



Vaccines

GMHC



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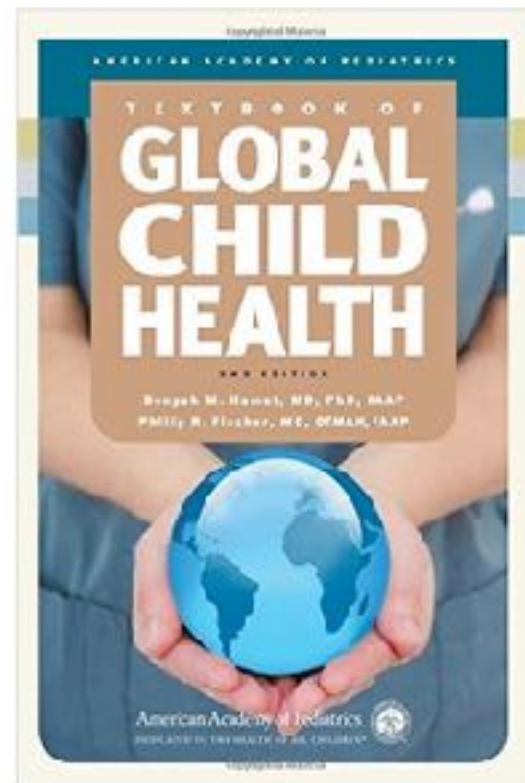
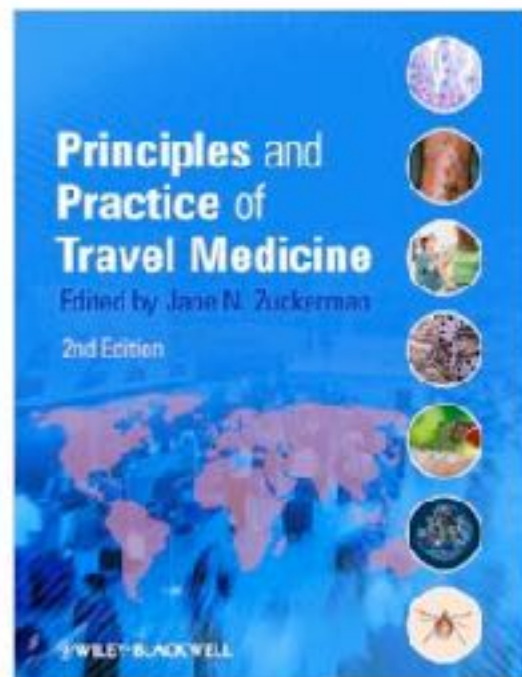
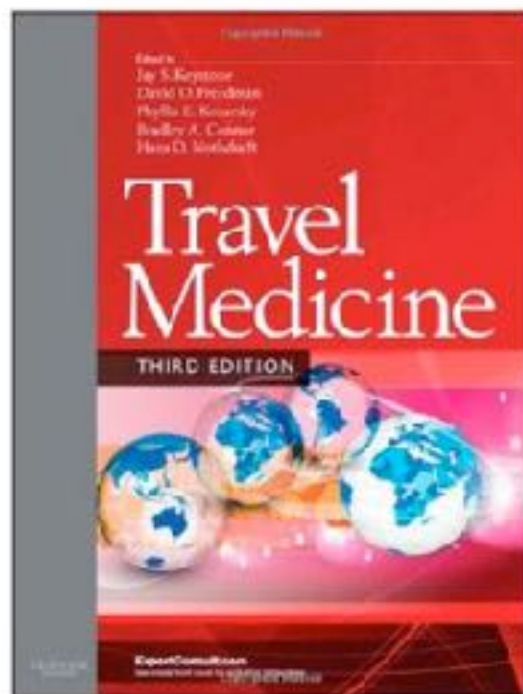
Vaccines GMHC

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Disclosures

Financial – vaccine-related writing:

free copies and small royalties for textbook writing

payment for commentaries, *Infectious Disease Alert*

Personal “biases:”

I’ve been sick with typhoid (2 weeks) and hepatitis A (10 months) before good vaccines were developed.

I’ve had dozens of patients die from vaccine-preventable infections.

Another Disclosure

Some “off label” vaccine use will be mentioned.



