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Herd Immunity & Vaccination

"It was not until relatively recently that it was discovered that most of these vaccines lost their effectiveness 2 to 10 years after being given. What this means is that at least half the population, that is the baby boomers, have had no vaccine-induced immunity against any of these diseases for which they had been vaccinated very early in life. In essence, at least 50% or more of the population was unprotected for decades."

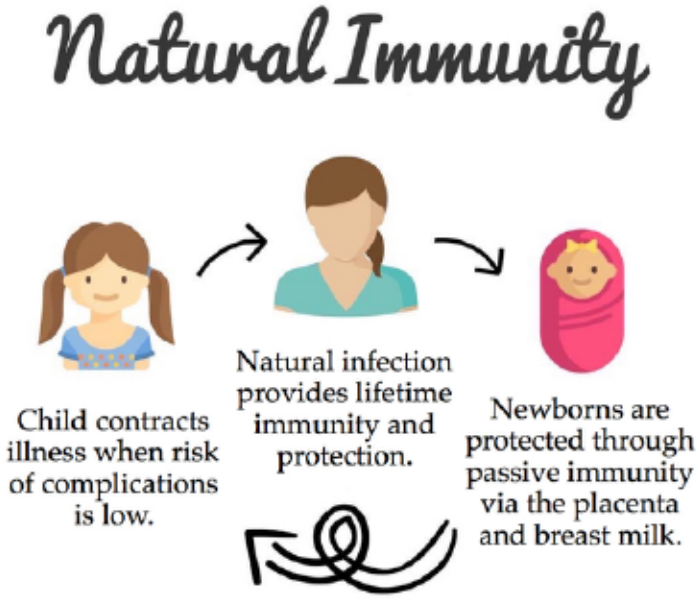
- Russell Blaylock, M.D.

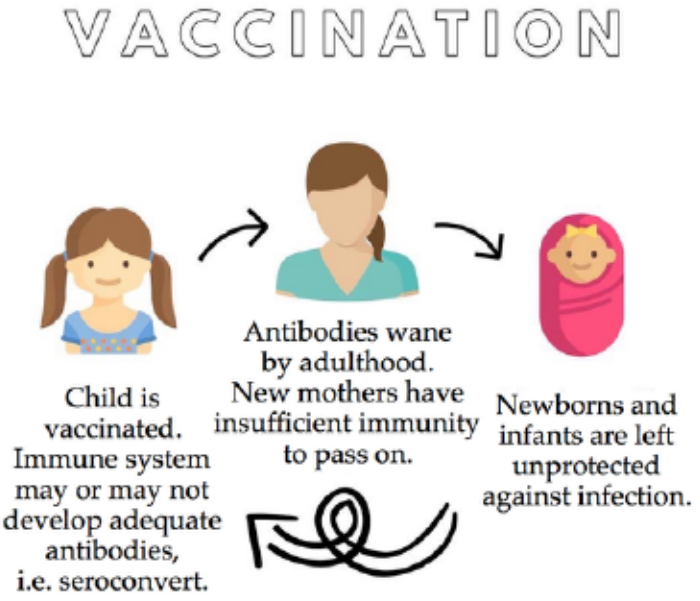
Herd Immunity & Vaccination

Key Terms

- Elimination of disease: Reduction to zero of the incidence of a specified disease in a defined geographical area as a result of deliberate efforts; continued intervention measures are required. Example: neonatal tetanus.
- Elimination of infections: Reduction to zero of the incidence of infection caused by a specific agent in a defined geographical area as a result of deliberate efforts; continued measures to prevent re-establishment of transmission are required. Example: measles, poliomyelitis.
- Eradication: Permanent reduction to zero of the worldwide incidence of infection caused by a specific agent as a result of deliberate efforts; intervention measures are no longer needed. Example: smallpox.

Source: cdc.gov/mmwr/preview/mmwrhtml/su48a7.htm





Vaccination programs are based on a flawed application of the theory of herd immunity

- Natural immunity is different than vaccine-acquired immunity
  - ◇ Immunity acquired from vaccines, if any is even acquired (vaccines have a primary and secondary failure rate, and there are no guarantees nor confirmation of said immunity), wanes and is never lifelong, unlike natural immunity
  - ◇ Many vaccines do not prevent colonization, transmission and/or viral shedding
- Herd immunity was first observed in children who had natural immunity
  - ◇ Active immunity results when exposure to a disease organism triggers the immune system to produce antibodies to that disease. Exposure to the disease organism can occur through infection with the actual disease
- Vaccines have a primary *and* secondary failure rate, making 95%-100% efficacy impossible
  - ◇ Primary failure: failure to seroconvert (produce an antibody response)
    - ■ "About 2–10% of healthy individuals fail to mount antibody levels to routine vaccines." ncbi.nlm.nih.gov/pmc/articles/PMC4962729/
  - ◇ Secondary failure: waning immunity
- Unintended consequences of vaccination programs:
  - ◇ Shift the age of onset to an older population, increasing the risk of serious complications
  - ◇ Increase the size of the susceptible population
- Louisiana vaccination coverage rates have been historically lower than the 95% target
  page 116 ldh.la.gov/assets/oph/Center-PHI/2014HealthReportCard/DHHHlthCreRprtCrd_2008.pdf

The unvaccinated are not a threat to public health nor to the immunocompromised

- Herd immunity can not be achieved through vaccination programs due to primary and secondary vaccine failure rates, inability to prevent colonization, transmission and/or viral shedding, so therefore the unvaccinated are not a threat to the "herd"
- Studies have shown immunocompromised schoolchildren are not put at significant risk by the vaccination status of other schoolchildren*
  *See insert: Vaccines: What About Immunocompromised Schoolchildren?

Can Vaccination Achieve Herd Immunity?

Tetanus

- **Caused by bacterium Clostridium tetani which lives in soil, dust and manure[1]**
- **Not a communicable disease (not contagious)[1]**
  - The vaccine is for personal protection in the very rare instance you puncture your skin with a contaminated object.[1]
- **Extremely rare - less than 30 cases a year in the U.S.[1]**

1. "Tetanus is not contagious from person to person. It is the only vaccine-preventable disease that is infectious but not contagious."
   CDC Pink Book on Tetanus
   cdc.gov/vaccines/pubs/pinkbook/tetanus.html

Pertussis (Whooping Cough)

- **The vaccine does not prevent infection or transmission of the bacteria. It only reduces personal risk of contracting whooping cough.[1]**

1. "The observation that aP, which induces an immune response mismatched to that induced by natural infection, fails to prevent colonization or transmission provides a plausible explanation for the resurgence of pertussis and suggests that optimal control of pertussis will require the development of improved vaccines."
   Acellular pertussis vaccines protect against disease but fail to prevent infection and transmission in a nonhuman primate model
   ncbi.nlm.nih.gov/pubmed/24277828

- **Being vaccinated with DTaP makes you more susceptible to pertussis throughout your lifetime.[2]**

