

Myths, Lies and Rhetoric; Deconstructing the Anti- Vaccination Movement

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82HIES



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- The views expressed in this presentation are my own
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- I received no funding for this presentation
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What this talk ISN'T



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MYTH

An idea or story that is believed by many people but that is not true.

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LIE

To be or to stay at rest in a horizontal position.

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RHETORIC

The art or skill of communicating effectively, especially as a way to persuade or influence people.

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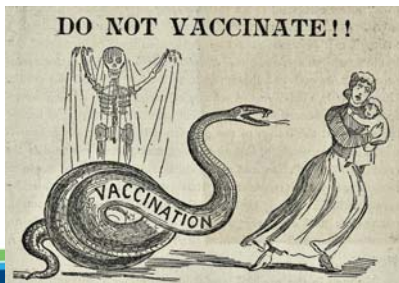
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STATISTICS

$$\begin{aligned}\hat{\beta}_{OLS} &= \frac{\sum (x_i - \bar{x})y_i}{\sum (x_i - \bar{x})^2} = \frac{\sum x_i y_i - \sum \bar{x} y_i}{\sum x_i^2 + \sum \bar{x}^2 - 2 \sum x_i \bar{x}} = \frac{\sum_{i=1}^{n_1} y_i - \frac{n_1}{n} \sum_{i=1}^n y_i}{n_1 + (n) \left(\frac{n_1}{n} \right)^2 - 2 \left(\frac{n_1}{n} \right) n_1} = \frac{\sum_{i=1}^{n_1} y_i - n_1 \bar{y}}{n_1 - \frac{n_1^2}{n_0 + n_1}} \\ &= \frac{\frac{1}{n_0 + n_1} \sum_{i=1}^{n_1} y_i - \frac{n_1}{n_0 + n_1} \bar{y}}{\frac{1}{n_0 + n_1} \sum_{i=1}^{n_1} y_i - \frac{n_1}{n_0 + n_1} \left(\frac{1}{n_0 + n_1} \sum_{i=1}^n y_i \right)} = \frac{\frac{1}{n_0 + n_1} \sum_{i=1}^{n_1} y_i - \frac{n_1}{n_0 + n_1} \left(\frac{1}{n_0 + n_1} \sum_{i=1}^n y_i \right)}{\frac{n_1 n_0 + n_1^2 - n_1^2}{(n_0 + n_1)^2}} \\ &= \frac{\left(\frac{1}{n_0 + n_1} \right) \left[\sum_{i=1}^{n_1} y_i - \frac{n_1}{n_0 + n_1} \left(\sum_{i=1}^{n_0} y_i + \sum_{i=1}^{n_1} y_i \right) \right]}{\frac{n_1 n_0}{(n_0 + n_1)^2}} \\ &= \frac{\left(1 - \frac{n_1}{n_0 + n_1} \right) \sum_{i=1}^{n_1} y_i - \frac{n_1}{n_0 + n_1} \sum_{i=1}^{n_0} y_i}{\frac{n_1 n_0}{n_0 + n_1}} = \frac{\frac{n_0}{n_0 + n_1} \sum_{i=1}^{n_1} y_i - \frac{n_1}{n_0 + n_1} \sum_{i=1}^{n_0} y_i}{\frac{n_1 n_0}{n_0 + n_1}} \\ &= \frac{\sum_{i=1}^{n_1} y_i}{n_1} - \frac{\sum_{i=1}^{n_0} y_i}{n_0} = \bar{y}_1 - \bar{y}_0\end{aligned}$$

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The First Anti-Vaxxers



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SMALLPOX

- AD 165 – 30% of Rome killed
- Today – 30% of New York City:

2,565,000



9

SMALLPOX

- AD 1700s – 400,000 killed per year (population Earth: 629-961 million)
- Today – 7.7 billion on earth

3.2 – 4.9 million



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SMALLPOX

- AD 1797 – vaccine studied



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SMALLPOX

- AD 1853 – Vaccination Act
- AD 1866 – Anti-Compulsory Vaccination League



PENNSYLVANIA ACADEMY OF THE ARTS
FOUNDED 1761

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SMALLPOX

- Last Smallpox case in the developed world: 1949
- Last Smallpox case worldwide: 1977
- WHO declared eradicated: 1980



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1. VACCINES KILL BABIES (ergo, we should not vaccinate)



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NON SEQUITUR

An argument whose conclusion does not follow from its premises.