Approach

Knowledge is power – preparedness by information

Humility breeds caution – accept help from a team

We're in this together – so, interact “freely”

Both “forest” and “trees” – big picture and details

Objectives

By participating in this session, learners will:

1. be able to explain vaccines in the context of an overall approach to infection prevention
2. know how to find good up-to-date information about vaccination
3. understand new data about vaccination for several important illnesses



Vaccines, Germs, and Immunity



Germs

Inside and out, we're covered with germs.

Most don't bother us,
many help us,
some make us sick.



Germs - Suppression

Sanitize the environment (kill germs)

Make the environment germ-unfriendly (such as by decreasing mosquito populations)

Germs – Reducing Transmission

Breathing

Swallowing

Touching

Sharing (intimately)



Germs – Reducing Transmission

Breathing	masks (help in and out)
Swallowing	sanitize hands cook food treat water
Touching	wash, gloves
Sharing (intimately)	monogamy

But, germs are sneaky!



Build “Natural” Immunity

Lifestyle

good nutrition

regular, adequate sleep

enough regular exercise

Memory

body remembers first infection

> prevent future infections/illnesses
by same germ

Passive Immunization

We accept antibodies (“anti-germs”) to prevent and/or treat infection.

Examples:

general antibodies (immunoglobulin)

hepatitis A

measles

Passive Immunization

We accept antibodies (“anti-germs”) to prevent and/or treat infection.

Examples:

- general antibodies (immunoglobulin)

- germ-specific antibodies

 - hepatitis B

 - rabies

 - Brucella

 - RSV

Passive Immunization

We accept antibodies (“anti-germs”) to prevent and/or treat infection.

Examples:

general antibodies (immunoglobulin)

germ-specific antibodies

monoclonal antibodies

Ebola

COVID-19

Active Immunization

We accept dead or inactive germs or pieces of germs that prompt us to make our own antibodies.

Examples:

chicken pox

whooping cough

influenza

typhoid fever

“Doubly Active” Immunization

We accept cellular messenger that tells us to make a specific germ protein, then we make it, and that prompts us to then make antibodies against that protein.

Examples:

via mRNA – some COVID vaccines

via vector – COVID and Ebola vaccines

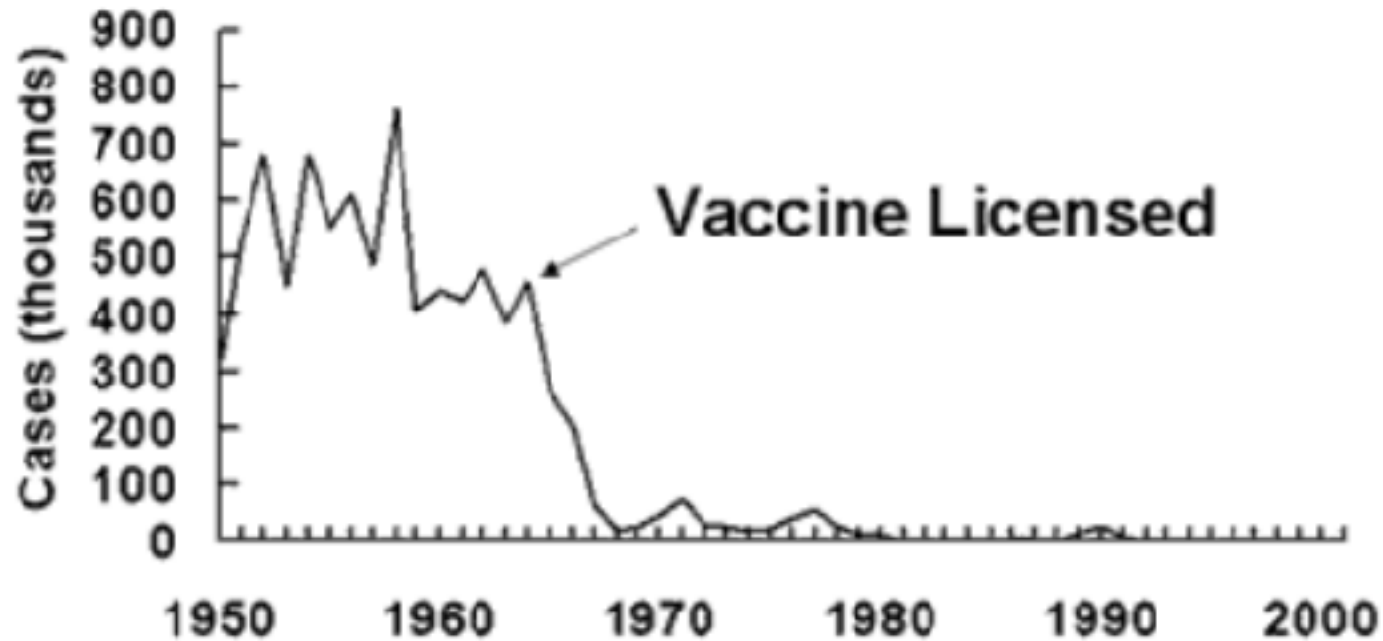
What to Do?

