Staying on the Defense:
Clinical Recognition of Vaccine Preventable Diseases

David C Fredenburg MD MPH MA FAAP

NH Immunization Conference

2019Sep26

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Following this session, participants will (or rather might had could) be able to:

1. Recognize the major features in the presentation of the diseases for which NH children are routinely vaccinated.
2. Explain the changing epidemiology of the current vaccine preventable diseases and impact of immunization or lack thereof.
3. Communicate the prevalence of vaccine preventable diseases, the success of vaccinations and risks of vaccine refusal in counselling of their patients and parents.

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Inoculation versus Vaccination

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Vaccinia vs Cowpox Inoculation

Progressive (necrotizing) Vaccinia

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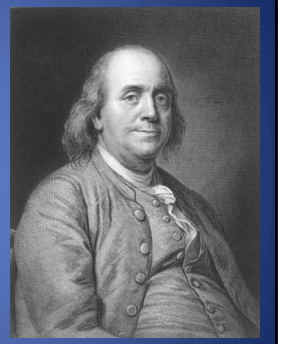
Clinical Recognition of Vaccine Preventable Diseases

In 1736 I lost one of my sons, a fine boy of 4 years old, by the smallpox…I long regretted bitterly and I still regret that had not given it to him by innoculation; this 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

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Clinical Recognition of Vaccine Preventable Diseases

In colonial times:

20% mortality 1st year of life from vaccine preventable disease;

and another 20% mortality by 5 years of age

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Where we're at…

Comparison of 20th Century Annual Morbidity and Current Morbidity: Vaccine-Preventable Diseases

Disease	20th Century Annual Morbidity†	2011 Reported Cases ††	Percent Decrease
Smallpox	29,005	0	100%
Diphtheria	21,053	0	100%
Measles	530,217	212	> 99%
Mumps	162,344	370	> 99%
Pertussis	200,752	15,216	92%
Polio (paralytic)	16,316	0	100%
Rubella	47,745	4	> 99%
Congenital Rubella Syndrome	152	0	100%
Tetanus	580	9	98%
Haemophilus influenzae	20,000	8*	> 99%

†Source: JAMA. 2007;298(18):2155-2163
††Source: CDC. MMWR January 6, 2012;60(51);1763-1775. (provisional 2011 data)
* *Haemophilus influenzae* type b (Hib) < 5 years of age. An additional 14 cases of Hib are estimated to have occurred among the 237 reports of HI (< 5 years of age) with unknown serotype.

CDC
National Center for Immunization & Respiratory Diseases
Historical Comparisons of Vaccine-Preventable Disease Morbidity in the U.S.

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Clinical Recognition of Vaccine Preventable Diseases

- Global vaccinations
  - saves 3 million lives annually;
  - still 2 million are lost from lack of vaccination;
- Despite reasonable access to vaccines:
  - 50,000 - 70,000 adults die each year in US from vaccine preventable illnesses;
  - ~ 300 deaths annually in children

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Recommended Childhood Vaccine Schedule 1982

(adapted from Gellin, B. *IOM Committee on Assessment of Studies of Health Outcomes Related to the Recommended Childhood Immunization Schedule, 2010)*
http://www.iom.edu/~/media/Files/Activity%20Files/PublicHealth/ChildhoodImmunization/Gellin%20Presentation.pdf

	2 mo	4 mo	6 mo	12 mo	15 mo	18 mo	4 – 6 yr
Diphtheria, Tetanus, Pertussis	DTP	DTP	DTP		DTP		DTP
Polio	OPV	OPV	OPV				OPV
Measles, Mumps, Rubella				MMR			

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Recommended Childhood Vaccine Schedule US, January 1995

(Gellin, B. *IOM Committee on Assessment of Studies of Health Outcomes Related to the Recommended Childhood Immunization Schedule, 2010)*
http://www.iom.edu/~/media/Files/Activity%20Files/PublicHealth/ChildhoodImmunization/Gellin%20Presentation.pdf

Vaccine	Birth	2 Months	4 Months	6 Months	12† Months	15 Months	18 Months	4 - 6 Years	11-12 Years	14-16 Years
Hepatitis B§	HB-1	HB-2		HB-3						
Diphtheria, Tetanus, Pertussis¶		DTP	DTP	DTP	DTP or DTaP at ≥15 months			DTP or DTaP	Td	
H. influenzae type b**		Hib	Hib	Hib	Hib					
Poliovirus		OPV	OPV	OPV				OPV		
Measles, Mumps, Rubella††					MMR			MMR or MMR		

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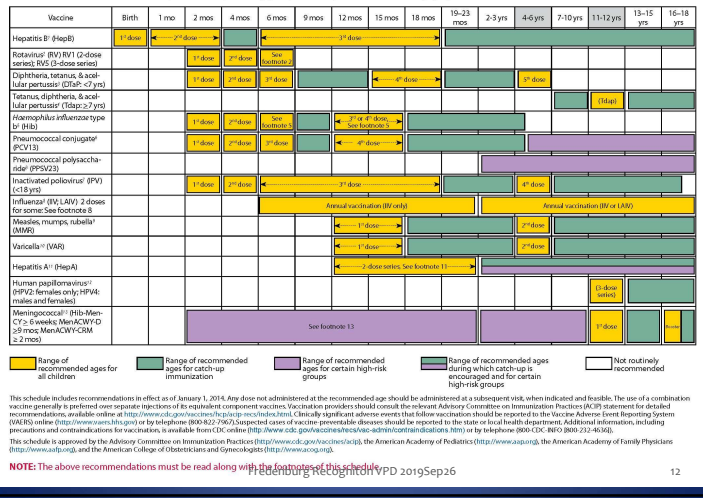
Figure 1. Recommended immunization schedule for persons aged 0 through 18 years – United States, 2014.
(FOR THOSE WHO FALL BEHIND OR START LATE, SEE THE CATCH-UP SCHEDULE (FIGURE 2)).
These recommendations must be read with the footnotes that follow. For those who fall behind or start late, provide catch-up vaccination at the earliest opportunity as indicated by the green bars in Figure 1. To determine minimum intervals between doses, see the catch-up schedule (Figure 2). School entry and adolescent vaccine age groups are in bold.



This schedule includes recommendations in effect as of January 1, 2014. Any dose not administered at the recommended age should be administered at a subsequent visit, when indicated and feasible. The use of a combination vaccine generally is preferred over separate injections of its equivalent component vaccines. Vaccination providers should consult the relevant Advisory Committee on Immunization Practices (ACIP) statement for detailed recommendations, available online at http://www.cdc.gov/vaccines/hcp/acip-recs/index.html. Clinically significant adverse events that follow vaccination should be reported to the Vaccine Adverse Event Reporting System (VAERS) online (http://www.vaers.hhs.gov) or by telephone (800-822-7967). Suspected cases of vaccine-preventable diseases should be reported to the state or local health department. Additional information, including precautions and contraindications for vaccination, is available from CDC online (http://www.cdc.gov/vaccines/recs/vac-admin/contraindications.htm) or by telephone (800-CDC-INFO [800-232-4636]).

This schedule is approved by the Advisory Committee on Immunization Practices (http://www.cdc.gov/vaccines/acip), the American Academy of Pediatrics (http://www.aap.org), the American Academy of Family Physicians (http://www.aafp.org), and the American College of Obstetricians and Gynecologists (http://www.acog.org).

NOTE: The above recommendations must be read along with the footnotes of this schedule.

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So, now, what we're here for: Clinical Recognition of Vaccine Preventable Diseases

- Whirlwind tour of 17 vaccine prevented (one so far) & preventable diseases (16 not so much)
  - Disease incidence pre- / post- vaccine
  - Transmission / pathogenesis if uniquely curious, and not too boring
  - Clinical features specific to the disease
  - Specific complications
  - ***Please do not attempt to take notes***

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Known as Variola (Latin varius, meaning spotted, or varus, meaning pimple)
'Smallpox' was first used in Europe in the 15th century to distinguish variola from the great pox (syphilis)

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Smallpox Transmission

- person to person by infected aerosols and air droplets
- also possible via ventilation systems
- contaminated clothes and bedding, though the risk of infection from this source is much lower
- infectious till smallpox scabs fall off

Bangladesh, 1973

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Smallpox Clinical Features

- incubation period usually 12–14 days (range 7–17), healthy, not infectious
- sudden onset of influenza-like symptoms including fever, malaise, headache, back pain and, less often, abdominal pain and vomiting
- 2-3 days later, defervescence with improved symptoms, rash appears, first on the face/hands/forearms then trunk, mucous membranes with viral shedding
- centrifugal distribution of lesions, macules to papules to pustules
- 8 to 14 days, pustules scabs leaving depressed depigmented scars

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Clinical Forms of Smallpox
Variola Major / Minor

- variola major (30% fatal) - severe, most common form of smallpox, extensive rash, higher fever (~ 90% of cases)
- variola minor (< 1% fatal) - less common, less severe

WHO photo, October 1975 of a 3-year-old Bangladeshi girl named Rahima Buna, "the last case of smallpox on the Asian subcontinent." , as well as the last case of wild variola major in the world.

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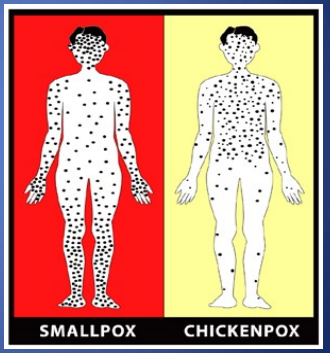
Differentiating Varicella and Smallpox Rash and Disease Course

	SMALLPOX	CHICKENPOX
FEVER	2 to 4 days before rash	At time of rash
RASH		
• *Appearance*	Pocks in same stage	Pocks in several stages
• *Development*	Slow	Rapid
• *Distribution*	More pocks on arms and legs	More pocks on body
• *On palms and soles*	Usually present	Usually absent
DEATH	Usually 1 in 10 die	Very uncommon



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Smallpox Vaccination

- 1960s: US: Landmark Neff/Lane Surveys (active surveillance for risk/benefit of variola vaccine)
- 1972: US: Routine Childhood vaccination stopped
- 1976: US: Routine HCW vaccinations stopped
- 1977: Global: Last naturally occurring smallpox case (Somalia)
- 1980: Global: WHO declared Smallpox eradicated
- 1982: Global: Int'l travel req lifted US: vaccine production halted
- 1984: US: Military program restricted to basic training settings
- 1990: US: Military recruit immunization discontinued
- 1990-pres US: Laboratorians targeted

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Smallpox Vaccination

- 2001 (June) – ACIP recommendations updated for laboratorians and included new guidelines for bioterrorism preparedness
- 2002 (June) – ACIP updated recommendations for Smallpox Response Teams
- 2002 (Dec) - Military vaccination program began: HCW, response teams and operational personnel
- 2003 (Jan) – Civilian voluntary program began: smallpox response teams

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Tetanus

'Lockjaw', 1st clinical descriptions from 5th century BC

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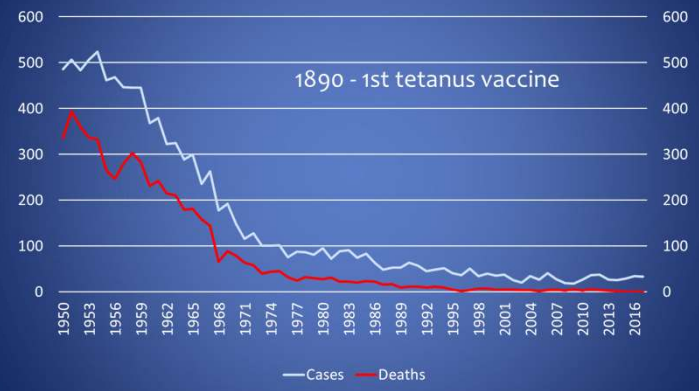
Tetanus (Cases/Deaths by Year)

https://www.cdc.gov/vaccines/pubs/pinkbook/downloads/appendices/e/reported-cases.pdf



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Tetanus (Cases/Deaths by Year)

https://www.cdc.gov/vaccines/pubs/pinkbook/downloads/appendices/e/reported-cases.pdf

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Tetanus Pathogenesis

- Anaerobic conditions allow germination of spores and production of toxins
- Toxin binds in central nervous system
- Interferes with neurotransmitter release
- Leads to unopposed muscle contraction and spasm

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Tetanus Clinical Symptoms

- Incubation period; 8 days (range, 3-21 days)
- Three clinical forms: local (uncommon), cephalic (rare), generalized (most common)
- Generalized tetanus: descending symptoms of trismus (lockjaw), risor sardonicus, difficulty swallowing, muscle rigidity, spasms
- Spasms continue for 3-4 weeks
- complete recovery may take months

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Neonatal Tetanus

- Generalized tetanus in newborn infant
- Infant born without protective passive immunity
- > 250,000 deaths worldwide in 2000-2003
- 4,712 reported cases (2008)
- 59,000 estimated cases (2009)

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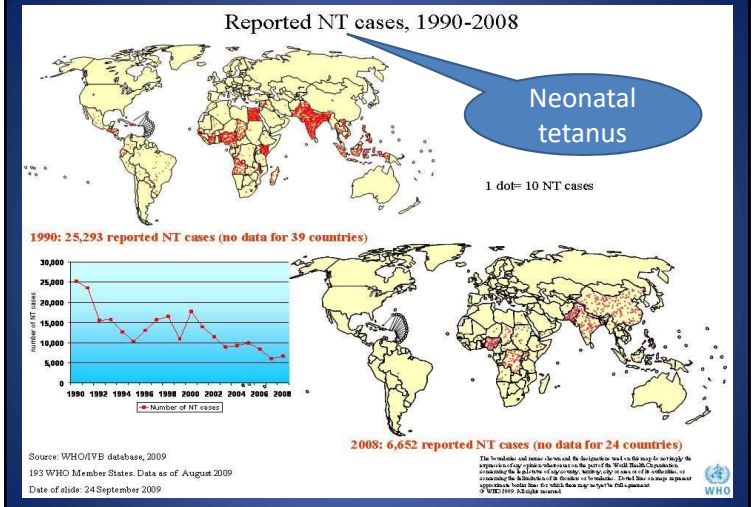
Reported NT cases, 1990-2008



