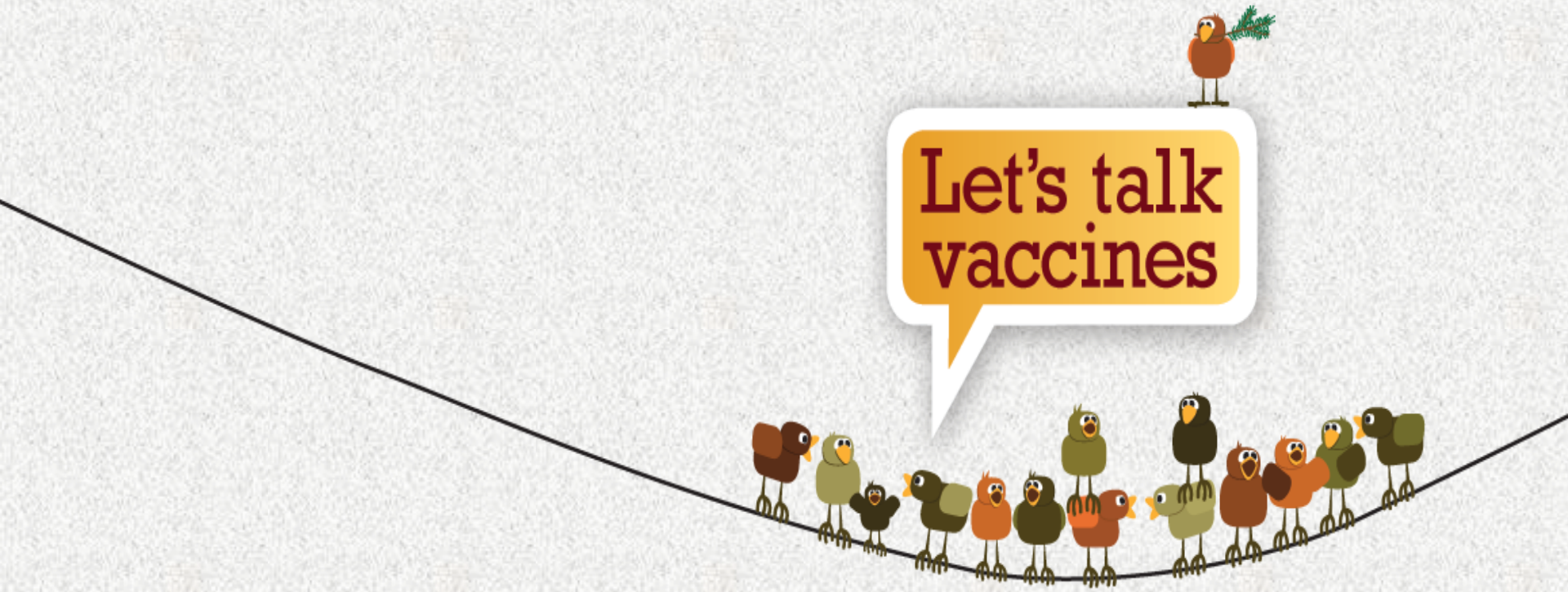

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Coke Salish by Sonny Assu (*www.sonnyassu.com*.)


BRITISH
COLUMBIA
Strait of
Georgia
VANCOUVER
ISLAND
SALISH
SEA
Nanaimo
Vancouver
CANADA
U.S.A.
Bellingham
VICTORIA
Everett
Juan de
Fuca Strait
PACIFIC
OCEAN
Puget
Sound
Seattle
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WASHINGTON
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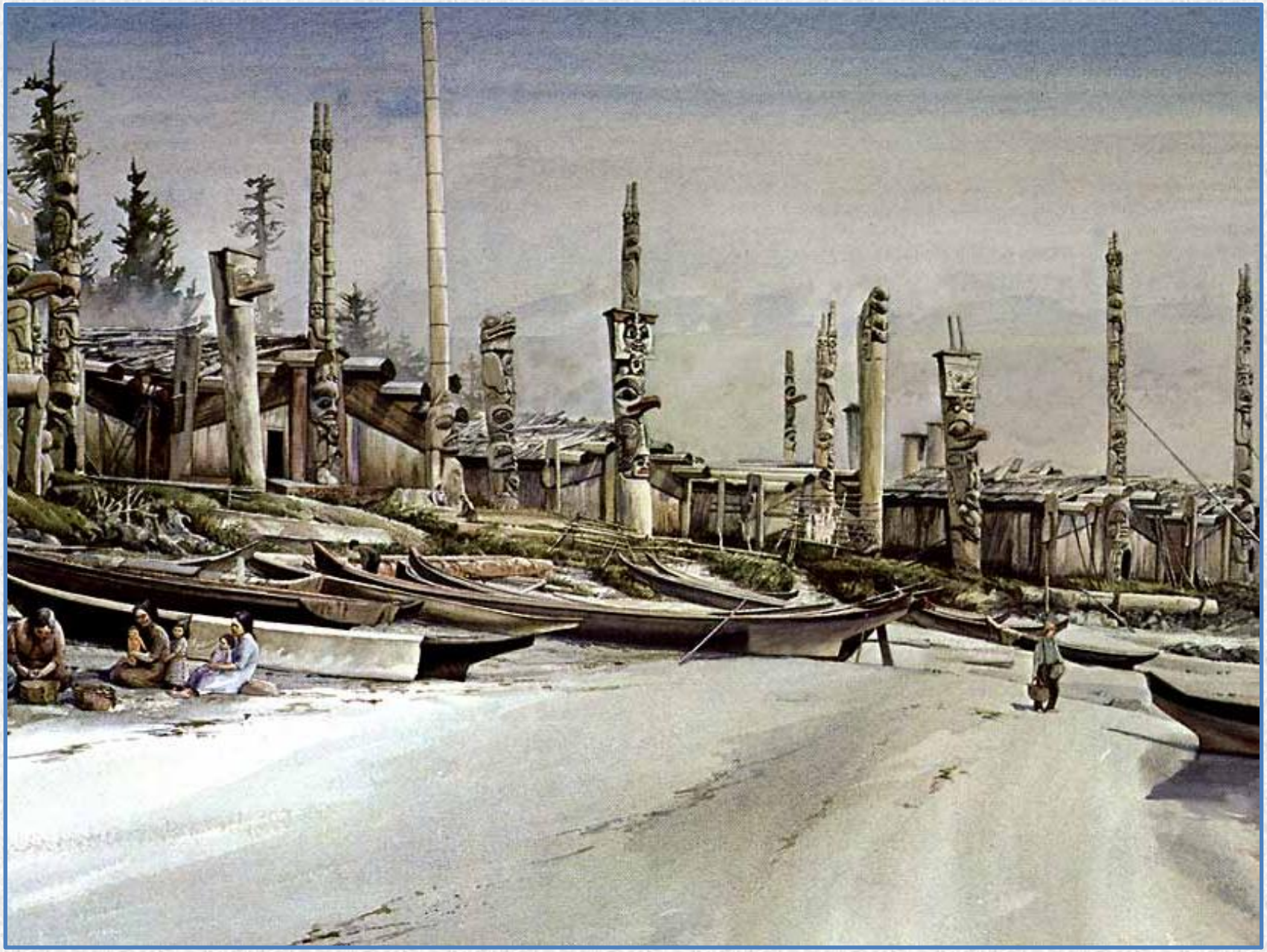