See vaccination as a health issue.

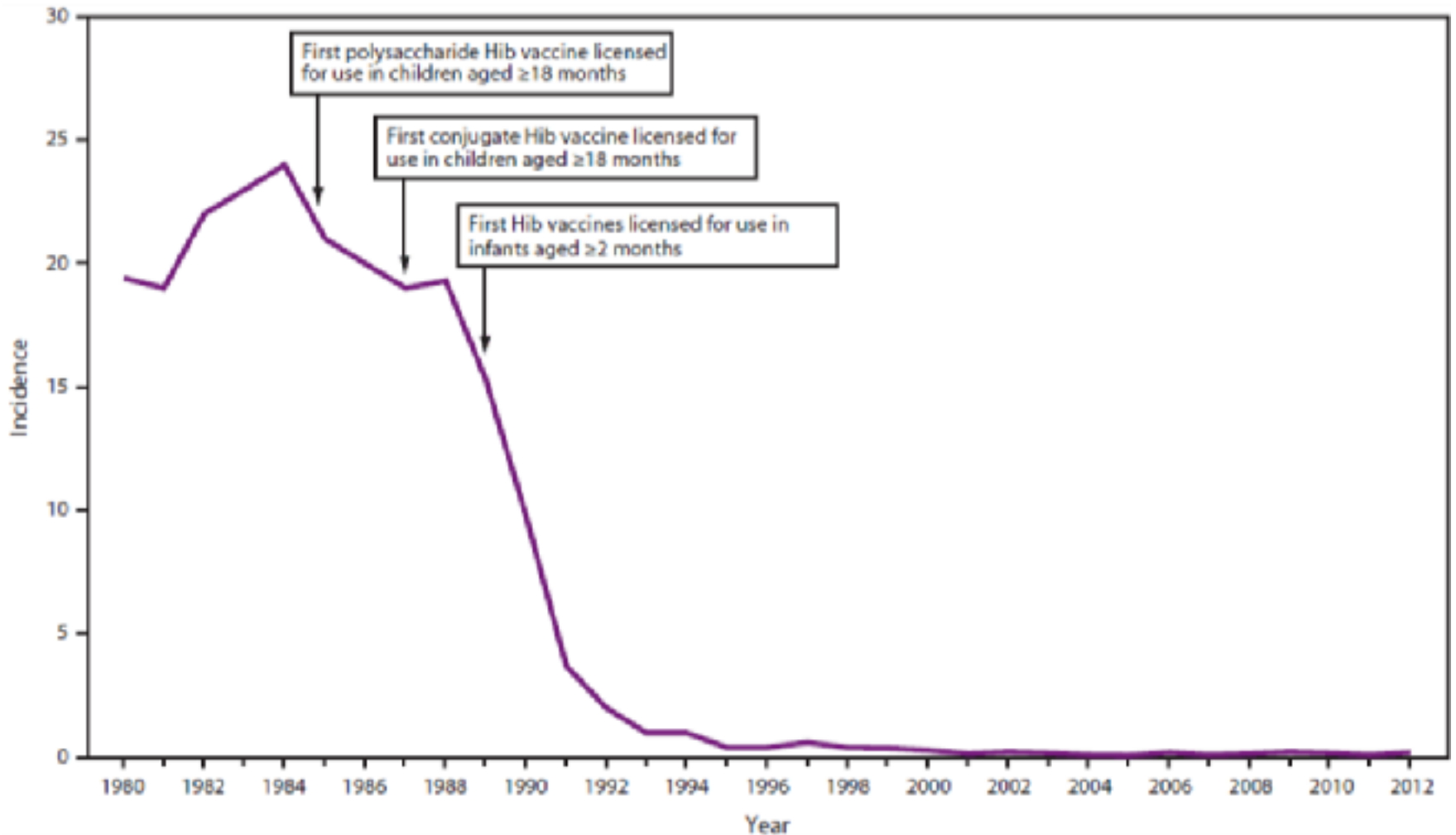
Understand that vaccines help.

