# What Every Pediatrician Has Already Learned about Raising the Rates (Through Our Children)

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# Objectives

- Historical context of vaccination
- Factors contributing to pediatricians' success
- Challenges in adult immunizations – Disparities
- What we can learn from children and the childhood experience

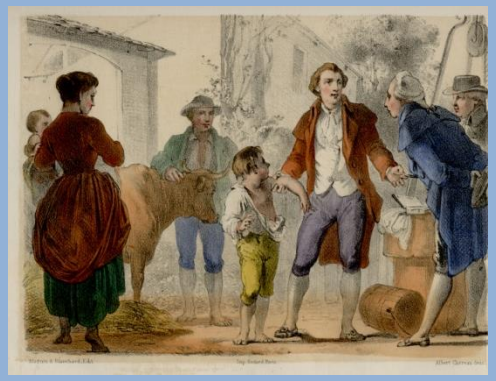
# Historical Context of Vaccination

# Vaccine History

**Vaccination** derived from vacca = cow [L]
as first vaccine was derived from cow-pox

# Let’s Not Forget the Children

## James Phipps



## Joseph Meister

## Polio Pioneers

# Smallpox

- 25-35% mortality, significant morbidity
- Highly contagious – an average, one person would infect 5-20 others
- In 1520, smallpox killed roughly half the population of Mexico
- WHO passed a resolution to eradicate smallpox in 1959; the Eradication Program was started in 1966
- Last reported case in 1977 in Somalia
- US. Discontinued vaccinations in 1972

# Jenner and James Phipps

# Jenner and James Phipps

- 8 yo. James Phipps with permission of parents
- 1776… Received first recorded vaccination with cowpox material from hand of dairymaid Sarah Helms
- May 14 1776 vaccinated with mild reaction of arm that resolved by day 8
- July 1,1776 injected with fresh small pox fluid from patient with active disease…no reaction