Smallpox in the Pacific Northwest

Captain Vancouver remarked in his journal in 1792 on the *"present apparent depopulation of the coastline"* – most notable among the Coast Salish peoples who lived on the shores of Puget Sound.

I frequently met with human bone during my rambles [and] encountered an Uninhabited Village nearly a half Mile long constructed with a good deal of regularity and ornament with a prodigious number of carved logs…which once gave lodging to many hundred"

Thomas Manby, Crewman

"Each of the deserted villages was nearly if not quite equal to contain all the scattered inhabitants we saw."

George Vancouver, Captain

Source: EA Fenn. *Pox Americana, The Great Smallpox Epidemic of 1775-82.* Hill &Wang, New York, 2001

Meningococcal A Conjugate Vaccine

PsA-TT (MenAfriVac)

2009:

> 88,000 cases

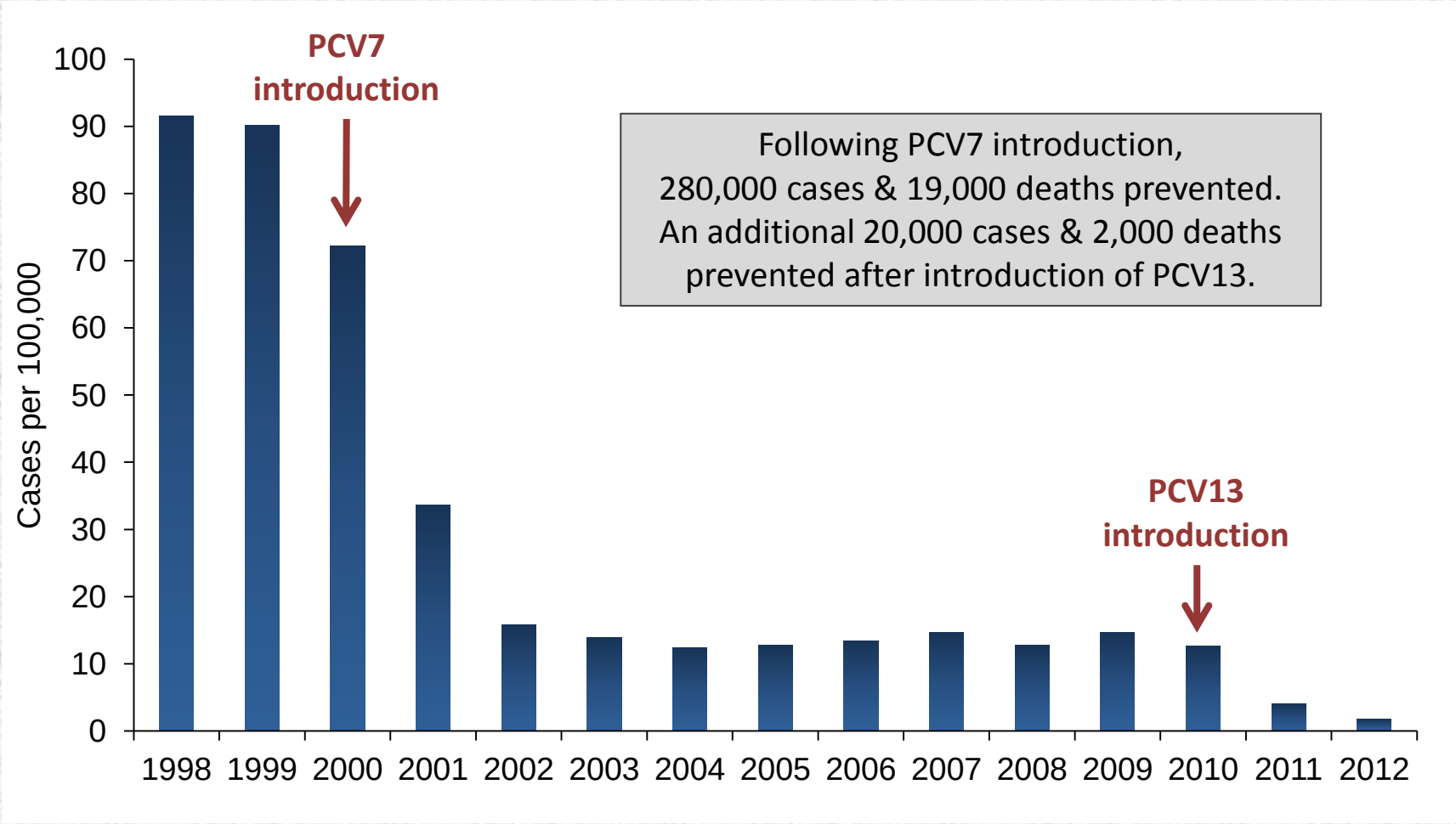
> 5000 deaths

2013, Jan 1-May 15:

9,250 cases

857 deaths

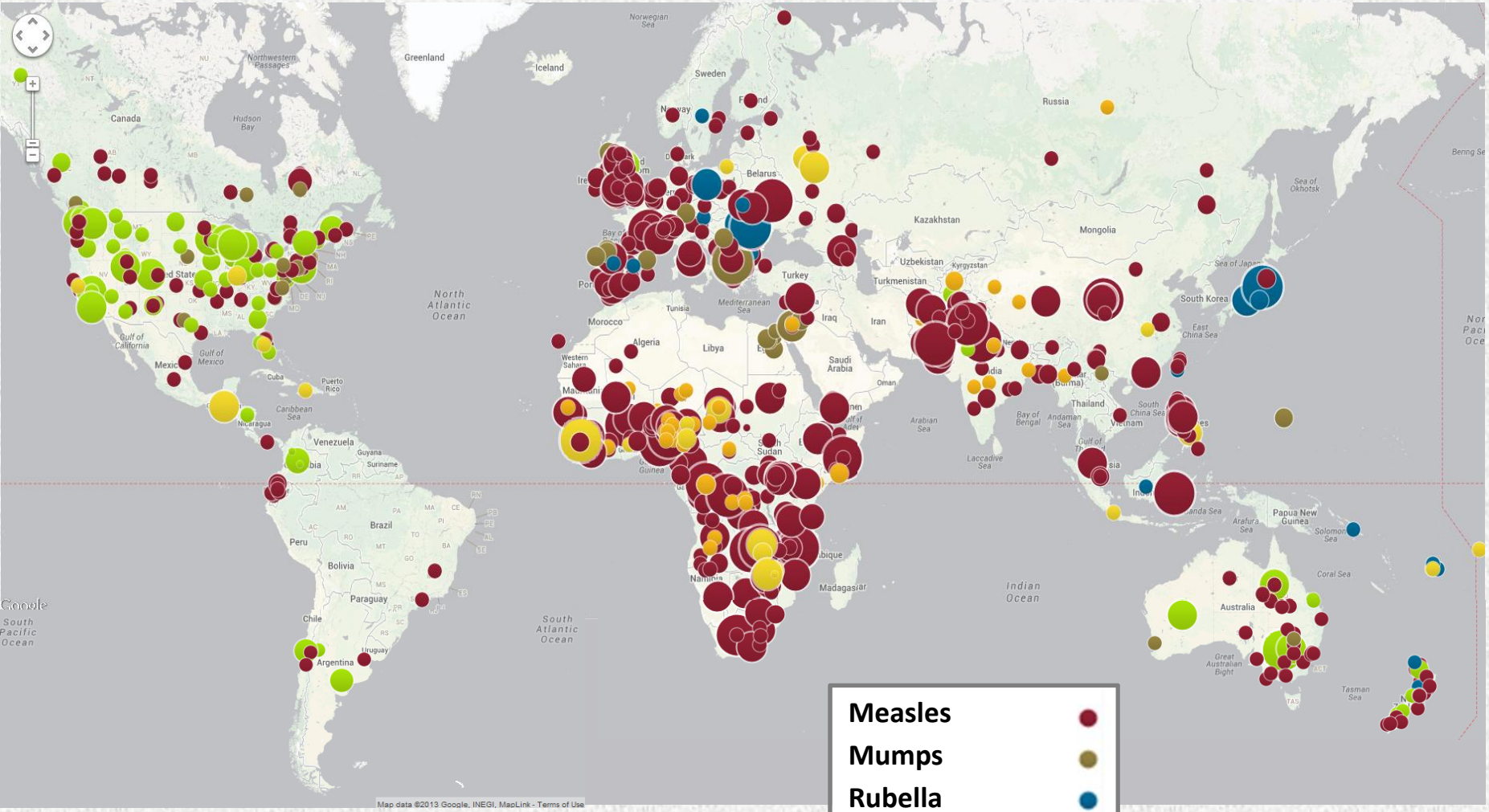
Summary Impact of PCV7 and PCV13 Introduction 1998-2012



