For information on how to avoid or respond to errors in COVID-19 vaccine administration, see COVID-19 Vaccine Administration Errors and Deviations at www.cdc.gov/covid/hcp/vaccine-considerations/appendices.html.

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

*To err is human. Is your healthcare setting making any of these frequently reported errors in administering vaccines? Although some of these errors are more serious than others, each can be prevented. Be sure those who administer vaccines are trained to avoid 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. This helps avoid either 1) giving a vaccine to a patient who should not receive it or 2) missing opportunities to vaccinate because of lack of knowledge of pre-existing medical conditions or false contraindications (which can leave a patient vulnerable to a vaccine-preventable disease).

If you do not know about medical conditions or false contraindications, the patient could walk away still vulnerable.

Helpful Resources: Use Immunize.org's screening checklists, such as *Screening Checklist for Contraindications to Vaccines for Children and Teens* (see www.immunize.org/catg.d/p4060.pdf) and *Screening Checklist for Contraindications to Vaccines for Adults* (see www.immunize.org/catg.d/p4065.pdf). See CDC's Vaccine Contraindications and Precautions web page at www.cdc.gov/vaccines/hcp/imz-best-practices/contraindications-precautions.html.

ERROR: Administering the wrong vaccine due to similarities in vaccine names (e.g., DTaP for Tdap, zoster for varicella, PPSV23 for PCV20)

How to Avoid This Error: Check the vial label **3 times,**

- when medication is taken from shelf,
- when a dose is withdrawn from container, and
- just before administration.

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. 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: Tell the parent/patient that the wrong vaccine was given. Provide the correct vaccine, if necessary, with correct spacing (for more details, check *Ask the Experts* [www.immunize.org/ask-experts/] under the relevant vaccine section, or email CDC at nipinfo@cdc.gov for advice). Assess how this error happened and take steps to prevent it.

Helpful Resource: Institute for Safe Medication Practices' (ISMP) *Recommendations for Practitioners to Prevent Vaccine Errors Part 2: Analysis of ISMP Vaccine Errors Reporting Program*: www.ismp.org/sites/default/files/attachments/2018-03/community201503.pdf

ERROR: Using the wrong diluent or administering the diluent only

How to Avoid This Error: Use clear labeling in your storage unit. Keep vaccines and their diluents together if storage requirements are the same. Check the vial and diluent labels 3 TIMES before reconstituting vaccine. Be especially careful with products that require mixing and contain antigens in both liquid and powder components, including Menveo, Pentacel, and Penbraya brands.

What to do after such an error: Diluent errors could affect the potency of the vaccine administered, or the patient might not get the full benefit of the vaccine. If the wrong diluent is used, the vaccine needs to be repeated (except in a case of mixing up the diluent for Merck's MMR [MMR II], MMRV [ProQuad], and varicella [Varivax] vaccines, because all 3 use the same sterile water diluent).

If an INACTIVATED vaccine is reconstituted with the wrong diluent and then administered, the dose is invalid and should be repeated as soon as possible. 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 4 weeks after the invalid dose. The 4-week interval avoids interference between the wrong dose and the later valid dose.

Menveo (GSK) for prevention of meningococcal serogroup A, C, W, or Y disease is available in two different formulations: 1) a single vial of liquid containing all four serotypes and 2) a two-vial presentation comprised of the MenCYW liquid component and a vial containing the MenA lyophilized powder component. If using the two-vial presentation and the patient receives only the diluent, he or she is not protected against serogroup A. Serogroup A disease is very rare in the United States but common in some other countries. If the recipient of the MenCYW 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 the correctly reconstituted Menveo or with a dose of MenQuadfi (MenACWY, Sanofi). There is no minimum interval between the incorrect dose and the repeat dose.

With Pentacel (DTaP-IPV/Hib, Sanofi), 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.

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With recombinant zoster vaccine (Shingrix, GSK), 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

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 so 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 given by mistake, 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 blood testing to check for immunity for certain vaccinations (e.g., measles, rubella, hepatitis A, and tetanus), although this may be more expensive. If test results are negative, revaccination is indicated.

Helpful Resources: CDC's *Vaccine Storage and Handling Toolkit*: www.cdc.gov/vaccines/hcp/storage-handling/resources.html

ERROR: Administering vaccine at 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. 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. 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, take care to avoid injection too high on the upper arm where injury to the shoulder could result (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 exceptions: hepatitis B, rabies, and HPV 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

How to Administer Multiple Intramuscular Vaccines to Adults During One Visit at www.immunize.org/catg.d/p2030.pdf

ACIP's *General Best Practice Guidelines for Immunization* at www.cdc.gov/vaccines/hcp/imz-best-practices/vaccine-administration.html

Ask the Experts: www.immunize.org/ask-experts/topic/admin-vaccines/

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 (see www.cdc.gov/vaccines/hcp/imz-best-practices/timing-spacing-immunobiologics.html). 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 generally should be repeated (see first resource below for exceptions to this rule). 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, wait at least 28 days from the invalid dose.

