

Don't Be Guilty of These Preventable Errors in Vaccine Administration!

Is your healthcare setting making any of these frequently reported errors in administering vaccines? Although some of these errors are much more serious than others, none of them should occur. Be sure those who administer vaccines are not making any of these **preventable** errors in vaccine administration.

Note: Information about **reporting** vaccine administration errors is found at the end of this article.

ERROR: Not using a screening checklist to identify patients' contraindications and precautions to vaccination

How to Avoid This Error: Always use a reliable screening questionnaire to consistently avoid either 1) giving a vaccine to a patient for whom it is contraindicated (a serious, potentially life-threatening situation), or 2) missing opportunities to vaccinate because of false contraindications (which can also be life-threatening, as they can leave a patient exposed to a vaccine-preventable disease).

Helpful Resources: Use IAC's screening checklists, such as *Screening Checklist for Contraindications to Vaccines for Children and Teens* and *Screening Checklist for Contraindications to Vaccines for Adults* (both reviewed by CDC) available at www.immunize.org/handouts/screening-vaccines.asp. CDC's Vaccine Contraindications and Precautions web page: www.cdc.gov/vaccines/hcp/acip-recs/general-recs/contraindications.html.

ERROR: Administering the wrong vaccine due to similarities in vaccine names (e.g., DTaP for Tdap, zoster for varicella, PPSV23 for PCV13)

How to Avoid This Error: Check the vial label 3 TIMES! Such errors often involve vaccines whose generic or trade names look or sound alike (e.g., Tdap and DTaP, Adacel and Daptacel), or that have similar packaging, so store such vaccines separately and mark them clearly in your storage unit as well as on the patient's vaccine tray. Other times, vaccines are mixed up when vaccinating multiple family members, such as siblings, on the same visit. Prepare vaccines needed for one family member at a time, and always verify names and birthdates for the patient receiving the vaccines.

What to do after such an error: The parent/patient should be told the wrong vaccine was given. Provide the correct vaccine, if necessary, with correct spacing, if necessary (for more details about specific situations, check *Ask the Experts* [www.immunize.org/askexperts] under the relevant vaccine section, or email CDC nipinfo@cdc.gov for advice). Assess how this error happened to ensure it will not happen again.

Helpful Resource: Institute for Safe Medication Practices' (ISMP) *Recommendations for Practitioners to Prevent Vaccine Errors*: www.ismp.org/newsletters/acutecare/showarticle.aspx?id=104

ERROR: Using the wrong diluent or administering the diluent only

How to Avoid This Error: Use careful labeling in your vaccine storage unit. Keep vaccines and their diluents together if storage requirements are the same. Check the vial and diluents labels 3 TIMES before reconstituting vaccine. Administering the diluent *only* is most likely to happen with the two vaccines that include antigen in their liquid component, Menveo and Pentacel.

What to do after such an error: Diluent errors could affect the potency of the vaccine antigen administered, or the patient might not get the full benefit of the vaccine if the diluent not given contains antigen. If the wrong diluent is used, the vaccine needs to be repeated (except in the case of mixing up the diluent between MMR, MMRV, varicella, and zoster vaccines which are all made by Merck and use the same sterile water diluent).

If an INACTIVATED vaccine is reconstituted with the wrong diluent and is administered, the dose is invalid and should be repeated ASAP. If a LIVE vaccine is reconstituted with the wrong diluent and is administered, the dose is invalid and if it can't be repeated on the same clinic day, it needs to be repeated no earlier than four weeks after the invalid dose. This spacing is due to the effects of generating a partial immune response that could suppress the live replication of subsequent doses, even of the same live virus vaccine.

