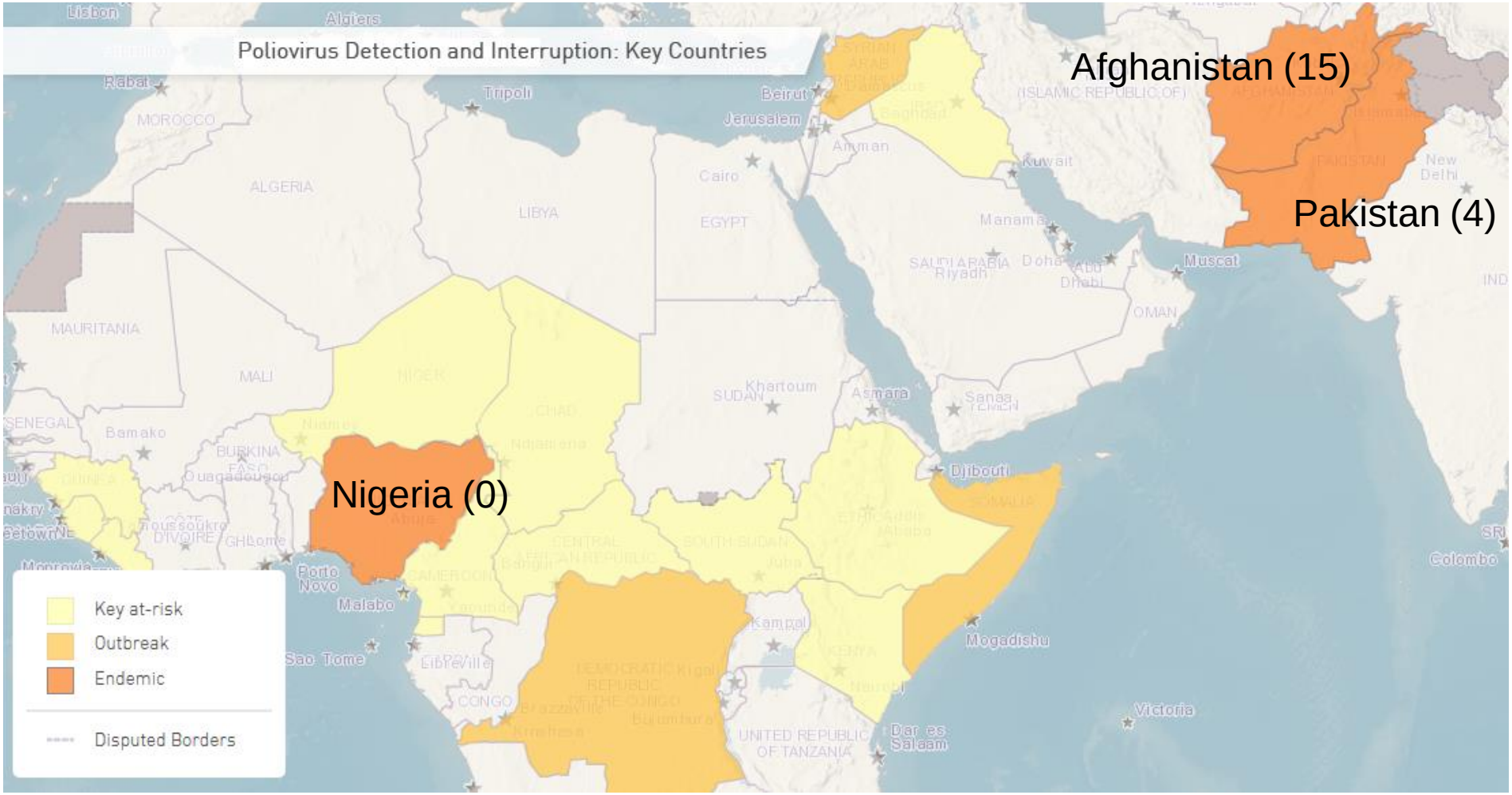
Remaining Challenges for the Polio Eradication Endgame

James Gaensbauer, MD, MScPH
Center for Global Health, Colorado School of Public Health
Children's Hospital Colorado
Denver Health Hospital Authority

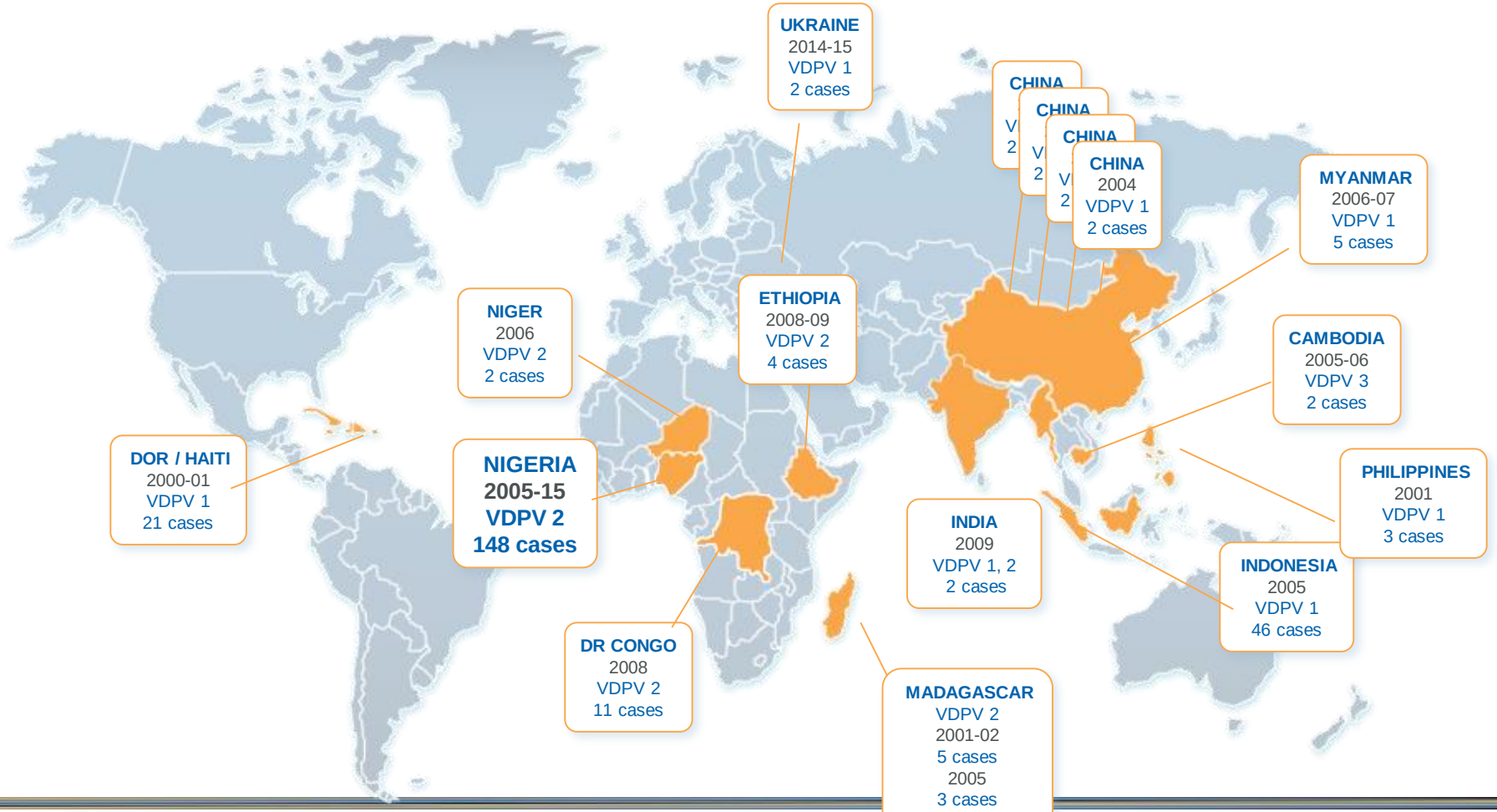
Global Achievements in the Conquest of Polio


