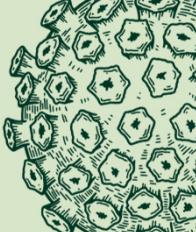


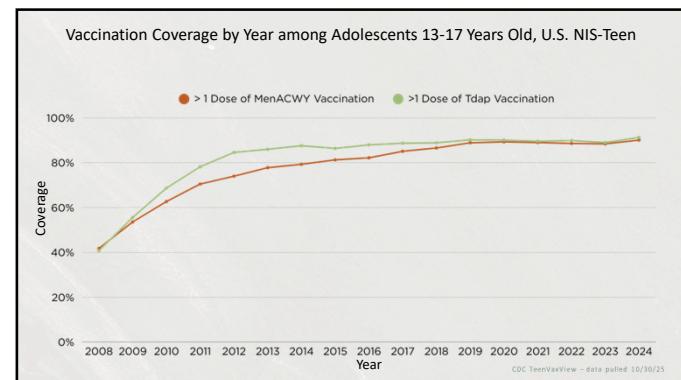
HPV Infection: Immunizing for Cancer Prevention

Tracie Newman, MD, MPH, FAAP
Pediatrician, Sanford Health
Medical Director, NDSU CIRE

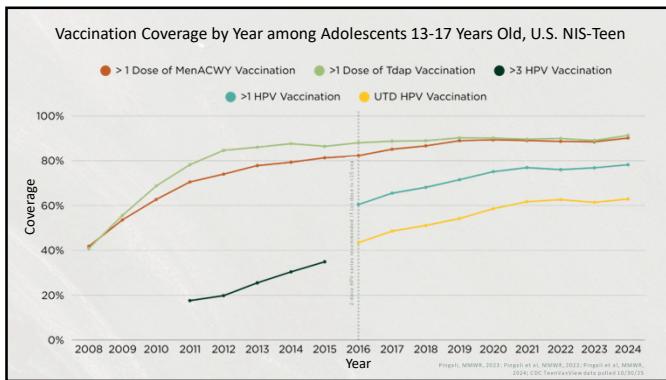


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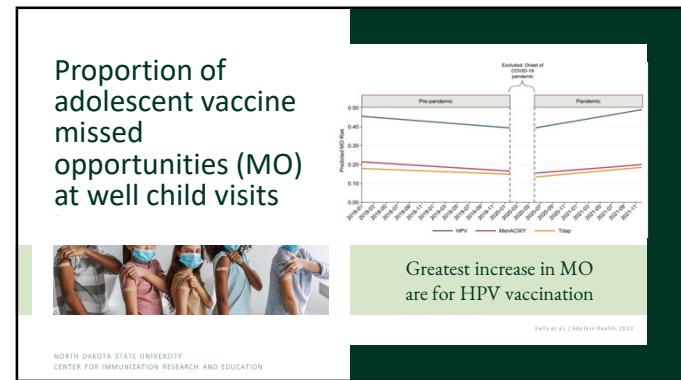
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Objectives

By the end of today we hope you feel more confident in addressing HPV vaccination with patients and have fewer missed opportunities!

- 1 Describe the epidemiology and pathology of human papillomavirus (HPV).
- 2 Summarize HPV vaccine efficacy, real-world effectiveness, and current coverage data.
- 3 Apply effective communication strategies to improve HPV vaccination confidence and reduce missed opportunities in practice.

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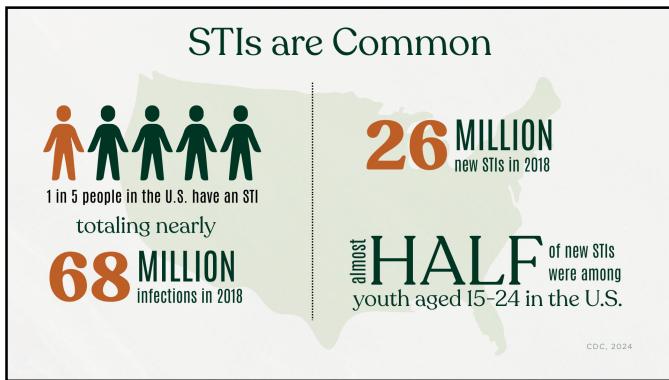
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Epidemiology and Pathology

