Medication Reconciliation

By Olavo A. Fernandes,
RPh, BScPhm, ACPR, PharmD, FCSHP

A dverse drug events and medication discrepancies continue to be a patient safety challenge for patients and healthcare professionals. Vulnerable moments, defined as points in time when a patient is at high risk for medication discrepancies, often occur at interfaces of care when a patient moves from one healthcare setting to another, such as admission and discharge from an acute care hospital or changes in setting, service, practitioner or level of care. Medication reconciliation is intended to ensure accurate and consistent communication of patients’ medication information through transitions of care. The educational training and expertise of pharmacists uniquely positions them to support patients and other healthcare professionals with medication reconciliation. This article outlines practical tips, strategies and tools for pharmacists to support medication reconciliation.

Potential impact of medication discrepancies

Mounting evidence indicates that medication discrepancies and adverse drug events at interfaces of care may pose a significant patient safety risk. In Canada, published studies have demonstrated that 40–50% of patients experience unintentional medication discrepancies upon admission to acute care hospitals and at least 40% of patients experience discrepancies at hospital discharge. Many of these medication discrepancies, if not intercepted, can be significant and lead to adverse drug events, medication errors, drug therapy problems and preventable patient harm.

Cornish et al found that 54% of patients admitted to a general medicine ward in a Canadian tertiary care teaching hospital had at least one unintended medication discrepancy between physician admission orders and a comprehensive medication history. In this study, which investigated 151 patients prescribed at least four medications, 39% of discrepancies were judged to have the potential to cause moderate to severe discomfort or clinical deterioration. According to this study, 23% of discharged patients had an adverse event within 30 days of discharge, of which 72% were adverse drug events. These patient safety studies raise serious concerns about medication information communication at transition points.

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The following actual patient scenarios are intended to promote a better understanding of the potential impact of medication discrepancies on patients:

- An elderly male’s warfarin (prescribed for stroke prophylaxis in chronic atrial fibrillation) is appropriately held prior to elective surgery. However, it is inadvertently not restarted and several months after hospital discharge he suffers a stroke.

- A female long-term care patient is admitted to hospital for the acute management of community-acquired pneumonia. Her long-standing levothyroxine is inadvertently not ordered for the duration of her hospital stay nor during her subsequent transfer back to the long-term care home. The omission of levothyroxine is not identified until she becomes symptomatic four weeks after discharge.

Other common examples of discrepancies include duplicate therapy at hospital discharge (inadvertently often resulting from substitution of a product to match what is carried within the hospital formulary or brand/generic name combinations); commission errors (where home medications that patients have discontinued are inadvertently reinitiated); and incorrect doses or dosage forms. These types of medication discrepancies can result in patient harm and appear to occur commonly in Canada and around the world.

Safe and efficient transfer of patient medication information appears to pose a significant challenge for all healthcare professionals involved in the continuum of care. Patients are constantly moving from one healthcare setting to another (Figure 1). At each healthcare setting, multiple clinicians, including physicians, pharmacists and nurses, are involved in patient medication management, which adds to the complexity, risk and exponential number of potential interfaces. To ensure patient safety and prevent adverse drug events, medication information must transfer seamlessly and accurately across these interfaces. Medication reconciliation is one proactive solution to overcoming the challenge of medication discrepancies.
### Defining medication reconciliation

Medication reconciliation is a formal process in which healthcare professionals partner with patients to ensure accurate and complete medication information transfer at interfaces of care (Figure 2). It involves a systematic process for obtaining a medication history, and then comparing that information to medication orders at transitions in order to identify and resolve discrepancies, with the purpose of preventing adverse drug events. To be effective and sustainable, this process is a shared responsibility of a team of interdisciplinary practitioners, including physicians, nurses, pharmacists, technicians and other healthcare professionals, in collaboration with patients and their caregivers.

### BPMH: the foundation of medication reconciliation

An up-to-date, accurate and complete patient medication record is essential to ensure safe prescribing in any setting. The foundation of medication reconciliation is the Best Possible Medication History (BPMH). It is obtained by a clinician (e.g., pharmacist) using various sources of information and includes a thorough history of all regular medication use (prescribed and nonprescribed). The BPMH is more comprehensive than a routine primary medication history, as it involves a systematic patient interview as well as verification of information with more than one source (e.g., contacting community pharmacies and physicians, as well as inspection of medication vials/patient medication lists, government medication databases and previous patient health records) (Figure 2). The BPMH includes the drug name, dose, frequency and route of administration for each medication a patient is currently taking, even though this may differ from what was actually prescribed.

