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Dangerous abbreviations: "U" can make a difference!

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Abstract

Dangerous abbreviations are also known as "error-prone abbreviations". They are referred to as "dangerous" or "error-prone" because they can lead to misinterpretation of orders and other communications, resulting in patient harm or death. Selected medication errors arising from the use of dangerous abbreviations are highlighted in this article, along with examples of such abbreviations and strategies to eliminate their use. This column is intended to enhance the awareness of practitioners who treat and care for critical care patients of the problems associated with using ambiguous abbreviations and to provide suggestions for associated safe practices.

The use of dangerous abbreviations was one of the first medication safety issues highlighted by the Institute for Safe Medication Practices (ISMP) more than 25 years ago (ISMP, 2001). Since then, other safety and quality organizations have emphasized this problem as a safety issue, including the Joint Commission on Accreditation of Healthcare Organizations (JCAHO) in the United States (JCAHO, 2001; USP, 2004). Starting in 2006, the Canadian Council on Health Services Accreditation (CCHSA) will require facilities to meet goals that "Ensure the safe use of high-risk medications" and "Ensure the safe administration of parenteral medications" (CCHSA, 2005, p. 104). Although the elimination of dangerous abbreviations is not yet a required practice, it is noted in a CCHSA worksheet for assessment of strategies for preventing medication errors (CCHSA, 2005). Eliminating these abbreviations can improve communication throughout the medication use process — prescribing, transcribing, dispensing and administration.

The use of dangerous abbreviations can result in what is known as confirmation bias. In this situation, errors can occur because practitioners "see" the information they expect (i.e., confirming their expectations) rather than seeing the information that is actually present (which might contradict what they expect). Depending on the frame of reference, the "U" in the title of this column can be interpreted as "you" or "units". Confirmation bias involving the abbreviation "U" can also occur in the medication use process: the letter U being misread as a zero (0) resulting in a ten-fold overdose. For example, an order for insulin written as "7U" was interpreted as "70 units"; the overdose caused permanent harm to a patient (ISMP Canada, 2003). Confirmation bias is often more pronounced when people are stressed or fatigued.

Although technically the "naked decimal point" is not an abbreviation, this dose designation can lead to serious medication errors. The problem occurs when a fractional amount of medication is ordered (e.g., 0.2 mg), but is expressed without a preceding zero (i.e., .2 mg). Without the leading zero, the decimal point might be overlooked, with a resultant ten-fold overdose. This practice, and associated misinterpretations have led to serious patient harm, including the death of a nine-month-old baby girl. "The baby's physician had prescribed morphine '.5 mg' IV for the management of post-operative pain. However, a unit secretary did not see the decimal point and transcribed the order by hand onto a medication administration record (MAR) as '5 mg.' An experienced nurse followed the directions on the MAR without question and gave the baby 5 mg of IV

Table One: "Minimum list" of dangerous abbreviations, acronyms and symbols*

Abbreviation	Potential Problem	Preferred Term
U (for units)	Mistaken as the numeral 0 (zero), the number 4 (four) or the unit cc (mL)	Write "units"
IU (for international units)	Mistaken as IV (intravenous) or 10 (ten)	Write "international units"
QD, QOD, (for once daily and every other day)	Mistaken for each other; a period after the Q can be mistaken for the letter I and the letter O can also be mistaken for the letter I	Write "daily", write "every other day"
Trailing zero (X.0 mg), lack of leading zero (.X mg)	Decimal point is overlooked	Never write a zero by itself after a decimal point (use X mg), and always use a zero before a decimal point for a fractional amount (0.X mg)
MS, MSO4, MgSO4	Confused for one another. Can mean morphine sulfate or magnesium sulfate	Write "morphine sulfate" or "magnesium sulfate" depending on what is intended

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morphine initially and another 5 mg dose two hours later. About four hours after the second dose, the baby stopped breathing and suffered a cardiac arrest (ISMP, 2001). This death was a particular tragedy, since a similar case, in which another infant died, had been reported the previous year (ISMP, 2000).