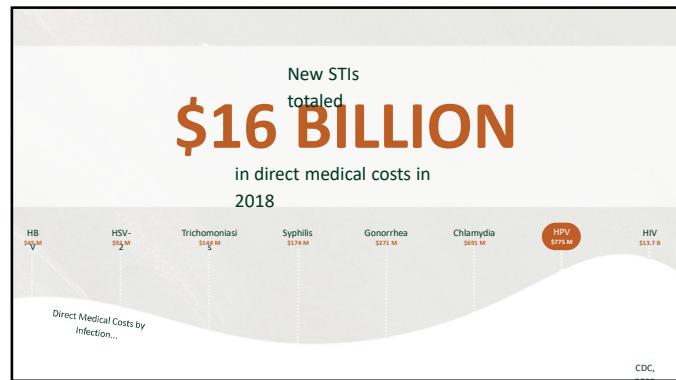


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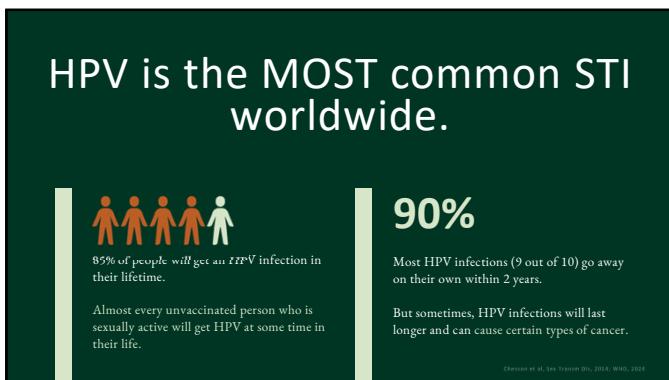
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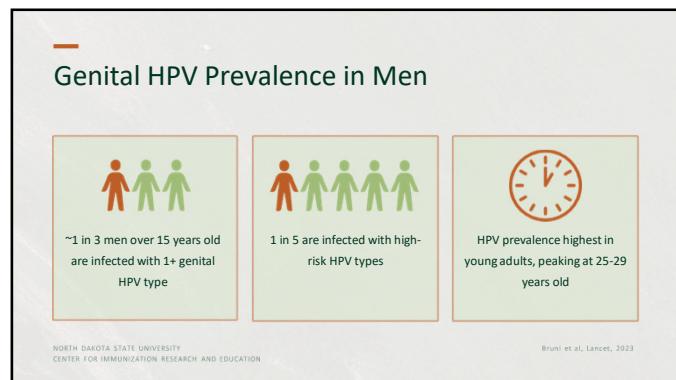
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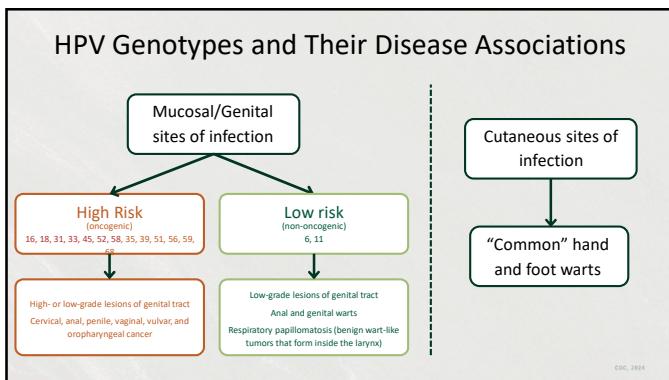
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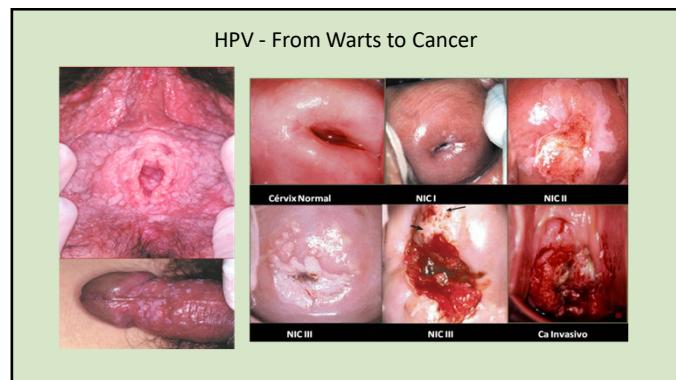
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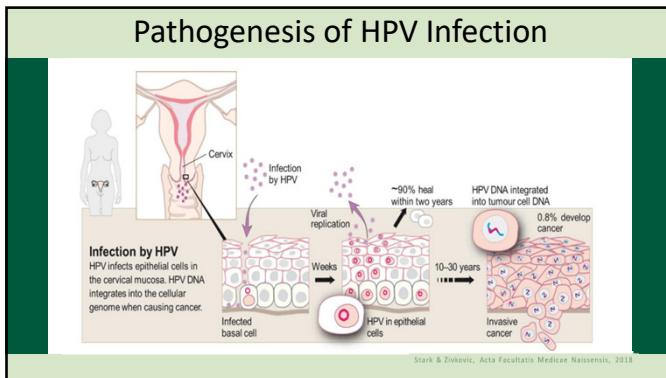


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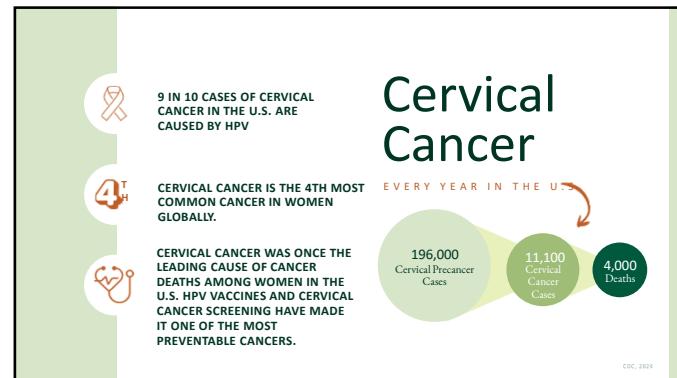