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Greek 'diphthera',
meaning leather hide,
Hippocrates from 5th century BC

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Diphtheria Epidemiology

- Reservoir: Human carriers; usually asymptomatic
- Transmission: respiratory; rarely skin and fomites
- Temporal pattern: Winter and spring
- Communicability: Up to several weeks without antibiotics

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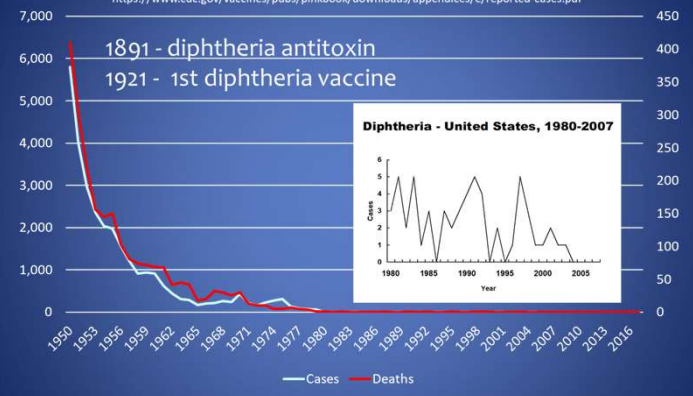
Diphtheria (Cases/Deaths by Year)

https://www.cdc.gov/vaccines/pubs/pinkbook/downloads/appendices/e/reported-cases.pdf



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Diphtheria Clinical Features

- Incubation period 2-5 days (range 1-10 days)
- May involve any mucous membrane or skin

- Classified based by site of infection
  - anterior nasal
  - pharyngeal and tonsillar
  - laryngeal
  - cutaneous
  - ocular
  - genital

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Tonsillar / Pharyngeal Diphtheria

- Insidious onset of exudative pharyngitis
- Exudate spreads within 2-3 days and may form adherent membrane
- Membrane may cause respiratory obstruction
- Fever usually not high but patient appears toxic

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Diphtheria Complications

- Severity generally related to extent of local disease
- Most attributable to toxin (needs viral tox gene)
- Most common complications are myocarditis (60% in unvaccinated) and neuritis
- Death occurs in 5%-10% from respiratory disease
- (??) often quoted as "Guinness Book of World Records 'most resurgent disease' - with dissolution of former USSR 1990 > 150,000 cases"

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silence the sounds of
PERTUSSIS
Parents of Kids with Infectious Diseases

'Whooping cough'
Pertussis / 100 day cough

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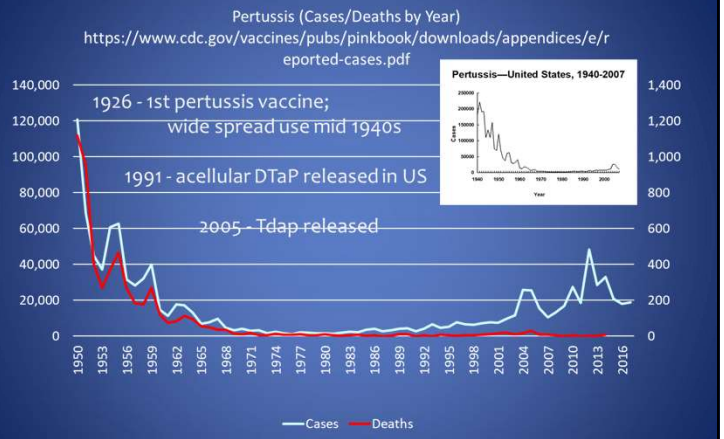
Pertussis (Cases/Deaths by Year)
https://www.cdc.gov/vaccines/pubs/pinkbook/downloads/appendices/e/reported-cases.pdf



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Pertussis Pathogenesis

- Primarily a toxin-mediated disease
- Bacteria attach to cilia of respiratory epithelial cells
- Inflammation occurs which interferes with clearance of pulmonary secretions
- Pertussis antigens allow evasion of host defenses (lymphocytosis promoted but impaired chemotaxis)

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Pertussis Clinical Features

- Incubation period 5-10 days (range 4-21 days)
- Insidious onset, similar to minor upper respiratory infection with nonspecific cough
- Fever usually minimal throughout course of illness
- In adolescents and adults:
  - Disease often milder than in infants and children
  - Infection may be asymptomatic, or may present as classic pertussis
  - Persons with mild disease may transmit the infection
  - Older persons often source of infection for children

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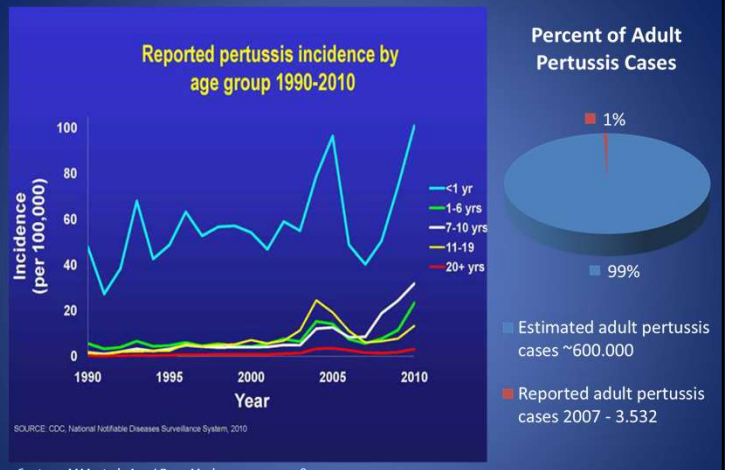

Cortese MM et al. *Am J Prev Med.* 2007;32:177-185
Centers for Disease Control and Prevention. Pertussis Surveillance Report – 10/6/08. Weeks 1-52, 2007 (Final Data)

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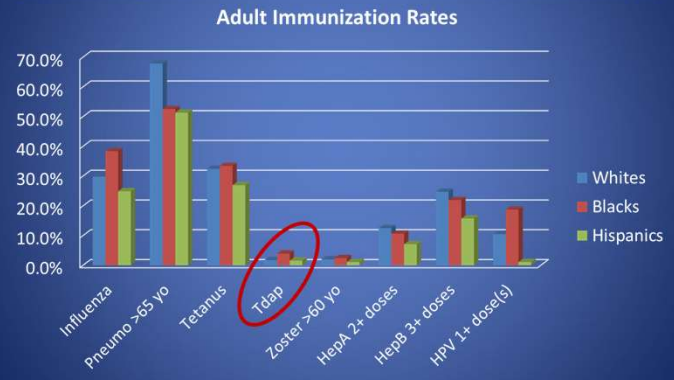
Vaccination coverage among U.S. adults

National Immunization Survey – Adult, 2007* (n=7055)
http://www.cdc.gov/vaccines/stats-surv/nis/downloads/nis-adult-summer-2007.pdf



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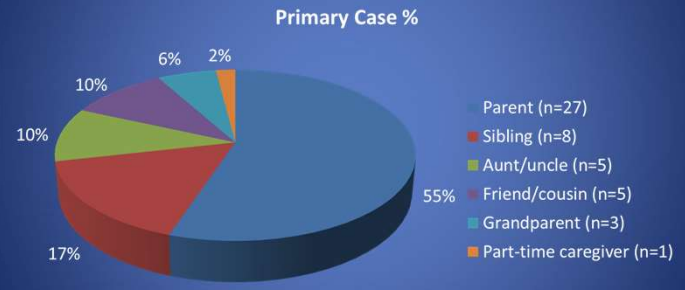
Primary Cases Identified in *Bordetella pertussis* Transmission in Infants

Wendelboe AM, Njamkepo E, Bourillon A, et al. Transmission of *Bordetella pertussis* to young infants. *Pediatr Infect Dis J.* 2007;26:293-99.



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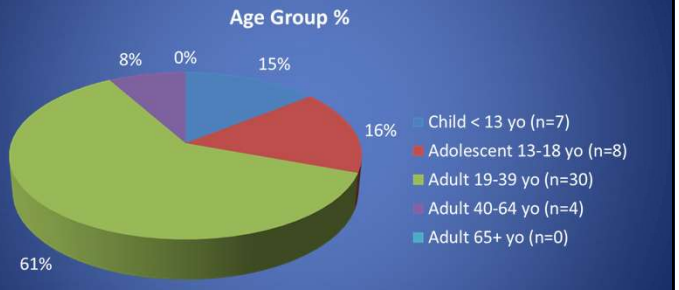

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Pertussis Clinical Features

- Catarrhal stage: 1-2 weeks
- Paroxysmal cough stage: 1-6 weeks – child adult
- Convalescence: weeks to months

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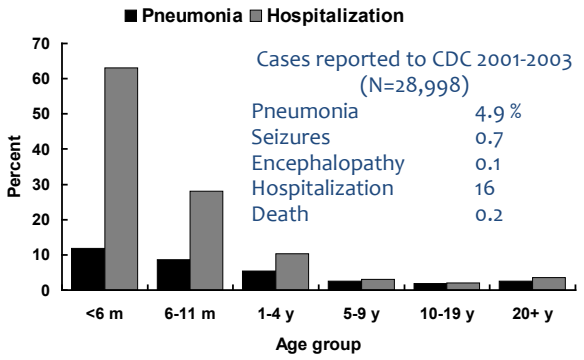
Pertussis Complications by Age



Cases reported to CDC 2001-2003 (N=28,998)

Pneumonia	4.9 %
Seizures	0.7
Encephalopathy	0.1
Hospitalization	16
Death	0.2

*Cases reported to CDC 1997-2000 (N=28,187)

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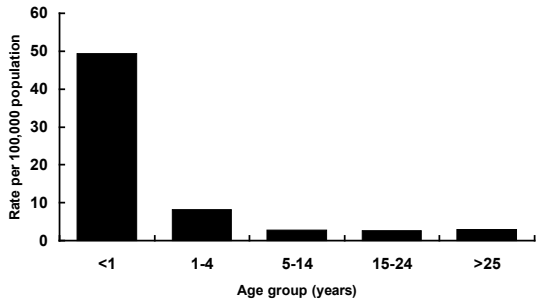
Pertussis Incidence, 2006



N=15,129. *MMWR* 2007;56(No. 53):33-34

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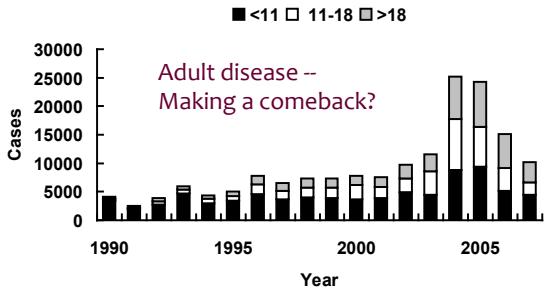
Reported Pertussis by Age Group, 1990-2007



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Pertussis
2010 California

- 8,383 individuals diagnosed, highest incidence in 52 years, most cases reported in 63 years
- ~10 infant deaths

2014 California stats as of 9/21/2014

7980 cases

Sonoma County 137 cases/100,000 persons
Napa County 93 cases/100,000 persons
Marin County 80 cases/100,000 persons

No deaths!!

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Upsurges of B. pertussis Cases

Cases of pertussis in previously vaccinated older children and adults are generally attributed to waning immunity without considering potential differences in Bordetella pertussis strains. As pointed out in 2009 by Dr Frits Mooi "There are now many studies which show that outbreaks of pertussis are often associated with changes in the B. pertussis population. Most recently, we have shown that more virulent (P3) strains have appeared which we believe to be (partly) responsible for the outbreak in the Netherlands. The P3 strains have emerged worldwide. Any discussion on the causes of sudden upsurges in infectious diseases should include changes in the pathogen population. This is even true for pertussis".

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Transmission of B pertussis in Healthcare

Location	Index Case	Secondary Cases
Minnesota, 2005 [1]	Unknown	122 cases (64 cases in healthcare personnel)
Texas, 2004 [2]	Healthcare worker	11 newborns
Washington, 2004 [3]	ED physician (hospital A)	5 cases among staff and visitors
	Respiratory therapist (hospital B)	3 cases among nurses
Pennsylvania, 2003 [4,5]	Infant	17 symptomatic cases in healthcare workers
Louisiana, 2004 [6]	Infant (source believed to be hospital worker or visitor)	3 infants diagnosed with pertussis
Watertown, NY 2010	?? Inpatient 80s (no work-up), husband wandering halls with chronic cough ??	??????
Nashua, NH 2011	?? Medical assistant 30s (no work-up), outpatient dermatology office	??????

[1] Leekha S, et al. *Infect Control Hosp Epidemiol.* 2009;30:467-473. [2] CDC. *MMWR.* 2008;57(22)600-603. [3] Bagget HC, et al. *Infect Control Hosp Epidemiol.* 2007;28:537-543. [4] CDC. *MMWR.* 2005; 54:67-71. [5] Calugar A, et al. *Clin Infect Dis.* 2006;42:981-988. [6] Vranken P, et al. *Am J Infect Control.* 2006;34:550-554. (Adapted from Wright WL, ARNP. *Immunization Update: What's New for 2012.* Presentation 2012 NH Immunization Conference)

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Pertussis – Please…

- Pertussis vaccine has incomplete efficacy at any age
- Clinical presentation is modified by vaccination (lack of whoop, lymphocytosis) and age
- Adults are routinely under-diagnosed (as in asking - when was the last time you saw pertussis?)
- NH DHHS-DPHS (HAN 01.26.09) Clinical case definition - your best guesses please!
- "Acute cough illness lasting at least two weeks with either paroxysms of coughing, inspiratory whoop, or post-tussive vomiting without other apparent cause"
- Nah, it's just bronchitis - maybe a different antibiotic!?