Poliovirus Detection and Interruption: Key Countries
Afghanistan (15)
Pakistan (4)
Nigeria (0)
Key at-risk
Outbreak
Endemic
Disputed Borders

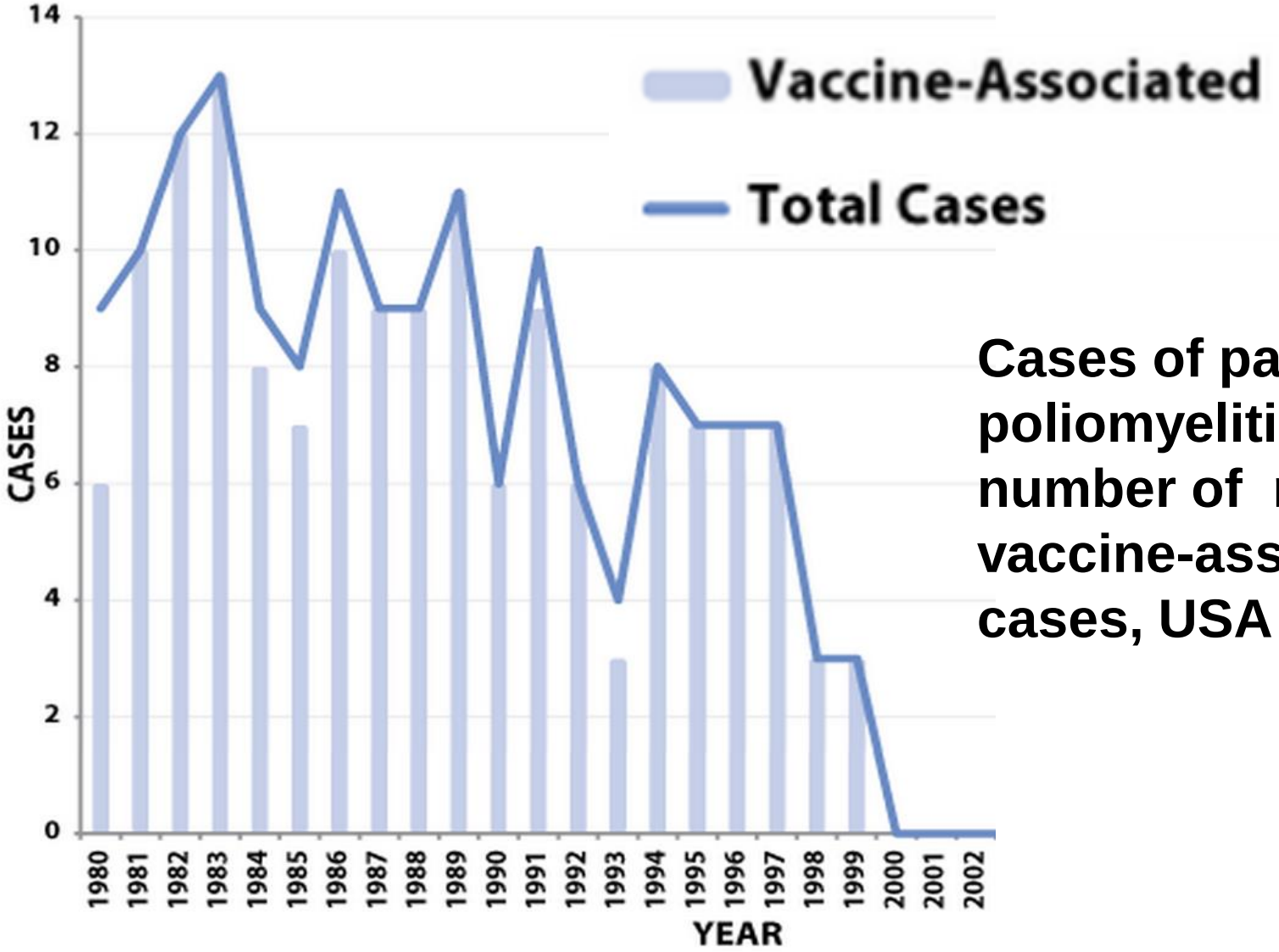
Colorado School of
PUBLIC HEALTH

Source: UNICEF, 2018

Outbreaks of Vaccine Derived Polioviruses (cVDPV), 2000-2015



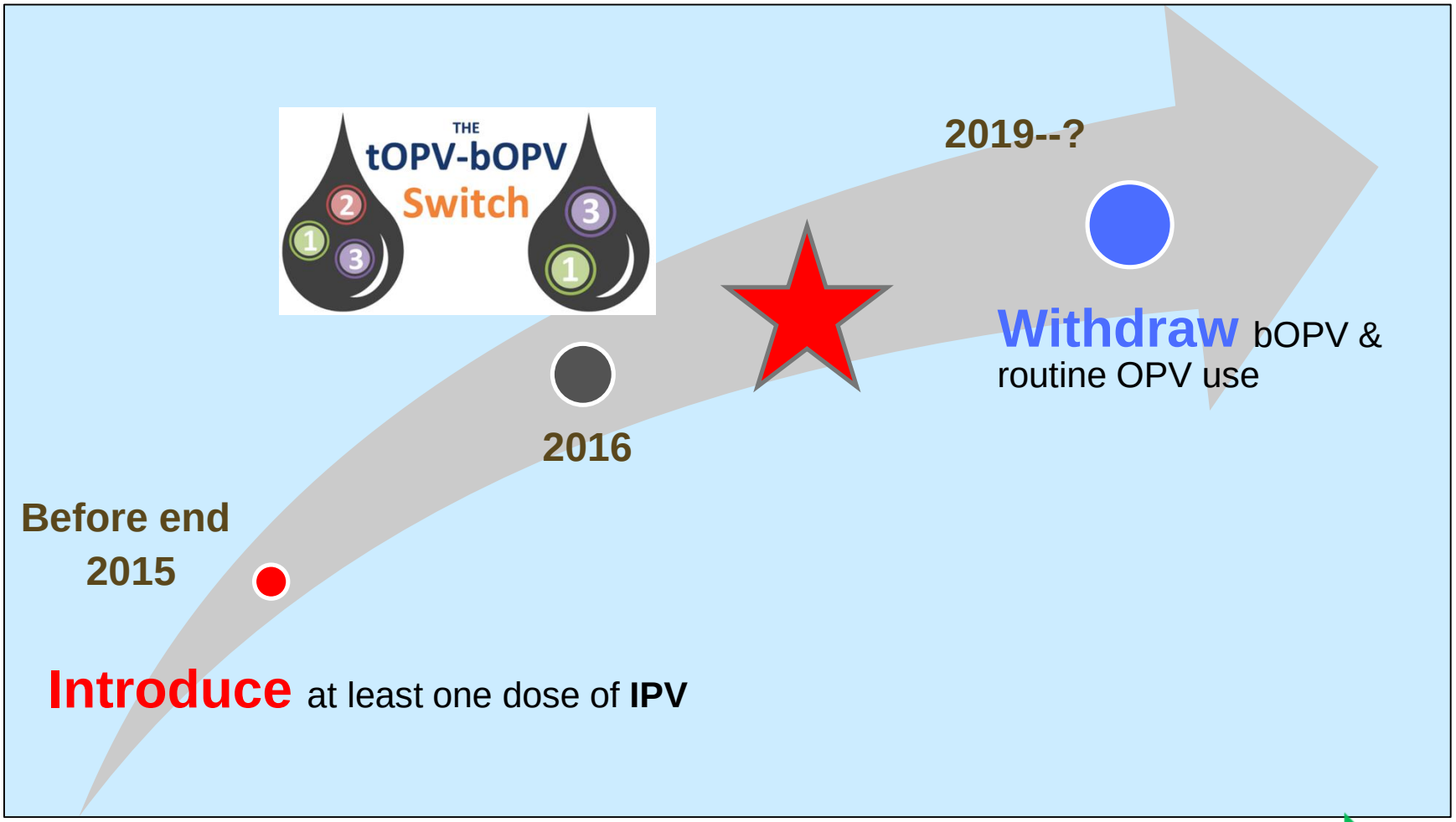
Colorado School of
PUBLIC HEALTH



Cases of paralytic poliomyelitis and number of reported vaccine-associated cases, USA 1980-2002