Understand That Vaccines Help

Measles—United States, 1950-2001

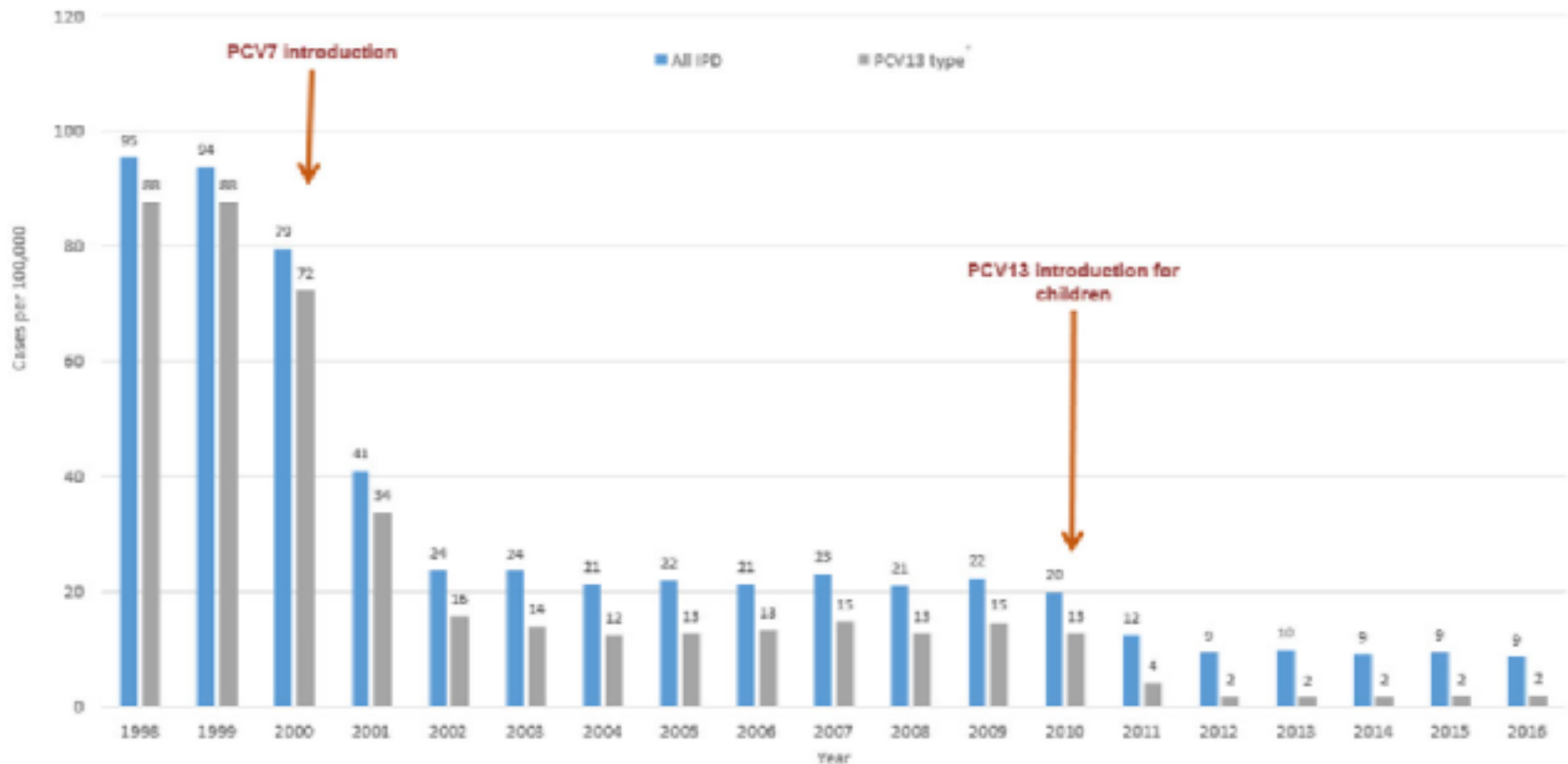


Understand That Vaccines Help



Understand That Vaccines Help

Trends in invasive pneumococcal disease among children aged <5 years old, 1998–2016



