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# Immunization: Administering and Advising on Vaccination Schedules to Protect Against Various Diseases, Including Routine Childhood Vaccinations and Travel Vaccines

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**Abstract** **Review Article**

Vaccination is a very important health issue on the global level as it is an effective measure to prevent diseases. Pediatricians are required to vaccinate children. As an illustration, heed the vaccination schedule recommended by the CDC, the American Academy of Pediatrics, and the American Academy of Family Physicians, and shield high-risk children from illnesses that can be prevented by vaccination. Single-shot, slow-acting vaccinations immunize the children gradually. Two shots of the measles, mumps, rubella, and varicella are administered to children 12 months of age and up. Taken together, vaccination lowers disease incidence and mortality rates and it should be recommended for all children without any limitations.

**Keywords:** Vaccination, children, disease, mortality, prevention.



## 1. INTRODUCTION TO IMMUNIZATION

The key individuals or professionals concerned with the immunization processes are, of course, the enablers. These are the individuals working in the vaccine development, research, and production sector and the National Institutes of Health (NIH) and the World Health Organization (WHO). The others are the administrators of vaccination programs in the country. In Namibia, this is the Ministry of Health and Social Services whose work the private medical practitioners when they act in part as agents of the ministry. Then there are indeed also the health promoters whose role is both to give health education to the public and the school children and the pregnant mothers and the other caregivers and then the community nursing services as rendered by the community health workers and the nurses. All these groups work under the guidance of the Public Health Council, the council established under the Public Health Act, Act 36 of 2015 to concern itself with health matters. The act was passed and signed into law in 2015 (Parikh *et al.*, 2020; Mirin, 2021; Stoyanov *et al.*, 2022).

In focus, therefore, is vaccine immunization where the immunity agents are in a chemically altered form administered to the individual. Vaccine immunization is what we understand and which the public health officer engages in. The common term in use is "vaccination". Both vaccination and immunization do not cure diseases; they only prevent diseases. The term vaccination has its terminologies, which are mostly in the Latin language, and this has implications in training, which we come back to in the section on Vaccines (Chumakov *et al.*, 2020; Garbuglia *et al.*, .2020; Wagner and Weinberger, 2020; Bloom *et al.*, 2021; Cleve, 2021).

Immunization is the granting of immunity, immunity as in protection, by deliberate action or exposure. The exposure in this case may involve a substance taken into the body or environmental conditions, or the protection may be natural or innate. Immunization occurs in two forms: (a) active immunity where the organs of the individual produce the immunity agents and (b) passive immunity where the immunity agents are administered to the individual (Eichinger *et al.*, 2021; Scotta and Stein, 2023).

### 1.1. Definition and Importance of Immunization

It is the process where the body develops resistance to infectious organisms. This is usually achieved by stimulating the body's immune response to the infectious agent, without causing disease.

Immunization can protect against diseases that are life-threatening and are a threat to health and society. With new vaccines becoming available, health personnel must get familiar with and updated about vaccine schedules and implementing them. The availability of effective vaccines has played a predominant role in controlling the spread of disease. The range of vaccine-preventable diseases is constantly expanding to include more and more of the potentially serious communicable diseases that are found in every community (Fan *et al.,* 2022; Lynn *et al.,* 2022). All vaccines strengthen the immune system and protect individuals from disease. Immunization saves millions of lives every year. Immunization remains the backbone of preventive medicine and public health. It offers protection to the vaccinated individual and ensures community protection. Everyone should be fully immunized ((Lindstrand *et al.,* 2021; Carrico *et al.,* 2022; Shattock *et al.,* 2024).

**2. Routine Childhood Vaccinations**

At 2 months, the ACIP schedule recommends receipt of four vaccines: diphtheria-tetanus-pertussis toxoid (DTP) diphtheria-tetanus acellular pertussis toxoid (DTaP), or an alternative acellular pertussis vaccine (specific acellular pertussis vaccine recommended for use in this series has not been licensed) if the first dose in the series was DTaP; inactivated poliovirus vaccine (IPV); Haemophilus influenzae type b (Hib) conjugate (preservative-free) vaccine; and oral poliovirus vaccine (OPV) only if the first dose in the series was OPV. The first dose of OPV for which there is a specific vaccination schedule should be administered at the final dose of IPV (Freedman, 2021; Rockwell, 2021; Newcomer *et al.,* 2023).