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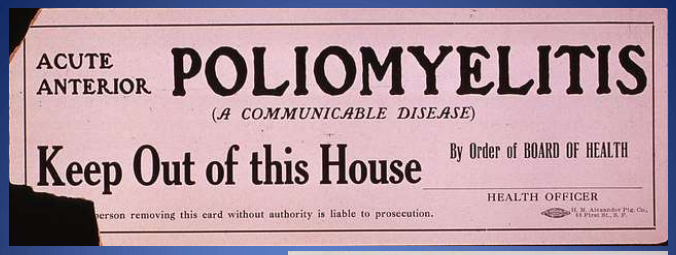
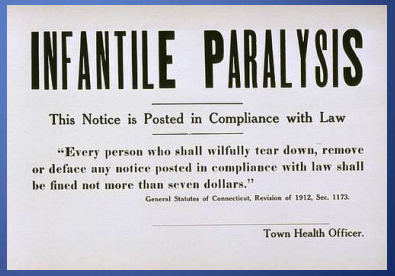


Poliomyelitis



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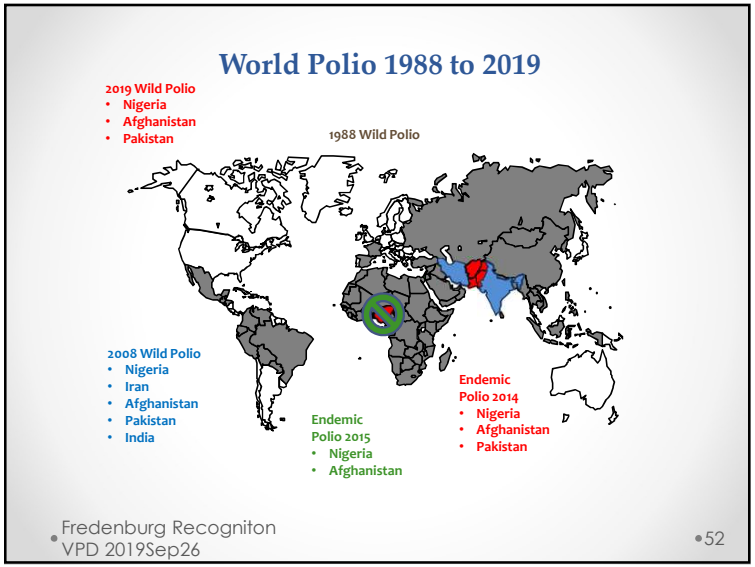

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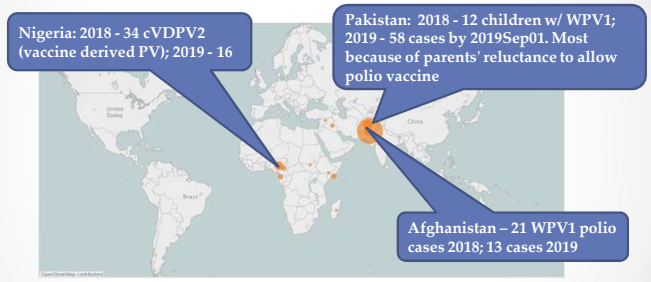
World Polio Cases Reported in 2018/2019

(as of 2019Sep01)



https://mail.google.com/mail/u/1/#search/polio/FMfcgxwDqxMBkNzgtHcVHMsltLNbjdvg

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Polio Eradication

- Last case in United States in 1979
- Western Hemisphere certified polio free in 1994
- Last isolate of type 2 poliovirus in India in October 1999
- Global eradication is the goal

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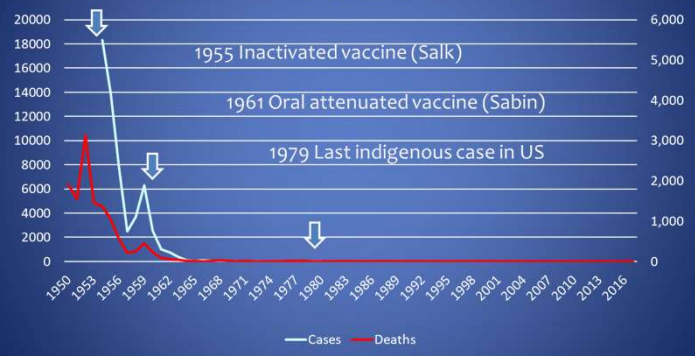
Polio (Paralytic Cases/Deaths by Year)

https://www.cdc.gov/vaccines/pubs/pinkbook/downloads/appendices/e/reported-cases.pdf



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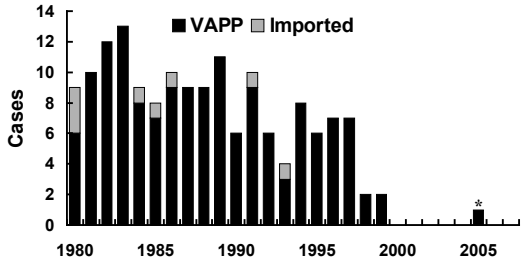
Poliomyelitis—United States, 1980-2007

Last indigenous case 1979



*Vaccine-acquired paralytic polio (VAPP) in a U.S. resident acquired outside the U.S.

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Polio Pathogenesis

- Entry into mouth
- Replication in pharynx, GI tract, local lymphatics
- Hematologic spread to lymphatics and central nervous system
- Viral spread along nerve fibers
- Destruction of motor neurons

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Outcomes of Poliomyelitis Infections

Clinical Outcome	Proportion of cases
Asymptomatic	90–95%
Minor illness	4–8%
Non-paralytic aseptic meningitis	1–2%
Paralytic poliomyelitis	0.1–0.5%

Spinal polio (79% of paralytic cases)
Bulbospinal (respiratory) polio (19%)
Bulbar (brain stem) polio (2%)

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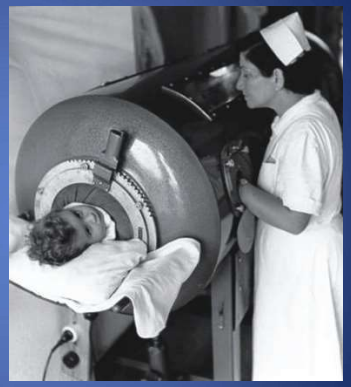

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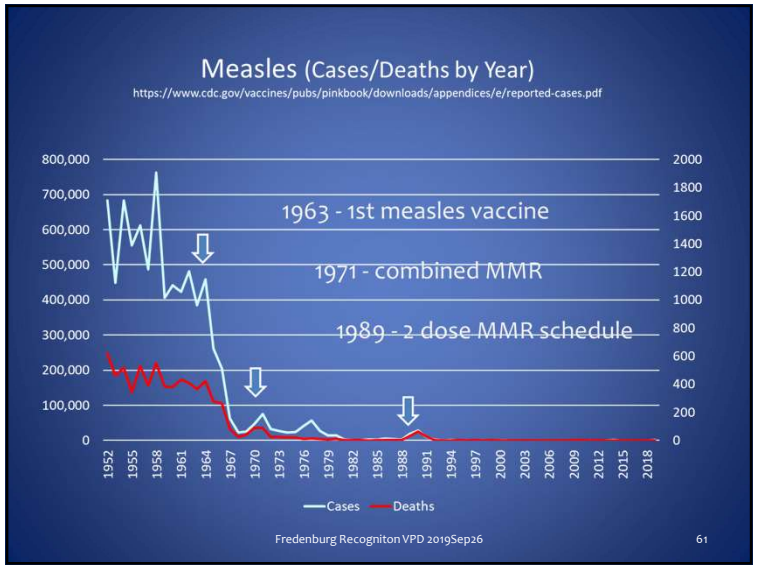
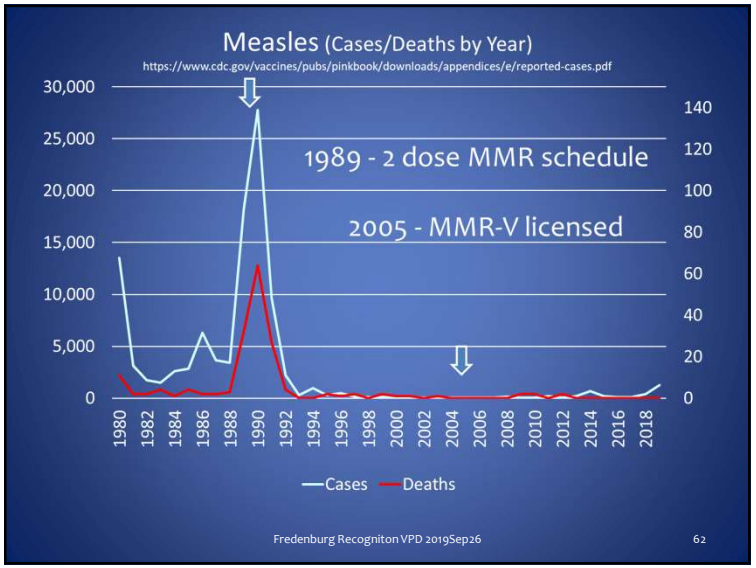
Rubeola & Morbilli Too

- 1st disease: measles, hard/red measles
- 2nd disease: scarlet fever
- 3rd disease: rubella (German measles)
- 4th disease: Duke's disease (staph scalded skin or rubella/strep variant or coxsackie) - defunct
- 5th disease: erythema infectiosum
- 6th disease: roseola infantum or exanthem subitum

60


Measles (Cases/Deaths by Year)
https://www.cdc.gov/vaccines/pubs/pinkbook/downloads/appendices/e/reported-cases.pdf
1963 - 1st measles vaccine
1971 - combined MMR
1989 - 2 dose MMR schedule
Cases
Deaths
Fredenburg Recogniton VPD 2019Sep26
61

61


Measles (Cases/Deaths by Year)
https://www.cdc.gov/vaccines/pubs/pinkbook/downloads/appendices/e/reported-cases.pdf
1989 - 2 dose MMR schedule
2005 - MMR-V licensed
Cases
Deaths
Fredenburg Recogniton VPD 2019Sep26
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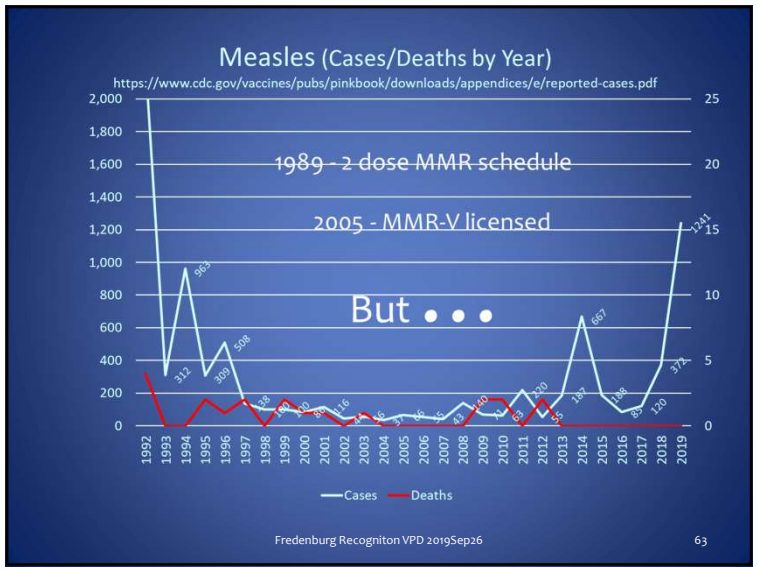
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But . . .
Cases
Deaths
Fredenburg Recogniton VPD 2019Sep26
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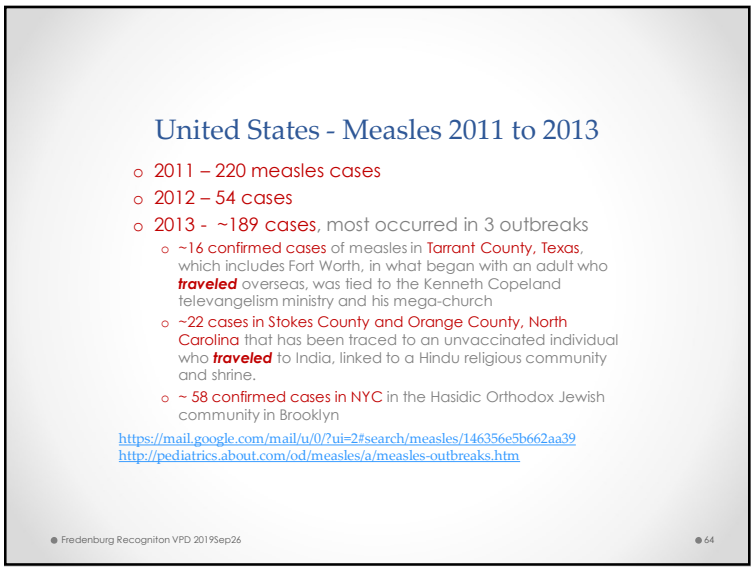
United States - Measles 2011 to 2013
2011 – 220 measles cases
2012 – 54 cases
2013 - ~189 cases, most occurred in 3 outbreaks
~16 confirmed cases of measles in Tarrant County, Texas, which includes Fort Worth, in what began with an adult who traveled overseas, was tied to the Kenneth Copeland televangelism ministry and his mega-church
~22 cases in Stokes County and Orange County, North Carolina that has been traced to an unvaccinated individual who traveled to India, linked to a Hindu religious community and shrine.
~ 58 confirmed cases in NYC in the Hasidic Orthodox Jewish community in Brooklyn
https://mail.google.com/mail/u/0/?ui=2#search/measles/146356e5b662aa39
http://pediatrics.about.com/od/measles/a/measles-outbreaks.htm
Fredenburg Recogniton VPD 2019Sep26
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64

It's a Small World After All…

This delightful itty, bitty ditty is both a major amusement park theme & a major cause of pandemics?