Source: Centers for Disease Control and Prevention, 2015

Polio Eradication Endgame Strategy: Withdrawal of OPV



Ongoing STRENGTHENING of routine immunization services

Colorado School of
PUBLIC HEALTH

Adapted from: WHO, 2018

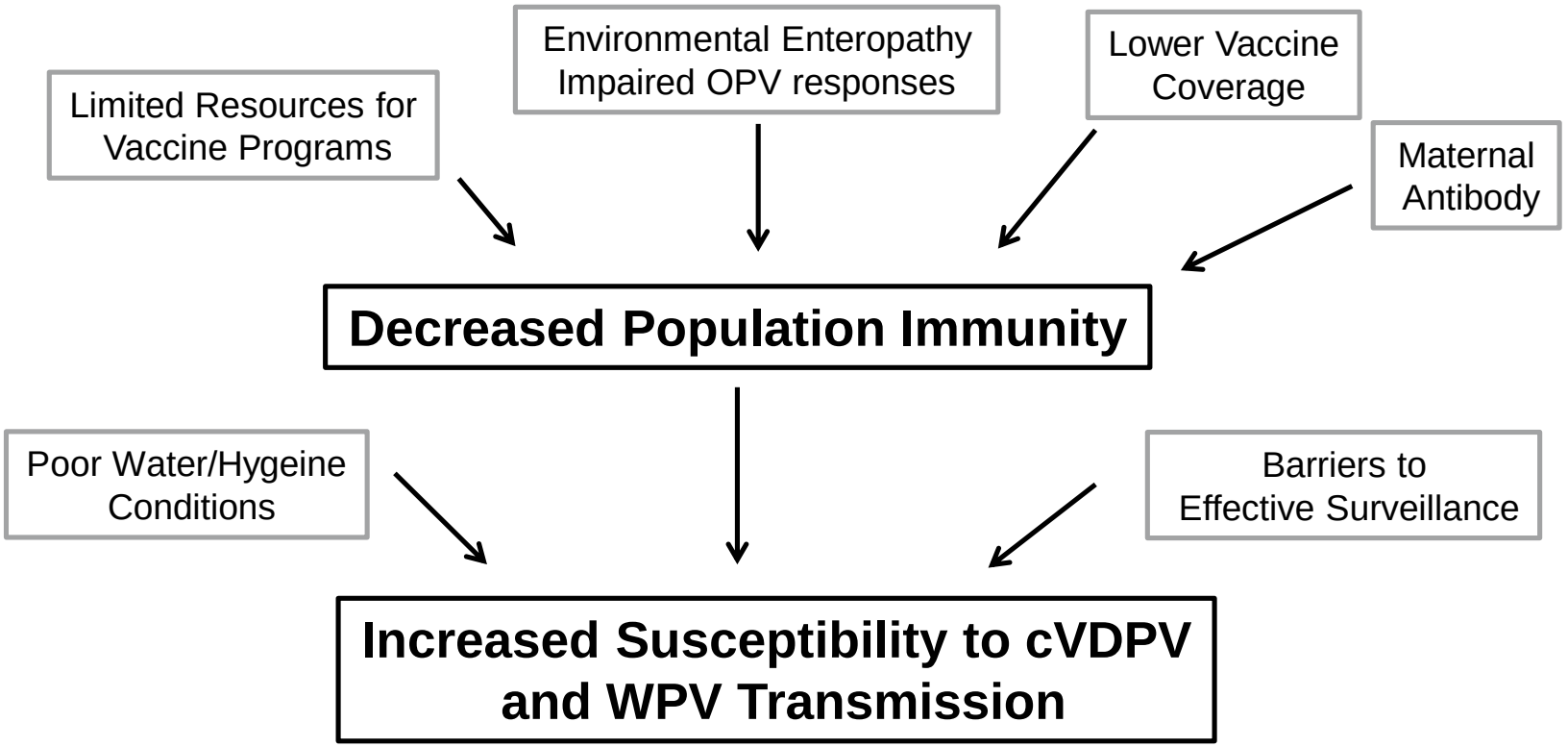
Critical Vaccine-Related Questions for the Eradication Endgame:

- Optimal use of IPV in high-transmission countries, following tOPV-bOPV switch
- Optimal use of IPV in low-transmission countries
- Mitigating barriers to IPV supply

Critical Vaccine-Related Questions for the Eradication Endgame:

- **Optimal use of IPV in high-transmission countries, following tOPV-bOPV switch**
- Optimal use of IPV in low-transmission countries
- Mitigating barriers to IPV supply

Factors Affecting Polio Vaccine Policy: High Transmission Countries



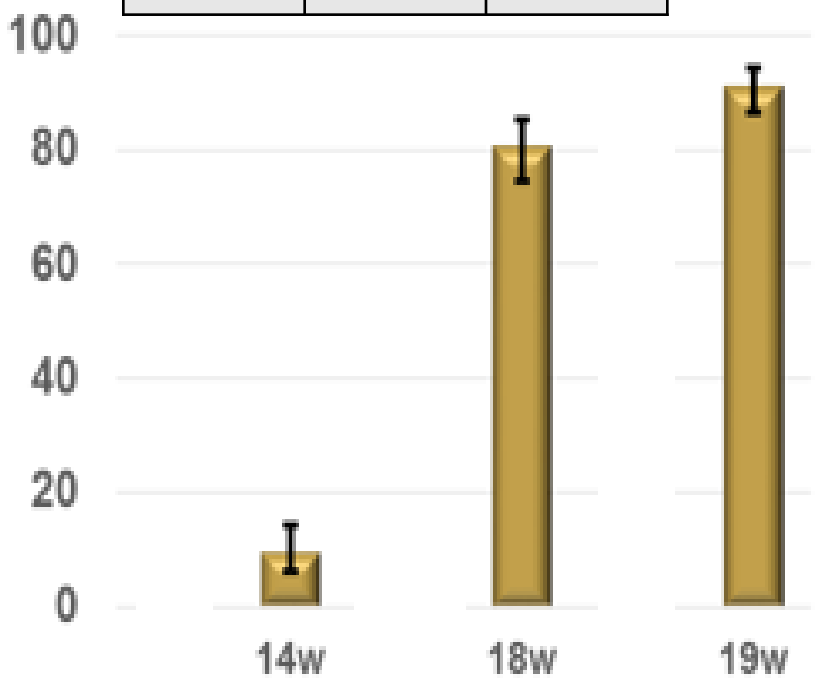
Emphasis on:

- **Affordability**
- **Alignment with EPI**
- **Mucosal Immunity**

bOPV	bOPV	bOPV
6	10	14
		IPV

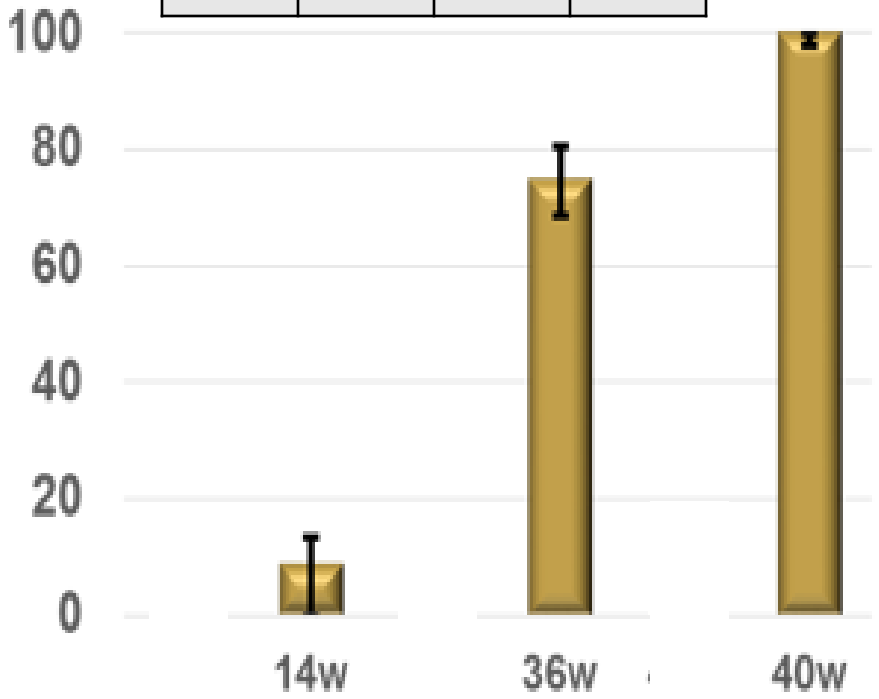
% Type 2 Seroconversion with bOPV-IPV Mixed Schedules, Latin American Infants

bOPV	bOPV	bOPV
6	10	14
		IPV



1-dose IPV: 80% Seroconversion

bOPV	bOPV	bOPV	
6	10	14	36
		IPV	IPV



2-dose IPV: 100% Seroconversion

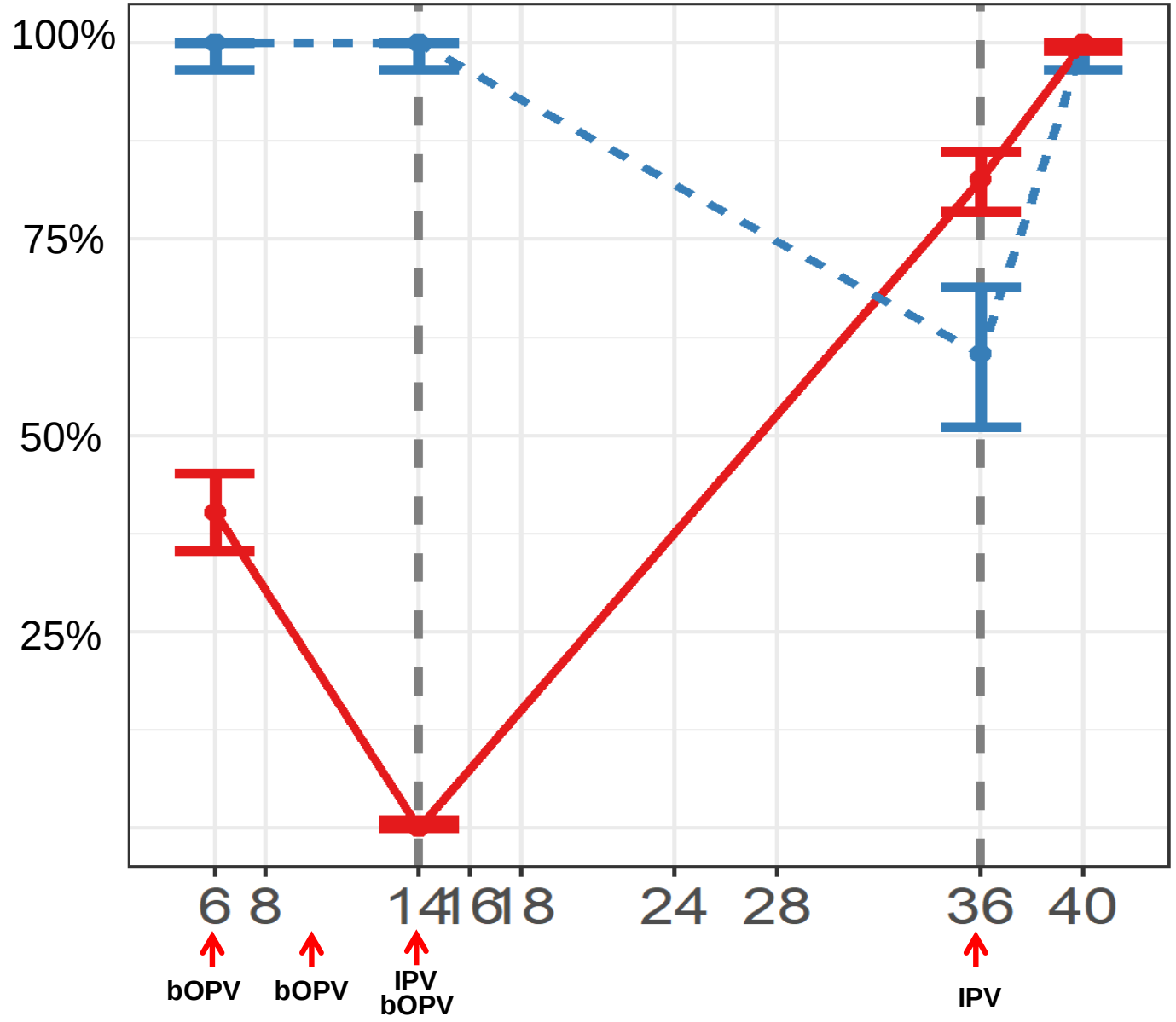
Colorado School of PUBLIC HEALTH

Asturias et al., *Lancet* 2016.

22 wk	
Type 1	
Seroconversion	
Proportion	131/139
Percentage (95% CI)	94 (90–98)
Titer,[a] median (95% CI)	≥1448 (≥1448 to ≥1448)
Type 2	
Seroconversion	
Proportion	74/139
Percentage (95% CI)	53 (44–61)
Titer,[a] median (95% CI)	32 (28–57)
Type 3	
Seroconversion	
Proportion	136/139
Percentage (95% CI)	98 (95–100)
Titer,[a] median (95% CI)	1261 (910 to ≥1448)

bOPV	bOPV	bOPV
6	10	14
		IPV

Source: Saleem et al. *JID* 2017



Seroprotection rates according to pre-IPV serostatus and vaccination schedule among Latin American Infants