2. "The type of cellular response a predominantly, T2 response results in less efficacy and shorter duration of protection. Because of the small number of antigens (3-5 in DTaP vaccines vs >3000 in DTwP vaccines), linked-epitope suppression occurs. Because of linked-epitope suppression, all children who were primed by DTaP vaccines will be more susceptible to pertussis throughout their lifetimes, and there is no easy way to decrease this increased lifetime susceptibility."
   The 112-Year Odyssey of Pertussis and Pertussis Vaccines-Mistakes Made and Implications for the Future
   ncbi.nlm.nih.gov/m/pubmed/30793754/?fbclid=IwAR2Q1pvNqwZJuFnyDZAv8jkRSHBh9k7dPm_ejIkZ5uqrEh7NvmXLAneN51g

- **Infants are catching whooping cough from fully vaccinated siblings and adults.[3]**

3. "Conclusions: The incidence of pertussis was highest in children aged 12 years and under in this epidemic. At its peak, siblings were the most important sources of pertussis in infants 6 months and younger, particularly fully vaccinated children aged 2 and 3 years. Waning immunity before the booster at 4 years may leave this age group susceptible to infection. Even if cocooning programs could achieve full vaccination coverage of parents and ensure all siblings were fully vaccinated according to national schedules, waning immunity in siblings could provide a means for ongoing transmission to infants."
   Finding the "who" in whooping cough: Vaccinated siblings are important pertussis sources in infants 6 months of age and under
   researchgate.net/publication/268232954_Finding_the_who_in_whooping_cough_Vaccinated_siblings_are_important_pertussis_sources_in_infants_6_months_of_age_and_under

Mumps

- **It is impossible to achieve herd immunity with this vaccine (MMR).**
  - The MMR is plagued by low efficacy and waning immunity.[1,2,3]
    - Antibodies decline by 69% during the first eight years after the second dose.[4]

1. "Increased reports of mumps in vaccinated populations prompted a review of the performance of mumps vaccines . . . There was evidence of waning immunity, which is a likely factor in mumps outbreaks, aggravated by possible antigenic differences between the vaccine strain and outbreak strains . . . Our findings indicate the need for more-effective mumps vaccines and/or for review of current vaccination policies to prevent future outbreaks."
   Mumps Outbreaks in Vaccinated Populations: Are Available Mumps Vaccines Effective Enough to Prevent Outbreaks?
   academic.oup.com/cid/article/47/11/1458/282575

2. "Immunity against mumps virus appears insufficient in a fraction of college-aged people who were vaccinated in childhood, research indicates. The findings highlight the need to better understand the immune response to mumps and mumps vaccines."
   Mumps study shows immunity gaps among vaccinated people
   sciencedaily.com/releases/2019/09/190902181607.htm

3. "During 2010-2015, multiple mumps outbreaks among highly vaccinated populations in close-contact settings occurred. Most cases occurred among vaccinated young adults, suggesting that waning immunity played a role."
   Characteristics of Large Mumps Outbreaks in the United States, July 2010-December 2015
   ncbi.nlm.nih.gov/pubmed/30204850

4. "During the first 8 years after the second dose (1987–1995), the decline in levels of antibodies against all 3 viruses was significant (P<.001); the decline was 50%, 69%, and 58% for measles, mumps, and rubella, respectively. From then on, the antibody decline was substantially smaller but still significant: 23% for measles, from 957 to 729 mIU/mL (P<.001); 22% for mumps, from 1:767 to 1:597 (P<.001); and 21% for rubella, from 28 to 22 IU/mL (P<.05)."
   Persistence of Measles, Mumps, and Rubella Antibodies in an MMR-Vaccinated Cohort: A 20-Year Follow-up
   academic.oup.com/jid/article/197/7/950/798890

- **Fully vaccinated populations can spread and catch mumps.** [5,6,7]

5. "A US Navy warship deployed to the Persian Gulf has been stuck at sea for months due to a viral outbreak of what's likely the mumps, and servicemembers are continuing to fall ill, raising the total number of affected personnel to 27 . . . mumps [is] one of a number of illnesses that all US military personnel are vaccinated against . . . Unfortunately, the mumps portion of the measles, mumps, and rubella (MMR) vaccine is the least effective of the three components, providing 88% effectiveness after completion of the two dose series."
   The Navy's fighting to get a rare viral mumps outbreak under control after it stranded a US warship at sea, March 2019
   businessinsider.com/uss-fort-mchenry-sailors-are-still-falling-ill-in-viral-mumps-outbreak-2019-3?fbclid=IwAR0mDeKh5mvZV7W-AEj8Z-yq_76r_oKVRqrYZEthUucitEkjfSp7ZoJBMjU?utm_source=copy-link&utm_medium=referral&utm_content=topbar

6. "The health department said all but one of the 26 people with mumps had been fully vaccinated."
   More than 2 dozen mumps cases seen at University of Arkansas, December 6, 2019
   apnews.com/4f45cf311abb16d3c9f0b012090e534b

7. "Public health officials are investigating an outbreak of six mumps cases . . . The outbreak is among a group of residents and health care personnel . . . all six of the adult patients had been vaccinated against the disease. She said the mumps vaccine is about 88 percent effective and immunity can wane."
Mumps Outbreak In Denver Investigated
denver.cbslocal.com/2016/02/24/mumps-outbreak-in-denver-county-investigated/

- **Merck has been in federal court since 2010 on fraud charges in a whistleblower suit.**
  - Merck is accused of falsifying data and tainting samples to report higher efficacy rates.[8,9]

8. "Specifically, the suit claims Merck manipulated the results of clinical trials beginning in the late 1990s so as to be able to report that the combined mumps vaccine . . . is 95 percent effective, in an effort to maintain its exclusive license to manufacture it."
Merck Whistleblower Suit A Boon to Vaccine Foes Even As It Stresses Importance of Vaccines
forbes.com/sites/gerganakoleva/2012/06/27/merck-whistleblower-suit-a-boon-to-anti-vaccination-advocates-though-it-stresses-importance-of-vaccines/#49ff53f69678

9. "Merck has known for a decade that its mumps vaccine is 'far less effective' than it tells the government, and it falsified test results and sold millions of doses of 'questionable efficacy,' flooding and monopolizing the market . . . Starting in the late 1990s, Merck set out on its sham testing program with the objective of 'report[ing] efficacy of 95 percent or higher regardless of the vaccine's true efficacy.' . . . Merck did not test the vaccine's ability to protect children against a "wild-type" mumps virus, which is 'the type of real-life virus against which vaccines are generally tested,' the complaint states. Instead, Chatom says, Merck tested children's blood using its own attenuated strain of the virus. 'This was the same mumps strain with which the children were vaccinated,' the complaint states . . . The end result of this deviation … was that Merck's test overstated the vaccine's effectiveness,' Chatom claims. Merck also added animal antibodies to blood samples to achieve more favorable test results, though it knew that the human immune system would never produce such antibodies, and that the antibodies created a laboratory testing scenario that 'did not in any way correspond to, correlate with, or represent real life … virus neutralization in vaccinated people,' . . . 'But no amount of extra time or dosages will be enough to eliminate the disease when the vaccine does not work as represented in the labeling," the complaint states."
Class Says Merck Lied About Mumps Vaccine
courthousenews.com/Class-Says-Merck-Lied-About-Mumps-Vaccine/

- **The MMR vaccine program has shifted the age of onset to an older population.**
  - In the pre-vaccine era nearly everyone in the U.S. experienced mumps, and 90% of cases occurred among children aged <15 years.[10]
  - Now there is a high attack rate among young adults, with instances of a median age of 21.[10]
  - Mumps is more severe in adults, exhibiting a higher rate of complications.[11]
  - This was foreseen back in 1955 before the mumps vaccine was even developed.[12]

