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E-Prescribing: Benefits and Challenges in Enhancing Patient Safety

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Abstract

As technology is becoming ever more prevalent in the delivery of health care, implementation of electronic prescribing (e-prescribing) has proven to be beneficial in many aspects. However, new challenges have arisen which may be problematic for pharmacy workflow and patient safety. Pharmacists must recognize potential medical errors due to e-prescribing and take the lead on identifying and preventing such errors to enhance patient safety.

Introduction

According to The Institute of Medicine (IOM) report "To Err is Human," at least 44,000 people and as many as 98,000 people die in hospitals each year due to medical errors which could have been prevented.[1] In "To Err is Human," medical errors are defined as "the failure of a planned action to be completed as intended, or the use of a wrong plan to achieve an aim."[1] Adverse drug reactions (ADRs), which can be caused by medical errors, are defined by the World Health Organization (WHO) as "harmful, unintended reactions to medicines that occur at doses normally used for treatment." According to the WHO, "ADRs are among the leading causes of death in many countries."[2] Prevention of these events is critical for patient safety. In addition, prevention could save billions of dollars for the health care system. Total costs from medical errors have been estimated between 17 and 29 billion dollars each year.[1] There are many strategies for improvement and it will take time and effort to see a change in rates of medical errors in our current health care system.

An area emerging as a strategy to decrease medication errors and improve continuity of care is health information technology (HIT). The U.S. Department of Health and Human Resources defines HIT as "the use and exchange of health information in an electronic environment."[3] The use of HIT allows information to be accessed quickly and to be shared in order to enhance patient care.[4] Integrated HIT can allow health care providers to improve the completeness of patient information as well as better coordinate care. "Facilitating the meaningful use of HIT and exchange of health information among health care and public health professionals" are among the goals of Healthy People 2020, an initiative designed to improve the nation's health.[5] HIT can positively impact patient health and the U.S. health care system in many ways, one of which includes decreasing medical errors. One component of HIT that may reduce medical errors is the use of electronic prescribing (e-prescribing).

E-prescriptions are prescriptions created by a health care provider that are sent electronically through a private, secure and closed network to a pharmacy.[6] Since the prescription is sent directly from the physician to the pharmacy electronically, it is thought that this will decrease the amount of errors that arise from handling the prescription. To make this process as secure as possible, the equipment used for e-prescribing must be certified to perform these tasks of proper transmission. E-prescribing is seen as a great opportunity to improve the health system and incentives are being given to physicians to help transition to a more uniform health care system.[7] Adoption of the e-prescribing system has grown rapidly over the past few years. The National Progress Report on E-prescribing and Interoperable Healthcare found that in 2004, only 0.4 percent of office based prescribers used e-prescribing, but by 2007, e-prescribing became legal in all 50 states.[8] In that same year, the National E-Prescribing Safety Initiative was launched to help prescribers use e-prescribing properly to avoid medication errors.[8] The progress report also found that prescriptions routed electronically grew 72 percent from 191 million in 2009 to 326 million in 2010.[8] Although these numbers are impressive and e-prescribing may help decrease errors, more needs to be done to assess its efficacy. While HIT can lead to better patient safety, it can also introduce new risks.[9] Gaps in implementation make it hard to examine its beneficial impact.[9]

Documented Benefits and Challenges With E-prescribing

E-prescribing streamlines daily pharmacy practice and prescriber/pharmacy interaction in a technologically advanced society. The director of the Agency of Healthcare Research and Quality, Carolyn Clancy, MD, has said "the handoff of prescription data is at the heart of e-prescribing's potential to save time and advance patient safety."[10]

E-prescribing systems have been shown to be a key resource in recognizing and decreasing the number of prescription errors.[11,12] This mode of prescribing eliminates the need for handwriting interpretation, mitigating pharmacists' need for clarification.[11,12] E-prescribing may also decrease errors by providing decision support for the clinician.[11] Prescribers save time when using e-prescribing, especially for renewal prescriptions.[12] Electronic transmission also simplifies workflow for pharmacy staff by reduction in manual entry and minimization of interruptions such as phone calls and fax transmissions, further decreasing error rates.[12]

Providers and pharmacies are using electronic health records and e-prescribing for many reasons, including the reduction of medication errors. However, complications in the current system hinder some of the apparent benefits and may cause much frustration to pharmacists. Implemented applications should be reviewed and adjusted as needed.

For example, one commonly reported problem is with transmission of prescriptions; this problem is currently often reported when transmitting the prescription to a mail order pharmacy.[13] In addition, some community pharmacies have reported that the patient may arrive before the prescription has actually been received or processed. Pharmacies have also stated that electronic renewals were not as easy to integrate into the system as new prescriptions.[12] Another current issue with e-prescribing software programs is "over-specification" where prescribers must select certain attributes such as quantities or dosage forms; this is a challenge for certain medications such as prepackaged or multi-use medications.[12] Also, e-prescribing systems require periodic maintenance and crashes are seen as common occurrences.[13]

Some studies have found the rate of errors with e-prescribing to be comparable to those of written prescriptions.[14] One study found that omission of key information was the most common error. This includes proper doses or how long/how many times a day a medication should be taken. Improper abbreviations, conflicting information about how or when to take the drug and clinical errors in the choice or use of the treatment were also errors found.[14] Some of the errors documented are unique to e-prescribing. Computer-related errors can include inadvertent ordering of duplicate medications; selecting an unintended medication from a drop-down menu; and errors in keypad entry/typographical errors.[15] Errors can be also be generated by fragmentation of information between multiple computer screens, lack of integrated computer systems and implementation of processes that do not correspond to workflow.[13]

The Pharmacist's Role in E-prescribing

The increased use of e-prescribing has facilitated some changes in the profession of pharmacy and there are more to come. There have been new types of medication errors introduced by e-prescribing and pharmacists need to be aware of these new types of errors so they can adequately minimize or prevent these errors from reaching the patient. It is imperative that pharmacists work together and with other health care providers to reduce medication errors due to e-prescribing.