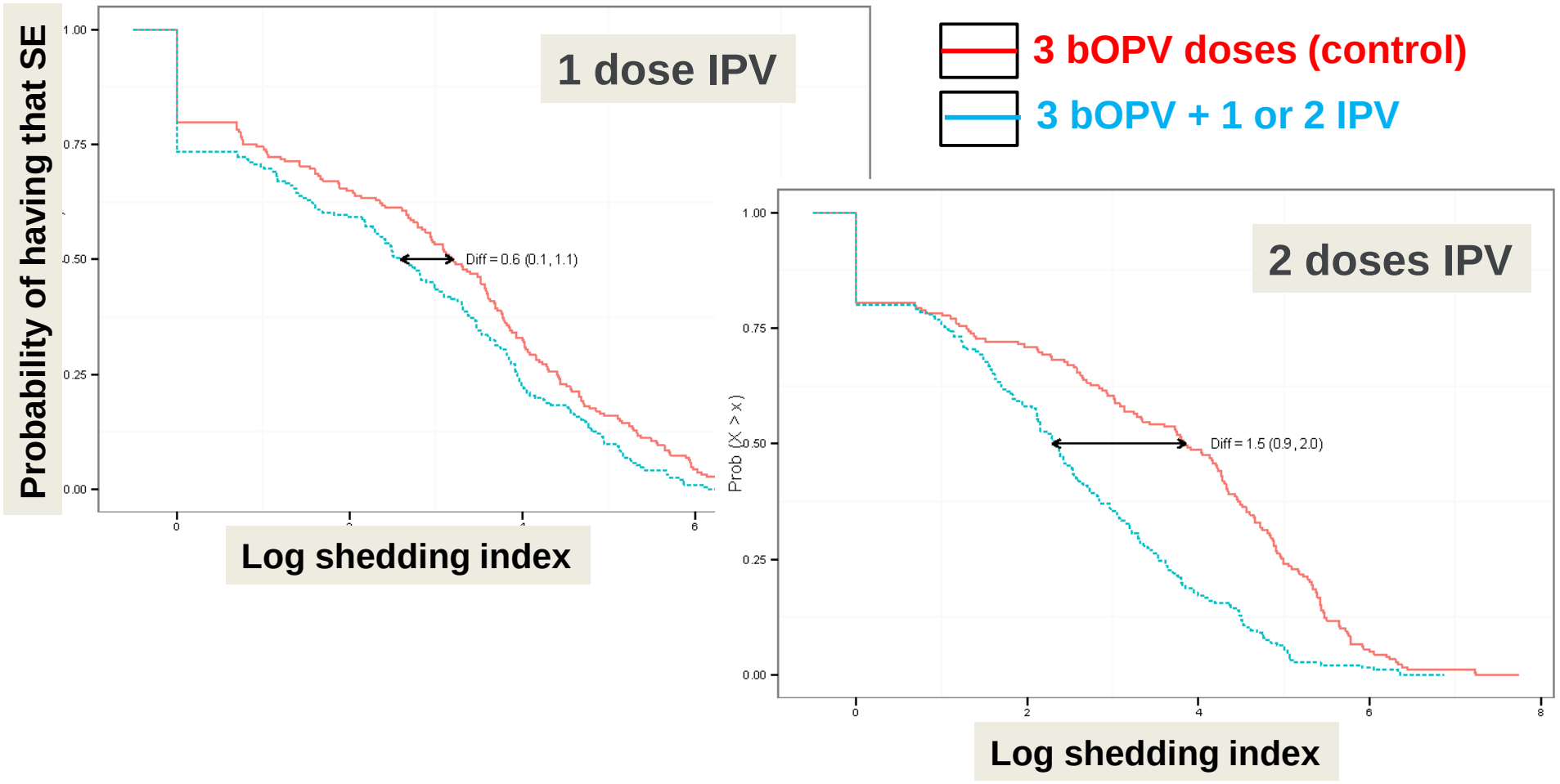
Pre-IPV seropositive:
n=111

Pre-IPV seronegative:
n=370

Colorado School of PUBLIC HEALTH

Source: Gaensbauer et al. *CID* 2018 (in production)

1 or 2 doses of IPV added to a 3 dose bOPV vaccine schedule in Latin America: mucosal immunity



Colorado School of PUBLIC HEALTH

Asturias et al., *Lancet* 2016.

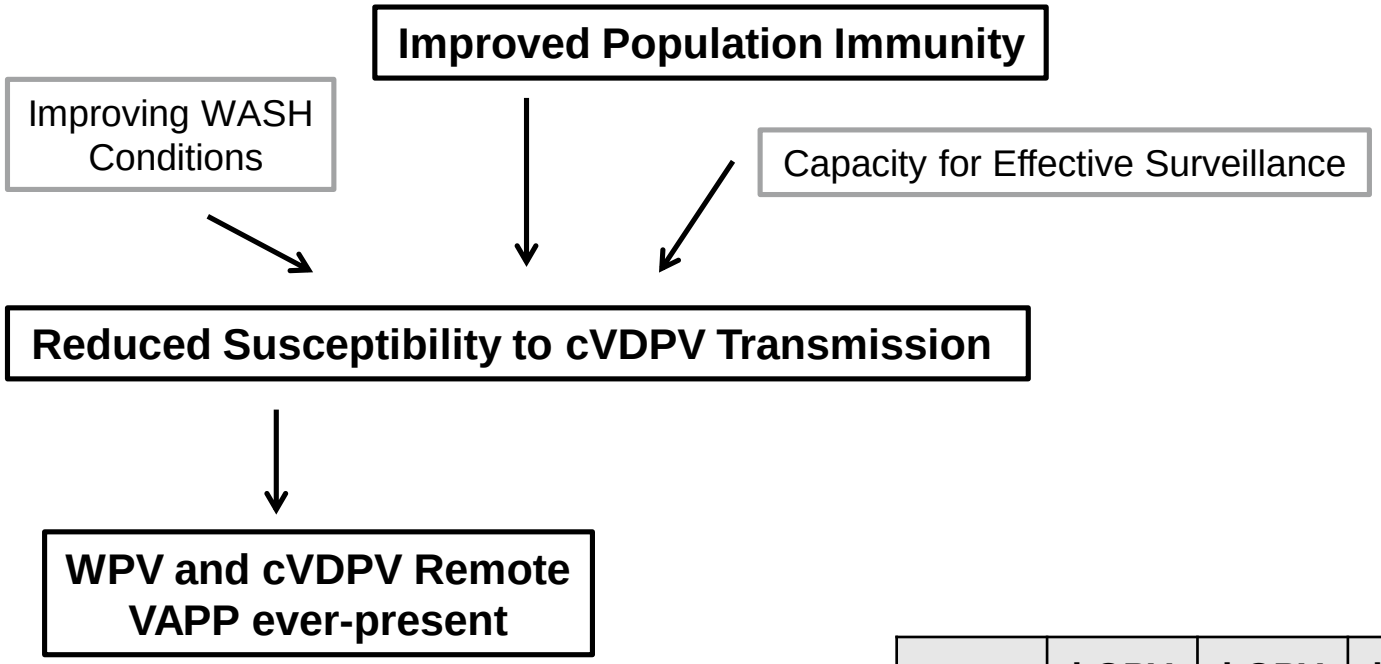
SAGE Polio Working Group 2018 post-certification IPV schedule:

- **All previously OPV-only using countries**
- **Minimum of two doses of IPV**
- **Full dose or fractional dose**
- **First dose at 4 months, second dose at least 4 months later**

Critical Vaccine-Related Questions for the Eradication Endgame:

- Optimal use of IPV in high-transmission countries, following tOPV-bOPV switch
- **Optimal use of IPV in low-transmission countries**
- Mitigating barriers to IPV supply

Factors Affecting Polio Vaccine Policy: Low-Transmission Countries



Emphasis on:

- **Reduction in VAPP**
- **Humoral immunity**
- **Individual protection**

	bOPV	**bOPV**	**bOPV**	**bOPV**
2	4	6	18	48
IPV				

Bolivia*

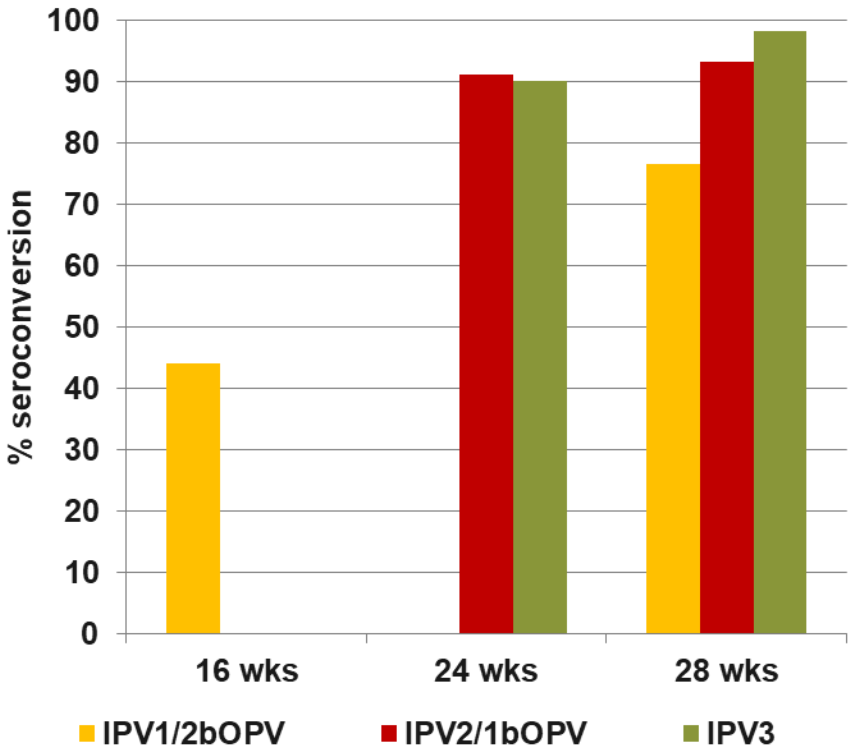
			bOPV	**bOPV**
2	4	6	15	48
IPV	**IPV**	**IPV**		

