

Addressing Vaccine Hesitancy: Historical and Modern Perspectives

René F. Najera, MPH, DrPH, FCPP

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Statement on Conflicts of Interest

- No known personal, professional, or financial conflicts of interest
- I am not a physician, so none of what I will present should be considered medical advice
- The views and opinions in this presentation do not necessarily represent those of my employers, affiliated institutions, colleagues, friends, family, or cats

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The World Before and After Vaccines

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Vaccine Preventable Diseases in the United States

BEFORE:

- Smallpox: Millions of cases in cyclical waves each generation
- Rabies: ~100 human cases, thousands of domesticated animals
- Measles: 500k cases, 500 deaths
- Mumps: Everyone got it!
- Rubella: 12M cases, ~20,000 CRS cases
- Hib: 20K cases, 1K deaths
- Rotavirus: 2.7M cases, 50-60 deaths
- Pertussis: 270K cases, 10K deaths

AFTER:

- Smallpox: Last known human case in 1977
- Rabies: 1 or less human cases, ~500 domesticated animals
- Measles: Dozens in non-epidemic years, Hundreds in epidemic years, 0 to 1 deaths
- Mumps: Hundreds in non-epidemic years
- Rubella: 0 to 5 cases per year, mostly imported. No domestic cases of CRS.
- Hib: Handful of cases, 0 to 1 deaths
- Rotavirus: ~1.4M cases, deaths are rare
- Pertussis: ~2.5K cases, deaths are rare

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\$10.90

Dollars saved in medical and societal costs for every \$1 spent on vaccination programs
 (via VaccinateYourFamily.org based on an analysis of CDC data)

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A Quick Story

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Congenital Rubella Syndrome

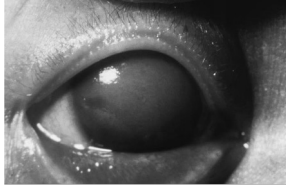
CRS caused by in utero exposure to Rubella virus.

Heart defects. Cataracts. Deafness. Neurological impacts. Autistic-like behavior. Death.

Not seen in developed nations with MMR coverage.

Last major epidemic in the US in 1964 to 1965. About 12.5 million cases, 11,000 pregnant women losing their babies, 2,100 newborns dying, and 20,000 CRS cases

1 in 100 newborns in Philadelphia diagnosed with CRS



3 year-old boy with cataracts due to CRS. Via CDC's Public Health Image Library.

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"Jane"

Born in the 1980s in the US. Never vaccinated due to parents' beliefs.

Married at 18 and traveled to Africa for a religious mission trip. Took Yellow Fever vaccine and Malaria chemoprophylaxis

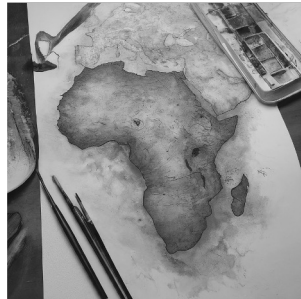
Contracted rubella during local outbreak. Was found to be pregnant when relief agency arrived with MMR.

Flown to Europe, where symptoms developed.

Fetus showed abnormalities on ultrasound.

Jane continued pregnancy.

Child born with CRS, died days later.



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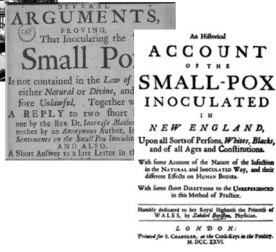
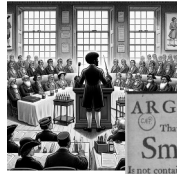
History of Anti-Vaccine Movements

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Before Vaccines

An enslaved man, Onesimus, explained to Cotton Mather in Massachusetts that variolation was used to make enslaved people more valuable, because they wouldn't get smallpox.

Mather consults with Boylston, and they recommend variolation. The people wouldn't have it. They attempted to firebomb Mather's home, and published defamatory claims.



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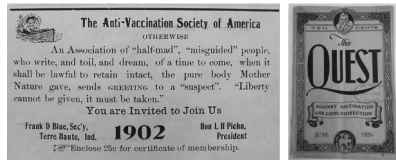
1796: The First Vaccine Arrives... And so did the memes.

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The 1800s

Smallpox vaccine replaces variolation. Anti-Compulsory Vaccination League in 1866 in the UK forms after vaccine requirements are codified.

Anti Vaccination Society of America was founded in 1879, inspired by British anti-vaccinationist William Tebb's visit to America. This was followed by the establishment of the New England Anti Compulsory Vaccination League in 1882 and the Anti-vaccination League of New York City in 1885.