### Medication reconciliation at discharge

Hospital discharge is another critical interface where patients are at a high risk of discrepancies. The goal at discharge is to reconcile the medications the patient was taking prior to admission (BPMH) and those initiated in hospital, with the medications they should be taking post-discharge, to ensure all changes are intentional and that discrepancies are resolved. This should result in avoidance of therapeutic duplications, omissions, unnecessary medications and confusion. The Best Possible Medication Discharge Plan (BPMDP) is the most appropriate and accurate list of medications the patient should be taking after discharge. It should account for a number of factors, including new medications started in hospital or upon discharge, discontinued medications, adjusted medications, unchanged home medications to be continued, medications put “on hold” while the patient was in hospital, formulary adjust-

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**FIGURE 3 EXAMPLE OF A PRESCRIPTION ILLUSTRATING THE BEST POSSIBLE MEDICATION DISCHARGE PLAN**

<table>
<thead>
<tr>
<th>Medication</th>
<th>Dose</th>
<th>Route</th>
<th>Frequency</th>
<th>Qty</th>
<th>Rpts</th>
<th>LU Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Ferrous Glucronate</td>
<td>300mg</td>
<td>PO</td>
<td>TID</td>
<td>90</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>2 Omeprazole</td>
<td>40mg</td>
<td>PO</td>
<td>Daily</td>
<td>30</td>
<td>1</td>
<td>295</td>
</tr>
<tr>
<td>3 Ciprifloxacin</td>
<td>500mg</td>
<td>PO</td>
<td>BID</td>
<td>14</td>
<td>0</td>
<td>336</td>
</tr>
</tbody>
</table>

**Summary of Medication Allergies:**

Pencillin - Hives

**Summary of Medication Changes Since Admission:**

**New Medications:**

- Atorvastatin increased to 40mg PO QHS
- Calcium carbonate increased to 1000mg elemental calcium PO TID with meals
- Metoprolol increased to 50mg PO BID

**Discontinued Medications:**

- Aspirin 81mg PO dly
- Metoloxan 7.5mg PO dly

**Adjustement Medications:**

- Diphenhydramine 50mg PO BID
- Isoniazid 300mg PO QHS
- Ibuprofen 600mg PO QHS
- warfarin 5mg PO QHS

**Unchanged Medications to be Continued:**

- Calcium 0.25mg PO dly
- Darbepoetin 60mg SC QfFriday
- Docetaxel sodium 100mg PO BID
- Ramipril 5mg PO Qd
- Acetaminophen 325—650mg PO q4h PRN

**Additional Comments:**

E.G. Section 8 filled for XXXX drug

The pharmacist clarifies with the prescriber, it is evident the omission was inadvertent. In order to determine whether an unintentional discrepancy has occurred, any inconsistencies in the BPMH information should be verified with the prescriber and resolved. Similar reconciliation processes should occur at internal transfer between hospital units and levels of care.
Medication reconciliation in the community

In contrast to the acute care setting, the community setting can be heterogeneous and medication management can involve a variety of distinct environments, including the patient's home, homecare services and diverse long-term care environments. Patient medication management may vary, ranging from patient self-administration to nurse administration of medications. Patients may also move between these environments, regularly visit ambulatory clinics or have frequent acute care admissions (Figure 6).

Two distinct types of interfaces of care for medication reconciliation occur in the community: major healthcare setting interface transitions (vulnerable moments e.g., discharge from an acute care hospital to home) and more minor interface transitions (risk points e.g., medication changes upon visit to a primary care physician, cardiologist or an oncology ambulatory clinic). Patients often have multiple independent prescribers influencing their medication management, including primary care physicians, many medical specialists and dentists. Consequently, a patient's medication regimen in the community can be constantly changing without one distinct healthcare provider overseeing and supporting the patient through these processes. For example, patients living at home may visit their primary care physician for blood pressure medications, their oncologist for cancer treatment and their cardiologist for cardiac medications. Every healthcare visit is a potential risk point for medication discrepancies.

