6 out of 8 oral squamous cell carcinoma

Palefsky 1998, Adegoke 2012, Zandberg 2013

HPV Types

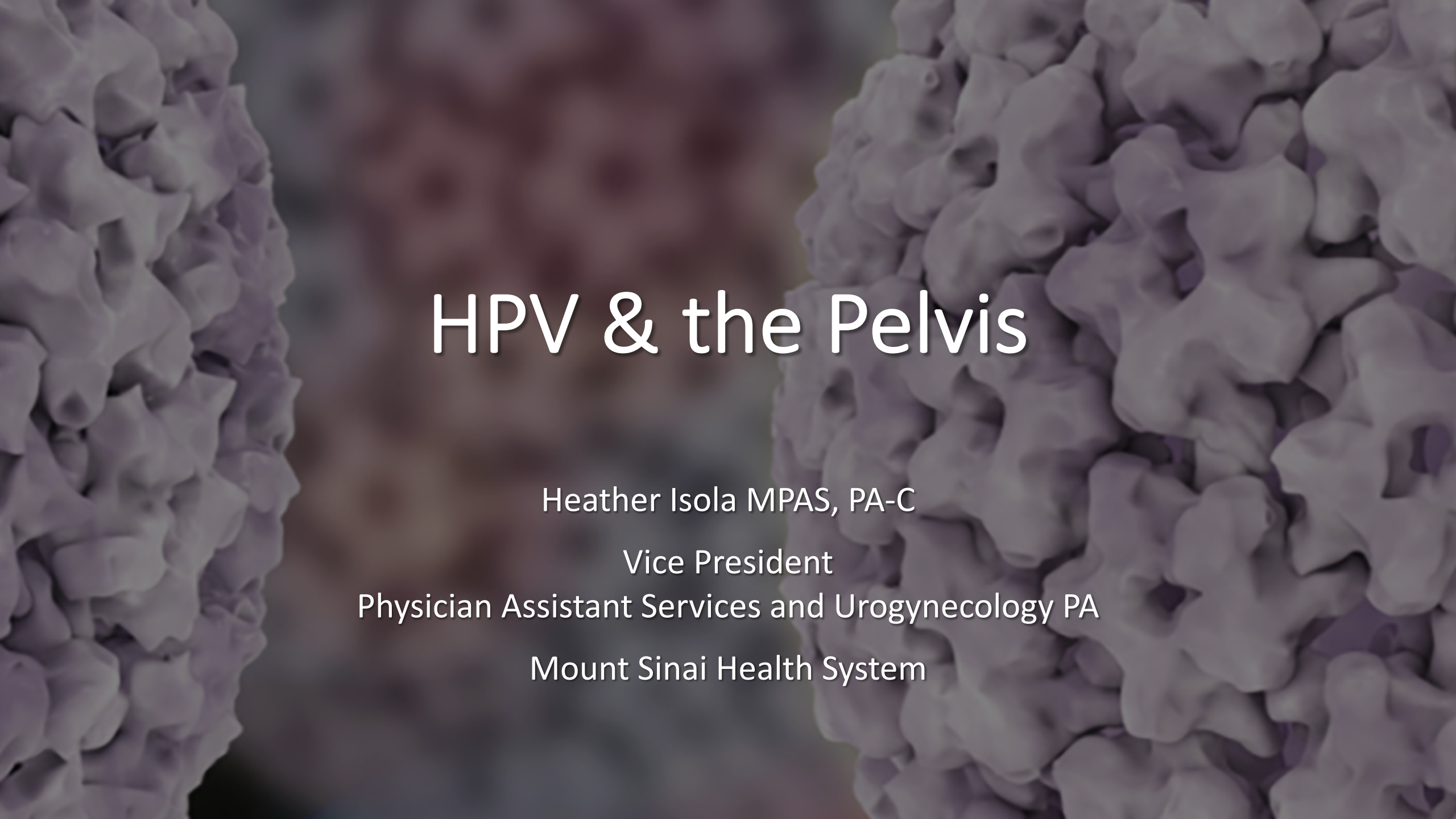
High Risk (oncogenic)	**16, 18**, 31, 33, 35, 39, 45, 51, 52, 56, 58, 59, 68, 73, 82
Low Risk (wart-causing)	**6, 11**, 40, 42, 43, 44, 53, 54, 61, 72, 81
Cutaneous (non-genital)	1, **2**, 3, **4**, 7, 10, 27, 28, 41, 57, 65, 88, 95

Cleveland 2011, Bruggink 2012, Zandberg 2013

Most sexually active people
who are not vaccinated
get HPV infection
at some point in their lives,
even if they only have
one sexual partner.

What is the most common symptom of HPV infection

A. Oral lesions
B. Most HPV infections are asymptomatic
C. Anal itch
D. Cervicovaginal discharge



HPV & the Pelvis

Heather Isola MPAS, PA-C

Vice President
Physician Assistant Services and Urogynecology PA

Mount Sinai Health System

HPV & the Pelvis

External HPV

- Condyloma Acuminatum- "Genital Warts"

Cervical HPV

- Microscopic Changes- Pap smears, Colposcopy/Biopsy, Pathology
- Macroscopic Changes- Visible lesions and changes
- No changes

Vaginal HPV

Genital Warts- HPV 6 & 11

- How do you know when to intervene?
- Evaluate the following: look, feel, partner, difficult placement, how many or clustering, patient concerns, physical look/disfiguring, does fixing it make it worse?

