

Big and Small Changes in Vaccines

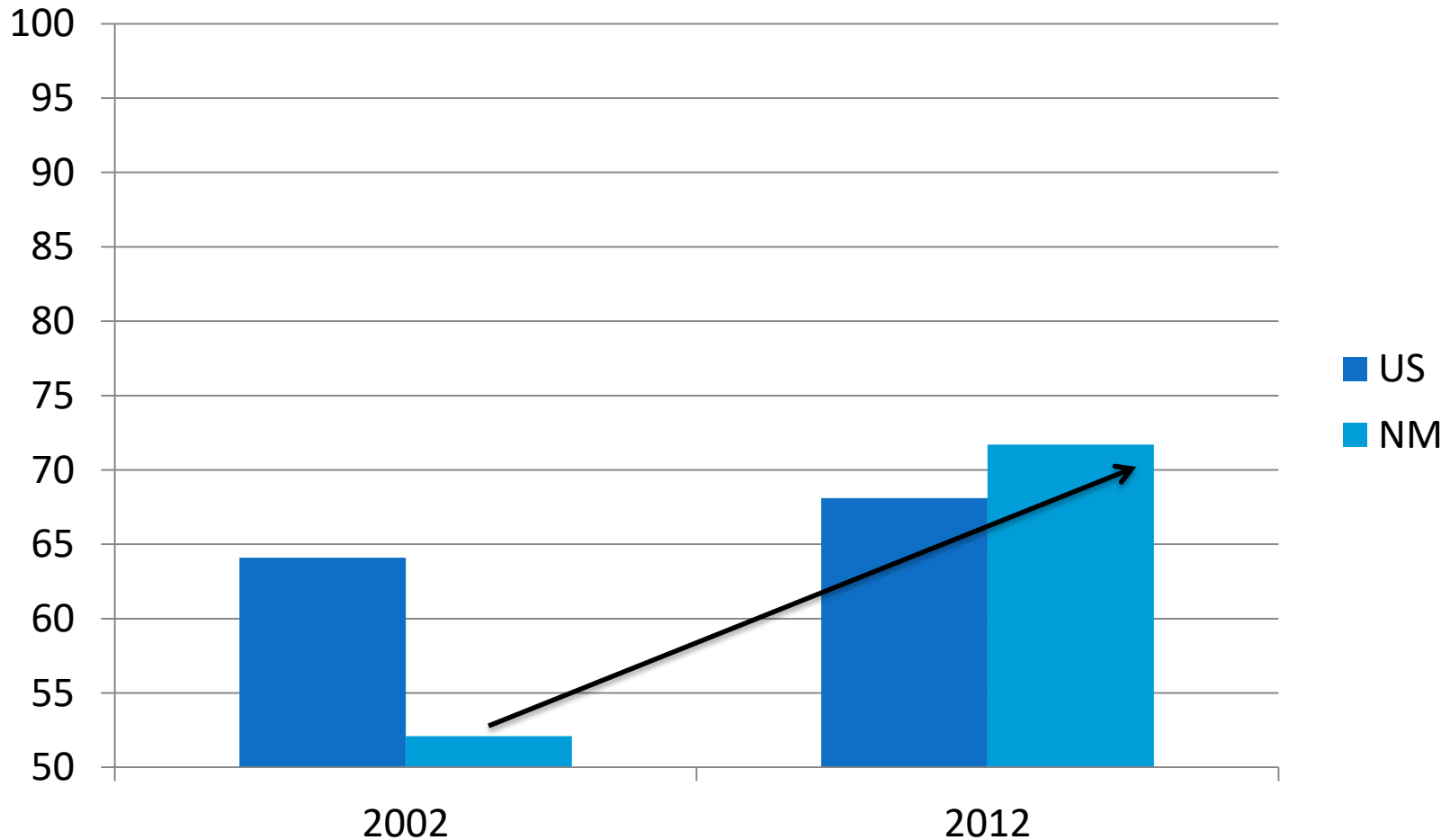
July 31, 2014



Melissa Martinez MD FAAFP
Professor
Division of General Internal Medicine

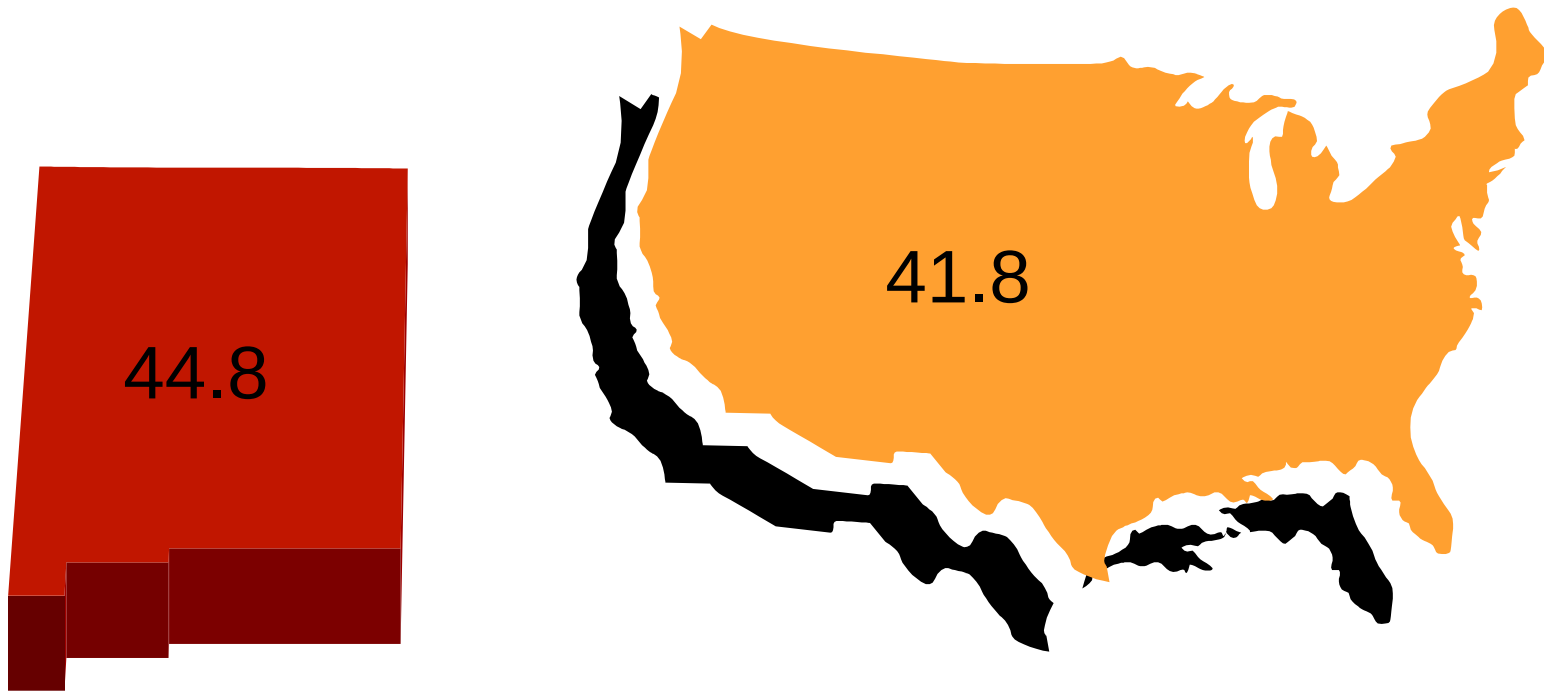
**No Conflicts of
Interest to Declare**

Estimated Vaccination Coverage with 4:3:1:3:3:1 Age 19-35 Months Old, New Mexico and U.S., 2002-2012



National Immunization Survey, National Center for Health Statistics,
U.S. Centers for Disease Control and Prevention.

