

# Acute Care

# ISMP Medication Safety Alert!®

Educating the Healthcare Community About Safe Medication Practices

## DTaP, LAIV, MCV4, PPSV23, HZV, 9vHPV...

### Alphabet soup vaccine abbreviations and acronyms lead to errors



**PROBLEM:** Advances in immunization technology and knowledge of diseases have led to an ongoing stream of new vaccines. To date, the US Food and Drug Administration (FDA) has approved 48 different single and combination vaccines that target 24 vaccine-preventable diseases. The large number of vaccines and long, often complex, nonproprietary (generic) vaccine names have spurred the use of abbreviations, most often in the form of acronyms that attempt to describe the vaccine components.

#### ACIP standard vaccine abbreviations and acronyms

The Centers for Disease Control and Prevention (CDC) Advisory Committee on Immunization Practices (ACIP) provides a list (**Table 1**, page 2) of standardized abbreviations or acronyms for FDA-approved vaccines ([www.ismp.org/sc?id=2866](http://www.ismp.org/sc?id=2866)). The list includes most single and combination vaccines but not all (e.g., non-routine vaccines [typhoid, yellow fever, rabies, others] are not included). The list was developed by the CDC; ACIP Work Groups and members; the editors of *Morbidity and Mortality Weekly Report (MMWR)* and *Epidemiology and Prevention of Vaccine-Preventable Diseases* (the “Pink Book”); and liaison organizations to the ACIP. According to CDC, the abbreviations and acronyms are intended to provide a uniform approach for referencing vaccines in ACIP recommendations that are published in the *MMWR*, the *Pink Book*, the American Academy of Pediatrics’ *Red Book*, and US immunization schedules for children, adolescents, and adults.

CDC believes this list will promote accuracy, consistency, and convenience, and will reduce errors and ambiguity in vaccine labeling, medical practice, and scientific publications. However, the preamble to the list on the CDC website only suggests that the standard abbreviations are intended for use in ACIP recommendations published in various references and immunization schedules. Healthcare practitioners are not specifically encouraged in the preamble to use the standard abbreviations when prescribing immunizations or documenting administration on an immunization record (although ISMP believes such encouragement is intended by the CDC).

The CDC site also includes a list of abbreviations that are often used on immunization records, including abbreviations for vaccine-targeted diseases and “old” or non-standard (coined) abbreviations ([www.ismp.org/sc?id=2867](http://www.ismp.org/sc?id=2867)). This resource is helpful to those attempting to translate the myriad of abbreviations often found on patient immunization records, and there is an open invitation below the list to contact the web team directly to let the agency know if it is missing an abbreviation or acronym found on a health record.

#### Longstanding concerns with vaccine abbreviations and acronyms

ISMP has long advocated a ban on using abbreviated drug names. Yet, when it comes to vaccines, the rationale for abbreviation or acronym use may appear sound at first glance. But a closer look at vaccine errors caused by confusion among vaccine abbreviations and acronyms—even when using the “standard” abbreviations identified by ACIP—raises significant safety concerns.

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## SAFETY briefs



**Tresiba U-200 won't allow odd number dosing of insulin units.** With the introduction of the **TRESIBA** (insulin degludec) U-200 pens comes a chance for dosing errors. A pharmacist recently reported that a physician prescribed 25 units daily of Tresiba U-200. This product is only available in the Novo Nordisk Flex-Touch insulin pen. An odd numbered dose is not possible with U-200 because the pen only allows dosing increments in even numbers, starting at 2 units and going up to 160 units. In this case, an elderly patient tried to dial 25 units by estimating the proper position between 24 units (marked on the pen) and a notch or score that represents 26 units (**Figure 1**). Due to the design of the pen, the insulin will not be administered unless the pen is correctly set to a dose—24 or 26 units in this case.

It's important for healthcare professionals to be aware of the difference between U-100 pens and the U-200 Tresiba pen. Although the U-200 pen WILL allow doses from 2 to 160 units (in even numbers only, 2 units at a time), prescribers should consider providing a U-100 pen when smaller or odd numbered doses must be administered, reserving U-200 pens for patients requiring larger, even numbered doses.