Source: CDC, unpublished (used with permission from M. Moore)

Vaccine-Preventable Disease Outbreaks

www.cfr.org/vaccinemap



A Rising Tide of Immunization Hesitancy

2000

- 19% of parents do not think vaccines are proven safe

2004

- 92% of pediatricians report parental vaccine refusal

2008

- ~20% of parents now delay or refuse some vaccines

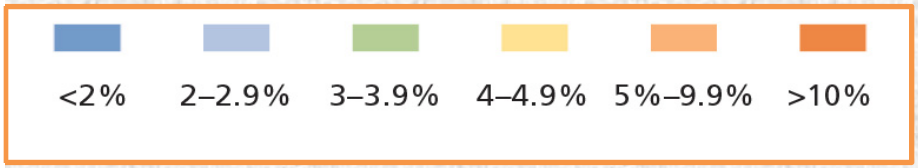
2010

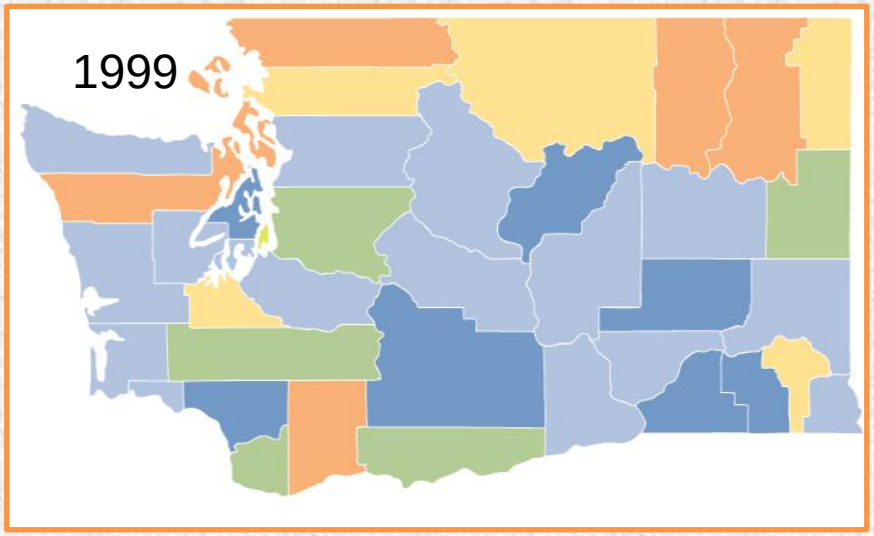
- >30% of parents now delay or refuse some vaccines

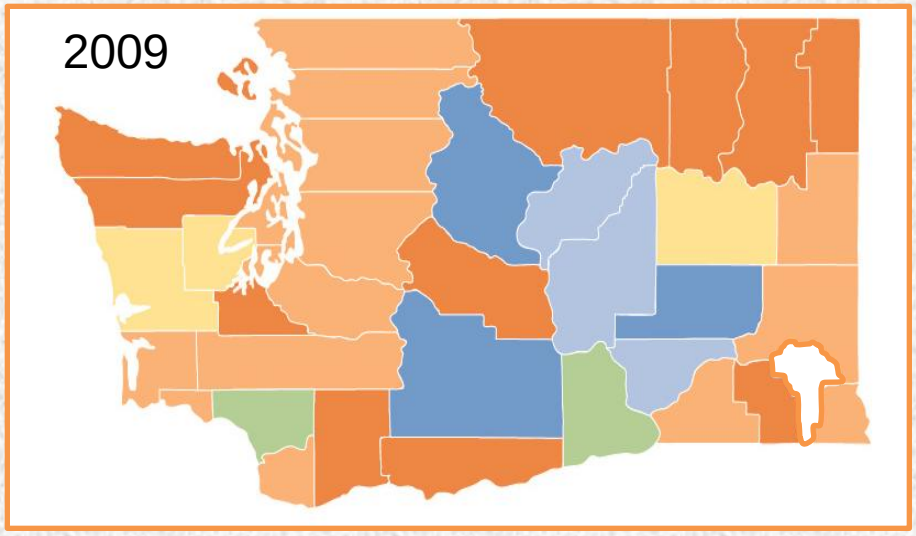
Sources: Gellin BG, et al. *Pediatrics* 2000;106(5):1097-1102; Freed GL, et al. *Am J Prev Med* 2004;26(1)11-14; Salmon DA, et al. *Arch Pediatr Adolesc Med* 2005;159(5):470-476; Gust DA, et al. *Pediatrics* 2008;122(4):718-725; Freed GL, et al. *Pediatrics* 2010;125(3):654-659; Smith P, et al. Poster, 2010 PAS Meeting, Vancouver BC