- How best to treat?
- Imiquimod (Aldara)- 2 x per week, 16 weeks. Apply at night, wash in the morning
- Freezing, Lance, Laser *(wear a mask for aerosol risks)*
- Monitor without treatment

- Not sure what you are looking at?
- Skin tags and Squamous Cell Cancers can look similar
- Biopsy- bleeding, cracked, scabbed, odd placement, irregular in appearance

Genital Warts- HPV 6 & 11 continued…

Clinical to Notes for Practice

- Evaluate for change over time and continue pap smears with HPV co-test as per guidelines
- Incidence of other anogenital cancer, head and neck cancers elevated (study noting Male risk > Women)
- Gardasil covers HPV 6 and 11- Vaccinate when you can!

Bloomberg 2012

HPV & the Cervix

Then	Now
Pap smears start when ready to see GYN/First Sexually Active	No Screening Under 21
Occur Annually	Every 3-5 years, dependent on HPV cotest
No HPV Cotest	HPV Reflex and HPV Cotest
Colposcopy every 3 Months	Colposcopy every 6 months
Cone Biopsy, Freezing, LEEP more common	Less Frequent LEEP and Cone Biopsy (no longer “freezing”)

Consensus Guidelines For PAP Smear

ORIGINAL RESEARCH ARTICLE: CERVIX AND HPV

OPEN

Risk Estimates Supporting the 2019 ASCCP Risk-Based Management Consensus Guidelines

Didem Egemen, PhD,[1] Li C. Cheung, PhD,[1] Xiaojian Chen, MSc,[1] Maria Demarco, PhD,[1] Rebecca B. Perkins, MD, MSc,[2] Walter Kinney, MD,[3] Nancy Poitras, BSc,[4] Brian Befano, BSc,[5] Alexander Locke, MD,[4] Richard S. Guido, MD,[6] Amy L. Wiser, MD,[7] Julia C. Gage, PhD, MPH,[1] Hormuzd A. Katki, PhD,[1] Nicolas Wentzensen, MD, PhD, MS,[1] Philip E. Castle, PhD, MPH,[8] Mark Schiffman, MD, MPH,[1] and Thomas S. Lorey, MD[3]

Journal of Lower Genital Tract Disease- Volume 24, Number 2, April 2020

Egemen 2020

Screening PAP Smear VS Reason PAP Smear

- New Reason for a PAP smear
- New Bleeding- intermenstrual bleeding, bleeding with intercourse
- Notable Friability of the Cervix (can be normal with OCP use)
- Undiagnosed Visible Lesion

Pap in Practice

Clinical notes:

- *Endometrial Cells on a PAP smear over age 45 needs a work-up: Rule out Endometrial Cancer/Hyperplasia*
- *Always document LMP!*

SPECIMEN ADEQUACY:	Comment
Comment: Satisfactory for evaluation. Endocervical and/or squamous metaplastic cells (endocervical component) are present.	

Order the Right Test:

HPV order, age-based, past history

- Always Cotest: HPV – 16, 18, 45
- HPV HR- all other HPV subtypes can vary by lab
- Know when to ask for reflex testing (eg if ASCUS, then HPV testing)
- Adding any further STD screening to pap smear

Ordering the Right Cytology

IGP, HPV, rfx 16/18,45
IGP, HPV 16/18
IGP, CtNg, HPV 16/18
IGP, CtNg, rfx HPV ASCU
IGP, CtNgTv, HPV 16/18
IGP, rfx HPV ASCU
IGP, rfx HPV 16/18 ASCU
IGP, CtNg, HPV rfx 16/18,45
IGP, CtNgTv, HPV rfx 16/18, 45
IGP, CtNgTv, HPV rfx ASCU
IGP, HPV all pth
IGP, CtNgTv, rfx HPV all
IGP, CtNg, HPV HR

<u>Screening Age</u>

<21 No Screening
21-29 Cytology ONLY, HPV ASCUS is OK every 3 years
30-65 Cytology every 3 years, with HPV Cotest at 5 years
>65 Case by Case basis, but general rule is to end PAPs

<u>Clinical Notes:</u>

- Know where you are: ordering is unique per practice, EMR and lab
- Usually Ordering HPV will order 16/18 and 45 as break out, but will have all High Risk HPV strains as well

What about Pap Smears over age 65?

