

## Multiple Levels Involved in Prescribing the Wrong Medication

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### The Case

A 65-year-old woman complained of some ongoing nausea two weeks after hernia repair surgery. The surgery itself had not been complicated and on her postoperative visit, her physical examination was benign. The only lab abnormality was a mild increase in her liver function tests which was attributed to her ongoing nausea and vomiting. The patient was encouraged to maintain her hydration status and to trial small frequent meals as conservative management of her nausea and vomiting.

On postoperative day 15, she called back again with ongoing nausea. She was asked to stop taking the pain medication (oxycodone) and given a prescription for trimethobenzamide (after noting her allergy to ondansetron) to be taken every 6 hours as needed for nausea. The patient filled her prescription the same day and started using the medication that same evening. The next day her nausea was worse, and she continued taking the medication, thinking that the drug would take time to work. That evening she was more tired, having had several episodes of vomiting. The next day her daughter found her extremely weak and took her to the Emergency Department (ED).

On arrival to the ED, the patient was profoundly volume depleted, confused, and had electrolyte abnormalities. On review of her medications, she was asked why she was taking topiramate; the daughter recalled her mother picking up a new medication for nausea two days prior. Once adequately volume-supported, the patient was able to answer all questions well and recalled starting the new medication two days ago. Further questioning revealed that the new medication was topiramate (Topamax™) instead of trimethobenzamide (Tigan™). Topamax™ had been accidentally selected by a nurse and pended to the physician who then prescribed the medication electronically to the patient for her ongoing symptom of nausea. The medication was then picked up by the patient from her usual pharmacy. The pharmacist had reviewed the medication with the patient, but with her state of mind she did not question the information being provided. Although no major complications occurred in this case, it is an example of how mistakes are made, despite multiple opportunities for cross-verification.

# The Commentary

*By Kristine Chin, PharmD, Van Chau, PharmD, Hannah Spero, MSN, APRN, and Jessamyn Phillips, DNP*

The [Swiss Cheese Model](#) of accident causation is useful in understanding the multiple breakdowns in patient safety that occurred during this case.<sup>1</sup> The Swiss Cheese model, first described by British psychologist James Reason, suggests that safety failures are rarely caused by a single human error; rather, it is poorly designed systems that allow a series of small mistakes to result in a sometimes catastrophic medical error. These small mistakes are the holes in the swiss cheese and when they align, errors occur. It is the responsibility of the healthcare organization to put barriers in place to prevent the holes from aligning. Unfortunately, there can be unintended random weaknesses in these barriers that can cause the holes to align, resulting in patient harm. In the Swiss Cheese Model, each “slice” of “cheese” represents a measure taken to enhance patient safety; with each “slice,” things can still go wrong, represented by the holes in the “cheese slice.”<sup>1</sup>

The goal of patient safety work is to continue to add “slices” of safety measures to reduce the size of the “holes” in the total stack of “slices.” For this case, there are four principal levels at which additional patient safety measures, “slices,” could be added to reduce the cumulative size of the “holes” (potential for errors): 1) the nurse (who pended the wrong medication), 2) the provider (who approved the incorrectly pended medication), 3) the pharmacist (who reviewed and filled the incorrectly prescribed medication), and 4) the provider and nurse (who failed to provide adequate education to the patient about the new medication). There was not a single cause of this adverse drug event, but rather multiple failures in the system.

## **SLICE 1: The Nurse Pending the Wrong Medication**

The first failure in this case occurred when the nurse pended the wrong medication to the provider. Instead of pending the trimethobenzamide (Tigan™), she pended topiramate (Topamax™), which ultimately led to the patient’s ED visit. Trimethobenzamide is an antiemetic medication. In contrast, topiramate is an anticonvulsant medication commonly used in the treatment of seizures and migraines. There are many possible reasons (“holes”) for this pending error: the pressure on the nurse to work quickly, the numerous competing responsibilities of nurses in ambulatory care, the lack of familiarity with the patient coming in for episodic care, confusion around the medication names or indications, among others. The “pending” function in electronic health records (EHR) is intended to increase care team efficiency by allowing certain licensed team members to input orders for the provider to review and sign, rather than the provider entering every order themselves. However, it is not a workflow free from errors; medication errors and adverse drug events still occur. Some studies have even found that computerized provider order entries have not reduced these kinds of errors.<sup>2</sup>

