

# INCIDENTS ASSOCIATED WITH MISSED MEDICATION DOSES: *A Multi-Incident Analysis*

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## INTRODUCTION

An aging population and increasing medication use imply that pharmacies and patients may be at risk of experiencing errors that involve missed medication doses. Missed medication doses can attenuate or eliminate a drug's therapeutic effects resulting in suboptimal disease management, more frequent physician visits, and higher hospitalization rates.<sup>1</sup> For some medications, such as warfarin, even a few missed doses can reduce its beneficial effects and result in serious adverse events, such as a stroke.<sup>2</sup> Missed doses can also cause withdrawal symptoms with some medications, such as antidepressants, resulting in side effects such as flu-like symptoms, anxiety, and electric shock-like sensations.<sup>3,4</sup>

Factors, such as pharmacy environments, complex medication regimens, and training of pharmacy staff

can contribute to incidents associated with missed medication doses. Identifying and addressing the root causes that may lead to these incidents in community pharmacy practice can have a significant positive impact on patient care and medication safety.

This multi-incident analysis aims to identify overarching themes encompassing underlying contributing factors that result in incidents associated with missed medication doses reported by community pharmacies. Additionally, this analysis targets vulnerable medication-use processes in community pharmacy settings in order to develop recommendations to mitigate the risk of future incidents associated with missed doses, and to optimize patient safety outcomes through safe medication practices.

## METHODS

Incidents included in this analysis were voluntarily reported by pharmacy professionals to the Institute for Safe Medication Practices Canada (ISMP Canada) Community Pharmacy Incident Reporting (CPhIR <https://www.cphir.ca>) program. We extracted incidents with “Omitted Medication/Dose” reported as the primary type of incident from the CPhIR database between July 1, 2016 and June 30, 2017.

Using the specified inclusion criteria, an initial search yielded a total of 194 incidents. After removing duplicate entries and non-viable incidents (e.g. incidents with insufficient details, ambiguous description, etc.), a total of 156 incidents were included and subjected to a qualitative, multi-incident analysis, which was conducted by four independent medication safety analysts. Themes, sub-themes, contributing factors, and recommendations to address patient safety gaps corresponding to incidents associated with missed medication doses were then derived from this analysis.

## RESULTS

We identified three main themes and corresponding sub-themes. Along with contributing factors and potential recommendations, they are listed in Tables 1 to 4 below.

We would also like to bring your attention to the following previous Multi-Incident Analyses that have been published in *Pharmacy Connection*, as most incidents reviewed in this analysis that were associated with missed medication doses were identified during some of the high-risk processes in community pharmacy workflow.

- [Medication Incidents Associated with Hospital Discharge](#)
- [Medication Incidents Involving Drug Tapering in Community Pharmacy](#)
- [Complexity and Vulnerability of Compliance Pack Preparation](#)
- [Drug Shortage and Patient Safety](#)

## CONCLUSION

Despite pharmacy professionals' best efforts to provide safe and effective pharmaceutical care, errors cannot be 100% eliminated. Whether errors are related to a lack of communication among healthcare practitioners, or from an inadequate medication management system, it is essential to recognize the importance of being proactive in addressing the root causes. In this analysis, we described some of the contributing factors that may lead to missed medication doses and offer

recommendations to prevent these incidents from occurring. Findings from this multi-incident analysis will help target areas of risk associated with missed medication doses and support making changes to improve medication safety in your pharmacy.

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The CPhIR Program contributes to the Canadian Medication Incident Reporting and Prevention System (CMIRPS) (<https://www.cmirps-scdpim.ca>). A goal of CMIRPS is to analyze medication incident reports and develop recommendations for enhancing medication safety in all healthcare settings. The incidents anonymously reported by community pharmacy practitioners to CPhIR were extremely helpful in the preparation of this article. 