**Figure 1.** Tresiba U-200 pen allows dosing increments of 2 units, so only even numbered doses can be delivered.



**Why color-coding injectables by drug class can be dangerous.** A hospital recently converted from ePHEDrine ampuls to vials from Éclat Pharmaceuticals. Since

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First, there are scores of vaccines, each with a main root abbreviation (e.g., IIV for inactivated influenza vaccine) to identify the type of vaccine, which may be shared by other vaccines that target the same disease. Thus, some abbreviations and acronyms are very similar. Next, specifiers (e.g., “3” in IIV3 [trivalent inactivated influenza vaccine] or “4” in IIV4 [quadrivalent inactivated influenza vaccine]) intended to help distinguish among vaccines that target the same disease may be left off when prescribing or documenting vaccines.

Individual vaccine abbreviations may be useful to the few health professionals who repeatedly use just a handful of the same vaccines in their practice and find it easy to remember the abbreviations. However, given the wide variety of vaccines in use today, those not familiar with the abbreviations may confuse them given their similarity, fail to recall the correct abbreviation, or misinterpret them for other reasons.

**Vaccine errors due to similar abbreviations or acronyms**

The ISMP National Vaccine Errors Reporting Program (ISMP VERP) contains many cases of repetitive mix-ups between vaccines that reporters felt were caused by similar abbreviations or acronyms. For example, a recent report involved confusion between Hib (*Haemophilus influenzae* type b conjugate vaccine, **PEDVAXHIB**) and HPV (in this case, the correct abbreviation is 9vHPV for human papillomavirus 9-valent vaccine, recombinant, **GARDASIL 9**). During an office visit, a healthcare practitioner administered 9vHPV to a 2-month-old baby who was supposed to receive Hib. This is not the first re-

**Table 1.** Selected examples of CDC standard vaccine abbreviations and acronyms

2vHPV	Human papillomavirus vaccine (bivalent)
9vHPV	Human papillomavirus vaccine (nonavalent)
DT	Diphtheria and tetanus toxoids adsorbed (pediatric)
DTaP	Diphtheria and tetanus toxoids and acellular pertussis vaccine adsorbed (pediatric)
HepA	Hepatitis A vaccine
HepB	Hepatitis B vaccine
Hib	<i>Haemophilus influenzae</i> type b conjugate vaccine
HZV	Herpes zoster (shingles) vaccine
IIV3	Trivalent inactivated influenza vaccine
IIV4	Quadrivalent inactivated influenza vaccine
IPV	Inactivated poliovirus vaccine
LAIV	Live attenuated influenza vaccine
MenACWY or MCV4	Quadrivalent meningococcal conjugate vaccine
MenB	Serogroup B meningococcal vaccine
MMR	Measles, mumps, and rubella vaccine
MMRV	Measles, mumps, rubella, and varicella vaccine
PCV13	Pneumococcal conjugate vaccine (13-valent)
PPSV23	Pneumococcal polysaccharide vaccine (23-valent)
RV5	Rotavirus vaccine (pentavalent)
Td	Tetanus and diphtheria toxoids adsorbed (adult)
Tdap	Tetanus toxoid, reduced diphtheria toxoid and acellular pertussis vaccine, adsorbed (adult)
VAR	Varicella vaccine

Source: <https://www.cdc.gov/vaccines/acip/committee/guidance/vac-abbrev.html>

port of a mix-up between these two vaccine abbreviations, but it is the first that involved an infant. We contacted Merck, the manufacturer. Understandably, the company was unable to provide information about adverse effects in infants.