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WE ACCEPT

- Motor Vehicle Accidents: 1,399
- Second hand smoke → SIDS: 776
- Drowning: 702
- Death from guns: 448



deadlier than



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VAERS

Voluntary
Imprecise
No Causality



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Risk, VAERS method

VAERS: 165 deaths in 2018

CDC: 300,000,000 doses/year

Risk of death: 1:1.8 million



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Risk, VICP method

Between 2006 – 2016

3.1 billion vaccine doses

3,597 claims paid

Risk of harm: 1:1 million



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Risk for comparison

| METHOD | RAW RISK | PROBABLE ACTUAL RISK |
|-------------------------|----------|----------------------|
| VAERS – death | 1:8M | 1:3.6M |
| VICP – compensable harm | 1:1M | 1:2.9M |

- To avoid distraction in the details, consider the absolute risk of a serious outcome from a vaccine to be 1:1M
- This is what most vaccine manufacturers use in their labelling



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RISK:
1 : 1,000,000



RISK vs BENEFIT

HARMED

2,100

SAVED

42,000



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MYTH BUSTED!

For every 1 person harmed by a vaccine, 20 people live who would have died.

For every 1 person killed by a vaccine, 254 people live who would have died.



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2. THE HERD PROTECTS US

(ergo, *my* kid doesn't need it)



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CIRCULAR REASONING

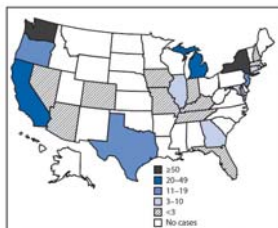
A fallacy in which the premise and the conclusion are essentially the same.

PERTUSSIS IN JAPAN

- 1940: 10,000 killed per year
- 1950: pertussis vaccine
- 1968: combined DTwP
- 1974: ZERO pertussis deaths
- 1975: safety concerns → pulled
- 1979: 41 deaths
- 1981: DTaP

WHOSE HERD?

Measles cases Jan 1 – Apr 26, 2019



MEDICAL ETHICS 101: JUSTICE



PENNSYLVANIA ACADEMY OF
FAMILY PHYSICIANS FOUNDATION

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MYTH BUSTED!

The herd is only as strong as its size
and members' compliance.

PENNSYLVANIA ACADEMY OF
FAMILY PHYSICIANS FOUNDATION

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3. Why would my un-vaccinated
kids be a threat to your
vaccinated kids, if you're so
sure that vaccines work?



your cards
someecards.com

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STRAW MAN

Arguing against an opponent by misrepresenting the opponent's position.



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MYTH BUSTED!



BEFORE



AFTER



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4. VACCINES ARE AGAINST RELIGION



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ASYNDETON

A style of writing in which conjunction are omitted.

TIMELINE OF RELIGIOUS LAW ON VACCINATION

- Hinduism 1600 BC
- Judaism 1300 BC
- Christianity 0 AD
- Roman Catholic 400 AD
- Islam 570 AD
- Amish 1700 AD
- **FIRST VACCINE 1796 AD**
- Jehovah's Witnesses 1870 AD

HINDUISM



JUDAISM



CHRISTIANITY



ROMAN CATHOLIC



ISLAM



PERSEUTYMANIA ACADEMY OF
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AMISH



PERSEUTYMANIA ACADEMY OF
FAMILY PHYSICIANS FOUNDATIONS

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JEHOVAH'S WITNESSES



PERSEUTYMANIA ACADEMY OF
FAMILY PHYSICIANS FOUNDATIONS

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LIMITS OF RELIGIOUS FREEDOM

“Parents are free to become
martyrs themselves. But it does not
follow they are free . . . to make
martyrs of their children . . .”



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MYTH BUSTED!

No major religion prohibits
vaccination.



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5. VACCINES ARE TOXIC



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EXEMPLUM

Providing an example that may be fictional to support a point.