- No screening after adequate Negative History
- Continue if immunocompromised or with past HPV history
- Use your judgement
- Patient continues sexual activity- have honest conversations about sexual contacts/partners
- Pap always if unknown source of bleeding or visible lesion

- *At this time Medicare reimburses PAP smears –*
  don't let this be a barrier to completing

Interventions- Cervical HPV

PAP Smear with HPV Cotest

Follow ASCCP Guidelines

Colposcopy

Every 6 Months

- ASCUS with HPV (*16/18)
- LGSIL (CIN 1, 2)
- Atypical Glandular Cells
- Add Endocervical Curretage (ECC) on First Colposcopy
- Can be Diagnostic or Treatment

LEEP/CONE

- HGSIL (CIN 2-3)
- Persistent LGSIL (3+Colposcopy)
- Rule out HGSIL or Incongruent Pathology
- Endocervical Findings (Cone)
- Carcinoma in Situ (CIS)
- Treatment of lesion
- *Avoid repeated LEEP in childbearing age*

Total Hysterectomy

- Pathology HGSIL/CIS/Cancer

*VAIN- Vaginal Intraepithelial Neoplasia

After a LEEP/Cone:

- If clear margins, return to pap smear at 6 months (NOT EARLIER!)
- If margins not clear or further pathology with HSGIL, CIS, Cancer- Refer to GYN ONC for monitoring or Total Hysterectomy +/- associated BSO/Lymph
- Continue Education- *lesion may be gone, but HPV can be present*. Important to continue screening

HPV & the Vagina?

- Incidence: 0.2-0.3 cases per 100,000 in the US
- -HPV most common cause of VAIN- HPV 16/18 most prevalent

- Categories: VAIN 1, 2, 3 and CIS
- -Most of what we know with VAIN is extrapolated from HPV and Cervical studies

- **When to PAP vaginally?**
- Monitoring s/p Total Hysterectomy for Cervical Cancer (or high risk pathology)
- History of VAIN
- New Visible Lesions

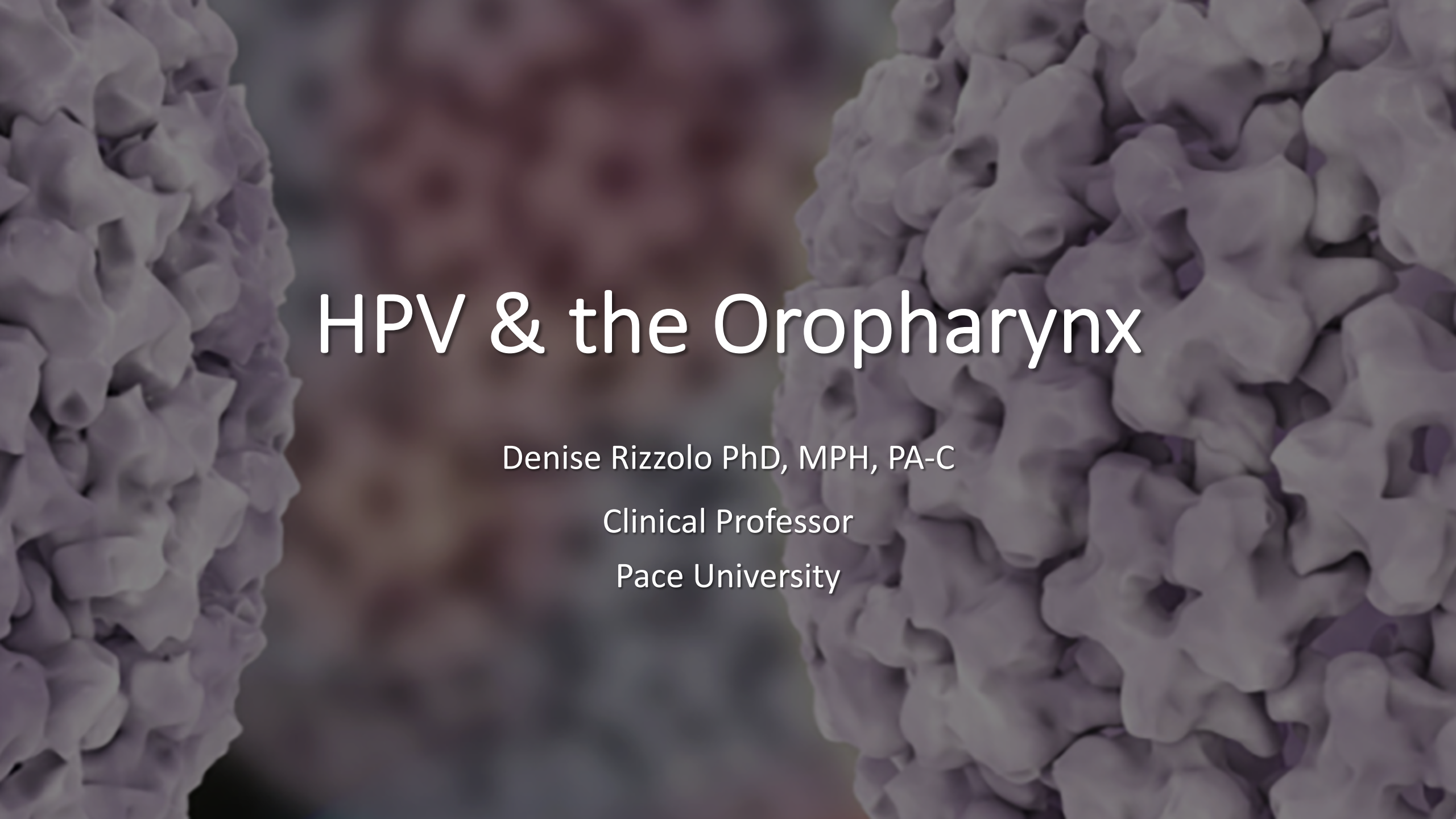
*VAIN- Vaginal Intraepithelial Neoplasia