# Cow Udder Infected with Cowpox

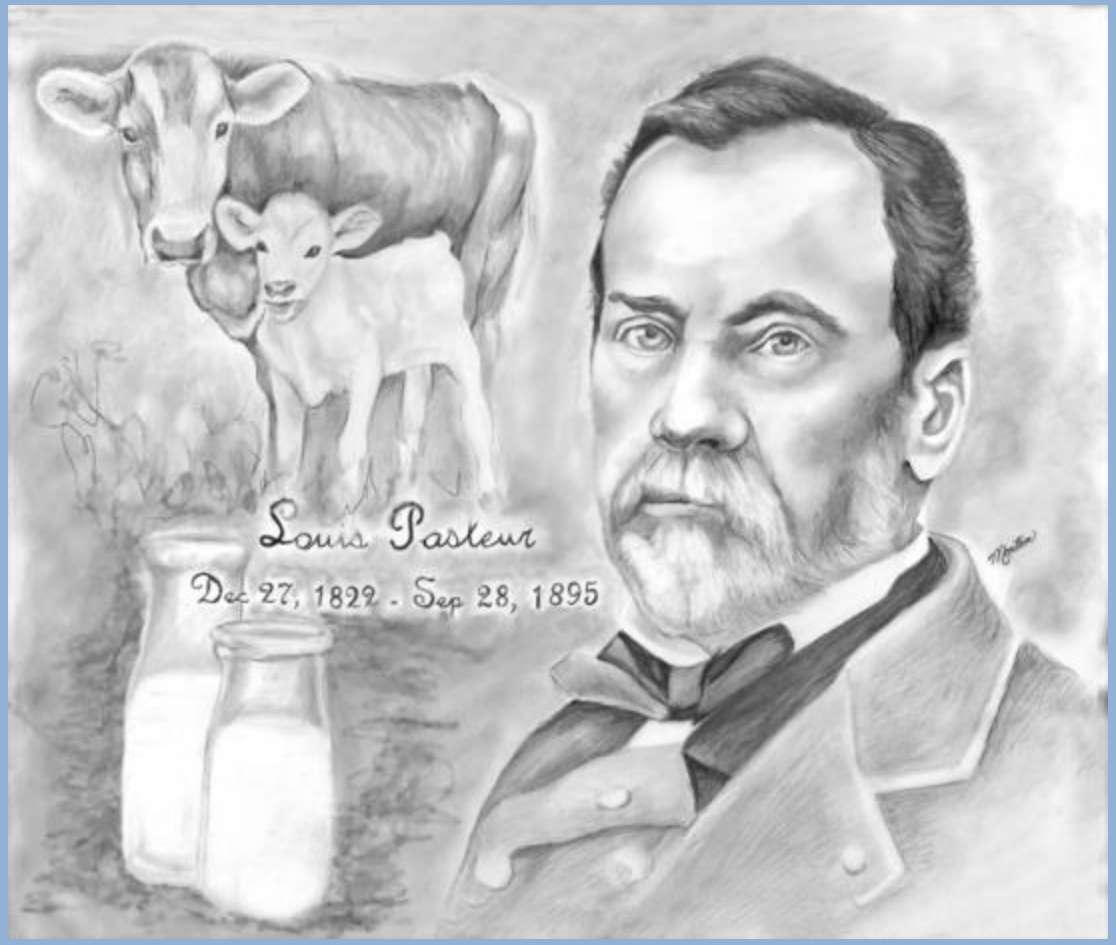
# Cowpox lesion on hand

# Jenner later vaccinates his son November 1789

DR. EDWARD JENNER INOCULATING HIS SON, EDWARD, AT THE AGE OF EIGHTEEN MONTHS, WITH SWINEPOX MATTER, NOVEMBER, 1789

# Anti-Vaccination League

# Joseph Meister

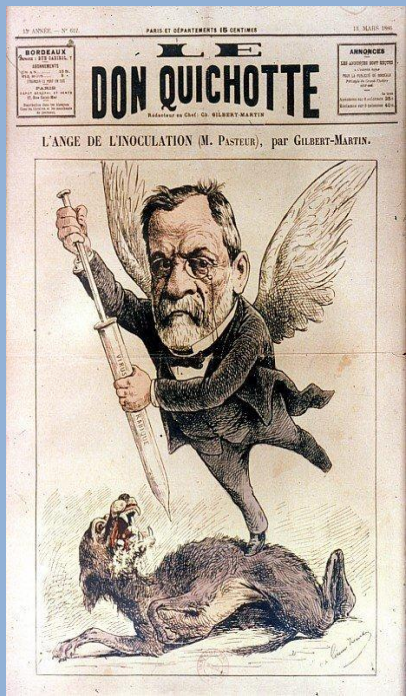


# Pasteur and Joseph Meister
# 7/6/1885

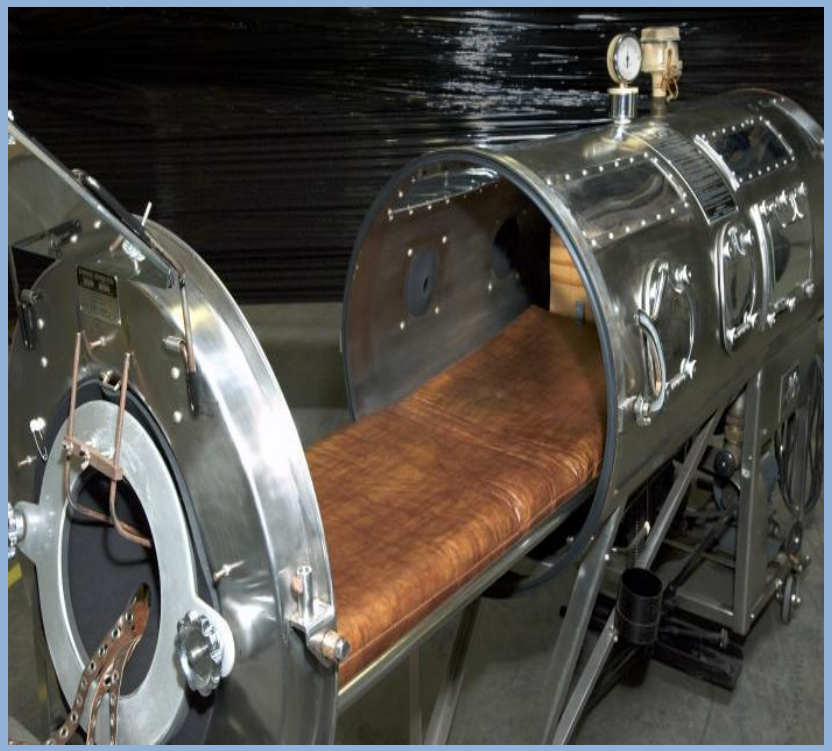
- Joseph Meister 8 y.o. bitten 14 times by rabid dog
- Experiments were not completed, but urged to proceed to save child as number and extent of wounds meant rabies was a certainty
- July 6, 1885; 60 hrs. after attack injections started with dried spinal cord of dead rabbit
- Total of 13 injections over 10 days..last injection was most virulent
- Joseph survived….. and word spread widely

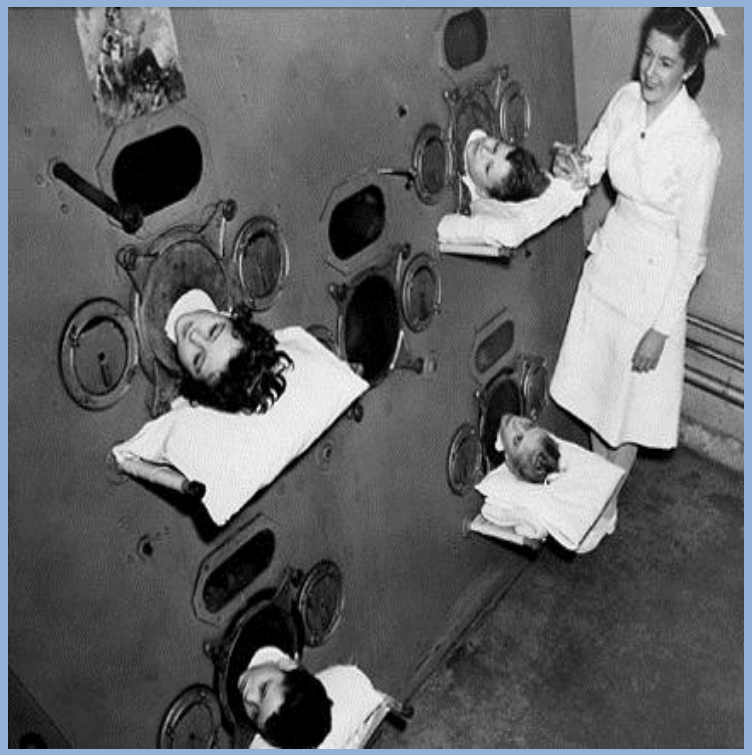
# Boys Sent to France for Rabies Vaccine 12/1/1885

- In Newark, New Jersey, four boys were bitten by a rabid dog
- A fundraising effort arose to help send the boys to France for treatment by Pasteur
  - Donors raised $1,000, which sent the boys overseas via ocean liner
- The healthy boys returned home after treatment
  - The long incubation period of the rabies virus gave the boys enough time to travel thousands of miles for the post-exposure vaccination



*Mother and child quarantined during the 1916 polio epidemic, Brooklyn, New York*