Helpful Resources: Minimum ages and intervals are available on CDC's recommended immunization schedule for children and adolescents (see www.cdc.gov/vaccines/hcp/imz-schedules/child-adolescent-catch-up.html).

Contact information for state immunization program managers: www.immunize.org/official-guidance/state-policies/state-resources/

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?"). Immunize.org's screening checklist includes the question, "Have you (or has your child) received any vaccinations in the past 4 weeks?" Check the person's record in your state registry.

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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: Immunize.org's screening checklists: www.immunize.org/clinical/topic/screening-checklists/.

See CDC's Table 3-2 for minimum intervals between doses of vaccine at www.cdc.gov/vaccines/hcp/imz-best-practices/timing-spacing-immunobiologics.html.

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.

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*: www.cdc.gov/vaccines/hcp/admin/storage/toolkit/storage-handling-toolkit.pdf

Immunize.org's *Hepatitis A and B Vaccines: Be Sure Your Patients Get the Correct Dose!* www.immunize.org/catg.d/p2081.pdf

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

ERROR: Giving pneumococcal polysaccharide vaccine (PPSV23) and any pneumococcal conjugate vaccine (PCV) on the same day

How to Avoid This Error: When PCV20 or PCV21 are used, PPSV23 is not recommended. When PCV15 is administered to an adult or a child older than age 2 years with a high-risk condition, PPSV23 should be administered a minimum of 8 weeks later (for most adults, it is recommended 1 year later: see pneumococcal vaccine schedule for details).

What to do after such an error: ACIP has not published specific guidance for administration of PCV15 and PPSV23 on the same day or less than 8 weeks apart. CDC subject matter experts advise not repeating the second dose. This is an exception to the usual response to a minimum interval violation.

Helpful Resources: *Pneumococcal Vaccine Timing for Children*: https://eziz.cdph.ca.gov/wp-content/uploads/docs/IMM-1159.pdf

Pneumococcal Vaccine Timing for Adults: https://eziz.cdph.ca.gov/wp-content/uploads/docs/IMM-1152.pdf

CDC's "PneumoRecs VaxAdvisor" is a mobile app available for iOS and Android devices that provides patient-specific guidance consistent with ACIP's pneumococcal vaccination recommendations: www.cdc.gov/pneumococcal/hcp/vaccine-recommendations/app.html

Immunize.org's *Standing Orders for Administering Pneumococcal Vaccines to Children and Teens:* www.immunize.org/catg.d/p3086.pdf

Immunize.org's *Standing Orders for Administering Pneumococcal Vaccines to Adults:* www.immunize.org/catg.d/p3075.pdf

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 or Quadracel) is only approved for the 5th dose of the DTaP and the 4th dose of IPV in children age 4–6 years. MMRV (ProQuad) is approved for children age 12 months through 12 years. ACIP recommends MMRV only for children age 4 years through 12 years. Unless ACIP has made an off-label recommendation, you should use a vaccine as licensed to ensure its efficacy and safety.

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What to do after such an error: Check *Ask the Experts* (www.immunize.org/ask-experts/) under the specific vaccine section, or email CDC at nipinfo@cdc.gov 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/official-guidance/fda/pkg-inserts/

State immunization program manager contact information: www.immunize.org/official-guidance/state-policies/state-resources/

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, and rabies 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. Your reports help identify error trends and possible solutions.

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

Helpful Resource: In March 2015, VERP published an excellent guide on avoiding vaccine errors at www.ismp.org/sites/default/files/attachments/2018-03/community201503.pdf

2. CDC recommends that healthcare professionals report vaccine errors to the Vaccine Adverse Event Reporting System (VAERS). If an adverse event occurs following a vaccine administration, a report should 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 https://vaers.hhs.gov/reportevent.html.

Educational Resources for Vaccine Administration

CDC's *General Best Practice Guidelines for Immunization* — This website covers a broad range of immunization topics, including detailed information about recommended vaccine administration practices, and is updated regularly.

- www.cdc.gov/vaccines/hcp/imz-best-practices/vaccine-administration.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

***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 https://shop.immunize.org/collections/immunization-techniques-dvd
- Viewable on YouTube at www.youtube.com/watch?v=WsZ6NEijlfI&feature=youtu.be

Questions?

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

Call the vaccine manufacturer. Contact information at www.immunize.org/clinical/external/manufacturers/

Call your state immunization program manager. Contact information at www.immunize.org/official-guidance/state-policies/state-resources/

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