- Refer to GYN/Onc
- *Vaginal Colposcopy with biopsy is painful , and more vascular than cervix*

Henson 1977, Sugase 1997

The Future

- Pap Smears become confirmatory, not screening
- Screening with HPV ***ONLY*** as standard of care
- Less and less cervical cancer, and associated anogenital cancers
- More understanding of microbiome and microscopic cervical changes
- Learning more about HPV- where it can live, what it can impact, how long it lasts, recurrence, etc
- Wider uptake of Gardasil in the population
- Development of therapeutic vaccines for HPV



HPV & the Oropharynx

Denise Rizzolo PhD, MPH, PA-C

Clinical Professor

Pace University

HPV and Oral Cancer—The stats

- HPV detected in 45% to 90% of head and neck squamous cell carcinomas (HNSCC), most commonly in the lingual and palatine tonsils or base of the tongue

- Incidence rates of HPV-positive oropharyngeal cancer have been increasing among white men and women. Age is usually 10 years younger than that of cancer of the oral cavity; roughly seen as early as age 40. **There has been a recent shift that we are now seeing it older men once again**.

- The age at sexual debut is decreasing with oral sex being performed more by men and women that are currently aged 30 to 49 years compared to older generations.

D'Souza G 2014, Tota 2019

Which risk factors are MOST associated with Oral HPV16+ Tumors?

A. Tobacco use, HIV infection
B. Alcohol, same sex partner
C. Smoking marijuana, history of oral sex
D. Multiple sex partners, poor oral hygiene

Risk Factors

Researchers conducted a study in which they stratified risk factors according to HPV-16 tumor status and found that HPV-16 positive tumors were associated strongly with specific sexual behaviors and marijuana smoking – not with tobacco smoking, alcohol, or poor oral hygiene.

- History of sexual activity at a young age
- Having multiple sexual partners
- History of genital warts
- History of oral sex
  - (Speculated to be the main transmission mode of oral HPV infection)
- History of oral and anal sexual contact
- History of marijuana use
- HIV infection
- History of having same sex partner

CDC 2020

Signs & Symptoms

- Persistent sore throat
- Non-healing sore in the mouth
- Earaches
- Hoarseness
- Enlarged lymph nodes
- Pain with swallowing
- Unexplained weight loss

Most patients may have no signs or symptoms!

CDC 2020

Physical Exam Findings

High risk clinical presentations

- Sharply defined, leukoplakic lesions (especially >1 cm)
- Non-homogenous or mixed red-white lesions
- Erythroplakic lesions
- Areas of persistent ulceration and indurated lesions

Is there a test to find out if I have oral HPV?

Screening for HPV

Oral HPV Testing Pitfalls

- Acetic staining: May become diluted with saliva, detects trauma
- Rinsing: May be positive, but does not indicate where the lesion is
- Swab: Must brush non keratinized surface such as buccal mucosa, the vestibule, the floor of the mouth, the border of the tongue (until the oropharynx), under the surface of the tongue. **Keratinized surfaces are resistant to collection)
- Biopsy of the lesion is most accurate

Prognosis and Treatment Options

Prognosis depends on:

- The stage and grade of cancer
- Location of tumor
- Association of tumor with HPV

Treatment options depend on:

- Stage and grade of cancer
- Location of tumor
- Maintaining patient speech and swallowing functions
- General health of patient

Prognosis for HPV positive OSCC

- HPV positive OSCC is associated with a significant overall survival rate when compared to patients with HPV negative tumors. Various studies reveal statistics between 40% and 50% increased overall survival rate.

HPV & the Anus

Jonathan Baker PA-C

He Pronouns

Laser Surgery Care, NYC
Liaison to GLMA, AAPA
President Elect, NYSSPA
Past President, LBGT PA Caucus

At Risk Populations

- HIV+
- MSM (men who have sex with men)
- Iatrogenic immunosuppression (ie transplant and biologicals)
- Gynecologic disease (cervical/vaginal/vulvar dysplasia)
- Inflammatory Bowel Disease

Silverberg 2012, Cranston 2017

Question

Do anal pap smears reduce the risk of anal cancer at the same rate as cervical pap smears for cervical cancer?

Anal Cytology

- ↑ Sensitivity ↓Specificity
- Various methods
- 3-10% unsatisfactory

Cranston 2004, Darragh 2011

Anal Pap

Equipment

- water-moistened synthetic-fiber swab with non-scored stick
- Liquid media (same as cervical cytology)

1. Evert anal verge.
2. Blindly insert one half of swab through the anal verge.
3. Apply lateral pressure in a circular motion while withdrawing the swab (10+ seconds)
4. Stir into liquid preparation (15+ seconds)

https://www.youtube.com/watch?v=YyzmLYFc7Yc

Histologic Grades & Paired Cytology

Cytology	Histology: Normal	LSIL	HSIL	SCC
Normal	58%	37%	5%	0%
ASCUS	37%	23%	40%	0%
LSIL	14%	50%	36%	0%
HSIL	3%	22%	70%	6%