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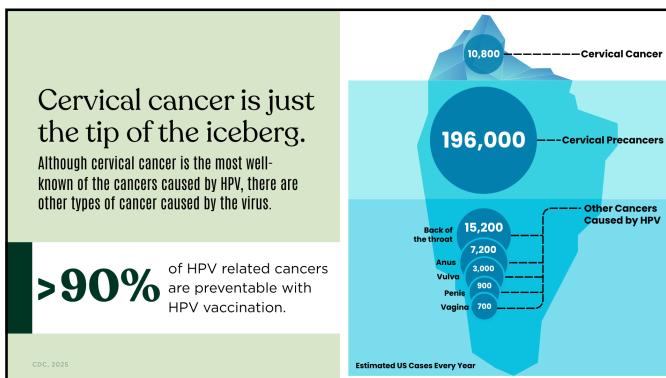
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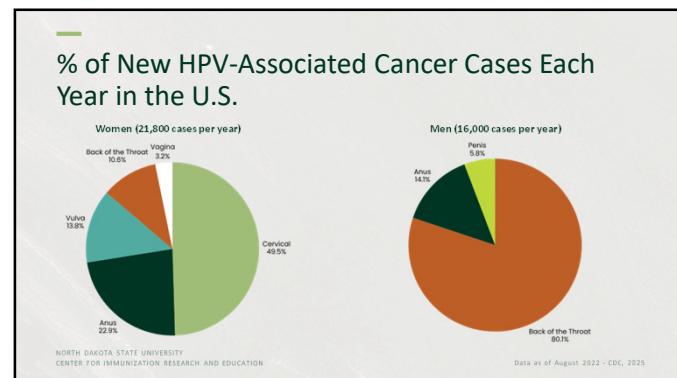
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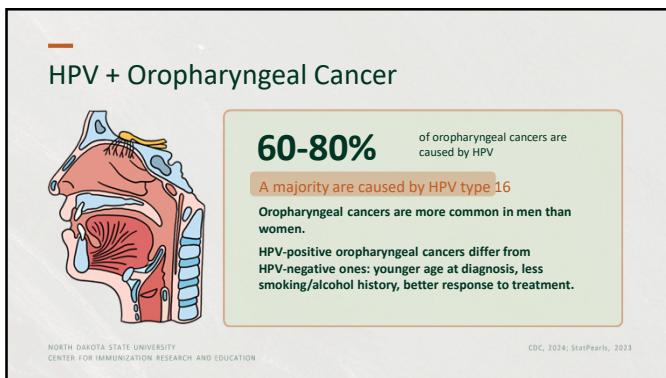
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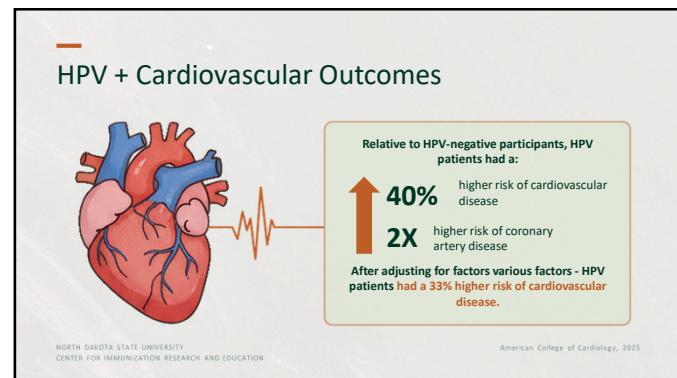
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HPV + Infertility

IN WOMEN:

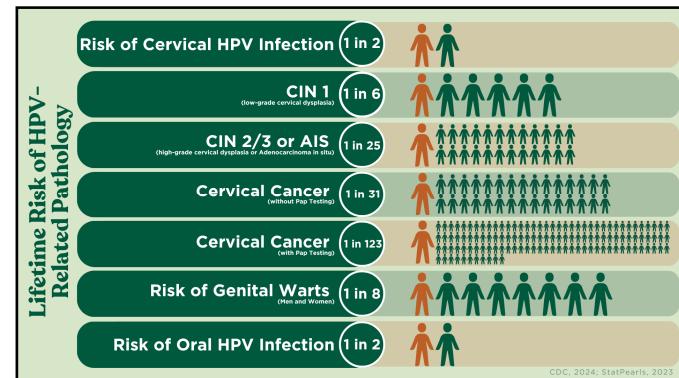
- High-risk HPV may increase odds of infertility (evidence mixed)
- Possible impact on endometrial implantation and trophoblastic cells
- Treatment of cervical lesions (e.g., LEEP, cone biopsy) **can increase** risk of cervical changes affecting pregnancy
- Treatment for cervical cancer (e.g., hysterectomy, radiation, chemotherapy) **can cause** infertility

NOTARI ET AL., NATURE, 2024; ARDEKANI ET AL., EUR J MED RES, 2015; PEREIRA ET AL., J PATHOLG, 2015

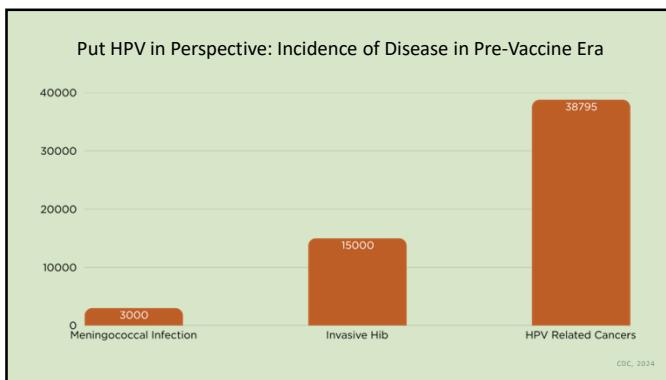
IN MEN:

- HPV linked to reduced sperm motility and quality
- May cause abnormal sperm morphology and DNA fragmentation
- Associated with oxidative stress affecting sperm function