10. "During the prevaccine era, nearly everyone in the United States experienced mumps, and 90% of cases occurred among children aged <15 years . . . Of the 219 cases reported in Iowa, the median patient age was 21 years (range: 3-85 years), with 48% of patients aged 17-25 years; 30% were known to be college students . . . the United Kingdom (UK) experienced a recent mumps epidemic that peaked during 2005 with approximately 56,000 cases and a high attack rate among young adults."
Mumps Epidemic - Iowa, 2006, Morbidity and Mortality Weekly Report by the Centers for Disease Control and Prevention
cdc.gov/mmwr/preview/mmwrhtml/mm55d330a1.htm

11. "Since 1998, however, several mumps outbreaks have occurred in adolescents and young adults; these culminated in a national epidemic, mainly affecting university students, in 2004 and 2005 . . . Declining protection over time, and possible antigenic differences between the vaccine and outbreak strains, have been suggested as contributory factors (7,16,17). In the absence of natural boosting, therefore, future mumps epidemics may be unavoidable in vaccinated populations living in crowded, semiclosed settings such as colleges . . . Because mumps is more severe in adults, increasing numbers of mumps cases in young adults in the postvaccine era could be expected to lead to a high rate of complications . . . The mumps outbreak in England and Wales led to a clear increase in hospitalizations caused by mumps complications, which mirrored the outbreak curve . . . The estimated complication rates were **lower in younger persons** . . . As reports of mumps outbreaks in highly immunized populations of older teenagers and young adults continue to occur, the long-term effects of mumps complications may be substantial."
Mumps Complications and Effects of Mumps Vaccination, England and Wales, 2002–2006
ncbi.nlm.nih.gov/pmc/articles/PMC3377415/

12. "If it can be assumed that the eventual control of chickenpox and mumps will depend on the development of an effective vaccine . . . the author . . . questions whether these two diseases are of sufficient gravity in terms of morbidity, mortality, or disability to justify universal and probably repeated vaccinations. Unless lifelong immunity is conferred by the primary vaccination, which seems unlikely, should the attack merely be postponed to older ages when economic loss and risk of complications are greater?
Reporting of Notifiable Diseases
jstor.org/stable/41980697?seq=1#metadata_info_tab_contents

Measles

- **It is impossible to achieve herd immunity with this vaccine (MMR).**
  - Herd immunity for measles requires 95% or more of the population to be immune.[1]
  - The MMR has a primary failure rate of 2-10% and a secondary failure rate of ~5%.[2]

1. "Thus, measles outbreaks also occur even among highly vaccinated populations because of primary and secondary vaccine failure, which results in gradually larger pools of susceptible persons and outbreaks once measles is introduced [8]. This leads to a paradoxical situation whereby measles in highly immunized societies occurs primarily among those previously immunized . . . However, eradication (complete elimination of the global spread and transmission) of measles is unlikely as modeling studies suggest that herd immunity of approximately 95% or greater is required to eliminate persisting measles endemicity . . . However, even with two documented doses of measles vaccine, our laboratory demonstrated that 8.9% of 763 healthy children immunized a mean of 7.4 years earlier, lacked protective levels of circulating measles-specific neutralizing antibodies, suggesting that even two doses of the current vaccine may be insufficient at the population level . . . At the same time, measles vaccine has a failure rate measured in a variety of studies at 2–10%."
The Re-Emergence of Measles in Developed Countries: Time to Develop the Next-Generation Measles Vaccines?
ncbi.nlm.nih.gov/pmc/articles/PMC3905323

2. " In those whose follow-up antibody levels were considered protective, nine of 175 (5%) subsequently had measles. These nine cases were secondary vaccine failures . . . We conclude that secondary vaccine failures occur and that while primary failures account for most cases, secondary vaccine failures contribute to the occurrence of measles cases in an epidemic."
The Role of Secondary Vaccine Failures in Measles Outbreaks
ncbi.nlm.nih.gov/pmc/articles/PMC1349980/pdf/amjph00230-0075.pdf

- **Measles outbreaks can occur even with a 99% vaccination rate and 95% immune rate.[3]**

3. "Outbreaks of measles can occur in secondary schools, even when more than 99 percent of the students have been vaccinated and more than 95 percent are immune."
Measles Outbreak in a Fully Immunized Secondary-School Population
nejm.org/doi/full/10.1056/NEJM198703263161303

- **The two doses given to children do not provide an immune response sufficient for total protection.[4]**

4. "Vaccinated and unvaccinated students were equally able to infect their siblings. Total protection against measles might not be achievable, even among revaccinees, when children are confronted with intense exposure to measles virus."
Explosive school-based measles outbreak: intense exposure may have resulted in high risk, even among revaccinees
ncbi.nlm.nih.gov/pubmed/9850133

- **Immunity acquired by vaccination, if any, decreases rapidly.**
  - Antibodies decline by 50% decline during the first 8 years after the second dose.[5]

5. "During the first 8 years after the second dose (1987–1995), the decline in levels of antibodies against all 3 viruses was significant (P<.001); the decline was 50%, 69%, and 58% for measles, mumps, and rubella, respectively. From then on, the antibody decline was substantially smaller but still significant: 23% for measles, from 957 to 729 mIU/mL (P<.001); 22% for mumps, from 1:767 to 1:597 (P<.001); and 21% for rubella, from 28 to 22 IU/mL (P<.05)."
Persistence of Measles, Mumps, and Rubella Antibodies in an MMR-Vaccinated Cohort: A 20-Year Follow-up
academic.oup.com/jid/article/197/7/950/798890

- **Studies show a third dose does not extend protection beyond several months.[6]**

6. "Most subjects were seropositive before MMR3 receipt, and very few had a secondary immune response after MMR3 receipt. Similarly, CMI and avidity analyses showed minimal qualitative improvements in immune response after MMR3 receipt. We did not find compelling data to support a routine third dose of MMR vaccine."
Measles Virus Neutralizing Antibody Response, Cell-Mediated Immunity, and Immunoglobulin G Antibody Avidity Before and After Receipt of a Third Dose of Measles, Mumps, and Rubella Vaccine in Young Adults
academic.oup.com/jid/article/213/7/1115/2912150

- **The MMR vaccine program has increased the size of the susceptible population.**[7]
  - In 1984 using computer modeling, researchers warned there would be more vaccinated yet still susceptible people than there were unvaccinated, susceptible children in the pre-vaccine era.[7]
- **It shifted the age of onset to an older population, increasing the risk of serious complications.**[7,8]

7. "However, despite short-term success in eliminating the disease, long-range projections demonstrate that the proportion of susceptibles in the year 2050 may be greater than in the prevaccine era. Present vaccine technology and public health policy must be altered to deal with this eventuality . . . As natural immunity is slowly replaced by the artificial one of lesser coverage, the proportion susceptible reflects this change. The future susceptible population is not only children but people of all ages whose morbidity and mortality from measles is increased."
   The Future of Measles in Highly Immunized Populations a Modeling Approach
   academic.oup.com/aje/article-abstract/120/1/39/98627?redirectedFrom=fulltext