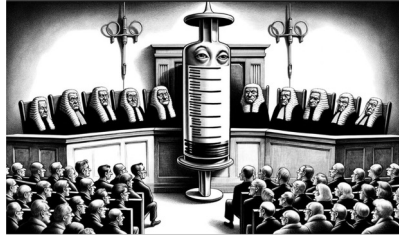


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The Early 1900s

Smallpox hits the ports over and over. Massachusetts mandates universal smallpox vaccination, with a fine if you don't comply. Henning Jacobson does not comply, and sues to not be fined.

In a 7-2 vote, SCOTUS upholds the power of the local governments (state) to use their police powers during emergencies to protect the general public.



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Accidents and Mishaps

13 children die in 1901 when a horse named Jim catches tetanus and its serum is used to produce diphtheria antitoxin. Happens again with smallpox vaccine in New Jersey, 9 dead.

Biologics Control Act of 1902 leads to modern Food and Drug Administration.

In 1954, Cutter Labs in California sends out batches of polio vaccine without killing the virus. 56 paralyzed and five dead.

In 1976, a swine vaccine rushed to market due to pandemic fears is associated with increased risk of Guillain-Barré Syndrome.



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"DPT: Vaccine Roulette"

1982 documentary on association between DTP (Diphtheria, Tetanus, Pertussis) vaccine and seizures.

Documentary caused fear of all vaccines, increased lawsuits, and much disinformation.

Congress, Parents, and Vaccine manufacturers collaborated on National Vaccine Injury Compensation Program (VICP) in 1986.

Pertussis component was whole cell and replaced with acellular components in the early 1990s.



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Recent Trends in Anti-Vaccine Sentiment

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The Wakefield Fraud (1998)

British physician Andrew Jeremy Wakefield claims in a small case series that MMR vaccine causes syndrome that leads to autism. It is his "gut feeling" since the study fails to prove the link.

Investigative reporter Brian Deer discovers Wakefield was paid to find "dirt" on MMR vaccine, had a patent in the works for a measles vaccine, and data were manipulated in the study.

Wakefield is de-registered and cannot practice medicine in the UK. Moves to the US, where First Amendment protects his anti-vaccine speech.



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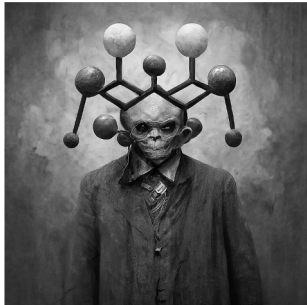
The Thimerosal Boogie Man

Thimerosal is a preservative and contains mercury salts (ethylmercury). This is NOT methylmercury, which is the toxin we worry about eating from fish.

Used since the 1930s.

Removed from most childhood vaccines in the US in early 1990s, "out of an abundance of caution." No evidence of harm, just public pressure to limit exposure to mercury.

Single-dose vaccines are thimerosal-free.



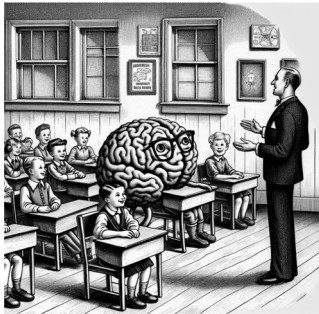
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The Vaccine-Autism Myth

Prevalence rates of autism have increased from 1 in 150 in 2000 to 1 in 36 in 2020. Better diagnostics and more acceptance.

Anti-vaccine sentiment has demonized autism. Science moves more toward autism as a variation of development.

Study after study has shown no causal association over the last 25 years. Autistic people need accommodations, not searches for "cures."



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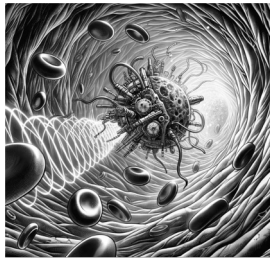
5G Chips, DNA Changes, and Other Myths

Physics states that any chip sending out radio would need a power source, and a powerful one at that.

Biology states that anything corrupting the host DNA will lead to cell damage, but nothing in vaccines integrates with DNA. Otherwise, gene editing would be easy to do.

Numerous large, methodologically sound studies have looked at the now billions of mRNA vaccines given, and no causal association with "died suddenly" has been found.

Pharmaceutical companies did not trademark "COVID" decades ago.



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Recent Accidents and Mishaps

In 2010, porcine virus DNA was found in some rotavirus vaccine batches. Just the DNA, not viable virus. No harm reported.

In 2015, two children died and dozens sick in Chiapas, Mexico, died from *Staphylococcus* contamination in Hep B vaccines.

In 2018, two children died in Samoa when anesthetic used instead of saline diluent in MMR vaccine. A measles epidemic swept through, killing 83 children. Most cases and victims were unvaccinated.