Adapted from: Panther 2004

Panther 2004, Swedish 2011, Nahas 2009, Salit 2010, Bean 2010

Management of Anal HSIL

- Observation only
- Topical therapy
- Ablative therapy
- Surgical therapy

***ALL TREATMENTS OF ANAL HSIL ARE OFF-LABEL

Anal HSIL Natural Regression & Progression

Regression (HSIL→benign/LSIL)

Around **25%** of HSIL spontaneously regress /year[1-5]

- SPANC: 24% regression of HSIL mostly to LSIL[1]
  - 19% HIV+ and 37% HIV-
- Regression ↓ with age[1,2,5]

Progression (HSIL→Cancer)

Takes several years (~5 yrs?) [4,5]

- Rate of progression: 1 in 377 HSIL to CA(HIV+ MSM)[2]
- SPANC: 2 HSIL progressed; 1.2% per year (95% CI 0.31–4.95)[1]
- Progression risk ↑ with age[1,2,5]

[1]Tong 2013, [2]Machalek 2011, [3]Goldstone 2018, [4]Berry, [5]Expert Opinion

Anal HSIL Treatment

156 HIV+ MSM w/ HSIL

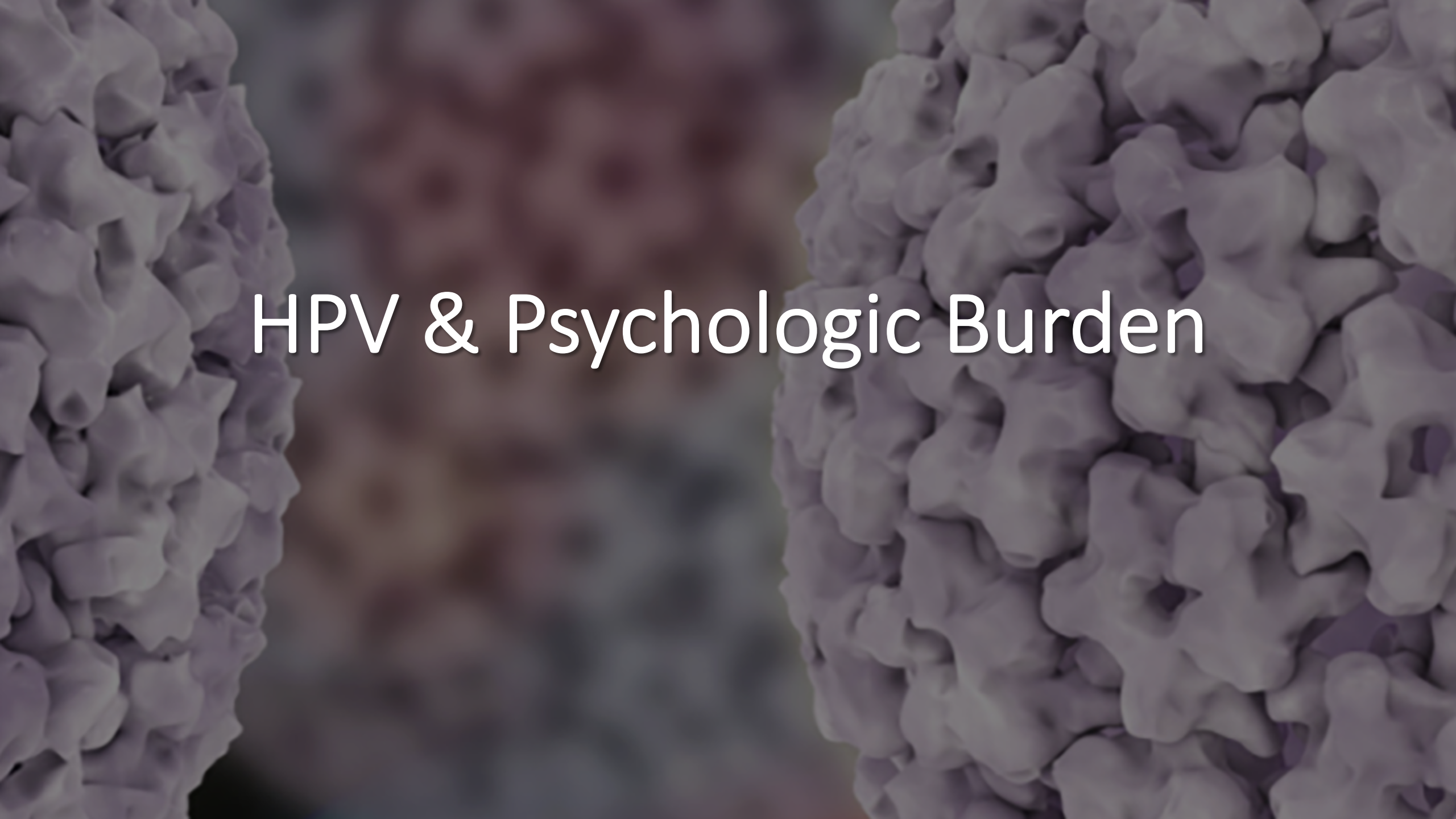
		Topical imiquimod	Topical 5FU	Electo-cautery
Complete Clinical Response		**24%**	**17%**	**39%**
Recurrence	Wk 24		22%	
	Wk 48		46%	
	Wk 72		67%	
	Wk 98	71%	58%	68%
S/E (Grade 3+) (Pain, bleeding, and itching)		43%	27%	18%