In the United States, the Advisory Committee on Immunization Practices (ACIP) publishes an annual schedule of childhood vaccinations. This schedule includes vaccination within 24 hours of birth with hepatitis B vaccine if the mother is hepatitis B surface antigen positive or if her hepatitis B status is uncertain. Currently, there is no recommendation for routine vaccination at birth with the hepatitis B vaccine for infants of negative mothers. The schedule also recommends vaccination at 1 and 6 months with hepatitis B vaccine if the mother is negative or if the young woman is not known to be hepatitis B surface antigen positive 8 to 24 hours after delivery. Additionally, it recommends completion of the hepatitis B vaccine series or the vaccination series with the combined hepatitis B-Haemophilus influenzae type b polysaccharide conjugate vaccine (Comvax) with one dose of hepatitis B vaccine at 2 months, 4 months, or 6 months regardless of the mother's or the young woman's status(es) for hepatitis B. (Pickering *et al.,* 2020; COVID, 2021; Wallace *et al.,* 2023; Pereira, 2024).

**2.1. Recommended Vaccines for Infants and Children**

An important part of vaccine quality control is the simplicity of the timetable. Most children have had one year of life by their first birthday, and therefore vaccines are administered based on this 1-month schedule, with some variations after the first year. From the third to eleventh year, VZIG, DT, and OPV may also be given, based on the same criteria. At school entry, the child should have had measles, mumps, rubella, polio, diphtheria, tetanus, and pertussis immunization, probably with some boosters as well, which is followed by VZIG for selected cases. In the case of any fever or infection during the period of immunization, the vaccination can be postponed until the child is fit again (Anjorin and Yaya, 2021; Whaley *et al.,* 2021).

As a licensed practical nurse, you will play an important role in administering immunizations and advising clients on recommended vaccination schedules. Much of your work will likely involve immunizing infants and small children. Children are generally good clients in the office setting and may require only simple guidance as to what is happening and what will happen next. However, there will be a few 'needle-phobic' clients who may need a little more time and discussion. The information in this course will prepare you to provide safe vaccine injections and give good client advice. This is important because the success of a vaccination program relies on good nursing and client compliance (Trifunović *et al.,* 2022; Bonanni *et al.,* 2023).

**3. Travel Vaccines**

Advise which travel vaccinations are recommended, ensuring the person has time to complete them before they travel if possible. This can be a complicated process, as the number and types of potential vaccines, as well as people's general health may mean the vaccines need to be given over several weeks or months. In some parts of the world, vaccinations are required for legal entry into or out of a country. Information about which countries those are can be found on the U.S. Department of State website (Weintraub *et al.,* 2021; Mithani *et al.,* 2022).

People traveling to parts of the world where infectious diseases are more common should be vaccinated against these diseases. The decision about which vaccines are required depends on issues, such as whether the person has been vaccinated already, where they plan to travel, and their general health. Travel vaccinations may be recommended for diseases that are rare in the country to which a person is traveling but are still common in other parts of the world (Steffen *et al.,* 2023).

**3.1. Common Travel Vaccines and Their Importance**

Yellow fever is a live viral vaccine, given as a single subcutaneous injection. One dose of the vaccine is considered to provide lifelong protection. Yellow fever immunization certificates remain valid for ten years. The

certificate is the only means by which some countries may allow entry of travelers when arriving from or having been in, certain infected areas. Some embassies require non-immune travelers to leave the country for 10 days or more before applying for a visa. This reflects the maximum incubation period of the disease in the traveler. The minimum age for vaccination is 9-12 months. In some epidemic situations, young infants have been immunized. However, the current policy is that yellow fever vaccine is not recommended in infants less than 9 months. The vaccine is more likely to produce adverse effects the older one gets. Existing intolerance to eggs, a lowered immune response, and allergy (particularly asthma) have all been related to higher rates of adverse events shortly after vaccination (Hansen and Barrett, 2021; Schnyder *et al.,* 2024).

Specific diseases are more often encountered among travelers than among the general population. The following information outlines the most common vaccination requirements or recommendations. Remember that equally important travel health issues include immunizations from some vaccine-preventable diseases – particularly influenza, pneumococcal, and hepatitis B – and the prevention (Often through barrier methods or medications) of a variety of "conventional" and "exotic" diseases ranging from diarrhea and dengue fever to schistosomiasis, typhus, and yellow fever. For some vaccines (Japanese encephalitis, typhoid fever, yellow fever, and antiracism), demand far outstrips supply, and distribution is limited to certain key points. Be sure to check supplies and vaccination providers in your area well in advance of your travel (Amrane *et al.,* 2020; Bielecki *et al.,* 2020).

