

Patient Safety Tip of the Week

February 5, 2019

Flaws in Our Medication Safety Technologies

Over the last 2 decades we've implemented numerous technologies designed to improve medication safety. These have included barcoding, CPOE and e-prescribing, EMAR's, automated dispensing cabinets, pharmacy IT systems, and pharmacy robots. These have helped us eliminate or reduce some of the errors we previously saw with handwritten or faxed medication orders. The new technologies have undoubtedly reduced many of the errors we saw in the pre-technology era. But, at the same time, they have introduced new error types or otherwise had unintended consequences. Patient Safety Tip of the Week is now in its 13th year and in every year we've had several columns on such unintended consequences related to healthcare IT (see full list at the end of today's column).

A recent review of a database of pharmacist survey responses looked at both error prevented and errors observed in relation to e-prescribing and automated dispensing cabinets ([Shaha 2019](#)). The authors found the e-prescribing eliminated four error types but three new error types emerged (eg. duplicate prescriptions). Though e-prescribing eliminated many errors, wrong dose or wrong drug errors continued and either the prescriber or pharmacist might make wrong patient errors. Lack of required information also persisted.

Regarding automated dispensing cabinets (ADC's), they found four error types were eliminated, three new error types emerged, and three error types persisted. Labelling errors were eliminated but wrong patient errors persisted and inaccuracies continued to be seen. Loading problems accounted for a large percentage of the "emerging" errors. (Note that we just did our January 1, 2019 Patient Safety Tip of the Week "[More on Automated Dispensing Cabinet \(ADC\) Safety](#)" after seeing another incident relating to ADC's in our December 11, 2018 Patient Safety Tip of the Week "[Another NMBA Accident](#)".)

Regarding source of the errors, Shaha and colleagues found that input errors accounted for about 3% of errors but that computer errors accounted for about 10%.

Ratwani and colleagues ([Ratwani 2018](#)) recently reviewed 9000 patient safety reports on medications errors that were likely related to EHR use in children from 3 different health care institutions. 3,243 (36 percent) had a usability issue that contributed to the medication event, and 609 (18.8 percent) of the 3,243 might have resulted in patient harm. The most common usability challenges were associated with system feedback and

the visual display. The most common medication error was improper dosing. The general pattern of usability challenges and medication errors were the same across the three sites.

ISMP Canada recently did a column on electronic prescribing in primary care ([ISMP Canada 2018](#)), focusing on both the potential benefits and the unintended consequences.

One the positive side they note:

- support for better medication adherence
- potential to support the safe use of opioids and other controlled drugs
- potential to reduce communication delays
- potential for patient engagement through online patient-facing applications

But, on the negative side, they note the unintended introduction of risk:

- prescription modifications missed by the system
- loss of prescription bundling
- confusing free-text entries reduced patient engagement

They note that technology-related issues, such as automation complacency (over-reliance on technology) and incorrect selection from drop-down menus, have the potential to arise, similar to those that have been experienced with the introduction of computerized physician order entry in hospitals.

They highlight the risk that changes made in one component of the e-prescribing system may not be communicated to other components. As an example, they note the case where a prescriber makes a last-minute change to a previously transmitted e-prescription. Depending on the e-prescribing system, the revised prescription may override the initial one, or it may be necessary for the prescriber to cancel the initial prescription before transmitting the updated prescription. They note one study ([Allen 2012](#)) found 1.5% of e-prescriptions discontinued by the prescriber were dispensed, and about 12% of these improperly dispensed prescriptions were potentially harmful. (We highlighted the problem of discontinuation of medications in our March 2017 What's New in the Patient Safety World column "[Yes! Another Voice for Medication e-Discontinuation!](#)" and our Patient Safety Tips of the Week for August 28, 2018 "[Thought You Discontinued That Medication? Think Again](#)" and December 18, 2018 "[Great Recommendations for e-Prescribing](#)".)

They also note one problem we were not familiar with. With some e-prescribing systems, prescriptions for multiple patients, from various prescribers, arrive in the pharmacy sequentially in the order of prescription submission rather than being "bundled" for the individual patient. This lack of prescription bundling can create confusion for the pharmacy team and may result in patients leaving the pharmacy without receiving all their prescriptions or with prescriptions intended for another person.

Free-text fields within electronic prescriptions are another source of errors. In a US study involving review of more than 3 million prescriptions ([Dhavle 2016](#)), it was found that 15% of e-prescriptions contained free-text data. About two-thirds of these free-text entries captured unnecessary information already present in other fields of the

prescription. Notably, for 19% of the prescriptions with free-text entries, the information provided in the free-text field conflicted with directions included in the designated standard field intended for this purpose. Moreover, 9.6% were prescription cancellation requests for which a separate e-prescribing message currently exists but is not widely supported by software vendors or used by prescribers.

Lastly, the ISMP Canada column notes that e-prescribing systems often remove the patient from the process of conveying the prescription to the pharmacy, bypassing a patient's potential safety check. They note that prescribers should engage the patient in discussion at the time prescriptions are entered and provide patients with a printed summary of their prescribed medications. And better use should be made of "patient-facing applications" (e.g., patient portals) to support patient-based safety checks.

Abramson ([Abramson 2015](#)), in a literature review of errors in community pharmacies, found many new types of errors, such as provider order entry errors, transcription errors, and dispensing errors, resulting from e-prescribing.