# An Iron Lung Ward

# The Polio Pioneers


1954 Polio Pioneers, Provo, Utah. Souvenir Button went to children who received all three shots.

# Vaccine Field Trial

- “Someone is giving out vaccine that might protect my child against polio? Where do I sign?”
- Parents signed a form in which they requested that their child be allowed to participate in testing of new vaccine
- Words “permission”, “volunteer”, “test”, “experimental” were never used
- Parents had to “request” to “participate” in “trial”

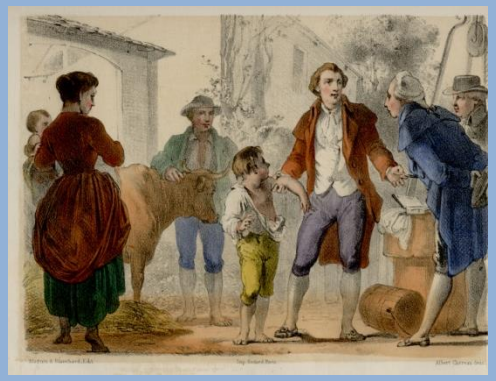
# Jonas Salk

# Polio Vaccine Trials

- 1949 isolation of polio virus
- School based field trial 15,000 public schools in 44 of 48 states
- Polio Pioneers..650,000 injected 1,180,000 controls
- 70% - 90% effective

# Let’s Not Forget the Children

## James Phipps



## Joseph Meister

## Polio Pioneers

## Table 1.1. Baseline 20th Century Annual Morbidity and 2007 Morbidity From 10 Infectious Diseases With Vaccines Recommended Before 1990 for Universal Use in Children: United States[a]

| Disease | Baseline 20th Century Annual Morbidity | 2007 Morbidity | % Decrease |
|---|---|---|---|
| Smallpox | 48 164[b] | 0 | 100 |
| Diphtheria | 175 885[c] | 0 | 100 |
| Pertussis | 147 271[d] | 10 454 | 93 |
| Tetanus | 1314[e] | 28 | 98 |
| Poliomyelitis (paralytic) | 16 316[f] | 0 | 100 |
| Measles | 503 282[g] | 43 | >99 |
| Mumps | 152 209[h] | 800 | >99 |
| Rubella | 47 745[i] | 12 | >99 |
| Congenital rubella syndrome | 823[j] | 0 | 100 |
| *Haemophilus influenzae* type b | 20 000[k] | 22[l] | >99 |

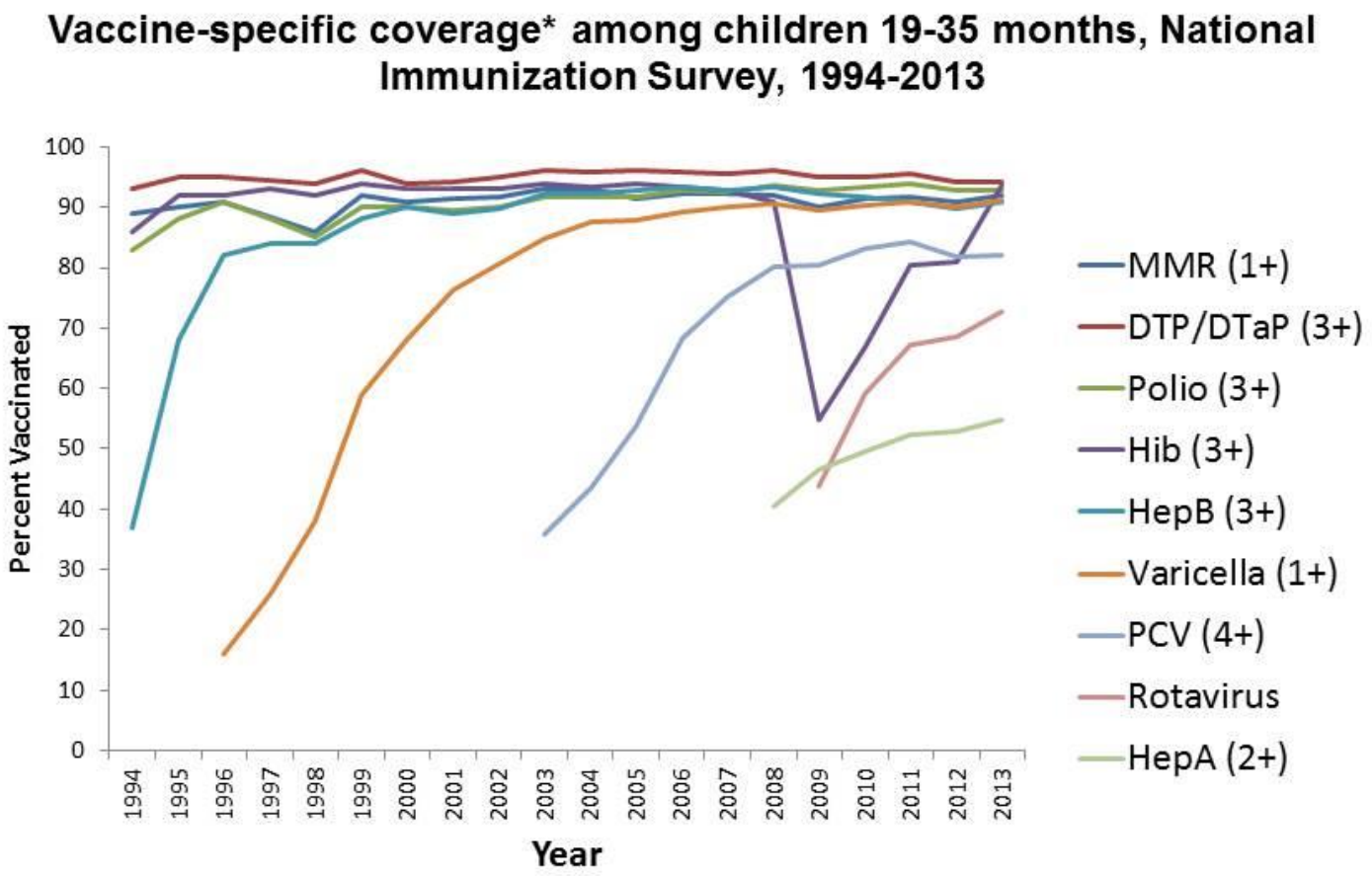
When I approach a child, he inspires in me two sentiments; tenderness for what he is, and respect for what he may become.