**Table 1.** Summary of Themes

Main Themes	Subthemes
Main Theme 1: Compliance Packaging (Multi-Medication Compliance Aids)	Over-the-Counter (OTC) Medications Use of Samples Drug Shortages or Backorders Complex Medication Regimens
Main Theme 2: Transitions of Care	Pharmacy (Prescription) Transfer Hospital Discharge Long-Term Care (LTC) Admission or Discharge
Main Theme 3: Medication Distribution	Pick Up Delivery

Table 2. Main Theme 1 – Compliance Packaging (Multi-Medication Compliance Aids)

Subtheme 1 – Over-the-Counter (OTC) Medications		
Incident Examples:	Contributing Factors:	Recommendations:
<ul style="list-style-type: none"> <li>• Nurse phoned to say that the horse chestnut capsule was not included in the blister pack.</li> <li>• Physician called in renewals for patient's medications (including inhalers, blister-pack medications and OTC medications). However, during the transcribing of the verbal orders, the OTC medications were omitted and not updated on the patient profile. When the next blister pack was processed, the OTC medications (i.e. Vitamin D and ASA) were not included on the compliance pack labels and hence omitted from the blister packs.</li> </ul>	<ul style="list-style-type: none"> <li>• OTC medications purchased separately by patient were not included in the blister pack.</li> <li>• Incomplete medication review and/or medication list not up-to-date.</li> <li>• Inadequate transcription and/or lack of verification of verbal orders.</li> </ul>	<ul style="list-style-type: none"> <li>• Conduct regular medication reviews with patients; document and assess OTC medications in addition to prescription medications.</li> <li>• Place a poster or reminder at prescription pick-up area to remind patients to carry an updated medication list (including OTC medications) with them and to consult their pharmacist if starting any new OTC medications.</li> <li>• Develop or reinforce pharmacy policies and procedures when OTC medications are included in compliance packaging.<sup>5,6</sup></li> </ul>
Subtheme 2 – Use of Samples		
Incident Examples:	Contributing Factors:	Recommendations:
<ul style="list-style-type: none"> <li>• Patient usually gets Tridural® samples mailed directly from the pharmaceutical company to the nursing home; and the nursing home will administer the samples to patient. The order form for the samples was not filled out properly by the prescriber this time, so the samples did not arrive on time.</li> <li>• Patient has been on samples. When prescription was called into the pharmacy, the prescription labels of the compliance packs for the next cycle were already printed. Hence, the sample medications were missed in the compliance pack preparation. Pharmacy staff expected that patient had enough samples to last until the next cycle.</li> </ul>	<ul style="list-style-type: none"> <li>• Medication samples supplied directly to the patient.</li> <li>• Lack of communication between pharmacy and prescriber.</li> <li>• Lack of documentation of sample supply on patient profile</li> </ul>	<ul style="list-style-type: none"> <li>• Develop or reinforce pharmacy policies and procedures to ensure appropriate documentation and communication when sample medications are included in compliance packaging.<sup>6</sup></li> <li>• Ensure adequate training of pharmacy staff involved in compliance pack preparation.<sup>7</sup></li> </ul>
Subtheme 3 – Drug Shortages or Backorders		
Incident Examples:	Contributing Factors:	Recommendations:
<ul style="list-style-type: none"> <li>• Pharmacy ran out of Apixaban. We ran the medication roll via PACMED strip packaging (i.e. automated compliance packaging) without Apixaban. We then forgot to add Apixaban to the medication roll the next day and did not perform final check on PACMED pouch upon dispensing.</li> </ul>	<ul style="list-style-type: none"> <li>• Drug shortages and backorders.</li> <li>• Inadequate maintenance of pharmacy inventory.</li> <li>• Lack of communication among pharmacy staff members.</li> <li>• Lack of independent double checks.</li> </ul>	<ul style="list-style-type: none"> <li>• Create end-of-day inventory maintenance checklist for pharmacy staff.</li> <li>• Develop or reinforce existing pharmacy policies and procedures to manage drug shortages and/or backorders.<sup>8</sup></li> </ul>
Subtheme 4 – Complex Medication Regimens		
Incident Examples:	Contributing Factors:	Recommendations:
<ul style="list-style-type: none"> <li>• A new blister-pack patient was supposed to receive Synthroid® 237 mcg daily alternating with 250 mcg daily (i.e. 100 mcg +137 mcg tablets daily alternating with 100 mcg +150 mcg tablets daily). Somewhere down the line, the 150 mcg tablets were mistakenly discontinued from the patient's profile, therefore the patient's set of blister packs ended up containing 237 mcg daily alternating with 100 mcg daily. The directions on these prescriptions did not accurately reflect the patient's dosing requirements, so it was not obvious that something went wrong.</li> <li>• Patient brought back his blister packs asking if we had forgot to put in his medications. He is on a specific cycle, taking 1 tablet once daily and 2 tablets on Mondays and Thursdays. We forgot to add the second Rapamune® tablet to the Monday and Thursday slots.</li> </ul>	<ul style="list-style-type: none"> <li>• Inadequate documentation of prescription directions.</li> <li>• Lack of independent double checks.</li> </ul>	<ul style="list-style-type: none"> <li>• When possible, prescribers should simplify dosing regimens for patients with consideration of commercially available product formulations.<sup>9,10</sup></li> <li>• Perform independent double checks with patient when preparing and dispensing complex medication regimens.<sup>11</sup></li> <li>• Flag compliance packaging orders with more than two strengths of the same medication.</li> <li>• Flag compliance packaging orders with medications dosed with specific frequencies (e.g. only on certain days of the week).<sup>12</sup></li> </ul>