**4. Advising on Vaccination Schedules**

There are few absolute contraindications for a vaccine, and the benefits of vaccination normally outweigh the risks. Immunizations, however, are most effective when they are given on the recommended schedule. To blanket delay or refuse immunization may place an individual child, and community, at unnecessary risk. The term 'herd immunity' is used to indicate the level of immunity in a community that limits the spread of an infection. If too many individuals exclude themselves from vaccination, these communities are at risk of increased spread of serious infection. Outbreaks of measles and whooping cough have been linked to parental refusal to allow vaccination. Therefore, as future public health workers, pediatricians, and family practitioners play important roles in advocating for universal vaccine coverage. The vaccine schedule can create a child's readiness for childcare, preschool, and school. Reasonable, sensible advice to parents based on eliminating misconceptions is as important as the decision to vaccinate or not vaccinate their children (Al-Betar *et al.,* 2021; Pfattheicher *et al.,* 2022).

**4.1. Factors to Consider in Developing Vaccination Schedules**

The most important factor when developing vaccination schedules is the timing of vaccines developed to provide maximal protection, with the fewest and least severe reactions. In this context, the immune system responds differently, and optimally, to antigens at different ages. Newer combination vaccines also enhance the uptake by providing the utmost possible protection while still decreasing the number of injections. Even though the vaccination schedule must shield the individual to the utmost, it also needs to be applicable, and context adapted. The use of vaccines from various manufacturers and the timeliness and organization of appointments provide vaccine protection that is both achievable and trustworthy (García-Montero *et al.,* 2021; Wei *et al.,* 2022).

Immunizations are the most effective method to control and prevent infectious diseases. It is vital to ensure that all individuals receive the vaccines appropriate for their age, which are effective in preventing diseases and safe. Immunization schedules have been developed by various professional bodies to provide such guidance and assist health professionals. Scheduling has evolved as new, increasingly effective vaccines are developed. It is important to understand the rationale for vaccine scheduling to offer eligible and at-risk individuals timely vaccination opportunities (Wagner and Weinberger, 2020; Excler *et al.,* 2021).

## 5. CONCLUSION

Immunization is the administration of vaccines or biologicals to stimulate immunity to prevent specific diseases. Vaccination is the act of administering vaccines or biologicals to enable the development of an immune response to a particular pathogen by the host. Vaccination schedules have been made to ensure optimal vaccination and immunization among individuals of different age groups. Healthcare providers play vital roles as immunization advisors and administrators. It is essential to educate clients about the clinical features such as the mode of transmission, potential clinical outcomes, prevention benefits, and risks presented by the vaccine. Furthermore, providers need to counsel the clients about the proper delivery and safety of the vaccine. In conclusion, because healthcare providers are in the best position to visit and discuss immunization, it is important for them to research and provide state-of-the-art information and to communicate this knowledge to the community members. Effective counseling and communication strategies can also have the potential to increase acceptance of vaccines and immunization completion rates among clients, and effective behaviors will remain including family members. In addition, national governments must also work to provide training and a supportive environment to ensure that immunization services are delivered safely and effectively.