Menveo's diluent contains the C, Y, and W-135 serogroups, and the lyophilized vaccine component (i.e., freeze-dried powder) contains serogroup A. If the patient receives only the diluent, he or she is not protected against invasive meningococcal disease caused by *Neisseria meningitidis* serogroup A. Serogroup A disease is very rare in the United States but common in some other countries. If the recipient of the C-Y-W diluent-only dose does not plan to travel outside the U.S., then the dose does not need to be repeated. Otherwise, the dose should be repeated with either correctly reconstituted Menveo or with a dose of Menactra. There is no minimum interval between the incorrect dose and the repeat dose.

With Pentacel, the liquid DTaP-IPV component given alone can count as valid doses of DTaP and IPV vaccines. You cannot mix the leftover Hib component (lyophilized powder) with sterile water. ActHib must ONLY be reconstituted with either the DTaP-IPV solution supplied with Pentacel, or with a specific ActHib saline diluent. You must contact the manufacturer to obtain diluent for the extra ActHib dose.

With Recombinant Zoster Vaccine (RZV, Shingrix), if only the diluent is administered, this dose is invalid and does not count. Administer a correctly reconstituted dose 4 weeks after the invalid dose.

Helpful Resource: *Vaccines with Diluents: How to Use Them* www.immunize.org/catg.d/p3040.pdf

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ERROR: Administering a vaccine after the expiration date

How to Avoid This Error: If a vaccine is even one day over its expiration date, it should not be used. Rotate stock in your storage unit (which means make sure your vaccine that expires soonest is the closest to the front and easiest to reach in your storage unit), and establish a regular schedule for checking your storage unit for expired vaccine.

What to do after such an error: If a dose of expired vaccine is inadvertently given, it should be repeated. If the expired dose is a live virus vaccine, you must wait at least 4 weeks after the expired dose was given before repeating it. If the error is detected the same day, a repeat dose can be administered that day. The repeat dose of an expired inactivated vaccine can be given on the same day or any other time. If you prefer, you can perform serologic testing to check for immunity for certain vaccinations (e.g., measles, rubella, hepatitis A, and tetanus), although this may be more expensive and may produce negative test results, and if so, revaccination would be indicated.

Helpful Resources: CDC's *Vaccine Storage and Handling Toolkit* (page 18): www.cdc.gov/vaccines/hcp/admin/storage/toolkit/storage-handling-toolkit.pdf

ERROR: Administering vaccine in the wrong site or by the wrong route

How to Avoid This Error: In your vaccine preparation area, post reference materials that show the site and the route for each vaccine for each age group so that those who administer vaccines can easily verify the administration site and route for all vaccines and for all ages. Highlight or otherwise mark the route information on the package.

What to do after such an error: The deltoid muscle is the preferred site for intramuscular (IM) injection for children age 3 years and older and adults, although the anterolateral thigh can be used as a secondary choice. The anterolateral thigh is the site of choice for infants and toddlers under age 3 years; the deltoid is a secondary injection site for IM injections with toddlers if the muscle mass is adequate. For deltoid injections, care must be taken to avoid injection too high on the upper arm where injury to the shoulder could result (referred to as Shoulder Injury Related to Vaccine Administration, or SIRVA). Although the gluteus muscle is not a recommended site for vaccination, in general a dose given there can be considered valid. The exceptions to this general rule are hepatitis B, rabies and HPV vaccines, which should not be considered valid if administered in any site other than the deltoid or anterolateral thigh.

Although vaccines should always be given by the route recommended by the manufacturer, if a vaccine is given by the wrong route (subcutaneously (Subcut) instead of IM, or IM instead of Subcut), it doesn't need to be repeated with the following four exceptions:

hepatitis B, rabies, HPV, and inactivated influenza vaccine that is labeled for IM administration given by any route other than IM should not be counted as valid and should be repeated.