- Louis Pasteur

# Factors Contributing to Pediatricians' Success

- Protecting children
- School requirements
- Elimination of outbreaks of childhood diseases
- Harmonization with ACIP recommendations
- Improvements in the availability and delivery of vaccines
- Vaccine For Children's program
- Registries – Electronic Health Records
- Monitoring immunization coverage
- Advocacy

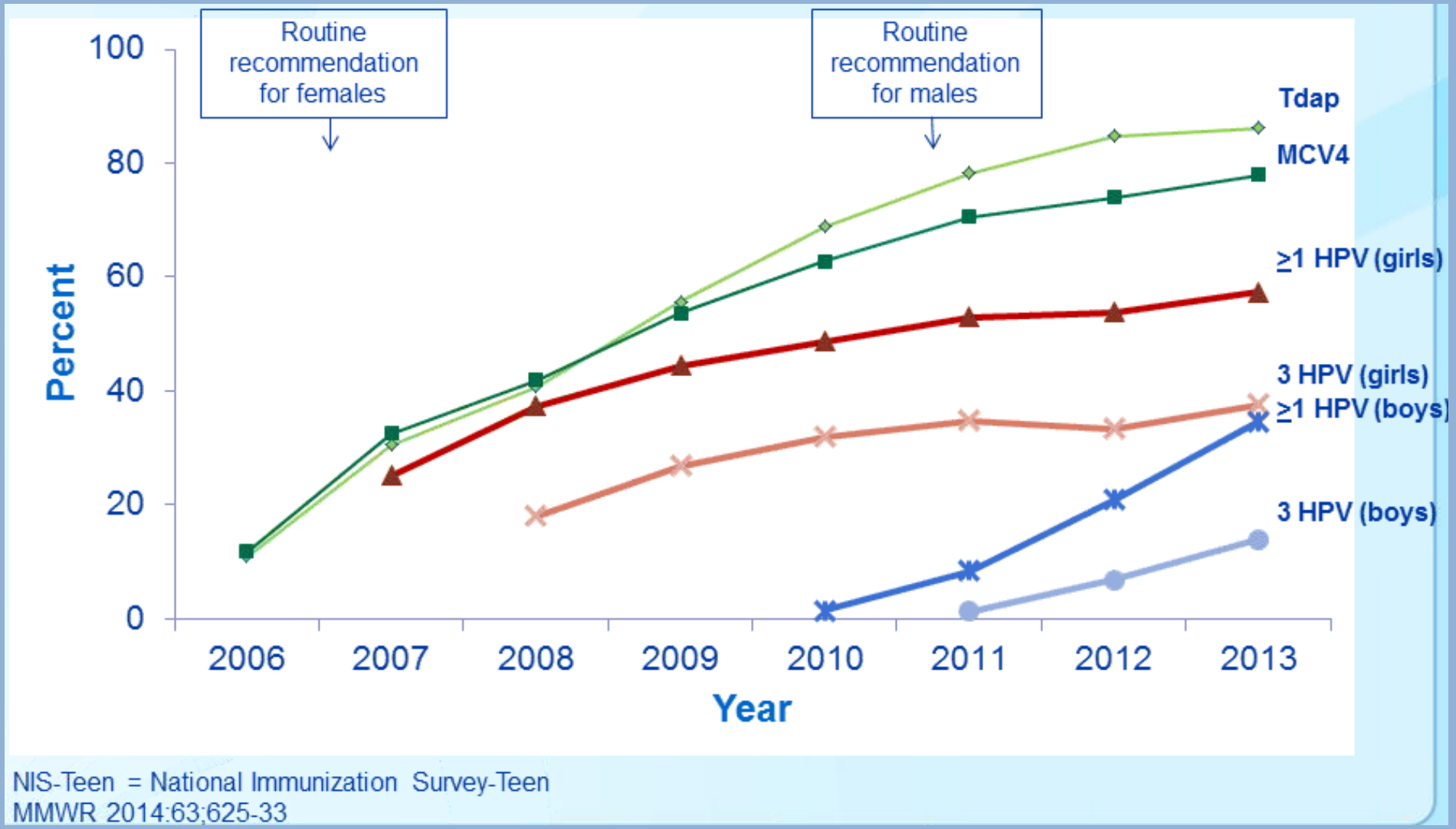
# Children 19-35 Months Vaccination Coverage, 1994-2013




* The *Healthy People* 2020 target for coverage is 90% for all vaccines with the exception of rotavirus (80%) and HepA (85%).

**Abbreviations:** MMR = measles, mumps, and rubella vaccine; DTP/DTaP = diphtheria, tetanus toxoids, and pertussis vaccine / diphtheria, tetanus toxoids, and acellular pertussis vaccine; Hib = *Haemophilus influenzae* type b vaccine; HepB = hepatitis B vaccine; PCV = pneumococcal conjugate vaccine; HepA = hepatitis A vaccine

