SAHCS Vaccination Guidelines

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4th Southern African HIV Clinicians Society Conference / 24-27 October 2018 Gallagher Convention Centre, Midrand





Declarations







PHARMACEUTICAL COMPANIES OF Johnson Johnson



OUTLINE

- Introduction
- SAHCS Guideline
- Vaccines with strong local evidence for use
- Vaccines that are recommended but local data lacking
- Vaccines- no recommendation
- Conclusion

Healthy communities

Closing the immunisation gap

The world before vaccines

Examples of major disease outbreaks



Polio NEW YORK 1916 6,000 deaths

Yellow fever PHILADELPHIA 1793 >5,000 deaths Cholera pandemic EUROPE 1829-1851 >200,000 deaths

> Smallpox epidemic INDIA 1974 15,000 deaths

A 40

PREVENTIVES OF CHOOLDERBAS Published by order of the Sanatory Committee, under the sanction of the Medical Counsel. DE TEMPERATE IN EATING & DRINKING! Abota Raw Vegetables and Unripe Fruit ! Abstain from COLD WATER, when heats ed, and above all from Ardent Spirits, and if habit have rendered them indispensable, take much less than usual.

Flu pandemic 1918-1920 > 50-100 million deaths worldwide



Vaccination essential element for promoting

- Health equity
- Economic equity (reducing medical & non-medical costs)
- Social equity –access to the health care system
- Vertical equity intervention-vaccines for diseases of poverty



Vaccinate to Prevent Disability

Catastrophic disability

- ♦ Defined as a loss of independence in \ge 3 ADL
- 72% who experience catastrophic disability have been hospitalized
- Leading causes of catastrophic disability
 - 1. Strokes
 - 2. CHF
 - 3. Pneumonia and influenza
 - 4. Ischemic heart disease
 - 5. Cancer
 - 6. Hip fracture

Ferrucci et al. JAMA 277:728, 1997 Barker et al. Arch Int Med 158:645, 1998 Falsey et al. *N Engl J Med*. 2005;352:1749



1= Very fit
2= Well
3= Well, with treated chronic disease
4= Apparently vulnerable
5= Mildly frail
6= Moderately frail
7= Severely frail
8= Very severely frail
9= Terminally ill

Low Vaccine Coverage in HIV

- Coverage rates among HIV patients reportedly low
 - In US influenza vaccination coverage 25-43%
 - In France influenza coverage is 30.9%

Multifactorial

- Lack of knowledge of current vaccine recommendations
- Lack of infrastructure in clinics to provide vaccines
- Concerns about vaccine safety
- Insurers not willing to pay for vaccines



36.9 million living with HIV











Top 10 global causes of deaths, 2016



Source: Global Health Estimates 2016: Deaths by Cause, Age, Sex, by Country and by Region, 2000-2016. Geneva, World Health Organization; 2018.



Top 10 causes of deaths in low-income countries in 2016



Source: Global Health Estimates 2016: Deaths by Cause, Age, Sex, by Country and by Region, 2000-2016. Geneva, World Health Organization; 2018. World Bank list of economies (June 2017). Washington, DC: The World Bank Group; 2017 (https://datahelpdesk.worldbank.org/knowledgebase/articles/906519-world-bank-country-and-lending-groups).



South Africa

NEW HIV INFECTIONS AMONG ADULTS, BY AGE AND SEX, SUB-SAHARAN AFRICA, 2015



- 7.9 million South African are HIV-infected
- ~4.4 million on ART
- Estimated ART coverage 62%
- Estimated viral suppression rate 87.3%





2017 National estimates

RESEARCH ARTICLE

Open Access



Trends in prevalence of selected opportunistic infections associated with HIV/AIDS in Uganda

Rubaihayo et al. BMC Infectious Diseases (2015) 15:187





Guideline Development

- Experts in the field of vaccination
 - Vaccines for Africa Initiative (VACFA)
- National Institute for Communicable Diseases (NICD)
- Academics
- Private Sector
- Rural health
- Pediatricians & Physicians
- South African Cochrane Centre