Prescribing errors continue to be a major patient safety issue, and their causes are multifaceted. Both the World Health Organization (WHO) and the [Joint Commission](#) have indicated that reducing medication errors/adverse drug events and improving medication safety are among their major goals.<sup>3</sup> In particular, [Look-Alike Sound-Alike](#) (LASA) drugs represent one of the most common causes of medication errors worldwide.<sup>3</sup> In the case described above, one possible reason the nurse pended the wrong medication is

the similarity in the names of the two medications: trimethobenzamide (Tigan) and topiramate (Topamax).?

Multiple interventions have been developed to prevent mistakes caused by LASA drugs. Because of confusion resulting from the use of both generic and brand names for medications, it has become a suggested standard of care to include both types of names on the electronic prescription order and all medication labels.<sup>3</sup> Having both names present allows for easier identification of correct and incorrect medications. Trimethobenzamide hydrochloride, the generic name for Tigan™, sounds and looks more different than topiramate, or its brand name, Topamax™, than does trimethobenzamide alone.

Changes to EHR systems have also made strides in reducing LASA drug-associated errors. Many EHR systems integrate “tall man” lettering into the way LASA drugs appear to emphasize name differences.<sup>3</sup> For example, trazodone and tramadol would appear as “traZODone” and “traMADol”. This aids members of the healthcare team in being sure they are talking about the same drug. Some EHRs have also taken the step of requiring an indication or active diagnosis for each drug when placing medication orders.<sup>3,4</sup> For the trimethobenzamide, the indication for ordering this medication could have been “post-operative nausea and vomiting.” Including the indication in the order forces nurses and other healthcare team members to check that the medication being ordered matches the indication provided. The inclusion of such an indication in this case may have made the nurse recheck the order, as topiramate is not used for postoperative nausea and vomiting. These changes in EHR design help shrink the error “holes” in the safety measure “slices” described in the Swiss Cheese Model, and thus reduce the chances of similar adverse drug events occurring when utilizing a nurse to pend orders for providers.

## **SLICE 2: The Provider Approving the Incorrectly Pended Medication**

The second failure in this case was the provider approving the incorrectly pended medication. The provider approving topiramate rather than trimethobenzamide is an individual level error, which occurred in the midst of system errors. In primary care and acute care settings, there are so many distractions that it is critical to focus on one task at a time. Refocusing on the basics, like utilizing the systematic approach of the eight rights of medication administration,<sup>5</sup> i.e. identifying the right medication, indication, and patient, could have reduced the likelihood of this error occurring. The provider bypassed multiple opportunities to prevent the wrong medication being prescribed, which led to an adverse drug event.

At the individual level, the provider could have reviewed the medication, its indication, and verified that the patient had an active diagnosis that matches this treatment plan.<sup>3,4</sup> A quick glance at the chart would reveal no history of seizures or migraine headaches, alerting the ordering provider to question the pended order. Reviewing the written indication of ‘post-operative nausea and vomiting’ would also have raised a red flag for the provider as topiramate is not indicated for post-operative nausea and vomiting. Finally, the provider should have verified the medication selection with the nurse who pended the original order, closing the loop of their communication regarding the prescription. Taking these individual actions?would have helped prevent this adverse drug event.?

System-level approaches are also necessary to reduce LASA drug-associated errors. Medication formularies and prescription patterns vary from facility to facility, which leads to variation in the LASA drugs likely to cause errors in an individual facility’s system.<sup>6</sup> As such, the Joint Commission recommends healthcare organizations not only create a list of LASA drugs for their facilities, but also that they update the

list annually depending on the error patterns in their health system and changes to their formulary.<sup>6</sup>

Another systems-level safeguard that could be put in place to help prevent providers from signing off on incorrectly pended medications is a “break-the-glass” type of alert, embedded in the EHR, that requires the provider to verify they are ordering the drug they are intending to order and not similar LASA medications. Additionally, healthcare organizations should provide LASA drug education for all team members involved with administration or prescription of medications, and that education should include review of where to find the facility’s LASA drug list.<sup>3</sup> These safeguards would have provided the nurse and provider in this case with extra support to ensure the correct medication had been pended and signed off on.

