

Patient Safety Tip of the Week

October 1, 2019

Electronic Medication Reconciliation:

Glass Half Full or Half Empty?

One of the most important things we do during hospital admission, discharge, or any other transition of care is medication reconciliation. But we've all learned that this is an imperfect process.

Multiple studies have demonstrated that well-done medication reconciliation reduces medication discrepancies. But does that translate to fewer adverse drug events (ADE's) or fewer hospital admissions related to medications? The data on whether these are impacted by medication reconciliation is less convincing.

A new Canadian study on electronic medication reconciliation sought to answer these questions. The RightRx study ([Tamblyn 2019](#)) was a cluster randomized trial involving patients who were discharged from 2 medical units and 2 surgical units at the McGill University Health Centre in Montreal. Clinicians and researchers used electronically retrieved community drugs from the provincial insurer and aligned them with in-hospital drugs to facilitate reconciliation and communication at care transitions.

Medication discrepancies were significantly reduced in the intervention group compared with the control group (26.4% vs 56.0%). But there was no significant difference in the risk of ADE's between intervention and control groups (4.6% vs 4.0%), or ED visits (26.2% vs 26.6%), or hospital readmission (10.3% vs 14.2%), or the composite outcome (27.0% vs 27.6%) at 30 days.

The electronic system used at McGill was interesting in that drugs are grouped by pharmacologic class and displayed in order of clinical importance rather than in alphabetic order. This apparently reduces the cognitive load on the user while reconciling drugs such as aspirin, enoxaparin, and warfarin, which would usually appear in 3 separate areas.

The intervention could be used at any point in the patient's stay to reconcile medications at admission, transfer, and discharge. It consisted of 3 components. First, at admission,

the community drug list was electronically retrieved from the provincial health insurer (a prior validation study showed that that insurer's prescription claims achieve an accuracy of 100% for the drug dispensed and 98.5% for the date of dispensing). They included all drugs dispensed in the last 3 months to prepopulate the community drug list (to allow for nonadherence). The treatment teams then validated the list with the patient and added any medications not listed as well as notes about adherence. Second, all hospital drugs were retrieved from the hospital's drug information system and then aligned with community medications by generic molecule, dosage, and route of administration. Third, the discharge prescription, including the changes made to community medications and the reasons for the changes, were faxed to each physician and pharmacy involved in the patient's community-based care.

The authors conclude that their results do not provide empirical support for hospital accreditation requirements that are based on the contention that medication reconciliation will reduce discrepancies that lead to ADEs, ED visits, hospital readmission, or death after discharge.

This study result comes on the heels of the MARQUIS study ([Schnipper 2018](#)), which demonstrated that mentored implementation of a multifaceted medication reconciliation QI initiative was associated with a reduction in total medication discrepancies, but not potentially harmful medication discrepancies. In that study, done at 5 US hospitals, the intervention consisted of local implementation of medication reconciliation best practices, utilizing an evidence-based toolkit with 11 intervention components.

Overall, potentially harmful discrepancies did not decrease over time beyond baseline temporal trends, adjusted incidence rate ratio (IRR) 0.97 per month. The intervention was associated with a reduction in total medication discrepancies (IRR 0.92 per month). Of the four sites that implemented interventions, three had reductions in potentially harmful discrepancies. The fourth site, which implemented interventions and installed a new electronic health record (EHR), saw an increase in discrepancies, as did the fifth site, which did not implement any interventions but also installed a new EHR.

The good news is that those sites which seemed to implement the most components of the toolkit did see reductions in potentially harmful discrepancies. The authors attributed those potentially beneficial effects to a combination of the evidence-based components of the toolkit and the mentored implementation approach,

They also questioned the confounding role of the EHR implementation at those sites where there was no reduction and, in fact, an increase in potentially harmful discrepancies. They were quite surprised by the magnitude of the increases seen at those sites, each of which used a different EHR vendor.

The authors are concerned with the amount of resources required for good medication reconciliation. Their previous work had shown that taking a BPMH (best possible medication history) is time consuming, taking approximately 21 min per patient. They suggest that optimal implementation would require hiring additional staff or reallocating

staff from other tasks, but that those costs could be more than offset if the results lead to fewer inpatient ADEs and/or fewer readmissions.

You'll probably want to take a look at the MARQUIS toolkit ([Mueller 2013](#)) or the comparable MATCH toolkit ([Gleason 2010](#)). Both have multiple evidence-based components that you may want to incorporate into your own medication reconciliation practices.

We're actually quite surprised at the accuracy of the processes and lists in the RightRx trial. When we did our first electronic medical record implementation in 2007, we were very optimistic that an electronic medication reconciliation program would be easy to accomplish and reliable. Boy, did we get some surprises! We thought that use of electronically downloaded medication lists from sources such as third-party payors, PBM's, RHIO's and other sources could supplement the data from our own hospital pharmacy and the EHR used by our affiliated physicians.