ITE FOR COMMUNICABLE DISEASES



Research: Cochrane group, academics,





- Full day workshop
- Presentation of local data
- Discussion
- Recommendation
 - Consensus if no local data
- Draft of guidelines
 - Evidence based
 - Based on best international practice
 - Circulated and comments received
- Review of guideline recommendation
 - Every 3-5 years
 - Identify gaps in local data -help inform future guidelines



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Guidelines

Guidelines for the vaccination of HIV-infected adolescents and adults in South Africa

TABLE 1: Vaccination guidelines for HIV-infected adolescents and adults. Vaccine Safety CD4+ count Indication Doses for unvaccinated Booster Comments adults MMR vaccine 2 doses (28 days apart) Protection likely lifelong Mainly indicated in measles Measles, mumps or > 200 cells/mL rubella seronegative seronegative HIV-infected women of childbearing age Pregnancy should be avoided for 1 month after vaccination 1 dose Influenza R Any Yearly Pneumococcal R Any 1 dose -Given with PPV23 but must be given first Conjugated (PCV13) RS Given with PCV13 but given 8 weeks 5-10 years Pneumococcal > 200 cells/mL 1 dose after PCV13 Polysaccharide (PPV23) Can be given to patients with CD4 count < 200 cells/mL if on ART and VL suppressed Maximum 2 booster doses, 1 booster dose in patients > 65 years. Poor response if CD4+ cell count < 200 cells/ mL and VL not suppressed Hepatitis B R Anv 4 doses (40 µg) Not clear awaiting evidence 3 doses (20 µg) Hepatitis A RS - travel, MSM, liver > 200 cells/mL 2 doses 10 years disease Meningococcal RS Any 2 doses 5 years Tetanus-diphtheria (Td) R Any 10 years Pertussis-acellular R Any 1 dose 10 years Given in pregnancy combined with tetanus-diphtheria (DTPa/dTpa) Poliomyelitis-inactivated RS > 200 cells/mL 3 doses none Human papilloma virus (HPV) RS - females, MSM Any 2 doses none May be considered if CD4+ count > 400 Varicella NR cells/mL ≥ 200 cells/mL Zoster RS 1 dose none Only use if CD4+ count ≥ 200 cells/µl

MMR, measles, mumps, and rubella; R, recommended; RS, recommended in selected individuals; NR, not recommended; VL, viral load; HBsAb, hepatitis B surface antibody; MSM, men who have sex with men.

S Afr J HIV Med 2018; 19(1)

Authors: Sipho K. Dlamini¹ Shabir A. Madhi^{2,3} Rudzani Muloiwa⁴ Anne von Gottberg^{5,6} Mahomed-Yunus S. Moosa⁷ Susan T. Meiring^{8,9} Charles S. Wiysonge^{10,11} Eric Hefer¹² Muhangwi B. Mulaudzi¹³ James Nuttall⁴ Michelle Moorhouse¹⁴ Benjamin M. Kagina^{15,16}







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Guidelines

#AOSIS

Guidelines for the vaccination of HIV-infected adolescents and adults in South Africa



- Recommendations made on the basis:
 - Vaccines with strong local evidence for use
 - Influenza
 - Pneumococcal vaccination
 - Hepatitis B, Tetanus-diphtheria
 - Vaccines recommended but either local data lacking or warranted in selected cases
 - Pertussis
 - Meningococcal, hepatitis A
 - Vaccines with no recommendation (NR) OR recommended in selected individuals (RS)
 - Varicella
 - Herpes Zoster
 - Measles, mumps & rubella

S Afr J HIV Med 2018; 19(1)



Vaccines with strong local evidence for Use





ACUTE LOWER RESPIRATORY INFECTIONS

- 2nd common cause of illness
- 3rd common cause of death
- Most common agent: virus
 - mainly RSV and influenza in children and elderly