### **SLICE 3: The Pharmacist Reviewing and Filling the Incorrectly Prescribed Medication**

The third category of “Swiss cheese hole” in this case involved in the next step of the workflow: the pharmacy. Although the pharmacist dispensed the prescription as it was prescribed, it was the incorrect prescription for the patient and therefore an error. In analyzing how this error occurred, there were three missed opportunities for intervention: 1) critical analysis of the prescription itself, 2) communication between the prescriber and the pharmacist, and 3) the pharmacist-patient consultation.

Critical analysis of the prescription itself is the first opportunity a pharmacy team has to catch prescribing errors. As the technician and pharmacist review the prescription during data entry, they can check the prescription for the right patient, the right drug, the right dose, the right quantity and right indication. The basics of prescribing the drugs pertinent to this case should have tipped off the pharmacist. When using trimethobenzamide hydrochloride (Tigan™) for postoperative nausea and vomiting, it is typically dosed at 300 mg orally every six to eight hours as needed,<sup>7</sup> whereas topiramate (Topamax™) is dosed very differently. When used for its intended indications (seizures, migraines, etc.), topiramate is started at a dose of 25 to 50 mg per day and then increased gradually to reach the desired effect, with a maximum dose of 400 mg per day.<sup>8</sup> Using their critical thinking skills and pharmacotherapy knowledge, the pharmacist could have raised questions about this patient’s new prescription, asking why the patient was not only starting at 300 mg of topiramate, but also being instructed to take it every 6 hours as needed for nausea.

When a prescription contains errors, the pharmacist is obligated to use their professional judgment and carry out due diligence to ensure patient safety. When a pharmacist needs clarification on a prescription, it’s common practice that they contact the prescriber prior to dispensing the medication. Unfortunately, the pharmacist in this case did not recognize the need to contact the prescriber for clarification on the drug, directions or indication as prescribed, therefore failed to contact the prescriber, and thus missed those two opportunities to catch the error.

The pharmacist-patient consultation, the pharmacist’s third chance to catch the error in this case, was also a missed opportunity. The pharmacist did not adequately or effectively utilize the pharmacist-patient consultation to learn from the patient that they did not suffer from seizures or migraines and that they thought they were getting a medication for nausea. This consultation time, though vital to patient safety, often presents a challenge at dispensing pharmacies for multiple reasons. Pharmacists in these settings often have a high volume of work, requiring multitasking and speed. They must balance the patient’s need

for consultation, ensuring patient safety, and the patient's desire for prompt service. One approach would have been to ask open-ended questions, utilize the teach-back method or 'repeat what you have learned to your healthcare provider,' to assess both the patient's understanding of the medication and its purpose (See [Table 1](#)). By doing this step, and using this tool, the pharmacist-patient consultation can be more effective and make it more likely for an error to be identified.

It is also uncommon for a dispensing pharmacy to have access to a patient's medical records, making it difficult for a pharmacist to determine the reason for and appropriateness of a prescription. Lack of access to patient information serves as another source of error, a systemic issue, and another "hole" per the Swiss Cheese Model of accident causation. Our healthcare systems could improve standards of practice in relation to sending prescription orders to pharmacies by including patient chart notes or at least pertinent medical information, such as diagnosis, weight, creatinine clearance and known medication allergies, that would enable pharmacists to thoroughly assess and verify the clinical appropriateness of the prescribed medication for the patient.

