Teaching Trainees to Prescribe During the Public Health Crisis of Critical Medication Shortages

Maryann Mazer-Amirshahi, PharmD, MD, MPH, PhD
Erin R. Fox, PharmD

In the article, "A Cross-Sectional Survey of Medical Trainee Experiences During Medication Shortages," by Hantel et al,[1] the authors examine the impact drug shortages have on physicians in training in a variety of specialties and care settings. Their findings reveal some disturbing trends that highlight new aspects of this public health crisis.

In their analysis, the authors found that nearly 95% of medicine, anesthesiology, and emergency medicine residents reported managing drug shortages, and over 50% managed clinically relevant shortages daily or weekly, at 2 large institutions. At the same time, only 13% of residents reported some form of training about how to manage shortages, and residents often did not discuss management decisions related to shortages with their supervising physician.

Exposure to pharmacology in medical school is somewhat limited, and it is often during residency training where physicians refine their pharmacology skills. Medication safety principals are also not always taught in medical school and residency, which are particularly vulnerable prescribing times for trainees.[2] Additionally, drug shortages have been linked to multiple different types of medication errors.[3,4] For example, substitution errors may occur when a less familiar therapeutic alternative is used. Providers often memorize specific details for medications they commonly use. When a substitute must be used due to a shortage situation, clinicians may be less familiar with the alternative medication, particularly the dosing, contraindications, administration recommendations, and monitoring parameters. This is particularly relevant in high-acuity settings, such as the intensive care unit or emergency department, where the patient may be in extremis and there is limited time to consult additional references or a pharmacist.[4] Previous studies have demonstrated that many therapeutic alternatives have also been affected by shortages, which forces clinicians to use even less familiar third- and fourth-line agents.[5] Research has suggested that there is an association between inexperience and medication errors.[2] Lack of experience on the part of trainees, inadequate training as it relates to managing shortages, and limited communication with supervising physicians have the potential to create a "perfect storm" that can compromise patient safety and produce worse patient outcomes.

The authors also highlight the great deal of variability in how hospitals manage shortages. Larger organizations may have more resources devoted to mitigating drug shortages compared to smaller organizations or single institutions. For example, larger systems, with more resources devoted to informatics, may be able to more easily implement changes to electronic health record (EHR) systems. Changes to the EHR, while time consuming, result in fewer required front-line staff interventions for drug shortages. As a result, shortages at these institutions may not significantly affect patient care. Smaller organizations or those with limited informatics resources must rely on more front-line staff interventions to manage drug shortages. Staff must rely on communication notes advising shortage management actions and remember to make manual changes.[6] These disparities can lead to significant variation in trainee experience as well as patient outcomes between institutions.

In the Hantel et al study, residents also reported a relative lack of transparency, with the majority of trainees only informing patients of clinically relevant shortages "some of the time." Emergent settings may preclude notification in all cases; however, guidelines recommend patients and family members should be notified if a shortage will delay or compromise care.[6] Drug shortages can create ethical concerns, as patients may want to know if they are receiving a second-line therapy due to a shortage. One study demonstrated that the majority of patients wanted to be informed of a drug shortage that may affect their treatment and the percentage of patients wanting to be informed increased as the adverse effects associated with alternative medications increased.[7] Failure to document and inform patients about substitution of an alternative agent, in the event of a shortage, could potentially open clinicians to liability if the patient has a poor outcome or toxicity related to a second-line agent.

DOI: http://dx.doi.org/10.4300/JGME-D-19-00966.1

The findings of the Hantel et al study provide important insights that can be used to safeguard patient care. Trainees should receive formal training in medication safety with a focus on the management of drug shortages, ideally during orientation or early in the course of their postgraduate education, as this is when most medication errors are likely to occur.[2] We recommend trainees be included on all pharmacy communications regarding shortages, including protocols for substitution and education on alternative agents. Every effort should be made to update trainees regarding shortages, because as they rotate through different sites and services, they may not be aware of current shortage trends. When possible, include trainees in shortage management teams that are working on shortage mitigation strategies and identifying alternatives. Allow trainees in relevant specialties to participate in developing shortage management plans to increase trainee awareness and management skills, as current shortages are likely to persist into practice after graduation from residency. Including trainees in planning exercises is worthwhile not only for their learning, but also because trainees are first-line prescribers in many institutions. When an alternative medication is used due to a shortage situation, particularly one the trainee is less familiar with, disclosure to the supervising physician is recommended. In addition, attending physicians should role model how to discuss drug substitutions, during times of shortage with patients, and to document the rationale for therapy substitutions in the chart. These recommendations apply not only to physicians in training, but also can be extended into nursing, physician assistant, and pharmacy programs as well.

An entire generation of providers has never practiced during a time without shortages. The fact that nearly 95% of residents reported experience managing drug shortages highlights the severity of this long-standing public health crisis. If more than 50% of residents in this study were dealing with a specific topic on a *daily* to *weekly basis*, surely this demonstrates a critical need for targeted education. Managing drug shortages requires complex problem-solving skills, often in emergent circumstances. Trainees need education on best practices to manage these situations. We must promote and improve efforts to manage shortages at local institutions and incorporate medication safety and shortage training into residency curricula. However, we should not become complacent that the presence of drug shortages is the new norm. As clinicians, we must also continue to advocate for long-term, sustainable solutions at the policy and industry levels to end the drug shortage problem.

References

1. Hantel A, Egan AM, Nguyen TT, DeMartino ES, Hlubocky F, Bastow S, et al. A cross-sectional survey of medical trainee experiences during medication shortages. *J Grad Med Educ*. 2020;12(1):38–43.
2. Wheeler JS, Duncan R, Hohmeier K. Medication errors and trainees: advice for learners and organizations. *Ann Pharmacother*. 2017;51(12):1138–1141. doi:10.1177/1060028017725092.
3. Drug shortages roundtable: minimizing the impact on patient care. *Am J Health Syst Pharm*. 2018;75(11):816–820. doi:10.2146/ajhp180048.
4. Mazer-Amirshahi M, Pourmand A, Singer S, Pines JM, van den Anker J. Critical drug shortages: implications for emergency medicine. *Acad Emerg Med*. 2014;21(6):704–711. doi:10.1111/acem.12389.
5. Mazer-Amirshahi M, Goyal M, Umar SA, Fox ER, Zocchi M, Hawley KL, et al. U.S. drug shortages for medications used in adult critical care (2001–2016). *J Crit Care*. 2017;41:283–288. doi:10.1016/j.jcrc.2017.06.005.
6. Fox ER, McLaughlin MM. ASHP guidelines on managing drug product shortages. *Am J Health Syst Pharm*. 2018;75(21):1742–1750. doi:10.2146/ajhp180441.
7. Hsia IK, Dexter F, Logyinov I, Tankosic N, Ramakrishna H, Brull SJ. Survey of the national drug shortage effect on anesthesia and patient safety: a patient perspective. *Anesth Analg*. 2015;121(2):502–506. doi:10.1213/ANE.0000000000000798.

Maryann Mazer-Amirshahi, PharmD, MD, MPH, PhD, is Associate Professor of Emergency Medicine, Georgetown University School of Medicine, and Attending Physician, Department of Emergency Medicine, MedStar Washington Hospital Center; and **Erin R. Fox, PharmD,** is Senior Director, Drug Information and Support Services, University of Utah.

Corresponding author: Maryann Mazer-Amirshahi, PharmD, MD, MPH, PhD, MedStar Washington Hospital Center, 110 Irving Street NW, Washington, DC 20010, 202.877.7385, maryannmazer@gmail.com