Source: B Gellin, 2014

Immunization Exemptions, WA State 1999-2009





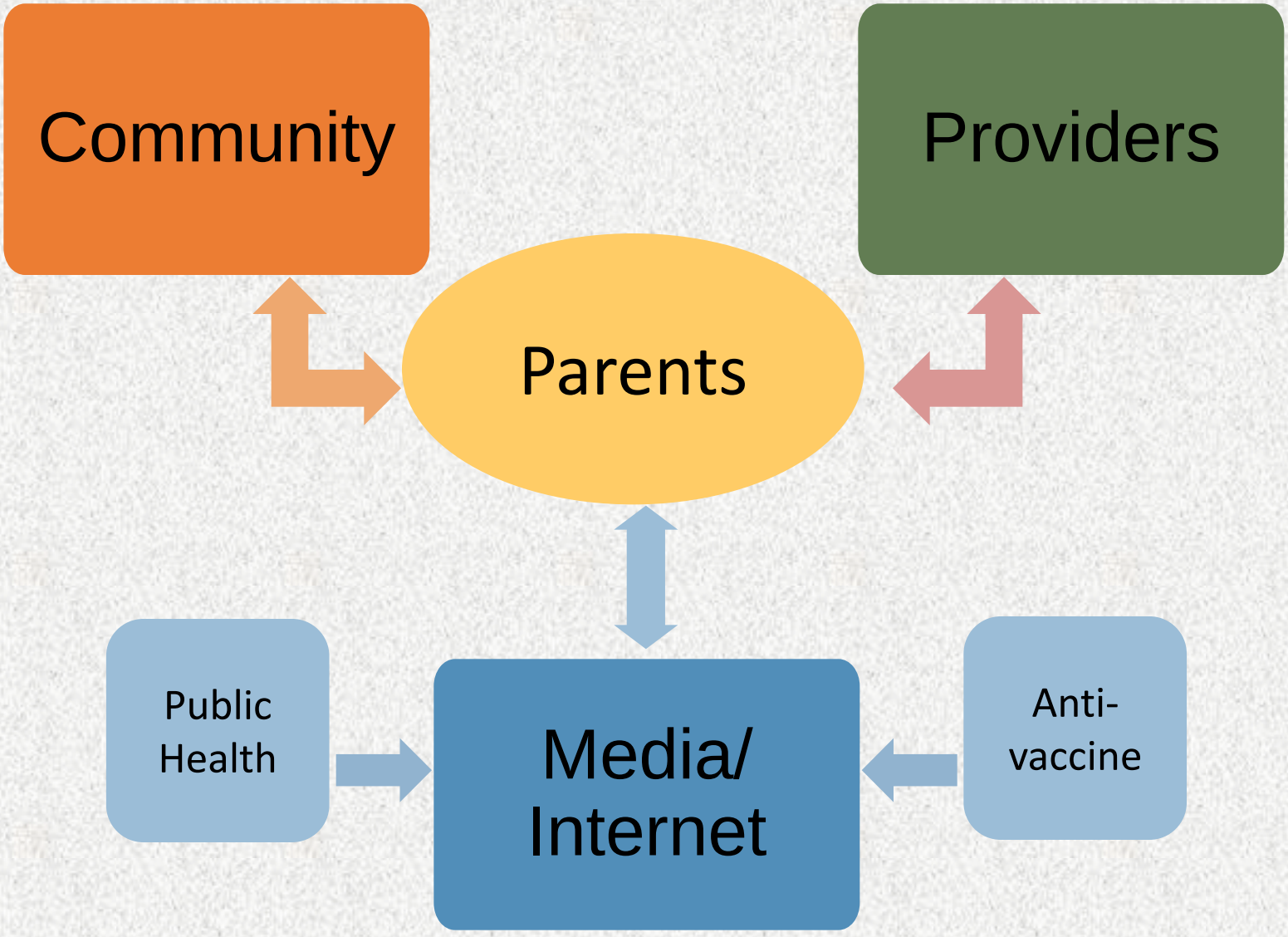


VAX NORTHWEST

Building Vaccine Hesitancy Solutions for WA State & Beyond

Vax Northwest is a group of community agencies collaborating to address immunization hesitancy in WA State by designing, implementing, & evaluating two innovative interventions for clinicians & communities.

Parents want to do what is best for their child…
but face a conundrum: *What to believe*?



Provider Intervention Study

- Based on application of social marketing principles; 3 years of needs assessment & pilot studies in WA State
- Modeled on a client-centered approach to communication with vaccine-hesitant parents & motivational interviewing techniques:
  - *Ask; Acknowledge; Advise*
- Randomized controlled trial in 56 clinics
- Assess:
  - Physician confidence – self-efficacy
  - Parent attitudes – vaccine hesitancy

Community Intervention Study

- Activate & directly engage parents who immunize
- Reinforce the value of a healthy local community using local data & expertise
- Train volunteer advocates in child & schools
- Develop tool kits, messages, other resources
- Use social media, earned media to support parents' engagement
- Assess:
  - Immunization attitudes
  - Policy changes
  - Exemption rates

Some of the Many Lessons We Have Learned

- **Interventions**
  - Clinicians, parents are willing to participate in provider intervention – vaccine hesitancy high-priority issue
  - Some communities concerned project could prove divisive
- **Assessment**
  - Logistically complex: change in days unimmunized is "gold standard" outcome, but very challenging – relied on intermediate outcomes
  - Need relatively large numbers of participants & high baseline rate of vaccine hesitancy to demonstrate statistically significant effects
- **Assumptions**
  - Emerging evidence challenges the utility of some immunization communication strategies:
    - Responding to misinformation
    - "Marketing" vaccine safety
    - Heightening concerns about growing numbers of vaccine-hesitant
  - Initial assumptions about effective parent-provider communication were simplistic
    - Were based on experience & expert opinion

Parent-Provider Immunization Communication

New research suggests how an immunization discussion is initiated affects the outcome:

- **Participatory**
  - *"Did you want to get some vaccines for him today?"*
  - *"So what are we going to do about vaccines today?"*
  - *"How do you feel about vaccination?"*
- **Presumptive**
  - *"It's time for some vaccines…we're going to be doing two live vaccines today: the MMR and the chicken pox."*
- **Effect on parent satisfaction**
  - *Preliminary analysis suggests presumptive approach increases vaccine uptake on that visit but decreases parent satisfaction!*

Sources: Opel DJ et al. *Pediatrics* 2013:132:6;1037-1046; Pediatric Academic Societies meeting, May, 2014 Vancouver BC

Centuries of scientific observation
and prophets wise have shown us:
what we know defines what we know not,
and that is where our future lies.

