Medication errors, drug related problems and patient safety

Patient safety is arguably the most important issue facing pharmacy practice today. In this issue of the Translator the prevalence and incidence of drug related morbidities is examined, and possible solutions and the impact of medication reconciliation are discussed.

- Seventy percent of hospitalizations for drug-related causes are deemed preventable
- Preventable drug related morbidities occur in about 1 out of every 7 older adults
- Medication reconciliation helps prevent harm to patients by correcting medication errors at hospital admission and discharge
- Pharmacists help resolve drug therapy inconsistencies and omissions in patients at time of hospital discharge

Seventy percent of hospitalizations for drug-related causes are deemed preventable


Issue: It has been estimated that the costs of drug-related morbidity and mortality are rapidly increasing. Between 1995 and 2000 the costs of drug-related morbidity and mortality rose from $76.6 billion to more than $177.4 billion in the US.\(^1\) \(^2\)

Given the high cost and effect on lives, strategies need to be implemented to address drug related problems, but, first we need to understand how many are preventable.

A solution: This study prospectively evaluates the frequency, severity, preventability, and classification of adverse drug events resulting in hospitalization. It aims to identify the system, and individual patient, prescriber and drug factors that lead to drug-related hospitalization (DRH) in a large tertiary care hospital.

Of the 565 patients admitted to the internal medicine services in a 12-week period, nearly a quarter (24%) of these hospitalizations was drug-related, meanwhile, the majority (72%) of these DRH were deemed preventable. The most common classifications of these DRH were adverse drug reaction (35%), improper drug selection (18%), and noncompliance (16%). The most common drug classes associated with these hospitalizations were cardiovascular agents (28%) and antibiotics (23%).

Implications: With 136 admissions to internal medicine units at a large Canadian teaching hospital over a 12-week period deemed to be preventable, it is in everyone’s interest to address this problem and aim to improve system efficiencies, with the involvement of patients, physicians, pharmacists, caregivers and other health care professionals. This will not only save money and improve efficiencies but also decrease the morbidity and mortality of patients by addressing preventable drug-related incidents. Further research is required to identify, implement and evaluate strategies targeted at reducing these DRH.
Background or research methods:
Conducted at the Vancouver General Hospital, a 700-bed tertiary referral centre, this study enrolled patients who were consecutively admitted to the internal medicine units during a 12-week period from January 10 to April 4, 2005. Patients were enrolled by one of the 10 residency-trained clinical pharmacists. The pharmacists specializing in adult acute care received training and participated in a 3-week pilot period to ensure proper use of the data collection tool and applications of definitions. A total of 739 patients were admitted to the internal medicine service, 134 met some exclusion criteria. There were 565 patients included in the final analysis. Pharmacists conducted a history of the present illness, medical and drug history, and etc. They consulted chart reviews and accessed ancillary information when required. Preventable DRH were identified when inconsistencies with current knowledge of best medical practices were recognized (e.g., inappropriate drug, dosage, administration route according to patient’s needs, allergies, known interactions, non-compliance, no laboratory monitoring, and errors in prescribing, dispensing, or administration).

Preventable drug related morbidities occur in about 1 out of every 7 older adults


Issue: Patient safety has always been an important issue with medication use. It is estimated that of adult Canadians admitted to acute care hospitals, 7.5% experience an adverse event, and 23.6% of these are due to drug/fluid related problems. Many studies conducted over the past decades concur that a significant number — probably at least 50% — of adverse drug-related outcomes are preventable (i.e., a preventable drug-related morbidity (PDRM)). A PDRM has the four features of being recognizable, foreseeable, identifiable, and controllable.

A solution: In this particular study, preventable drug related morbidities (PDRM) were studied in older adults in Halifax, Nova Scotia. It is known that seniors take more medications and are thus more vulnerable to PDRMs. The researchers looked for specific outcomes (morbidities) that were associated with inappropriate patterns of care. This process was repeated for 52 different clinical scenarios involving medication use in older adults. For example, if a patient over the age of 65, with no contraindications for the influenza vaccine but has not received the vaccination, visits the emergency due to pneumonia during the flu season, this would be considered a “hit” or a PDRM. There were 3,277 occurrences out of 29,796 that were considered PDRMs, which equates to an overall incident-event rate of 110 per 1,000 occurrences. These 3,277 PDRMs occurred in over 22,000 seniors, or 14.6% of the study population, or in about 1 out of every 7 seniors.

Implications: This study only includes 52 clinical scenarios, and the authors acknowledge that there are other types of PDRMs that were not captured, which implies that there may be many more PDRMs that have not been accounted for and that 1 in every 7 is really a lower-bound estimate. On the other hand, there was a specific issue with regards to the indicator related to the influenza vaccine. The information obtained for the study was collected during a year in which the vaccine was a poor match for the circulating virus, and hospitalizations due to pneumonia are not always caused by influenza; therefore, the incidence rate may have been overestimated for this particular indicator. So although there may have been slight over-estimates for certain indicators, there are also many PDRMs that have not been captured.

Nevertheless, given that 60% of all PDRMs are linked to two causes in this population, ensuring that eligible elderly patients get the flu vaccine and that thyroxine (T4)/thyroid-stimulating hormone (TSH) levels are monitored can significantly reduce patient morbidity and lead to system efficiencies.


