Preventable Medication Errors – Look-alike/Sound-alike Drug Names

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INTRODUCTION

The existence of look-alike/sound-alike drug names is one of the most common causes of medication error and is of concern worldwide. As more medicines and new brands are being marketed in addition to the thousands already available, many of these medication names may look or sound alike (some examples are illustrated in Table 1). Thus, the potential for error due to confusing drug names is very high. In addition, when patients take multiple prescription medications and/or receive care from different health care providers, medication history information may be less reliable and more difficult to verify.[1] As a result, the problem of Look-Alike/Sound-Alike drug names has become a significant challenge to pharmacists, pharmacy technicians, patients, and prescribers.

Simplicity, standardization, differentiation, lack of duplication, and unambiguous communication are important concepts that are relevant to the medication-use process.[1-3] Many factors could contribute to the confusion of medication names, such as illegible handwriting, knowledge deficit on drug names, and similar indications of drugs. Medication incidents are often resulted from a combination of several factors[1-3]

Medication incidents involving Look-Alike/Sound-Alike drug names can cause serious patient harm. It is often difficult to detect the error, as the dispensed medication is presumed to have been the one that is prescribed for the patient.[3] In a community pharmacy, these errors can occur at any point in the medication use system, including prescribing, order entry, dispensing, administration and/or monitoring.[1] Incident reporting can be used to gain a deeper understanding of contributing factors or potential causes leading to medication incidents involving look-alike/sound-alike drug names.

TABLE 1: EXAMPLES OF LOOK-ALIKE/SOUND-ALIKE DRUG NAMES
(Brand name is shown in bold. Generic name is shown in italics)

BRAND NAME *(Generic name)*	BRAND NAME *(Generic name)*
Celebrex® *(Celecoxib)*	**Celexa**® *(Citalopram Hydrobromide)*
Losec® *(Omeprazole)*	*Lasix*® *(Furosemide)*
Lamictal® *(Lamotrigine)*	*Lamisil*® *(Terbinafine Hydrochloride)*
Reminyl® *(Galantamine Hydrobromide)*	**Amaryl**® *(Glimepiride)*
Seroquel® *(Quetiapine Fumarate)*	**Seroquel XR**® *(Quetiapine Fumarate)*
Yaz® *(Drospirenone and Ethinyl Estradiol)*	**Yasmin**® *(Drospirenone and Ethinyl Estradiol)*

The Community Pharmacy Incident Reporting (CPhIR) Program (available at http://www.cphir.ca) is designed for community pharmacies to report near misses or medication incidents anonymously to ISMP Canada for further analysis and dissemination of shared learning from incidents.[4] CPhIR has allowed the collection of invaluable information to help identify system-based vulnerable areas in order to prevent medication incidents.[4] This article provides an overview of a multi-incident analysis of medication incidents involving look-alike/sound-alike drug names reported to the CPhIR program.

MULTI-INCIDENT ANALYSIS OF MEDICATION INCIDENTS RELATED TO LOOK-ALIKE/SOUND-ALIKE DRUG NAMES IN COMMUNITY PHARMACY PRACTICE

Reports of medication incidents involving "look-alike/sound-alike" were extracted from the CPhIR Program from April 2010 to March 2012. In total, 540 incidents were retrieved and 342 incidents met inclusion criteria and were included in this qualitative, multi-incident analysis. They were independently reviewed by two ISMP Canada Analysts and categorized into four main themes: (1) individual factors, (2) environmental factors, (3) tech-nological factors and (4) unique factors, as shown in Table 2. (Note: The "Incident Examples" provided in Table 2 were limited by what was inputted by pharmacy practitioners to the "Incident Description" field of the CPhIR program.)

HIERARCHY OF EFFECTIVENESS IN PREVENTING MEDICATION INCIDENTS ASSOCIATED WITH LOOK-ALIKE/SOUND-ALIKE DRUG NAMES

Many possible recommendations with varying degrees of effective-ness are available to prevent medication errors. It is often difficult to select the best strategy

TABLE 2: THEMES FROM THE MULTI-INCIDENT ANALYSIS

THEME 1: INDIVIDUAL FACTORS

Individual factors take into account human capabilities, limitations, and characteristics, such as confirmation bias, illegible handwriting, knowledge deficit, etc.