Richel 2013, Goldstone 2014

***ALL TREATMENTS OF ANAL HSIL ARE OFF-LABEL

Anal Cancer Morbidity

- Most incident anal cancer is extensive enough to require CT/RT +/- surgery
- Early identified cancers can be excised
- Long term physical, sexual sequalae

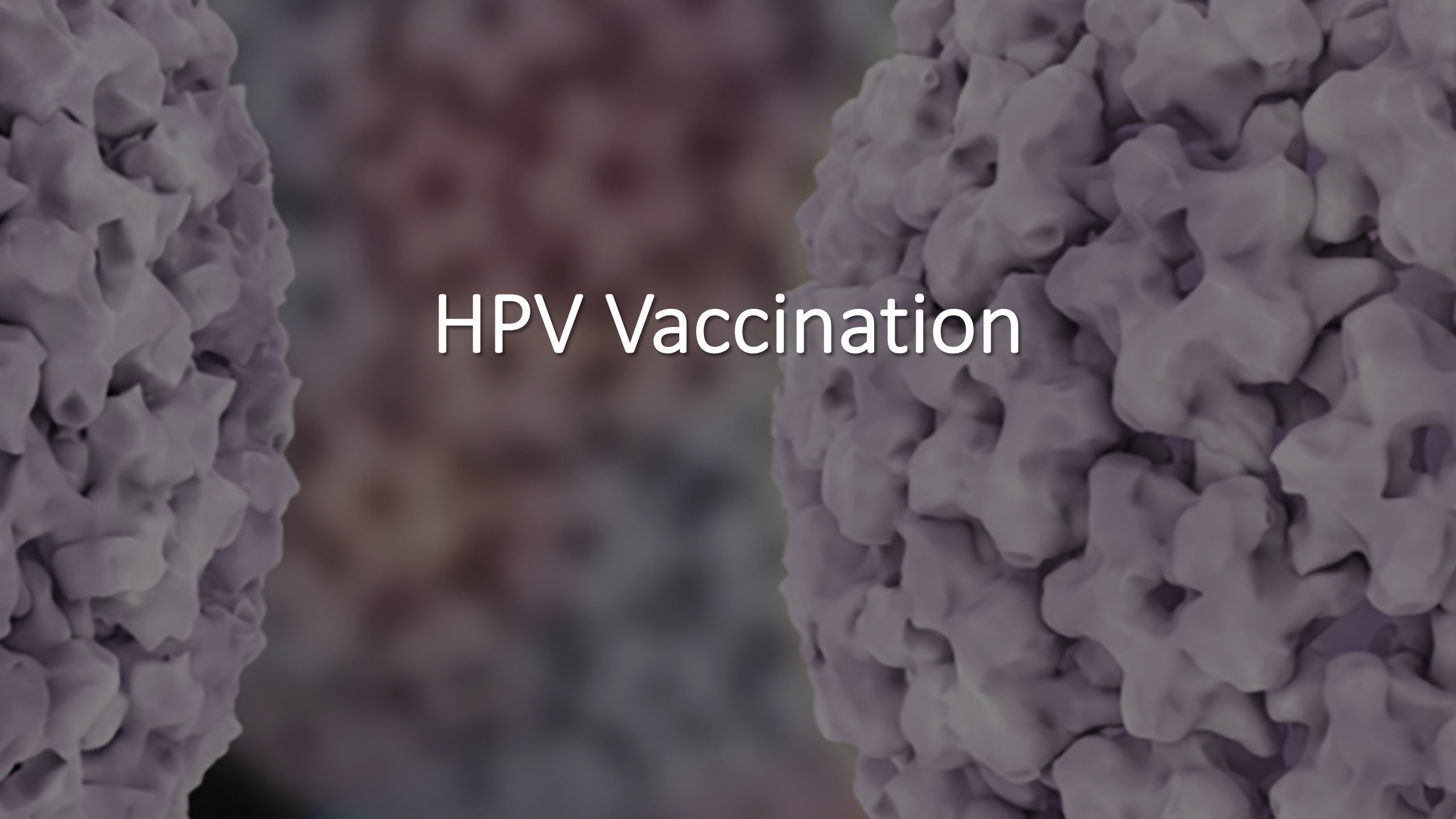


HPV & Psychologic Burden

Addressing Psychological Burden

- HPV might be the patient's first STI
  - May be anxiety or concern surrounding sexual practices
- Sexual practices post diagnosis -- "Am I contagious?"
  - "Do I have to tell my partner?"
- Destigmatize HPV infection
- Patients often don't understand "atypical cells" or "precancer"
- Stress the importance of periodic screening
- Consider partner screening
- Trauma informed care

Slide adapted from Goldstone 2017


HPV Vaccination

HPV Vaccination

- Vaccination covers: 6,11(warts), 16/18, 31,33,45,52, 586

- 70% of Cervical Cancers caused by HPV 16/18
- 20% of Cervical Cancer caused by HPV 31, 33, 45, 52, 58.6

- Reduced need for frequent screenings invasive procedures
- Well studied, with longevity
- Protects the unknown of HPV

CDC 2019

Vaccination After 26

- **<u>Things to think about</u>**
- How old is your patient?
  - Up to about age 30 at this time, likely to have received HPV vaccination
  - Younger patients may not know they had it at earlier age- ask family, past medical providers, vaccine cards
  - Age 35-45 had the option for Gardasil in 20's but may/may not have taken it
  - Over age 45- likely to have not had vaccination
- Did the patient finish the series?
- Did the patient receive Gardasil 4 or 9?