Influenza in South Africa

- Responsible for a 10-fold increased mortality rate
- In SA influenza kills between 6,000-11,000 people every year
 - Half of these deaths are in the elderly
 - About 30% in HIV-infected individuals
- Highest rates of hospitalization
 - The elderly (65 years and older)
 - HIV-infected people
 - Pregnant women
 - Children less than five years



HIV infected HIV uninfected



MAJOR ARTICLE



Impact of Human Immunodeficiency Virus on the Burden and Severity of Influenza Illness in Malawian Adults: A Prospective Cohort and Parallel Case-Control Study

Antonia Ho,^{1,2} Stephen J. Aston,^{1,2} Hannah Jary,^{2,3} Tamara Mitchell,² Maaike Alaerts,² Mavis Menyere,² Jane Mallewa,^{4,5} Mulinda Nyirenda,^{4,5} Dean Everett,^{1,2} Robert S. Heyderman,^{2,6,a} and Neil French^{1,2,a}

Conclusions. HIV is an important risk factor for influenza-associated ILI and severe presentation in this high–HIV prevalence African setting. Targeted influenza vaccination of HIV-infected African adults should be reevaluated, and the optimal mechanism for vaccine introduction in overstretched health systems needs to be determined.

Open Forum Infectious Diseases

MAJOR ARTICLE





Risk Factors for Influenza-Associated Severe Acute Respiratory Illness Hospitalization in South Africa, 2012–2015 OFID 2017

Stefano Tempia,^{1,2,3} Sibongile Walaza,^{3,4} Jocelyn Moyes,^{3,4} Adam L. Cohen,^{1,5} Claire von Mollendorf,^{3,4} Florette K. Treurnicht,³ Marietjie Venter,^{6,7} Marthi Pretorius,^{3,7,8} Orienka Hellferscee,^{3,9} Senzo Mtshali,³ Mpho Seleka,³ Akhona Tshangela,³ Athermon Nguweneza,³ Johanna M. McAnerney,³ Nicole Wolter,^{3,9} Anne von Gottberg,^{3,9} Halima Dawood,^{10,11} Ebrahim Variava,^{12,13,14} Shabir A. Madhi,^{3,15,16} and Cheryl Cohen^{3,4}

Influenza Vaccination of Pregnant Women and Protection of Their Infants

Shabir A. Madhi, M.D., Ph.D., Clare L. Cutland, M.D., Locadiah Kuwanda, M.Sc., Adriana Weinberg, M.D., Andrea Hugo, M.D., Stephanie Jones, M.D., Peter V. Adrian, Ph.D., Nadia van Niekerk, B.Tech., Florette Treurnicht, Ph.D., Justin R. Ortiz, M.D., Marietjie Venter, Ph.D., Avy Violari, M.D.,
Kathleen M. Neuzil, M.D., Eric A.F. Simões, M.D., Keith P. Klugman, M.D., Ph.D., and Marta C. Nunes, Ph.D., for the Maternal Flu Trial (Matflu) Team* N Engl J Med 2014;371:918-31.

Influenza vaccination in HIV-infected individuals: Systematic review and assessment of quality of evidence related to vaccine efficacy, effectiveness and safety

Cornelius Remschmidt*, Ole Wichmann, Thomas Harder

Conclusion: This systematic review indicates that TIV is effective in preventing influenza infection in HIVinfected adults but not in young children. For both age-groups, only limited evidence exists for other outcomes, indicating a need for further studies.

Vaccine 2014; 32:5585-5592



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Guidelines for the vaccination of HIV-infected adolescents and adults in South Africa

• Influenza

- 1 dose yearly
- Irrespective of CD4+ cell count, HIV viral load or pregnancy status



Pneumococcal Infection

- HIV-infected individuals have a 35 to 60 fold increase risk of invasive IPD
 - Higher rates of bacteremia
 - Often at risk of **recurrent** pneumococcal infections
 - Associated with a 2-fold higher mortality rate
 - Risk elevated despite the use of ART
- Some good reasons why vaccination important in this population
- Vaccines available
 - Polysaccharide vaccine (PPV23)
 - Conjugate vaccine (PCV13)





Antiretroviral Therapy as Prevention of ... Pneumococcal Infections?