Flu Immunization Coverage 2011-2012



www.cdc.gov/flu/professional/vaccination/report1112/

Improved immunization rate in children

Better prevention of pneumococcal

More choices of flu shots

Pertussis Outbreaks

Measles Outbreaks

Confusing Schedules

Risks to Universal Purchase

Vaccine Prices

Objectives:

- List reasons for the increased incidence of pertussis and measles
- Describe ACIP recommendations for Flu Season
- Describe ACIP recommendations for Prevnar (PCV13) use in adults
- Review reasons for vaccine hesitancy
- Explain the business and politics of vaccines

Reported NNDSS pertussis cases: 1922-2013*



*2013 data are provisional.

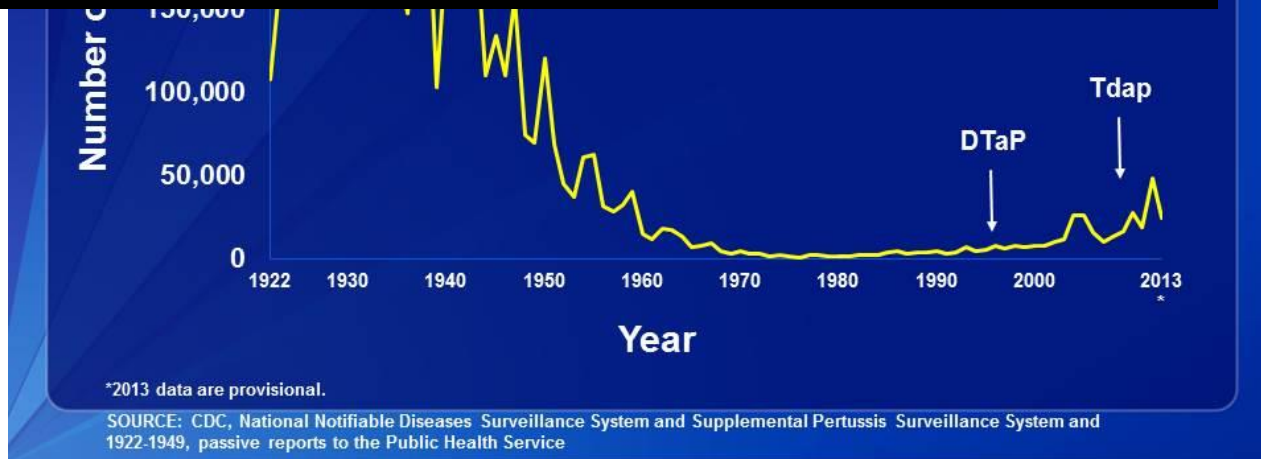
SOURCE: CDC, National Notifiable Diseases Surveillance System and Supplemental Pertussis Surveillance System and 1922-1949, passive reports to the Public Health Service

More Pertussis

- Natural Variation
- Better testing/reporting
- Unimmunized/Under-immunized
- Waning Immunity
- Acellular not as protective

Natural Variation

January 1-June 16, 2014
9,964 cases of pertussis
24% increase compared with the
same time period in 2013.