In the state of California, the pharmacist's Duty to Consult is outlined in Section 1707.2 of Article 2 of Division 17 of Title 16, California Code Regulations:<sup>9</sup>

*“(c) When oral consultation is provided, it shall include at least the following:*

- 1. Directions for use and storage and the importance of compliance with directions; and*
- 2. Precautions and relevant warnings, including common severe side or adverse effects or interactions that may be encountered.*

*(d) Whenever a pharmacist deems it warranted in the exercise of his or her professional judgment, oral consultation shall also include:*

- 1. the name and description of the medication;*
- 2. the route of administration, dosage form, dosage, and duration of drug therapy;*
- 3. any special directions for use and storage;*
- 4. precautions for preparation and administration by the patient, including techniques for self-monitoring drug therapy;*
- 5. prescription refill information;*
- 6. therapeutic contraindications, avoidance of common severe side or adverse effects or known interactions, including serious potential interactions with known nonprescription medications and therapeutic contraindications and the action required if such side or adverse effects or interaction or therapeutic contraindications are present or occur;*
- 7. action to be taken in the event of a missed dose.”*

In addition to meeting the legal requirements of a pharmacist-patient consultation, there are several “soft” skills the pharmacist could have employed in this case to not only better meet the needs of the patient, but also to more quickly identify the potential for an adverse drug event.<sup>10</sup> Using open-ended questions during a consultation provides broader information to the pharmacist than questions with yes or no answers. Practicing active listening encourages the patient to share information with the pharmacist and express any concerns they might have more openly. The pharmacist can also become a keen observer of

body language cues to pick up any hesitation or misunderstanding the patient may have. Lastly, in formulating the most effective consultation for the patient, the pharmacist should consider assessing the patient's learning style and incorporating understanding checks through the teach-back method throughout the consultation.<sup>10</sup> Employing all of these skills would have supported a stronger therapeutic relationship between the pharmacist and the patient, and likely provided the pharmacist with more information about the patient and their pharmacotherapy needs.

#### **SLICE 4: Patient's Role as the Last Defense in Medication Safety**

But even the most experienced healthcare professionals can introduce medication errors into care, despite numerous systematic safety interventions. That's why patients, the end-users of medications, play a vital role as the last defense in preventing and reducing adverse drug events.<sup>11</sup> That being said, the onus is not on the patient to prevent mistakes; rather, patients can play an active part in enhancing patient safety when engaged and encouraged by their healthcare team to be knowledgeable about their own health and to advocate for themselves.

Patient participation in their own care has become increasingly recognized as a key component of improving patient safety. In fact, when the World Health Organization (WHO), in March 2017, launched the third [WHO Global Patient Safety Challenge: Medication Without Harm](#),<sup>12</sup> in March 2017, the "5 Moments for Medication Safety" patient engagement tool was created to support it. Healthcare providers have since been encouraged to use this tool which aims to engage patient participation, encourage curiosity, and empower patients to communicate openly with their healthcare professionals at each visit. Each "moment" represents a point in medication use when actions by the patient or caregiver can reduce the risk of harm associated with the use of medication.<sup>12</sup> These "moments" include:

1. Starting a medication;
2. Taking my medication;
3. Adding a medication;
4. Reviewing my medications;
5. Stopping my medication.<sup>12</sup>

During each patient encounter, be it with a provider, nurse or pharmacist, there is an opportunity for patient education and, as previously mentioned, there are sometimes even legal parameters that need to be met regarding patient education. However, because of the time pressures placed on most healthcare encounters, patients should be encouraged by the entire healthcare team to be active partners in their care because it makes care safer. There are numerous reports in databases of errors that were prevented by observant and informed patients, families and caregivers.<sup>11</sup> In this specific case, for example, the patient's daughter or another advocate for the patient could have been more engaged in the care being provided by being present during encounters with medical professionals when the patient was nauseated and therefore likely not as effective a self-advocate as she might have been otherwise. Strategies that patients and caregivers can take to prevent medication errors are listed in **Table 1**.

#### **Table 1: Ten Strategies Patients/Caregivers Can Take to Prevent Medication Errors**

Know the brand and generic name of the medication you are prescribed

### **Table 1: Ten Strategies Patients/Caregivers Can Take to Prevent Medication Errors**

Know the indication for which your medication is prescribed and have the prescriber include it in the directions

Know the dose and directions for the medication being prescribed

Ask your doctor, nurse, and pharmacist to educate you about your medication

Request written information about your medications

Request a translator if you speak a different language than your healthcare team

Compare the information provided by your doctor/nurse to that received by the pharmacy