Table 3. Main Theme 2 – Transitions of Care

Subtheme 1 – Pharmacy (Prescription) Transfer		
Incident Examples:	Contributing Factors:	Recommendations:
<ul style="list-style-type: none"> <li>• Patient's prescriptions were transferred [from another pharmacy. Patient then brought in a prescription vial from another pharmacy and said that we should already receive the transfers. However, we did not see Ativan® SL on her medication profile. We then referred back to the prescription transfer images and realized that the transfer was supposed to be two pages, but we only logged the first page. We missed the last two prescriptions on the second page.</li> </ul>	<ul style="list-style-type: none"> <li>• Incomplete medication review and/or medication list not up-to-date.</li> <li>• Lack of independent double checks.</li> </ul>	<ul style="list-style-type: none"> <li>• Perform independent double checks by conducting medication reviews with all new patients to the pharmacy.<sup>11</sup></li> <li>• Develop technology to allow Pharmacy Practice Management Systems (PPMS) to communicate prescription transfers seamlessly in order to avoid the need for human intervention or transcription.<sup>7</sup></li> </ul>
Subtheme 2 – Hospital Discharge		
Incident Examples:	Contributing Factors:	Recommendations:
<ul style="list-style-type: none"> <li>• Nurse at long-term care home phoned to ask about Metoprolol and why it was not in the patient's blister packs. It was discovered that at hospital discharge, Metoprolol had been accidentally discontinued. There had been many medication changes and discontinuations upon patient discharge, but Metoprolol was not one of them.</li> <li>• Pantoprazole was not in the patient's compliance packs. Prescription for Pantoprazole was on hospital discharge, but it was missed by the pharmacist when the orders were being inputted and prepared.</li> </ul>	<ul style="list-style-type: none"> <li>• Lack of medication reconciliation at hospital discharge.</li> <li>• Lack of medication reconciliation at community pharmacy post-discharge (e.g. MedsCheck Follow-Up).</li> <li>• Lack of patient education on hospital discharge.</li> <li>• Lack of independent double checks.</li> </ul>	<ul style="list-style-type: none"> <li>• Conduct medication reconciliation at hospital discharge and generate discharge prescriptions to minimize unintentional medication changes upon patient discharge.</li> <li>• Provide copies of the medication list (ideally the up-to-date best possible medication history) to the patient, community pharmacy, and family doctor.<sup>9, 10</sup></li> <li>• Assign a hospital helpline for patients and other primary health care providers (HCPs) to improve communication among HCPs at the transitions of care.<sup>10</sup></li> <li>• Educate patients on the "5 Questions to Ask About Your Medications" (<a href="https://www.ismp-canada.org/medrec/5questions.htm">https://www.ismp-canada.org/medrec/5questions.htm</a>).<sup>13</sup></li> </ul>
Subtheme 3 – Long Term Care (LTC) Admission or Discharge		
Incident Examples:	Contributing Factors:	Recommendations:
<ul style="list-style-type: none"> <li>• Pharmacy was notified earlier in the week that the resident would be transferring out of the long-term care facility (but no specific date was given). When cycle fill was run on Friday, this resident's medications were suspended as it was thought that he was leaving the long-term care facility. Technician had asked nursing staff to notify pharmacy if the resident did not leave. However, pharmacy was not informed, and the resident went without medications for three days before nursing staff noticed.</li> <li>• Medication was missed when entering an admission prescription order for the nursing home. Nurse at nursing home informed pharmacy of the omission.</li> </ul>	<ul style="list-style-type: none"> <li>• Lack of communication between pharmacy and LTC facility.</li> <li>• Potential confirmation bias.</li> </ul>	<ul style="list-style-type: none"> <li>• Implement an electronic reminder to prevent discontinuation of patient's medication profile unless resident discharge has been fully completed and documented.</li> <li>• Implement formal and standardized process for communicating LTC admissions and discharges between pharmacy and LTC facility (e.g. online communication).<sup>14</sup></li> <li>• Recommend LTC homes to send daily or weekly patient census reports (electronically or manually prepared) to pharmacy. This can serve as a back-up or independent double check to verbal communication about admissions, transfers, and discharges.<sup>14</sup></li> </ul>