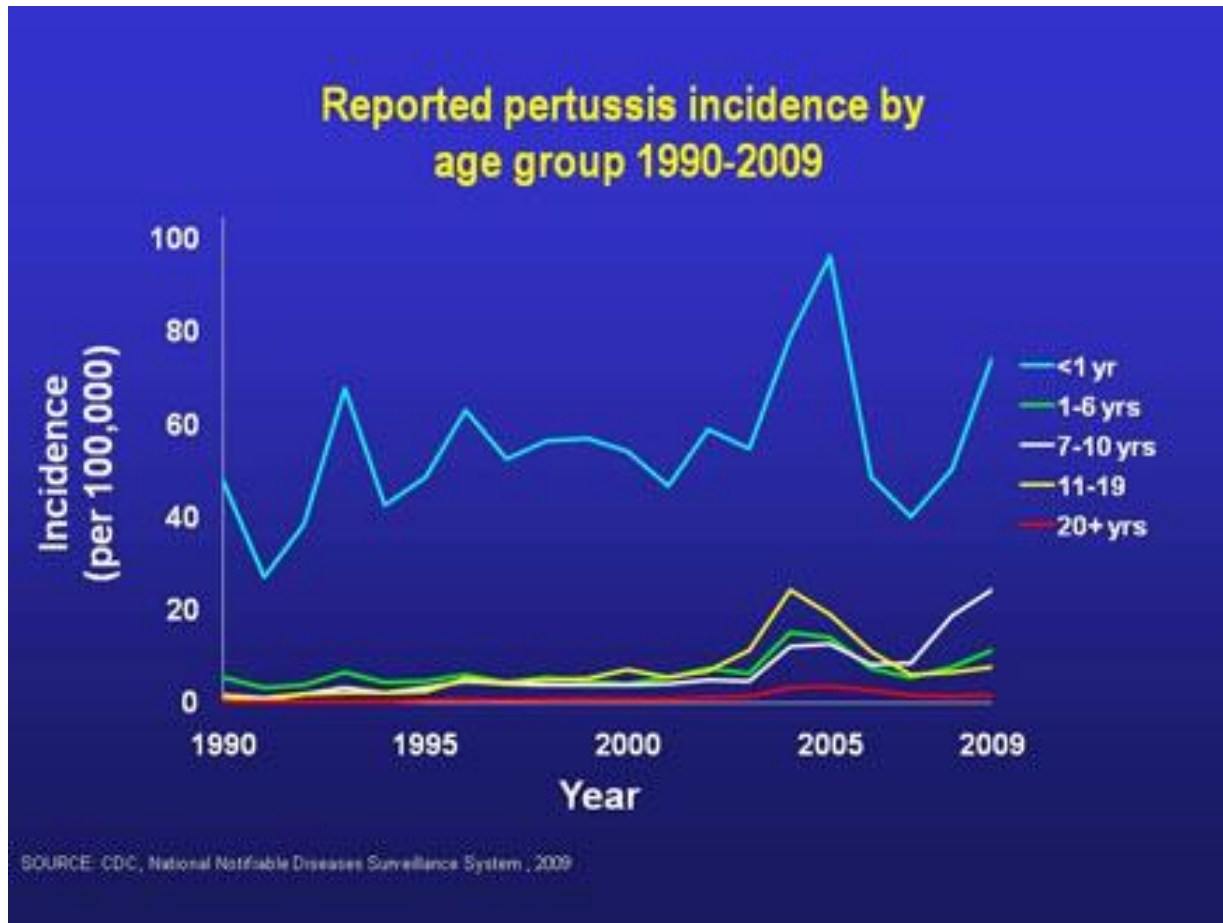


More Pertussis

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Better Testing

- PCR testing easier
- Unofficial reports from TriCore-more tests requested



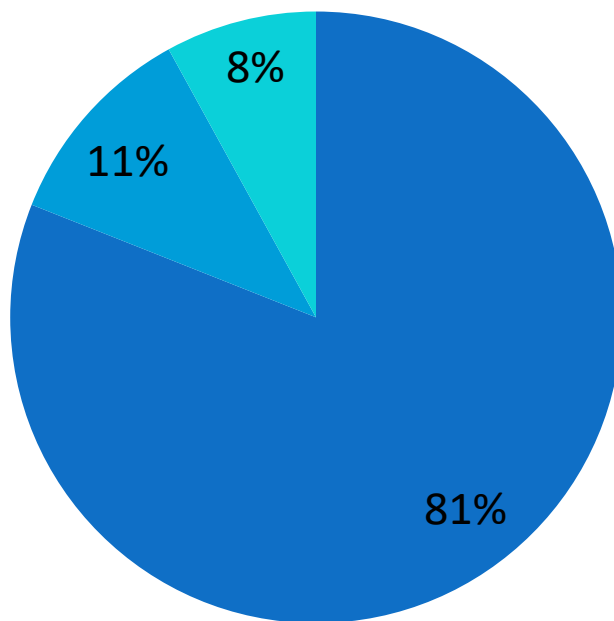
More Pertussis

- ~~Natural Variation~~
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Unimmunized/Under-immunized

132 Cases Marin County

■ Fully Immunized ■ Underimmunized ■ Unimmunized

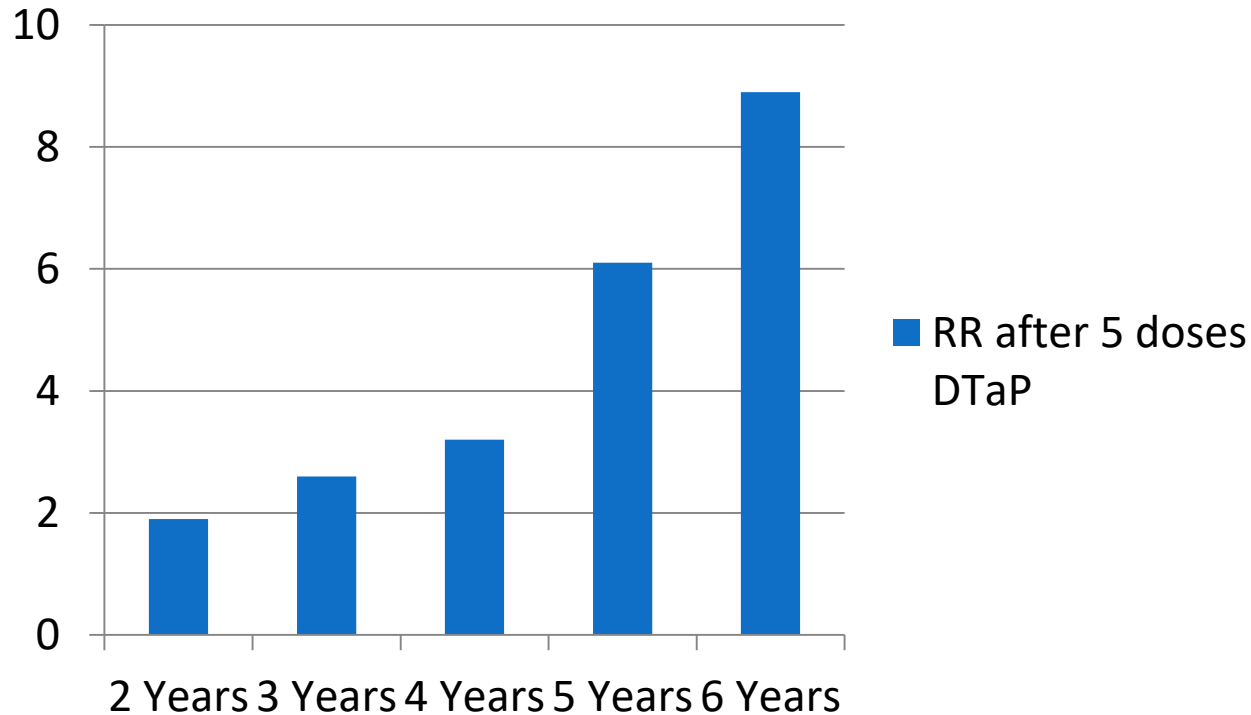


More Pertussis

- ~~Natural Variation~~
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Waning Immunity