Ten-fold medication dosage errors can also occur with trailing zeros. The presence of a zero after a decimal point can lead practitioners to overlook the decimal point. For example, oral risperidone 1 mg twice a day was ordered for an elderly patient, but the order was transcribed onto the MAR with a trailing zero, as "1.0 mg". A nurse misinterpreted the dose and administered 10 mg. The

Table Two: "Extended list" of dangerous abbreviations, acronyms and symbols*

Abbreviation	Potential Problem	Preferred Term
μg (for microgram)	Mistaken for mg (milligrams), resulting in thousand-fold dosing overdose	Write "mcg"
hs or HS (for half-strength or Latin abbreviation for bedtime)	Intended meanings may be mistaken for each other; qhs or qHS may be mistaken for "every hour"; all can result in a dosing error	Write out "half-strength" or "at bedtime"
T.I.W. (for three times a week)	Mistaken for three times a day or twice weekly, resulting in overdose	Write "3 times weekly" or "three times weekly"
SC or SQ (for subcutaneous)	Mistaken for SL (sublingual) or "5 every"	Write "subcut" or "subcutaneously"
D/C (for discharge)	Interpreted as an order to discontinue whatever medications follow	Write "discharge"
Cc (for cubic centimetre)	Mistaken for U (units) when poorly written	Write "mL" for millilitres
AS, AD, AU (Latin abbreviations for left ear, right ear, both ears)	Mistaken for OS, OD, OU (Latin abbreviations for left eye, right eye, both eyes)	Write: "left ear", "right ear" or "both ears"; "left eye", "right eye" or "both eyes"

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Table Three: Examples of strategies to eliminate the use of dangerous abbreviations*

Nursing Staff:

- Avoid use of dangerous or ambiguous abbreviations when:
  - transcribing medical orders (e.g., medication administration records, patient care plans);
  - taking telephone orders;
  - completing medication-related forms (e.g., pharmacy medication discrepancy forms; admission and discharge forms, which are often used in the medication reconciliation process); and
  - documenting information in patients' progress notes.
- Familiarize yourself with abbreviations that are considered dangerous.
- Alert appropriate departments or individuals when dangerous abbreviations are found (e.g., prescriber for order clarification, pharmacist for product packaging and labelling, nursing management for preprinted orders).
- Report all errors and near misses, including those that occur as a result of dangerous abbreviations. Consider reporting these problems to ISMP Canada.
- Model ideal behaviour when mentoring or preceptoring new staff by avoiding use of dangerous or ambiguous abbreviations.

Critical Care Units (and other patient care areas):

- Post a list of dangerous abbreviations in locations where orders are written and transcribed (e.g., by telephones, in health records dictation areas, in medication rooms, on medication carts, in a central location for access during unit rounds).
- Consider distributing the list to all staff in a variety of formats, such as a pocket card, a laminated card that can be placed with identification badge, an e-mail message.
- Ensure that drafts of preprinted order forms are reviewed before they are finalized for the purpose of eliminating dangerous and ambiguous abbreviations. Include a pharmacist in the review process of any forms that include medications.

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- Systematically review and revise all preprinted orders and care pathways to ensure appropriate use of abbreviations.
- Hold brief, regularly scheduled education sessions on patient safety for staff, and highlight this issue. (These education sessions can be multidisciplinary.) Outline expectations and include discussions on how to effectively deal with dangerous abbreviations and other unclear orders.
- Include this safety topic in orientation for new staff members. A presentation can be created and shared throughout the organization.
- Make patient safety a standing agenda item at staff meetings, and solicit staff feedback regarding hazardous conditions, including the use of dangerous, ambiguous, inappropriate or unapproved abbreviations.
- Share learning throughout the organization, i.e., successes and difficulties encountered.