Rate of patients with CD4-T cells > 500/mm³ (n)

Rate of patients with an undectectable viral load (%)

incidence of pneumocococcal infections/100.000 patients (n)

Open Forum Infectious Diseases 2016

■ HIV-infected patients treated ≥ 6 months (n)



Incidence of IPD per 100,000 person-years of follow-up among HIV-infected patient by transmission group, Denmark, 1995 – 2012. Periods: pre-cART, 1995–1996; early cART, 1997–1999; late cART, 2000–2012.



IPD among HIV-positive individuals, 2000–2009



- 18% of adults were diagnosed with HIV & IPD simultaneously (within 1 month)
- 68% diagnosed with IPD more than 1 month after HIV diagnosis
- Incidence rates were lower for HIV-positive on ART compared with untreated
 - HIV-infected with CD4+ of 500 cells/mL³ significantly lower
 - 71 per 100 000 versus 269 per 100 000 (all HIV-positive adults)
 - This is still 7 times higher than general population (11 per 100 000 population)

AIDS 2012; 26:87-94

Persisting high prevalence of pneumococcal carriage among HIV-infected adults receiving antiretroviral therapy in Malawi: a cohort study

Ellen Heinsbroek^a, Terence Tafatatha^b, Amos Phiri^b, Bagrey Ngwira^{b,c}, Amelia C. Crampin^{b,d}, Jonathan M. Read^e and Neil French^a



Months since baseline (BL) / months since start of ART



Control of pneumococcal disease in African HIV remains a priority

AIDS 2015; 29:1837-1844

Persistent High Burden of Invasive Pneumococcal Disease in South African HIV-Infected Adults in the Era of an Antiretroviral Treatment Program

Marta C. Nunes¹, Anne von Gottberg², Linda de Gouveia², Cheryl Cohen³, Locadiah Kuwanda¹, Alan S. Karstaedt⁴, Keith P. Klugman^{2,5}, Shabir A. Madhi^{1,2}*

Conclusion: Despite a stable prevalence of HIV and the increased roll-out of HAART for treatment of AIDS patients in our setting, the burden of IPD has not decreased among HIV-infected adults. The study indicates a need for ongoing monitoring of disease and HAART program effectiveness to reduce opportunistic infections in African adults with HIV/AIDS, as well as the need to consider alternate strategies including pneumococcal conjugate vaccine immunization for the prevention of IPD in HIV-infected adults.



MAJOR ARTICLE

HIV and Influenza Virus Infections Are Associated With Increased Blood Pneumococcal Load: A Prospective, Hospital-Based Observational Study in South Africa, 2009–2011







Estimated incidence of invasive pneumococcal disease amongst HIV-infected and -uninfected persons by age category, South Africa, 2017



University of Cope John Tunivesity

GERMS-SA, unpublished data

Slide courtesy – Susan Meiring

EDITORIAL COMMENT

Pneumococcal vaccination of HIV-infected young adults is an important global priority

Francesca Chiodi



AIDS 2016, 30:1991–1993

Pneumococcal conjugate vaccine use in adults – Addressing an unmet medical need for non-bacteremic pneumococcal pneumonia

Heather L. Sings

Pfizer Inc, 500 Arcola Road, Collegeville, PA 19426, USA

 Protection of adults against pneumococcal disease- "Tale of Two Vaccines"

accine

CrossMark

- PCV13 effective against both bacteremic & non-bacteremic CAP
- Overall evidence supports sequential use of PCV13 followed by PPV23
 - should provide adults with long-term protection





Immune response to polysaccharide vaccine





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Eur J Clin Microbiol Infect Dis (2015) 34:19-31