Carolyn Breese Hall

What we know not…

- How and when attitudes toward immunization are formed
- The relative weights of specific factors other than science-based information in vaccine decisions
- How & when to influence attitudes & beliefs
- Effectiveness of tailored messages
- The importance of peer-to-peer communication in vaccine decision-making or the utility of peer-to-peer community interventions

Myth of Science Illiteracy As a Root Cause

(Deficit Model)

- When the relation between science and society breaks down, science illiteracy is blamed
  - Vaccine hesitancy
  - Fluoridated water supplies
  - Global warming
  - Radiated food
  - Nuclear waste disposal
  - Genetically modified foods
- Science literacy accounts for only a small fraction of the variance of how lay publics form opinions about controversial areas of science
- All who raise questions about vaccines and immunization policies are not "*unable to understand concepts of risk (innumerate)*" or "*of low cognitive complexity*"

Source: Nesbit NC, Sheufele DA. *Am J Botany* 2009;96:1767-78

Knowledge, Attitudes & Beliefs

- Ideology, partisanship, political context, religious identity, values, trade-offs among benefits, risks & costs are far stronger influences than is science
  - Example: Acceptance of evidence of climate change by well-informed college graduates:

    More likely to <u>accept</u> if political party A

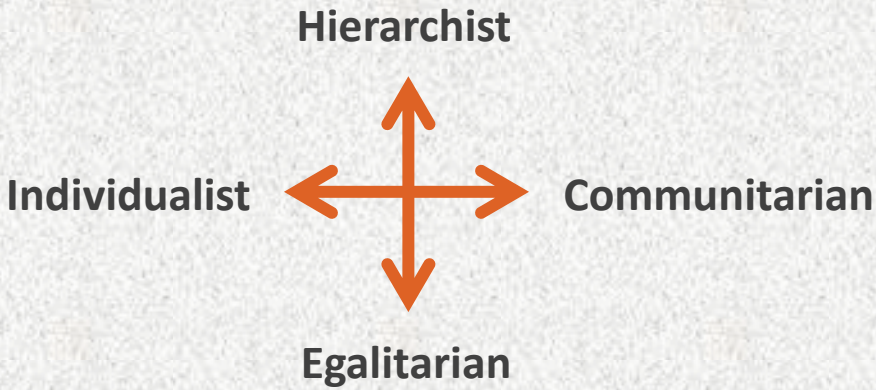
    More likely to <u>reject</u> if political party B

- Conflicts arise principally from differing values, perceptions, beliefs & fears – termed *cultural differences*

Sources: Nesbit NC, Sheufele DA. *Am J Botany* 2009;96:1767-78;
Mooney C. *Do Scientists Understand the Public?* 2010 www.amacad.org

