

Preventing HIV-Related Comorbidities in Adolescents

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Financial Relationships With Ineligible Companies (Formerly Described as Commercial Interests by the ACCME) Within the Last 2 Years

Dr Agwu has served on the scientific advisory boards for Gilead Sciences, Inc., and Merck & Co, Inc. (Updated 9/29/21)

Slide 2 of 40

Learning Objectives

At the end of this presentations, learners will be able to:

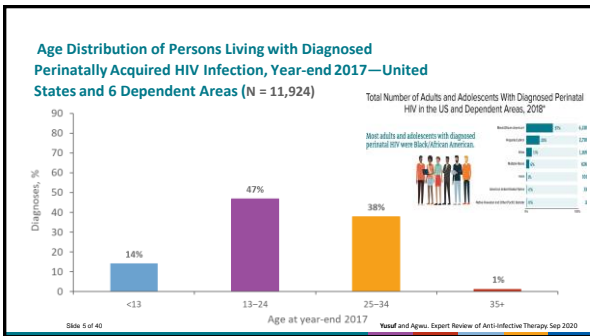
- Review the epidemiology of adolescents living with HIV
- Describe risk factors for developing comorbidities over the life course among adolescents with HIV
- Discuss opportunities to prevent comorbidities and optimize outcomes

Slide 3 of 40

PEDIATRICS *"Although they make up only 1% of AIDS patients, they have unique clinical, social, and public health problems that require special attention" Rogers*

1982 1985 1987 1988 1990 1994 1996 2003 2006 2013 2014 2015 2017 2020 2021

Slide 4 of 40 <https://www.hiv.gov/sites/default/files/2020/08/08/2019-2020-Annual-Report-Boysers-et-al-1982729-1008-1014>



Many AYA born with HIV are thriving.....

First wave of babies born with HIV soaring so

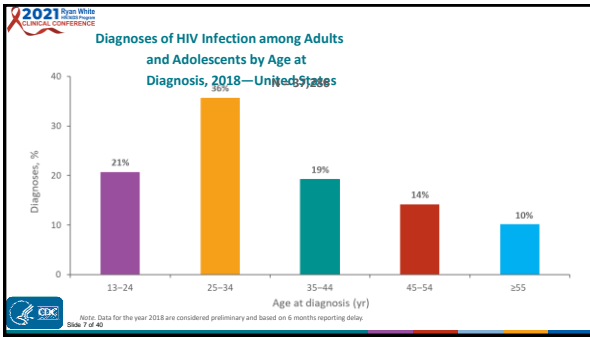
Having a NEGATIVE family can be the most POSITIVE thing in your life.

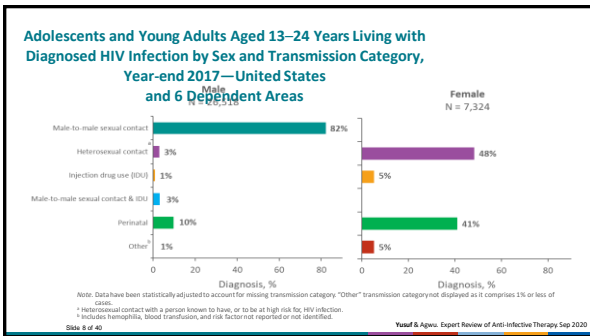
POZ CME

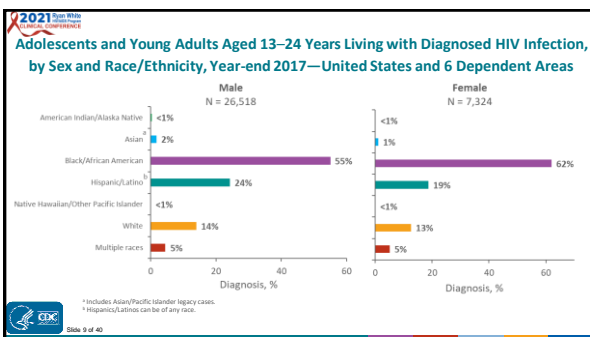
WATCH: As We See It: Wisdom and the Unique Experiences of Women Born with HIV