Ask questions if something doesn't seem right

When picking up your prescription, tell the pharmacist why you are taking the medication and verify you are receiving a medication for that indication

Repeat what you have learned to your healthcare provider during your medication consultation session

## **Take-Home Points**

- A multifactorial approach is needed when addressing medication errors; the Swiss Cheese Model of accident causation is one aid in understanding multiple breakdowns in prescribing practices when medication errors occur.
- LASA medications are a major source of medication errors; in addition to the use of tall-man lettering for these medications, organizations should be proactive in maintaining lists of LASA medications, based on their facility's formulary, medication errors, and prescription patterns.???
- The purpose of a medication, which matches an active diagnosis or indication, should be included in its written or electronic prescription as well as on any subsequent medication labels.
- Pharmacists must exercise their professional judgment by contacting the prescriber when they identify errors in prescriptions.
- Pharmacists dispensing medication can maximize patient consultation time through the use of "soft" skills: open-ended questions, active listening, interpretation of body language, assessment of patient learning style, and teach-back methods.
- At every encounter, healthcare professionals must encourage and empower their patients to play an active role in their own healthcare.

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## References

1. Vernaz N, Simona A, Samer CF. The Swiss Cheese Prescribing Model for Precision Medicine [published online ahead of print, 2020 Jun 27].?Am J Med. 2020;S0002-9343(20)30531-3. doi:10.1016/j.amjmed.2020.06.001
2. Ciociano N, Bagnasco L. Look alike/sound alike drugs: a literature review on causes and solutions. Int J Clin Pharm. 2014;36(2)(2):233-242. doi:10.1007/s11096-013-9885-6
3. World Health Organization Collaborating Centre for Patient Safety Solutions. Look-alike, sound-alike medication names. <https://www.who.int/publications/m/item/patient-safety-solution-look-alike-sound-alike-medication-names>. Published May 2007. Accessed August 15, 2020.
4. Flynn E. A troubling amine. <https://psnet.ahrq.gov/web-mm/troubling-amine>. Published September 2006. Accessed August 15, 2020.
5. Martyn JA, Paliadelis P, Perry C. The safe administration of medication: Nursing behaviours beyond the five-rights.?Nurse education in practice. 2019 May;37:109-14.
6. The Joint Commission. Managing high-alert/hazardous and look-alike-sound-alike medications in ambulatory care settings. <https://www.jointcommission.org/en/resources/news-and-multimedia/blogs/...> Updated January 8, 2020. Accessed August 15, 2020.
7. Trimethobenzamide. In: In Depth Answers [database on the Internet]. Greenwood Village?(CO): Truven Health Analytics; 2020?[cited 2020 Aug 11]. Available from: [www.micromedexsolutions.com](http://www.micromedexsolutions.com). Subscription required to view.
8. Topiramate. In: In Depth Answers [database on the Internet]. Greenwood Village?(CO): Truven Health Analytics; 2020?[cited 2020 Aug 11]. Available from: [www.micromedexsolutions.com](http://www.micromedexsolutions.com). Subscription required to view.
9. Requirements for patient consultation, Title 16, California Code of Regulations section 1707.2. [https://www.pharmacy.ca.gov/laws\\_regs/lawbook.pdf](https://www.pharmacy.ca.gov/laws_regs/lawbook.pdf) Accessed August 11, 2020.
10. American Society of Health-System Pharmacists. ASHP guidelines on pharmacist-conducted patient education and counseling. Am J Health Syst Pharm. 1997; 54:431-4. <https://www.ashp.org/-/media/assets/policy-guidelines/docs/guidelines/pharmacist-conducted-patient-education-counseling.ashx?la=en&hash=9807B331FA0ABA85F1CBDD733A32E4CD9B263126> Reviewed 2011. Accessed August 11, 2020.

11. APhA. Patients: Last defense in preventing medication errors. ISMP Error Alert.? July 1, 2012  
<https://www.pharmacist.com/patients-last-defense-preventing-medication-...> August 11, 2020.
12. World Health Organization: Patients for Patient Safety. Published May 2017, Geneva, Switzerland:  
World Health Organization; <https://www.who.int/initiatives/patients-for-patient-safety> Accessed  
August 11, 2020.

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