## REFERENCES


- Al-Betar, M. A., Alyasseri, Z. A. A., Awadallah, M. A., & Abu Doush, I. (2021). Coronavirus herd immunity optimizer (CHIO). *Neural Computing and Applications*, 33(10), 5011-5042. springer.com
- Amrane, S., Tissot-Dupont, H., Doudier, B., Eldin, C., Hocquart, M., Mailhe, M., ... & Gautret, P. (2020). Rapid viral diagnosis and ambulatory management of suspected COVID-19 cases presenting at the infectious diseases referral hospital in Marseille, France,-January 31st to March 1st, 2020: A respiratory virus snapshot. *Travel medicine and infectious disease*, 36, 101632. sciencedirect.com
- Anjorin, S. & Yaya, S. (2021). Anaemia among under-five children: Is maternal marriage at 18th birthday and above protective? Evidence from 15 countries in Sub-Saharan Africa. *Maternal & child nutrition*. wiley.com
- Bielecki, M., Patel, D., Hinkelbein, J., Komorowski, M., Kester, J., Ebrahim, S., ... & Schlagenhauf, P. (2020). Reprint of: Air travel and COVID-19 prevention in the pandemic and peri-pandemic period: A narrative review. *Travel medicine and infectious disease*, 38, 101939. sciencedirect.com
- Bloom, K., van den Berg, F., & Arbuthnot, P. (2021). Self-amplifying RNA vaccines for infectious diseases. *Gene therapy*. nature.com
- Bonanni, P., Steffen, R., Schelling, J., Balaisyte-Jazone, L., Posiuniene, I., Zatoński, M., & Van Damme, P. (2023). Vaccine co-administration in adults: An effective way to improve vaccination coverage. *Human Vaccines & Immunotherapeutics*, 19(1), 2195786. tandfonline.com
- Carrico, J., La, E. M., Talbird, S. E., Chen, Y. T., Nyaku, M. K., Carias, C., ... & Roberts, C. S. (2022). Value of the immunization program for children in the 2017 US birth cohort. *Pediatrics*, 150(3). aap.org
- Chumakov, K., Benn, C. S., Aaby, P., Kottilil, S., & Gallo, R. (2020). Can existing live vaccines prevent COVID-19?. Science. [HTML]
- Cleve, M. (2021). What the lightning-fast quest for Covid vaccines means for other diseases. Nature. uoguelph.ca
- COVID, V. A. (2021). Advisory Committee on Immunization Practices Recommended Immunization Schedule for Adults Aged 19 Years or Older—United States, 2022. City. cdc.gov.
- Eichinger, K. M., Kosanovich, J. L., Lipp, M., Empey, K. M., & Petrovsky, N. (2021). Strategies for active and passive pediatric RSV immunization. Therapeutic Advances in Vaccines and Immunotherapy, 9, 2515135520981516. sagepub.com
- Excler, J. L., Saville, M., Berkley, S., & Kim, J. H. (2021). Vaccine development for emerging infectious diseases. Nature medicine. nature.com
- Fan, J., Jin, S., Gilmartin, L., Toth, I., Hussein, W. M., & Stephenson, R. J. (2022). Advances in infectious disease vaccine adjuvants. Vaccines, 10(7), 1120. mdpi.com
- Freedman, M. S. (2021). Advisory committee on immunization practices recommended immunization schedule for adults aged 19 years or older—United States, 2021. MMWR. Morbidity and mortality weekly report. cdc.gov
- Garbuglia, A. R., Lapa, D., Sias, C., Capobianchi, M. R., & Del Porto, P. (2020). The use of both therapeutic and prophylactic vaccines in the therapy of papillomavirus disease. Frontiers in immunology, 11, 188. frontiersin.org
- García-Montero, C., Fraile-Martínez, O., Bravo, C., Torres-Carranza, D., Sanchez-Trujillo, L., Gómez-Lahoz, A. M., ... & Ortega, M. A. (2021). An updated review of SARS-CoV-2 vaccines and the importance of effective vaccination programs in pandemic times. Vaccines, 9(5), 433. mdpi.com
- Hansen, C. A. & Barrett, A. D. T. (2021). The present and future of yellow fever vaccines. Pharmaceuticals. mdpi.com
- Lindstrand, A., Cherian, T., Chang-Blanc, D., Feikin, D., & O'Brien, K. L. (2021). The world of immunization: achievements, challenges, and strategic vision for the next decade. The Journal of Infectious Diseases, 224(Supplement_4), S452-S467. oup.com
- Lynn, D. J., Benson, S. C., Lynn, M. A., & Pulendran, B. (2022). Modulation of immune responses to vaccination by the microbiota: implications and potential mechanisms. Nature Reviews Immunology, 22(1), 33-46. nature.com
- Mirin, A. A. (2021). Gender disparity in the funding of diseases by the US National Institutes of Health. Journal of women's health. liebertpub.com
- Mithani, S. S., Bota, A. B., Zhu, D. T., & Wilson, K. (2022). A scoping review of global vaccine certificate solutions for COVID-19. Human vaccines & immunotherapeutics, 18(1), 1-12. tandfonline.com
- Newcomer, S. R., Glanz, J. M., & Daley, M. F. (2023). Beyond vaccination coverage: population-based measurement of early childhood immunization schedule adherence. Academic pediatrics. sciencedirect.com
- Parikh, P. A., Shah, B. V., Phatak, A. G., Vadnerkar, A. C., Uttekar, S., Thacker, N., & Nimbalkar, S. M. (2020). COVID-19 pandemic: knowledge and perceptions of the public and healthcare professionals. Cureus, 12(5). cureus.com
- Pereira, M. R. (2024). Updated 2024 US vaccine recommendations from the Advisory Committee on Immunization Practices (ACIP). American Journal of Transplantation. [HTML]
- Pfattheicher, S., Petersen, M. B., & Böhm, R. (2022). Information about herd immunity through vaccination and empathy promote COVID-19 vaccination intentions.. Health Psychology. apa.org