Helpful Resources: *Administering Vaccines: Dose, Route, Site, and Needle Size*: www.immunize.org/catg.d/p3085.pdf

Administering Vaccines to Adults: Dose, Route, Site, and Needle Size: www.immunize.org/catg.d/p3084.pdf

How to Administer Intramuscular and Subcutaneous Vaccine Injections: www.immunize.org/catg.d/p2020.pdf

How to Administer Intramuscular and Subcutaneous Vaccine Injections to Adults: www.immunize.org/catg.d/p2020a.pdf

How to Administer Intranasal and Oral Vaccinations: www.immunize.org/catg.d/p2021.pdf

ACIP's *General Best Practice Guidelines for Immunization* at www.cdc.gov/vaccines/hcp/acip-recs/general-recs/downloads/general-recs.pdf (pages 95–6)

Ask the Experts: www.immunize.org/askexperts/administering-vaccines.asp#errors.

ERROR: Giving a vaccine dose earlier than the recommended age or interval

How to Avoid This Error: Know the minimum intervals for all vaccine series. Keep an easy-to-read immunization schedule handy for staff as well as the CDC table of minimum intervals. If you still aren't sure if a dose will be valid, check with your state immunization program *before* giving it. Attempt to locate old vaccination records by contacting previous healthcare providers and reviewing your state registry.

What to do after such an error: A dose administered 5 or more days earlier than the recommended *minimum interval* between doses is not valid and should be repeated. The repeat dose should be spaced after the INVALID dose by the recommended minimum interval.

Doses administered 5 or more days before the *minimum age* should be repeated on or after the patient reaches the minimum age. If the vaccine is a live vaccine, waiting at least 28 days from the invalid dose is recommended.

Helpful Resources: CDC's Recommended and Minimum Ages and Intervals Between Doses of Routinely Recommended Vaccines chart: www.cdc.gov/vaccines/pubs/pinkbook/downloads/appendices/A/age-interval-table.pdf

IAC's *Summary of Recommendations for Child/Teen Immunization*: www.immunize.org/catg.d/p2010.pdf

IAC's *Summary of Recommendations for Adult Immunization*: www.immunize.org/catg.d/p2011.pdf

Contact information for state immunization program managers: www.immunize.org/coordinators

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ERROR: Giving two doses of live injectable or nasally administered vaccines too close together (leading to potential interference between these vaccines)

How to Avoid This Error: Ask patients if they have received any recent vaccinations (“Have you (or has your child) received any vaccinations in the past 4 weeks?” is a question on IAC’s screening checklist for contraindications). Check the person’s record in your state registry.

What to do after such an error: If two live injectable or nasally administered virus vaccines are administered less than 4 weeks apart and not on the same day, the vaccine given second should be considered invalid and be repeated. The repeat dose should be administered at least 4 weeks after the INVALID dose.

Note: Oral vaccines (Ty21a typhoid vaccine, rotavirus and cholera) can be administered simultaneously or at any interval before or after other live vaccines (injectable or intranasal) if indicated. One pair that is an exception is TY21a and cholera. Cholera vaccine should be administered before TY21a vaccine, and 8 hours should separate cholera vaccine and the first dose of TY21a.

Helpful Resources: IAC’s screening checklists: www.immunize.org/handouts/screening-vaccines.asp

CDC’s “Pink Book” chapter on General Recommendations on Immunization: www.cdc.gov/vaccines/pubs/pinkbook/downloads/genrec.pdf

ERROR: Giving the wrong dosage amount for the patient’s age (e.g., influenza, hepatitis A, and hepatitis B vaccines)

How to Avoid This Error: Check the vial label 3 TIMES to be certain you are administering the appropriate pediatric or adult product! Store vaccines with pediatric and adult dosages (certain influenza vaccine products, hepatitis A and B) on different shelves and clearly marked “pediatric” or “adult.” Verify the patient’s age and check against the vaccine’s age indications in the package insert, on the VIS, or on a vaccine dosing schedule that includes such information.

