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ISMP
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Acute Care
ISMP Medication Safety Alert!®
Educating the Healthcare Community About Safe Medication Practices

Call to action: Standardization and smarter logic needed to prevent drug name selection errors

Problem: Since 2019, ISMP has recommended entering, at a minimum, the first five letter characters of a drug name (unless the name has fewer than five letters) during searches in automated dispensing cabinets (ADCs) when a needed item has not yet been added to the patient's medication profile (during overrides) (see *Statement 4.4* in the ISMP ***Guidelines for the Safe Use of Automated Dispensing Cabinets*** [www.ismp.org/node/1372]). Use of only the first two to four characters of the drug name (e.g., "met"), abbreviations (e.g., "mtx"), or a combination of the first few characters and dose (e.g., "meth10") has led to the presentation of similar-looking drug names on the screen and has resulted in selection errors.

Despite its potential as a valuable safeguard, the five-character minimum approach is not without limitations and challenges when removing medications from an ADC via override, which we acknowledged in our 2021 article, *Challenges with requiring five characters during ADC drug searches via override* (www.ismp.org/node/28102). These challenges include misspelling a drug name, needing spaces or symbols to meet the five-character minimum, difficulty locating combination medications or fluids, and failing to find emergency drugs (e.g., reversal agents) when forgetting about this requirement. Of course, to limit override challenges, whenever possible, orders should be entered and verified by a pharmacist to allow medication or product removal within the patient's profile, thus, negating the need to enter five characters for product selection. Additionally, including the therapeutic class to the drug name listing or "pinning" emergency drugs to the top of the ADC screen could help prevent drug selection errors.

Vendors such as Omnicell and BD Pyxis have played a significant role in addressing the issue of wrong drug selections by demonstrating support for the five-character look-up minimum within their ADC functionalities. Omnicell unveiled a new safety feature in 2019, enabling cabinets to be configured to require a search of one to five characters for medications removed via override. BD Pyxis followed in 2022, offering a configurable search of three to five characters. To note, these functionalities require manual configuration and may necessitate a software update.

While these changes were a step in the right direction, we believe further technological advancements are necessary. A study,[1] published in February 2024, examined safety strategies when searching for medications by name within health technology platforms. Researchers found that when looking at the number of overlapping characters in brand and generic medication names from left to right, medication name overlap varies widely. Some medication names overlap by only a few initial characters (e.g., **INDERAL** and **INDOCIN**); others overlap by seven or more initial characters (e.g., hydroxychloroquine and hydr**OXY**zine). Less frequently, medication names overlap by ten or more initial characters (e.g., **PHEN**obarbital and **PHEN**obarbital with belladonna alkaloids). For many lists of real-world medication names, worst case left-to-right character overlap varied from 4 to 29 characters, with the most frequent worst case being 14 overlapping characters. Looking just at high-alert medications, worst case overlap varied in these same lists from 3 to 10 characters, with the most frequent overlap being 6 characters. Instead of software requiring users to enter a fixed number of keystrokes, these findings provide insight into the value of keystroke disambiguation, a type of incremental search mechanism that uses each new keystroke to uniquely identify a single name of interest. We support the study's conclusion that drug search safety can be improved by upgrading systems to respond dynamically to each keystroke entered.

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SAFETY brief

HIGH-ALERT

Are your organization's medication surveillance systems positioned to detect foul play? We were devastated to learn about the recent case where a Pennsylvania nurse pleaded guilty to killing patients in nursing homes with lethal doses of insulin (www.ismp.org/ext/1366). After allegedly administering high doses of insulin to 22 patients at different facilities, she was sentenced to three consecutive life sentences for first-degree murder charges and up to 760 years for criminal intent to commit murder. This caused us to pause and ask, how did something like this happen and continue for 3 years at different facilities? The following discussion explores that question and provides recommendations to help organizations address similar concerns.

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ASHP USP Chapter <797> Activities

The American Society of Health-System Pharmacists (ASHP) is offering two **free** on-demand webinars, ***Mind the Gaps: Assessing Your Institution's Compliance with USP Chapter <797>***, and ***Elevating Compliance: Navigating USP <797> with Technology and Standardization***. Continuing education (CE) credit is available for pharmacists and technicians. For more information and to earn CE, visit: www.ismp.org/ext/1364.