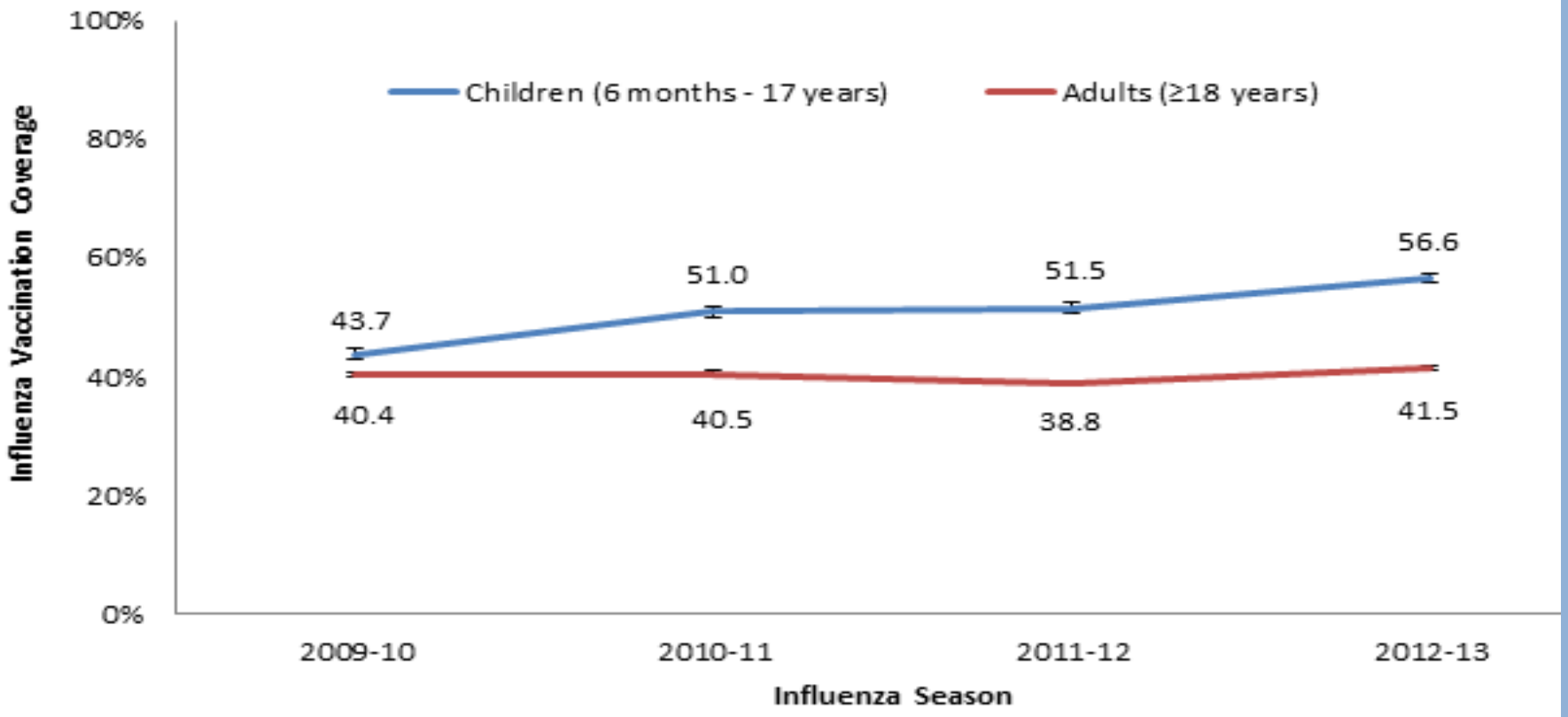
# National estimated coverage levels among adolescents 13-17 years NIS-Teen, 2006-2013




NIS-Teen = National Immunization Survey-Teen
MMWR 2014;63;625-33

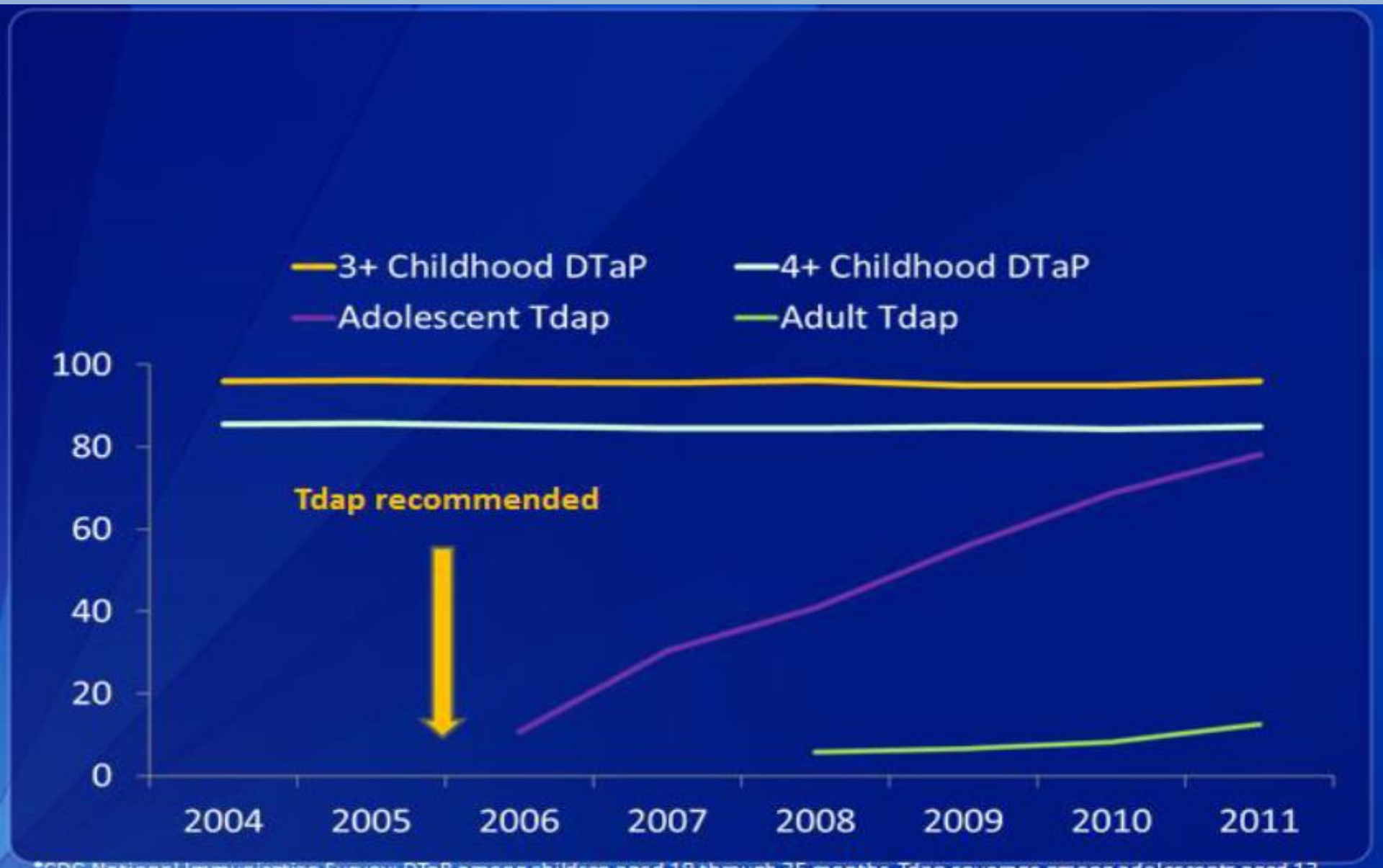
# Flu Vaccination coverage: Adults and Children 2009-2013

