

## Medication Errors: Fix the Machine

Medication errors, a significant concern in the healthcare sector, are preventable events that may lead to inappropriate medication use and patient harm. These errors can occur at any stage of the medication use process, including prescribing, dispensing, administering, and monitoring. The impact of medication errors is far-reaching, affecting both patient safety and healthcare costs.

More than 7 million patients in the United States are impacted by medication errors yearly, making it a critical public health issue. These errors not only compromise the health and safety of patients but also impose a substantial economic burden on the healthcare system.

By understanding the root causes of medication errors, healthcare professionals, patients, and policymakers can work together to develop effective strategies to prevent these errors and improve patient safety.

### Causes of Medication Errors

Medication errors can stem from various sources, often involving complex factors related to the healthcare system, healthcare professionals, and patients. Understanding these causes is the first step towards developing effective strategies to prevent these errors.

1. **Incorrect Diagnosis**: Incorrect diagnosis is a common cause of medication errors. Misinterpretation of patient symptoms or a lack of comprehensive patient history can lead to a wrong diagnosis, resulting in the prescription of inappropriate medications. This underscores the importance of thorough patient evaluation and proper diagnostic procedures.
2. **Prescribing Errors**: Prescribing errors, another significant cause of medication errors, involve wrong drug selection or incorrect dosage calculation. These errors occur due to a lack of knowledge about the medication, misunderstanding of the patient's condition, or human error.
3. **Poor Drug Distribution Practices**: Poor drug distribution practices, another cause of medication errors, include inadequate storage and labeling of medications, leading to confusion and mistakes. Additionally, inefficient supply chain management often results in the use of expired or substandard drugs.
4. **Drug and Drug-Device Confusion**: Confusion between drugs with similar names or packaging can lead to medication errors. This is particularly problematic when drugs have different indications or side effects.



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Dr. Chaiken has over 25 years' experience in healthcare information technology, clinical transformation, and business intelligence. He provides thought leadership and strategic and analytics assessments in healthcare information technology, quality of care, clinical change management, and business development.

Chaiken has worked with the NIH, Tableau/Salesforce, Infor, McKesson, UK National Health Service, Boston University, and others.

## Navigating the Code

The healthcare industry, unlike many others, runs on time-tested ways to practice excellence in medicine. But does that mean adherence to practices and processes that are fifty, seventy, even a hundred years old?

Dr. Barry P. Chaiken thinks not. His 25+ years of experience as a physician and an informaticist, he believes information technology is healthcare's greatest problem-solving tool for resolving the greatest medical and business problems of the 21<sup>st</sup> century.

[Navigating the Code: How Revolutionary Transforms the Patient-Physician Journey](#)—Available on Amazon (Kindle and Audible) and at [navigatingthecode.com](http://navigatingthecode.com)

5. **System-Related Causes:** System-related causes of medication errors often involve issues with the healthcare system itself. These include inadequate training of healthcare professionals, distractors in the work environment, and convoluted processes and workflows that increase the likelihood of mistakes. Additionally, system flaws such as human factors engineering issues and impaired safety culture contribute to medication errors.
6. **Human Factors:** Human factors, such as the workload and fatigue of healthcare workers, significantly contribute to medication errors. Interruptions during the medication administration process, lack of support staff, insufficient time to counsel patients, and illegible handwriting all increase the risk of errors.
7. **Patient-Related Issues:** Finally, patient-related issues also lead to medication errors. These include needing more patient knowledge about their medication, leading to incorrect use or non-adherence to the medication regimen. This highlights the importance of patient education and communication in preventing medication errors.

In the following sections, we will explore the role of health information technology (Health IT) in medication errors and discuss some of the efforts underway to reduce these errors.

## Role of Health IT in Medication Errors

Health IT plays a crucial role in the healthcare system, particularly with medication errors. The integration of technology in healthcare has the potential to significantly reduce the occurrence of these errors, improve patient safety, and enhance the overall quality of care.

### Impact of Electronic Health Records on Medication Errors

Electronic Health Records (EHRs) have transformed how patient information is stored and accessed, reducing medication errors. EHRs provide a centralized digital record of a patient's medical history, including medication information. EHRs allow healthcare providers to access up-to-date, comprehensive patient information, reducing the likelihood of errors due to incomplete patient history or lost paperwork. EHRs also often include features such as automated alerts for potential drug interactions or allergies, further helping to prevent medication errors.

### The Role of Artificial Intelligence in EHR Systems

Integrating artificial intelligence (AI) into EHR systems represents a significant advancement in healthcare technology. AI algorithms can analyze vast amounts of data to identify patterns and make predictions, potentially identifying risks and preventing medication errors before they occur.

For instance, AI can help detect potential prescribing errors or predict adverse drug reactions based on a patient's medical history and

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current medications. The Office of the National Coordinator for Health Information Technology (ONC) is working on a regulatory framework to ensure AI's safe and effective use in EHR systems.