RR after 5 doses DTaP

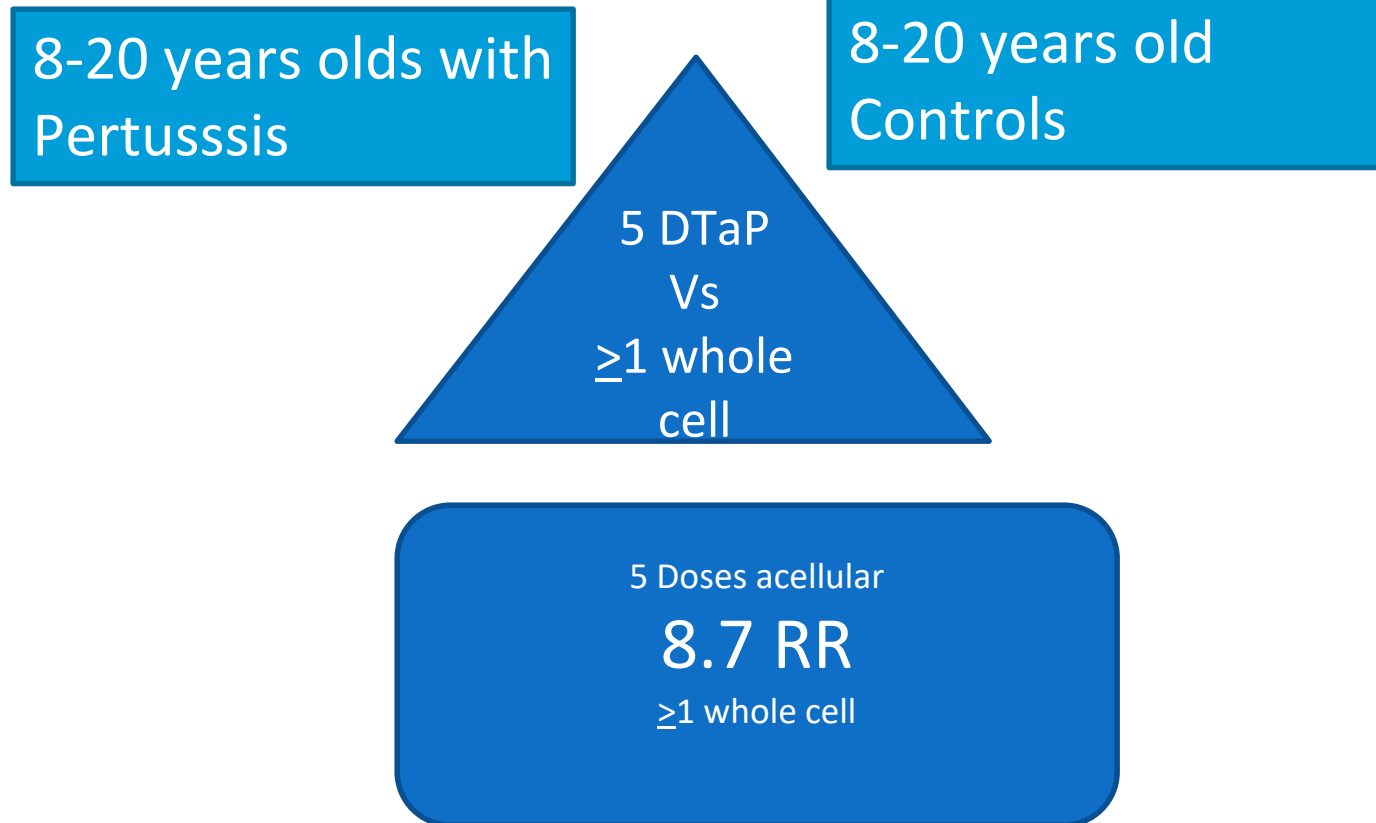


Tartof et al Pediatrics 2013; 131:e1047-e1052

More Pertussis

- ~~Natural Variation~~
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Acellular not as protective



More Pertussis

- ~~Natural Variation~~
- ✓ Better testing/reporting
- ↓ Unimmunized/Under-immunized
- ✓ Waning Immunity
- ✓ Acellular not as protective
 - ?New strains ?wrong antigens

Children

DTaP

2,4,6, Months

12-15 Months

4-6 Years

Tdap 11-12 years



Adults

Primary Series

- Dose 1
 - 4 weeks
- Dose 2
 - 6-12 months
- Dose 3
- *One dose Tdap

Boosters

- Tdap once
- Td q 10 year

Tdap Every Pregnancy



Conclusion Pertussis

- Tdap Every Pregnancy
- Same childhood and adult schedule
- Stay tuned
 - Change in frequency
 - Change in vaccine –not whole-cellular

What is New with Flu?

- ✓ Quadrivalent
- Recombinant
- Cell culture-based
- High dose
- Low dose

Influenza A and B

Influenza A



Most common cause of flu
Example H1N1

Influenza B



Not as common
2 lineages
Yamagata and Victoria

Trivalent (IV3) = 2A + most likely B

Quadravalent(IV4)=2A + 2B

TriCore Seasonal Influenza Data

Flu Season	Total Flu Isolates	% A	% B
2008 - 2009	559	60.5%	39.5%
2009 - 2010	2,948	99.9%	0.1%
2010 - 2011	1,008	70.1%	29.9%
2011 - 2012	633	96.7%	3.3%
2012 - 2013	2,365	64.7%	35.3%

Average Flu B over 8 seasons was 10-15% of Overall Flu Cases

Quadrivalent: IV4

- Fluarix[®] Quadrivalent IM IIV4
- Fluzone[®] Quadrivalent IM IIV4

FluMist[®] IntraNasal (live-attenuated) LAIV4

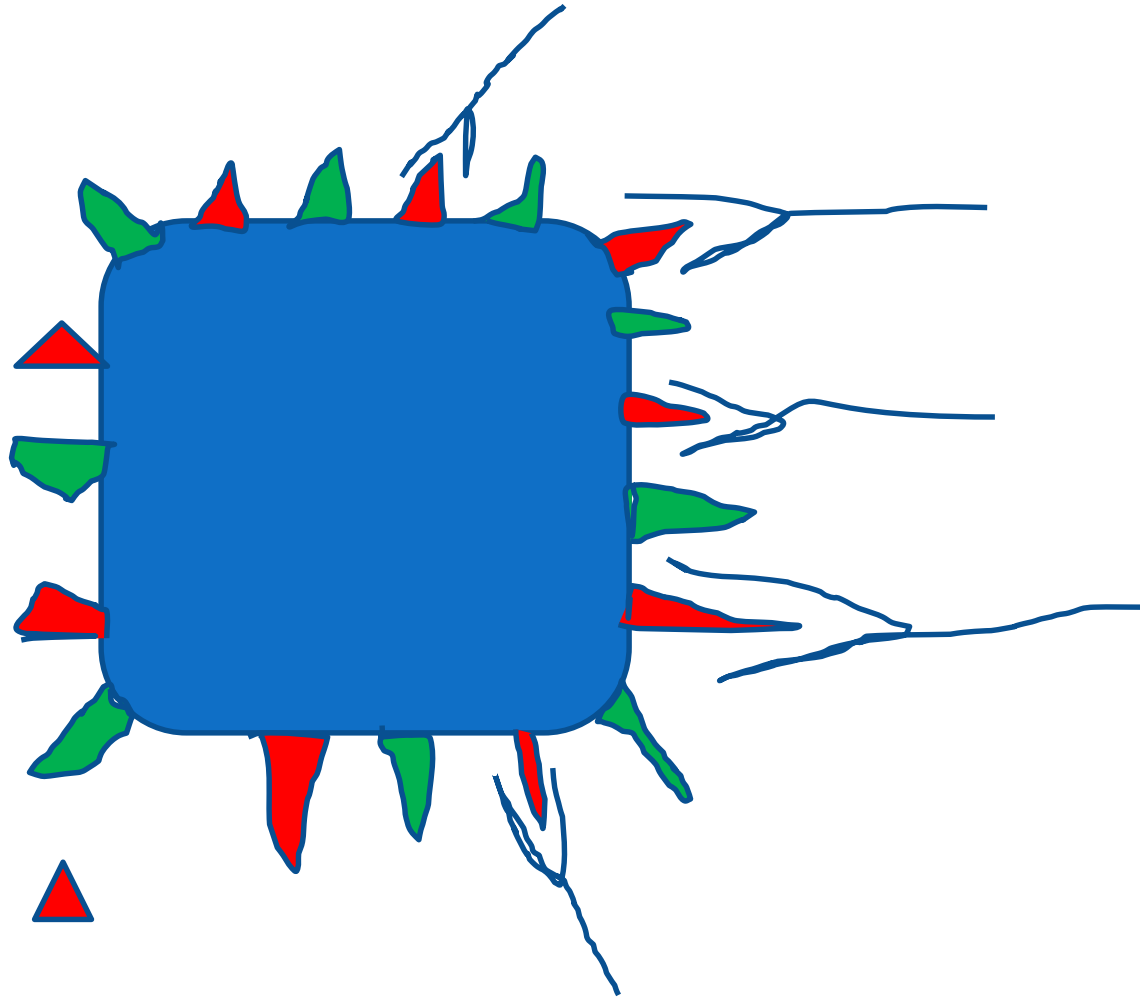
June 2014 ACIP preference of IntraNasal over injectable for ages 2-8 years

FluMist® IntraNasal (live-attenuated)

- LAIV4
- Metimmune
- Preference over injectable for ages 2-8 years
- Indications ages 2-49
- Contraindications
 - Egg Allergies
 - Asthma/wheezing
 - Immuno-compromised

What is new

- ✓ Quadrivalent
- ✓ Recombinant
- Cell culture-based
- High dose
- Low dose



Hemagglutinin

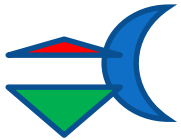


Neuraminidase



Traditional versus Recombinant

- HIV
- Virus grown in eggs
- Virus denatured



- Recombinant
- DNA makes antigens



Recombinant Influenza Vaccine

RIV3

- FluBlok[®]
- \$32.75/dose (whole sale)



- Only vaccine to be used in patients with severe egg allergy

Cell culture-based

- Mammal cells in place of eggs
- Faster and more flexible to manufacture
- Not clear if completely egg-free
- Flucelvax[®] Novartis
- CCIIV3 (Trivalent)



What is New?

