

Drug-induced Allergic Reactions

A MULTI-INCIDENT ANALYSIS BY ISMP CANADA

Leo Kim, RPh, PharmD,
Analyst, ISMP Canada

Certina Ho, RPh, BScPhm, MSt, MEd
Project Lead, ISMP Canada

INTRODUCTION

Drug-induced allergic reactions are one of the most common unpredictable manifestations of medication usage, accounting for approximately 5–10% of all adverse drug reactions.¹ Although there are various subtypes of unpredictable drug reactions that include drug intolerance, drug idiosyncrasy, drug allergy, and pseudo allergic reactions, they generally occur independently of the dose, are separate from the pharmacologic actions of the drug, and occur selectively in susceptible individuals.² Furthermore, for a given drug, there is a lack of homogeneity in the type and severity of allergic symptoms, which may range from mild local discomfort to life-threatening systemic anaphylaxis.³ Hence, these frequent yet erratic adverse events have potentially serious outcomes that may not always be foreseen.

However, many medication incidents involving drug allergies are preventable in nature, especially in cases where the patient's allergies have been previously documented.⁴ Thus, it is important to learn about the various ways in which errors could occur throughout the medication-use process, so that system vulnerabilities can be identified and consequently improved.

The Community Pharmacy Incident Reporting (CPhIR) Program (available at <http://www.cphir.ca>) is designed for community pharmacies to report near misses or medication incidents to the Institute for Safe Medication Practices Canada (ISMP Canada) for further analysis and dissemination of shared learning from the reported incidents.⁵ CPhIR has

allowed the collection of invaluable information to help identify system-based vulnerable areas in order to advance safe medication use.⁴ This article provides an overview of a multi-incident analysis of drug-allergies-related incidents reported to the CPhIR program.

MULTI-INCIDENT ANALYSIS OF DRUG-INDUCED ALLERGIC REACTIONS IN COMMUNITY PHARMACY PRACTICE

Incidents reported to CPhIR were used to conduct a multi-incident analysis of medication incidents involving drug-induced allergic reactions. Using a search criterion of "Drug Therapy Problem – Documented allergy" for the type of medication incidents and related free-text search for symptoms of allergic reactions (e.g., hives, rash) for the incident description, a total of 788 incidents were retrieved from the CPhIR database between 2010 and 2014. Incidents that had information irrelevant to the topic of drug allergies, and inadequate descriptions for analysis were excluded. 273 incidents met inclusion criteria and were included in this multi-incident analysis.

Three major themes were identified through the analysis of these 273 incidents: (1) Missing documentation, (2) Computer detection incapacity, and (3) Alert bypass. The three major themes were further divided into subthemes, as shown in Table 1, Table 2, and Table 3, respectively. (Note: The "Incident Examples" provided in Tables 1, 2, and 3 were limited by what was inputted by pharmacy practitioners to the "Incident Description" field of the CPhIR program.)

TABLE 1. Theme 1 – Missing Documentation

Subtheme	Incident Example	Commentary
Prescriber	<i>Our [pharmacy] system had up to date allergy information which stressed a penicillin allergy. [The doctor's] office did not have [the patient's] allergy information. [Pharmacist advised] patient to not start the medication and [had amoxicillin] switched to [a] more appropriate choice.</i>	<p>Prescribers do not have direct access to allergy information stored in pharmacy computer systems</p> <p>Ensure that a standardized system is in place to notify prescribers and to follow up on potential drug allergies. Ideally, the notification would include therapeutic alternatives or appropriate courses of action.⁶</p>
Pharmacy	<i>While counselling the [patient's] father, the pharmacist stated "amoxicillin is a similar antibiotic to penicillin." In response, the father noted the child was allergic to penicillin. The allergy to penicillin was not documented on her file. The reaction was described as "a rash and hives on her back."</i>	<p>Patients may not always be conscious of their drug allergies nor understand the importance of communicating information about allergies. Drug allergy information should always be obtained and recorded in the patient's medical profile.</p> <p>Where computer functionality exists to detect drug allergies, enter the patient data needed to allow appropriate screening.⁶</p> <p>Engage in dialogue with the patient and/or the caregiver as a way to detect potential errors. For example, as an additional check before providing a medication at pick-up, ask the patient about drug allergies.⁷</p>

TABLE 2. Theme 2 – Computer Detection Incapacity

Subtheme	Incident Example	Commentary
Inactive Ingredients	<i>Patient was prescribed Prometrium® as part of a HRT [hormone replacement therapy] regimen. [Patient's] husband picked up [the] prescription and was not counselled by [the] pharmacist. He was not asked about [patient's] peanut [allergies]. Patient read medication information sheet and saw the warning about not taking [it] if she has a peanut allergy. Patient was understandably upset that she had not been warned [even though] the peanut allergy [was] on her file. [The pharmacist] contacted [the] software provider [and asked] "The patient profile had [a] peanut allergy in [the] allergy field. Why didn't the software alert us?" Their response was that because the peanut oil isn't an active ingredient, the system will not catch it.</i>	<p>Consider enhancement of the functionality of the pharmacy computer system for allergy detection, with elimination (as much as possible) of the need for "free-form texting" of allergy information. This would include ensuring that inactive ingredients were included in the computer allergy database.⁸</p> <p>As part of a continuous quality improvement program, periodically test software alert systems to ensure that expected allergy alerts appear when medications known to have cross-reactivity potential are entered into a patient's medication profile.⁶</p>
Cross-reactivity	<i>Patient had a documented allergy on file from a month [ago] to sulfonyleureas. [The computer] did not [generate an alert] for the Septra® [prescription] filled 1 month later. Patient had the prescription [for Septra®] filled in May and never took them. The medication sat in the [patient's] cupboard for a year and when they developed another UTI [urinary tract infection], they took the Septra®, not realizing that they were allergic [to it]. Patient was treated for severe hives at [the] hospital and [was] prescribed Macrobid® instead.</i>	<p>To avoid incidents related to documented drug allergies that are undetected by the computer, independent double checks should be performed for each prescription during the order entry and dispensing process.⁹</p>