- Pickering, L. K., Meissner, H. C., Orenstein, W. A., & Cohn, A. C. (2020, March). Principles of vaccine licensure, approval, and recommendations for use. In Mayo Clinic Proceedings (Vol. 95, No. 3, pp. 600-608). Elsevier. mayoclinicproceedings.org
- Rockwell, P. G. (2021). ACIP Approves 2021 Adult and Child/Adolescent Immunization Schedules. American Family Physician. aafp.org
- Schnyder, J. L., de Jong, H. K., Bache, B. E., Schaumburg, F., & Grobusch, M. P. (2024). Long-term immunity following yellow fever vaccination: a systematic review and meta-analysis. The Lancet Global Health. thelancet.com
- Scotta, M. C. & Stein, R. T. (2023). Current strategies and perspectives for active and passive immunization against Respiratory Syncytial Virus in childhood. Jornal de Pediatria. scielo.br
- Shattock, A. J., Johnson, H. C., Sim, S. Y., Carter, A., Lambach, P., Hutubessy, R. C., ... & Bar-Zeev, N. (2024). Contribution of vaccination to improved survival and health: modelling 50 years of the Expanded Programme on Immunization. The Lancet, 403(10441), 2307-2316. thelancet.com
- Steffen, R., Chen, L. H., & Leggat, P. A. (2023). Travel vaccines—priorities determined by incidence and impact. Journal of Travel Medicine. [HTML]
- Stoyanov, G. S., Lyutfi, E., Georgieva, R., Georgiev, R., Dzhenkov, D. L., Petkova, L., ... & Ghenev, P. (2022). Reclassification of glioblastoma multiforme according to the 2021 World Health Organization classification of central nervous system tumors: a single institution report and practical significance. Cureus, 14(2). nih.gov
- Trifunović, V., Bach Habersaat, K., Tepavčević, D. K., Jovanović, V., Kanazir, M., Lončarević, G., & Jackson, C. (2022). Understanding vaccination communication between health workers and parents: a Tailoring Immunization Programmes (TIP) qualitative study in Serbia. Human vaccines & immunotherapeutics, 18(1), 1913962. tandfonline.com
- Wagner, A. & Weinberger, B. (2020). Vaccines to prevent infectious diseases in the older population: immunological challenges and future perspectives. Frontiers in immunology. frontiersin.org
- Wallace, M., Rosenblum, H. G., Moulia, D. L., Broder, K. R., Shimabukuro, T. T., Taylor, C. A., ... & Gargano, J. W. (2023). A summary of the Advisory Committee for Immunization Practices (ACIP) use of a benefit-risk assessment framework during the first year of COVID-19 vaccine administration in the United States. Vaccine. nih.gov
- Wei, J., Pouwels, K. B., Stoesser, N., Matthews, P. C., Diamond, I., Studley, R., ... & Eyre, D. W. (2022). Antibody responses and correlates of protection in the general population after two doses of the ChAdOx1 or BNT162b2 vaccines. *Nature Medicine*, 28(5), 1072-1082. nature.com
- Weintraub, R. L., Subramanian, L., Karlage, A., Ahmad, I., & Rosenberg, J. (2021). COVID-19 Vaccine To Vaccination: Why Leaders Must Invest In Delivery Strategies Now: Analysis describe lessons learned from past pandemics and vaccine campaigns about the path to successful vaccine delivery for COVID-19. *Health Affairs*, 40(1), 33-41. [HTML]
- Whaley, C. M., Cantor, J., Pera, M., & Jena, A. B. (2021). Assessing the association between social gatherings and COVID-19 risk using birthdays. *JAMA internal medicine*. jamanetwork.com