8. "Relative to earlier decades, an increased proportion of cases now occur among adults. In 1973, persons 20 years of age and older accounted for only about 3% of cases. In 1994, adults accounted for 24% of cases, and in 2001, for 48% of all reported cases."
   CDC Pink Book on Measles
   cdc.gov/vaccines/pubs/pinkbook/meas.html

- **The MMR vaccine program has left more infants more vulnerable.**[9,10,11]
  - Mothers with vaccine-acquired immunity cannot protect their infants because they do not transfer a sufficient level of antibodies, leaving a larger and younger susceptible population in the vaccine era.[9,10]

9. In response to the measles resurgence in 1989-1991 (the first outbreak after the introduction of the vaccine), the CDC wrote: "In addition, measles susceptibility of infants younger than 1 year of age may have increased . . . The mothers of many infants who developed measles were young, and their measles immunity was most often due to vaccination rather than infection with wild virus. As a result, a smaller amount of antibody was transferred across the placenta to the fetus, compared with antibody transfer from mothers who had higher antibody titers resulting from wild-virus infection. The lower quantity of antibody resulted in immunity that waned more rapidly, making infants susceptible at a younger age than in the past."
   CDC Pink Book on Measles
   cdc.gov/vaccines/pubs/pinkbook/meas.html

10. "Infants whose mothers were born after 1963 are more susceptible to measles than are infants of older mothers. An increasing proportion of infants born in the United States may be susceptible to measles."
    Increased Susceptibility to Measles in Infants in the United States
    pediatrics.aappublications.org/content/104/5/e59

11. "Our results suggest that infants born to mothers who acquired immunity to measles by vaccination may get a relatively small amount of measles antibody, resulting in loss of the immunity to measles before the vaccination age."
    Low titers of measles antibody in mothers whose infants suffered from measles before eligible age for measles vaccination
    ncbi.nlm.nih.gov/pubmed/20444295

- **There was no real need to develop a vaccine for measles.**[12]
- **Before the measles vaccine, less than 1 child out of 100,000 would die from measles.**[13]

12. Among all diseases measles has stood as the classic example of successful parasitism. This self-limiting infection of short duration, moderate severity, and low fatality has maintained a remarkably stable biological balance over the centuries . . . To those who ask me, "Why do you wish to eradicate measles?," I reply with the same answer that Hillary used when asked why he wished to climb Mt. Everest. He said, "Because it is there." To this may be added, ". . and it can be done."
The Importance of Measles as a Health Problem by Dr. Alexander Langmuir, CDC's Chief Epidemiologist and later, Director of CDC
ncbi.nlm.nih.gov/pmc/articles/PMC1522578/pdf/amjphnation00499-0004.pdf

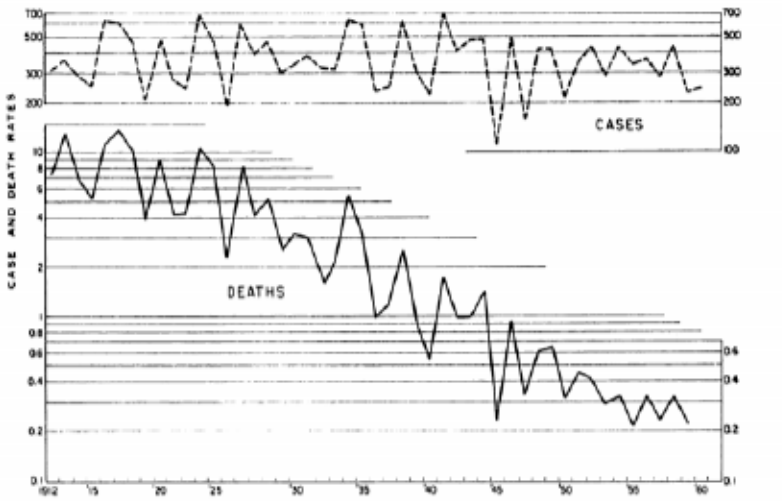


Figure 1—United States Measles Reported Cases and Deaths per 100,000 Population, 1912-1959

13. *The Importance of Measles as a Health Problem by Dr. Alexander Langmuir, CDC's Chief Epidemiologist and later, Director of CDC*
ncbi.nlm.nih.gov/pmc/articles/PMC1522578/pdf/amjphnation00499-0004.pdf

Hepatitis B Virus (HBV)

- **HBV is a bloodborne virus - it is transmitted via blood or fluids contaminated with blood.**[1]
  - ◇ It is also a sexually-transmitted disease, and the primary method of transmission.[1]

1. "The virus is transmitted by parenteral or mucosal exposure to HBsAg-positive body fluids from persons who have acute or chronic HBV infection. The highest concentrations of virus are in blood and serous fluids; lower titers are found in other fluids, such as saliva, tears, urine, and semen. Semen is a vehicle for sexual transmission and saliva can be a vehicle of transmission through bites; other types of exposure, e.g., to saliva through kissing, are unlikely modes of transmission. Transmission of HBV via tears, sweat, urine, stool, or droplet nuclei has not been clearly documented. In the United States, the most important routes of transmission are perinatal and sexual contact, either heterosexual or homosexual, with an infected person."
CDC Pink Book on Hepatitis B Virus
cdc.gov/vaccines/pubs/pinkbook/hepb.html

- **It is not transmitted casually - it cannot be spread through the sharing of toys, sneezing, coughing, spitting, or hugging. Because of this, the vaccine does not prevent transmission in a casual public setting.[2]**

- **Infected children can attend school without posing a risk to others and they are not required to disclose their health status.[2]**

2. "Hepatitis B is not transmitted casually. It cannot be spread through the sharing of toys, sneezing, coughing, spitting, or hugging. Hepatitis B is spread through blood and infected bodily fluids . . . your child is healthy and poses no risk if blood accidents are handled carefully . . . Although you do not necessarily have a 'duty' to inform people of your child's hepatitis B, there may be situations where it is wise to disclose your child's diagnosis."
Hepatitis B Foundation: Advice for Parents
hepb.org/treatment-and-management/children-with-hepatitis-b/advice-for-parents/

- **People with hepatitis B are protected under the Americans with Disabilities Act (ADA) and Title VI of the Civil Rights Act.[3]**
  - Infected adults seeking education and training in the health professions cannot be denied admission, threatened with dismissal, or have their higher education or professional training hindered/altered in any way.[3]
  - Undue constraints cannot be placed on a person's clinical training or practice because of their hepatitis B diagnosis.[3]

3. "People with hepatitis B are protected under the Americans with Disabilities Act (ADA) and Title VI of the Civil Rights Act . . . individuals seeking education and training in the health professions cannot be denied admission, threatened with dismissal, or have their higher education or professional training hindered/altered in any way because of their hepatitis B diagnosis . . . These recommendations confirm that having hepatitis B is not a reason . . . to put undue constraints on a person's clinical training or practice . . . CDC concludes that . . . HBV infection status alone does not require any curtailing of their practices or supervised learning experiences.' According to CDC, their HBV disease should be managed as any other personal health issue would be managed."
Hepatitis B Foundation: U.S. Schools and Education
hepb.org/resources-and-support/know-your-rights/schools-and-education/

Poliovirus (Polio)

- **Polio, also known as poliomyelitis, is caused by the poliovirus and is a type of enterovirus.**
  - There are more than 100 human enterovirus genotypes.[1]
  - So far 5 types of poliovirus have been discovered.[2]