Global Disease Intro 2015Feb12&17 ● 65

65

It's a Small World After All…

- 2015 Jan 12 ProMed
- Disney Land Theme Park
- Same exposure Dec 17-20, 2014 through December 20, 2014; unknown index case
- All visited Disneyland or Disney California Adventure between 15 & 20 Dec 2014 unknown index case
- 125 confirmed cases of measles have been reported to CDC linked to this outbreak
  - 110 California residents
    - 42 CA
    - 39 (35% visited Disney theme park(s)
    - 34 (31%) secondary cases
    - 37 (34%) unknown exposure source
  - 3 in Utah
  - 2 in WA
  - 1 in CO
  - 1in Colorado
- Only 2 in California were fully vaccinated against measles
- http://www.promedmail.org 2015 Jan 12
- 15 cases in 6 other states as well as Canada and Mexico
  - 1 in NE
  - 1 in AZ
  - 1 from Mexico
- Immunization Status of Cases
  - 49 (45%) were unvaccinated (12 too young for vaccine)
  - 47 (43%) had unknown vaccination status
  - 5 (5%) 1 dose of measles vaccine
  - 28 (55%) were unvaccinated (5 under age for vaccination)
  - 17 (31%) had unknown vaccination status
  - 6 (12%) were vaccinated (2 received 1 dose & 4 received 2 or more doses)
- 52 outbreak-associated cases
- All measles genotype B3, same as in Philippines, 14 countries & 6 states

Global Disease Intro 2015Feb12&17 ● 66

66

It's a Small World After All…

This delightful little ditty is both a major amusement park theme & a major cause of pandemics?

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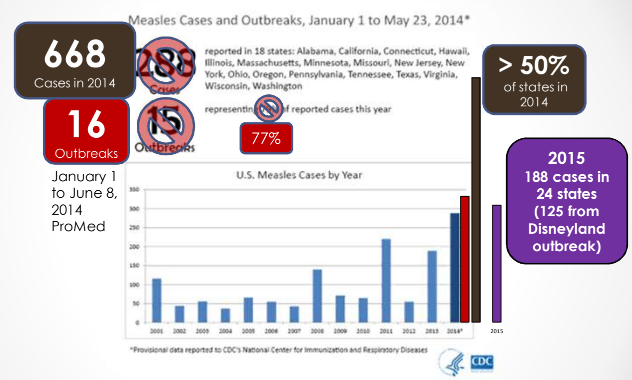
Global Disease Intro 2015Feb12&17 ● 67

67



http://www.cdc.gov/measles/cases-outbreaks.html
https://mail.google.com/mail/u/0/#inbox/1467c18ec8d7a441

Fredenburg Recogniton VPD 2019Sep26 ● 68

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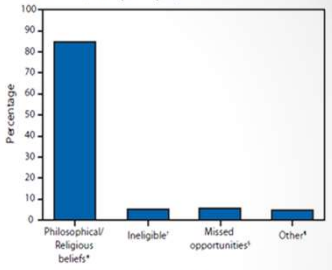
- ***288 measles cases in 2014***
  - 69% who were unvaccinated (200)
  - 20% unknown vaccination status (58)
  - 10% in persons who were vaccinated (30)
- 195 US residents w/ measles & unvaccinated
  - 85% declined vaccination because of religious, philosophical, or personal objections (165)
  - 6% were missed opportunities for vaccination (11)
  - 5% were too young to receive vaccination (10)

FIGURE. Percentage of U.S. residents with measles who were unvaccinated (N = 195), by reason for not receiving measles vaccine — United States, January 1–May 23, 2014



* Includes persons who were unvaccinated because of their own or their parents' beliefs.
† Includes person ineligible for measles vaccination, generally those aged <12 months.
§ Includes children aged 16 months–4 years who had not been vaccinated and international travelers aged ≥6 months who were unvaccinated but had no exemption.
¶ Includes persons who were known to be unvaccinated and the reason was unknown, and those who were born before 1957 and presumed to be immune.

http://www.cdc.gov/mmwr/pdf/wk/mm63e0529.pdf

69

United States - Measles 2014

- Ages of patients with reported measles in 2014
  - Range from 2 weeks to 65 years old
  - 18 (6%) were aged <12 months
  - 48 (17%) were aged 1–4 years,
  - 71 (25%) were aged 5–19 years
  - **151 (52%) were aged ≥20 years**
- 43 (15%) hospitalized
- Complications
  - Pneumonia (5 patients), hepatitis (1), pancytopenia (1) & thrombocytopenia (1)
  - No cases of encephalitis and no deaths have been reported

http://www.cdc.gov/mmwr/pdf/wk/mm63e0529.pdf

70

Spread of Measles

- The majority of people who got measles were unvaccinated
- Measles is still common in many parts of the world
- Travelers with measles continue to bring the disease into the U.S.
- Measles can spread when it reaches a community in the U.S. where groups of people are unvaccinated

https://www.cdc.gov/measles/cases-outbreaks.html

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Measles (Rubeola; Morbilli)

- Contagious, > 90% secondary infection rate in susceptible household contacts
- Transmitted by respiratory droplets, remains active 2 hrs
- Though primarily childhood illness, affects any age
- Infection confers life-long immunity
- Maternal antibodies protect infants younger than 1 year; interfere with live-attenuated measles vaccination
- Measles vaccine introduced in 1963
  - Given > 12 mo induces protective immunity in 95%;
  - 2nd dose induces immunity in about 95% of the 5% non-responders
- ***Endemic transmission reestablished if measles immunity falls to less than 93-95%***

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Measles – More Than a Rash

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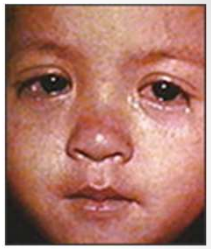
Measles - Presentation

- Incubation period 10-12 days (range 7-14 days)
- Communicable 1-2 days before symptoms; until 4 days after rash onset (immunocompromised can be contagious for duration of the illness)
- 1st sign usually a step-wise fever (repeated viremias) often >104° F [40° C] lasting 4-7 days
- Prodromal phase - malaise, fever, anorexia
- **Classic triad** (the '3-Cs'):
  - **Conjunctivitis**
  - **Cough** (may be the final symptom to appear)
  - **Coryza**
- Also possible - photophobia, periorbital edema, and myalgias



75

Measles - Complications

- Complications occur due to viral suppression of immune response (allows reactivating latent infections and/or superinfection by a bacteria)
- Complications are more common:
  - Patients < 5 yo or > 20 yo
  - Immune deficiency disorders (more severe & super-infections)
  - Malnutrition, esp vitamin A deficiency
  - Under-vaccinated
  - Pregnant women
- Pneumonia is most frequent complication (can be measles virus itself, tuberculosis or another bacterial etiology)

76

20 Jan 2015: World Bank corrected estimate of damage down [original estimate for October 2015 USD 25 billion; new estimate USD 6.2 billion.
<http://www.handelsblatt.com/technologie/forschung-medizin/medizin/ebola-epidemie-weltbank-korrigiert-schadensschaetzung-nach-unten/11257620.html>

Cost of Measles Outbreak Investigations

- 2004 outbreak in Iowa
  - 2 patients
  - 1000 identified contacts, includes exposure by index case during flight from India
  - Cost estimate--USD 140 000 [190,144 in 2014 USD] for local and state health departments to investigate, contain, and treat
  - Cost estimate does not include outside resources, e.g. airlines; federal government
- 2004 outbreak in Arizona hospitals
  - 7 confirmed measles cases
  - Cost estimate—USD 800 000 [1,086,534 in 2014 USD]
  - Cost mostly furloughing HCWs w/ no evidence of measles immunity
  - Estimate excludes the public health expenses incurred by state & local health departments
- 2014 Just Imagine to cost to investigate 644 cases from Disney Land
- Or now 1241 cases in 2019?

https://mail.google.com/mail/u/0/#inbox/14996f8ff51e9610

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MMR and Autism

- 1998 Lancet publishes article by Andrew Wakefield linking MMR with regressive autism and bowel disease, "new syndrome"
- January 2011 — BMJ published 3 articles/editorials charging Wakefield's study not just bad science but "an elaborate fraud"
- None of the 12 patients in the study were "free of misreporting or alteration"
- 2003 to 2004 vaccination rate of 80% has now recovered slightly in the United Kingdom
- measles epidemic was also declared in England and Wales in 2008

Deborah Brauser. *Autism and MMR Vaccine Study an 'Elaborate Fraud,' Charges BMJ.*
http://www.medscape.com/viewarticle/735354

78

'Epidemic parotitis'
described by Hippocrates in 5th century BC

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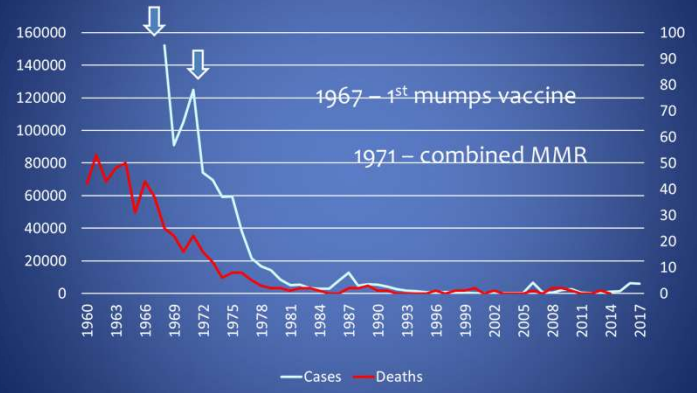
Mumps (Cases/Deaths by Year)

https://www.cdc.gov/vaccines/pubs/pinkbook/downloads/appendices/e/reported-cases.pdf



80

Mumps (Cases/Deaths by Year)

https://www.cdc.gov/vaccines/pubs/pinkbook/downloads/appendices/e/reported-cases.pdf

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Mumps Outbreak 2006

- >6,500 cases reported (314 cases reported in 2005)
- Most cases associated with a large multi-state outbreak
- Highest incidence was among young adults 18-24 years of age, many of whom were college students
- Transmission of mumps virus occurred in many settings, including college dormitories and healthcare facilities

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Mumps 2006 Factors Contributing to Outbreak

- College campus environment
- Lack of a 2-dose MMR college entry requirement or lack of enforcement of a requirement
- *Delayed recognition and diagnosis of mumps*
- Mumps vaccine failure
- Vaccine might be less effective in preventing asymptomatic infection or atypical mumps than in preventing parotitis
- *Waning immunity*

83

Vaccine waning and mumps re-emergence in the United States.

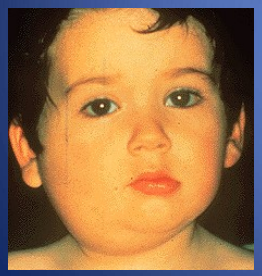
Lewnard JA and Grad YH. Sci Transl Med. 2018 Mar 21; 10(433): eaao5945. doi: 10.1126/scitranslmed.aao5945

- Loss of immunity
  - Now estimated that vaccine-derived immune protection against mumps wanes on average 27 years (95% confidence interval: 16 to 51)
  - *Peak of recurrence in adolescents and adults*
- Emergency of heterologous virus genotypes changing vaccine effectiveness appears unlikely
  - *Re-emergence more likely to occur in younger children*
- Mumps vaccine booster at 18 yo or throughout adulthood possible solution to waning immunity

84

Mumps Pathogenesis

- Respiratory transmission of virus
- Replication in nasopharynx and regional lymph nodes



- Viremia 12-25 days after exposure with spread to tissues
- Multiple tissues infected during viremia

85

Mumps Clinical Features

- Incubation period 14-18 days
- Nonspecific prodrome of myalgia, malaise, headache, low-grade fever
- Parotitis in 30%-40%
- Up to 20% of infections asymptomatic

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Mumps Complications

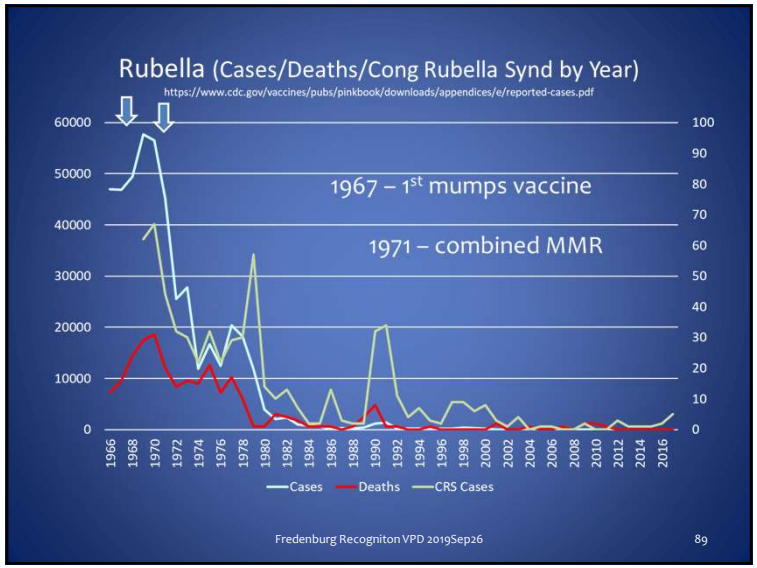
• CNS involvement	15% of clinical cases
• Orchitis	20 - 50% in postpubertal males
• Pancreatitis	2 - 5 %
• Deafness	1 / 20,000
• Death	average 1 per year (1980 - 1999)

87

Rubella

Latin 'little red', or 3rd disease (initially thought a possible variant of measles or scarlet fever), then 1814 'German measles'