INCIDENT EXAMPLE	POSSIBLE CONTRIBUTING FACTORS	COMMENTARY
A prescription was written for Mebendazole 100mg, 2 doses with 2 weeks apart. The pharmacist interpreted the prescription as metronidazole 1000mg, 2 doses with 2 weeks apart. The prescriber's handwriting was hard to read, and Metronidazole was commonly prescribed by this prescriber. When the pharmacist was discussing with the patient in terms of therapeutic indications of the prescription, it was discovered that the patient was supposed to be treated for worms, not bacterial infection.	• *Knowledge deficit* • *Confirmation bias* • *Illegible handwriting on the prescription* • *Lack of independent double checks*	In order to clearly indicate medication, dosage, and instructions on prescrip-tions, physicians should consider using standardized pre-printed order forms.[1] Warning flags should be incorporated into the pharmacy computer systems to alert for potential mix-up during drug selections.[3] Independent double checks should be performed throughout the entire pharmacy workflow.[5] This may include a verification with the patient or the patient's agent regarding the indication of the medication during drop-off or pick-up of prescription.
A physician wrote a prescription for Hydrocortisone 1% in Mycostatin®; however, Hydrocortisone 1% in Miconazole (Monistat®) was filled. The pharmacy staff member thought Mycostatin® and Miconazole were the same thing.		To avoid incidents related to confirma-tion bias, indications for each medication should be included on the prescription.[3] It is recommended to highlight informa-tion related to look-alike/sound-alike drug names as part of pharmacy staff training and communications.[6]

TABLE 2: THEMES FROM THE MULTI-INCIDENT ANALYSIS *(Continued)*

THEME 2: ENVIRONMENTAL FACTORS

Environmental factors refer to issues in the work environment or within the workflow process, such as drug storage, environmental distractions, drug shortage, etc.

INCIDENT EXAMPLE	POSSIBLE CONTRIBUTING FACTORS	COMMENTARY
A pregnant patient was prescribed Diclectin®, but Dicetel® was filled. The patient had been on Dicetel® many times in the past.	• *Confirmation bias* • *Lack of independent double checks*	To avoid incidents related to confirmation bias, indications for each medication should be included on the prescription.[3] Independent double checks should be performed throughout the entire pharmacy workflow.[5]
A pharmacy student entered two prescriptions correctly for the same patient. The technician who was filling prescriptions scanned out the proper drugs, but mislabeled vials with each other's label. The pharmacist found out the mistake while checking prescriptions.	• *Fill multiple prescriptions for the same patient simultaneously* • *Environmental distractions*	The pharmacy dispensing environment should be organized to create a safe and efficient working area.
Due to the shortage of Apo®-Amilzide, Novamilor was filled for the patient. When Apo®-Amilzide became available, the pharmacy staff member planned to switch back to it. However, the Apo®-Amiloride was chosen instead of Apo®-Amilzide. Apo®-Amilzide was a combination drug including amiloride and hydrochlorothiazide. Patient noticed the yellow color tablets when picking up the prescription and questioned the pharmacist. The patient's profile was checked and the error was noticed.	• *Drug shortage* • *Proximity of storage of look-alike/sound-alike drug pairs* • *Lack of independent double checks*	The look-alike/sound-alike drug pairs should be stored in separate locations or in non-alphabetical order on shelves.[6] Independent double checks should be performed throughout the entire pharmacy workflow.[5] This may include a verification of patient's prior medication use in the patient profile prior to dispensing.

for each situation. However, it is recommended to choose the most effective solution that is reasonable and/or possible given the circumstances.[8] Based on the potential contributing factors that have been identified from this multi-incident analysis, the following hierarchy of effectiveness in preventing medication incidents associated with look-alike/sound-alike drug names is summarized in Table 3. The recommendations are listed in order from the most effective to the least effective solution. For example:

• "Simplification / Standardization" helps eliminating illegible handwriting and standardizing safe order

communication, but it relies in some part on human vigilance and memory.[9]

• "Reminders, Checklists, Double Checks" and "Rules & Policies" are often used to remind or control people, not necessarily to fix systems. Therefore, they should be used primarily to support more effective recommendations that are designed to fix systems.[9]

• "Education & Information" is an important strategy when it is combined with other approaches that strengthen the system.[9]

Although all the listed actions can play important roles in error prevention, it is recommended to select the

TABLE 2: THEMES FROM THE MULTI-INCIDENT ANALYSIS *(Continued)*

THEME 3: TECHNOLOGICAL FACTORS

Technological factors are related to the use of pharmacy computer systems, such as copying prescriptions and scanning barcodes.

INCIDENT EXAMPLE	POSSIBLE CONTRIBUTING FACTORS	COMMENTARY
A patient took Tri-Cyclen® LO before and received a new prescription from the doctor for Tri-Cyclen®. The pharmacy staff member copied from previous prescription on patient's profile and filled as Tri-Cyclen® LO. The patient noticed the medication package was the same as before and was anticipating a change. The patient returned to the pharmacy before she took the pills.	• *Confirmation bias* • *Copying previous prescriptions* • *Lack of independent double checks*	The copy functionality is available in all pharmacy software systems to enhance pharmacy workflow. In order to prevent confirmation bias, policies may be considered within the pharmacy to limit the process of copying from previous prescriptions (where applicable). The inputted prescription information should be verified against the original prescriber-generated prescription order. When providing medication counselling, pharmacists should encourage patients/caregivers to actively participate in the conversation (e.g. confirm the appearance of the medication, discuss the use, and verify indication and appropriate technique for administration of the medication, etc.)[1]
A patient called the pharmacy to refill Zopiclone; however, the technician refilled the existing prescription for Zoloft® (Sertraline). When the patient got home, she realized that she got the wrong medication.	• *Confirmation bias* • *Lack of independent double checks*	Independent double checks should be performed throughout the entire pharmacy workflow.[5] For verbal prescriptions, order takers should be able to increase the source volume or have quiet areas to take orders. Spoken communication of drug names can be made safer by reading-back, spelling out the name, providing the indication for the drug or using both brand and generic names.[7] Alternatively, encourage patients to use Prescription Numbers when ordering refills over the phone. Independent double checks should be performed throughout the entire pharmacy workflow.[5]

most effective solutions that are designed to develop system-based improvements.

CONCLUSION

Look-alike/sound-alike drug names continue to be an inevitable issue that often lead to negative impacts on patient safety. A multifactorial approach is essential to overcome the threats to patient safety from look-alike/sound-alike drugs names as seen in Table 3. Everyone in healthcare has a role in reducing medication errors. The benefits of empowering and encouraging consumers to ask questions about their medications should not be underestimated as patients play a key role in advancing safe medication practices. The results of this multi-incident analysis are intended to educate health care professionals about the vulnerabilities within our healthcare

TABLE 2: THEMES FROM THE MULTI-INCIDENT ANALYSIS *(Continued)*

THEME 4: UNIQUE FACTORS

Unique factors are special characteristics pertaining to look-alike/sound-alike drug pairs themselves, such as similar dose, similar indication, same ingredients available in multiple formulations, etc.