- **<u>Vaccinate when you can</u>**
- Especially if not yet sexually active or never received
  - *Less benefit with increased age due to exposure, but it's not a NO*
- Most insurances reimburse >age 27 vaccination
- Unknown if completed series
- High risk/immunocompromised
- Good history taking on sexual activity

Works Cited

- Adegoke O, Kulasingam S, Virnig B. October 2012. Cervical Cancer Trends in the United States: A 35-Year Population Based Analysis. *Journal of Women's Health*, Pages 1031-1037, PubMedID 22816437
- Zandberg DP, Bhargava R, Badin S, Cullen KJ. The Role of Human Papilloma Virus in Non Genital Cancers. *CA Cancer J Clin* 2013;63:57-81
- Palefsky JM, Holly EA, Ralston ML, et al. High incidence of anal high-grade squamous intra-epithelial lesions among HIV-positive and HIV-negative homosexual and bisexual men. *AIDS*. 1998; **12**:495- 503.
- Cleveland, J. L., Junger, M. L., Saraiya, M., Markowitz, L. E., Dunne, E. F., & Epstein, J. B. (2011). The connection between human papillomavirus and oropharyngeal squamous cell carcinomas in the United States Implications for dentistry. *The Journal of the American Dental Association*, *142*(8), 915-924.
- Bruggink, Sjoerd C., et al. "Cutaneous wart-associated HPV types: prevalence and relation with patient characteristics." *Journal of Clinical Virology* 55.3 (2012): 250-255.
- New York City Department of Health. Human Papillomavirus (HPV). https://www1.nyc.gov/site/doh/health/health-topics/human-papillomavirus-hpv.page#:~:text=The%20HPV%20vaccine%20protects%20against,genital%20warts%20and%20anal%20cancers. Accessed January 1, 2021.
- Blomberg M, Friss S, Munk C, Bautz A, Kjaer S. 15 May 2012. Genital Warts and Risk of Cancer: A Danish Study of Nearly 50,000 Patient with Genital Warts. *The Journal Of Infectious Diseases*, Volume 205, Pages 1544-1553, from https://doi.org/10.1093/infdis/jis228
- Egemen, Didem, et al. "Risk estimates supporting the 2019 ASCCP risk-based management consensus guidelines." *Journal of lower genital tract disease* 24.2 (2020): 132.
- Henson D, Tarone R. 1977. *An Epidemiologic Study of Cancer of the Cervix, Vagina, and Vulva based on the Third National Cancer Survey in the United States*. American Journal of Gynecology, 129(5):525.
- Sugase M, Matsukura T. 1997. *Distinct Manifestations of Human Papillomaviruses in the Vagina*. International Journal of Cancer, 72(3):412.
- Cox J, Palefsky J. *Human Papillomavirus Vaccination*. UpToDate. Accessed: https://www.uptodate.com/contents/human-papillomavirus-vaccination?search=Ordering%20HPV&source=search_result&selectedTitle=5~150&usage_type=default&display_rank=5
- D'Souza G, Cullen K, Bowie J, Thorpe R, Fakhry C. Differences in oral sexual behaviors by gender, age, and race explain observed differences in prevalence of oral human papillomavirus infection. *PloS one*. 2014;9(1):e86023.
- Tota JE, Best AF, Zumsteg ZS, Gillison ML, Rosenberg PS, Chaturvedi AK. Evolution of the oropharynx cancer epidemic in the United States: moderation of increasing incidence in younger individuals and shift in the burden to older individuals. Journal of Clinical Oncology. 2019;37(18):1538.
- CDC. HPV and Oropharyngeal Cancers. Available at: https://www.cdc.gov/cancer/hpv/basic_info/hpv_oropharyngeal.htm. September 3, 2020. Accessed January 31, 2021.
- U.S. Cancer Statistics Working Group. U.S. Cancer Statistics Data Visualizations Tool, based on November 2017 submission data (1999-2015): U.S. Department of Health and Human Services, Centers for Disease Control and Prevention and National Cancer Institute; www.cdc.gov/cancer/dataviz, June 2018.
- Silverberg MJ, Lau B, Justice AC, et al. Risk of anal cancer in HIV-infected and HIV-uninfected individuals in North America. Clin Infect Dis. 2012;54(7):1026–34.