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Medication reconciliation helps prevent harm to patients by correcting medication errors at hospital admission and discharge


**Issue:** Medication errors are, unfortunately, quite common. They are one of the leading causes of adverse events upon hospital admission. It has been found that 20–72% of all adverse events are due to adverse drug events, or medication errors, many of which have been shown to be preventable.

Rather than treating the patient for the adverse event, preventing the occurrence in the first place would be the ideal method in which to deal with medication errors. One of the possible solutions involves medication reconciliation.

**A solution:** Medication reconciliation has been considered for quite some time now. It involves patient interviews, examination of existing patient records, comparing orders and discussions with physicians. Medication reconciliation provides the patient with a more comprehensive process of “double checking” than the existing system currently in place.

Of the 60 patients enrolled in the study, there were a total of 10 clinically important medication variances identified at admission affecting nine people, and a same number identified at discharge in five patients. The identification of these variances through pharmacist intervention was able to prevent harm to the patient in 75% of these cases.

**Background or research methods:**
Sixty patients from acute care units (not including the rehabilitation and chronic care units) in Markham Stouffville Hospital were randomly selected to participate in this study. Patients were selected on each weekday of July 2002 using a random number table from amongst all new admissions in the previous 24 hours. The medication reconciliation was performed by a study pharmacist. The patient’s comprehensive drug history was obtained and subsequently compared to the hospital admission medication orders. Differences between the history and admission orders were considered to be variances (e.g. omission of medication, discrepancy in dose). The variances were investigated, and any unintended variations were considered to be medication errors. Any identified medication error was then corrected at the physician’s discretion. The unintended variance was later reviewed by an internist for clinical importance.

**Implications:** This study involved a single clinical pharmacist who performed all of the medication reconciliations, and a small patient population. These two factors combined make it difficult to apply this knowledge to the general population. In addition, this study concentrated on prescription medications, excluding non-prescription and herbal medications. Herbals and non-prescription medications are both important factors to consider when performing reconciliation, and further studies should include these two categories of medications. Medication reconciliation appears to be effective in preventing harm to patients, and may help prevent unnecessary hospitalizations. Large scale evaluations to determine the impact of medication reconciliation would be beneficial.
Pharmacists help resolve drug therapy inconsistencies and omissions in patients at time of hospital discharge


**Issue:** Drug therapy inconsistencies and omissions are unfortunately quite common. As patients are discharged from hospital into community or long term care settings, changes in drug therapy often get lost in translation. Approximately 40% of medications being used upon admission are not continued at hospital discharge. This has the potential to cause serious harm, and to negatively impact patient outcomes.

**A solution:** To minimize/eliminate discrepancies and drug therapy problems that may arise in the discharge of a patient from the hospital, seamless care seems to be the most promising, and most popular, solution. Medication reconciliation is one component of seamless care in which the pharmacist can play a significant role. The patient’s current medications (including non-prescription) are identified and compared with medication records to identify discrepancies. This role can be effectively filled by a clinical pharmacist.

This randomized controlled trial, conducted at the Moncton Hospital in New Brunswick, was performed to determine the frequency, and potential impact of drug therapy problems, and drug therapy inconsistencies identified by the “seamless care” pharmacist at the time of discharge.

Two-hundred and fifty-three patients were enrolled in the study with 134 randomly being assigned to the intervention group, and another 119 to the control group. Of the 134 patients in the intervention group, there were 481 drug therapy problems (DTP) identified by the seamless care pharmacist, an average of 3.59 per patient. The researchers determined that the need for additional drug therapy accounted for a third of all DTPs, and 83.8% of all DTPs identified were either somewhat significant, or significant (a rating of 3 and 4 respectively on a scale from 1 to 6) for potential clinical impact. Forty per cent of patients had a drug therapy inconsistency or omission (DTIO) at the time of discharge. The pharmacists rated the inconsistencies on average 4.33, and the omissions 4.35 for potential clinical impact. Once identified, the pharmacist was able to resolve all DTIOs before discharge.

**Implications:** As the intervention was performed by only one clinical pharmacist, at one hospital site, it is difficult to apply the results to a broader population. A larger scale study is required in order to determine the impact of pharmacist intervention in identifying DTPs, and preventing DTIOs upon hospital discharge.

**Background or research methods:** This randomized controlled trial was performed at the Moncton Hospital, South-East Health Regional Health Authority in Moncton, New Brunswick. This study focused on the impact that the pharmacist had on drug related clinical outcomes and process of care in performing seamless care for patients being discharged from hospital. Patients were screened for the study by evaluating admissions to two family practice units between September 2000 and June 2001. To be included in the study, patients were required to have been discharged between 8h00 and 14h00, not transferring to another hospital, prescribed at least one medication at discharge, and not have enrolled in a previous study from a prior admission. Patients were also required to sign a consent form, and their respective community pharmacies were also required to sign agreements in order to be included in the study. Patients were then randomly assigned to either the intervention or control group. Hospital workers were unaware of the group to which the patient was assigned. The “seamless care” pharmacist then performed medication reconciliation with each patient in the intervention group in order to identify discrepancies, and drug therapy problems. The intervention included a comprehensive pharmacist- and the seamless care pharmacist prepared a computer-generated medication schedule for the patient which included pictures of each of the patient’s medication. This information was reviewed with the patient and also faxed to the patient’s community pharmacy and family physician.

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