# Adult Immunization in Office Practice

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Chapter

# Vaccine Administration: Principles and Practices

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**Q1. Which are the essential prerequisites and practical aspects to ensure optimal administration of vaccines and immunization in the adults?**

The process of administering a vaccine to a child or an adult needs several practical and logistic aspects that constitute essential components to deliver the vaccine to eligible adults to ensure the efficacy and the safety of the vaccines. These include:

- Maintaining a strict asepsis during the process of immunization;
- Selection of appropriate site and route of vaccine and administration by the recommended routes only;
- Measures to allay the vaccine recipient's anxiety, provide comfort, and alleviate pain following vaccine administration;
- Safe disposal of biomedical waste; and
- Proper documentation with details of the vaccine.

**Q2. What is the necessity of obtaining a consent before vaccination? Is it always mandatory?**

Prior to any vaccine administration, the vaccine recipients must be aware of the vaccines and the immunizations that they would be receiving during their visit whether it is a single component or a combination vaccine. Though a written consent is not mandatory, an informed consent is taken as implied during the immunization and the vaccine recipient must consent as per his/her free choice and being free from duress of the family or health professional. As a legal safe guard, the health-care professional must practice and follow basic and appropriate standards of care during the immunization procedures and must possess adequate facility to manage adverse events following immunization (AEFI).

**Q3. What are the necessary steps for a health-care worker to observe and practice strict asepsis prior to the injection procedure?**

Maintenance of strict asepsis and prevention of transmission of infection is an essential and most fundamental process in the all the immunization sessions. Inadequate asepsis and preparation can contribute to injection complications such as local abscess formation and bacterial sepsis. A thorough hand hygiene and cleansing must be performed by washing the hands with soap and water as a six-step procedure before the administration of vaccine or if the hands are found to be unclean or soiled at other times during the session. Use of alcohol-based hand rubs are acceptable to be used in between the patients during a session. The skin should be allowed to dry before the administration of the vaccine.

**Q4. Is the use of gloves and protective eye wear recommended during immunization?**

Routine use of gloves is not recommended unless the vaccine provider has infected or open skin lesions on hand or if he is at

risk to come in contact with infected body fluids of the recipients. If the gloves are used, these should be used and discarded after the particular vaccine recipient. In response to the COVID-19 pandemic, Centers for Disease Control and Prevention (CDC) has made recommendations concerning the use of protective eyewear by immunization providers in communities where SARS-CoV-2, the virus that causes COVID-19, is circulating.

**Q5. Which are the further steps to follow for the effective vaccination?**

While administering the vaccine to any adult and to ensure vaccine efficacy, the vaccine(s) must be checked, correctly identified by its label, batch number, and expiry date. If the vaccine label has become wet or illegible or has peeled off, then the vaccine should be discarded. If the vaccine has been supplied in a freeze dried form [such as measles, mumps, and rubella (MMR) and varicella], the supplied diluent also must be checked along with for the reconstitution of the vaccine. The supplied vaccine diluents are not interchangeable and hence only the specific diluent must be used for the particular vaccine.

Generally, the vaccines are gently shaken before their use to make them into a uniform and homogenous liquid or suspension. Correct dosage, route of administration, and injection site of the vaccine help to generate optimum immune response from the vaccine antigen while minimizing the risk of local side effects. Healthcare professionals must refer to the vaccine package inserts from time to time as these are vaccine specific and reliable sources for vaccine usage and information.

**Q6. Which are the different routes of vaccine delivery in adults? Which is the most common route for vaccination?**

Different routes are recommended for the administration of vaccines in adults and these include intradermal, subcutaneous, intramuscular (IM), and intranasal routes. Each vaccine has its recommended route and the site of administration which is included in the vaccine package insert of each vaccine. The recommended route of vaccine administration is a critical factor in any vaccine delivery both in the children and the adults.

The choice of route depends upon the contents, volume, the reactogenicity of the vaccines, and the muscle mass. IM route is the most commonly used for adult vaccinations. Intradermal is least used route for vaccinations in office practice in adults and the site of injection is skin area over the deltoid in upper arm. Intradermal administration of cell culture-based rabies vaccines is being practiced as an acceptable alternative to standard practice of IM route in cost and supply constraint hospital set ups in government sectors only in India. Intranasal route is used for live-attenuated influenza vaccine but this vaccine is not presently available in India.