Searching the ISMP VERP database from September 2012 to February 2017, the most frequently reported mix-ups among vaccine abbreviations or acronyms involved:

- Tdap and DTaP
- DT and Td
- MMR and MMRV
- PCV13 and PPV23, or PCV and PPV (PPV23 is now replaced by PPSV23)
- Hib and HepB
- HepA and HepB

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then, there have been several instances at the hospital where the drug vial was mistaken as **EPINEPHrine**, manufactured by PAR Pharmaceutical. Both products are available in small vials with purple caps, as noted by the person who sent us the report. Purple is also on the vial labels, and the generic names of the drugs can look similar, especially with the narrow print used by Éclat on its **ePHEDrine** label (**Figure 1**). Also, these drugs are often stored near each other in areas such as labor and delivery and the operating room.

What's important to know is that this report represents our first notification about a medication error where drug class color-coding may have played a role, at least indirectly. Purple is the standard color for *user-applied* labels on syringes of vasopressors in the operating room (OR) (ASTM



**Figure 1.** Although somewhat different in overall appearance, the purple cap and label may have contributed to several mix-ups.

D4774-06 Standard Specification for User Applied Drug Labels in Anesthesiology). However, “user-applied” (in the control of individual anesthesiologists or anesthesiologists) does not mean the standard should be applied by manufacturers for commercial drug vials that contain vasopressors, which, whether by design or coincidence, seems to be the case here. Although both drugs are vasopressors, mix-ups between **ePHEDrine** and **EPINEPHrine** are dangerous, as noted in our April 17, 2003 issue ([www.ismp.org/sc?id=2864](http://www.ismp.org/sc?id=2864)).

Many hospitals also purchase prefilled syringes from 503b compounding pharmacies continued on page 3—**SAFETY** briefs >

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- DTaP-HepB-IPV, DTaP-IPV/Hib, and DTaP-IPV
- HPV and IPV
- HPV and HBV (HBV was used to abbreviate hepatitis B vaccine; HepB is the correct abbreviation)
- MCV and PCV (MCV4 is the correct abbreviation; PCV7, PCV13, or PPSV23 is the correct abbreviation)
- MCV and MMR (MCV4 is the correct abbreviation)
- VAR and HZV
- IPV and PPD (PPD [purified protein derivative tuberculin test] is not a vaccine)
- IIV and PPD (PPD is not a vaccine)
- PCV and PPD (PPD is not a vaccine)
- HPV and Hib
- MMRV and MPSV (MPSV4 is the correct abbreviation)
- HepA and HPV4 (4vHPV is the correct abbreviation)
- HepB and HPV4 (4vHPV is the correct abbreviation)

The group of abbreviations used for tetanus, diphtheria, and pertussis (DT, DTaP, Tdap, Td) were the most frequently confused vaccine abbreviations or acronyms in the ISMP VERP database. Similar findings are well documented in various studies and analyses of vaccine errors.<sup>14</sup> However, we have also received more than a dozen reports of mix-ups between the abbreviations used for the pneumococcal vaccines (PCV13 and former abbreviations PPV23 and PPV [now PPSV23]), and the measles, mumps, and rubella vaccines with and without the varicella component (MMR and MMRV). Vaccine labeling and packaging may contribute to the mix-ups because distinguishing factors, such as noting the intended vaccine age group, is not always prominent on the label or is poorly positioned, as with DTaP and Tdap, and DT and Td. Also, the federal requirement to list the full nonproprietary name, which is often very long, above the brand name on vaccine packaging makes it hard to read the labels and contributes to similarities if the vaccine components overlap.

Errors caused by unclear vaccine abbreviations have been a longstanding problem. More than a decade ago, ISMP surveyed health professionals about errors related to vaccine abbreviations.<sup>5</sup> Almost half of the survey respondents experienced errors stemming from vaccine abbreviations used in handwritten orders; one in three encountered errors with abbreviations used on immunization records; one in four reported that abbreviations on vaccine protocols or schedules had contributed to errors; and almost one in five were aware of errors that resulted from vaccine abbreviations used on pharmacy labels or the manufacturers' product labels. While 63% of the respondents believed standard abbreviations should be used for vaccines, only 55% believed this would reduce the risk of errors.