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Emerging and Re-emerging Vaccine Preventable Diseases

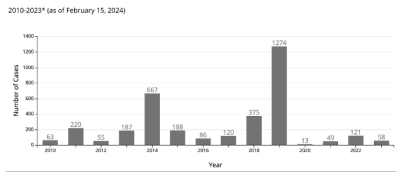
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Measles

2019 was a record year

Pandemic isolation cut that out, but bounced back in 2022

Per CDC: "As of February 15, 2024, a total of 20 measles cases were reported by 11 jurisdictions: Arizona, California, Georgia, Maryland, Minnesota, Missouri, New Jersey, New York City, Ohio, Pennsylvania, and Virginia."



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Pertussis

Cohort who got whole cell vaccine is older. Acellular immunity may be waning.

Prospective parents and caregivers should get booster dose. (Cocooning)

Localized outbreaks due to low vaccination rate (low herd immunity) and waning immunity.

Big risk to people with respiratory conditions; the elderly, and immune compromised.

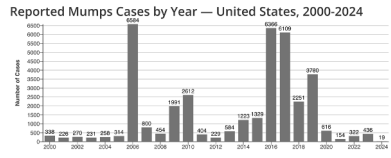
Reported NNDSS pertussis cases: 1922-2021



SOURCE: CDC, National Notifiable Diseases Surveillance System

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Mumps



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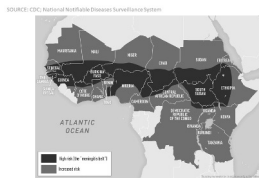
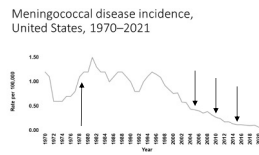
Meningococcal Disease

First vaccine licensed in 1978 for serogroups A, C, W, Y. Serogroup B not until 2015.

Trend down since late 90s.

Big problem in Africa's "meningitis belt."

Cross-protection with *N. gonorrhoeae*? (Trial underway)



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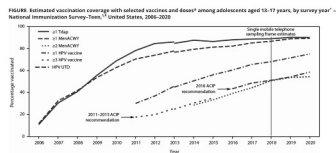
HPV

Vaccine uptake is stalling at around 60% for one dose and 50% for 3 or more doses

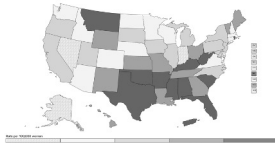
Uptake is inequitable, and so is the impact of cervical cancer in the United States

Texas has one of the highest rates in the US, with Black and Latinx people being most impacted

Australia is on pace to eliminate cervical cancer by 2035



Rate of New Cancers in the United States, 2020 Cervix, All Ages, All Races and Ethnicities, Female



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Diphtheria

No cases in the US since 2004, but...

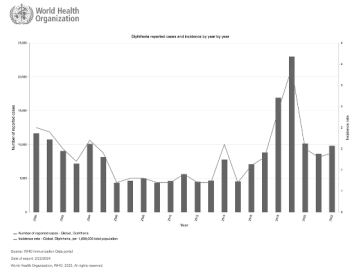
As of September 28, 2023, Nigeria has been dealing with a severe diphtheria outbreak since December 2022. The outbreak has resulted in 471 deaths, over 7,600 confirmed cases, and 12,000 suspected cases.

The Republic of Niger declared the outbreak on August 17, 2023, with 865 cases and 97 deaths reported across nine regions, primarily in the Matameye district bordering Nigeria.

In Guinea, 497 cases, including 14 confirmed and 483 suspected cases, and 58 deaths have been reported, primarily in the Kankan region.

Algeria has recorded 80 cases and 10 deaths in the Southern city of Tamanasset, affecting foreign nationals with no vaccination history.

65% of cases unvaccinated.



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Polio

Wild type 1 remains. 2 and 3 are eradicated. All cases in Pakistan and Afghanistan, but...

Wastewater surveillance in NYC, Jerusalem, and London showed someone was walking around with it.

Need to switch to injectable in places where OPV is used to prevent vaccine-derived polio.



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Mpox

Discovered in 1958. First human case reported in 1970.

Endemic in Africa. No competition from smallpox infection/immunity.

Epidemic (Pandemic?) in 2022-2023. About 87k cases and 112 reported deaths.

Declared PHEIC on July 23, 2022, mobilizing public health.

Smallpox vaccine 70-85% effective.



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The Four Types of Anti-Vaccine People

According to Dr. René

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Doesn't Know Better, But Wants To

- No advanced degree in science.
- Just a parent who wants the best for their kid and has heard stuff.
- Is reasonable but being influenced by other parents.
- Has heard horror stories but experienced none themselves.
- Needs clear explanations and not condescending speeches.
- Doesn't spread misinformation or shares their views with others.



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Doesn't Know Better and Is Activist

- No advanced degree in science.
- May or may not be a parent.
- Has heard stuff online and figured out what "they" don't want us to know.
- Will tell you all about the conspiracies. Shows up on social media posts. Copies/pastes without thinking.
- Buys products so long as they're not made by "them."
- Can be either liberal or conservative.