Additionally, don't forget to register for ASHP's ***Frontline Conversations***, scheduled for **May 30, 2024** at 1:00 pm ET. This is the second session being offered to organizations of all sizes. During the session, you will have the opportunity to ask expert faculty questions related to USP Chapter <797>. For more information and to register, visit: www.ismp.org/ext/1365.

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The study described an additional safety concern: medication names may vary by organization and/or computer system (e.g., ADC, electronic health record [EHR], order entry system). Medication names listed in computer systems may not be standardized, could frequently be modified, and may be constrained by field length limits which may contribute to selection errors. Examples of non-standard real-world medication names provided by the researchers, in their article's Supplementary Appendix A, includes various nicknames, brand names, and other names such as "1-2-3 cream," "ara-c," "dakin's half strength," "folic acid-vit b6-vit b12," "mvw complete formulation," and "tylenol #3." Rather than individual organizations maintaining unique medication naming schemes for these and other drug products, the researchers recommend a standard list of medication names for computer systems.

Safe Practice Recommendations: While the five-character minimum remains a valuable interim strategy and ISMP continues to support its use, a more comprehensive approach, including dynamic search function capability, is needed to mitigate risks of ADC drug selection errors. To update medication name search mechanisms and strategies to prevent medication selection mistakes, consider the following recommendations:

For Vendors

Support a dynamic search function. Due to substantial variability in medication name overlap, the way medication names are represented and handled in software systems should be improved. Vendors should develop and implement an algorithm that allows users to enter the exact number of characters to get only one unique drug name to appear on the screen when searching for medication names on override.

Support standard medication names. Vendors should promote the use of standard medication names and presentations in all medication-use systems (e.g., "Tylenol with Codeine #3" as opposed to "Tylenol #3"). Vendors should remove length limits on medication name fields because these limits sometimes force those who configure medication-use systems to devise cryptic names.

For Organizations

Require indications for certain override medications. Previous studies have shown that indications are the most impactful product characteristic to differentiate between similar medication names.[2,3] For high-alert and other potentially problematic medications, require users to confirm medication selection onscreen by selecting an indication or other verifying information. To streamline the indication selection process, build options derived from why the medication is on the override list (e.g., reversal agent). This is supported by *Statement 8.4* in the ISMP ***Guidelines for the Safe Use of Automated Dispensing Cabinets*** (www.ismp.org/node/1372) which recommends configuring interactive alerts that require users to enter or select clinically relevant information prior to the removal of organization-identified medications. In addition, ISMP ***Targeted Medication Safety Best Practices for Hospitals***, *Best Practice 7* (www.ismp.org/node/160), recommends confirmation of clinically relevant information (e.g., the purpose for removing the drug, such as whether the patient is ventilated when removing a neuromuscular blocking agent).

Analyze workflow. Analyze the workflow, especially the searchability of emergency medications, and conduct a failure mode and effects analysis (FMEA) to identify and manage potential challenges before implementing the five-character search requirement or other dynamic search (if available) for medications obtained from an ADC via override. For examples of risk points to consider during the FMEA, review our 2021 article, *Challenges with requiring five characters during ADC drug searches via override* (www.ismp.org/node/28102).

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Our March 7, 2024 article, *Drug diversion prevention beyond controlled substance medications* (www.ismp.org/node/126032), discussed how controlled substance medications are the most common targets for diversion detection programs, but that medication diversion by practitioners can involve non-controlled substances as well. Organizations often do not include non-controlled substances as part of their diversion detection programs because they may not understand the rationale as to why practitioners may be diverting non-controlled substances, or they may not know how to monitor them. In turn, practitioners may perceive non-controlled medications as easier to divert because they know that most organizations do not have processes in place to monitor them as closely. In this case, insulin was being diverted and administered to patients; some with diabetes, and others who did not have diabetes.