On the **provider ordering** side she found some of the errors we've often talked about:

- Incorrect selection from drop-down menus
- Incorrect autopopulated information or information incorrectly carried over from prior prescriptions
- Incorrect information propagated from using old refill templates

While a major benefit of e-prescribing is avoidance of **transcription errors**, many times there are interface problems, connectivity problems, or incompatibilities with pharmacy software that result in the need for manual input of the e-prescription into the pharmacy system. Errors may then be made during that manual transcription into the pharmacy system.

Dispensing errors were often associated with modified prescriptions. For example, once a prescription is sent by most e-prescribing systems, it may no longer be modified so the ordering provider inputs a new prescription. This may result in dispensing of more than one prescription. And, because the orders arrive at the pharmacy without "bundling", a patient may not receive all his/her prescriptions or get someone else's prescription intermixed with his/her prescriptions. Pharmacies also might fill a prescription twice if it was sent both via e-prescribing and fax. And, as we've so often discussed, pharmacies are often not notified when a provider discontinues a prescription, resulting in continued dispensing of discontinued drugs.

Abramson found that such errors often led to work inefficiency and rework for pharmacists, delays for patients, and increased costs to the pharmacies.

All these serve as a reminder that, as we implement new technologies intended to improve patient safety, we need to remain vigilant for introduction of unintended consequences.

See some of our other Patient Safety Tip of the Week columns dealing with unintended consequences of technology and other healthcare IT issues:

- June 19, 2007 “[Unintended Consequences of Technological Solutions](#)”
- May 20, 2008 “[CPOE Unintended Consequences – Are Wrong Patient Errors More Common?](#)”
- June 17, 2008 “[Technology Workarounds Defeat Safety Intent](#)”
- August 26, 2008 “[Pattern Recognition and CPOE](#)”
- September 9, 2008 “[Less is More...and Do You Really Need that Decimal?](#)”
- December 16, 2008 “[Joint Commission Sentinel Event Alert on Hazards of Healthcare IT](#)”
- February 2009 “[Healthcare IT The Good and The Bad](#)”
- March 3, 2009 “[Overriding Alerts...Like Surfin’ the Web](#)”
- October 2009 “[A Cautious View on CPOE](#)”
- November 24, 2009 “[Another Rough Month for Healthcare IT](#)”
- April 20, 2010 “[HIT’s Limited Impact on Quality To Date](#)”
- March 22, 2011 “[An EMR Feature Detrimental to Teamwork and Patient Safety](#)”
- January 24, 2012 “[Patient Safety in Ambulatory Care](#)”
- June 26, 2012 “[Using Patient Photos to Reduce CPOE Errors](#)”
- June 2012 “[Leapfrog CPOE Simulation: Improvement But Still Shortfalls](#)”
- July 17, 2012 “[More on Wrong-Patient CPOE](#)”
- January 2013 “[More IT Unintended Consequences](#)”
- April 30, 2013 “[Photographic Identification to Prevent Errors](#)”
- October 8, 2013 “[EMR Problems in the ED](#)”
- March 11, 2014 “[We Miss the Graphic Flowchart!](#)”
- October 2014 “[Ebola Exposes Fundamental Flaw](#)”
- January 2015 “[Beneficial Effect of EMR on Patient Safety](#)”
- March 2015 “[CPOE Fails to Catch Prescribing Errors](#)”
- March 31, 2015 “[Clinical Decision Support for Pneumonia](#)”
- August 2015 “[Newborn Name Confusion](#)”
- December 2015 “[Opioid Alert Fatigue](#)”
- January 12, 2016 “[New Resources on Improving Safety of Healthcare IT](#)”
- January 19, 2016 “[Patient Identification in the Spotlight](#)”
- February 9, 2016 “[It was just a matter of time...](#)”
- April 5, 2016 “[Workarounds Overriding Safety](#)”
- May 2016 “[Name Confusion in the Pharmacy](#)”
- May 3, 2016 “[Clinical Decision Support Malfunction](#)”
- May 24, 2016 “[Texting Orders – Is It Really Safe?](#)”
- August 23, 2016 “[ISMP Canada: Automation Bias and Automation Complacency](#)”
- November 22, 2016 “[Leapfrog, Picklists, and Healthcare IT Vulnerabilities](#)”
- January 2017 “[Joint Commission Thinks Twice About Texting Orders](#)”
- February 28, 2017 “[The Copy and Paste ETTO](#)”
- March 2017 “[Yes! Another Voice for Medication e-Discontinuation!](#)”
- April 2017 “[How Much Time Do We Actually Spend on the EMR?](#)”

- June 27, 2017 “[Texting – We Told You So!](#)”
- August 1, 2017 “[Progress on Wrong Patient Orders](#)”
- January 2018 “[Can We Improve Barcoding?](#)”
- January 16, 2018 “[Just the Fax, Ma’am](#)”
- January 30, 2018 “[Texting Errors Revealed](#)”
- June 19, 2018 “[More EHR-Related Problems](#)”
- September 2018 “[More Clinical Decision Support Successes](#)”
- December 11, 2018 “[Another NMBA Accident](#)”
- January 1, 2019 “[More on Automated Dispensing Cabinet \(ADC\) Safety](#)”

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