Table 4. Main Theme 3 – Medication Distribution

Subtheme 1 – Pick Up		
Incident Examples:	Contributing Factors:	Recommendations:
<ul style="list-style-type: none"> <li>• Three prescriptions were filled for one patient – two at one time, and one at another time. Patient's daughter came in to pick up prescriptions and only received two; the third prescription was in a separate bag.</li> </ul>	<ul style="list-style-type: none"> <li>• Medications for the same patient were prepared in separate prescription bags.</li> <li>• Lack of communication between pharmacy staff and patient.</li> <li>• Insufficient patient counseling at pick-up</li> <li>• Lack of independent double check during pick-up and patient counselling.</li> </ul>	<ul style="list-style-type: none"> <li>• Perform independent double checks at pick up with patient to confirm the number of prescriptions to be picked up and for which medications.<sup>11</sup> Ask the patient to review the prescription labels and contents of each prescription container to make sure that the medication is correct.<sup>12</sup></li> <li>• Develop reminders in the Pharmacy Practice Management Systems (PPMS) to flag all prescriptions for the same patient if additional prescriptions are filled and a previous prescription has not been picked up yet.</li> <li>• Develop or reinforce existing pharmacy policies and procedures to ensure medications filled for the same patient are stored together.</li> <li>• When a friend or caregiver picks up prescriptions on behalf of a patient, remind the patient to check the contents of the prescription package at home before taking any medications and ask the pharmacist if there are any concerns or questions.<sup>12</sup></li> </ul>
Subtheme 2 – Delivery		
Incident Examples:	Contributing Factors:	Recommendations:
<ul style="list-style-type: none"> <li>• Prescription was delivered to the wrong nursing home. Patient had transferred to a different LTC home and the delivery address on patient's profile was not updated.</li> <li>• Patient called to have her prescriptions delivered. Prescriptions were not filled nor delivered until she called again two days later and informed the pharmacy about the outstanding delivery.</li> </ul>	<ul style="list-style-type: none"> <li>• Potential confirmation bias</li> <li>• Lack of independent double checks.</li> <li>• Ineffective communication among pharmacy staff members.</li> </ul>	<ul style="list-style-type: none"> <li>• Implement automated refill reminder system to prevent missed medication doses if delivery systems are delayed.</li> <li>• Remind pharmacy staff members of the importance of double-checking patient details (e.g. name, date of birth, delivery address) prior to sending prescriptions out for delivery.<sup>11</sup></li> </ul>

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