Varkey et al conducted a study of medication reconciliation in a primary care clinic; 98% of visits to the clinic were associated with some discrepancy between the medications a patient was currently taking and the medication list available on the clinic medication record. A structured medication reconciliation process in the community (Figure 7) may help clinicians prevent medication discrepancies and patients safely navigate changes to their medication regimen.
feature

OVERCOMING CHALLENGES AND BARRIERS

Communication barriers during patient interviews (e.g., non-English speaking patients, cognitive impairment, level of consciousness issues) can sometimes be overcome by involving interpretation professionals, family members or other clinical staff who can serve as interpreters or facilitators.

Another challenge is that patients often have variable perceptions of what constitutes a “medication,” and therefore may not volunteer information on all medications unless prompted. A systematic review by Tam et al identified omission of medications as the most common type of medication history discrepancy.\(^\text{11}\) Specific prompt questions about nonprescription categories (including over-the-counter drugs, vitamins, supplements, herbal products and alternative remedies) and unique dosage forms (e.g., eye drops, inhalers, patches, injections, sprays, physician samples) are key to overcoming this challenge. Moreover, proactively explaining to patients the purpose, value and importance of obtaining an accurate medication history will often engage them to actively participate.

Commission errors (i.e., assuming patients are taking medications that they are not) are the second most common type of medication history discrepancy.\(^\text{11}\) These often occur when clinicians inappropriately assume patients are taking medications according to prescription vial labels. When inspecting medication vials, pharmacists should inquire about recent changes from vial directions (i.e., dose changes, stopped medications initiated by either the patient or the physician). In addition, pharmacists should inquire about why patients may be taking medication differently from directions (e.g., concerns about side effects, allergic reactions or lack of efficacy). It is also important to verify whether vials contain medications other than those on the label (patients at times rearrange medications from formats originally dispensed).

FIGURE 7

PROCESS FOR MEDICATION RECONCILIATION IN THE COMMUNITY

Creating the most “up to date” medication record (best possible medication history)

Adapted from references 8 and 9.

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FIGURE 5

PATIENT MEDICATION SCHEDULE ILLUSTRATING THE BEST POSSIBLE MEDICATION DISCHARGE PLAN

<table>
<thead>
<tr>
<th>Name: xxx</th>
<th>Date: xxx</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Documented Allergies:</strong> Penicillin, Codeine</td>
<td></td>
</tr>
<tr>
<td>My family physician is __________________________ phone __________________ __________</td>
<td></td>
</tr>
</tbody>
</table>

### Morning

<table>
<thead>
<tr>
<th>Medication</th>
<th>Comments</th>
<th>Directions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calcium Carbonate 500mg tablet</td>
<td>Phosphate binder Take with food</td>
<td>Take 1 tablet</td>
</tr>
<tr>
<td>Metoprolol 50mg tablet</td>
<td>For blood pressure</td>
<td>Take 2 tablets</td>
</tr>
</tbody>
</table>

### Noon

<table>
<thead>
<tr>
<th>Medication</th>
<th>Comments</th>
<th>Directions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calcium Carbonate 500mg tablet</td>
<td>Phosphate binder Take with food</td>
<td>Take 1 tablet</td>
</tr>
</tbody>
</table>

### Supper

<table>
<thead>
<tr>
<th>Medication</th>
<th>Comments</th>
<th>Directions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calcium Carbonate 500mg tablet</td>
<td>Phosphate binder Take with food</td>
<td>Take 1 tablet</td>
</tr>
<tr>
<td>Metoprolol 50mg tablet</td>
<td>For blood pressure</td>
<td>Take 2 tablets</td>
</tr>
</tbody>
</table>

### Bedtime

<table>
<thead>
<tr>
<th>Medication</th>
<th>Comments</th>
<th>Directions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Atorvastatin 20mg tablet (LIPITOR)</td>
<td>Take at night (bedtime)</td>
<td>Take 1 Tablet</td>
</tr>
</tbody>
</table>

### As needed

<table>
<thead>
<tr>
<th>Medication</th>
<th>Comments</th>
<th>Directions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ibuprofen 200mg tablet (ADVIL)</td>
<td>Take as needed for pain only</td>
<td>Take 1 tablet as needed</td>
</tr>
</tbody>
</table>

* If discrepancies occur between this list and your prescriptions, please follow the instructions on your medication vials unless your physician has indicated otherwise *