1. "Studies have shown there to be over 100 human Enterovirus genotypes."
Enterovirus Foundation
enterovirusfoundation.org/the-facts

2. " . . . after the introduction of inactivated poliovirus vaccination (IPV) in 2002, showed rare polioviruses, none that were wild-type or circulating vaccine-derived poliovirus (cVDPV), and many other enteroviruses among 1,392 samples analyzed. Two of five polioviruses (PV) detected were Sabin-like PV2 and three PV3, based on enzyme-linked immunosorbent assay (ELISA) and PCR results. Neurovirulence-related mutations

were found in the 5' noncoding region (5'NCR) of all strains."
Sporadic Isolation of Sabin-Like Polioviruses and High-Level Detection of Non-Polio Enteroviruses during Sewage Surveillance in Seven Italian Cities, after Several Years of Inactivated Poliovirus Vaccination
aem.asm.org/content/80/15/4491.long

- **The Inactivated Polio Vaccine (IPV) contains wild poliovirus types 1, 2, and 3 that have been inactivated (killed) with formalin (a formaldehyde solution).[3]**

3. "IPV is produced from wild-type poliovirus strains of each serotype that have been inactivated (killed) with formalin."
WHO: Biologicals: Inactivated polio vaccine (IPV)
who.int/biologicals/areas/vaccines/polio/ipv/en/

- **90% of infected people have no symptoms or very mild symptoms and usually go unrecognized.[4]**

4. "Most infected people (90%) have no symptoms or very mild symptoms and usually go unrecognized."
WHO: Immunization, Vaccines and Biologicals: Poliomyelitis
who.int/immunization/diseases/poliomyelitis/en/

- **IPV does not produce sufficient local gastrointestinal immunity.[5,8] Because of this, IPV:**
  - Does not stop transmission of the poliovirus.[6,7]
  - Does not prevent shedding of the poliovirus.[5,8,9]

5. "IPV is less effective than OPV in inducing intestinal mucosal immunity in previously unvaccinated individuals. Children given IPV then challenged with OPV become infected and shed OPV in their feces."
Polio vaccines: WHO position paper – March, 2016
who.int/wer/2016/wer9112.pdf?ua=1

6. "Thanks to this 'gut immunity', OPV is the only effective weapon to stop transmission of the poliovirus when an outbreak is detected."
WHO: Poliomyelitis (polio) and the vaccines used to eradicate it – questions and answers
euro.who.int/en/health-topics/disease-prevention/pages/news/news/2016/04/poliomyelitis-polio-and-the-vaccines-used-to-eradicate-it-questions-and-answers

7. "IPV prevents infection, but it does not stop transmission of the virus."
WHO: Poliomyelitis (polio) and the vaccines used to eradicate it – questions and answers
euro.who.int/en/health-topics/disease-prevention/pages/news/news/2016/04/poliomyelitis-polio-and-the-vaccines-used-to-eradicate-it-questions-and-answers

8. "In contrast, IPV provided no protection against shedding compared with unvaccinated individuals or when given in addition to OPV, compared with individuals given OPV alone . . . IPV does not induce sufficient intestinal mucosal immunity to reduce the prevalence of fecal poliovirus shedding after challenge, although there was some evidence that it can reduce the quantity of virus shed."
Systematic review of mucosal immunity induced by oral and inactivated poliovirus vaccines against virus shedding following oral poliovirus challenge
ncbi.nlm.nih.gov/pubmed/22532797

9. "No polioviruses were isolated in initial stool specimens, before the campaign, from infants in any of the groups . . . The excretion rates did not differ according to group when each IPV intervention group (A and C) was compared separately with group B . . . In our study, the prevalence of excretion after receiving trivalent OPV was high (more than 90% for any poliovirus) and was similar among all three groups, including the control group, but viral titers were lower in both IPV groups."
Randomized, Placebo-Controlled Trial of Inactivated Poliovirus Vaccine in Cuba
nejm.org/doi/full/10.1056/NEJMoa054960

- **The Oral Polio Vaccine (OPV) contains attenuated live poliovirus types 1, 2, and 3 and is used in countries around the world, but not in the U.S. since 2000.[10]**

10. "Use of OPV was discontinued in the United States in 2000."
CDC Pink Book on Polio
cdc.gov/vaccines/pubs/pinkbook/polio.html

- **The live viruses in OPV have mutated and spawned virulent circulating vaccine-derived polioviruses (cVDPVs) which can cause isolated cases or outbreaks of paralytic poliomyelitis.[11]**

11. "The attenuated viruses in live OPV vaccines (Sabin viruses) may, through prolonged replication in an individual or in a community, re-acquire the neurovirulence and transmissibility characteristics of WPV. They may then become cVDPVs that cause isolated cases or outbreaks of paralytic poliomyelitis . . . VDPVs are genetically divergent forms of the original Sabin vaccine virus."
Polio vaccines: WHO position paper – March, 2016
who.int/wer/2016/wer9112.pdf?ua=1

- **cVDPVs are now causing more paralysis than wild polio.[12]**

12. "For the first time, the number of children paralyzed by mutant strains of the polio vaccine are greater than the number of children paralyzed by polio itself . . . only six cases of 'wild' polio reported anywhere in the world . . . By contrast, there have been 21 cases of vaccine-derived polio . . . 'It's actually an interesting conundrum. The very tool you are using for [polio] eradication is causing the problem,' says Raul Andino, a professor of microbiology at the University of California at San Francisco."
Mutant Strains Of Polio Vaccine Now Cause More Paralysis Than Wild Polio
npr.org/sections/goatsandsoda/2017/06/28/534403083/

- **The surge[13] in cVDPVs prompted the WHO to replace trivalent OPV (tOPV) with bivalent OPV (bOPV) in April 2016.[14]**
  - The vast majority of cVDPVs were derived from OPV type 2, so bOPV only contains types 1 & 3.[14]
  - They introduced the use of monovalent OPV type 2 (mOPV2) for responding to any cVDPV type 2 outbreak.[14]

13. *WHO: Poliomyelitis: Disease outbreak news*
who.int/csr/don/archive/disease/poliomyelitis/en/

14. ". . . over 90% of the approximate 750 paralytic cases due to cVDPVs between 2000 and 2012 and 40% of VAPP cases were derived from OPV type 2. To minimize the risk of continued type 2 cVDPV (cVDPV2) cases . . . required to switch from tOPV to bOPV in a coordinated manner . . . Following the switch, monovalent OPV type 2 (mOPV2) will be the vaccine of choice for responding to any cVDPV type 2 outbreak."
WHO: Preparing for the withdrawal of all oral polio vaccines (OPVs): Replacing trivalent OPV with bivalent OPV
who.int/immunization/diseases/poliomyelitis/endgame_objective2/oral_polio_vaccine/OPVswitch-FAQs-Feb_2015.pdf?ua=1

- **We're not much closer to eradicating polio; they've created a mess and there is no available solution.[15]**
  - The switch didn't work in Africa - outbreaks from cVDPVs have been more frequent and much harder to stop than the models projected.[15]