- ✓ Quadrivalent
- ✓ Recombinant
- ✓ Cell culture-based
 - High dose
 - Low dose

High Dose

Fluzone HD[®] Sanofi Pasteur

- Age ≥ 65 50-75% lower antibody titer
- High-dose higher post-vaccine antibody
- Will higher antibody levels translate into fewer cases of the flu?
- Study for 2014-2015



What is New?

- ✓ Quadrivalent
- ✓ Recombinant
- ✓ Cellular
- ✓ High Dose
- Low Dose

IntraDermal

Fluzone IntraDermal® Sanofi Pasteur

Trivalent

40% less antigen

Same immune response

Single dose

For needle phobia



So Many Choices

Intranasal preferred 2-8 years

Recombinant -Egg Allergies



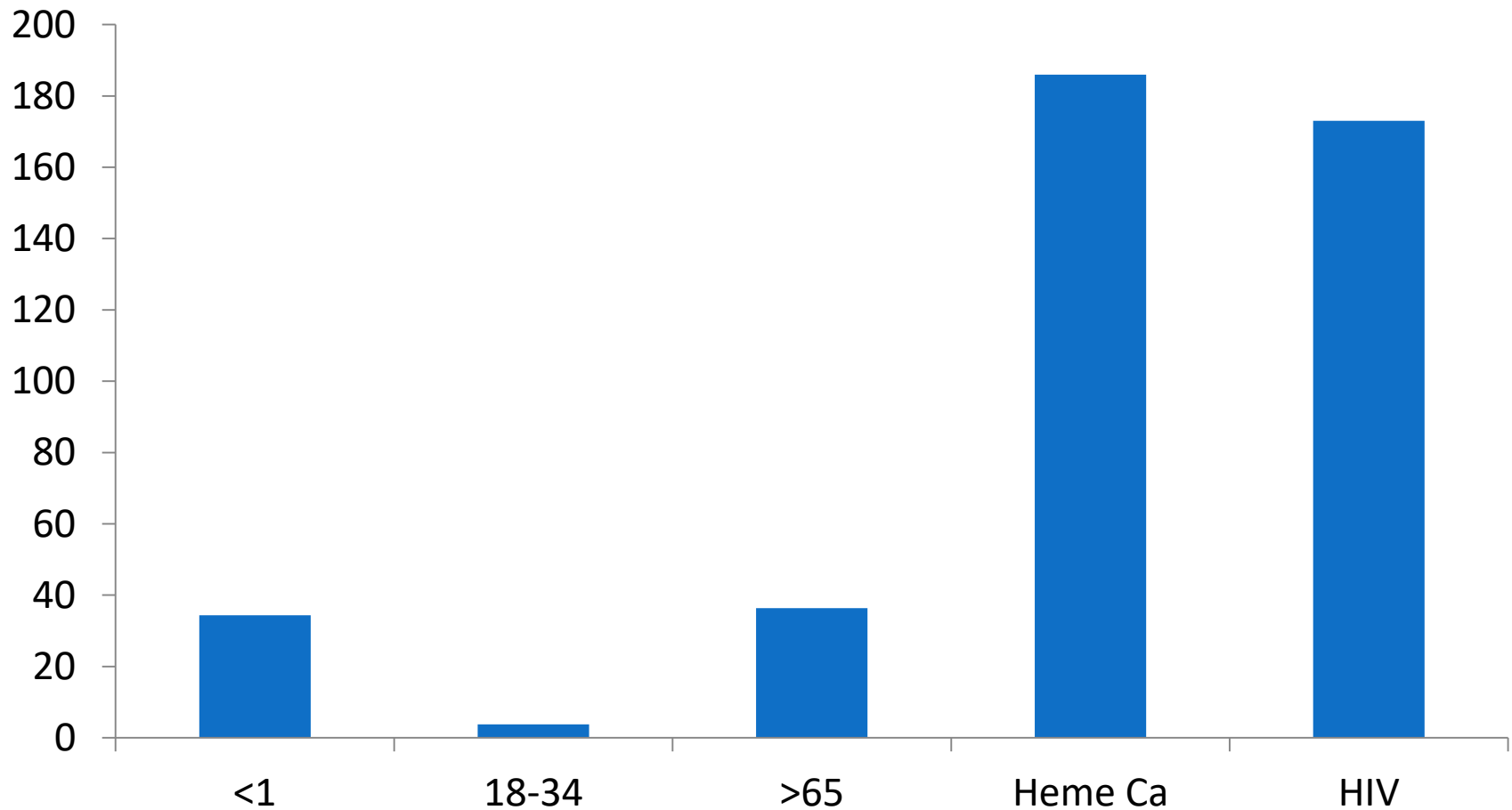
The only wrong flu vaccine is the one not given

Streptococcus pneumoniae

- Pneumonia (CAP)
- Invasive Pneumococcal Disease (IPD)
 - Bacteremia/Sepsis
 - Meningitis
- Other
 - otitis media
 - sinusitis



U.S. Rates of Invasive Pneumococcal Disease (IPD) by Age or Conditions



Pneumococcal Vaccines

- **Pneumovax® (PPSV23)**
 - Polysaccharide vaccine
 - Duration 3-5 years
 - Repeat vaccination does not improve titers
 - May/maynot prevent CAP
 - Protection for IPD
 - Effectiveness estimates 54-80%
- **Prevnar® (PCV13)**
 - Conjugated
 - Only 13 types vs 23
 - Induces Immunity in children
 - Better Immunogenicity

Prevnar® PCV7 in Children

Active Bacterial Core surveillance (ABCs)

Tracked IPD in adults >18 years

- 65% reduction in IPD in adults (1998-1999 vs. 2009)

Muhammad et al CID 2013;56(5):e59-67.