**Q7. What is the basis for administering some vaccines subcutaneously, while others are to be given intramuscularly?**

Subcutaneous route is used most commonly for giving live, attenuated viral vaccines such as MMR, varicella and as alternate route in patients who are at risk of IM hematomas as in bleeding disorders. The vaccines containing adjuvants of aluminum salts [such as tetanus toxoid, hepatitis A, hepatitis B, Tdap and human papillomavirus (HPV) vaccines] are given intramuscularly to minimize the local side effects such as pain, swelling, and tenderness. Adjuvants are the aluminum salts added to the vaccines to improve their immune responses in the vaccine recipients. If any vaccine which has a recommendation of subcutaneous route is inadvertently given by IM route, such doses must be considered valid and not repeated.

**Q8. Which are the sites that are to be used for vaccinating the adults?**

The vaccines which are to be given by subcutaneous route are given on the upper arm on the triceps under the dermal layer with the injection needle inclined to 45° to the skin. Anterolateral part of thigh can also be used for the same purpose. Majority of the vaccines are administered by IM route in the deltoid muscle of the upper arm with the needle at 90° to the skin site. The area to be injected is to be stretched flat between the thumb and the forefinger during the administration. There is no need to pull back the piston of the syringe as there are no major blood vessels at the recommended vaccination sites. If blood appears after syringe aspiration accidentally, the needle must be withdrawn and a different site and needle be used to give the dose. Following the IM injections, the site need not be rubbed but a firm pressure to applied for a few seconds.

Anterolateral part of the thigh due to its large muscle mass may also be used particularly if more than one vaccine is to be given during a single visit. While injecting more than one vaccine in a limb during a single visit, a distance of 1–2 inches must be maintained between them. The vaccines can also be safely given in two different limbs during the same visit.

**Q9. Why gluteal region is best avoided for the use of vaccines?**

Gluteal muscle is not used for active immunization due to the potential risk of sciatic nerve injury and suboptimal immune response observed with the large amount of fat in the region. Vaccines such as hepatitis B and rabies should never be given in gluteal region specifically. If these have been inadvertently given in gluteal region, those doses must not be counted and schedule completed by additional doses. Gluteal region is used uncommonly for administering large volumes of immunoglobulin preparations intramuscularly for passive prophylaxis.

**Q10. Which syringe sizes and needle lengths/gauges are best suited for giving vaccines to the adults?**

The most often used syringe sizes for intradermal and subcutaneous route are either 1 or 2 mL and generally 2 mL for IM injections. Though single-use disposable needle and syringe sets are used in practice, the use of autodisable syringes is increasingly recommended. Additionally, many of the vaccines are supplied in a prefilled syringe (e.g., conjugate pneumococcal 13 valent, hexavalent, conjugate typhoid, and Tdap vaccine) which saves the time, minimizes reconstitution errors, and handling of the vaccines. Each vaccine must always be given by a separate sterile syringe and needle and no vaccines should be mixed together in a same syringe unless specifically mentioned by the vaccine manufacturer.

The needle gauge for intradermal injections should be 26 or 27 with a length of 1 cm. Subcutaneous injections require a needle gauge of 23–25 and length of 5/8 inch (1.6 cm) for all the ages. The needle size for IM injection varies between 22 and 24 gauges with a length of 5/8 inch and this depends upon the viscosity of the vaccine product, age, and muscle bulk of the vaccine recipient. The length of the needle must be of adequate length to reach the deeper part of the muscle to avoid inadvertent injection into the superficial tissues which can contribute to increased local inflammation, induration, and pain in the recipient.

**Q11. Is it necessary to wait for the vaccines to reach the room temperature before it is given to the recipient?**

The best practice is to administer the vaccine as early as it is taken out, prepared,

and made ready for injection. There is no recommendation to wait until the vaccine reaches the room temperature. However, all the vaccines must be stored in the clinic at their recommended temperature only.

**Q12. In case, while giving the injection if the vaccine is spilled out completely or partially, what should be done?**

This may happen sometimes when the recipient suddenly and unexpectedly moves the limb and the vaccine spills out either completely or partially. This can also happen if the needle is loosely attached to the syringe and gets detached while pushing the vaccine. In such situations, it is imprecise to decide the exact amount of the vaccine that went in. Such a dose should not be counted in the immunization schedule and should be repeated on the same day for inactivated vaccines and after 4 weeks for live-attenuated vaccines.

**Q13. If an adult who has received one particular brand of vaccine is unable to receive that particular brand for the subsequent dose, what should be done?**

As a general practice, the immunization dosages should be completed with the same brand from the same manufacturer. This is due to the reason that different products have different antigenic strengths, serotypes, production processes, and preservatives. If the same brand is unavailable for the second or third dose of the vaccine, these should not be deferred or delayed and the schedule be completed with the available brand as full protection would be achieved only after recommended doses only. Completion of vaccination with available brand helps to counter missed opportunity in that individual but at times might raise medicolegal issue in case of an inadvertent vaccine failure or an AEFI.