The problem continues to worsen as new vaccines are added to the arsenal. Please keep in mind that the reports submitted to the ISMP VERP likely represent just the tip of the iceberg. Clearly, the use of vaccine abbreviations and acronyms, even those that are standardized, is contributing to errors. These errors lead to patient inconvenience and reduce the benefits of our immunization program in the US. If the errors go unnoticed, we leave patients unknowingly more vulnerable to serious diseases such as hepatitis A and B, pertussis, diphtheria, cervical cancer, and others.

**SAFE PRACTICE RECOMMENDATIONS:** While a single vaccine error may not place a patient in immediate jeopardy, the risk to society of a vaccination program that is lessened in effectiveness by preventable errors is significant. Therefore, we urge FDA, CDC, ACIP, and vaccine experts from around the country to further explore the risk of errors caused by vaccine abbreviations and acronyms, and to ultimately establish safer alternatives than

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that unnecessarily use the standard colors for user-applied labels. But what may be safe on syringes within the OR environment may not be safe in other areas of the hospital. With commercial vials, similarity in appearance is enhanced by the use of similar colors across a drug class.

The ASTM color scheme is used for other drug classes such as opioids, neuromuscular blockers, beta blockers, and induction agents. It was never meant for commercial drug vials, especially high-alert drugs where individual agents within the class may have varying potencies and pharmacologic effects. We agree with the reporter's concern about the potential for mix-ups attributed to the purple caps. We hope that the US Food and Drug Administration (FDA), Éclat, PAR, and other manufacturers of commercial drug vials will stay away from any type of color-coding by drug class.

## ➔ Special Announcements

### Updated ISMP assessments available

ISMP recently launched two newly updated safety self-assessment tools! The updates were overseen by ISMP with input from national expert advisory groups. The updated tools are intended to be used internally by healthcare organizations, as ISMP will not be collecting aggregate national data on the assessment findings at this time.

The updated **ISMP Medication Safety Self Assessment® for Community/Ambulatory Pharmacy** ([www.ismp.org/sc?id=2868](http://www.ismp.org/sc?id=2868)) is designed to help assess the safety of community/ambulatory pharmacy dispensing systems and identify opportunities for improvement. We hope that hospitals with outpatient or ambulatory care pharmacies will strongly consider its use. ISMP thanks Cardinal Health Foundation for supporting this update.

The updated **ISMP Medication Safety Self Assessment® for Antithrombotic Therapy** ([www.ismp.org/sc?id=2869](http://www.ismp.org/sc?id=2869)) is intended to

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relying on the use of error-prone abbreviations to help vaccine manufacturers and health-care practitioners reduce the risk of confusion among the various vaccines.

Until such alternative strategies have been established, consider the following recommendations to reduce the risk of vaccine errors associated with abbreviations and acronyms:

- If vaccine abbreviations or acronyms are permitted, allow only current, uniform, CDC-approved abbreviations and acronyms to be used. Prohibit the use of coined or informal names for vaccines.
- Establish standard order sets or protocols for frequently administered vaccines that include the vaccine's brand name (if applicable) and full nonproprietary name on forms and computer screens. The Immunization Action Coalition (IAC)<sup>6</sup> and Defense Health Agency Immunization Healthcare Branch<sup>7</sup> provide sample standing orders for most vaccines. If CDC-approved vaccine abbreviations or acronyms are permitted, follow the CDC recommendations to list both the full nonproprietary name (and brand, if needed) along with the approved abbreviation or acronym on all order sets to reinforce their correct use.
- Review all standard order sets for vaccines at least annually, and update the order sets as conditions warrant (e.g., change in hepatitis B vaccine brands).
- If CDC-approved vaccine abbreviations or acronyms are permitted in electronic formats (e.g., electronic medication administration records [eMARs], electronic order sets), configure the display to allow viewing of the full nonproprietary vaccine name when hovering over the vaccine abbreviation or acronym.
- On vaccination records and MARs, list the vaccine brand name (if applicable) and the full nonproprietary name of the vaccines administered. In electronic formats, nonproprietary names may be provided by hovering over the vaccine abbreviation or acronym if space is an issue.
- Use patient vaccination records with enough space to list full vaccine names. Give patients a copy of the larger, provider immunization record with full vaccine names, even if wallet-sized immunization cards with CDC abbreviations are provided.