Prepared by __________________, Pharmacist, _________________ Hospital

Phone:__________ Pager:____________

Adapted from references 8 and 9.
An open-ended questioning style (“tell me how you take this medication”) is most useful to create a comfortable and non-judgmental interview environment. The patient’s medical conditions can be used as effective triggers to inquire about commonly used medication classes to prevent medication omissions. Interview questions about details of patient adherence are also essential. Shalansky and colleagues presented some concise and effective phrasing of questions for this purpose:12

- Did the doctor change the dose or stop any of your medications recently?
- Have you changed the dose or stopped any of your medications recently?
- Have any of the medications been causing side effects?
- Your prescription profile indicates that you may have run out of some medications. Are you still taking any of these?

The challenge of poor patient recall of the medications they are taking can be overcome by contacting peer community pharmacists for clarification. It is important to anticipate that the patient may visit multiple pharmacies.

Other challenges include the time and resources (clinician and physical space) to conduct an effective BPMH, as well as accessibility to patient medication vials and personal medication lists. Successful strategies to overcome these challenges include a proactive approach to scheduling patient appointments and reminders to bring in vials and medication lists. Interviews can be scheduled on a certain day of the week or at times when additional staffing is available. Being proactive includes gathering as much information as possible prior to the patient interview. This includes past medication histories, community pharmacy profiles, primary care medication records and provincial database information. This also allows for advance review of information and anticipation of clarification questions.

**TOP 10 PRACTICAL TIPS**

**How to Obtain an Efficient, Comprehensive and Accurate Best Possible Medication History (BPMH)**

1. **Be proactive.** Gather as much information as possible prior to seeing the patient. Include primary medication histories, provincial database information, and medication vials/lists.
2. **Prompt questions about non-prescription categories:** over the counter drugs, vitamins, recreational drugs, herbal/traditional remedies.
3. **Prompt questions about unique dosage forms:** eye drops, inhalers, patches and sprays.
4. **Don’t assume patients are taking medications according to prescription vials (ask about recent changes initiated by either the patient or the prescriber).**
5. **Use open-ended questions:** (“Tell me how you take this medication?”).
6. **Use medical conditions as a trigger to prompt consideration of appropriate common medications.**
7. **Consider patient adherence with prescribed regimens (“Has the medication been recently filled?”).**
8. **Verify accuracy:** validate with at least two sources of information.
9. **Obtain community pharmacy contact information:** anticipate and inquire about multiple pharmacies.
10. **Use a BPMH trigger sheet** (or a systematic process/interview guide). Include efficient order/optimal phrasing of questions and prompts for commonly missed medications.

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**Drug-related problems were linked to medication care process, 65% of patients’ drug-use history (BPMH) is an essential feature. In a systematic review, Kaboli et al concluded that “reconciling medications” was one of only five interventions by clinical pharmacists that actually resulted in improved outcomes for hospitalized patients (the others were interacting with the healthcare team on patient rounds, interviewing patients, providing patient discharge counselling and providing patient follow-up). Furthermore, an observational study by Bond and colleagues, involving almost three million patients in 885 U.S. hospitals, demonstrated that pharmacist-provided admission medication histories was one of seven clinical pharmacy services associated with a reduced mortality rate; the reduction in the number of deaths per hospital was almost twice that of any other clinical pharmacy service investigated.17

KWAN ET AL CONDUCTED A CANADIAN RANDOMIZED CONTROLLED TRIAL WITH 464 SURGICAL PATIENTS AT AN ACUTE CARE TEACHING HOSPITAL.4 THE MAIN INTERVENTION WAS A PROACTIVE INTERDISCIPLINARY ADMISSION MEDICATION RECONCILIATION PROCESS IN WHICH PHARMACISTS CONDUCTED PATIENT BPMHS IN A SURGICAL PREADMISSION CLINIC TO SUPPORT SURGEON POST-OP PRESCRIBING OF HOME MEDICATIONS. FINDINGS DEMONSTRATED THAT MULTIDISCIPLINARY MEDICATION RECONCILIATION (WITH PHARMACISTS, NURSES AND PHYSICIANS PARTNERING PROACTIVELY WITH THE PATIENT) RESULTED IN A 50% REDUCTION IN THE NUMBER OF PATIENTS WITH DISCREPANCIES LINKED TO HOME MEDICATIONS COMPARED TO THE STANDARD OF CARE. THE INTERVENTION ALSO RESULTED IN A REDUCTION IN THE NUMBER OF PATIENTS WITH CLINICALLY SIGNIFICANT DISCREPANCIES THAT HAD THE POTENTIAL TO CAUSE POSSIBLE OR PROBABLE HARM (29.9% vs. 12.9%).