*PCV13 serotype: 1, 3, 4, 5, 6A, 6B, 7F, 9V, 14, 18C, 19A, 19F, and 23F

What to Do?

See vaccination as a health issue.

Understand that vaccines help.

Realize vaccine needs vary:

geographically (examples yellow fever, JEV)

with age (example *Haemophilus influenza*)

with medical situation (example TB)

Acknowledge that vaccines aren't perfect.

Realize That Vaccines Aren't Perfect

Protection rates vary

influenza	~ 50-70%
typhoid	~ 70%
measles	~ 99%
hepatitis A	~ 100%
COVID-19	~ 90%

Side effect rates vary

injectable, pain	~100%
tetanus, sore	~10%
yellow fever	death in ~ 1 of 70,000

Practically...

Stay up-to-date!

with US recommendations (CDC, WHO)

www.cdc.gov/vaccines/schedules/index.html



(Part of) CDC Vaccine Schedule

Birth to 15 Months

Vaccine	Birth	1 mo	2 mos	4 mos	6 mos	9 mos	12 mos	15 mos
Hepatitis B ⓘ (HepB)	1 st dose	–2 nd dose–			←3 rd dose→			
Rotavirus ⓘ (RV) RV1 (2-dose series); RV5 (3-dose series)			1 st dose	2 nd dose	See notes			
Diphtheria, tetanus, & acellular pertussis ⓘ (DTaP: <7 yrs)			1 st dose	2 nd dose	3 rd dose			–4 th dose–
Haemophilus influenzae type b ⓘ (Hib)			1 st dose	2 nd dose	See notes		–3 rd or 4 th dose, See notes –	
Pneumococcal conjugate ⓘ (PCV13)			1 st dose	2 nd dose	3 rd dose		–4 th dose–	
Inactivated poliovirus ⓘ (IPV: <18 yrs)			1 st dose	2 nd dose	←3 rd dose→			



WHO Childhood Vaccine Schedule

[updated: September 2020]

Table 1: Summary of WHO Position Papers - Recommendations for Routine Immunization

Antigen		Children (see Table 2 for details)	Adolescents	Adults	Considerations (see footnotes for details)
Recommendations for all immunization programmes					
BCG ¹		1 dose			Birth dose and HIV; Universal vs selective vaccination; Co-administration; Vaccination of older age groups; Pregnancy
Hepatitis B ²		3-4 doses (see footnote for schedule options)	3 doses (for high-risk groups if not previously immunized) (see footnote)		Birth dose; Prematurity and low birth weight; Co-administration and combination vaccine; Definition high risk
Polio ³		3-4 doses (at least one dose of IPV) with DTPCV			LOPV/ birth dose; Type of vaccine; Transmission and importation risk criteria
DTP-containing vaccine (DTPCV) ⁴		3 doses; 2 boosters 12-23 months (DTPCV) and 4-7 years (TbOIT containing vaccine, see footnote)	1 booster 9-15 yrs (1d)		Delayed/interrupted schedule; Combination vaccine; Maternal immunization
Haemophilus influenzae type b ⁵	Option 1	3 doses, with DTPCV			Single dose if > 12 months of age; Not recommended for children > 5 yrs old; Delayed/interrupted schedule; Co-administration and combination vaccine
	Option 2	2 or 3 doses, with booster of least 6 months after last dose			
Pneumococcal (Conjugate) ⁶	Option 1	3 primary doses (3p+0) with DTPCV			Schedule options (3p+0 vs 2p+1); Vaccine options; HIV+ and preterm neonate booster
	Option 2	2 primary doses plus booster dose at 9-18 months of age (2p+1) with DTPCV			
Rotavirus ⁷		2-3 doses depending on product, with DTPCV			Vaccine options; Not recommended if > 24 months old
Measles ⁸		2 doses			Combination vaccine; HIV early vaccination; Pregnancy
Rubella ⁹		1 dose (see footnote)	1 dose (adolescent girls and women of child bearing age if not previously vaccinated); see footnote)		Achieve and sustain 80% coverage; Combination vaccine and Co-administration; Pregnancy
HPV ¹⁰			2 doses (Females)		Target 9-14 year old girls; Multi-age cohort vaccination; Pregnancy; Older age groups > 15 years 3 doses; HIV and immunocompromised



Practically...