Immune response to conjugate vaccine



Eur J Clin Microbiol Infect Dis (2015) 34:19-31



Immunogenicity: Opsonophagocytic Activity Following One and Two Doses of PCV13 and PPV23: Serotype 1



Paradiso PR. Clin Infect Dis 2012; 55: 259-64



Immunological efficacy of pneumococcal vaccine strategies in HIV-infected adults: a randomized clinical trial

C. Sadlier^{1,2}, S. O'Dea¹, K. Bennett³, J. Dunne⁴, N. Conlon⁴ & C. Bergin^{1,2}

This Study adds to evidence supporting current pneumococcal vaccination recommendations combining the conjugate and polysaccharide pneumococcal vaccines in the United States and Europe for HIV-infected individuals.



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Guidelines

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Guidelines for the vaccination of HIV-infected adolescents and adults in South Africa

• Pneumococcal

- All HIV-infected regardless of CD4+ with suppressed viral load
- Prime-boost approach
- PCV13 followed by PPV23 eight weeks later
- PCV13 alone is sufficient



Vaccine	WHO [6, 7]	UK [8]	Europe [12]] France [14]	US [9-11, 13]
Pneumococcal	Not recommended in resource-limited settings	Recommended for all patients. Use PCV-13 (one dose) regardless of HIV control. PPV recommended only for those with additional risk factors which include: •Age >65 years old •Younger adults with concurrent comorbidity (e.g., asplenia) based on national program recommendations Dosed as 1 dose of PPV-23 with PPV-23 given ≥3 months after PCV-13 No repeat doses of PPV-23 or PCV-13 are advised	Recommended for all patients. Use PCV-13 (one dose) No repeat dosing advised	Recommended for all patients. Use PCV-13 and PPV-23 Previously unvaccinated: 1 dose of PCV-13 followed by PPV-23 at ≥2 months later Previously vaccinated with PPV-23: 1 dose of PCV-13 at ≥3 years followed 2 months later with 1 dose of PPV-23	Recommended for all patients. Use PCV-13 and PPV-23 Previously unvaccinated: 1 dose of PCV-13 followed by 1 dose of PPV-23 at ≥8 weeks later (preferably when CD4 count ≥200 cells/mm ³). Repeat PPV-23 dose 5 years later Previously vaccinated with PPV-23, give PCV-13 at ≥1 year later followed by PPV-23 at 5 years later

Table 1 Summary of advisory group recommendations for inactivated vaccines with broad indications for HIV-infected adults



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Guidelines for the vaccination of HIV-infected adolescents and adults in South Africa

• Hepatitis B

- Prevalence in HIV-infected individuals ranges 0.4%- 23%
- Administration of vaccine shown to be safe
- Four-double-dose regimen
- Best responses in those with undetectable VL & CD4+ >200 cells/ μ L



Diphtheria Outbreaks in South Africa

• 15 cases occurred in eThekwini, KZN province 2015



- most cases occurred in people who were not vaccinated or partially vaccinated
- 2 confirmed cases 2016- KZN
- Diphtheria kills 1, infects 3 in Western Cape August 2017
 - 4 lab-confirmed cases & 1 asymptomatic carrier
- 3 cases (aged 20,11 & 10 yrs), KZN province since March 2018
 - 2 of the cases have demised
- Catch-up campaign



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Guidelines for the vaccination of HIV-infected adolescents and adults in South Africa



• Tetanus-diphtheria (Td)

- Vaccinated irrespective of CD4+ count
- Booster vaccine every 10 years (until more data available)



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Guidelines for the vaccination of HIV-infected adolescents and adults in South Africa

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- Human papilloma virus
 - In SA HPV- preteen girls 9-13 yrs- regardless of HIV status
 - Recommended for all HIV-infected adult men (MSM) & women,
 - Can be given regardless of CD4+ count, ART use or viral load





Protecting young girls, future women of South Africa against cervical cance

#AOSIS



Vaccines that are recommended but either local data lacking or warranted in select cases





The Pertussis Problem

Stanley A. Plotkin

Department of Pediatrics, University of Pennsylvania, Philadelphia

Pertussis is resurgent, and many cases are occurring in vaccinated children and adolescents. In countries using acellular vaccines, waning immunity is at least part of the problem. This article discusses possible improvements in those vaccines.