88



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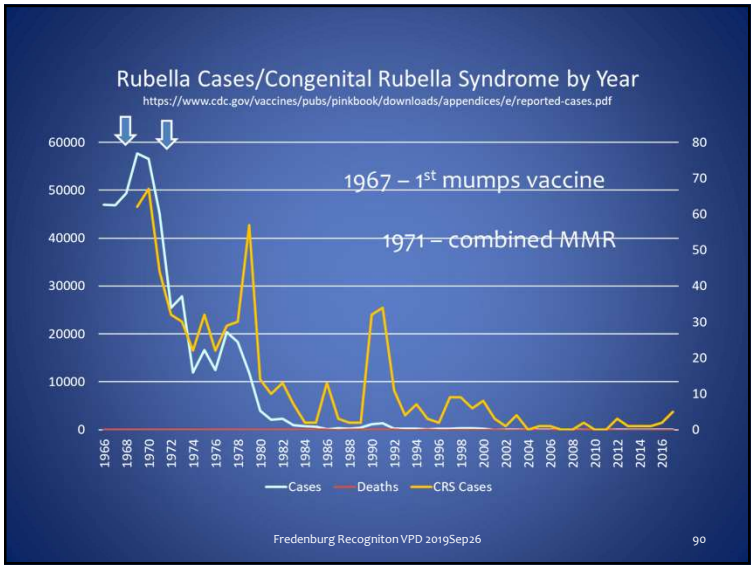

90

Rubella Pathogenesis

- Respiratory transmission of virus
- Replication in nasopharynx and regional lymph nodes
- Viremia 5-7 days after exposure with spread to tissues
- Placenta and fetus infected during viremia

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Rubella Clinical Features

- Incubation period 14 days (range 12-23 days)
- Prodrome of low-grade fever

- Maculopapular rash 14-17 days after exposure
- Lymphadenopathy in second week

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Rubella Complications

Arthralgia or arthritis	
adult female	up to 70%
children	rare
Thrombocytopenic purpura	1 / 3000 cases
Encephalitis	1 / 6000 cases
Neuritis	rare
Orchitis	rare

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Congenital Rubella

- Infection may affect all organs
- May lead to fetal death or premature delivery
- Severity of damage to fetus depends on gestational age
- Up to 85% of infants affected if infected during 1st trimester

- Outcomes:
  - *Deafness*
  - *Cataracts*
  - *Heart defects*
  - *Microcephaly*
  - *Mental retardation*
  - *Bone alterations*
  - *Liver and spleen damage*

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Congenital Rubella

Blueberry Muffin - generalized hemorrhagic purpuric eruptions that on histopathology showed dermal erythropoiesis (TORCH)

Cataracts secondary to congenital rubella

95

Rubella Epidemic - United States, 1964 - 1965

- 12.5 million rubella cases
- 2,000 encephalitis cases
- 11,250 abortions (surgical/spontaneous)
- 2,100 neonatal deaths
- 20,000 CRS cases
  - deaf - 11,600
  - blind - 3,580
  - mentally retarded - 1,800

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MMR/Rubella Vaccination During in Pregnancy Outcomes 1971-1989

- 321 women received rubella vaccine during pregnancy or near the estimated time of conception
- 324 live births
- No observed CRS
- 95% confidence limits 0%-1.2%

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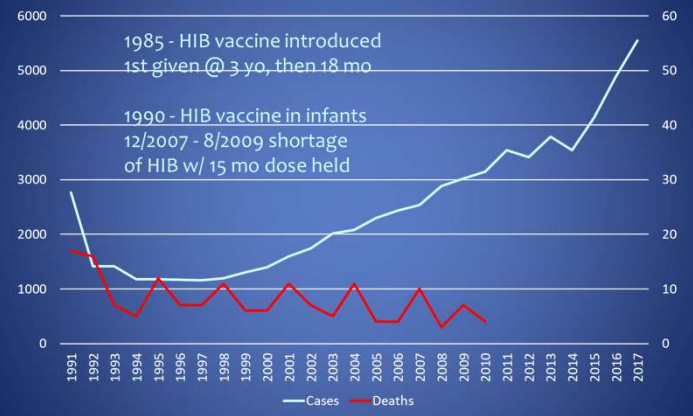
HIB

Hemophilus ('blood loving') influenza, type B

98

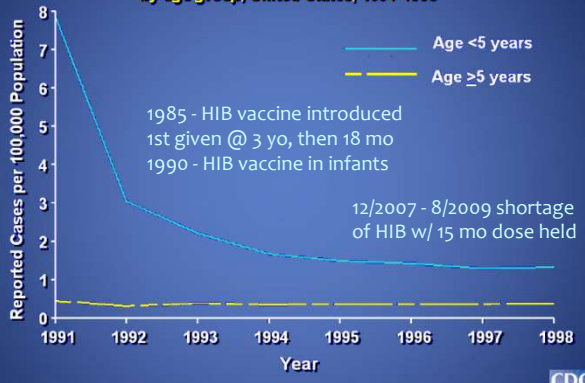
H flu, type B (Cases/Deaths by Year)

https://www.cdc.gov/vaccines/pubs/pinkbook/downloads/appendices/e/reported-cases.pdf



99

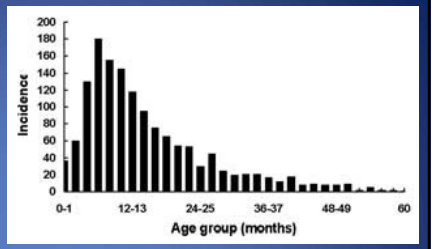
HAEMOPHILUS INFLUENZAE, Invasive Disease -- by age group, United States, 1991-1998

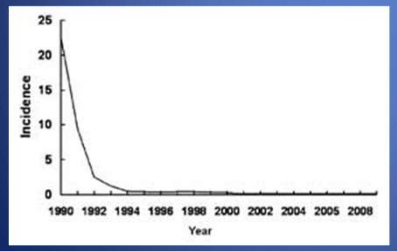


100

Hemophilus influenza, type B

H flu, type B rate per 100,000 population, prevaccine era





H flu, type B rate per 100,000 children <5 years of age

101

HIB Transmission and Risk Groups

- Transmission - direct contact with respiratory droplets from nasopharyngeal carrier or case patient
- Risk Groups:
  - infants and young children
    - household contacts
    - day-care classmates
  - American Indian/Alaska Native populations

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Invasive Hemophilus flu type B Disease
(lots of –itis' with an –onia and –emia)

- pneumonia
- occult febrile bacteremia
- meningitis
- epiglottitis
- septic arthritis
- cellulitis
- periobital cellulitis (sinusitis)
- purulent pericarditis
- less common infections
  - endocarditis
  - osteomyelitis

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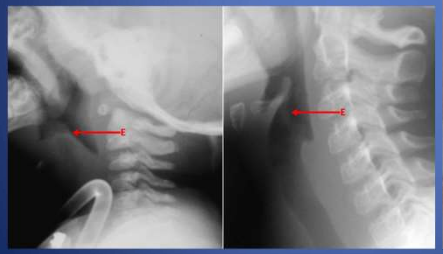
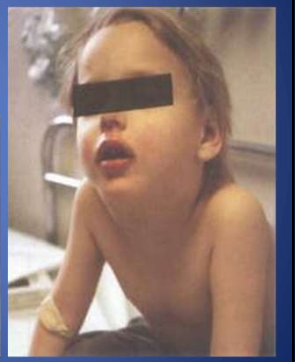
Epiglotitis

High fever, toxic appearance, drooling, dysphagia, muffled voice, inspiratory retractions, soft stridor

Sniffing dog, tripod position
Can suddenly lead to complete airway obstruction





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Complications of Sinusitis

Complications (due to contiguous spread)

- Orbital preseptal / orbital cellulitis (from ethmoid)
- Osteomyelitis of the frontal bone (Pott's puffy tumor) (from frontal sinus)
- Occasionally cheek cellulitis (from maxillary)

105

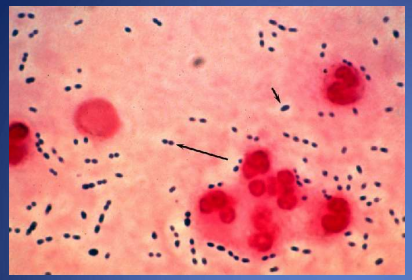
Sequelae of H flu type B Disease

- 3%-6% of cases are fatal
- up to 20% of surviving patients have permanent hearing loss or other long-term sequela per CDC estimate

- BUT -

- 2009 - 2010 literature review - 1433 children (1970 to 2010) survivors of childhood bacterial meningitis
  - 705 (49.2%) have 1 or more long-term sequelae
  - 455 (45.0 %) behavioral and/or intellectual disorders
  - 68 (6.7%) hearing changes
  - 145 (14.3%) gross neurologic deficits

106



PPV14, PPV23, PCV7, PCV13

Pneumococcal Disease

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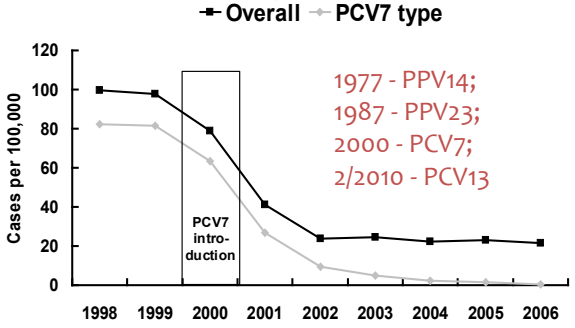
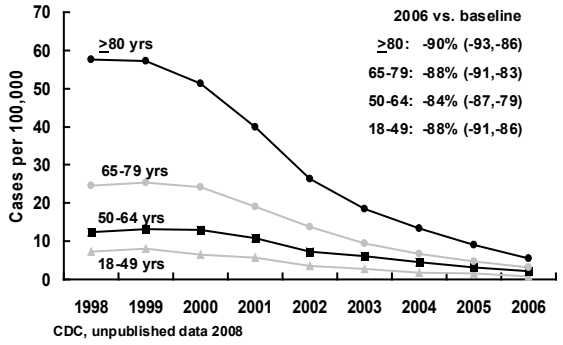
Direct Effect of Vaccination: Invasive Pneumococcal Disease Among Children <5 Years of Age, 1998/99-2006



108

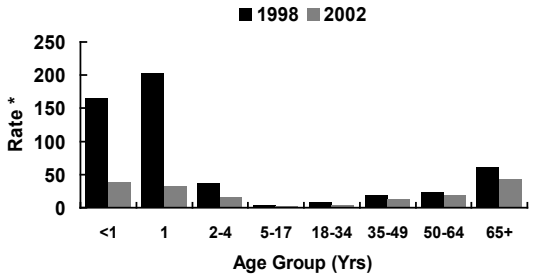
Rates of PCV7-type Invasive Pneumococcal Disease among Adults, U.S., 1998/99-2006



CDC, unpublished data 2008

109

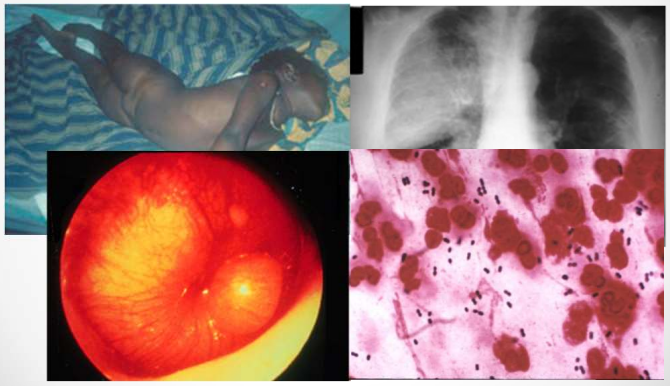
Invasive Pneumococcal Disease Incidence by Age Group, 1998 and 2002



* Rate per 100,000 population
Source: Active Bacterial Core Surveillance/EIP Network

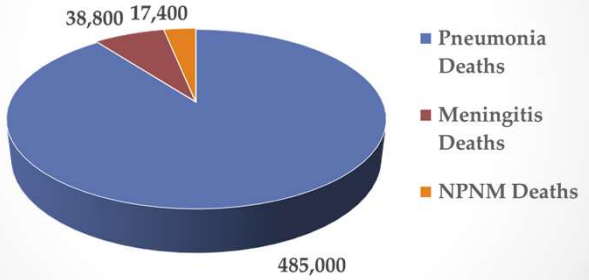
110

Pneumococcal Disease



111

Estimated Pneumococcal Deaths for Children Under 5 Years of Age, 2008



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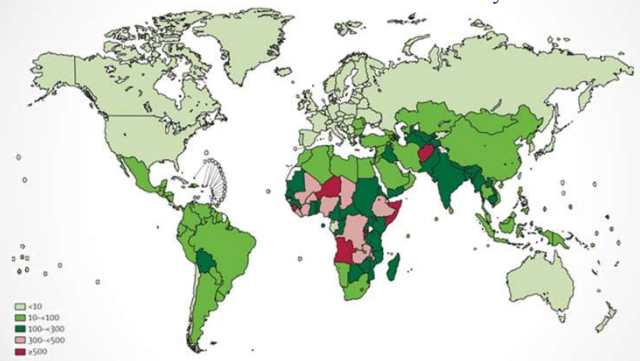
Global Pneumococcal Mortality Rate



http://www.thelancet.com/journals/lancet/article/PIIS0140-6736(09)61204-6/ppt

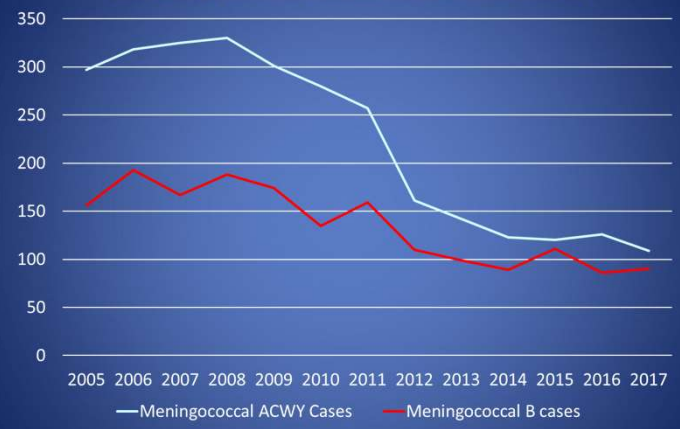
113

MPSV, MCV (A, C, Y, W-135)
Meningococcal Disease

114

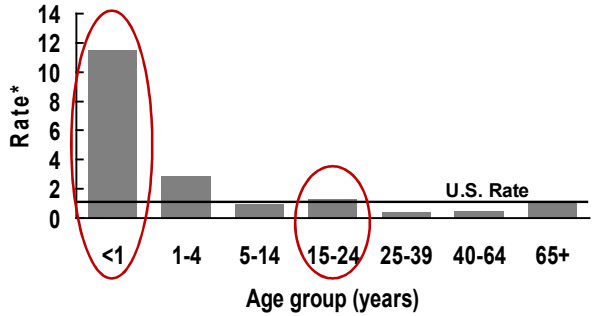
Meningococcal (Cases/Deaths by Year)

https://www.cdc.gov/vaccines/pubs/pinkbook/downloads/appendices/e/reported-cases.pdf