**Figure 1. Seasonal Flu Vaccination Coverage, by Age Group and Season, United States, 2009-2013**




Error bars represent 95% confidence intervals around the estimates.
The 2009-10 estimates do not include the influenza A (H1N1) pdm09 monovalent vaccine.
Adult estimates for the 2011-12 and 2012-13 seasons reflect changes in methods of the Behavioral Risk Factor Surveillance System (BRFSS) (addition of cellular telephone sample and new weighting methods).

# Tdap Vaccination Coverage: Children, Adolescents, and Adults, 2004-2011




*CDC National Immunization Survey: DTaP among children aged 19 through 35 months, Tdap coverage among adolescents aged 13 through 17 years. Coverage among adults aged 19 through 64 years from National Health Information Survey.

# Challenges of Disparities in Adult Immunizations

# Racial/Ethnic Vaccination Disparities – NHIS 2013

- Compared with 2012, racial/ethnic differences persisted for all six and widened for Tdap and herpes zoster
- Non-Hispanic blacks, Hispanics, and Non-Hispanic Asians had lower vaccination coverage than that of non-Hispanic whites for all of the vaccines routinely recommended for adults, except for:
  - PPSV/PCV13 19-64-HR -- Blacks had coverage similar to whites
  - Tdap 65+ -- Asians had coverage similar to whites
  - Hep A 19-49 – Blacks had coverage similar to and Asians had coverage higher than whites
  - Hep B 19-49 – Asians had coverage higher than whites
  - Herpes zoster 60+ – Asians had coverage similar to whites
  - Health Care Personnel (HCP) – Non-Hispanic black and Hispanic HCP had lower coverage than white HCP for Tdap, and Hispanic HCP had lower coverage than white HCP for Hep B

# Key Facts about Adult Immunization Disparities

- Disparities among older people
  - Shingles, influenza, and pneumococcal vaccination rates are higher among whites aged 60 years or older than blacks, Hispanics, and Asians of the same age
- HPV vaccination disparities in young women
  - Among young women 19-26, non-Hispanic whites have higher HPV rates than other racial/ethic groups
- Disparities in vaccination rates of healthcare personnel
  - Among healthcare personnel, whites have higher Tdap coverage than blacks, and higher Hepatitis B coverage than Hispanics
- Adult immunization disparities associated with lack of health insurance
  - The uninsured have lower vaccination rates than the insured

# What Can Be Done to Reduce Adult Immunization Disparities

- No single Intervention
  - Need for broad collaborative efforts, sustained over time
  - Cross-disciplinary efforts that leverages housing, transportation, education, and employment
  - Rooted in social determinants of health
- Surveillance
  - Identifying and monitoring disparities over time
- Evidence-based Interventions
  - Including reminder/recall systems, standing orders for vaccination, immunization registries, and improving provider awareness on the importance of vaccines for adults
- Promise of Healthcare Reform
  - Great opportunity to reduce disparities
  - Includes many race, ethnicity, and language-specific provisions