15. ". . . [they] knew some vaccine-derived type 2 virus would linger in the first few years after the switch, sparking outbreaks. But modeling suggested the program could quickly squelch them—without starting new ones—with the judicious use of a new live vaccine, monovalent OPV2 (mOPV2), which is effective against only type 2. It's akin to fighting fire with fire; the gamble was that mOPV2 would not spawn new outbreaks of its own. (An alternative exists, the killed or inactivated polio vaccine [IPV], which can't revert but simply isn't powerful enough to quash an outbreak.). The switch worked, except in Africa, where type 2 vaccine-derived outbreaks have been more frequent and much harder to stop than the models projected . . . 'We have now created more new emergences of the virus than we have stopped,' Pallansch says . . . Meanwhile, the program has already used nearly 260 million doses of mOPV2. 'We are down to less than 10 million doses for the whole planet, and that is not enough,' says Pallansch, who chairs a committee advising WHO's director-general on the vaccine's use. 'No one thought it was possible that we would use that amount.' And as a result of the 2016 vaccine switch, an increasing number of children lack immunity to the type 2 virus, setting the stage for an explosive outbreak. That puts the program in a bind. 'We have no choice but to keep using [the monovalent vaccine]', says WHO's Michel Zaffran, who heads the global initiative. 'It is all we've got. We have to live with the risk until we have a technical solution.'"
Surging cases have dashed all hope that polio might be eradicated in 2019
sciencemag.org/news/2019/07/surging-cases-have-dashed-all-hope-polio-might-be-eradicated-2019

Influenza (Flu)

- **The flu vaccine has historically low rates of efficacy[1] especially with repeated vaccination;[2,3] it does not prevent transmission of the flu virus;[2] nor does it induce an adequate immune response.[4]**

1. "The imperfect effectiveness of seasonal influenza vaccines is often blamed on antigenic mismatch, but even when the match appears good, effectiveness can be surprisingly low. Seasonal influenza vaccines also stand out for their variable effectiveness by age group from year to year and by recent vaccination status . . . less than 20% of children and adults had at least a four-fold titer rise against H3N2 and influenza B after immunization."
   Immune History and Influenza Vaccine Effectiveness
   ncbi.nlm.nih.gov/pmc/articles/PMC6027411/

2. "Substantially lower effectiveness was noted among subjects who were vaccinated in both the current and prior season. There was no evidence that vaccination prevented household transmission once influenza was introduced; adults were at particular risk despite vaccination. CONCLUSIONS: Vaccine effectiveness estimates were lower than those demonstrated in other observational studies carried out during the same season. The unexpected findings of lower effectiveness with repeated vaccination and no protection given household exposure require further study."
   Influenza vaccine effectiveness in the community and the household
   europepmc.org/article/PMC/3693492

3. "This study raises relevant questions about the potential interference of repeated annual influenza vaccination and possible residual protection from previous season vaccination that have not been considered in most trials . . . The analysis using 5 years of historical vaccination data suggested a significant difference in current-season VE (vaccine effectiveness) among frequent vaccinees compared with nonvaccinees . . . In the analysis using 5 years of historical vaccination data, current season VE against H3N2 was significantly higher among vaccinated individuals with no prior vaccination history (65%; 95% confidence interval [CI], 36%-80%) compared with vaccinated individuals with a frequent vaccination history (24%; 95% CI, 3%-41%; P = .01)."
   Impact of Repeated Vaccination on Vaccine Effectiveness Against Influenza A(H3N2) and B During 8 Seasons
   ncbi.nlm.nih.gov/pmc/articles/PMC4207422/

4. "The mucosal tissues of the respiratory tract are the main portal entry of influenza, and the mucosal immune system provides the first line of defence against infection . . . The commercially available trivalent IV (TIV) elicits good serum antibody responses but induces poorly mucosal IgA antibody and cell-mediated immunity."
   Influenza Virus: Immunity and Vaccination Strategies. Comparison of the Immune Response to Inactivated and Live, Attenuated Influenza Vaccines
   onlinelibrary.wiley.com/doi/full/10.1111/j.0300-9475.2004.01382.x

- **The vaccine sheds the infectious virus presenting a risk for airborne transmission.[5]**

5. "A significant fraction of influenza cases routinely shed infectious virus, not merely detectable RNA, into aerosol particles small enough to remain suspended in air and present a risk for airborne transmission . . . The association of current and prior year vaccination with increased shedding of influenza might lead one to speculate that certain types of prior immunity promote lung inflammation, airway closure, and aerosol generation . . . Vaccination with both the current and previous year's seasonal vaccines, however, was significantly associated with greater fine-aerosol shedding in unadjusted and adjusted models ($P < 0.01$). In adjusted models, we observed 6.3 (95% CI 1.9–21.5) times more aerosol shedding among cases with vaccination in the current and previous season compared with having no vaccination in those two seasons."
Infectious virus in exhaled breath of symptomatic seasonal influenza cases from a college community
pnas.org/content/115/5/1081.full

- **The flu vaccine puts children at greater risk of hospitalization[6] and noninfluenza respiratory virus infections.[7]**

6. "The inactivated flu vaccine does not appear to be effective in preventing influenza-related hospitalizations in children, especially the ones with asthma. In fact, children who get the flu vaccine are more at risk for hospitalization than their peers who do not get the vaccine."
Children Who Get Flu Vaccine Have Three Times Risk Of Hospitalization For Flu, Study Suggests
sciencedaily.com/releases/2009/05/090519172045.htm

7. "We randomized 115 children to trivalent inactivated influenza vaccine (TIV) or placebo. Over the following 9 months, **TIV recipients had an increased risk of virologically-confirmed non-influenza infections** (**relative risk: 4.40**; 95% confidence interval: 1.31-14.8). Being protected against influenza, TIV recipients may lack temporary non-specific immunity that protected against other respiratory viruses."
Increased risk of noninfluenza respiratory virus infections associated with receipt of inactivated influenza vaccine
ncbi.nlm.nih.gov/pubmed/22423139

- **The vaccine does not significantly lower incidence, risk of complications, or mortality, even in high risk groups like the elderly.[8]**

8. "Our review findings have not identified conclusive evidence of benefit of HCW (healthcare workers) vaccination programmes on specific outcomes of laboratory-proven influenza, its complications (lower respiratory tract infection, hospitalisation or death due to lower respiratory tract illness), or all cause mortality in people over the age of 60 who live in care institutions. This review did not find information on co-interventions with healthcare worker vaccination: hand-washing, face masks, early detection of laboratory-proven influenza, quarantine, avoiding admissions, antivirals and asking healthcare workers with influenza or influenza-like illness (ILI) not to work. This review does not provide reasonable evidence to support the vaccination of healthcare workers to prevent influenza in those aged 60 years or older resident in LTCIs (long term care institutions). High quality RCTs (randomised controlled trials) are required to avoid the risks of bias in methodology and conduct identified by this review and to test further these interventions in combination."
Influenza vaccination for healthcare workers who care for people aged 60 or older living in long-term care institutions
cochranelibrary.com/cdsr/doi/10.1002/14651858.CD005187.pub5/abstract

- **The CDC has a history of reporting inaccurate and exaggerated figures regarding flu deaths.**[9]

9. "'U.S. data on influenza deaths are a mess,' states a 2005 article in the British Medical Journal entitled *Are U.S. flu death figures more PR than science?* This article takes issue with the 36,000 flu-death figure commonly claimed, and with describing "influenza/pneumonia" as the seventh leading cause of death in the U.S. 'But why are flu and pneumonia bundled together?' the article asks. 'Is the relationship so strong or unique to warrant characterizing them as a single cause of death?' The article's answer is no. Most pneumonia deaths are unrelated to influenza . . . Because the flu was rarely an 'underlying cause of death,' the CDC created the sound-alike term, 'influenza-associated death.' . . . The CDC's decision to play up flu deaths dates back a decade, when it realized the public wasn't following its advice on the flu vaccine. During the 2003 flu season 'the manufacturers were telling us that they weren't receiving a lot of orders for vaccine,' Dr. Glen Nowak, associate director for communications at CDC's National Immunization Program, told National Public Radio. 'It really did look like we needed to do something to encourage people to get a flu shot.'"
Don't Believe Everything You Read About Flu Deaths
huffingtonpost.ca/lawrence-solomon/death-by-influenza_b_4661442.html

Vaccines: What About Immunocompromised Schoolchildren?