115

Meningococcal Disease, 1998 Incidence by Age Group



*Rate per 100,000 population. Source: Active Bacterial Core surveillance/Emerging Infections Program network

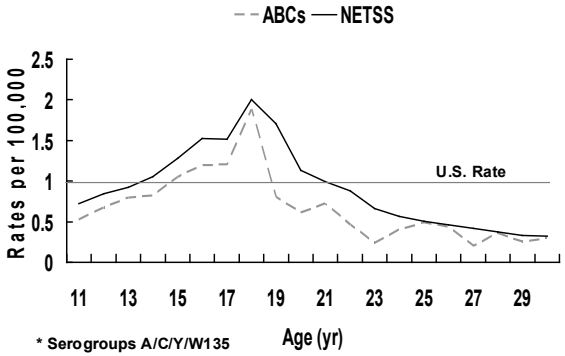
116

Meningococcal Disease in the United States

- Distribution of cases by serogroup varies by time and age group
- In 1996-2001:
  - 31% serogroup B
  - 42% serogroup C
  - 21% serogroup Y
  - 65% of cases among children younger than 1 year of age caused by serogroup B
- Quadrivalent vaccines - only A, C, Y, W-135

117

Rates of Meningococcal Disease* by Age, United States, 1991-2002



118

Meningococcal Disease Among Young Adults, United States, 1998-1999

• 18-23 years old	1.4 / 100,000
• 18-23 years old not college student	1.4 / 100,000
• Freshmen	1.9 / 100,000
• Freshmen in dorm	5.1 / 100,000

- **Bruce et al, *JAMA* 2001;286;688-93**

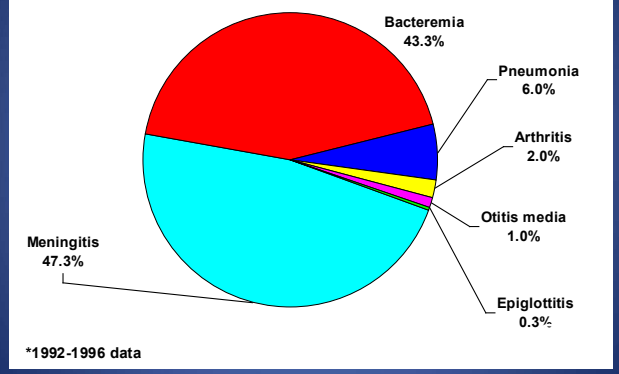
119

Meningococcal Pathogenesis & Clinical Features

- Organism colonizes nasopharynx
- In some persons organism invades bloodstream and causes infection at distant site
- Antecedent URI may be a contributing factor
- Incubation period 3-4 days (range 2-10 days)
- Abrupt onset of fever, meningeal symptoms, hypotension, and rash
- Fatality rate 9%-12%; up to 40% in meningococcemia

120

Neisseria meningitidis Clinical Manifestations*

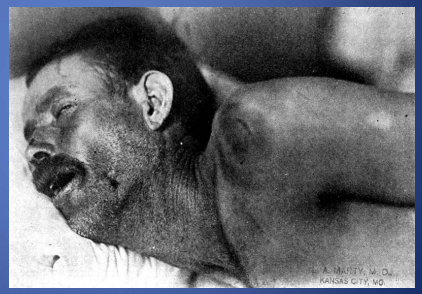


*1992-1996 data

121

Meningococcal Meningitis

- Most common pathologic presentation
- Result of hematogenous dissemination
- Clinical findings
  - fever
  - headache
  - stiff neck



Opisthotonic Posturing with Meningitis

122

Meningococcal Septicemia

- Bloodstream infection
- May occur with or without meningitis
- Clinical findings
  - fever
  - petechial/purpuric rash
  - hypotension
  - multiorgan failure / collapse

123

124

Varicella

Chickenpox

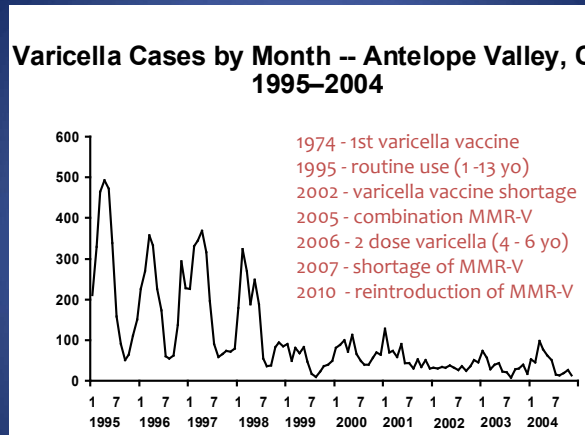
a.k.a.

Cicer (chickpea) pox/pocks

Giccin (itchin') pox/pocks

Merely a 'chicken' version of the pox
(compared with smallpox)

125

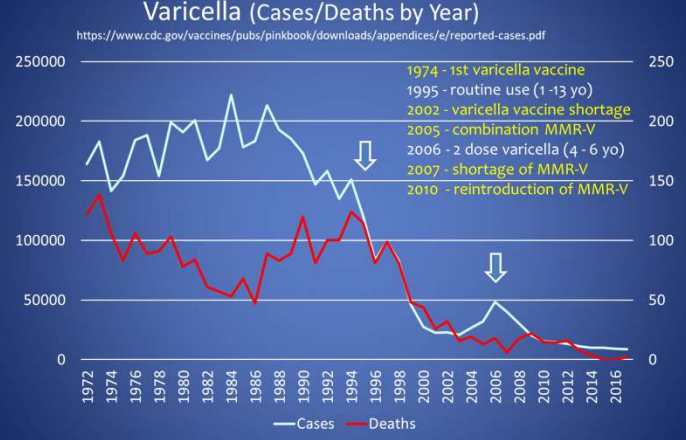


126

Varicella Epidemiology

- Respiratory transmission of virus
- Replication in nasopharynx and regional lymph nodes
- Repeated episodes of viremia
- Multiple tissues, including sensory ganglia, infected during viremia

127



128

Dew Drop on a Rose Pedal

129

Varicella Clinical Features

- Incubation period 14-16 days (range 10-21 days)
- Mild prodrome for 1-2 days
- Rash generally appears first on head; then most concentrated on trunk
- Successive crops over several days with lesions present in several stages of development

130

Varicella Complications

- Bacterial super-infection of skin lesions
- Pneumonia (viral or bacterial)
- Central nervous system manifestations - postvaricella cerebellitis/encephalitis)
- Reye's syndrome (ASA)
- Hospitalization: 2-3 per 1,000 cases
- Death: 1 per 60,000 cases
- Postherpetic neuralgia (complication of zoster)

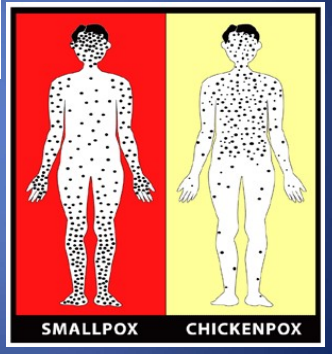
131

Varicella Clinical Features

132

Differentiating Varicella and Smallpox Rash and Disease Course

	SMALLPOX	CHICKENPOX
FEVER	2 to 4 days before rash	At time of rash
RASH		
• Appearance	Pocks in same stage	Pocks in several stages
• Development	Slow	Rapid
• Distribution	More pocks on arms and legs	More pocks on body
• On palms and soles	Usually present	Usually absent
DEATH	Usually 1 in 10 die	Very uncommon



133

Varicella Zoster

- Reactivation of varicella zoster virus
- Associated with:
  - aging
  - immunosuppression
  - intrauterine exposure
  - varicella at younger than 18 months of age

- Postherpetic neuralgia (PHN)
- Ophthalmic zoster
- Dissemination with generalized skin eruptions and involvement of the central nervous system, lungs, liver and pancreas

134

Varicella Vaccine Efficacy - AAP Report 2007

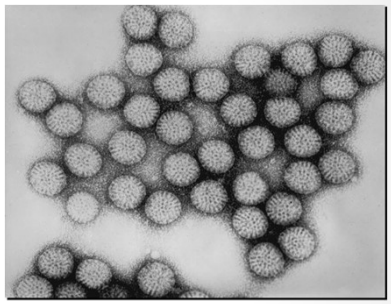
- 1 dose schedule, from 1997 to 2005 vaccinations increased from 27% to 88% (1 - 4 year olds)
  - 71% - 84% decrease in varicella cases
  - 88% decrease in hospitalizations
  - 92% decrease in deaths
  - 80 - 85 % prevention of disease of any severity
- Peak age shifted from 3-6 years old to 9-11 years old (both immunized and unimmunized children)
- 2 dose varicella vaccine (99% of children protective antibody)
  - 98% prevention of any varicella disease (94% - 1 dose)
  - 100% efficacy for prevention of severe disease
- 70% less hospitalizations in < 20 year olds, also 65% less hospitalizations in 20 + year olds between the pre-vaccination and 1-vaccine eras

135

Rotavirus

rota - Latin for wheel

from electron micrography



136

The Family of Rotaviruses

- Rotavirus A
  - > 90% of rotavirus gastroenteritis in human
  - Endemic worldwide
    - Temperate areas, infections occur primarily in the winter
    - Tropics infections occur throughout the year
    - Outbreaks common among hospitalized infants, day care centers & elderly in nursing homes
  - Annually in developing countries
    - Millions of cases of diarrhea
    - ~ 2 million hospitalization
    - ~ 611,000 deaths
- Rotavirus B (adult diarrhea rotavirus or ADRV)
  - Epidemics in China primarily (sewage contamination of drinking water)
  - Surveys showing lack of immunity in US
- Rotavirus C
  - Rare, sporadic cases of childhood diarrhea in many countries
  - Outbreaks have occurred in Japan & England

http://www.news-medical.net/health/Rotavirus-Epidemiology.aspx

137

Rotavirus

- First identified as cause of diarrhea in 1973

http://intranet.tdmu.edu.ua/data/kafedra/internal/pediatria2/classes_stud/en/med/lik/ptn/Childrens%20infectious%20diseases/5/Lesson%206.%20Shigellae%20infections.%20Salmonellae%20infections..htm

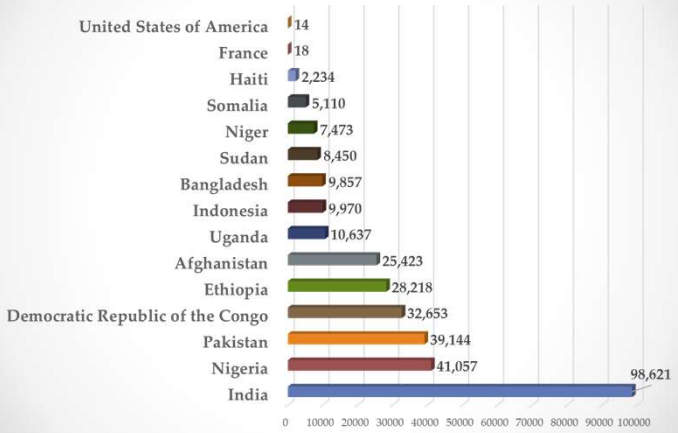
138

Rotovirus Disease Burden

- Rotovirus Disease in the United States
- Annually (prevaccine) responsible for:
  - More than 400,000 physician visits
  - More than 200,000 emergency dept visits
  - 55,000-70,000 hospitalizations
  - 20-60 deaths
- Annual direct and indirect costs are estimated at approximately $1 billion

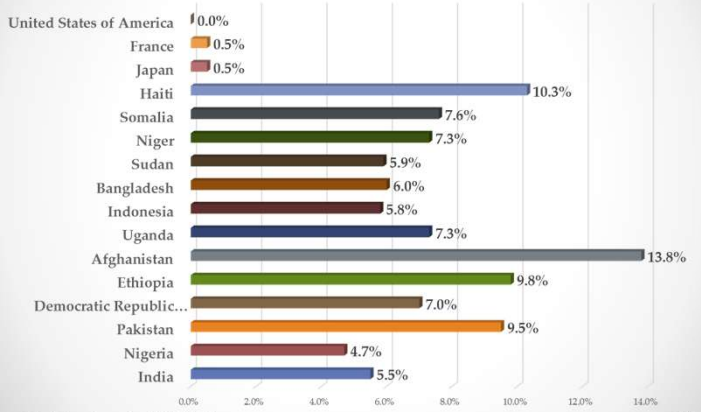
139

2008 Rotavirus Deaths, Under 5 Years of Age



140

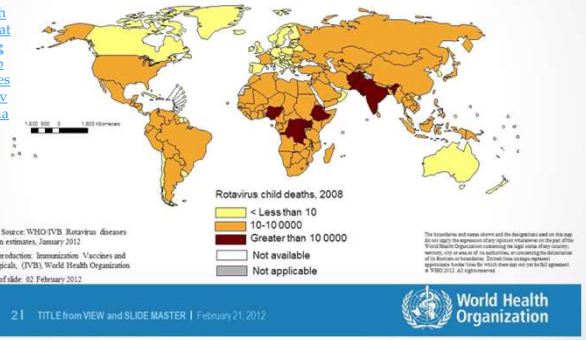
Rotavirus Deaths < 5 Years Old as Percentage of All Deaths < 5 Years Old