# Healthcare Providers Can Prompt Action

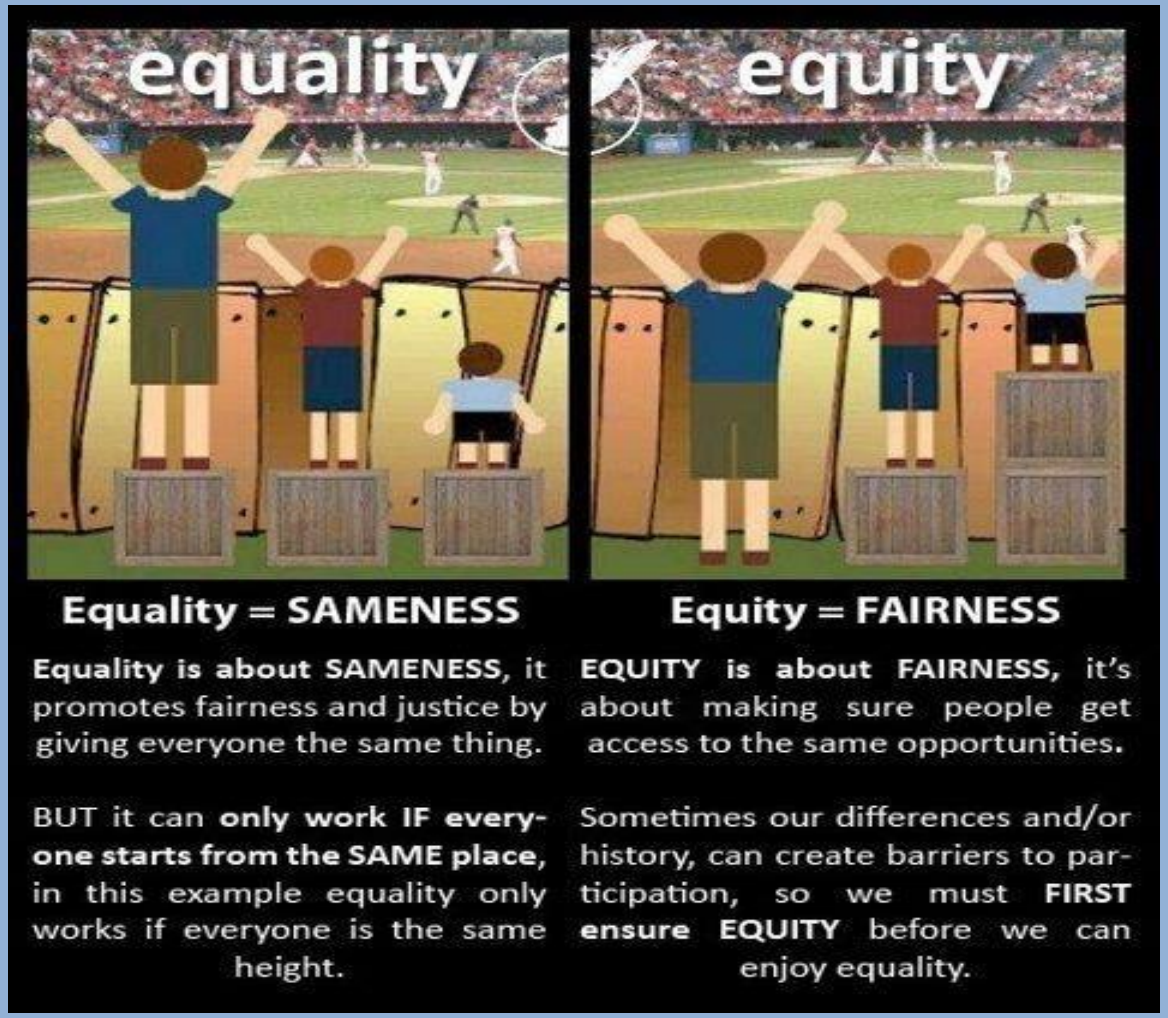
- Healthcare providers have a unique power to prompt action to reduce immunization disparities
- Positioned to collaborate with others
- Can find ways to reduce disparities within their own practice or clinic

*We should not allow vaccine uptake to be disparate*

*because vaccination is one of our most powerful tools to eliminate health disparities*

Tamera Coyne-Beasley, MD, MPH 2015

# To Raise Vaccination Rates and Reduce Disparities Think About Equity



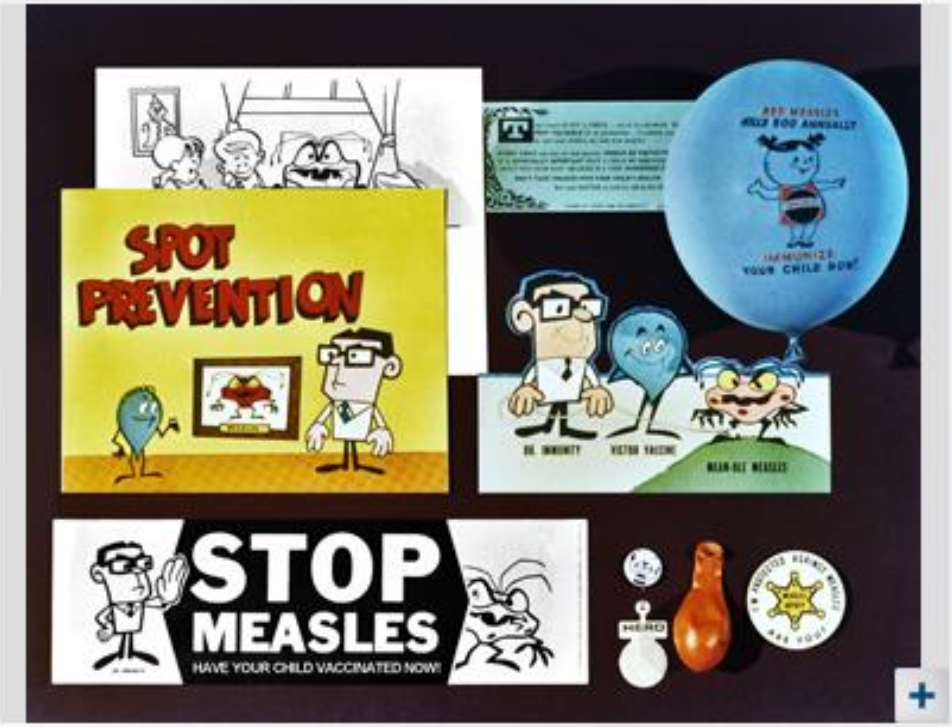
1706

## African Use of Variolation

Cotton Mather, a Boston minister (1663-1728), received a gift of a Libyan-born slave named Onesimus, who bore a scar from smallpox variolation in Africa. Mather inquired among other slaves and found that many had been variolated and thought themselves immune to the disease.

Later, Mather would read of variolation in English medical journals and promote the practice in Massachusetts.