INCIDENT EXAMPLE	POSSIBLE CONTRIBUTING FACTORS	COMMENTARY
The prescription was written for Hydrocortisone 1% ointment; however, Hydrocortisone 1% cream was dispensed.	• *The look-alike/sound-alike drug pairs has similar or same therapeutic indications*	Warning flags should be incorporated into the pharmacy computer systems to alert for potential mix-up during drug selection.[3]
A patient was prescribed Carbamazepine CR 200mg; but Carbamazepine 200mg was dispensed.	• *The look-alike/sound-alike drug pair is available in similar or same strength*	Auxiliary alerts should be placed on medication storage bins or shelves, where look-alike/sound-alike drugs are potentially stored.[1]
A pharmacist dispensed Advair® 250 Diskus instead of Advair® 250. The second pharmacist noticed the error and corrected it before giving to the patient.	• *The same active ingredient is available in multiple formulations* • *Lack of independent double checks*	Independent double checks should be performed throughout the entire pharmacy workflow.[5]

system. Additionally, community pharmacists can mitigate and prevent the likelihood of negative outcomes from occurring through understanding the common themes as seen in Table 2 and implementing safeguards within practice settings. The following is a list of online resources that may be helpful for pharmacies with respect to differentiating look-alike/sound-alike drug names.

Canadian Resources for Differentiation of Look-alike/Sound-Alike Drug Names:

Visual Differentiation in Look-alike Medication Names (Canadian Patient Safety Institute (CPSI)) http://www.patientsafetyinstitute.ca/English/research/cpsiResearchCompetitions/2008/Documents/Gabriele/Report/Visual%20Differentiation%20in%20Look-alike%20Medication%20Names%20-%20Full%20Report.pdf

Look-Alike/Sound-Alike Drug Names: Can We Do Better in Canada? (ISMP Canada) http://www.ismp-canada.org/download/safetyBulletins/ISMPCSB2004-02DrugNames.pdf

U.S. Resources for Differentiation of Look-Alike/Sound-Alike Drug Names:

Separate Drugs That Look or Sound Alike (Institute for Healthcare Improvement (IHI)) http://www.ihi.org/resources/Pages/Changes/SeparateDrugsthatLookorSoundAlike.aspx
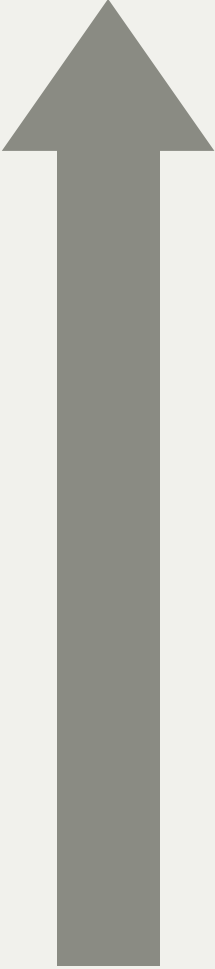
ISMP's List of Confused Drug Names (ISMP US) https://www.ismp.org/tools/confuseddrugnames.pdf

FDA and ISMP Lists of Look-Alike Drug Names with Recommended Tall Man Letters (ISMP US) https://www.ismp.org/tools/tallmanletters.pdf

TABLE 3: HIERARCHY OF EFFECTIVENESS IN PREVENTING MEDICATION INCIDENTS INVOLVING LOOK-ALIKE/SOUND-ALIKE DRUG NAMES[8, 9]

SUMMARY OF RECOMMENDATIONS	HIERARCHY OF EFFECTIVENESS CATEGORIES	
• Include both generic and brand names in pharmacy order entry system • Use standardized pre-printed order forms	Simplification / Standardization	**Highest Leverage**
• Incorporate warning flags into pharmacy computer systems to alert for look-alike/sound-alike drug names • Place auxiliary alerts on medication storage bins or shelves, where look-alike/sound-alike drug pairs are potentially stored • Perform independent double checks • Verify all verbal orders by repeating it back, spelling out the drug names, providing the indication of the drug to the caller	Reminders, Checklists, Double checks	
• Include indications for each medication on the prescription • The copy functionality is available in all pharmacy software systems to enhance pharmacy workflow. Limit the process of copying from previous prescriptions (where applicable). The inputted prescription information should be verified against the original prescriber-generated prescription order. • Store look-alike/sound-alike drug pairs in different locations	Rules & Policies	
• Highlight the importance of look-alike/sound-alike drug names as part of pharmacy staff trainings and internal communication	Education & Information	**Lowest Leverage**

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