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Knows Better and Throws Around Their Titles

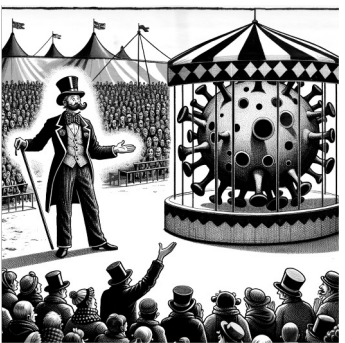
- Physician or healthcare provider, or scientist, makes unprovable claims or disinformation.
- Appears on a lot of interviews on talk shows and online.
- Has shown clear political or popularity ambitions.
- Sells a product or service.
- May or may not be litigious.
- Considers themselves a "maverick" because Boards have sanctioned them.



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The Showman

- Conspiracy theories get clicks and likes.
- Has a show online or on television. Or very active on social media.
- Not an expert. Not a scientist.
- Has shown clear political or popularity ambitions.
- Sells you a product to "detox" after vaccines, "cure" autism, or "naturally" prevent infections.
- Is usually litigious.
- Quack Miranda Warning: "These products are not intended to cure or prevent any disease..."



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Common Anti-Vaccine Talking Points and How to Talk About Them

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“Vaccines Are Not Safe!”

- Nothing is 100% safe or 100% effective. There are no utopias.
- Vaccines effectiveness depends on many factors.
- Some will have adverse reactions
 - Important to know medical history
 - If vaccine can do that, imagine what the disease would do?
- Who confirms vaccine safety?
 - Government: CDC, FDA, NIH State/Local Health Departments
 - Academia: Researchers
 - Pharmaceuticals: They compete with each other
 - Public: Nonprofits keeping an eye out and the public reporting adverse events



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“Why Vaccinate Against an Eliminated Threat?”



- We do not live in a bubble. Someone with polio can travel from Central Asia to the US in about 18 hours by plane.
- Animal reservoirs exist for many diseases, and the only thing controlling them is community (herd) immunity in humans, and animal immunization programs.
- If we stop, many diseases will return. (See measles.)

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“I Still Got Sick!”

- Vaccine efficacy is ability to prevent disease, not infection
- “Sterilizing immunity” is difficult to prove
- Primed immune system clears infection often before symptoms appear
- Naive immune system doesn't respond in time to infection, leading to disease
- Evidence shows those immunized have lower risk of hospitalization and death if they do show signs/symptoms of infection



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“You’re in It for the Money”



- In reducing disease rates, vaccines actually take away work from healthcare providers
- Vaccines are given in combination, reducing office visits (copays)
- Reimbursement for vaccination is not a major source of revenue
- “Have you seen my student loan debt?”

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Talking to Vaccine-Hesitant or Anti-Vaccine Parents

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First Things First: Keep Them In Your Practice



- Each interaction is an opportunity for change.
- Are they refusing all vaccines or some vaccines? If some, which ones?
- Are they otherwise following your medical recommendations?
- Weigh the risk to your other patients. Are you clustering them into practices that will see them if you dismiss them?
- Set expectations and explain consequences clearly.

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Give More Info, Find "Champions"



We listen to people who are like us. Find parent "champions" willing to reach out to talk to vaccine-hesitant parents.

Reach out to parent-led organizations. Or to organizations focusing on your patients' demographics.

Always offer more information, and make sure the information is not too technical and culturally competent/sensitive.

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Support Policies for Improving Vaccine Uptake

California eliminated non-medical exemptions, rates went up

Mississippi started allowing non-medical exemptions, coverage in kindergarteners dropped 3%

Vermont and Oregon require parental education from provider for non-medical exemptions

More paperwork, less non-medical exemptions

Looser non-medical exemptions, lower vaccination rates, higher risk of outbreaks



Via the National Conference on State Legislatures, 2019 data. Available at: <https://www.ncsl.org/health/states-with-religious-and-philosophical-exemptions-from-school-immunization-requirements>

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Conclusion

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Let History Inform You, Science Guide You

- Anti-science/vaccine sentiment has been around for centuries and probably will be around longer
 - Social media has amplified it
 - Social divisions has made it scary
 - Nothing new under the sun
 - Vaccines have reduced suffering, saved lives
 - The evidence is there, historical and scientific
 - Most people are reasonable and will listen
 - Some people just want to watch the world burn
- Listen to parents' concerns
 - Avoid speeches, use examples
 - Be patient and understanding
 - Just like we do not exaggerate the risks of vaccination, do not exaggerate the risks of not vaccinating
 - Stick to the facts
 - Don't generalize random events
 - Do not exaggerate the benefits of vaccination, either
 - Keep up the good fight... You're doing great!

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Questions, Comments, Concerns?

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