What to do after such an error:

- If you gave LESS than a full age-appropriate dose of any vaccine, the dose is invalid. If the error is discovered while the patient is still in the office, you can give another pediatric dose (i.e., the other “half” dose). If the error is discovered after the person has left the office, then the patient should be revaccinated with a full age-appropriate dose as soon as feasible. Exceptions are if a patient sneezes after nasal spray vaccine or an infant regurgitates, spits, or vomits during or after receiving oral rotavirus vaccine.
- If you gave MORE than an age-appropriate dose of a vaccine (adult dose of a vaccine to child or 2 doses of the same vaccine (e.g., mistakenly administering MMRV and varicella at the same visit), count the dose as valid and notify the patient/parent

about the error. Using larger than recommended dosages can pose a risk because of excessive local or systemic concentrations of antigens or other vaccine constituents. The patient should receive subsequent doses in the series on schedule (that is, a larger-than-recommended dose does not negate the need for the remaining doses in the series).

- For Shingrix only: if less than a full dose is administered (e.g., needle slip, syringe malfunction) and the error is recognized on the same clinic day, the repeat dose can be administered immediately. If the error is identified after the day the partial dose was given, then wait 4 weeks and administer another full dose.

Helpful Resources: CDC’s *Vaccine Storage and Handling Toolkit* (pages 21–23): www.cdc.gov/vaccines/hcp/admin/storage/toolkit/storage-handling-toolkit.pdf

IAC’s *Hepatitis A and B Vaccines: Be sure your patient gets the correct dose!* www.immunize.org/catg.d/p2081.pdf

IAC’s *Influenza Vaccine Products for the [current year] Influenza Season:* www.immunize.org/catg.d/p4072.pdf

ERROR: Giving both pneumococcal vaccines PPSV23 (Pneumovax) and PCV13 (Prevnar 13) on the same day

How to Avoid This Error: Almost all vaccines used in the United States may be given simultaneously (not in the same syringe), but pneumococcal vaccines are an exception. PCV13 and PPSV23 should not be given at the same visit. For adults age 19–64 who are receiving both vaccines due to a high-risk immunosuppressive condition, PCV13 should be given first followed by PPSV23 at least 8 weeks later. If PPSV23 has already been given, wait 8 weeks (for a child) or 1 year (for an adult age 19 years or older) before giving PCV13 to avoid interference between the two vaccines. For adults age 65 and older who are receiving both PCV13 and PPSV23 as part of the routine recommendation, PCV13 should be given first followed by PPSV23 one year later.

- **What to do after such an error:** ACIP has not spelled out what to do when doses of PCV13 and PPSV23 are given non-simultaneously without the recommended minimum interval between them, but CDC subject matter experts have said that in such a case, the dose given second does not need to be repeated. This is an exception to the usual procedure for a minimum interval violation.

Helpful Resources: *Pneumococcal Vaccine Timing:* eziz.org/assets/docs/IMM-1152.pdf

Pneumococcal Vaccination Recommendations for Children and Adults by Age and/or Risk Factor: www.immunize.org/catg.d/p2019.pdf

IAC’s *Summary of Recommendations for Child/Teen Immunization:* www.immunize.org/catg.d/p2010.pdf

IAC’s *Summary of Recommendations for Adult Immunization:* www.immunize.org/catg.d/p2011.pdf

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ERROR: Administering a vaccine outside of its ACIP-recommended age/dose schedule (e.g., DTaP-IPV, MMRV)

How to Avoid This Error: If you are unsure whether it is acceptable to use the vaccine in a certain situation, check the package insert. For example, DTaP-IPV (Kinrix, Quadacel) is only approved and recommended for the 5th dose of the DTaP and the 4th dose of IPV in children age 4–6 years. MMRV (ProQuad) is approved and recommended for children age 12 months through 12 years. Unless ACIP has made an off-label recommendation, you should use a vaccine as licensed to ensure its efficacy and safety.

What to do after such an error: Check *Ask the Experts* (www.immunize.org/askexperts) under the specific vaccine section, or email CDC for advice. In general, as long as the off-label dosage was correct and the minimum age(s) and interval(s) were met, CDC does not recommend that an off-label dose be repeated, but state immunization registries may not accept it as valid, so check.