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1. WHAT DOES IT MEAN TO BE IMMUNOCOMPROMISED?

Immunocompromised children have weakened immune systems that prevent them from optimally fighting infections on their own. Consequently, they may be at increased risk of complications from infectious diseases and require additional precautions and treatments.

2. CAN IMMUNOCOMPROMISED CHILDREN ATTEND SCHOOL?

The Immune Deficiency Foundation states, "Years ago, a diagnosis of a PI [primary immune deficiency] meant extremely compromised lives... Today, with early diagnosis and appropriate therapies, many patients diagnosed with a PI can live healthy, productive lives." Modern treatments have reduced the risk of many immunocompromised children so that they are able to attend school.[1]

Children who are not severely immunocompromised can attend school with the approval of their doctor.

3. CAN IMMUNOCOMPROMISED SCHOOLCHILDREN BE VACCINATED?

Immunocompromised schoolchildren have the option to receive all the vaccines licensed for children in the United States, except for the live virus vaccines (such as vaccines targeting measles, mumps, rubella, or varicella infections).[2] Although vaccination often results in protective levels of antibodies in immunocompromised children,[3-7] clinical vaccine safety trials typically exclude immunocompromised subjects.[8] In addition, vaccines have not been evaluated for their potential to cause cancer, genetic mutations or impaired fertility in the general or immunocompromised population.[9] Due to these limitations, it is not known whether the benefit of vaccinating an immunocompromised child outweighs the risk of vaccine injury to that child.

4. DOES THE VACCINATION STATUS OF OTHER SCHOOLCHILDREN POSE A SIGNIFICANT RISK TO IMMUNOCOMPROMISED SCHOOLCHILDREN?

The vaccination status of other schoolchildren does not pose a significant risk to immunocompromised schoolchildren for the following reasons (Table 1):

- Some vaccines cannot prevent the spread of the bacteria or viruses they target.
- Immune globulin (plasma containing antibodies) is available for immunocompromised children exposed to certain infectious diseases.
- Some infectious diseases rarely cause complications in immunocompromised schoolchildren.
- Not all infectious diseases are contagious.
- Some infectious diseases are not spread in schools.

Immunocompromised schoolchildren are not put at significant risk by the vaccination status of other schoolchildren.

Table 1: Why the Vaccination Status of Other Schoolchildren Is Not a Significant Risk to Immunocompromised Schoolchildren

Some vaccines cannot prevent the spread of the bacteria or viruses they target.

Children vaccinated with the diphtheria, tetanus, and pertussis (whooping cough) vaccine (DTaP) or the inactivated polio vaccine (IPV) can still be infected with diphtheria-causing bacteria, pertussis bacteria, or poliovirus and spread them to others, even with mild or no symptoms of their own.[10-13] The influenza vaccines (TIV and LAIV) have not been observed to significantly reduce the spread of influenza.[14,15] About half of schoolchildren vaccinated with the measles, mumps, and rubella (MMR) vaccine can still be infected with measles virus and spread it to others, even with mild or no symptoms of their own.[16-19]

Immune globulin (plasma containing antibodies) is available for immunocompromised children exposed to certain infectious diseases.

Immune globulin (IG) is available for the prevention of severe symptoms in immunocompromised children exposed to measles or rubella (IG does not provide protection for fetuses of expectant mothers infected with rubella).[20,21] Varicella-zoster immune globulin (VIG) is available for the prevention of severe symptoms in immunocompromised children exposed to varicella (chickenpox).[22] Hepatitis B immune globulin (HBIG) and tetanus immune globulin (TIG) are also available for immunocompromised children.[2]

Some infectious diseases rarely cause complications in immunocompromised schoolchildren.

Fatal cases of mumps are very rare in schoolchildren (1 mumps death per 100,000 mumps cases),[23] and immunocompromised children have been observed to recover just as well from mumps as the general population.[24] Severe cases of pertussis or rubella rarely occur in schoolchildren, and being immunocompromised has not been observed to be a significant risk factor for complications of pertussis or rubella in schoolchildren.[25,26]

Not all infectious diseases are contagious.

Tetanus is not a communicable disease; that is, it cannot spread from person to person under any circumstances.[27]

Some infectious diseases are not spread in schools.

Hepatitis B is not spread by kissing, hugging, holding hands, coughing, sneezing, or sharing eating utensils,[28] and the main routes of hepatitis B transmission (sexual contact, injection drug use, or being born to an infected mother)[29] do not occur in school. Nearly all cases of *Haemophilus influenzae* type b (Hib) occur among children younger than 5 years of age; therefore, nearly all Hib transmission does not occur in school.[30] Human papillomavirus (HPV) is sexually transmitted and is therefore not spread in school.[31]

All references are available at physiciansforinformedconsent.org/immunocompromised-schoolchildren.