Brazil*

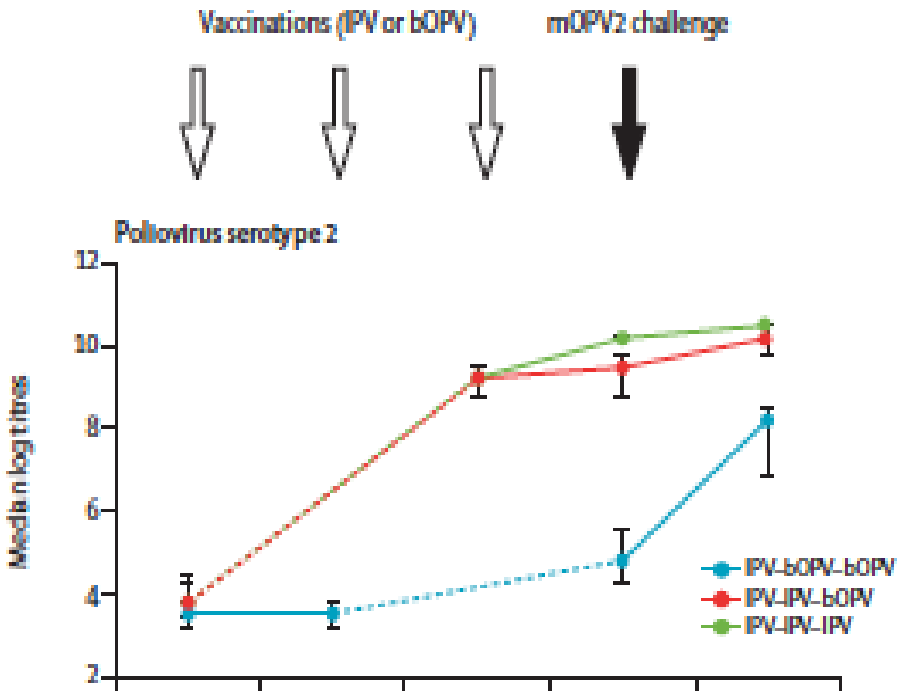
*Source: WHO, 2018

Type 2 Polio seroconversion and Ab titers by study group in Chile 2013

Seroconversion to serotype 2

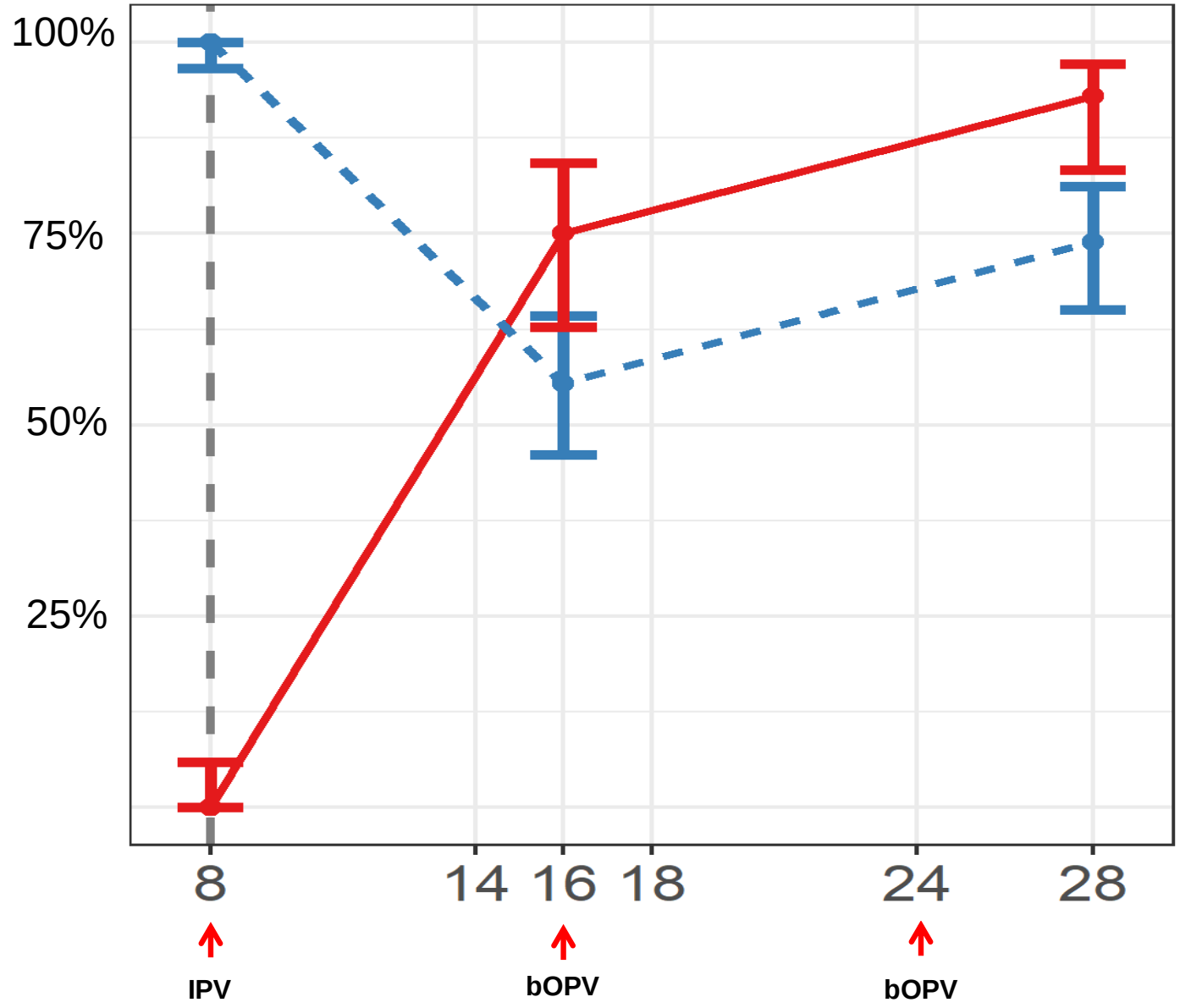


Serotype 2 Antibody Titers



Colorado School of PUBLIC HEALTH

O'Ryan M. *Lancet ID* 2015



Seroprotection rates according to pre-IPV serostatus and vaccination schedule among Chilean Infants