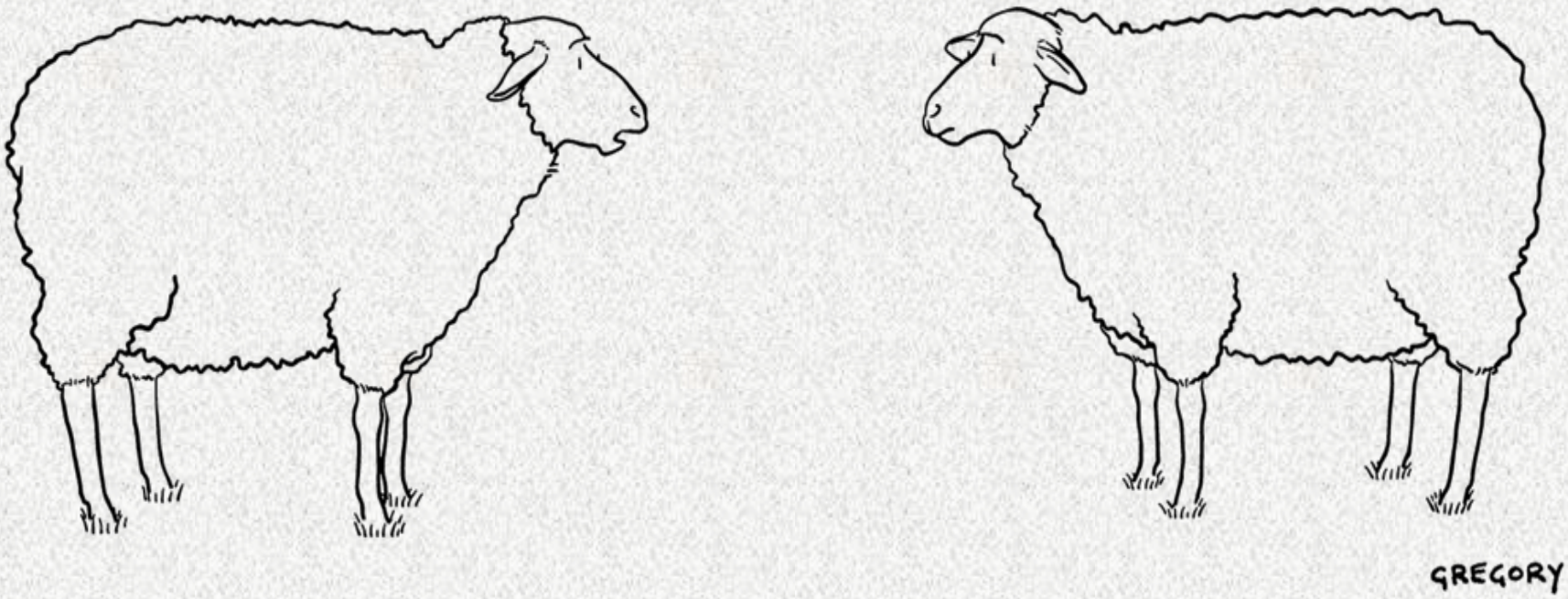
Cultural Cognition

- Even when expert consensus emerges on a complex issue, members of the public can't verify it for themselves.
- So what we choose to believe derives from our cultural world view:



- We rely on such short-cuts to deal with complexity

Source: Kahan DW, et al. *Law & Human Behavior* 2010;34:501-516



"Sure, I follow the herd—not out of brainless obedience, mind you, but out of a deep and abiding respect for the concept of community."

Implications of Cultural Cognition

- Relying on disseminating sound information to dispel disagreement is futile, because in deciding if the evidence is sound, individuals rely on their cultural evaluations

- The key is to frame…information in terms that make agreement "compatible with, rather than antagonistic to the commitments of individuals with diverse cultural persuasions"

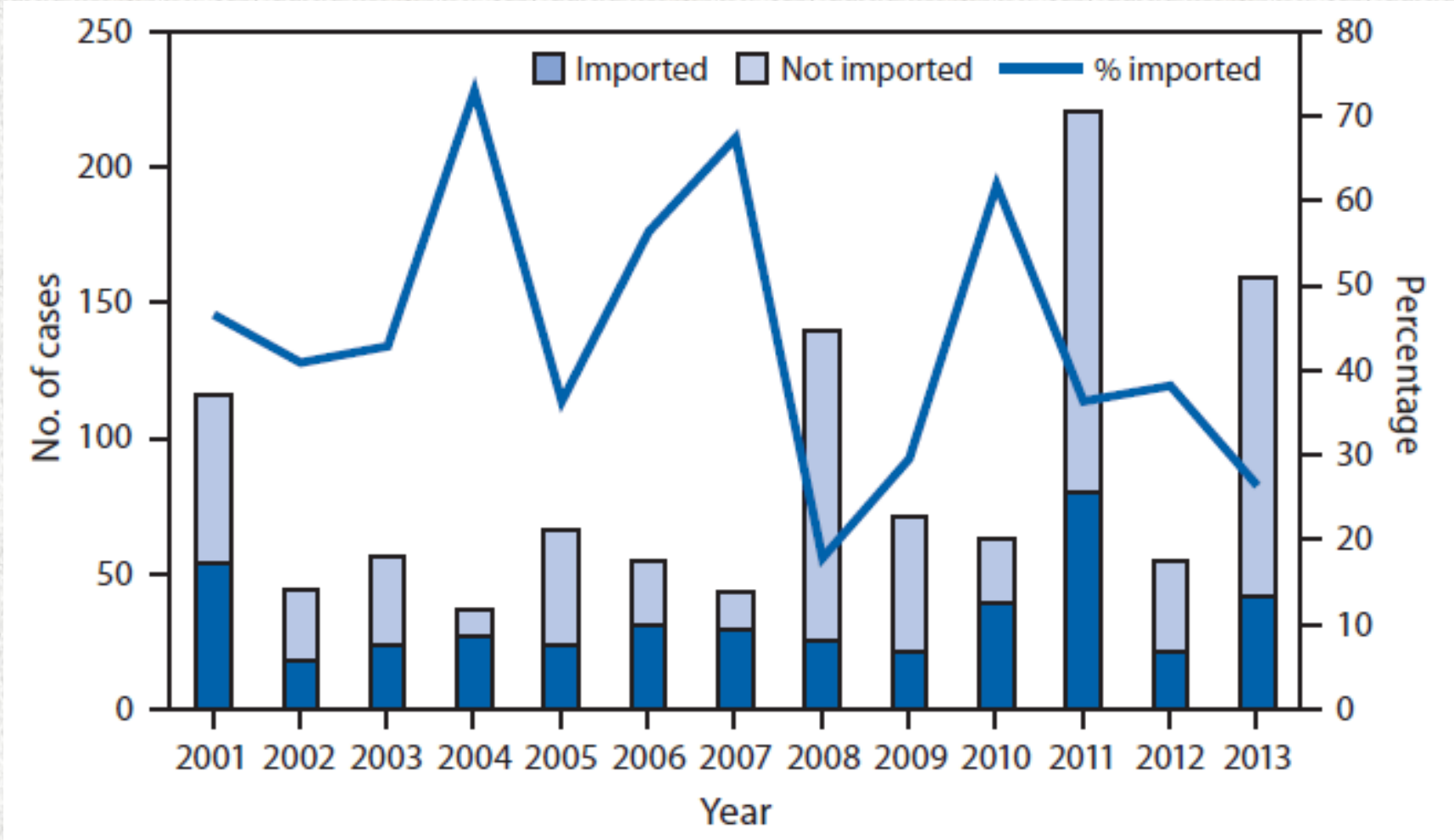
Source: Kahan DM. Cultural Cognition and Public Policy (2006) http://digitalcommons.law.yale.edu/fss_papers/103