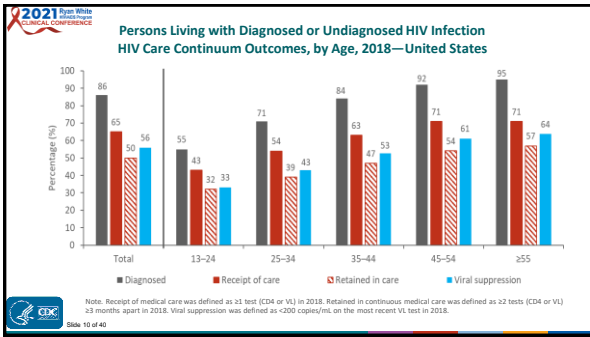
POZ CME

CHIPATALA











	2 nd Decade (10-19 years)
Life events	School Trade School/College Employment Parent/guardian loss
Self-management	Parental/caregiver involvement waning
Disclosure	Disclosure to peers Disclosure to adults
Stigma	Internal and external stigma

Life course perspective for adolescents with HIV

	2 nd Decade 20-29 years	3 rd Decade 30-39 years	4 th Decade 40-49 years	5 th Decade 50-59 years	6 th Decade 60-69 years
Antiretroviral treatment	Simple regimen, increased responsibility of ART	Simple regimen, increased complex regimens due to development of resistance, Full responsibility of ART	Simple regimen, increased complex regimens due to development of resistance, Full responsibility of ART	Simple regimen, increased complex regimens due to development of resistance, Full responsibility of ART	Simple regimen, increased complex regimens due to development of resistance, Full responsibility of ART
Treatment and Treatment-related Factors					

Slide 14 of 40

How will adolescents with HIV infection be impacted?

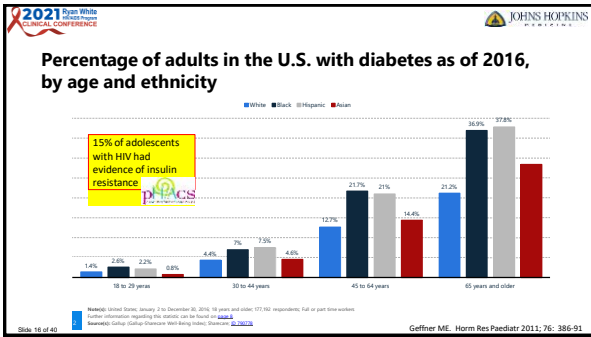
Slide 14 of 40

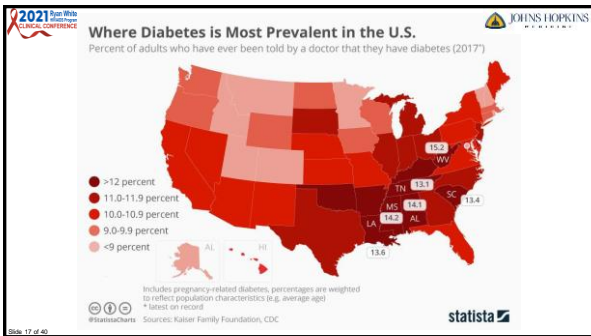
Leading Cause of Death in the United States for Select Age Groups (2019)

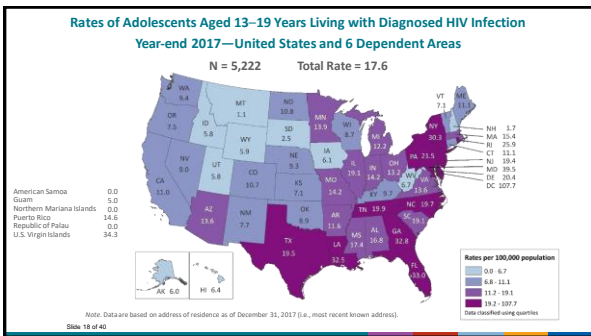
Note: Suicide is not among the ten leading causes of death among children in the 0-9 year age group.