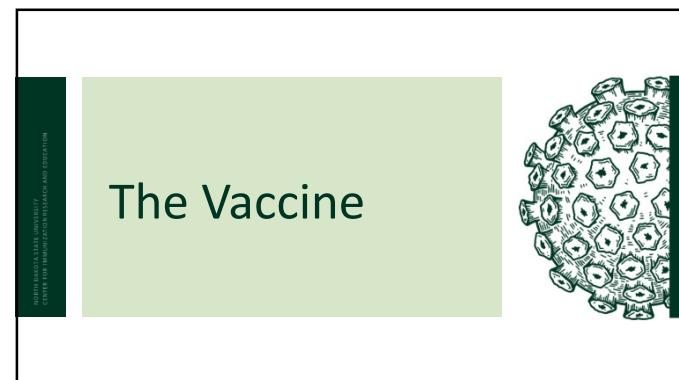
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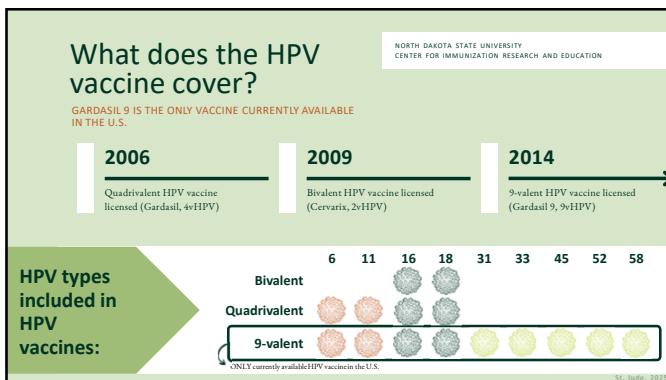
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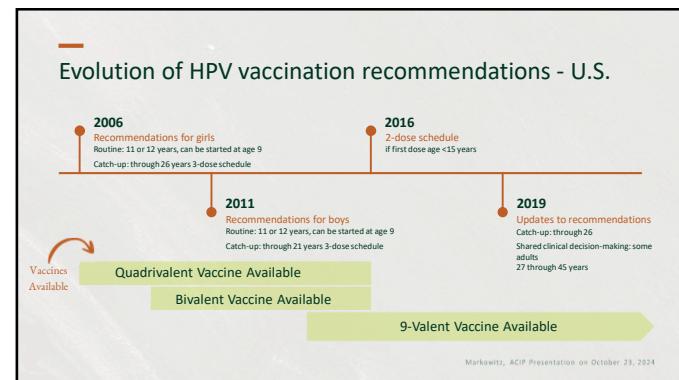
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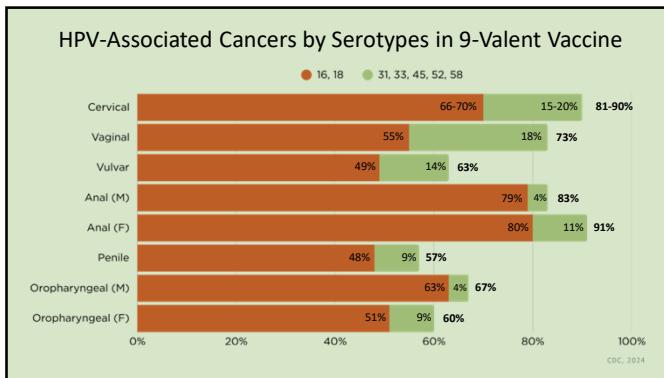
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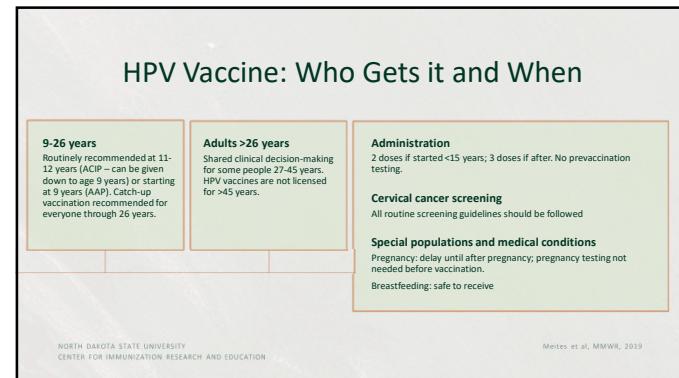
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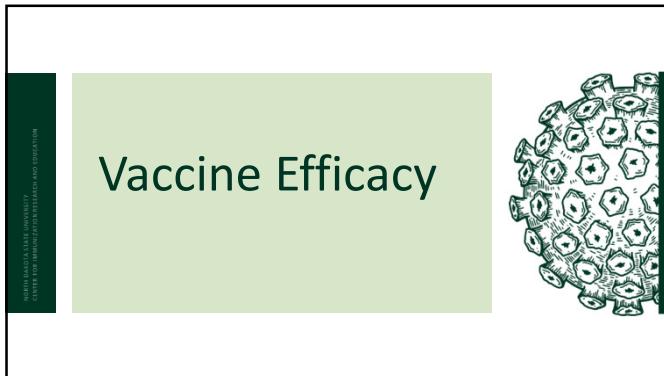
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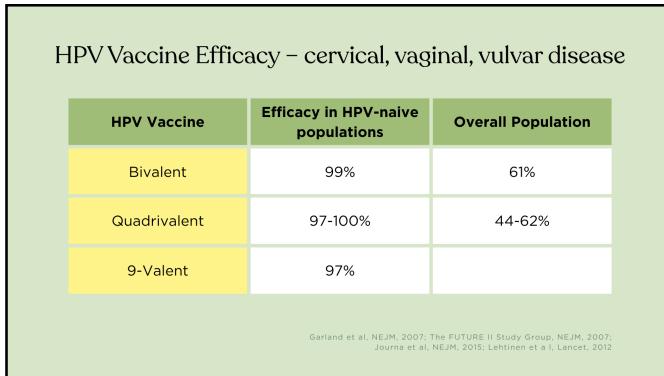
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Efficacy of the quadrivalent and 9-valent HPV vaccines against clinical endpoints among patients aged 16-26

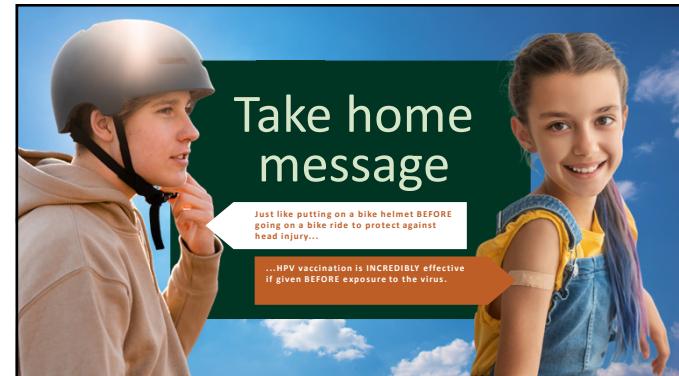
Clinical endpoint	Vaccine		Placebo		Vaccine efficacy % (95% CI)
	# of people	# of cases	# of people	# of cases	
Cervical Cancer: HPV 16/18-related CIN 2/3 OR AIS	8,493	2	8,464	112	-98% (93.5, 99.8)
Vulvar Cancer: HPV 6/11/16/18-related VIN 2/3	7,772	0	7,744	10	100% (55.5, 100)
Vaginal Cancer: HPV 6/11/16/18-related VaIN 2/3	7,772	0	7,899	9	100% (49.5, 100)
Anal Cancer in Males: HPV 6/11/16/18-related AIN 2/3	194	3	208	13	-75% (3.8-95.4)
Gardasil 9		Gardasil			
Clinical endpoint	# of people	# of cases	# of people	# of cases	Vaccine efficacy % (95% CI)
	# of people	# of cases	# of people	# of cases	
HPV 31/33/45/52/58-related CIN 2/3, AIS, VIN 2/3, VaIN 2/3	6,016	1	6,017	30	-97% (80.9, 99.8)