PPVS23



PCV13



Immunogenicity



Range of Serotypes

Pprevnar[®] (PCV 13)

- FDA Licensed age ≥ 50
- ACIP
 - Cost analysis
 - Limited Studies
 - Cost effective only in certain conditions

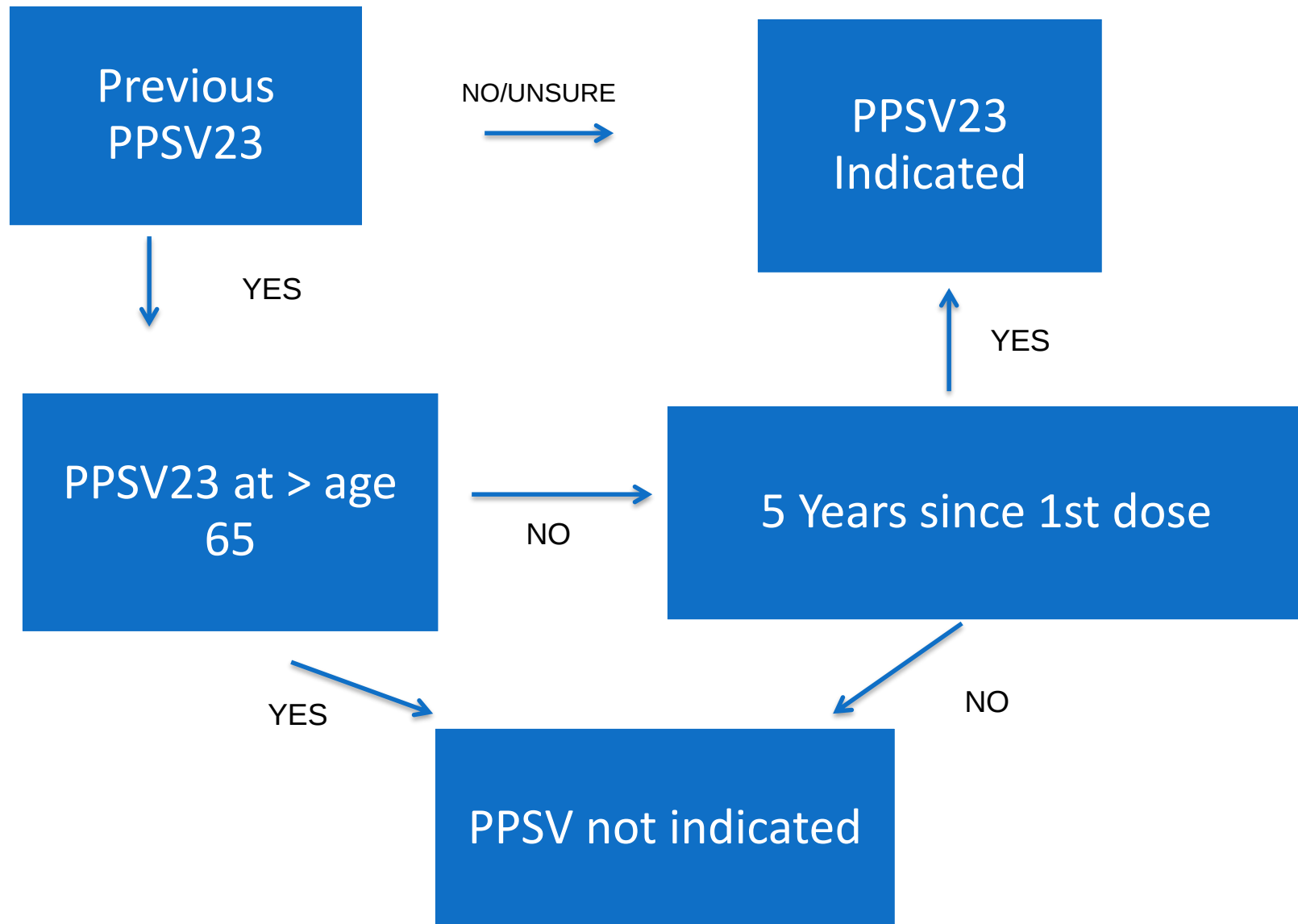


Conditions		PVC13	PPSV23
Adults 19-64 Children 6-18	Common Chronic heart disease Chronic lung disease (Asthma) Diabetes mellitus Alcoholism Chronic liver disease Cigarette smoking	Not Recommended	One dose Repeat once at age 65 (if interval > 5 years)
	Immunocompromised Hemaglobinopathies Asplenia Chronic Renal Failure Nephrotic Syndrome Generalize Malignancy Leukemia Lymphoma Hodgkins HIV/Immunocomprised Immunosuppresion Solid Organ Transplant Multipe Myloma	One dose ➤ 8 weeks before or 12 months after PPSV23	Dose 1 8 weeks after PCV13 Dose 2 in 5 years At age 65 (If interval > 5 years)
	Meningitis risk Cochlear Implant CSF Leak	One dose 8 weeks before or 12 months after PPSV23	One dose 8 weeks after PCV 13 No repeat until 65

Age $\geq$ 65 without Conditions

**Indicated Pneumococcal
Vaccination(s)**

PPV23 once



Children 2-59 Months (<5 years)

PCV13

- 2,4, 6 and 12-15 months
- Parallels schedule for DTaP and other childhood vaccines

PCV13 for Older Children and Catch-Up Schedule

Age 1 st dose	Total doses	Information
7-11 months	3	2 doses $\geq$ 4 weeks apart, 3rd dose after 12 months
12-23 months	2	$\geq$ 2 months apart
24-59 mo. immunocompetent	1	
24-59 mo. Immunocompromised received 3 doses	1	Before or $\geq$ 8 weeks after PPSV23
24-59 mo. immunocompromised Received <3 doses	2	2 doses given 8 weeks apart Before or $\geq$ 2 months after PPSV23

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6-64 years with Common Conditions*

*Common Conditions

- Chronic heart disease
- Chronic lung disease (Asthma)
- Diabetes mellitus
- Alcoholism
- Chronic liver disease
- Cigarette smoking

Indicated Pneumococcal Vaccination(s)

- PPSV23 once
- **Repeat PPSV23 at age 65**
- **No indication for PCV13**

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6-64 years – Very Immunocompromised

Hemaglobinopathies

Asplenia

Chronic Renal Failure

Nephrotic Syndrome

Generalize Malignancy

Leukemia

Lymphoma

Hodgkins

HIV/Immunocomprised

Immunosuppresion

Solid Organ Transplant

Multipe Myloma

Indicated Pneumococcal Vaccination(s)

- PCV13

- PPSV23

**1 additional dose in 5 years
AND**

Again at age 65 years

**PCV13 8 weeks before or 12
months after PPSV23**

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6-64 years - Meningitis Risk

Conditions

**Cochlear Implant
CSF Leak**

Indicated Pneumococcal Vaccination(s)

- PCV13
- PPSV23

**NO additional dose in 5 years
AND**

Again at age 65 years

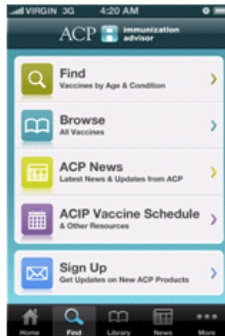
**PCV13 8 weeks before or 12
months after PPSV23**

Apps

SHOTS



CDC Flu App



<http://www.cdc.gov/flu/apps/cdc-influenza-hcp.html>

<http://immunization.acponline.org/app/>

Adult Immunization Scheduler



<http://www.cdc.gov/vaccines/recs/Scheduler/AdultScheduler.htm>

Prices

PPSV23

- Whole Sale \$37.99*
- Retail \$61.94*

*2012 Peds Prices per CDC

PCV13

- Whole Sale \$102.03*
- Retail \$120.90*
- Walgreens \$180.00

Vaccine Costs

- ***The Price of Prevention: Vaccine Costs Are Soaring New York Times JULY 2, 2014***

- Cost excluding administration
- \$ 2, 2573 per child

Cohort of 4.2 Million
Vaccines **saved**
\$76 Billion
Direct/Indirect Cost

Zhou F Pediatrics, 2014.
133:577.