In 2009, Karnon and colleagues conducted a model-based cost-effectiveness analysis of interventions aimed at preventing medication errors with medication reconciliation at hospital admission.10 The aim of the study was to assess the incremental costs and effects (measured as quality-adjusted life years) of a range of medication reconciliation interventions. All five interventions for which evidence of effectiveness was identified were estimated to be extremely cost effective when compared to the baseline scenario. The pharmacist-led reconciliation intervention had the highest expected net benefits and a probability of being cost effective of more than 60% by a quality-adjusted life-year value of £10,000.10 New evidence on the positive impact of medication reconciliation and the beneficial effects of pharmacists is continually emerging.18

**Medication reconciliation initiatives**

From an international perspective, the World Health Organization (WHO) has
recently prioritized medication reconciliation as one of three patient safety strategies, within the collaborative initiative Action on Patient Safety: High 5s.\textsuperscript{8,19} Canada has been selected by the WHO to lead medication reconciliation for the participating countries (the Canadian Patient Safety Institute will be the lead technical agency and ISMP Canada will support leadership of the medication reconciliation intervention). Nationally, Accreditation Canada has made medication reconciliation a mandatory requirement for various health settings, including acute care and homecare. Safer Healthcare Now\textsuperscript{1} (a national Canadian patient safety campaign (started in 2005) to reduce preventable patient adverse events has championed medication reconciliation as one of a handful of core patient safety strategies; it includes more than 400 national interprofessional teams in acute care, long-term care and home care.\textsuperscript{7} In addition, the Canadian Society of Hospital Pharmacists’ 2015 campaign has endorsed medication reconciliation activities as a high priority for pharmacists.\textsuperscript{20}

Tools and strategies, such as expanded pharmacist access to provincial medication databases, may contribute to efforts to improve the accuracy and efficiency of medication reconciliation.\textsuperscript{21} Several provinces have recently initiated programs that allow for community pharmacist reimbursement models for medication reviews. For example, Ontario’s MedsCheck is a provincially funded initiative that reimburses pharmacists who perform an annual one-on-one 30-minute patient interview, reviewing patient medications and providing the patient with an up-to-date medication record; it includes additional opportunities to perform a MedsCheck follow-up upon admission to hospital or following a recent hospital discharge.\textsuperscript{22} Figure 10 depicts a system for linking MedsCheck and medication reconciliation. Many teams have also implemented effective models that involve pharmacy technicians or pharmacy students systematically partnering with pharmacists to support clerical and cognitive medication reconciliation activities at many interfaces.\textsuperscript{23,24}

**Conclusion**

Medication discrepancies at interfaces of care pose a significant medication safety risk for patients. This provides an opportunity, as pharmacists are uniquely positioned to bridge this important patient safety gap to support patients and other healthcare professionals with medication reconciliation at vulnerable care transitions. Awareness of key medication information transfer challenges will allow for implementation of effective solutions. Systematic tools and strategies can support clinicians in performing comprehensive, efficient and effective medication reconciliation.

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The full article including figures 6,10 and references is available at www.canadianhealthcarenetwork.ca
REFERENCES

FIGURE 6 CHALLENGES OF MEDICATION INFORMATION TRANSFER IN THE COMMUNITY

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FIGURE 10 LINKING MEDSCHECK AND MEDICATION RECONCILIATION

1. Patient is asked to obtain a MedsCheck from their community pharmacy two weeks prior to pre-admission appointment. Patient brings MedsCheck to their appointment.

2. Pre-Admission clinician initiates MedRec by confirming MedsCheck medications with the patient and creates the best possible medication history (BPMH).

3. Patient has surgery. Physician reviews the BPMH and writes post-op orders for home medications.

4. Discharge clinician performs MedRec to reconcile discrepancies between post-op orders and the BPMH and creates the best possible medication discharge plan (BPMDP) and sends to community pharmacist.

5. Patient returns to community pharmacy for a MedsCheck follow-up within 2 weeks of hospital discharge.

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