We also encourage practitioners to report vaccine errors or potential hazards that could lead to an error to the ISMP VERP at: <http://verp.ismp.org/>. Your reports will allow us to continue to learn about the types and causes of vaccine errors, and we are very interested in your thoughts on how to prevent similar vaccine errors.

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help organizations assess their practices and identify opportunities for improvement with antithrombotic therapy, including the new direct oral anticoagulants. (Safe use of anticoagulants will also be covered in the *ISMP High-Alert Medication Safety Self Assessment*, due for release later this spring.) ISMP thanks Boehringer-Ingelheim Pharmaceuticals, CSL Behring, and Pfizer for their support of this update.

### ISMP webinars

You don't want to miss our next webinar, *Implementation of Best Practices for Safer Insulin Pen Use: Stories from the Frontline*, to be held on **March 28**. The webinar will explore the challenges associated with the safe use of insulin pens and the distribution of patient-specific pens from the pharmacy with the support of integrated electronic prescribing and bar-coding systems.

Also join us on **April 20** to learn from the experiences of two successful medication safety officers as they present, *Medication Safety Practitioners: Leading, Innovating, and Improving Healthcare*. Hear firsthand how they prioritize medication safety issues, impact change, and address medication-related challenges.

To register, visit: [www.ismp.org/sc?id=349](http://www.ismp.org/sc?id=349).

To subscribe: [www.ismp.org/sc?id=382](http://www.ismp.org/sc?id=382)



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#### Report medication and vaccine errors to ISMP:

Please call 1-800-FAIL-SAF(E), or visit our website at: [www.ismp.org/MERP](http://www.ismp.org/MERP) or [www.ismp.org/VERP](http://www.ismp.org/VERP) ISMP guarantees the confidentiality of information received and respects the reporters' wishes regarding the level of detail included in publications.

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# Safe Medication Management Fellowships

ISMP is now accepting applications for three unique **2017-2018 Fellowship** programs

## One ISMP Safe Medication Management Fellowship

**Location and Term:** This 12-month Fellowship, sponsored by **Baxter International Inc.**, commences summer 2017 at the Horsham, Pennsylvania (near Philadelphia) office of ISMP. Relocation to the Horsham/Philadelphia area is required.

**Description:** The Fellowship **offers a nurse, pharmacist, or physician with at least 1 year of postgraduate clinical experience** an unparalleled opportunity to learn from and work with some of the nation's experts in medication safety. This Fellowship is open to US citizens only. Now in its 25<sup>th</sup> year, the Fellowship allows the candidate to work collaboratively with practitioners in various healthcare settings to assess and develop interdisciplinary medication error-prevention strategies.

Sponsored by: ***Baxter***

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## Two FDA/ISMP Safe Medication Management Fellowships

**Location and Term:** These 12-month Fellowships commence August/September 2017. The Fellows will spend 6 months at the Horsham, Pennsylvania (near Philadelphia) office of ISMP and 6 months at the Silver Spring, Maryland (near Washington, DC) office of the US Food and Drug Administration (FDA). Relocation to the Horsham/Philadelphia and Silver Spring/Washington, DC, area is required.

**Description:** The Fellowships, **open to healthcare professionals with at least 1 year of postgraduate clinical experience**, are a joint effort between ISMP and FDA's Center for Drug Evaluation and Research, Office of Surveillance and Epidemiology, and Division of Medication Error Prevention and Analysis. These Fellowships are open to US citizens only. The Fellowships allows candidates to benefit from ISMP's years of experience devoted to medication error prevention. At FDA, valuable regulatory experience is gained by working with the division focused on medication error prevention.

**A competitive stipend, paid vacation, and health benefits are provided with all Fellowship programs.**

## How to Apply

Information and applications can be found at: [www.ismp.org/profdevelopment/](http://www.ismp.org/profdevelopment/).  
Applications can also be requested by calling 215-947-7797.

**The application deadline for all Fellowship Programs is March 31, 2017.**