**Q14. What are general guidelines for vaccine administration when the vaccine(s) require more than one dose for immunization?**

When any vaccine requires more than one dose for protection, the dosing interval is decided upon the vaccine efficacy and the expected immune response of the vaccine. Generally, when any live vaccine is needed in two or more doses, a minimum interval of 28 days is to be followed (except rabies vaccine) between the doses. If the second/subsequent dose is delayed due to any reason, then the first dose must still be counted and the remaining doses be completed without any further delay. When two different types of vaccines (live and inactivated) are to be given one after another (such as MMR vaccine and Tdap vaccine), they can be given on the same visit or any day after each other regardless of interval between them.

**Q15. What further steps need to be practiced to ensure patient comfort prior to and during immunization session?**

It is important to address the issues of patient comfort, fear of needles and syringes, and pain relief following the administration of any vaccine in the children as well as adults. Individual anxiety and stress responses vary from person to person or may change according to time or context. The vaccines and the immunization sessions can be a source of anxiety and stress and these can be allayed by shorter waiting time, appropriate communication, and clarifying any issues which may arise from the vaccine recipient. All these factors help to improve the trust in the healthcare provider and timely compliance of further vaccine doses and healthcare visits.

The term "immunization anxiety-related reaction" as described by World Health Organization (WHO) includes a range of symptoms and signs that may arise around

immunization that are related to "anxiety" and not to the vaccine product, a defect in the quality of the vaccine, or an error of the immunization program.

The most common problem seen in adult postvaccination is vasovagal reaction, which needs supportive care and requires person to wait for 20–30 minutes postvaccination for observation.

**Q16. How to manage the pain and discomfort associated with vaccine administration?**

Explaining the method of administration and spending quality time for that will help alleviate the anxiety to a great extent. Proper positioning and appropriate technique of administration are very crucial.

Aspiration of the syringe while injecting IM vaccines is not recommended as it produces more pain and discomfort. There is no data to justify the aspiration of the syringe before injecting. If the vaccinee has to receive two vaccines during the same visit, he/she should receive the most painful vaccine last. The pain, discomfort, and fever following the vaccination can be managed with the short-term use of paracetamol for 1–2 days.

**Q17. The terms contraindications and precautions are often used in vaccines and immunization. What is the difference between these two terms?**

Contraindications are the conditions in the vaccine recipients which increase the risks of serious adverse reactions if the vaccine(s) are given to them. These may be a severe allergic reaction to an earlier dose of an individual vaccine (e.g., influenza vaccine) or presence of an associated pre-existing immune-deficient conditions when live vaccines (e.g., MMR) should not be given. Due to the theoretical risk to the developing fetus, pregnant women should not receive live, attenuated viral vaccines.

Precautions also may increase the chance of serious adverse reaction in the recipient following vaccination. However, the actual risk for such an event to follow is much less than that of contraindication. In such a condition, there exists a situation of diagnostic confusion or a reduced ability of the vaccine antigen to produce immune response in the recipient. Generally, vaccinations are temporarily deferred when the vaccinee has moderate or severe acute illness, till he/she has recovered.

**Q18. What is injection safety and why is it important?**

A safe injection to be one that does not harm the recipient, does not expose the provider to avoidable risk, and does not result in a waste that is dangerous to the community. WHO estimates that about 50% of world's population receives unsafe injections annually. These can be a potential source of transmission of serious infections such as hepatitis B, hepatitis C, and human immunodeficiency virus (HIV). Hence, improving the safety of injections is of paramount importance for universal precautions. Injection safety is equally important for the vaccine recipient, healthcare worker, and the community.

**Q19. What are the reasons for unsafe injections?**

Unsafe injection practices are caused by avoidable risky situations and practices which include:

- Lack of awareness of the risks of unsafe injections
- Misuse of injections for illnesses for which effective oral medications exist
- Needle-stick injuries to healthcare workers from recapping needles
- Lack of clean work spaces
- Unsafe sharps collection and waste management.