Pharmacists and Pharmacy Staff:

- Avoid purchasing pharmaceutical products that are labelled with dangerous or ambiguous abbreviations. Report dangerous abbreviations that appear on pharmaceutical packages and labels to the manufacturer and to your buying group, if applicable. (Buying groups or group purchasing organizations, to which hospital pharmacies commonly belong, can often influence pharmaceutical manufacturers to make changes in packaging, labelling and product format.) Consider reporting packaging and labelling problems to ISMP Canada.
- Eliminate use of dangerous abbreviations from all computerized and automated systems in the pharmacy, both on-screen and for generation of labels. If the abbreviations are hard coded into the software, work with vendors to eliminate their use. Consider the following:
  - Create a forcing function, whereby computers do not use or accept input of dangerous abbreviations.
  - Eliminate use of dangerous abbreviations on all pharmacy-generated labels and forms, e.g., centralized intravenous admixture, total parenteral nutrition, unit dose dispensing, repackaging of bulk products, medication administration records, patient medication histories and summaries.
- Avoid use of dangerous or ambiguous abbreviations when:
  - transcribing medication orders into patient profiles, progress notes, care plans;
  - transcribing telephone order clarification;
  - completing medication-related forms (e.g., medication reconciliation forms); and
  - documenting information in patients' progress notes.
- Require order clarification when dangerous abbreviations are used by prescribers.
- Create a standard alert letter and send it when prescribers use dangerous abbreviations.
- Refer to sections above (nursing staff, critical care units) for education and feedback that can also be applied for pharmacy staff.

Hospital Leaders:

- Build and actively cultivate a "culture of safety" so that patient safety is a priority at all levels of the organization. Organizational culture is the foundation on which successful patient safety initiatives are built. Patient safety must be viewed as *everyone's* ongoing responsibility.
- Make the elimination of dangerous abbreviations an organization-wide initiative that incorporates interdisciplinary collaboration. Identify champions from the various disciplines and departments to create momentum.
- Develop and widely distribute a list of dangerous abbreviations that must not be used. Consider starting with a few ambiguous and problematic abbreviations, and build on the list over time. In addition, consider a grace period followed by a "go live" date, after which the abbreviations will not be accepted.
- Use a variety of communication strategies, e.g., hospital publications; agenda items at committee meetings, such as pharmacy and therapeutics committee and medical advisory board; laminated lists used as a divider for the "orders" section of the patient's chart; posters; screen savers.
- Update current list of acceptable abbreviations to eliminate those that are dangerous and ambiguous.
- Ensure that new technology and software does not use dangerous abbreviations or ambiguous terminology, e.g., physician order entry applications.
- Ensure that all new staff who are expected to deal with any aspect of the medication use process — e.g., nurses, physicians, pharmacists, respiratory therapists and respiratory care practitioners, unit secretaries (if transcribing), pharmacy technicians, purchasing staff, risk management staff, all front-line managers — receive formal orientation on patient safety that includes eliminating the use of dangerous abbreviations. Include internal and external errors to highlight the issues.
- Include the elimination of dangerous abbreviations as a criterion for product purchasing decisions, e.g., pharmaceuticals, infusion pumps.
- Include the elimination of dangerous abbreviations in the approval process for all hospital forms.
- Perform frequent random chart audits to determine if unapproved or inappropriate abbreviations are being used. Widely distribute and present results of these audits to staff.

patient required admission to ICU. "After a couple of excessive doses, the patient developed hypoxia and required the establishment of an airway and subsequent ventilation" (Hicks, Santell, Cousins, & Williams, 2004, p.33).

Latin abbreviations are often the norm in medicine, yet they can be problematic. Figure One illustrates an order for digoxin 0.125 mg with an abbreviated frequency that could be interpreted as "qod", "qid", or "q.d." The prescriber intended the dose to be given "qod" (every other day), but the abbreviation was understood to mean "qid", or four times a day.