Merck, 2025

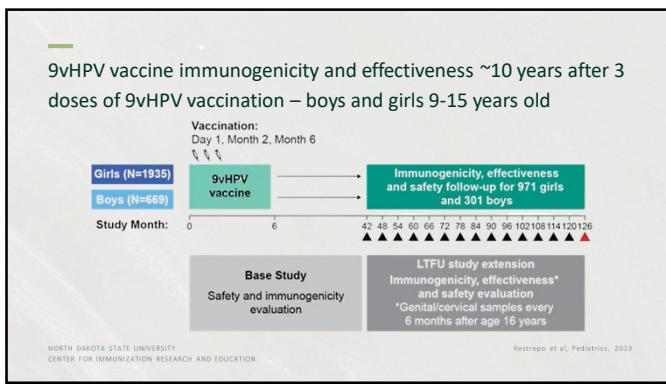
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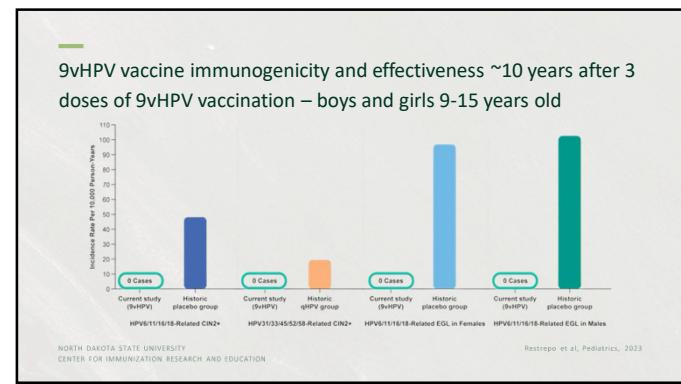
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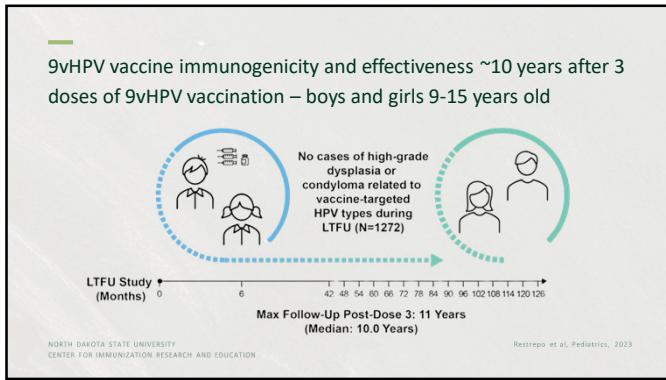
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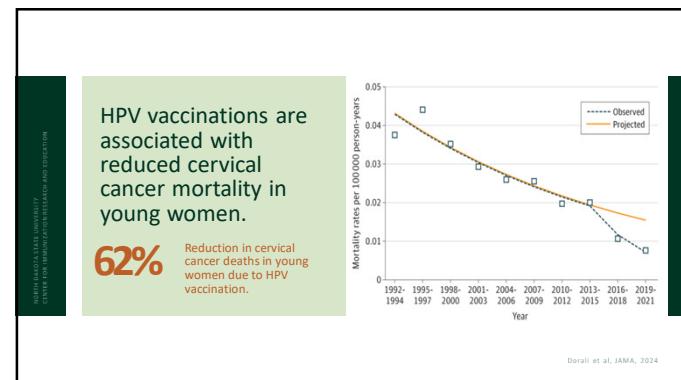
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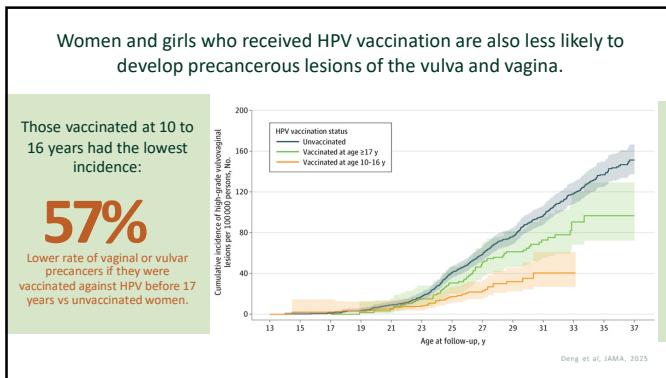
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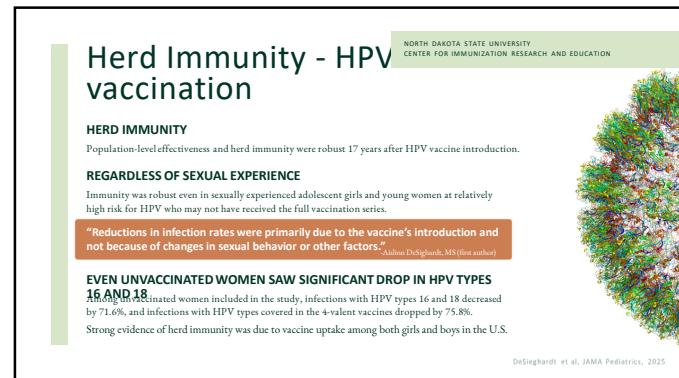
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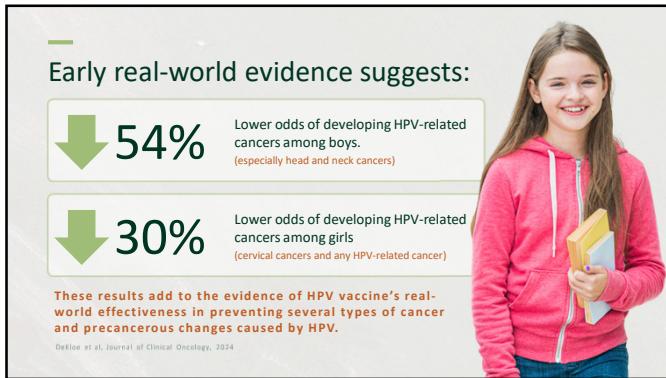
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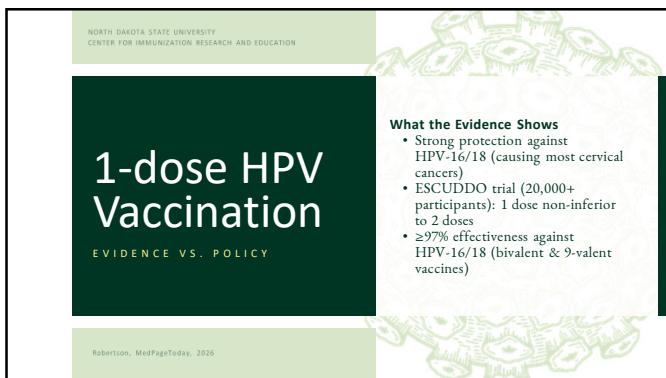
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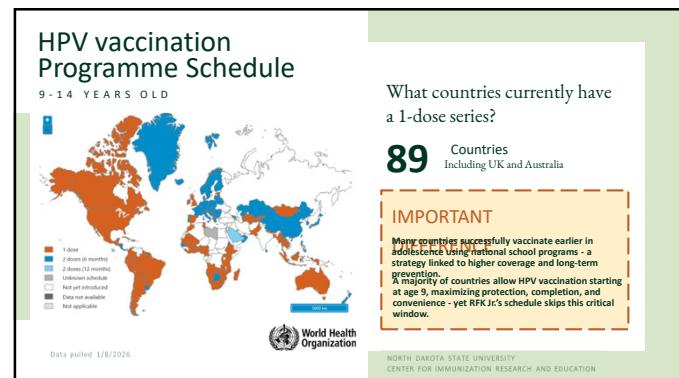
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Does 1-dose provide adequate protection?