**TABLE 1:** Biomedical Waste Management Rules 2016.

| *Yellow bin* | *Red bin* | *White bin (puncture proof)* | *Blue bin* |
|---|---|---|---|
| *Infectious waste non-plastic* | *Infectious waste plastic* | *Infectious and injurious sharps* | *Infectious sharp waste* |
| Gauze, cotton, discarded drugs/medicines, expired drugs, disposable gown, mask, or caps | Plastic syringe, cut plastic/latex gloves, IV set, plastic pints | Needle, syringe with fix needle | Broken glassware, glass bottles, glass ampules, injection vials |

(IV: intravenous)

**Q20. What are the essential steps to ensure administration of safe injections for vaccines?**

These include: (1) preparation with the clean and sterile hands in a clean area; (2) vaccine must be drawn in from an ampoule or sterile vial. The top septum/rubber stopper of the multidose vial must be swabbed with alcohol before the withdrawal. The needle used for withdrawal must not be left in the vail for any further length of time. However, if feasible, prefer the use of single dose rather than multidose vaccine vials; (3) the changing of the needle between withdrawing the vaccine and injecting it into the vaccine recipient is unnecessary; (4) immediate disposal of the needles and the syringes in labeled puncture proof bins in the same room to prevent needle stick injuries. The used needles must not be recapped before appropriate disposal to avoid any needle stick injuries. A needle hub cutter box with a key hole must be kept for isolating metal sharps such as needles.

**Q21. How should the vaccine generated biomedical waste be disposed?**

The vaccine administration generated waste (needles, syringes and broken glass, discarded vials) can cause punctures and cuts in the human skin and can cause transmission of infections such as hepatitis B, hepatitis C, and HIV. After segregation, the biomedical waste should be given to the Common Biomedical Waste Treatment and Disposal Facility for complete treatment and disposal as per Biomedical Waste Management (BMWM) Rules, 2016 as per **Table 1**.

**Q22. How can the essential principles and practices of immunization for adults be followed in a stepwise manner and be of benefit in adult immunizations?**

The National Vaccine Advisory Committee of Centre for Disease Control USA has formulated standards to help adult healthcare providers to make sure that all patients are up-to-date on recommended immunizations. Though India does not have a formulated adult vaccinations policy, these principles can augment the effective vaccine delivery to adult population target. Summarily these include: (1) To assess the immunization status of all adult patients at every clinical encounter. (2) Strongly recommend the vaccines that adults need. (3) Administer needed vaccines or refer the patient to the provider who can. (4) Document the vaccines received by your adult patients.

## FURTHER READING

1. Atkinson WL, Kroger AL, Pickering LK. General immunization practices. In: Plotkin SA, Orenstein WA, Offit PA (Eds). Vaccines, 6th edition. Philadelphia: Saunders, Elsevier; 2013. pp. 88-112.
2. Balasubramanian S, Shastri D, Shah A, Chatterjee P, Pemde HK, Shivananda S, et al.

(Eds). IAP Guide Book on Immunization 2018-2019. New Delhi: Jaypee Brothers Medical Publishers; 2020. pp. 39-49.
3. Centers for Disease Control and Prevention. There are vaccines you need as an adult. [online] Available from https://www.cdc.gov/vaccines/adults/index.html. [Last accessed June 2022].
4. Griffith R. Obtaining consent for the immunization of adults. Hum Vaccin Immunother. 2016;12(1):231-4.
5. Hunter P, Fryhofer S, Szilagyi P. Vaccination for adults in general medical practice. Mayo Clin Proc Jan. 2020:95;169-83.
6. Vaccine administration practices. Canadian Immunization Guide. [online] Available from https://www.canada.ca/en/public-health/services/publications/healthy-living/canadian-immunization-guide-part-1-key-immunization-information. [Last accessed June 2022].
7. Vashishtha VM, Kalra A, Thacker N. FAQs on Vaccines and Immunization Practices, 1st edition. New Delhi: Jaypee Brothers Medical Publishers; 2011. pp. 41-53.
8. Verma R, Khanna P, Chawla S. Adult immunization in India: importance and recommendations. Hum Vaccin Immunother. 2015;11(9):2180-2.

# Adult Immunization in Office Practice

***Salient Features***

- There is a paradigm shift regarding the importance and life-saving potential of vaccines and immunization beyond childhood. COVID-19 pandemic has created a sense of awareness and urgency for not only COVID-19 vaccines but also for other important vaccines, thus creating a huge opportunity by expanding the vaccination benefits to adolescents, adults and elderly against various vaccine-preventable diseases (VPDs).
- The contents provide complete, current and updated information from the basics in vaccinology to evolving and advanced concepts for effective immunization of adults.
- First book on vaccines in Frequently Asked Questions (FAQ) format, which is simple, in an easy to understand and implement in office practice for adult immunization.
- Comprised of 26 chapters by experts in field of infectious diseases and vaccinology and this would propel and catalyze the readers towards what is within their noble reach and rewarding practice.
- This book is a ready-reckoner and a reference book for understanding basics of science and art of adult immunization.


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