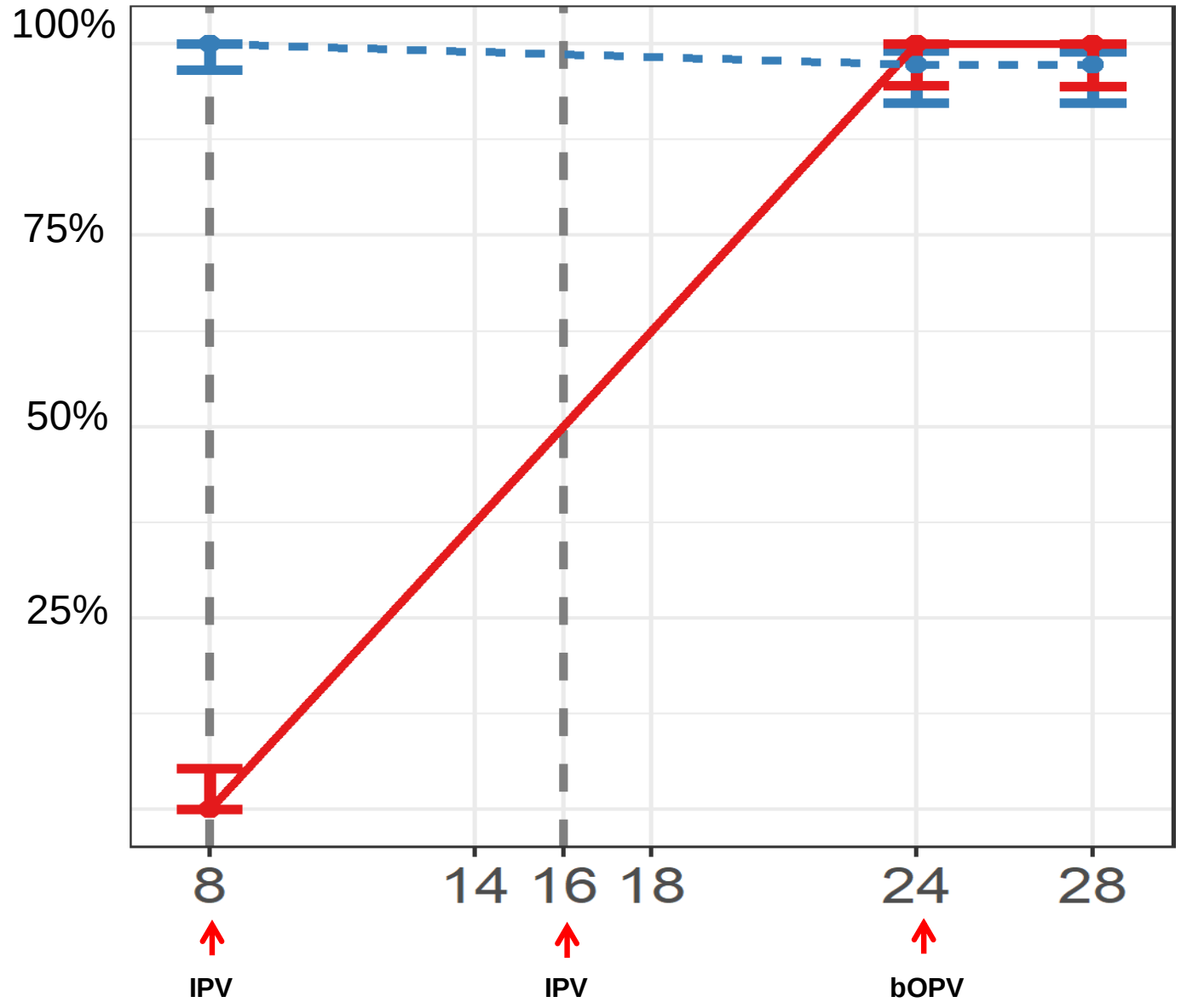
(1 IPV dose)

Pre-IPV seropositive: n=112

Pre-IPV seronegative: n=60

Colorado School of PUBLIC HEALTH

Source: Gaensbauer et al. *CID* 2018 (in production)



Seroprotection rates according to pre-IPV serostatus and vaccination schedule among Chilean Infants

(2 IPV doses)

Pre-IPV seropositive: n=111

Pre-IPV seronegative: n=67

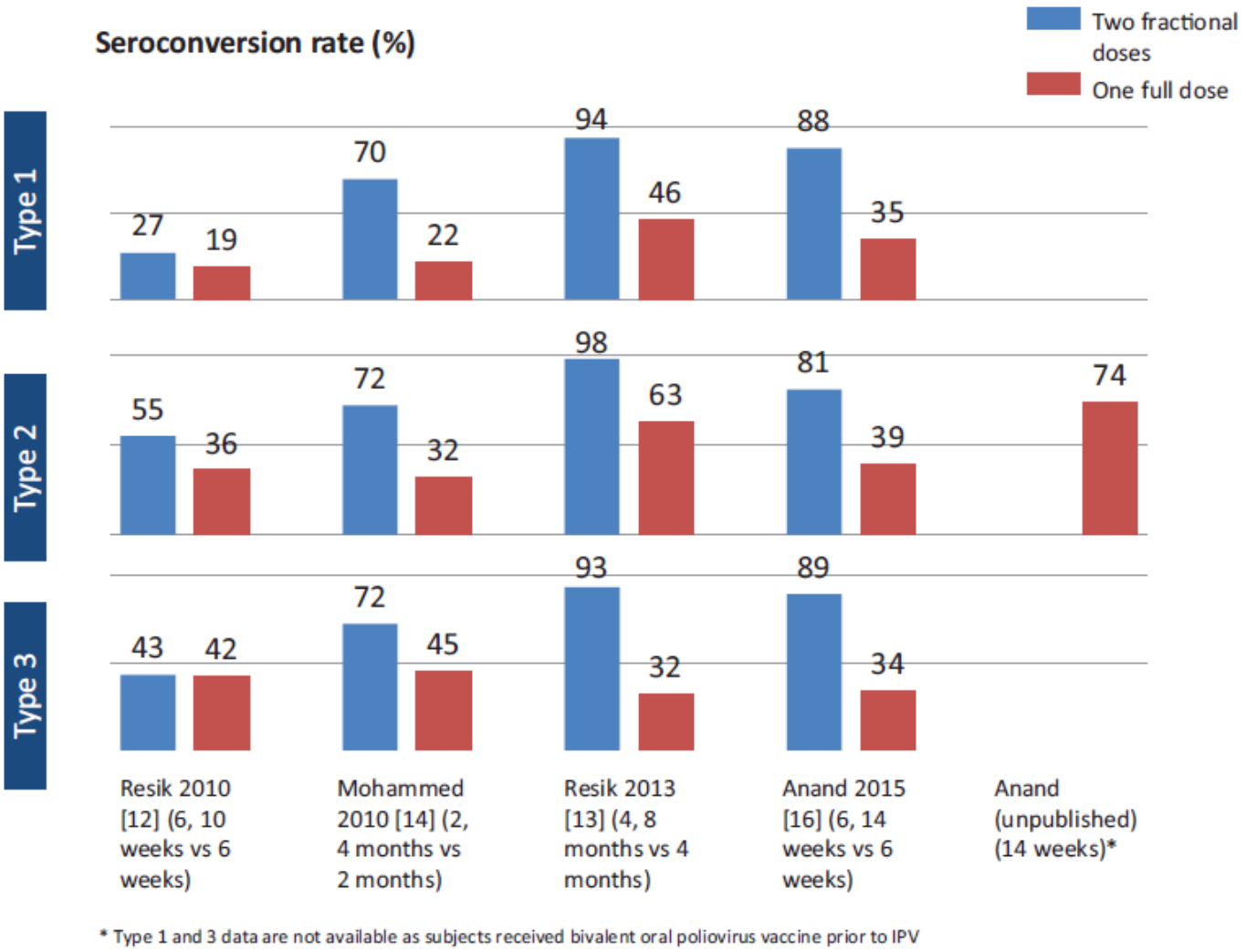
Colorado School of PUBLIC HEALTH

Source: Gaensbauer et al. *CID* 2018 (in production)

Critical Vaccine-Related Questions for the Eradication Endgame:

- Optimal use of IPV in high-transmission countries, following tOPV-bOPV switch
- Optimal use of IPV in low-transmission countries
- **Mitigating barriers to IPV supply**

Seroconversion of 2 intradermal f-IPV doses compared to 1 full IM dose



* Type 1 and 3 data are not available as subjects received bivalent oral poliovirus vaccine prior to IPV