Managing Values Conflict in a Democratic Society

- Addressing vaccine hesitancy requires more than insightful message framing & expert social marketing
- What should be the balance between:
  - the state's duty to protect the public health
  - an individual's right of free choice
  - at what point does the risk to the public health trump free choice?
- What disease risk balanced by what assurance of vaccine safety justifies an enforced mandate? What degree of coercion is warranted?
- What degree of societal consensus is required?
  - who should decide: public health, judges, legislators?

Source: Feudtner C, Marcuse E. *Pediatrics* 2001;107:1158-1164

Trend in Cases of Imported Measles as a Proportion of All Measles Cases, U.S. 2001-2013



Source: *MMWR* 2013,52(36):752-753

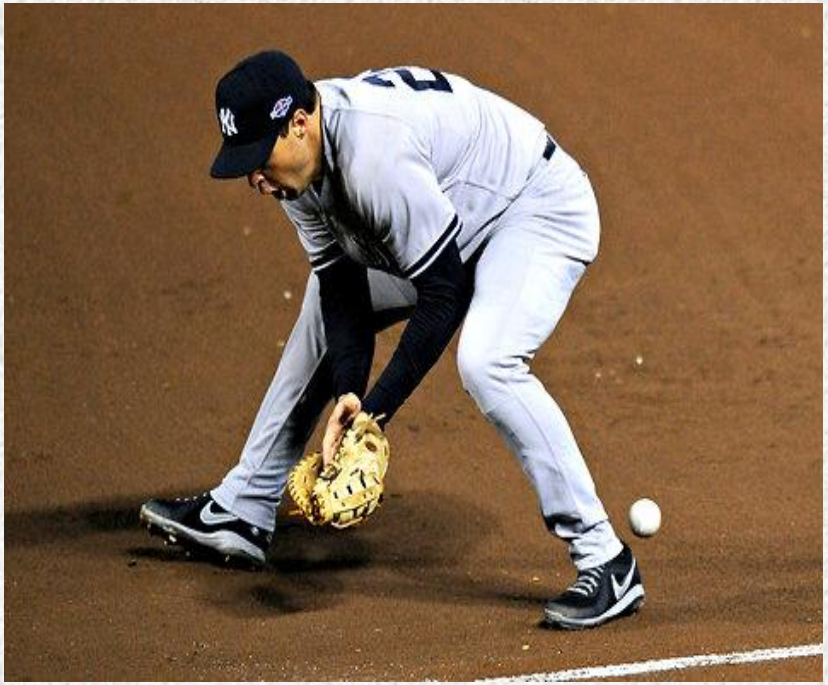
Conclusions

- Scope of vaccine hesitancy is unprecedented and widening
- Response to hesitancy emerging from the current immunization policy process appears inadequate
- Fear and compulsion have limited potential to sustain the immunization consensus needed
- We badly need evidence on how best to shape public knowledge, attitudes & beliefs to support immunization & public health
- Must shift from reactive to proactive long-term strategy
- Time to consider redesigning the policy-making process to involve additional expertise (communication, behavioral economics, anthropology…) and involve new stakeholders (business, information technology, education…)

Source: Adapted://www.amacad.org/multimedia/pdfs/publications/researchpapersmonographs/publicTrustVaccines.pdf

DO NOT FORGET THE FUNDAMENTALS!

Preliminary results from an ongoing analysis of national data suggest that the parents of most US measles-susceptible children have vaccine beliefs similar to those of parents of immunized children and that their children are susceptible primarily due to missed opportunities…



Newer Strategies for Vaccine Development

- Reverse vaccinology
- Adjuvants, including cytokines, TLR agonists
- Viral recombinants
- Defective particles replication
- Replicating vectors recombined with genes from pathogens
- DNA plasmids
- Gene delivery by invasive bacteria
- Transcriptomics and proteomics
- Induction of innate immunity
- Dendritic cell targeting
- Therapeutic vaccines

Source: Adapted from Plotkin, 2008,2011

Major Uncontrolled Infectious Diseases

Campylobacter
Chlamydia
Clostridium difficile
Cytomegalovirus**
Dengue*
Ebola
EBV
E. coli 0157
Helicobacter pylori
Hepatitis C
Herpes simplex**
HIV**
Hookworm
Influenza, Pandemic**
Malaria*
Norwalk**
Parainfluenza**
Parvovirus B19
RSV**
Schistosomiasis
Shigella
Strep, GpB**
Strep, GpA
Tuberculosis
Urinary tract infection
West Nile Virus

*Vaccine likely licensed by 2018
**Vaccine studies in humans underway

Source: Adapted from Plotkin, 2011; Englund, 2013

1954

World's First Pocket Radio

1987

World's First Conjugate Vaccine

2013

Google Glass

2047

?????

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and prophets wise have shown us:
what we know defines what we know not,
and that is where our future lies.

Carolyn Breese Hall