Stay up-to-date!

with US recommendations (CDC, WHO)

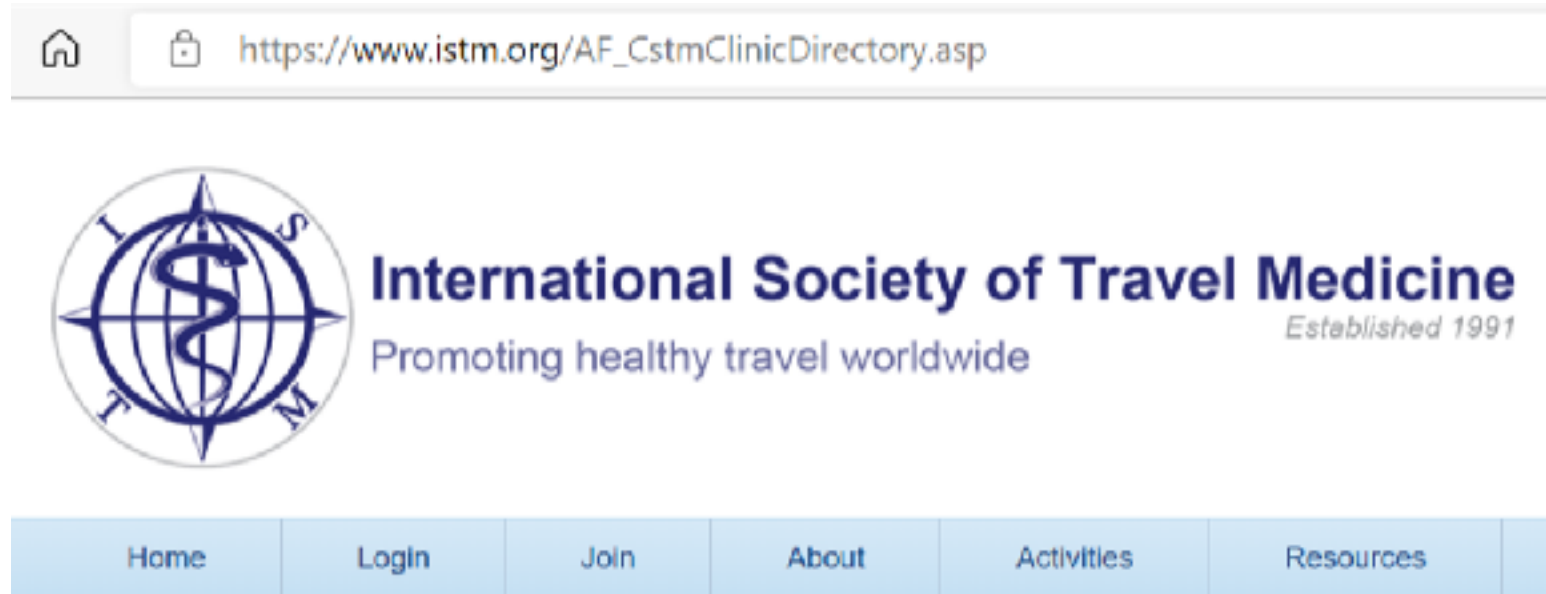
www.cdc.gov/vaccines/schedules/index.html


with travel-related recommendations


www.istm.org/AF_CstmClinicDirectory.asp

Practically... Stay up-to-date!

with travel-related recommendations



Home  https://www.istm.org/AF_CstmClinicDirectory.asp



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Practically...
Stay up-to-date!

with US recommendations (CDC, AAP)

with travel-related recommendations

with shots



A Few Recent Vaccine Updates



Malaria Vaccine (plus)