To prevent this, organizations should start by reviewing **Part I** (www.ismp.org/node/64547), of our previous publication, *Controlled substance drug diversion by healthcare workers as a threat to patient safety*, which highlights the widespread scope of diversion in healthcare, barriers to recognition, at-risk behaviors, and other signs associated with possible diversion; and **Part II** (www.ismp.org/node/66766), which includes tools for preventing, identifying, reporting, and responding to diversion. ISMP has also provided webinars on diversion which can be found in our on-demand education library (https://home.ecri.org/blogs/ismp-on-demand-events). Use this information as a starting point for developing drug diversion response programs and then incorporate medications beyond controlled substances to expand surveillance by considering the following recommendations:

For rapid identification of suspected diversion, consider machine learning diversion monitoring and advanced analytics software programs. These programs use consolidated data sets from multiple informatics technology systems

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Use simulation to educate staff. Conduct simulations with users before implementing any drug name search changes. This allows users to gain familiarity and confidence with the new functionality, particularly in time-sensitive situations such as medical emergencies. Include simulation during orientation and annual competency assessments for relevant employees.

Establish a feedback mechanism. Develop a robust and effective communication plan and obtain feedback from frontline staff before implementing any changes in drug name searches. After implementation, collect data to assess any unintended consequences that are identified. To collect this data, include a dedicated log near the ADC or an online platform for users to document any challenges encountered. Evaluate reported issues and make appropriate adjustments as needed.

Standardize medication names used in medication systems. After medication names are determined through existing regulatory processes, a gold standard set of medication names could be developed to use in all medication systems. This list of names could come about through a national consensus standards-setting process. We recognize that there will still be an organizational decision to name a medication differently based on a safety concern. However, in an ideal state, the computer system software should automatically check that the organization's medication name list conforms to the standard set of names or notify them of those that do not.

Stay informed about vendor updates. As we advocate for improved search functionalities by ADC vendors, it is important to activate software updates or upgrade technology when available. This approach ensures early access to the latest safety improvements offered by vendors.

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Worth repeating...

More mix-ups between EPINEPHrine and ePHEDrine

A pharmacy technician stocked vials of e**PHED**rine in **EPINEPH**rine pockets in several automated dispensing cabinets (ADCs). The products, **ADRENALIN** (**EPINEPH**rine) 1 mg/mL injection (Par Pharmaceutical), and e**PHED**rine 50 mg/mL injection (Amneal), come in similar-looking 1 mL vials with purple caps (**Figure 1**). Fortunately, the error was caught before reaching a patient, but we have previously reported similar mix-ups, most recently in our October 22, 2020, newsletter.



Figure 1. Adrenalin (**EPINEPH**rine) and e**PHED**rine 1 mL vials with purple caps.

These drugs also have known look-alike nonproprietary names and share indications that make storage of both products likely in the same clinical setting. As a vasoconstrictor, **EPINEPH**rine is 100 to 1,000 times more potent than e**PHED**rine, and mix-ups between these drugs have resulted in patient death (www.ismp.org/ext/1227).

Require barcode scanning when dispensing, restocking, and administering these medications. Consider purchasing an alternative brand for e**PHED**rine with a different cap color. If possible, use prefilled commercially available or outsourcer-supplied **EPINEPH**rine syringes. Require the pharmacy to prepare infusions and bolus doses for these drugs except in emergencies.

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(e.g., automated dispensing cabinets [ADCs], electronic health records [EHRs], attendance software, inventory systems, wholesalers) to reconcile stock movement and waste documentation, compare clinical data with dispensing patterns, detect when staff are accessing ADCs in areas where they do not normally work or are not scheduled to work that day, and trend behavior against other users on the same unit. Analyze ADC data such as canceled transactions, overrides, inventory counts, and discrepancies for unusual or repetitive transactions. If a staff member is identified as an outlier when it comes to high usage of a medication on the organizational list (e.g., insulin), this may be the first sign of potential diversion and should be further investigated. Also, use data from pharmacy inventory management systems and monitor the potential for diversion within the pharmacy. Consider excessive restocking and unexpected stockouts when monitoring procurement, current inventory, and usage.

Establish a reporting platform and maintain confidentiality of staff who report concerns about drug diversion. During orientation and at least annually, educate staff about how to report and respond to drug diversion and encourage them to speak up when it comes to any medication they suspect is being diverted. Monitor patients for unexpected outcomes (e.g., increased side effects) and consider if foul play is involved.

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