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ALUMINUM

Total body
aluminum
at birth

➔ **0.4mg**

Total aluminum
load first year
of vaccines

➔ **4.225mg**



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ALUMINUM

| | |
|--------------------------------|---------------|
| 1 st year vaccines: | 4.225mg |
| Processed cheese: | 9mg/slice |
| Bread: | 15mg/slice |
| OTC antacid: | 70mg in 5mL |
| Restaurant pancake: | 182mg/serving |
| Minimum risk: | 1mg/kg/DAY |



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MERCURY

AKA
Thiomersal
Thimerosal



Ethyl(2-mercaptobenzoato-(2-)-O,S) mercurate(1-) sodium



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MERCURY

Single dose → 25mcg
multi-vial flu

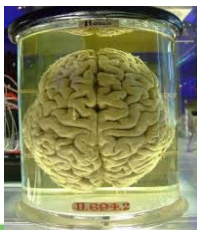


→ 50mcg



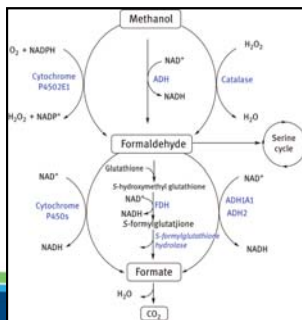
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FORMALDEHYDE



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FORMALDEHYDE



PERIYARVANA ACADEMY OF
ADVANCED POSTGRADUATE FOUNDATIONS

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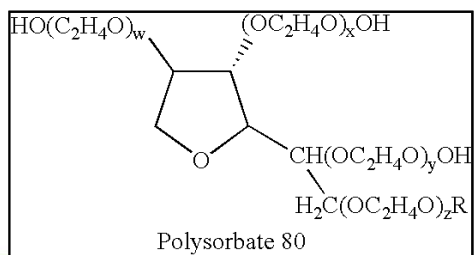
FORMALDEHYDE

Vaccine dose: 0.2mg
Milk: 0.1-0.3mg/kg
Fish: up to 200mg/kg
Avg. Adult diet: 100mg/day
Newborn: 1.1mg in body

PERIYARVANA ACADEMY OF
ADVANCED POSTGRADUATE FOUNDATIONS

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POLYSORBATE 80



PERIYARVANA ACADEMY OF
ADVANCED POSTGRADUATE FOUNDATIONS

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POLYSORBATE 80



MYTH BUSTED!

No component of any vaccine has the form
or quantity to pose a toxicity risk to
humans.

6. JENNY SAYS SO!



EPONYM

Referring to a specific famous person to evoke emotion and add credibility.



58

MYTH BUSTED!

For every 1 person harmed by a vaccine, 20 people live who would have died.

For every 1 person killed by a vaccine, 254 people live who would have died.



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7. BIG PHARMA PUSHES VACCINES FOR PROFIT



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AD HOMINEM

An argument made personally against an opponent instead of against the argument.



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PFIZER'S PROFIT

| DRUG | REVENUE* |
|------------------|----------|
| Pevnar | 1 |
| Lipitor (PATENT) | 13 |
| Lipitor | 2 |

* In billions of US dollars



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MYTH BUSTED!

Big Pharma grudgingly produces vaccines at a cost-per-product of 1 billion dollars per year.



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Estimating Disease Burden

Reported vs sampling

Outbreak vs baseline

Time to collect and collate



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Select Global vs US

| Disease | World-wide | | United States | |
|---------------|--------------|---------------|---------------|---------------|
| | Cases / year | Deaths / year | Cases / year | Deaths / year |
| Haemophilus | 340K | 30K | 5.5K | 0 |
| Varicella | 4.2M | 4.2K | 8.7K | 2 |
| Meningococcus | 1.2M | 50K | 350 | 35 |
| Pertussis | 151K | 160K | 18K | 13 |
| Measles | 353K | 110K | 1,241 (218) | 0 |

350,000

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Select Global vs US

| Disease | World-wide | | United States | |
|--------------------------|---------------|---------------|-----------------------------|---------------|
| | Cases / year | Deaths / year | Cases / year | Deaths / year |
| Viral Hepatitis | 2.3B | 1.4M | 73K (new) 3.2M (chronic) | 5,600 |
| Cervical Cancer from HPV | 371K | 189K | 33.7K | 2,940 |
| Influenza | 3-5M (severe) | 290-650K | 48.8M | 79K |
| Pneumococcus | 3.7M | 318K | 1M | 49K |

2,370,000

136,000




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| CAUSE | ANNUAL US DEATH RATE |
|------------------------------------|----------------------|
| Diseases of the heart | 647,000 |
| Malignant neoplasms | 599,000 |
| Accidents (all) | 170,000 |
| Chronic lower respiratory diseases | 160,000 |
| Cerebrovascular diseases | 146,000 |
| Alzheimer disease | 121,000 |
| Vaccine-preventable disease | 100,000 |
| Diabetes mellitus | 84,000 |
| Renal diseases | 51,000 |
| Suicide | 47,000 |

Thank you!