The IOM report, "To Err Is Human," listed four approaches to improve safety and reduce medical errors (Table 1).[1] Although this report is over 10 years old, the goals outlined by the IOM are still relevant to the present situation regarding e-prescribing. For example, having a reporting system in place for pharmacists to report medication errors due to e-prescribing could be beneficial by allowing the collection of more data regarding the rate of errors in e-prescribing. Furthermore, raising "performance standards and expectations for improvements in safety" for both prescribers and pharmacists regarding e-prescribing could lead to a reduction in errors that reach the patient.[1]

Part of the appeal of e-prescribing is that these systems are supposed to reduce medication errors, however, in a survey done by the Michigan Pharmacists Association, it was found that 40.3 percent of pharmacists responding indicated that e-prescribing had created more errors versus 10.4 percent of pharmacists reporting that e-prescribing had created fewer errors.[16] E-prescribing has the potential to reduce medication errors with improvements from both prescribers and pharmacists and there are actions that pharmacists can take to improve e-prescribing.

According to a statement from the National Community Pharmacists Association (NCPA) regarding e-prescribing, the presence of a learning curve exists for prescribers as they adjust from hand-written prescriptions to electronic prescriptions.[17] This presents an opportunity for pharmacists to improve the use of e-prescribing by providing education to various prescribers and their staff. Pharmacists have the chance to inform prescribers of the new classes of medication errors associated with e-prescribing and show them how reducing these types of medication errors during e-prescribing can benefit the prescriber and their staff. For example, if the prescriber reduces the transmission of incorrect electronic prescriptions then pharmacists will be calling the office less to clarify and correct the errors, which will result in fewer interruptions for the prescriber and staff and more productivity on their end. The pharmacist can even suggest methods to reduce errors if he or she has a good relationship with the prescriber and feels comfortable doing so. Some suggestions include, but are not limited to, having the prescriber visually verify the electronic prescription (especially if generated by an agent of the prescriber) before it is sent and instituting a double-check of information entered into the electronic prescription with information in the

Table 1. The Four-Tiered Approach to Improving Patient Safety[1]

1. Establishing a national focus to create leadership, research, tools and protocols to enhance the knowledge base about safety.
2. Identifying and learning from errors by developing a nationwide public mandatory reporting system and by encouraging health care organizations and practitioners to develop and participate in voluntary reporting systems.
3. Raising performance standards and expectations for improvements in safety through the actions of oversight organizations, professional groups and group purchasers of health care.
4. Implementing safety systems in health care organizations to ensure safe practices at the delivery level.

patient's medical chart before the electronic prescription is sent.

Another way that pharmacists can help to minimize or prevent medication errors associated with e-prescribing is to simply be aware of these new types of errors and their prevalence to improve their diligence. A survey done by the Michigan Pharmacists Association shows medication errors that are seen "sometimes" and "frequently" on electronic prescriptions, rather than "rarely" or "never" (Table 2).[16] Some of these types of medication errors sent by e-prescribing will be apparent and easily recognizable, while others may be harder for the pharmacist to catch. Hence, increased diligence from the pharmacist regarding electronic prescriptions and extra review by the pharmacist of all the electronic prescriptions received is needed. For example, a prescriber sends over an electronic prescription for a patient and has selected the extended-release version of a drug, while the patient was previously on the immediate-release version of that same drug. The prescriber has written for an acceptable dose of the extended release version and there is no other information on the prescription to indicate that an error has been made. However, the prescriber never intended to switch the patient to the extended-release drug, but the wrong drug was chosen during the e-prescribing process. So how can the pharmacist prevent this error from reaching the patient? If the pharmacist is more aware that these types of errors can occur with e-prescribing and is diligent while verifying prescriptions, the pharmacist will realize there is the possibility of an error with this electronic prescription and can take appropriate action. Pharmacists can take actions to minimize medication errors similar to this scenario, along with the other new types of errors related to e-prescribing and therefore improve patient safety. For instance, the pharmacist can ask patients who have had medication or dose changes sent over electronically if they were expecting such a change or if the prescriber mentioned anything to them about a change. Pharmacists also have the option of calling the prescriber to verify that he or she did mean to select that drug or that dose of medication.

Conclusion

Overall, pharmacists play a key role in reducing medication errors associated with e-prescribing. Pharmacists, by working together and with other health care providers, can help improve e-prescribing and enhance patient safety. E-prescribing has the opportunity to decrease medication errors and streamline the prescribing and dispensing process if pharmacists and other health care providers can work together to minimize the new types of medication errors that electronic prescribing has created.

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Table 2. Survey by the Michigan Pharmacists Association Regarding e-Prescribing[16]

Question 18: *"What is/are the biggest challenge(s) regarding e-prescribing for your pharmacy today (if applicable, select more than one)."*

The option "Prescribing errors" was chosen by 81.6% of respondents.

Question 19: *"Clinically, has e-prescribing led to any types of errors?"*

76.9% of respondents answered "yes".

Question 21: A follow-up question. *"Please specify if you have seen these types of errors on e- prescriptions (please elaborate)."*

The percentage of respondents that responded "sometimes" or "frequently" (as opposed to "never" or "rarely") was as follows:

Wrong patient	19%
Wrong medication	62%
Wrong dose	69%
Wrong route	42%

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