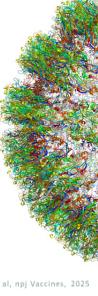
BEYOND CERVICAL CANCER
What about protection against other HPV disease (head and neck cancers, genital warts, and Recurrent Respiratory Papillomatosis [RRP])?

STUDY FOLLOW-UP: STILL GATHERING LONG-TERM DATA
Likely that protection from one dose will be long-lived. However, the longest period of follow-up has only been 5 years.

20% Nearly 20% didn't make detectable antibodies against HPV 6 after a single dose.

The Evidence Collective, 2026; Kemp et al, *npj Vaccines*, 2025

WM1



43

1-dose HPV Vaccination
EVIDENCE V.S. POLICY

WHAT WE STILL DON'T KNOW

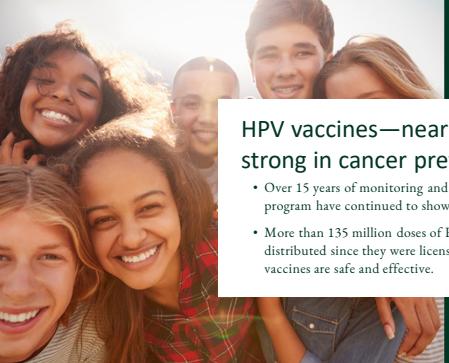
- Long-term durability of protection
- Protection against **non-cervical HPV disease** (head and neck cancers, genital warts, recurrent respiratory papillomatosis [RRP])
- Which groups still need multiple doses (older adolescents, immunocompromised)

WHY THIS

The HHS move was made without standard expert review. Expert groups (AAP, ACOG) suggest the evidence is promising - but process matters. Professional guidance still recommends completing the full series.

Robertson, *MedPageToday*, 2026

44



HPV vaccines—nearly two decades strong in cancer prevention

- Over 15 years of monitoring and research during the vaccination program have continued to show that HPV vaccination is safe.
- More than 135 million doses of HPV vaccines have been distributed since they were licensed. Data continue to show the vaccines are safe and effective.

CDC, 2025

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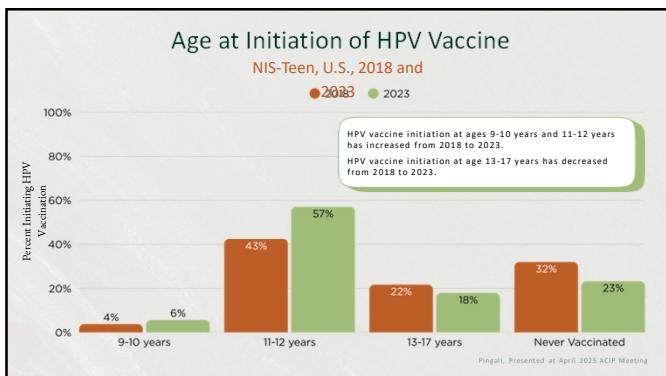
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HPV Vaccination Rates

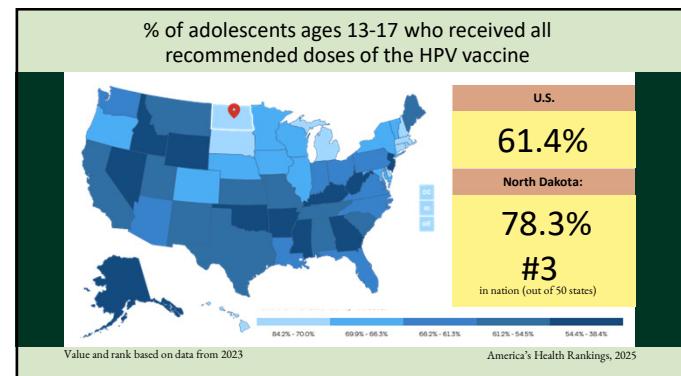


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48

WM1 Looks like this text box might be missing a last word and parenthesis?