Vaccines at pharmacies

PCV13

HPV

Certain Flu shots

Shingles Vaccine

Caution with Medicare and some insurance

Pharmacy vs. medical benefit

Measles Cases and Outbreaks,

January 1 to June 20, 2014*

514

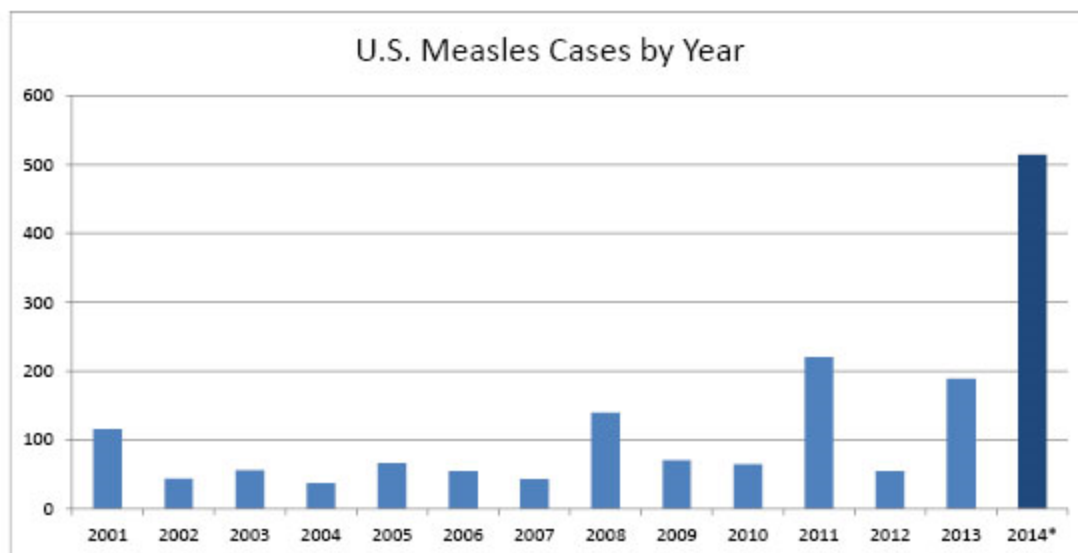
Cases

reported in 20 states: Alabama, California, Connecticut, Hawaii, Illinois, Kansas, Massachusetts, Minnesota, Missouri, New Jersey, New York, Ohio, Oregon, Pennsylvania, Tennessee, Texas, Utah, Virginia, Wisconsin, Washington

16

Outbreaks

representing 87% of reported cases this year



*Provisional data reported to CDC's National Center for Immunization and Respiratory Diseases



MMR Based on Year of Birth

After 1957

- 2 doses
- Unless
 - Medical Contraindication
 - Previous vaccination or disease
 - Blood tests show immunity

Before 1957

- May not need MMR
- Exceptions:
 - Healthcare workers
 - Students in postsecondary educational institutions
 - Exposure
 - Some International Travelers





NPR: Sarah Jane Tribble

Vaccine Hesitancy

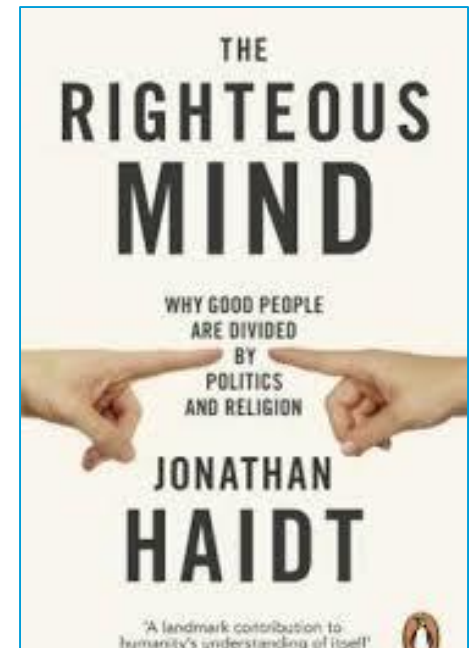
- Really Want Immunizations
 - Create opportunities
- Unsure
 - Brown et al Fam Prac Mtg March/April 2014
 - <http://www.cdc.gov/vaccines/conversations>
- No WAY

NO WAY!

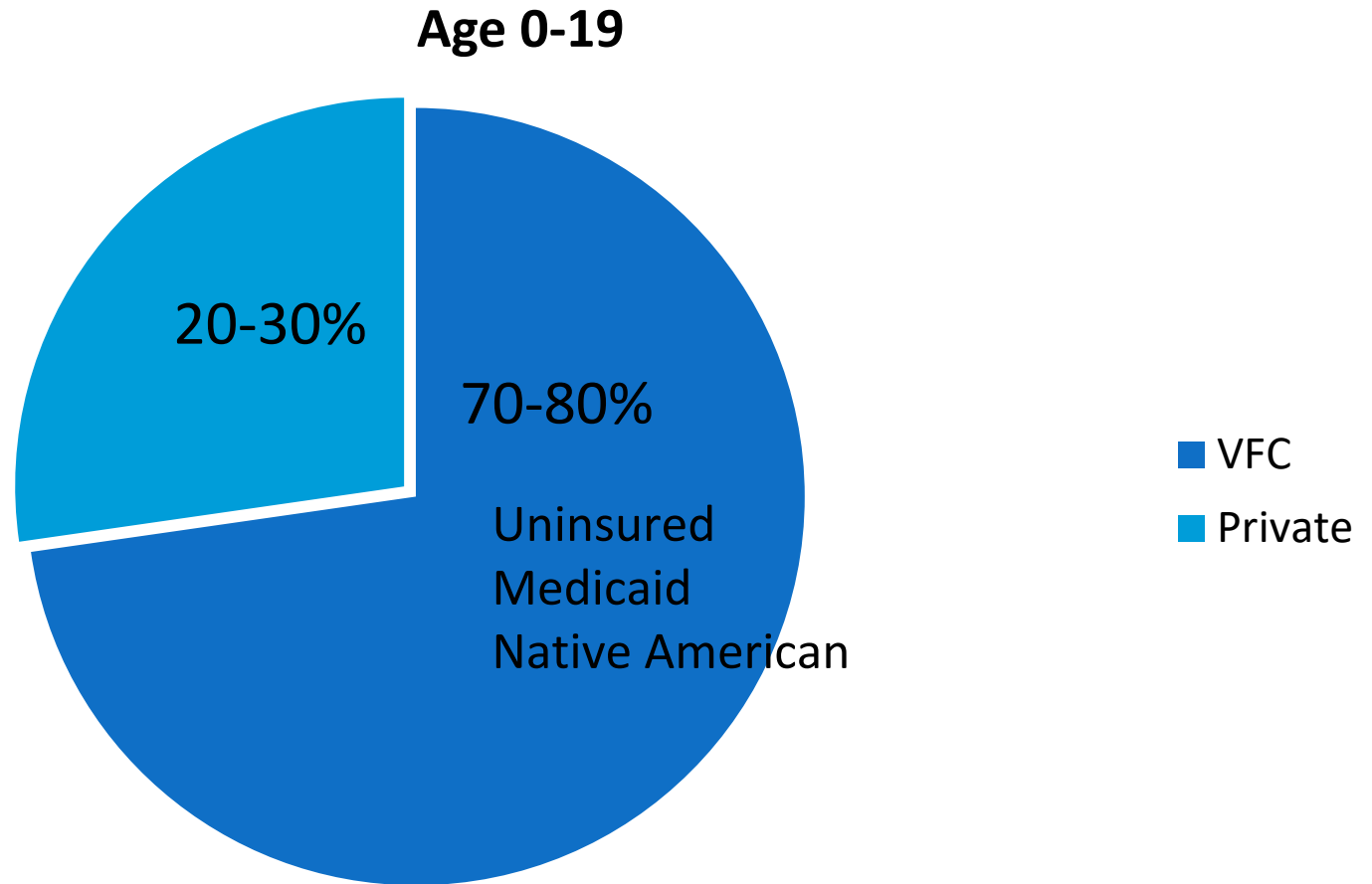
- Fire them?
- Report to CPS?
- Opel et al Pediatrics 2014;113;526