# What Happens When Rates Aren't Raised Or Children Aren't Immunized

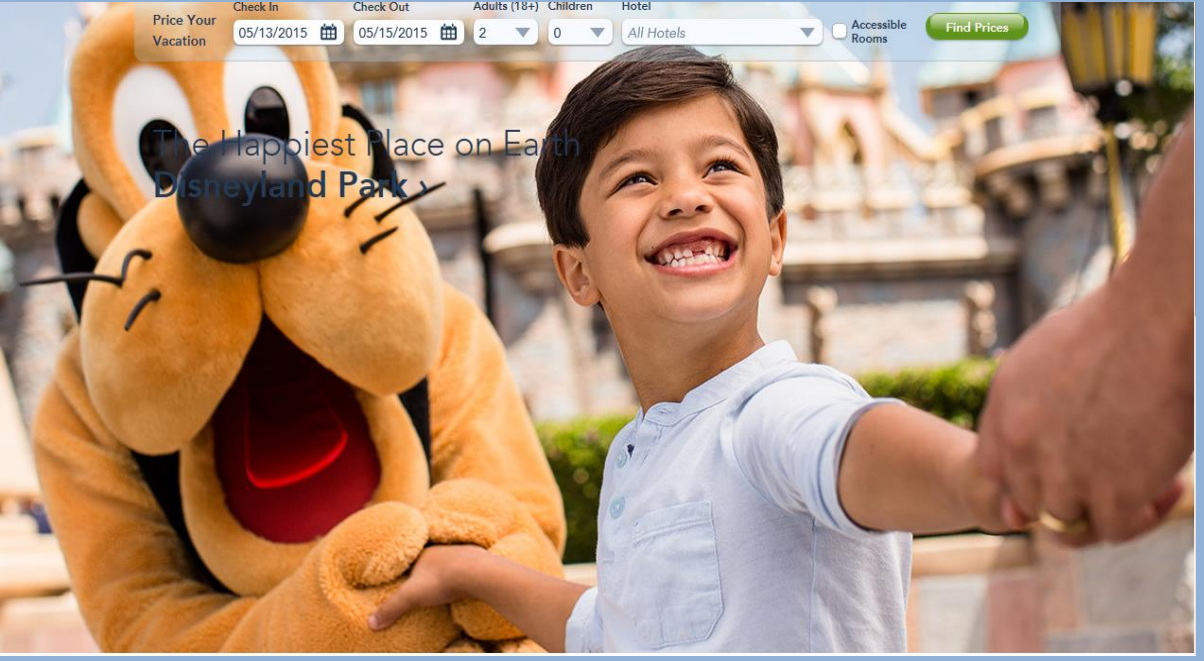



*Centers for Disease Control and Prevention*
**Promotion of measles vaccination**

2000

## Endemic Measles Eliminated From U.S.

Continuous transmission of measles was halted in the United States. However, U.S. residents remained at risk for infection from imported cases.





12/31/2014

## A Record Year for Measles in Elimination Era

The CDC reported 644 cases of measles in 2014, the highest number of U.S. cases in any year since measles was declared eliminated in 2000. December ended with a threat that would extend into 2015: between December 15 and December 20, visitors to Disneyland in Anaheim, California, were exposed to measles by an as-yet-unidentified index case. Cases quickly spread as primary contacts returned home and spread the illness to secondary contacts across the country. A small, unrelated outbreak of measles in Mitchell, South Dakota, added to the case count as the year ended.


**Daily Cartoon: Monday, February 2nd By Emily Flake**

# Despite Recent Measles Outbreak, Resistance To Vaccinations Persists

- Survey of more than 3,000 U.S. adults
  - 28% of households with children were still worried about vaccines, compared with about 13% of households without children
    - Adults with children cited side effects and vaccines as a cause of illness as the top concerns
  - 38% with children and 28% without children supported vaccination exemptions based on religious or personal beliefs
  - 91% of adults support mandatory vaccination for students in public school, unless medical reason not to vaccinate

Source: Truven Health Analytics-NPR Health poll (PDF) of 3,004 Americans interviewed from March 2-14, 2015. Margin of error: +/- 1.8 percent, Credit: Alyson Hurt/NPR

A 3 year old male who recently returned from a family trip to Disneyland 6 days ago develops a cough and watery eyes accompanied by a high spiking fever. He develops the rash pictured below:


*Source: Centers for Disease Control and Prevention.*

For how long is this child at increased risk of opportunistic infections?

A. 3 months
B. 12 months
C. 3 years
D. 15 years
E. 7-14 days

# MEASLES!!

- Of the many complications immunosuppression is the most lethal
  - Measles vaccination results in 50-90% reduction in all cause mortality in developing nations
- Measles virus directly infects lymphocytes
  - Lymphocytes restored in weeks
  - Resets adaptive immune system
- Predisposes to vicious superinfections
- Originally thought to last weeks to months
- Recent Science article by Mina et al. disputes this

*National Library of Medicine*
Benjamin Franklin

11/21/1736

## Franklin Loses Son

Benjamin Franklin's four-year-old son died of smallpox.

Rumors began to circulate claiming that the boy had been inoculated. Franklin published a denial and advocated inoculation.

> *"In 1736 I lost one of my Sons, a fine Boy of 4 Years old, taken by the Small Pox in the common way. I long regretted that I had not given it to him by Inoculation, which I mention for the Sake of Parents, who omit that Operation on the Supposition that they should never forgive themselves if a Child died under it; my Example showing that the Regret may be the same either way, and that therefore the safer should be chosen."*
>
> — Benjamin Franklin, quoted in *Franklin on Franklin* by Paul Zall

# Summary

- Lots to be learned from our experience with children
- We are victims of vaccination success
- Vaccine resistance and hesitancy must be overcome
- Improving regard for adults and elderly may be important
- Think about equity
- Vaccination can eradicate disease and eliminate health disparities

*Thanks for being a important part of the effort to increase adult vaccination!*

# Adults

# Acknowledgements


- Wally Brown, MD
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