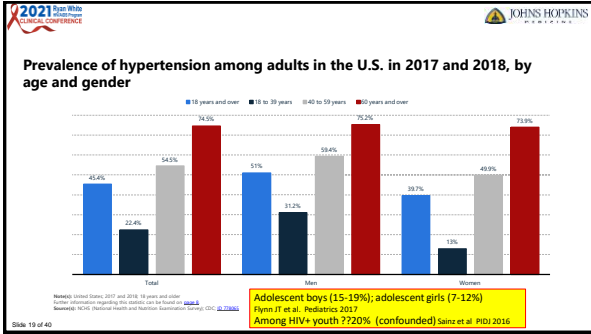
Rank	10-14	15-24	25-34	35-44	45-54	55-64	All Ages
1	Unintentional Injury 776	Unintentional Injury 11,755	Unintentional Injury 24,216	Unintentional Injury 24,072	Heart Disease 25,587	Heart Disease 11,702	Heart Disease 65,041
2	Suicide 824	Suicide 8,884	Suicide 8,899	Malignant Neoplasms 15,092	Heart Disease 21,128	Heart Disease 80,827	Malignant Neoplasms 595,821
3	Malignant Neoplasms 8,774	Homicide 5,341	Fire/injury 5,341	Heart Disease 16,490	Unintentional Injury 28,892	Unintentional Injury 17,140	Malignant Neoplasms 1,714,041
4	Homicide 191	Malignant Neoplasms 1,388	Malignant Neoplasms 5,977	Suicide 7,820	Liver Disease 6,208	CLRD 18,748	CLRD 158,978
5	Congenital Anomalies 180	Heart Disease 872	Heart Disease 3,490	Heart Disease 3,445	Suicide 8,912	Diabetes Mellitus 3,308	Diabetes Mellitus 158,005
6	Heart Disease 87	Congenital Anomalies 300	Liver Disease 4,712	Liver Disease 5,417	Diabetes Mellitus 6,349	Liver Disease 64,385	Liver Disease 121,499
7	CLRD 81	Diabetes Mellitus 248	Diabetes Mellitus 897	Diabetes Mellitus 2,228	Diabetes Mellitus 5,152	Cerebrovascular Disease 12,031	Diabetes Mellitus 87,647
8	Influenza & Pneumonia 71	Influenza & Pneumonia 175	Cerebrovascular Disease 585	Cerebrovascular Disease 1,741	CLRD 3,705	Suicide 8,288	Neoplasms 31,000
9	Cerebrovascular Disease 68	CLRD 168	Congenital Anomalies 52	Influenza & Pneumonia 93	Neoplasms 2,205	Neoplasms 5,857	Influenza & Pneumonia 49,783
10	Berriog 35	Cerebrovascular Disease 158	CLRD 480	Septicemia 813	Septicemia 1,178	Septicemia 3,672	Suicide 47,811