The Righteous Mind by Jonathan Haidt

Establish Relationship
Keep trying
Find Allies



Universal Purchase

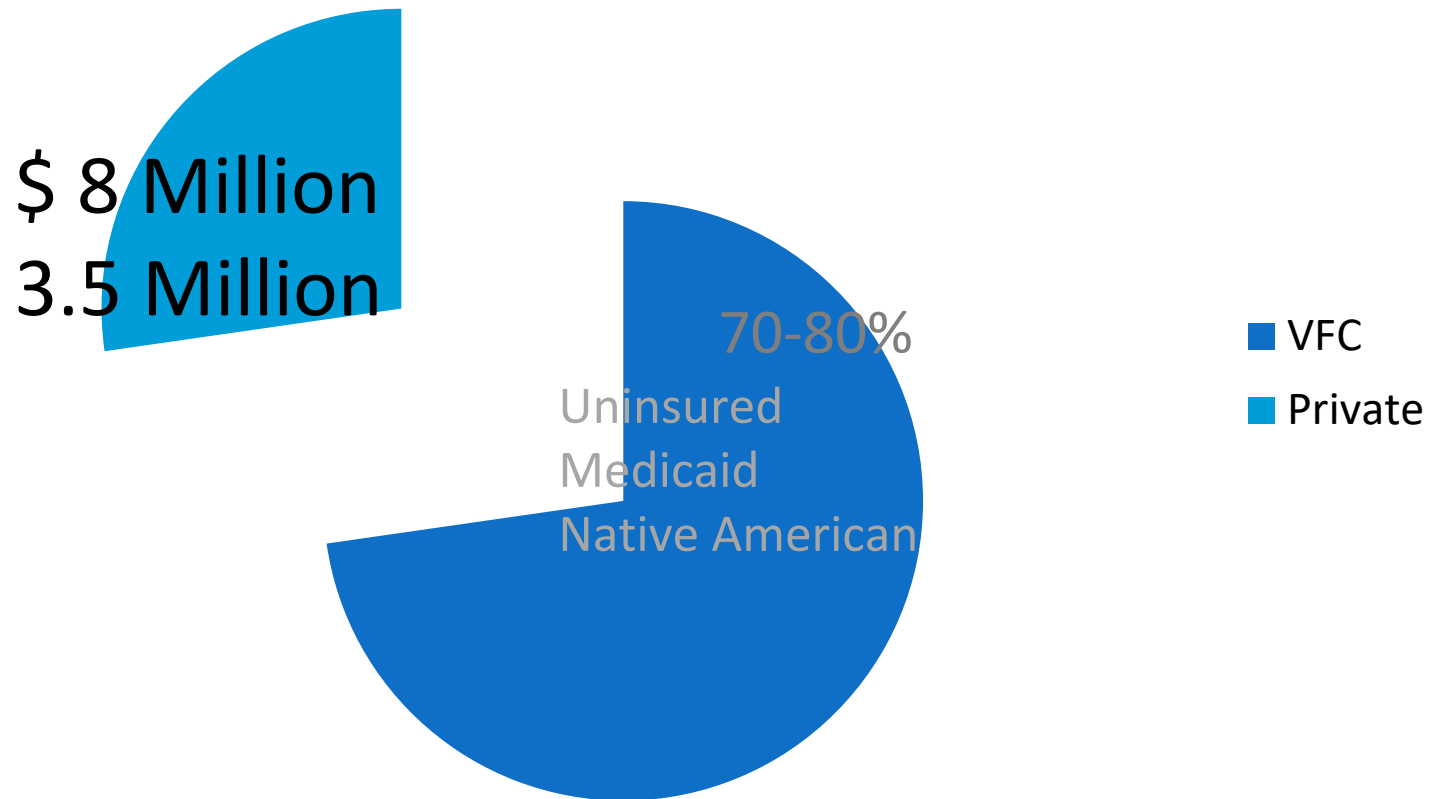


CDC Dose Accountability

- Keep Separate Stocks
 - VFC versus Private Insured
 - Borrowing Policy

Universal Purchase

Age 0-19



Send me your narratives

How would loosing Universal Purchase impact your practice and patients?

MLMartinez@salud.unm.edu

Conclusions

Expect Changes in Pertussis Vaccine

Give Flu shots

Intra Nasal -2-8 (if possible) and recombinant-egg allergies

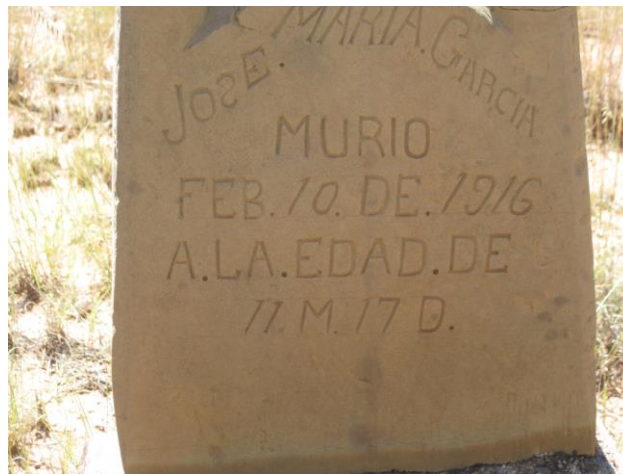
PCV13 for kids, PPSV23 for adults >65

References for high risk

Watch for measles

Patience with patients who refuse vaccines

Protect our Children by Protecting Universal Purchase



Resources/Further Reading

Summary Recommendations from ACIP for the 2013-2014 Influenza Season:

<http://www.cdc.gov/flu/professionals/acip/2013-summary-recommendations.htm>

CDC FluView (for weekly updates regarding Influenza Activity across U.S.):

<http://www.cdc.gov/flu/weekly/>

CDC Flu App

<http://www.cdc.gov/flu/apps/cdc-influenza-hcp.html>

New Mexico Influenza Weekly Surveillance Reports:

http://nmhealth.org/flu/weekly_reports.shtml