REFERENCES

1. Blaese RM, Ludwig M, Buckley R, Seymour JW, Dodds M. Immune Deficiency Foundation school guide for students with primary immunodeficiency diseases. 3rd ed. Towson (MD): Immune Deficiency Foundation; 2014. 6.
2. Centers for Disease Control and Prevention. Recommendations of the Advisory Committee on Immunization Practices (ACIP): use of vaccines and immune globulins in persons with altered immunocompetence. MMWR. 1993 Apr;42(No. RR-04).
3. Ercan TE, Soycan LY, Apak H, Celkan T, Ozkan A, Akdenizli E, Kasapçopur O, Yildiz I. Antibody titers and immune response to diphtheria-tetanus-pertussis and measles-mumps-rubella vaccination in children treated for acute lymphoblastic leukemia. J Pediatr Hematol Oncol. 2005 May;27(5):273-7.
4. Feldman S, Gigliotti F, Shenep JL, Roberson PK, Lott L. Risk of *Haemophilus influenzae* type b disease in children with cancer and response of immunocompromised leukemic children to a conjugate vaccine. J Infect Dis. 1990 May;161(5):926-31.
5. Hodges GR, Davis JW, Lewis HD Jr, Siegel CD, Chin TD, Clark GM, Noble GR. Response to influenza A vaccine among high-risk patients. South Med J. 1979 Jan;72(1):29-32.
6. Moss WJ, Clements CJ, Halsey NA. Immunization of children at risk of infection with human immunodeficiency virus. Bull of the World Health Organ. 2003;81(1):62,64.
7. Barbi M, Bardare M, Luraschi C, Zehender G, Clerici Schoeller M, Ferraris G. Antibody response to inactivated polio vaccine (E-IPV) in children born to HIV positive mothers. Eur J Epidemiol. 1992 Mar;8(2):211-6.
8. Centers for Disease Control and Prevention. Manual for the surveillance of vaccine-preventable diseases. 5th ed. Miller ER, Haber P, Hibbs B, Broder K. Chapter 21: surveillance for adverse events following immunization using the Vaccine Adverse Event Reporting System (VAERS). Atlanta: Centers for Disease Control and Prevention; 2011. 1,2.
9. U.S. Food and Drug Administration. Silver Spring (MD): U.S. Food and Drug Administration. Vaccines licensed for use in the United States; [updated 2018 Feb 14; cited 2018 Feb 27]. https://www.fda.gov/BiologicsBloodVaccines/Vaccines/ApprovedProducts/Ucm093833.htm.
10. Miller LW, Older JJ, Drake J, Zimmerman S. Diphtheria immunization. Effect upon carriers and the control of outbreaks. Am J Dis Child. 1972 Mar;123(3):197-9.
11. Warfel JM, Zimmerman LI, Merkel TJ. Acellular pertussis vaccines protect against disease but fail to prevent infection and transmission in a nonhuman primate model. Proc Natl Acad Sci USA. 2014 Jan 14;111(2):787-92.
12. Cuba IPV Study Collaborative Group. Randomized, placebo-controlled trial of inactivated poliovirus vaccine in Cuba. N Engl J of Med. 2007 Apr 12;356(15):1536-44.
13. Centers for Disease Control and Prevention. Washington, D.C.: U.S. Department of Health and Human Services. U.S. National Authority for Containment of Poliovirus: the need for containment; [cited 2019 Jul 21]. https://www.cdc.gov/cpr/polioviruscontainment/containment.htm.
14. Thomas RE, Jefferson T, Lasserson TJ. Influenza vaccination for healthcare workers who care for people aged 60 or older living in long-term care institutions. Cochrane Database Syst Rev. 2016 Jun 2;(6) CD005187:2.
15. Ohmit SE, Petrie JG, Malosh RE, Cowling BJ, Thompson MG, Shay DK, Monto AS. Influenza vaccine effectiveness in the community and the household. Clin Infect Dis. 2013 May;56(10):1363.
16. **Children with measles antibody levels less than 900 mIU/mL are susceptible to subclinical infection with measles virus but not to clinical infection. About 35% of vaccinated children 7 years of age have a measles antibody level less than 900 mIU/mL. This level steadily declines through childhood, resulting in about 60% of children 15 years of age with a measles antibody level less than 900 mIU/mL. Consequently, about half of schoolchildren are susceptible to infection with measles virus.**
    - LeBaron CW, Beeler J, Sullivan BJ, Forghani B, Bi D, Beck C, Audet S, Gargiullo P. Persistence of measles antibodies after 2 doses of measles vaccine in a postelimination environment. Arch Pediatr Adolesc Med. 2007 Mar;161(3):294-301.
17. Pedersen IR, Mordhorst CH, Glikmann G, von Magnus H. Subclinical measles infection in vaccinated seropositive individuals in arctic Greenland. Vaccine. 1989 Aug;7(4):345-8.
18. Chen RT, Markowitz LE, Albrecht P, Stewart JA, Mofenson LM, Preblud SR, Orenstein WA. Measles antibody: reevaluation of protective titers. J Infect Dis. 1990 Nov;162(5):1036-42.
19. Mizumoto K, Kobayashi T, Chowell G. Transmission potential of modified measles during an outbreak, Japan, March–May 2018. Euro Surveill. 2018 Jun 14;23(24):1800239.
20. McLean HQ, Fiebelkorn AP, Temte JL, Wallace GS; Centers for Disease Control and Prevention. Prevention of measles, rubella, congenital rubella syndrome, and mumps, 2013: summary recommendations of the Advisory Committee on Immunization Practices (ACIP). MMWR. 2013 Jun;62(RR-04):17,24.
21. Young MK, Cripps AW, Nimmo GR, van Driel ML. Post-exposure passive immunisation for preventing rubella and congenital rubella syndrome. Cochrane Database Syst Rev. 2015 Sep 9;(9)CD010586:3.
22. Centers for Disease Control and Prevention. Varicella-zoster immune globulin for the prevention of chickenpox: recommendations of the Immunization Practices Advisory Committee (ACIP). MMWR. 1984 Feb;33(7):84-90,95-100.
23. **Before the mumps vaccine was licensed in 1967, nearly everyone contracted mumps in childhood. In 1966, there were 43 mumps deaths out of 4 million cases (the average size of a birth cohort in the 1960s): about 1 mumps death per 100,000 mumps cases.**
    - Wagenvoort JH, Harmsen M, Boutahar-Trouw BJ, Kraaijeveld CA, Winkler KC. Epidemiology of mumps in the Netherlands. J Hyg (Lond). 1980 Dec;85(3):313-26.
    - Centers for Disease Control and Prevention. Reported cases and deaths from vaccine preventable diseases, United States, 1950-2013. Epidemiology and prevention of vaccine-preventable diseases. Hamborsky J, Kroger A, Wolfe S, eds. 13th ed. Washington, D.C.: Public Health Foundation; 2015. Appendix E3.
24. de Boer AW, de Vaan GA. Mild course of mumps in patients with acute lymphoblastic leukaemia. Eur J Pediatr. 1989 Jun;148(7):618-9.
25. Centers for Disease Control and Prevention. Epidemiology and prevention of vaccine-preventable diseases. 13th ed. Hamborsky J, Kroger A, Wolfe S, editors. Washington, D.C.: Public Health Foundation; 2015. 262,263,265.
26. Centers for Disease Control and Prevention. Epidemiology and prevention of vaccine-preventable diseases. 13th ed. Hamborsky J, Kroger A, Wolfe S, editors. Washington, D.C.: Public Health Foundation; 2015. 325,326.
27. Centers for Disease Control and Prevention. Epidemiology and prevention of vaccine-preventable diseases. 13th ed. Hamborsky J, Kroger A, Wolfe S, editors. Washington, D.C.: Public Health Foundation; 2015. 345.
28. Centers for Disease Control and Prevention. Washington, D.C.: U.S. Department of Health and Human Services. Hepatitis B questions and answers for the public; [cited 2019 Jul 15]. https://www.cdc.gov/hepatitis/hbv/bfaq.htm#bFAQc01.
29. Centers for Disease Control and Prevention. Epidemiology and prevention of vaccine-preventable diseases. 13th ed. Hamborsky J, Kroger A, Wolfe S, editors. Washington, D.C.: Public Health Foundation; 2015. 154-5.
30. Centers for Disease Control and Prevention. Epidemiology and prevention of vaccine-preventable diseases. 13th ed. Hamborsky J, Kroger A, Wolfe S, editors. Washington, D.C.: Public Health Foundation; 2015. 120.
31. Centers for Disease Control and Prevention. Epidemiology and prevention of vaccine-preventable diseases. 13th ed. Hamborsky J, Kroger A, Wolfe S, editors. Washington, D.C.: Public Health Foundation; 2015. 177.