Works Cited

- National Cancer Institute. Cancer Stat Facts: Anal Cancer. 2019. Available at: https://seer.cancer.gov/statfacts/html/anus.html
- Wilkin, Timothy J. "Human Papillomavirus–Related Malignancies in HIV Infection: Anal and Oropharyngeal Cancers." *Topics in antiviral medicine* 26.3 (2018): 85.
- Deshmukh, Ashish A., et al. "Management of precancerous anal intraepithelial lesions in human immunodeficiency virus–positive men who have sex with men: Clinical effectiveness and cost-effectiveness." *Cancer* 123.23 (2017): 4709-4719.
- *Aberg JA, Gallant JE, Ghanem KG, Emmanuel P, Zingman BS, Horberg MA, Infectious Diseases Society of America.* Primary care guidelines for the management of persons infected with HIV: 2013 update by the HIV Medicine Association of the Infectious Diseases Society of America. *Clin Infect Dis. 2014 Jan; 58(1):1-10.*
- New York State Department of Health. Clinical Guidelines, Standards & Quality of Care. https://www.health.ny.gov/diseases/aids/providers/standards/. 2007. Accessed August 9, 2019.
- Cranston RD, Regueiro M, Hashash J, Baker JR, et. al. A pilot Study of the Prevalence of Anal Human Papillomavirus and Dysplasia in a Cohort of Patients With IBD. *Diseases of the Colon and Rectum.* 2017; 60 (12): 1307-1313.
- Cranston RD, Darragh TM, Holly EA, et al. Self-collected versus clinician collected anal cytology specimens to diagnose anal intraepithelial neoplasia in HIV-positive men. J Acquir Immune Defi c Syndr 2004;36(4), 915–20.
- Darragh, Teresa M., and Barbara Winkler. "Anal cancer and cervical cancer screening: key differences." *Cancer cytopathology* 119.1 (2011): 5-19.
- Panther, Lori A., et al. "High resolution anoscopy findings for men who have sex with men: inaccuracy of anal cytology as a predictor of histologic high-grade anal intraepithelial neoplasia and the impact of HIV serostatus." *Clinical infectious diseases*38.10 (2004): 1490-1492.
- Swedish, Kristin A., Eric Q. Lee, and Stephen E. Goldstone. "The changing picture of high-grade anal intraepithelial neoplasia in men who have sex with men: the effects of 10 years of experience performing high-resolution anoscopy." *Diseases of the Colon & Rectum* 54.8 (2011): 1003-1007.Nahas et al Dis Colon Rectum 2009; 52: 1854–1863
- Salit, Irving E., et al. "The role of cytology (Pap tests) and human papillomavirus testing in anal cancer screening." *Aids*24.9 (2010): 1307-1313.
- Bean, Sarah M., et al. "Anal-rectal cytology: correlation with human papillomavirus status and biopsy diagnoses in a population of HIV-positive patients." *Journal of lower genital tract disease* 14.2 (2010): 90-96.
- Tong WW, Jin F, McHugh LC, Maher T, Sinclair B, Grulich AE, et al. Progression to and spontaneous regression of high-grade anal squamous intraepithelial lesions in HIV-infected and uninfected men. AIDS. 2013;27:2233–43.
- Machalek, Dorothy A., et al. "Anal human papillomavirus infection and associated neoplastic lesions in men who have sex with men: a systematic review and meta-analysis." *The lancet oncology* 13.5 (2012): 487-500.
- Grulich, A. "Natural history of anal HPV infection and HSIL and implications for screening and treatment: Data from SPANC study." *International Anal Neoplasia Society* (2016)
- Arens, Yotam, et al. "Risk of invasive anal cancer in HIV-infected patients with high-grade anal dysplasia: a population-based cohort study." *Diseases of the Colon & Rectum* 62.8 (2019): 934-940.
- Berry, J. Michael, et al. "Progression of anal high-grade squamous intraepithelial lesions to invasive anal cancer among HIV-infected men who have sex with men." *International journal of cancer* 134.5 (2014): 1147-1155.
- Richel, Olivier, et al. "Comparison of imiquimod, topical fluorouracil, and electrocautery for the treatment of anal intraepithelial neoplasia in HIV-positive men who have sex with men: an open-label, randomised controlled trial." *The lancet oncology* 14.4 (2013): 346-353.
- Goldstone, Stephen E., Andrew A. Johnstone, and Erin L. Moshier. "Long-term outcome of ablation of anal high-grade squamous intraepithelial lesions: recurrence and incidence of cancer." *Diseases of the Colon & Rectum* 57.3 (2014): 316-323.
- Centers for Disease Control and Prevention. “Human Papillomavirus (HPV): Vaccine Schedule and Dosing.” Updated August 15, 2019. Available at: https://www.cdc.gov/hpv/hcp/schedules-recommendations.html
- Resources ; https://www.cdc.gov/vaccines/vpd/hpv/hcp/recommendations.html

HPV: Here, There, Everywhere

Denise Rizzolo PhD, MPH, PA-C

Clinical Professor
Pace University

NYC Campus-PA Program

drizzolo@fdu.edu

Heather Isola MPAS, PA-C

Vice President
Physician Assistant Services

Mount Sinai Health System

heather.isola@mountsinai.org

Jonathan Baker MPAS, PA-C

Operations Director of Clinical Research

Laser Surgery Care, NYC

JonathanBaker.PA@gmail.com

@RectalRockstar