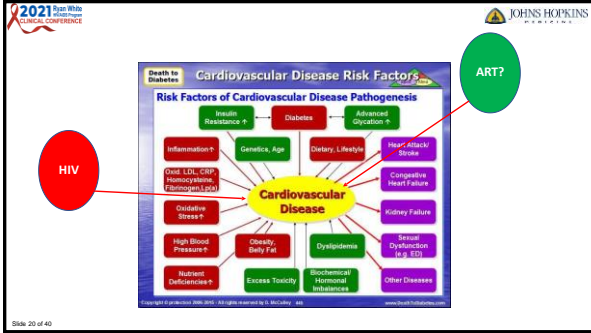
Slide 15 of 40

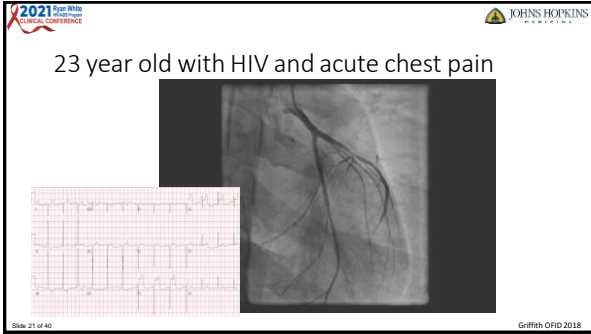












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CVD Data for Youth with HIV

- Studies of children and youths in non-HIV disease states (diabetes, obesity) link arterial stiffness and thickness to hypertension & increased left ventricular mass
- Limited data on youth with perinatal infection
 - Mixed results, study challenges
 - ↑ arterial thickness (carotid intimal medial thickness) in HIV+ vs. HIV-
 - ↑ arterial stiffness (pulse wave velocity) & ↓ flow-mediated dilatation in HIV+ vs. HIV-
 - ↑ inflammatory markers in HIV+ vs. HIV- → associated with arterial thickness, stiffness, and flow-mediated dilatation
 - ↑ inflammatory markers despite longstanding virologic suppression
 - AHA with HIV have higher markers of cardiopulmonary dysfunction
 - Up to 28% show evidence of early cardiovascular dysfunction
 - Biomarkers of cardiomyocyte stress and injury (high sensitivity cardiac troponin-T [hs-cTnT] and N-terminal pro-brain natriuretic peptide [NT-proBNP]) are elevated compared to uninfected adolescents after adjusting for adherence to ART.
 - Inflammation associated with poorer left ventricular function and increased stress in the ventricular walls


Slide 22 of 40 Miller TL, et al. HIV Med. 2012 13(5): 264-70; Saint T, et al. Atherosclerosis 2014; Ross et al. Persaed J JAMA Peds 2014; Yusuf 2020

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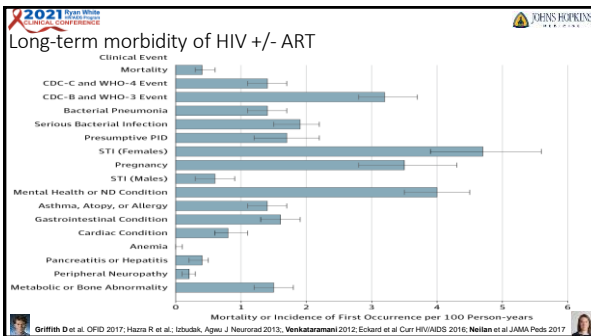
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A Harbinger for bad things to come....?

“....findings provide further evidence that HIV+ children are at risk for CVD. As many of these biomarkers were associated with modifiable risk factors as hyperlipidemia, **interventions** to modify these risks should be considered in future studies.”



Slide 23 of 40 Miller TL, et al. HIV Med. 2012 13(5)



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Mental health in adults born with HIV

Changing factors contributing to poor cognitive performance
 Cognitive effects of HIV contributing to reduced cognitive reserve
 Other factors contributing to reduced cognitive reserve

Side 25 of 40 Phillips Pediatrics 2016; Malee AIDS Care 2011; Scharfo AIDS Care 2006; Earnshaw AIDS & Behavior 2008; Will Project-Winnon Aet 20 January 2020

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Sexual and reproductive health for adults born with HIV

	2 nd Decade 10-19 years	3 rd Decade 20-29 years	4 th Decade 30-39 years	5 th Decade 40-49 years	6 th Decade 50+ years
Sex/reproductive	Sexual and gender identity evolving; Sexual activity often commences; Risk reduction	Sexual and Reproductive Health Secondary Prevention Child bearing Risk reduction	Secondary Prevention Child bearing Risk reduction	Secondary Prevention Risk reduction	Secondary Prevention Risk reduction

Side 26 of 40 Phillips Pediatrics 2016; Malee AIDS Care 2011; Scharfo AIDS Care 2006; Earnshaw AIDS & Behavior 2008; Yusuf 2020

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STI Rates among adolescents

Rates of chlamydia, gonorrhea, and primary & secondary syphilis ↑ for both sexes in 15–24 year olds

Chlamydia: highest among women 15–24 years; males 15–24 years ↑ 29% (2013–2017), while the rate in females ↑ 9%

Gonorrhea: males 15–24 years ↑ 52%, while the rate in females increased 24%

Reasons for increases include:

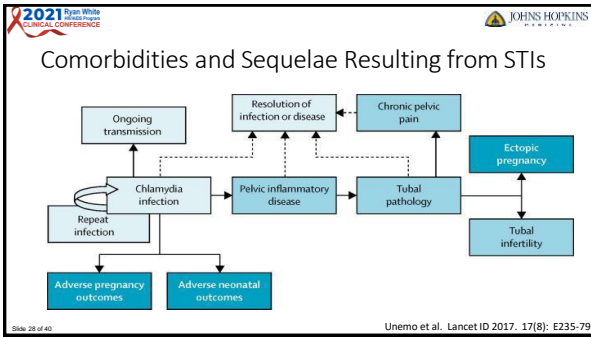
- ↑ incidence
- ↑ screening among young men
- ↑ extragenital screening

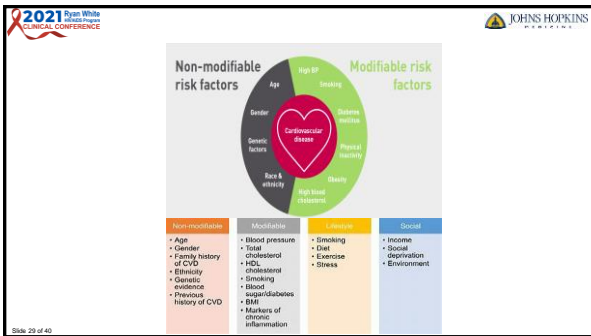
HIV positive adolescents:

- Perinatally acquired: ↑ likelihood to use condoms (60% use condoms inconsistently); 30% have >1 concurrent partner
- Non-perinatally acquired: continued sexual activity, inconsistent condom use
- Pregnancy desires unchanged

Figure 5. Chlamydia – Rates of Reported Cases by Age Group and Sex, United States, 2017

Side 27 of 40 Judd et al PLoS One 2018; Anukunda Pan Afr Med 2016; Koenig JAIDS 2010; CDC





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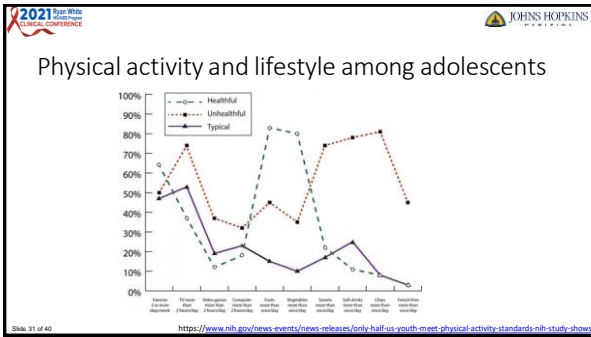
Tobacco use among adolescents

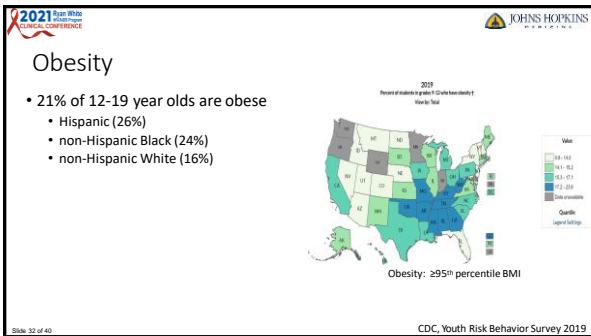
- 7% of middle schoolers and 23% of high schoolers report current use of a tobacco product
- Use of cigarillos have markedly increased, particularly among Black adolescents

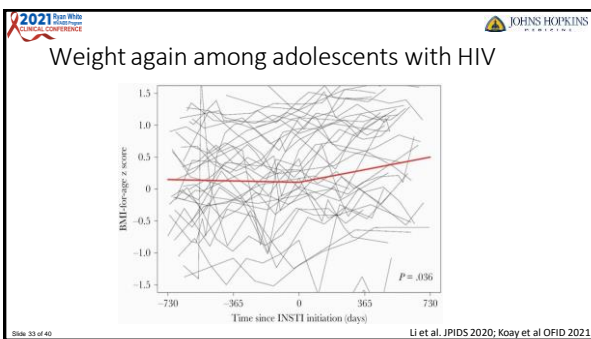
Learn more at: [doi:10.1093/ntr/ntr001](https://doi.org/10.1093/ntr/ntr001)
Source: National Youth Tobacco Survey (NYTS)