But the potential for unintended consequences became apparent early on (see our December 30, 2008 "[Unintended Consequences: Is Medication Reconciliation Next?](#)"). Those electronically downloaded lists may include drugs that a patient is not or never has been taking. Such medications can get on those lists for several reasons. In some cases, fraudulent activity is involved (eg. the medication is for a friend or relative) or there is medical identity theft involved. In most cases, though, it is simply due to honest mistakes taking place in the billing process. Remember, those lists are largely generated for the purpose of fulfilling the payment transaction between the pharmacy and the third-party payor. How many of you have ever had an item that you never purchased show up on your credit card statement? Probably most of you. Usually a harmless error that you can easily rectify via a phone call. Though we don't know the frequency of such ID errors in healthcare, your ID number at the pharmacy often differs from that of one of your family members by only one digit so we would not be surprised at all if such errors are more frequent than in the credit card industry. And if such an error leads to appearance on your best possible medication history of a drug you have never taken, that can lead to problems. Shouldn't that discrepancy be resolved when your physician goes over that list with you on admission? Certainly. But what if you are obtunded or comatose or otherwise not able to communicate on admission? You may well be started on a medication you have never taken. And you could ultimately also be discharged on that medication and have it continued indefinitely (see our August 28, 2018 "[Thought You Discontinued That Medication? Think Again](#)" and our other columns listed below on problems associated with discontinuation of medications).

In addition, lists from such sources can be misleading in terms of dosage or adherence. For example, some patients may be taking half a pill for some medications. From the downloaded lists, one might assume the patient is on the full dose and is not adherent because they only refill their prescription every 2 months (note that a good system might use artificial intelligence to flag such patterns as a patient likely taking a half dose).

Also, in our September 24, 2019 Patient Safety Tip of the Week “[EHR-related Malpractice Claims](#)” we noted the hazards of copy & paste. Copy & paste errors often led to medication errors, sometimes copying over a medication that had been discontinued since the prior note, and sometimes failing to include a medication that had been started since the prior note.

Also, from our experience with healthcare IT in general, we have learned that some of the unintended consequences may arise from excessive reliance on the computer (caregivers trust the computer to always be correct) and short cuts/workarounds may be seen (i.e. the physician under time constraints may not diligently question you about the medications on that list).

Additionally, confidentiality laws in many states often prohibit release of HIV-related medication or behavioral health medication information on such electronically downloaded lists. That may include medications whose cessation could lead to withdrawal syndromes. And other drugs, such as samples dispensed in a physician’s office, OTC drugs, or drugs administered in a physician office (such as biological agents) may or may not appear on the electronically downloaded lists. Additionally, prescription medications that a patient might pay for out of pocket rather than through their insurer may not make the list. Whether medications in many of the above categories reach the electronic list depends upon the integration of physicians’ EHR’s to the hospital EHR.

We also previously mentioned that compounded medications and topical medications are particularly prone to be absent on best possible medication histories (see our May 13, 2008 Patient Safety Tip of the Week “[Medication Reconciliation: Topical and Compounded Medications](#)”).

A recent study ([Ashfaq 2019](#)) further illustrates many of our above observations. Researchers compared documentation of medications between the structured medication list extracted from the EHR and medications written into the clinical progress note and transcribed by the study team for patients treated at an ophthalmology service for microbial keratitis. They found that 23.1% of prescribed medications differed between the progress notes and the formal EHR-based medication list. Reasons included medications not prescribed via the EHR ordering system (43.9%), outside medications not reconciled in the internal EHR medication list (40.4%), and medications prescribed via the EHR ordering system and in the formal list, but not described in the clinical note (15.8%). Fortified antimicrobials represented the largest category for medication mismatch between modalities (24.3%). Nearly one-third of patients (32.1%) had at least 1 medication mismatch in their record. Note that many medications used in this patient population may require compounding, something we discussed in that May 13, 2008 Patient Safety Tip of the Week “[Medication Reconciliation: Topical and Compounded Medications](#)”.

The bottom line is that your organization must be diligent in truly reconciling the medications that appear on electronically downloaded medication lists. Especially in those patients who are unable to participate themselves in medication reconciliation on

admission, you must have systems in place to prompt someone to repeat reconciliation once the patient has improved enough to communicate. And, of course, reconciliation via the patient's outside physicians and family become even more important in the poorly communicative patient.

We hope you'll review some of the barriers to medication reconciliation that we discussed in our September 8, 2009 Patient Safety Tip of the Week "[Barriers to Medication Reconciliation](#)" and our other columns on the topic listed below.

Medication reconciliation is an extremely important patient safety process. There has not been much written about the downside of medication reconciliation. As we better utilize technological solutions to improve the medication reconciliation process, we are also likely to encounter some unintended consequences. The electronic process may be helpful, but it cannot be accepted as complete or fully accurate. Discussing the list in detail with the patient (or his/her family or caregiver) is essential. Do it diligently...and keep your eyes and ears open!

Some of our previous columns on medication reconciliation:

October 23, 2007 "[Medication Reconciliation Tools](#)"
December 30, 2008 "[Unintended Consequences: Is Medication Reconciliation Next?](#)"
May 13, 2008 "[Medication Reconciliation: Topical and Compounded Medications](#)"
September 8, 2009 "[Barriers to Medication Reconciliation](#)"
August 2011 "[The Amazon.com Approach to Medication Reconciliation](#)"
January 2012 "[AHRQ's New Medication Reconciliation Tool Kit](#)"
September 2012 "[Good News on Medication Reconciliation](#)"

Some of our other columns on failed discontinuation of medications:

May 27, 2014 "[A Gap in ePrescribing: Stopping Medications](#)"
March 2017 "[Yes! Another Voice for Medication e-Discontinuation!](#)"
February 2018 "[10 Years on the Wrong Medication](#)"
August 28, 2018 "[Thought You Discontinued That Medication? Think Again](#)"
December 18, 2018 "[Great Recommendations for e-Prescribing](#)"
August 2019 "[Including Indications for Medications: We Are Failing](#)"
August 6, 2019 "[Repeat Adverse Drug Events](#)"

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