### **Use of Fast Healthcare Interoperability Resources (FHIR) to Improve Data Collection and Care Decisions**

Fast Healthcare Interoperability Resources (FHIR) is a standard for exchanging healthcare information electronically. It has been leveraged in projects funded by the ONC's Leading Edge Acceleration Projects (LEAP) to simplify populating clinical registries. By improving the ease and accuracy of data collection, FHIR can help healthcare providers make better-informed care decisions, reducing the likelihood of medication errors.

While Health IT holds great promise for reducing medication errors, it's important to remember that technology alone is not a panacea. Successful implementation requires careful planning, ongoing training, and a culture of safety that encourages the reporting and analyzing of errors to improve patient care continuously.

### **Efforts to Reduce Medication Errors**

Reducing medication errors requires a multifaceted approach involving changes at the system level, improvements in healthcare practices, and increased patient education. Several organizations are at the forefront of these efforts, implementing initiatives and regulations to minimize medication errors.

### **Initiatives by the Institute for Safe Medication Practices**

The Institute for Safe Medication Practices (ISMP) is a leader in medication error prevention. One of their key initiatives is the development of an online Foundations in Medication Safety program. This program offers a standardized, cost-effective way to educate all staff about the risks associated with medication use and strategies to prevent errors. The program includes separate modules for acute care and community settings, ensuring the training is relevant and applicable to the healthcare environment.

### **Regulations and Programs by the FDA**

The U.S. Food and Drug Administration (FDA) is crucial in reducing medication errors through its regulatory powers. The FDA oversees the safety of drugs and medical devices, including their labeling and packaging, to minimize confusion and prevent errors. The FDA also works closely with manufacturers to avoid or reduce the impact of drug shortages, which can contribute to medication errors. Additionally, the FDA provides resources and information to healthcare providers and patients to promote safe medication use.

### **Projects and Initiatives by the Office of the National Coordinator for Health Information Technology**

The ONC is fostering the use of technology to reduce medication errors. One of their key initiatives is the development of a "nutrition

## What is Hallucination in AI?

Hallucination in AI refers to the generation of outputs that may sound plausible but are either factually incorrect or unrelated to the given context. These outputs often emerge from the AI model's inherent biases, lack of real-world understanding, or training data limitations. In other words, the AI system "hallucinates" information that it has not been explicitly trained on, leading to unreliable or misleading responses.

Source: <https://bernardmarr.com/chatgpt-what-are-hallucinations-and-why-are-they-a-problem-for-ai-systems/>

label" for artificial intelligence use in EHRs. This label will provide clear, standardized information about the AI algorithms employed in these systems, helping to ensure their safe and effective use.

The ONC also supports projects that use Fast Healthcare Interoperability Resources (FHIR) to improve data collection and care decisions, further helping prevent medication errors.

These efforts represent important steps toward reducing medication errors. However, ongoing vigilance and continuous improvement are necessary to ensure patient safety.

## Conclusion

Medication errors represent a significant challenge in the healthcare system, impacting patient safety and healthcare costs. These errors stem from various causes, including incorrect diagnoses, prescribing errors, poor drug distribution practices, confusion between similar drugs or devices, system-related issues, human factors, and patient-related issues.

Health IT, particularly EHRs, AI, and FHIR, is crucial in reducing medication errors. These technologies provide healthcare professionals the tools to access comprehensive patient information, identify potential risks, and make informed care decisions.

Efforts by organizations such as the ISMP, the FDA, and ONC are instrumental in reducing medication errors. These organizations implement initiatives and regulations that promote safe medication practices, improve healthcare systems, and leverage technology to prevent errors.

However, reducing medication errors is a shared responsibility. Healthcare professionals, patients, and policymakers must work together to create a safety culture, promote education and training, and continuously improve healthcare practices. By understanding the causes of medication errors and implementing effective strategies to prevent them, we can significantly improve patient safety and the quality of care in our healthcare system.

## References

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3. MacDowell P, et. Al. Medication Administration Errors, PSNet, AHRQ. <https://psnet.ahrq.gov/primer/medication-administration-errors>
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## Hallucinations

1. ISMP's new online Foundations in Medication Safety program offers organizations a standardized, cost-effective way to give all staff the knowledge they need to avoid risks and prevent errors - Institute For Safe Medication Practices
2. FDA works closely with manufacturers to prevent or reduce the impact of drug shortages - U.S. Food and Drug Administration
3. The Office of the National Coordinator in 2020 finalized long-awaited regulations requiring providers, health information exchanges and health IT developers certified by ONC to share data with patients and with each other. The rules resulted in more hospitals electronically sharing health information - HealthIT.gov
4. The Office of the National Coordinator for Health Information Technology is leveraging its regulatory powers to mandate a "nutrition label" for artificial intelligence use in the electronic health record systems it vets - HealthIT.gov
5. A project funded by ONC's Leading Edge Acceleration Projects (LEAP) leveraged Fast Healthcare Interoperability Resources (FHIR) to simplify the historically complicated task of populating clinical registries and use the data to improve care decisions. - HealthIT.gov

*[Author Note:](#) I wrote this article using ChatGPT (4.0). By requesting several "regenerations" of the responses, I constructed a more informative article from pieces of each version. This is the finished document.*