Williams, Maeve, 2026-01-09T17:48:13.992

LD1 0 Great catch - updated :)

Dybsand, Lauren, 2026-01-09T19:11:00.679

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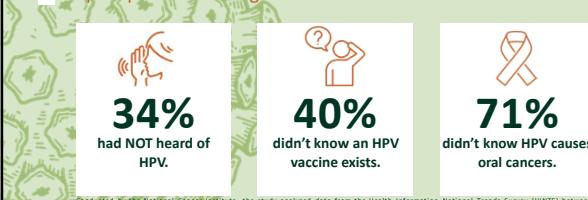
Communicating about HPV Vaccination



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Why is HPV vaccine education important?

Gaps in public knowledge



Conducted by the National Council of Health, the study analyzed data from the Health Information National Trends Survey (HINTS) between 2013 and 2015, encompassing over 22,000 U.S. adults.

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Garg et al, JAMA Oncology, 2025

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Provider recommendation is strongly correlated with vaccination:

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- Initiation
- Completion
- Follow-through

Oh et al, Prev Med, 2021

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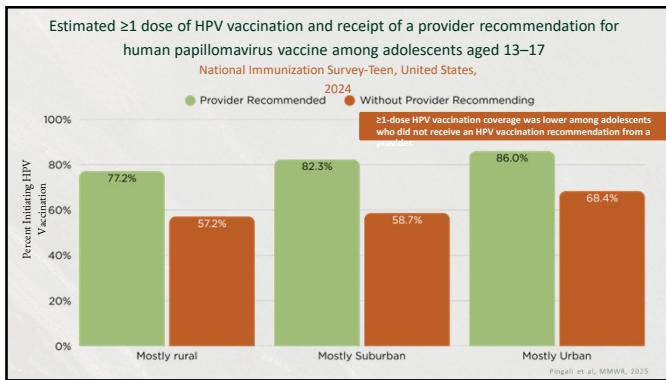
The Question: Are Providers Prepared for HPV Discussions?



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Shuck et al, Vaccine, 2019

52



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Recommending Vaccines

- Start with presumption**
- Pivot to Motivational Interviewing**
- Focus on building trust**

» If there is hesitancy...

» If the patient still declines...

Strong provider recommendations are correlated with increased vaccine acceptance versus participatory communication.

Presumptive
"Your child needs the MMR and varicella vaccines today. Any questions?"

Participatory
"How do you feel about shots today?"

VS

Motivational interviewing (MI) is a patient-centered, guiding communication style for enhancing a person's own motivation for health behavior change by exploring and resolving ambivalence.

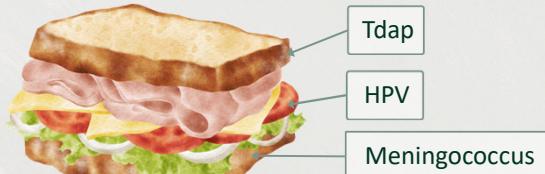
- Open-ended questions
- Ask permission
- Reflect back
- Support autonomy
- Honor ambivalence

Maintain a healthy patient-provider relationship by respecting your patient's choice and focus on being a trusted resource.

"I completely respect your decision regarding the vaccine. While I strongly recommend it for your health, I understand it's a personal choice and you always revisit it at a future visit. In the meantime, let's focus on what's most important to you right now. What other concerns would you like to discuss today?"

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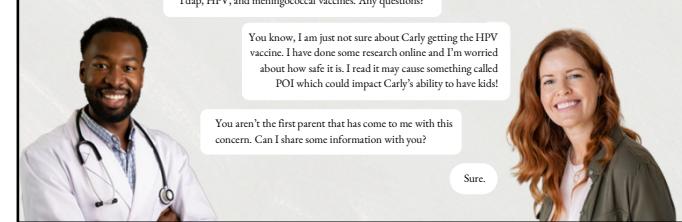
Normalize HPV Vaccination: “Sandwich”



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Case Study #1:



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Case Study: Know the facts!

HPV vaccine has been around for 15+ years.

- Extensive safety testing occurs before any vaccine is licensed by the FDA in the U.S., including HPV vaccination! Gardasil 9 was approved for use and licensed in 2014. Clinical trials looked at 15,000+ men and women indicated that the vaccine was safe and the benefits outweigh any risk.
- 130+ million doses of HPV vaccine have been distributed since they were licensed.
- 160+ studies have shown that HPV vaccines have a favorable safety profile.

HPV vaccine safety will continue to be monitored.

- Systems like VAERS, VSD, and CISA work together to provide timely data on vaccine safety in our country on vaccines that licensed and recommended for use.

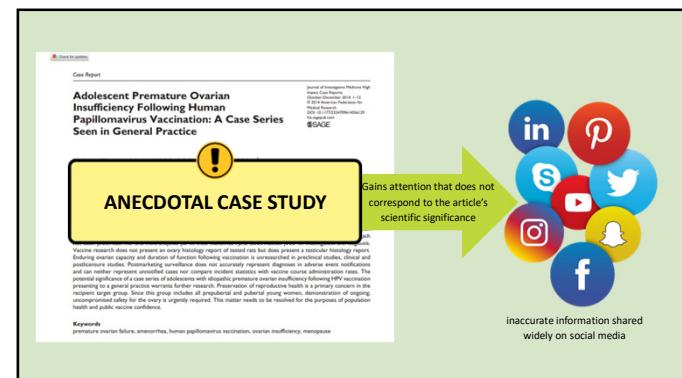
Acknowledge common side effects of HPV vaccination.