ORIGINAL ARTICLE

Seasonal Malaria Vaccination with or without Seasonal Malaria Chemoprevention

D. Chandramohan, I. Zongo, I. Sagara, M. Cairns, R.-S. Yerbanga, M. Diarra, F. Nikiéma, A. Tapily, F. Sompougou, D. Issiaka, C. Zoungrana, K. Sanogo, A. Haro, M. Kaya, A.-A. Sienou, S. Traore, A. Mahamar, I. Thera, K. Diarra, A. Dolo, I. Kuepfer, P. Snell, P. Milligan, C. Ockenhouse, O. Ofori-Anyinam, H. Tinto, A. Djimde, J.-B. Ouédraogo, A. Dicko, and B. Greenwood

September 2021



Impregnated Bednets for All Vaccine for Some Sulfadoxine-Pyrimethamine and Amodiaquine for Some

Variable	Person-yr at Risk	Events <i>no.</i>	Incidence (95% CI) <i>no. of events/1000 person-yr at risk</i>	Protective Efficacy, Vaccine Alone or Combination vs. Chemoprevention (95% CI)	Protective Efficacy, Combination vs. Vaccine Alone (95% CI)
Burkina Faso and Mali					
Chemoprevention alone	5449.9	1661	304.8 (290.5 to 319.8)	Reference	
Vaccine alone	5535.7	1540	278.2 (264.6 to 292.4)	7.9 (-1.0 to 16.0)	Reference
Combination	5508.0	624	113.3 (104.7 to 122.5)	62.8 (58.4 to 66.8)	59.6 (54.7 to 64.0)



CONCLUSIONS

Administration of RTS,S/AS01_E was noninferior to chemoprevention in preventing uncomplicated malaria. The combination of these interventions resulted in a substantially lower incidence of uncomplicated malaria, severe malaria, and death from malaria than either intervention alone. (Funded by the Joint Global Health Trials



COVID Vaccines

Whichever vaccine you can get is the “best” one.

Pay attention to ongoing research.



ORIGINAL ARTICLE

Evaluation of the BNT162b2 Covid-19 Vaccine in Children 5 to 11 Years of Age

E.B. Walter, K.R. Talaat, C. Sabharwal, A. Gurtman, S. Lockhart, G.C. Paulsen, E.D. Barnett, F.M. Muñoz, Y. Maldonado, B.A. Pahud, J.B. Domachowske, E.A.F. Simões, U.N. Sarwar, N. Kitchin, L. Cunliffe, P. Rojo, E. Kuchar, M. Rämets, I. Munjal, J.L. Perez, R.W. Frencck, Jr., E. Lagkadinou, K.A. Swanson, H. Ma, X. Xu, K. Koury, S. Mather, T.J. Belanger, D. Cooper, Ö. Türeci, P.R. Dormitzer, U. Şahin, K.U. Jansen, and W.C. Gruber, for the C4591007 Clinical Trial Group*

CONCLUSIONS

A Covid-19 vaccination regimen consisting of two 10- μ g doses of BNT162b2 administered 21 days apart was found to be safe, immunogenic, and efficacious in children 5 to 11 years of age. (Funded by BioNTech and Pfizer; ClinicalTrials.gov number, NCT04816643.)

Systematic review of the safety, immunogenicity, and effectiveness of COVID-19 vaccines in pregnant and lactating individuals and their infants

Winnie Fu ¹, Brintha Sivajohan ², Elisabeth McClymont ^{3 4}, Arianne Albert ⁵, Chelsea Elwood ³, Gina Ogilvie ^{3 6 7}, Deborah Money ^{3 5}

Affiliations [+ expand](#)

PMID: 34735722 DOI: [10.1002/ijgo.14008](#)

Systematic Review of 23 Studies

Conclusion: COVID-19 vaccination in pregnant and lactating individuals is immunogenic, does not cause significant vaccine-related adverse events or obstetrical and neonatal outcomes, and is effective in preventing COVID-19 disease.

Dengue Vaccines

Cell Host & Microbe

 CellPress

Review

Dengue Vaccines: The Promise and Pitfalls of Antibody-Mediated Protection

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<https://doi.org/10.1016/j.chom.2020.12.011>

More progress still needed!



Questions & Discussion

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