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AD MISERICORDIAM

An appeal to emotion that argues that a conclusion should be made based on feeling sorry for someone when that feeling is irrelevant to the conclusion.



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VAERS ADVERSE EVENT

A health problem that happens after vaccination (in time, may or may not be caused by the vaccine).



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VAERS SIGNIFICANT ADVERSE EVENT

| | |
|-------------------|-----------------|
| Death | Paralytic Polio |
| Anaphylaxis | Manu. Inserts |
| Encephalitis | Throm. Purpura |
| Chronic Arthritis | Any Acute Comp. |



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VACCINE

A substance used to provide immunity against disease without inducing the disease.



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IMMUNIZATION

The process whereby a person is made immune or resistant to a disease.



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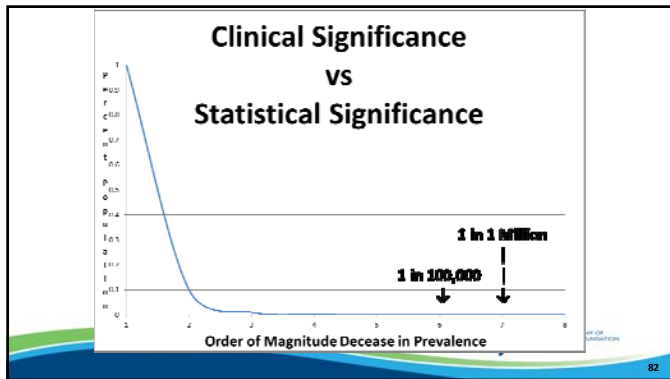
200

Estimated direct deaths from vaccine per year.

Dollars to prevent one death from vaccine preventable disease in third world.



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Likelihood

If you gave 2,000 pediatric vaccines
per year, you'd need, on average, to
practice for:

500 years

before you caused a single fatality.

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U.S. VACCINE MORBIDITY

| DISEASE | PRE | POST |
|--------------|------------------|---------------|
| SMALLPOX | 29,005 | 0 |
| DIPHTHERIA | 21,053 | 0 |
| MEASLES | 530,217 | 132 |
| MUMPS | 162,344 | 386 |
| PERTUSSIS | 200,752 | 10,007 |
| POLIO | 16,316 | 0 |
| RUBELLA | 47,745 | 17 |
| TOTAL | 1,007,432 | 10,542 |

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Vaccine Fast-Facts

 Risk of harm from vaccine = 1: 1,000,000 = Risk of being struck by lightning 
(<http://www.cdc.gov/vaccines/vac-gen/side-effects.htm>) (<http://www.lightningsafety.noaa.gov/odds.shtml>)



U.S Deaths per year (children)



Vaccines

200¹

<



Cars

700²

<



Vaccine
Preventable Disease

1,100³

¹ <https://vaers.hhs.gov/index>

² <http://www.iihs.org/iihs/topics/t/child-safety/fatalityfacts/child-safety>

³ composite: <http://www.cdc.gov/vaccines/pubs/pinkbook/downloads/appendices/E/reported-cases.pdf>



Lives saved per year by vaccines (US Children)



42,000

(Zhou F, Chefer A, Wenger J, *et al.* Economic Evaluation of the Routine Childhood Immunization Program in the United State, 2009. Pediatrics. 2014 Apr;133(4):577-85)

For every **1** child who dies from vaccination, **200** children live who would have died.
(composite, VAERS data, Zhou et al.)

Show me the Money?

Pfizer Profits, 2015

Revenue from PREVNAR
(the highest revenue-producing vaccine)

Revenue from Lyrica
(anti-epileptic medication)



\$1.31 Billion

<<

\$3.4 Billion



(<http://www.pharmacytimes.com/news/10-best-selling-brand-name-drugs-in-2015/P-6>)

<http://www.bloomberg.com/news/articles/2015-04-28/pfizer-cuts-2015-forecast-as-dollar-s-strength-cuts-into-sales>)