- Pain, redness, or swelling in the arm where the shot was given are common.
- Side effects are generally self-limiting. Put into perspective: HPV vaccination is cancer prevention.

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CDC, 2024

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What is primary ovarian insufficiency (POI)?

Also known as “premature menopause,” this is a condition in which a woman’s ovaries stop functioning before age 40. Causes of primary ovarian insufficiency include:

- Genetics
- Chemicals in the environment
- Cancer treatments
- Cigarette smoking
- Autoimmune disorders
- Some viral infections

However, in many cases it’s not possible to determine the cause. CDC and FDA have not found any proof that HPV vaccines cause POI.

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CDC, 2024; UpToDate, 2024

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How have the CDC & FDA addressed the concerns of HPV vaccines causing POI?

As part of ongoing safety monitoring of HPV vaccines, CDC has reviewed reports of POI to VAERS following both Gardasil 9 and Gardasil vaccination.

CDC has also conducted additional safety research on HPV vaccine in the Vaccine Safety Datalink.

Let's take a look at the
research...

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CDC, 2025

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“

With more than 12 years of HPV vaccine safety monitoring and research from the United States and other countries, we have robust data showing the HPV vaccines are safe. With regard to concerns about HPV vaccination and fertility in women, CDC and FDA have not found any convincing evidence that HPV vaccines cause primary ovarian insufficiency (POI).

Also known as “premature menopause,” POI is a condition in which a woman’s ovaries stop functioning before age 40. Causes of POI include genetics, chemicals in the environment, cancer treatments, smoking cigarettes, autoimmune disorders, and some viral infections.

A 2018 study from CDC’s Vaccine Safety Datalink that included nearly 200,000 women did not find an increased risk of POI following HPV vaccination.

-Frank Destefano, Director, Immunization Safety Office, CDC

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Research in other countries:

JAMA Network Open

Original Investigation | Public Health

Association Between Human Papillomavirus Vaccination and Primary Ovarian Insufficiency in a Nationwide Cohort

Anders Holst, Orly Melamed, Emilia Myrmp Thorsen, MSc

Abstract

Importance: Anecdotal case reports have suggested an association between human papillomavirus (HPV) vaccination and primary ovarian insufficiency, but observational studies of HPV and primary ovarian insufficiency are rare, and the findings do not support an association. However, available studies have been limited by statistical power, and concerns about infertility after vaccination are associated with lower levels of uptake of the cancer-preventing vaccine in many countries.

Objective: To evaluate the risk of primary ovarian insufficiency after quadrivalent human papillomavirus (4dHPV) vaccination.

Design, Setting, and Participants: This retrospective cohort study with follow-up from 2007 to 2016 used nationwide data for 956 300 Danish-born girls and women aged 11 to 34 years. Cox proportional hazards regression was used to estimate hazard ratios (HRs) of primary ovarian insufficiency.

Findings: In the cohort study of 956 300 girls and women, vaccination was not associated with primary ovarian insufficiency.

Meaning: This finding suggests that human papillomavirus vaccination is not associated with an increased risk of primary ovarian insufficiency.

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Case Study #1:

HPV vaccines have been around a long time now, over 15 years! And during this time, over a hundred million doses of HPV vaccines have been distributed in the U.S. We have very promising and reassuring data that these vaccines provide long-lasting protection and that they are very safe. The rumor that this vaccine causes infertility still makes the rounds on social media. What I hear you saying is that you are concerned this vaccine may cause infertility, and specifically Primary Ovarian Insufficiency or POI?

Yes.




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Case Study #1:

As part of ongoing safety monitoring of HPV vaccines, researchers have taken a look at the risk of POI following both Gardasil 9 and Gardasil vaccination – many studies looking at hundreds of thousands of girls have found no link between HPV vaccination and infertility or POI. Some of my patients do experience some soreness, swelling, and redness at where the shot was given. But this is common and should get better in a day or two. AND do you want to know what is absolutely linked to infertility? HPV cancer. The fact that they can cause issues with having children is unquestioned in the medical world. I vaccinated my own daughter against HPV, and I highly recommend Carly get vaccinated, too. What stands out to you about what I shared?




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Case Study #1:

No, that makes sense, and I guess I hadn't really realized that HPV vaccination had been around that long. I really appreciate you taking the time to talk to us about it. Your recommendations are important to us. But, I think we are going to take some time to think about it.

Of course. Can I send some resources home with you to take a look at? I think HPV vaccination is an important part of keeping Carly healthy. Can we re-address this at our next appointment?

Absolutely.




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Questions?

THANK YOU FOR LISTENING

SPECIAL THANKS TO:

- MAEVE WILLIAMS
- LAUREN DYBSAND, MPH

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ndsu.cire@ndsu.edu

WEB:
www.ndsu.edu/centers/immunize

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The image shows a screenshot of the CIRE Educational Opportunities website. The header features the CIRE logo and the text 'EDUCATIONAL OPPORTUNITIES'. Below the header is a photograph of a computer monitor displaying the website. The website has a dark green header with the text 'NIGU' and 'CIRE' followed by 'EDUCATIONAL OPPORTUNITIES'. The main content area includes sections for 'Monthly Webinars' and 'Motivational Interviewing Training Module'. Each section has a QR code and a link to sign up. The footer contains a copyright notice for 2018.

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Sign up for our email list: <https://bit.ly/3YRwl1c>

Monthly Webinars

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- Nationally-recognized speakers
- Live and recorded presentations
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Motivational Interviewing Training Module

- Each 10-15 minutes long
- Covers topics such as:
 - The Spirit of MI
 - Elicit-Provide-Elicit (EPE)
 - Change Talk & Scaling Questions
 - Best First Responses