Helpful Resources: Package inserts: www.immunize.org/fda

State immunization manager contact information:
www.immunize.org/coordinators

ERROR: Administering a vaccine using the wrong needle length

How to Avoid This Error: Post a reference guide in your vaccine preparation area so those who administer vaccines can easily verify the correct needle size for the type of injection and age/weight of the patient.

What to do after such an error: The needle length (not the gauge) is critical to delivering vaccine to the appropriate tissue depth. An IM injection given with too short a needle for the person's weight is functionally a Subcut injection. However, ACIP does not recommend repeating IM injections given by the Subcut route except for hepatitis B, HPV, rabies, and influenza vaccines.

Helpful Resources: *Administering Vaccines: Dose, Route, Site, and Needle Size:* www.immunize.org/catg.d/p3085.pdf

Administering Vaccines to Adults: Dose, Route, Site, and Needle Size: www.immunize.org/catg.d/p3084.pdf

REPORT VACCINE ADMINISTRATION ERRORS: If you've made a vaccination error, here are two places you can report it:

1. The Institute for Safe Medication Practices (ISMP) has a website where errors can be reported. The Vaccine Error Reporting Program (VERP) was created to allow healthcare professionals and patients to report vaccine errors confidentially. By collecting and quantifying information about these errors, ISMP will be better able to advocate for changes in vaccine names, labeling, or other appropriate modifications that could reduce the likelihood of vaccine errors in the future. Report at <http://verp.ismp.org>.

Helpful Resource: In March 2015, VERP published an excellent guide on avoiding vaccine errors:
www.ismp.org/newsletters/acutecare/showarticle.aspx?id=104

2. CDC recommends that healthcare professionals report vaccine errors to the Vaccine Adverse Events Reporting System (VAERS). If an adverse event occurs following a vaccine administration, a report should definitely be sent to VAERS. Adverse events should be reported to VAERS regardless of whether a healthcare professional thinks it is related to the vaccine or not, as long as the event follows administering a dose of vaccine. Report at vaers.hhs.gov/index.

Educational Resources for Vaccine Administration

ACIP's General Best Practice Guidelines for Immunization – Published in April 2017, *General Best Practice Guidelines for Immunization* updates and replaces ACIP's 2011 *General Recommendations on Immunization*. This multi-page document covers a broad range of immunization topics, including detailed information about recommended vaccine administration practices.

► www.cdc.gov/vaccines/ed/general-recs/index.html

CDC's e-Learn: Vaccine Administration – This training addresses knowledge gaps in proper vaccine administration. It highlights common mistakes and is designed to train providers to avoid administration errors by applying the “Rights of Medication Administration” to each encounter when vaccines are administered.

► www2.cdc.gov/vaccines/ed/vaxadmin/va/ce.asp

To Err Is Human; Not To Err Is Better! Vaccination Errors and How to Prevent Them – This slide presentation was developed by the Immunization Action Coalition in response to the questions emailed to the organization by healthcare professionals around the nation.

► www.immunize.org/catg.d/s8020.pdf

► www.immunize.org/resources/res_powerpoint.asp

Immunization Techniques DVD – Revised in 2010 by the California Department of Public Health, *Immunization Techniques: Best Practices with Infants, Children, and Adults* focuses on the skills and techniques needed for vaccine administration, including injectable, oral, and nasal vaccines.

► Available for purchase at www.immunize.org/dvd.

► Viewable on YouTube at www.youtube.com/watch?v=WsZ6NEijfl&feature=youtu.be

Questions?

Email CDC's immunization experts: nipinfo@cdc.gov.

Call the vaccine manufacturer.

Call your state immunization program manager. Contact information at www.immunize.org/coordinators.

Do you have questions about avoiding vaccine handling and storage errors? Download: *Don't Be Guilty of These Preventable Errors in Vaccine Storage and Handling!* www.immunize.org/catg.d/p3036.pdf