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, on page 2) of standardized abbreviations or acronyms for FDA-approved vaccines (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 suggests that the standard abbreviations are intended only 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). 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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Vaccine—continued from page 1

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 report 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

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

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

Soy lecithin long gone from Atrovent and Combivent products. We recently received an inquiry about peanut allergy concerns when prescribing ATROVENT (ipratropium) given that the current package insert does not list this as a warning or contraindication. At one time, prescribing information for Atrovent Inhalation Aerosol and COMBIVENT (ipratropium and albuterol) Inhalation Aerosol stated that these products were contraindicated in patients with hypersensitivity to soy lecithin (previously an inactive ingredient in these products) or related products such as soybeans and peanuts. However, by the end of 2013, both products had been reformulated to be in compliance with rules to reduce aerosol propellants containing chlorofluorocarbons (CFC), which decrease the ozone layer, and soy lecithin was removed as an inactive ingredient at that time. Thus, currently available Atrovent HFA and Combivent Respimat inhalers do not contain CFC or soy lecithin. Therefore, an allergy to soy lecithin or peanuts is no longer an issue with these drugs. More information is available from the American Academy of Allergy, Asthma & Immunology at: www.ismp.org/sc?id=2850.

More look-alike bottles. Bottles of atenolol 25 mg and ALPRAZolam 0.25 mg, both made by Sandoz (Figure 1, on page 3), look very similar. The containers employ the same color schemes and layout continued on page 3—SAFETY briefs >
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. 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. 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 designs. The numeral combination of “25” is shared by both. Also, it is likely that these may be stored near one another thus increasing the risk of mix-ups. In fact, the pharmacist who reported this to us mentioned that her technicians have repeatedly selected the ALPRAZolam bottle instead of the atenolol bottle from the pharmacy shelf because of the look-alike similarities. Before an error happens in your pharmacy, discuss the potential for error and patient harm and implement preventive measures that we have written about many times before. When possible, explore ordering one of the products from a different manufacturer to prevent a mix-up from occurring.

**Figure 1.** Look-alike bottles of atenolol 25 mg and ALPRAZolam 0.25 mg from Sandoz.

**Don’t forget to take our survey on verbal orders.** Please take a few minutes to take our survey on verbal orders before March 3. To take the survey and submit your responses, please visit: www.ismp.org/sc?id=2851.
alternatives than relying on the use of error-prone abbreviations to help vaccine manufacturers and healthcare 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)® and Defense Health Agency Immunization Healthcare Branch® 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 name, if needed) along with the approved abbreviation or acronym on all order sets to reinforce their correct use. This includes electronic health record systems, electronic prescribing systems, pharmacy computer systems, and any wholesale vendor systems used to order vaccines. Work with IT and drug information vendors to help accomplish this goal.
- Review all standard order sets and protocols 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, electronic protocols), configure the display to allow viewing of the full brand and nonproprietary vaccine names when hovering over the vaccine abbreviation or acronym.
- On vaccination records and medication administration records, list the vaccine brand name (if applicable) and the full nonproprietary name of the vaccine 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 ISM P 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.

References
5) ISMP Survey shows orders with vaccine abbreviations are risky. ISMP Medication Safety Alert! 2005(9);12.
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