Clinical Infectious Diseases January 2014



Re-emergence of pertussis: what are the solutions?

Expert Rev. Vaccines 11(11), 1331–1346 (2012)



Expert Rev Vaccines 2012: 11(11): 1331-1346



SUPPLEMENT ARTICLE



Bordetella pertussis Infection in South African HIV-Infected and HIV-Uninfected Mother–Infant Dyads: A Longitudinal Cohort Study

Marta C. Nunes,^{1,2} Sarah Downs,^{1,2} Stephanie Jones,^{1,2} Nadia van Niekerk,^{1,2} Clare L. Cutland,^{1,2} and Shabir A. Madhi^{1,2,3}

Conclusions. Bordetella pertussis identification was common among young infants with respiratory illness, most of whom were too young to be fully protected through direct vaccination. Vaccination of pregnant women might be a valuable strategy in a setting such us ours to prevent *B. pertussis*-associated illness in women and their young infants. **Clinical Infectious Diseases**[®] **2016;63(S4):S174–80**

Review

Pertussis in Africa: Findings and recommendations of the Global Pertussis Initiative (GPI)



Rudzani Muloiwa^a, Nicole Wolter^b, Ezekiel Mupere^c, Tina Tan^d, A.J. Chitkara^e, Kevin D. Forsyth^f, Carl-Heinz Wirsing von König^g, Gregory Hussey^{h,*}



Vaccine 36 (2018) 2385-2393

Risk of pertussis with HIV infection and exposure





Slide courtesy of Dr Muloiwa

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Guidelines for the vaccination of HIV-infected adolescents and adults in South Africa



- Pertussis
 - Emerging epidemiological data on burden of pertussis in HIV endemic countries
 - Only pregnant women regardless of CD4+ count or viral load
 - Recommend acellular vaccine



#AOS

Guidelines for the vaccination of HIV-infected adolescents and adults in South Africa

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Guidelines

- Meningococcal
 - Should be considered
 - 2 dose schedule (12 weeks apart)
 - Booster every 5 years



• Hepatitis A

- Recommended in high risk groups
 - MSM, IV drug users, travel, chronic liver disease
- Ideally vaccinate those with CD4+ count >200

Vaccines- no recommendation is given



Systematic Review

Hussey et al. BMC Infectious Diseases (2017) 17:717 DOI 10.1186/s12879-017-2815-9



BMC Infectious Diseases

-Developed search query

-Applied the search query in 9 databases: (PubMed, Web of Science, CENTRAL, Scopus, Africa-Wide, PDQ-Evidence, Wholis, Embase and CINAHL.)

-Screened studies for eligibility

-Data extraction and analysis

Included studies come from 13 countries

South Africa

Mortality and HIV infection

Mortality - Two studies reported mortality:

- Poulsen et al. 2005 reported a fatality rate of 0.13% varicella
- Siddiq et al. 2014 had a 30.8% mortality CNS infection

9 studies had data on HIV

Rubaihayo - Incidence was 1340 cases per 100 000 population pre-ART - 330 cases per 100 000 population after ART became available

Compston – Healthy HIV neg seroprevalence 45% - Symptomatic HIV pos seroprevalence 57% **OR=1.6 (95% CI, 1.1-2.6)**



Evidence of HIV impact on both seroprevalence & incidence

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Varicella

- Limited data on vaccination in adolescents or adults
- In Africa- lack of epidemiologic & socio-economic data



Herpes Zoster Vaccine

- HIV-infected persons at risk for VZV reactivation
 - Estimated incidence of 3.2 cases per 100 person-years
- Limited data on use of vaccine in HIV
- May be considered in HIV
 - History of varicella or zoster or
 - VZV positive without history of varicella vaccination
 - ≥60 years CD4 count ≥200 cells/mm³