141

453 000 global child rotavirus deaths, 2008

http://www.who.int/immunization/monitoring_surveillance/burden/estimates/rotavirus/rotavirus_deaths_map_a.jpg?ua=1



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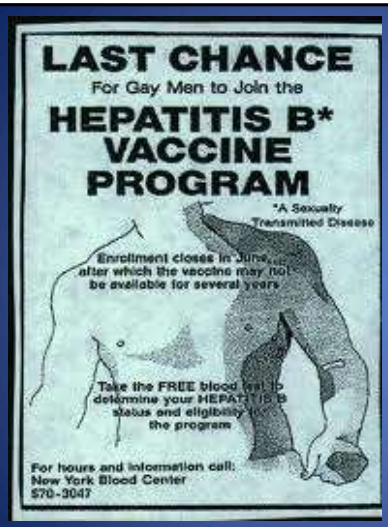
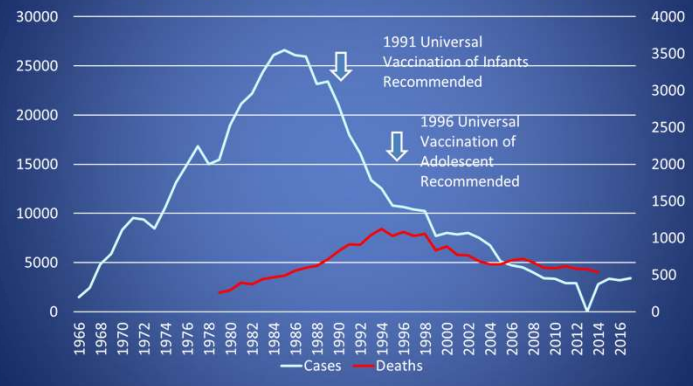


Hepatitis B
(Serum hepatitis)
1st recorded cases following smallpox variolation in 1880s

143

Hepatitis B (Cases/Deaths by Year)

https://www.cdc.gov/vaccines/pubs/pinkbook/downloads/appendices/e/reported-cases.pdf



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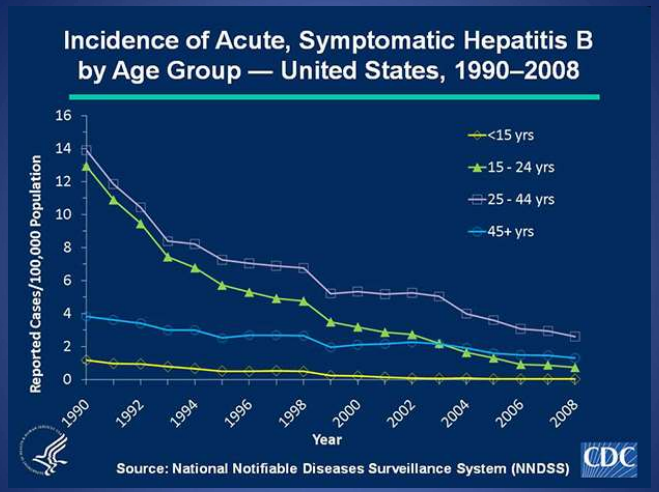


145

HBV Disease Burden in the United States

- Prevaccine era
  - estimated 300,000 persons infected annually, including 24,000 infants and children
- 2005
  - estimated 51,000 infections

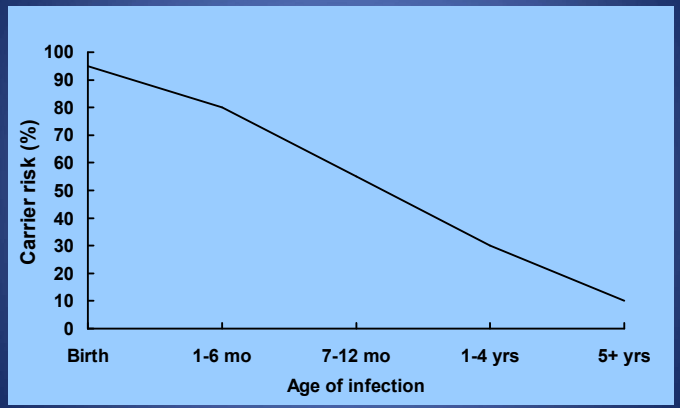
146

Clinical Features / Complications of Hep B

- Incubation period 60-150 days (average 90 days)
- Nonspecific prodrome of malaise, fever, headache, myalgia
- Presenting symptoms not specific for hepatitis B
- At least 50% of infections asymptomatic
- Complications
  - Fulminant hepatitis
  - Hospitalization
  - Cirrhosis
  - Hepatocellular carcinoma
  - Death

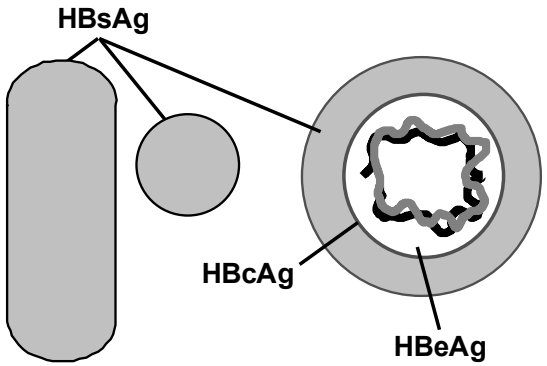
147

Risk of Chronic HBV Carriage by Age of Infection



148

Hepatitis B Virus



149

Hepatitis B Perinatal Transmission
(in absence of postexposure prophylaxis)

- If mother positive for HBsAg (surface antigen) and HBeAg (produced when virus is actively replicating)
  - 70%-90% of infants infected
  - 90% of infected infants become chronically infected
- If positive for HBsAg only
  - 5%-20% of infants infected
  - 90% of infected infants become chronically infected

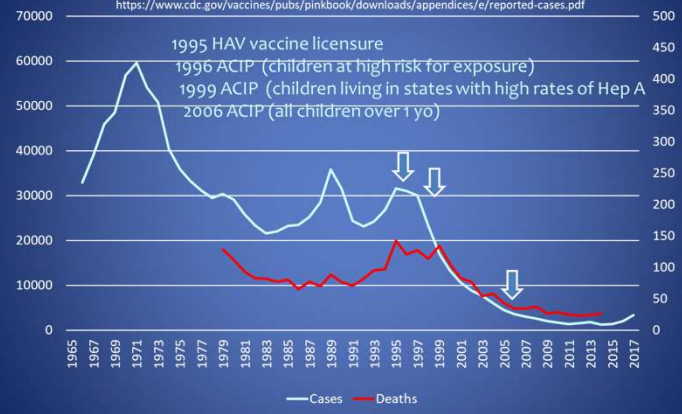
150

Hepatitis A

Epidemic/infectious jaundice, 1st described by Hippocrates in 5th century BC

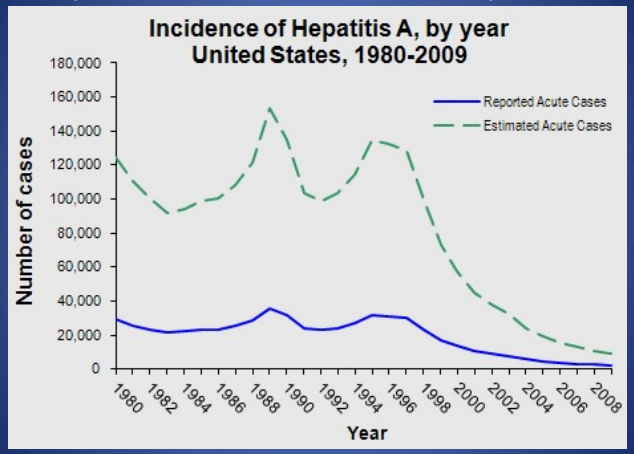
Hepatitis A (Cases/Deaths by Year)

https://www.cdc.gov/vaccines/pubs/pinkbook/downloads/appendices/e/reported-cases.pdf



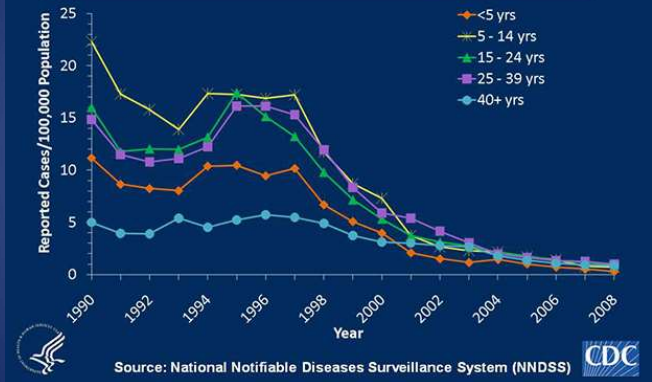
152

Reported Versus Estimated Cases Hepatitis A



153

Incidence of Acute, Symptomatic Hepatitis A by Age Group — United States, 1990–2008



154

Hepatitis A Transmission / Clinical Features

- Entry into mouth (fecal-oral transmission)
- Viral replication in the liver
- Virus present in blood and feces 10-12 days after infection
- Virus excretion may continue for up to 3 weeks after onset of symptoms
- Incubation period 28 days (range 15-50 days)
- Illness not specific for hepatitis A
- Likelihood of symptomatic illness directly related to age
- Children generally asymptomatic, adults symptomatic

155

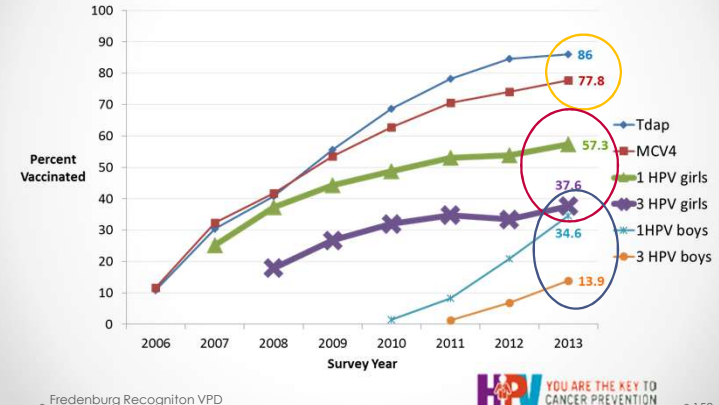
156

Human Papillomavirus (HPV)

- Tumors of the skin and mucous membranes
- > 100 HPV types known
- People with multiple sexual partners; who already have persistent HPV infection are at increased risk for acquiring additional HPV strains
- 2 main clinical categories:
  - Anogenital or mucosal
  - Nongenital cutaneous

157

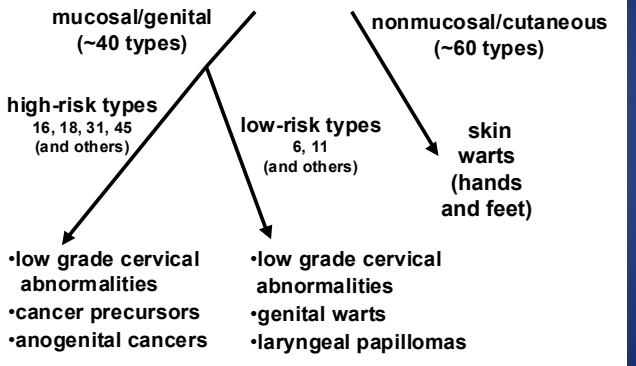
Adolescent Vaccination Coverage United States, 2006-2013



MMWR 2014; 63(29):625-633.

158

Human Papillomavirus Types and Disease Association



159

HPV Associated Disease

Type	Women	Men
16/18	70% of Cervical Cancer	70% of Anal Cancer
	70% of Anal/genital Cancer	Transmission to women
	Transmission to men	
6/11	90% of Genital Warts	90% of Genital Warts
	90% of RRP lesions	90% of RRP lesions
	Transmission to men	Transmission to women

160

HPV Clinical Features

- Most HPV infections are asymptomatic and result in no clinical disease
- Clinical manifestations of HPV infection include:
  - anogenital warts
  - recurrent respiratory papillomatosis (RRP)
  - cervical cancer precursors (cervical intraepithelial neoplasia)
  - cancer (cervical, anal, vaginal, vulvar, penile, and some head and neck cancer)

161

HPV Disease Burden

- Anogenital HPV is the most common sexually transmitted infection in the US
  - Estimated 20 million currently infected
  - 6.2 million new infections/year
- Common among adolescents and young adults

- Estimated 80% of sexually active women will have been infected by age 50
- Infection also common in men

162

Laryngeal Papillomatosis

A 48-year-old woman presents with inspiratory stridor, dyspnea, and hoarseness. On direct laryngoscopy, extensive respiratory papillomatosis were diagnosed as the cause of her symptoms.

Endoscopy reveals the characteristic wart-like lesions of laryngeal papilloma. JORRP is more common and more severe than AORRP. JORRP is caused by exposure to HPV during the peripartum period.