Slide 30 of 40

Neuman et al. Nicotine & Tobacco Research 2016; <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4848444/>

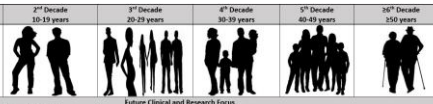






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Future Clinical and Research Focus

Treatment	Developing ideal treatment dosing regimens and formulations	Minimizing polypharmacy, optimizing ART, minimizing drug interactions
Comorbidities	Longitudinal studies on HIV comorbidities and early biomarkers of organ/systemic dysfunction, prevention strategies	Impact of customized mental health screening and interventions
	Minimizing cognitive dysfunction	

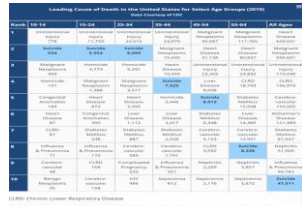
Slide 34 of 40

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What can you do?

- Take a good history
- Assess risk factors
 - Tobacco
 - Substances
 - Sex
 - Activities
 - Helmets, firearms
- Detailed family history
- Physical examination




Slide 35 of 40

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What can you do?

- Education** (patient and staff)
- Counseling**
 - Nutrition
 - Exercise
 - Smoking (cigarettes, vape, cigarillos, e-cigarettes)
 - Substance, ETOH use
 - Sex
 - Etc
- Screening:** BP, lipids (fasting/non-fasting), glucose, weight



Slide 36 of 40

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Risk calculators for adolescents?

- ASCVD Heart Risk Calculator (age 40-79)
- If you know your lipids information and you are <60, the Framingham Heart Study General Cardiovascular Disease 30-Year Lipid-Based Risk Score Calculator is used. **FOR AGES 30-79**
- If you don't know your lipids information and you are <60, the Framingham Heart Study General Cardiovascular Disease 30-Year BMI-Based Risk Score Calculator is used. **FOR AGES 30-79**
- If you know your lipids information and you are ≥60 or older, the ACC/AHA Pooled Cohort Equations CV Risk Calculator is used.
- If you don't know your lipids information and you ≥ 60 or older, the Framingham Heart Study Cardiovascular Disease 10-Year BMI-Based Risk Score Calculator is used.

Heart Disease Risk Calculator

Age: 18 years

Gender: Male Female

Weight: 150 lbs

Height: 5'8"

Cholesterol: Normal High

Continue

<http://www.cvriskcalculator.com/>; <https://www.mayoclinichealthsystem.org/locations/menomonie/services-and-treatments/cardiology/heart-disease-risk-calculator>

Slide 37 of 40

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What can you do?

- **Actions:**
 - Smoking cessation
 - Lifestyle modification
 - Treatment
 - HTN (<130/80 goal) or <90th percentile
 - Hyperlipidemia: ?? (benefit for older youth with clear abnormal)
 - Weight loss
 - hyperlipidemia
 - Substance use treatment
 - STI counseling, screening, and treatment; family planning
 - Immunizations

Immunizations for Adolescents and Young Adults

Human Papilloma (HPV)

Hepatitis A

Hepatitis B

Tdap

MCV

Flu

COVID

PCV & PS23

Others as indicated

Slide 38 of 40

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Immunizations for Adolescents and Young Adults

- Human Papilloma (HPV)
- Hepatitis A
- Hepatitis B
- Tdap
- MCV
- Flu
- COVID
- PCV & PS23
- Others as indicated

Immunizations for Adolescents and Young Adults

Human Papilloma (HPV)

Hepatitis A

Hepatitis B

Tdap

MCV

Flu



COVID

PCV & PS23

Others as indicated

Percentage of adolescents who are up to date on HPV vaccination

Slide 39 of 40

Conclusion

- Adolescents with HIV (perinatally or non-perinatally acquired) are surviving into adulthood
- Providers must be aware of potential comorbidities that may arise in adolescence
- Critically important to screen for and address comorbidities with prevention and early treatment.

Slide 40 of 40

Question-and-Answer Session