Colorado School of PUBLIC HEALTH

Source: Okayasu, *JID* 2017

Vaccine 35 (2017) 3209–3214

Contents lists available at ScienceDirect

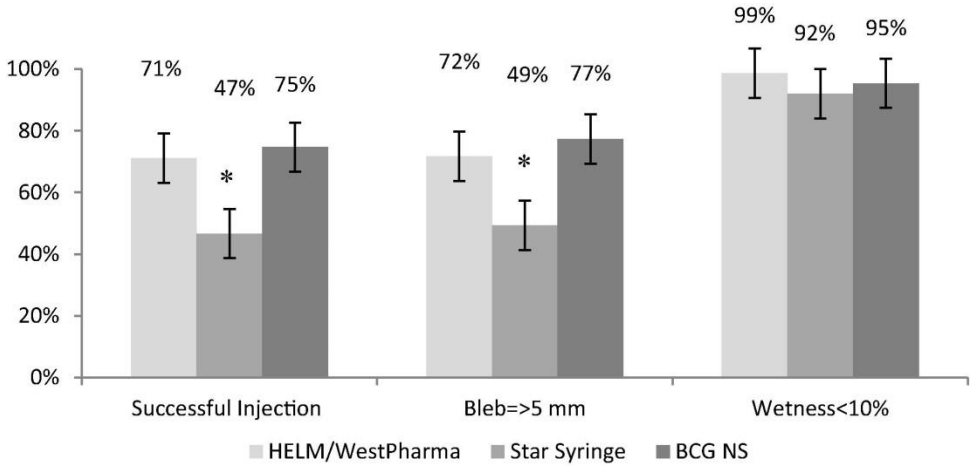
Vaccine

journal homepage: www.elsevier.com/locate/vaccine

Needle adapters for intradermal administration of fractional dose of inactivated poliovirus vaccine: Evaluation of immunogenicity and programmatic feasibility in Pakistan

Ali Faisal Saleem [a,*], Ondrej Mach [b], Mohammad T. Yousafzai [a], Asia Khan [a], William C. Weldon [c], M. Steven Oberste [c], Roland W. Sutter [b], Anita K.M. Zaidi [a,1]

[a] Aga Khan University, Karachi, Pakistan
[b] Polio Eradication Department, World Health Organization, Geneva, Switzerland
[c] Polio and Picornavirus Laboratory Branch, Centers for Disease Control and Prevention, Atlanta, USA



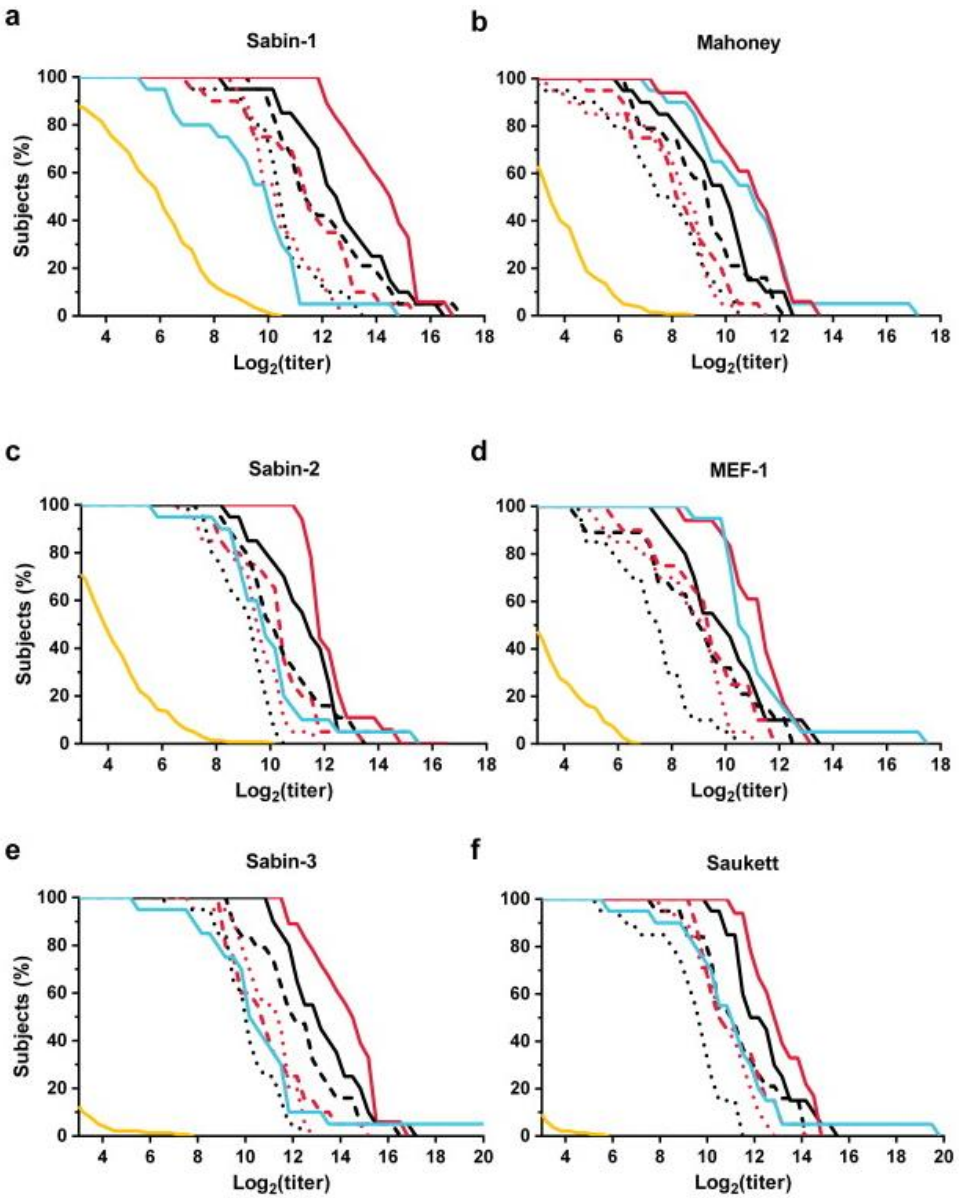
WestPharma ID Adapter

Colorado School of PUBLIC HEALTH

Vaccine
Volume 32, Issue 39, 3 September 2014, Pages 4938-4944

Safety and immunogenicity of a primary series of Sabin-IPV with and without aluminum hydroxide in infants

Pauline Verdijk [a], Nynke Y. Rots [b], Monique G.C.T. van Oijen [a], William C. Weldon [c], M. Steven Oberste [c], Hiromasa Okayasu [d], Roland W. Sutter [d], Wilfried A.M. Bakker [a]



Sabin-IPV may positively impact both *supply* and *safety* concerns

And may be optimal for cVDPV's

Colorado School of PUBLIC HEALTH

Critical Vaccine-Related Questions for the Eradication Endgame:

- **Future innovation to improve our vaccine armamentarium?**

THE LANCET
Infectious Diseases
Volume 17, Issue 7, July 2017, Pages 745-753

Immunogenicity and safety of three aluminium hydroxide adjuvanted vaccines with reduced doses of inactivated polio vaccine (IPV-Al) compared with standard IPV in young infants in the Dominican Republic: a phase 2, non-inferiority, observer-blinded, randomised, and controlled dose investigation trial

Luis Rivera, Rasmus S Pedersen, Lourdes Peña, Klaus J Olsen, Lars V Andreasen, Ingrid Kromann, Pernille I Nielsen, Charlotte Sørensen, Jes Dietrich, Ananda S Bandyopadhyay, Birgit Thierry-Carstensen

CDC > Global Health > Global Immunization > Field Stories

Welcome to Poliopolis – An nOPV2 Clinical Trial

Welcome to Poliopolis! You'll spend the next 28 days in a container village to help us test a new polio vaccine. Poliopolis is equipped with all the amenities to make your stay comfortable: air-conditioned private rooms with workstations and sinks, a lounge area with a flat screen TV and foosball table, a fitness room with a variety of exercise equipment, and a bright, sunny dining area. Enjoy your stay!

Colorado School of
PUBLIC HEALTH

UNICEF 2018

Colorado School of
PUBLIC HEALTH

Thank you very much for the honor of speaking to this conference!