Abbreviations that are common in everyday use have also found their way into health care communication. One example is the "at" sign (@) which can be misread as the numeral two or five, which would cause over-infusion of IV solutions and overdosing of medications. The examples in Figures Two and Three show that misinterpretation of abbreviations and symbols is not limited to handwritten orders and that such notations should be avoided throughout the medication use process: in labelling and packaging, preprinted orders, computerized physician order entry, electronic MARs, automated dispensing cabinets, and the screens of infusion pumps. Furthermore, the use of abbreviations needs to be carefully considered for all functions within health care facilities. For example, when new technologies and software are being purchased, safety requirements, such as hard coding or avoidance of unacceptable abbreviations, must be stipulated before a vendor is selected.

Two lists of dangerous abbreviations are provided in Tables One and Two. A more complete list is available from ISMP (ISMP, 2003). Of particular interest is that greater successes are achieved by organizations that begin by focusing on just a few abbreviations, those identified as most likely to cause harm, and building on these successes over time rather than trying to implement changes on the basis of a long or exhaustive list. Examples of additional strategies for the elimination of dangerous abbreviations are provided in Table Three.

Critical care staff often cares for seriously compromised patients, who have minimal physical reserves to recover from medication or fluid-related errors. The use of dangerous abbreviations in order communication — prescribing, transcribing, dispensing, administration and associated processes (e.g., medication reconciliation) — can be perceived as saving time; however, the potential for harm to patients, as well as to patients' families, the practitioners involved, and the health care organization as a whole reveals the need to eliminate their use. Health care organizations must become preoccupied with systemic reasons for failure, learn about common human limitations and continuously apply system-based improvements if they are to become "high reliability organizations":

> *"High reliability organizations refer to organizations or systems that operate in hazardous conditions, but have fewer than their fair share of adverse events… Commonly discussed examples include air traffic control systems, nuclear power plants, and naval aircraft carriers… It is worth noting that, in the patient safety literature, HROs are considered to operate with nearly failure-free performance records, not simply better than average ones. This shift in meaning is somewhat understandable given that the "failure rates" in these other industries are so much lower than rates of errors and adverse events in health care. The point remains, however, that some organizations achieve consistently safe and effective performance records despite unpredictable operating environments or intrinsically hazardous endeavours"* (AHRQ, 2005).

Eliminating the use of dangerous abbreviations is one type of proactive system-based change that critical care staff (nurses, physicians, pharmacists, respiratory therapists) can make by collaborating and setting an example in an organization's efforts to enhance patient safety and quality of care.

If in doubt, spell it out!

Report an error to the Institute for Safe Medication Practices Canada (ISMP Canada):

i) through the website, **www.ismp-canada.org**;
ii) by e-mail to **info@ismp-canada.org**; or
iii) by phone at (416) 480-4099 or 1-866-54-ISMPC [47672].

ISMP Canada guarantees confidentiality and security of information received. ISMP Canada respects the wishes of the reporter as to the level of detail to be included in publications.

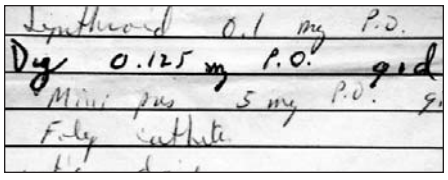

Figure One: A doctor's handwritten order. The abbreviation "qod" was interpreted as "qid". The digoxin was given four times daily, rather than the intended "every other day". (Used with permission from ISMP Canada.)

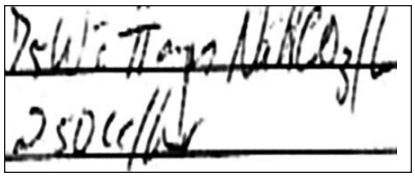

Figure Two: A doctor's handwritten order. The symbol @ was interpreted as the numeral 2. The intravenous bicaronate solution was infused at 250 mL/hour, rather than the intended "@ 50 cc/r". (Used with permission from ISMP Canada.)

Figure Three: Label on an octreotide infusion. The text "run @5ML/H" was misinterpreted as "run 25ML/H". (Used with permission from ISMP Canada.)

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