163

Laryngeal Papillomatosis

- HPV 6, 11, 16 implicated, with substantial percentage of mothers having a history of genital condylomata at delivery
- Age of onset usually 2-4 yo, but as late as juvenile onset documented, younger age worse prognosis
- Symptoms include hoarseness, voice changes, croupy cough, stridor
- Diagnosis by direct laryngoscopy
- Prevention by HPV vaccine
- Treatment by direct surgical resection (recurrences are the rule), tracheostomy occasionally required
- Spontaneous remissions do occur

164

Evolution of recommendations for HPV vaccination in the United States

Quadrivalent
Routine, females 11 or 12 yrs* and 13-26 yrs not previously vaccinated

Quadrivalent or Bivalent
Routine, females 11 or 12 yrs* and 13-26 yrs not previously vaccinated

Quadrivalent
May be given, males 9-26 yrs*

Quadrivalent
Routine, males 11 and 13-21 yrs not
May be given, 22-

2014 Dec 10-- **HPV 9-valent Vaccine** FDA Approval ~ additional 20% of HPV associated cancers from strains 31, 33, 45, 52 & 58

June October

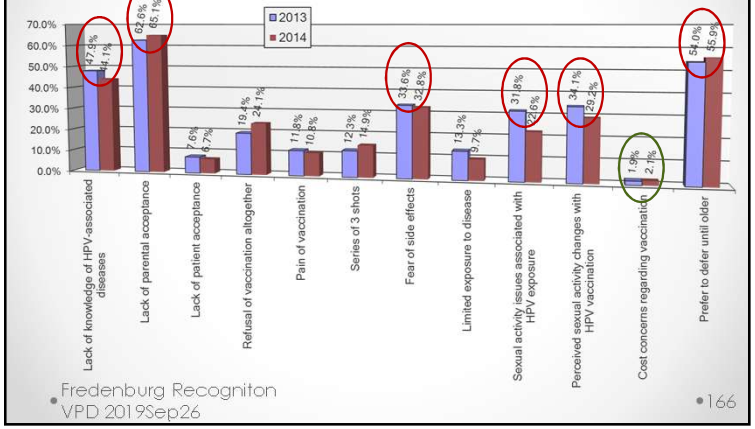
2006 2007 2008 2009 2010 2011 2012

Quadrivalent (HPV 6,11,16,18) vaccine; Bivalent (HPV 16,18) vaccine

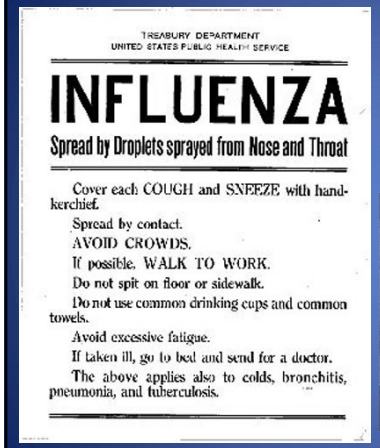
* Can be given starting at 9 years of age; ** For MSM and immunocompromised males, quadrivalent HPV vaccine through 26 years of age

165

What issues are the most difficult in parental or adolescent acceptance of vaccination (at any age)? (Choose the three that you feel represent the most common reasons for declining the vaccination.)



166


TREASURY DEPARTMENT
UNITED STATES PUBLIC HEALTH SERVICE

INFLUENZA

Spread by Droplets sprayed from Nose and Throat

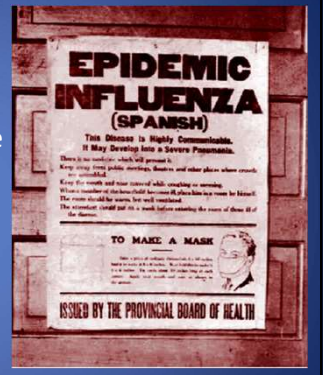
Cover each COUGH and SNEEZE with handkerchief.
Spread by contact.
AVOID CROWDS.
If possible, WALK TO WORK.
Do not spit on floor or sidewalk.
Do not use common drinking cups and common towels.
Avoid excessive fatigue.
If taken ill, go to bed and send for a doctor.
The above applies also to colds, bronchitis, pneumonia, and tuberculosis.

The name 'influenza' originated in 15th century Italy, from an epidemic attributed to "influence of the stars"

167

Risk Factors for Influenza Complications

- Asthma (or other chronic respiratory condition)
- Diabetes mellitus
- Chronic cardiac or renal disease
- Adults 65 and older
- Pregnant women
- People who have HIV/AIDS; cancer (immunosuppressed)
- Children < 5 yo, but especially children younger than 2 yo
- Residence in residential care homes & long-stay facilities


EPIDEMIC INFLUENZA
(SPANISH)
This Disease is Highly Communicable.
It May Develop into a Severe Pneumonia.
TO MAKE A MASK
ISSUED BY THE PROVINCIAL BOARD OF HEALTH

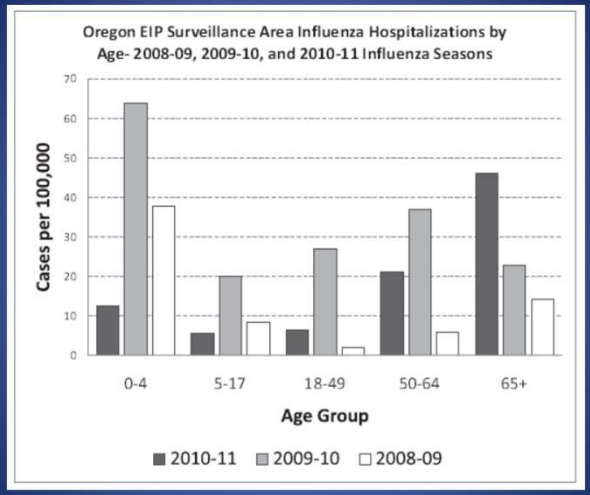
168

Hospitalizations for cardiopulmonary conditions in excess of the expected:

- 104 per 10,000 children per year - infants < 6 mo
- 50 per 10,000 per year – infants 6-12 mo
- 19 per 10,000 per year – children 1-3 yo
- 9 per 10,000 per year - children 3-5 yo
- 4 per 10,000 per year – 5-15 yo
- For every 100 children, ~ 6-15 outpatient visits & 3-9 courses of antibiotics were attributable to influenza
- In winter, 10-30% of the excess* number of courses of antibiotics occurred while influenza virus present

*above baseline

169



170

Impact of Childhood Influenza Vaccination on Adult Disease

- targeting school children during influenza vaccine shortages rather than directing resources at high risk adult individuals may be more effective in limiting disease in the entire population
- achieving a 20% influenza vaccination rate in children would reduce overall incidence in US by 46%, 80% vaccination rate would decrease total cases by 91%
- in another study vaccinating 20-25% of children under 19 with influenza vaccine had a protective effect on 8-18% of adults in the community over 35 years old

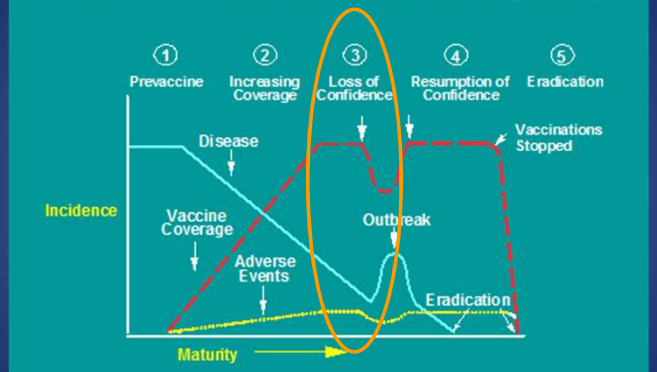
171

Why Vaccine Preventable Diseases Are Not Yet Prevented

- clinical recognition of once common vaccine preventable diseases - mumps, pertussis, measles
- modified illness due to vaccine - varicella, pertussis
- vaccine shortage - HIB booster, pneumococcal, flu
- inconsistent policies and funding of immunizations (e.g. Section 317 grants - discretionary funding)
- parent and clinician complacency - varicella, pertussis
- Fear mongering - is the disease or vaccine worse?
  - So who are the better publicists?

172

Evolution of Immunization Program and Prominence of Vaccine Safety



Hinman AR. *Communicating with parents, providers, and the media.* October 16-17, 2007

173

174

BMJ vs Andrew Wakefield*

But how did a small case-control study like this set off such a panic in the first place? "I think a lot of people would like to know the answer to that," said Dr. Godlee [BMJ Editor-in-Chief Fiona Godlee, MD].

"I think Andrew Wakefield is a terrifically good publicist. He managed to convince his institution to run a press conference for this very small piece of research. The media attention for this grew, and concerns were raised with his subsequent publications."

175

Patient Education from
New Atlantean Books
& Holistic Products
http://thinkchoice.com/educate.htm

32 Slides 15 minutes
$79/Patient Education Slide Show
$99/Seminar Presentation

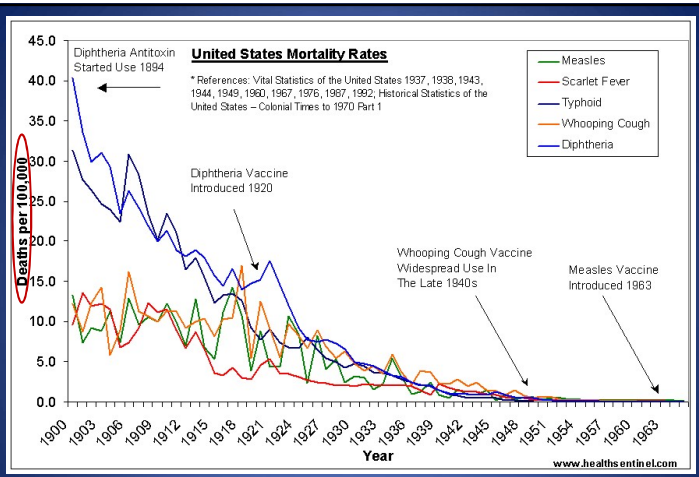
16 Slides 7 minutes
$49/Patient Education Slide Show
$69/Seminar Presentation

176

Clinical Recognition of Vaccine Preventable Diseases

. . . and another look at the 'data'

177



http://2.bp.blogspot.com/_3Hk10MXU4MI/SumjkFEW3cI/AAAAAAAAAC4/KUmbj8lSlbM/s1600-h/us-deaths-1900-1965.gif

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Natural waning of epidemics, nope, not vaccines

- "This [graph] shows that vaccines for measles, pertussis, and diphtheria all got introduced during the natural waning of the epidemics, making it impossible for me to conclude that the vaccine had any dramatic benefit. Child Health Safety has similar graphs referring to other vaccines."
- Don, on Blogger since May 2009
- Gender: Male
- Astrological Sign: Cancer
- Occupation: Nutritionist, Acupuncturist, Professor, Author, MA in Philosophy
- http://donmatesz.blogspot.com/2009/10/how-i-came-to-[illegible]-vaccines.html

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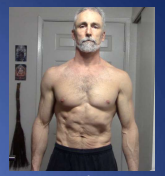
Current Evolution of Don Matesz, Author



- Master's philosophy & Oriental medicine
- Certifications American Academy of Nutrition & International Association of Resistance Trainers
- Co-authored The Garden of Eating and was a presenter at the first-ever Ancestral Health Symposium
- Author of the *Hypercarnivore Diet* (subtitle Eat Meat, Get Healthy. Plants Optional)
- Switched to a hypercarnivore diet in mid-2017 *after decades of practicing and authoring books on plant-based diets to relieve his psoriasis and eczema* (he's improved his skin, digestive health, and body composition dramatically)

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Natural waning of epidemics, nope, not vaccines

Quoth Don (of old). . .

"...natural waning of the epidemics, making it impossible for me to conclude that the vaccine had any dramatic benefit"

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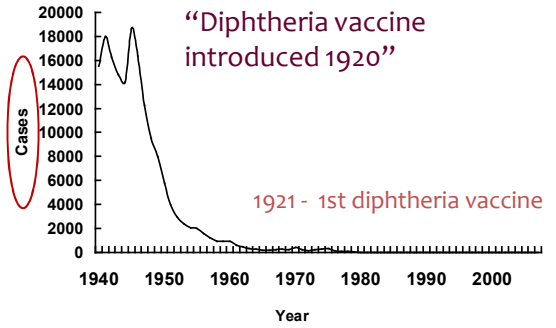
Diphtheria - United States, 1940-2007



"Diphtheria vaccine introduced 1920"

1921 - 1st diphtheria vaccine

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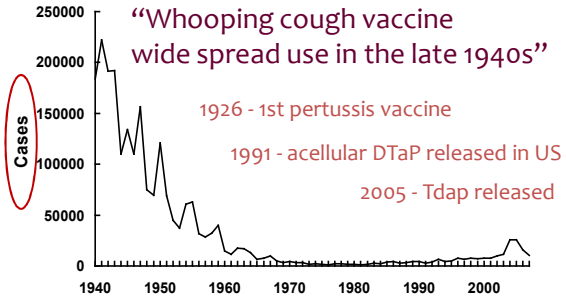
Pertussis—United States, 1940-2007



"Whooping cough vaccine wide spread use in the late 1940s"

1926 - 1st pertussis vaccine

1991 - acellular DTaP released in US

2005 - Tdap released

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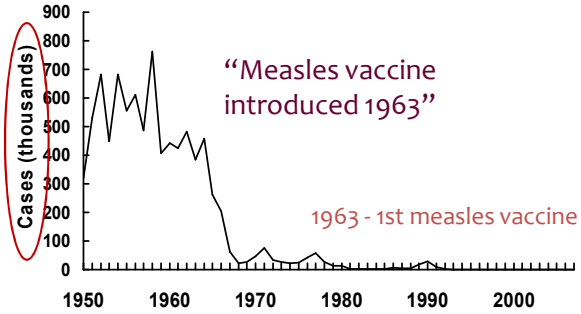
Measles - United States 1950 - 2007



"Measles vaccine introduced 1963"

1963 - 1st measles vaccine

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Jenny McCarthy "I do believe sadly it's going to take some diseases coming back to realize that we need to change and develop vaccines that are safe. If the vaccine companies are not listening to us, it's their f#@&king fault that the diseases are coming back. They're making a product that's s#&t. If you give us a safe vaccine, we'll use it. ***It shouldn't be polio versus autism***."

"Would you trust this woman to give you sound medical advice?" http://www.emagill.com/rants/eblog077.html

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