Safety and Immunogenicity of an Adjuvanted Herpes Zoster Subunit Candidate Vaccine in HIV-Infected Adults: A Phase 1/2a Randomized, Placebo-Controlled Study The Journal of Infectious Diseases®

SHINGRIX (ZOSTER VACCINE RECOMBINANT, ADJUVANTED)

2015:211:1279-87

ZOSTAVAX[®] Zoster Vaccine Live

Zostavax[®] is Generally Safe and Immunogenic in HIV-Infected Adults with CD4 Counts ≥200 Cells/µL Virologically Suppressed on ART: Results of a Phase 2, Randomized, Placebo-Controlled Trial

CA Benson, L Hua, JW Anderson, JH Jiang, DR Bozzolo, K Bergstrom, PW Annunziato, SW Read, R Pollard, D Rusin, J Lennox

for the ACTG A5247 Team

Abstract #96

• Benefits of zoster vaccine

- Reduce incidence of shingles
- Reduce severity of disease
- Reduce occurrence of post-herpetic neuralgia
- Concerns that remain
 - Lack of data on ideal dosing schedule
 - Safety & efficacy



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Guidelines for the vaccination of HIV-infected adolescents and adults in South Africa



- Zoster
 - No data in Africa to support use of this vaccine



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Guidelines



Guidelines for the vaccination of HIV-infected adolescents and adults in South Africa



- Measles, mumps & rubella (MMR)
 - Contra-indicated with CD4+ counts <200 cells.
- Polio
 - Exceedingly rare in SA
 - Live vaccine contra-indicated in HIV
 - Inactivated recommended for those infected with HIV

Vaccine	Indication	Safety CD4+ count	Doses for unvaccinated adults	Booster	Comments
MMR vaccine	Measles, mumps or rubella seronegative	≽ 200 cells/mL	2 doses (28 days apart)	Protection likely lifelong	Mainly indicated in measles seronegative HIV-infected women of childbearing age
					Pregnancy should be avoided for 1 month after vaccination
Influenza	R	Any	1 dose	Yearly	-
Pneumococcal	R	Any	1 dose	-	Given with PPV23 but must be given fire
Conjugated (PCV13)					
Pneumococcal	RS	≥ 200 cells/mL	1 dose	5–10 years	Given with PCV13 but given 8 weeks after PCV13
Polysaccharide (PPV23)					Can be given to patients with CD4 coun < 200 cells/mL if on ART and VL suppressed
					Maximum 2 booster doses, 1 booster dose in patients > 65 years. Poor response if CD4+ cell count < 200 cells/ mL and VL not suppressed
Hepatitis B	R	Any	4 doses (40 μg) or 3 doses (20 μg)	Not clear awaiting evidence	-
Hepatitis A	RS – travel, MSM, liver disease	≥ 200 cells/mL	2 doses	10 years	-
Meningococcal	RS	Any	2 doses	5 years	-
Fetanus-diphtheria (Td)	R	Any	-	10 years	-
Pertussis-acellular	R	Any	1 dose	10 years	Given in pregnancy combined with tetanus-diphtheria (DTPa/dTpa)
Poliomyelitis-inactivated	RS	➢ 200 cells/mL	3 doses	none	-
Human papilloma virus (HPV)	RS – females, MSM	Any	2 doses	none	-
Varicella	NR	-	-	-	May be considered if CD4+ count > 400 cells/mL
Zoster	RS	≥ 200 cells/mL	1 dose	none	Only use if CD4+ count ≥ 200 cells/µL

S Afr J HIV Med 2018; 19(1)

Conclusion

- Are opportunities to expand immunization for HIV-infected Adolescents & Adults
- Vaccinate during stable disease
- Communicate with patients about the importance of vaccination and the availability of vaccines
- Vaccination is the most cost effective intervention of 21st century



THANK YOU!