continued

Subtheme	Incident Example	Commentary
Free-form Comments	<i>Patient had skin rash on face. A compound was made with Glaxal® Base, as ordered by the doctor. [The patient] had previous allergy to Glaxal® Base, [but] doctor and pharmacists did not see this on his file. [The information was entered] as a free-form allergy so [the computer did] not flash as an allergy [alert and it] was missed. Patient [was] advised to stop using [the medication].</i>	Engage in dialogue with the patient and/or the caregiver as a way to detect potential errors. For example, as an additional check before providing a medication at pick-up, ask the patient about drug allergies. ⁷

TABLE 3. Theme 3 – Alert Bypass

Incident Example	Commentary
<i>Patient presented with [a] prescription for Macrobid®. There was a note [on] her file that she was allergic to Macrobid®. Pharmacy student processed the prescription and bypassed [the] allergy warning. Pharmacist didn't catch the mistake and [the medication] was dispensed. Patient called the following day and said [that] she couldn't tolerate Macrobid®. It made her sick to her stomach. [The pharmacist] called the doctor and he ordered Cipro®. [The pharmacist] called the patient and [noted that] she [was] doing better.</i>	<p>Electronic order entry systems require continuous quality improvement to minimize the potential for “alert fatigue” with drug allergies.¹⁰</p> <p>Establish indicators and targets for use of the override function, and audit these indicators and targets regularly (e.g., monthly). Potential information to be tracked might include types of medications retrieved on override, along with time of day, and day of week.¹¹</p> <p>Ensure that all orders for medications removed using the override function are reviewed by a pharmacist as soon as possible.¹¹</p> <p>Establish a requirement for an independent double check of selected items removed through the override function.¹¹</p>

PATIENT SAFETY KEY LEARNING POINTS

Although the majority of incident reports related to documented drug allergies were near misses and did not lead to patient harm, a significant number of cases did result in allergic reactions and hospital visits. If the issue is ignored, more patients could potentially experience undesirable outcomes such as illnesses or even life-threatening anaphylaxis.

Pharmacies should be encouraged to adopt a workflow that allows independent double checks to verify stages of order entry, dispensing, and monitoring in the medication-use process. Engaging in a dialogue with the patient when the medication is being picked up may also serve as an **independent double check** to ensure that drug allergies have not been missed.

It is important to recognize the need to **communicate with patients** about drug allergies, especially when the information is not available in the computer or dispensing system. Gathering information, such as the type of allergen, the nature of the allergic reaction, and the

severity of symptoms will help avoid the use of inappropriate medications and assure optimal medication therapy management for patients.


Continuous quality improvement of computer software is also central in addressing the systematic issue related to missing drug allergy detection and excessive alerts. Refining the comprehensiveness of allergy data input and detection, as well as minimizing the potential for alert fatigue of users will help reduce errors.

CONCLUSION

Medication incidents involving documented drug allergies continue to be a cause of preventable errors in community pharmacy practice. Learning from medication incidents is a major step to improve the limitations in the medication-use system. The results of this multi-incident analysis are intended to educate health care professionals about the vulnerabilities within our current healthcare system and offer some possible solutions in practice.

ACKNOWLEDGEMENTS

The author would like to acknowledge Roger Cheng, Project Lead, ISMP Canada, for his assistance in conducting the incident analysis of this report.

ISMP Canada would like to acknowledge support from the Ontario Ministry of Health and Long-Term Care for the development of the Community Pharmacy Incident Reporting (CPhIR) Program (<http://www.cphir.ca>). The CPhIR Program also contributes to the Canadian Medication Incident Reporting and Prevention System (CMIRPS) (<http://www.ismp-canada.org/cmiprs/>). 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. 

REFERENCES

1. Warrington R, Silviu-Dan F. Drug allergy. *Allergy, Asthma, and Clinical Immunology* 2011; 7 (Suppl 1):S10. Available from: <http://www.aacijournal.com/content/7/S1/S10>
2. Khan DA, Solensky R. Drug allergy. *The Journal of Allergy and Clinical Immunology* 2010; 125(2):S126-S137.e1.
3. Health Canada. Severe allergic reactions: It's Your Health. Available from: <http://hc-sc.gc.ca/hl-vs/iyh-vsv/med/allerg-eng.php#share>
4. Leape LL, Bates DW, Cullen DJ, Cooper J, Demonaco HJ, Gollivan T, et al. Systems analysis of adverse drug events. *JAMA* 1995; 274(1):35-43.
5. Ho C, Hung P, Lee G, Kadija M. Community pharmacy incident reporting: a new tool for community pharmacies in Canada. *Healthc Q* 2010; 13:16-24.
6. ISMP Canada. Preventable Death Highlights the Need for Improved Management of Known Drug Interactions. *ISMP Canada Safety Bulletin* 2014; 14(5):1-7.
7. ISMP Canada. Concerned Reporting: Mix-ups Between Bisoprolol and Bisacodyl. *ISMP Canada Safety Bulletin* 2012; 12(9):1-6.
8. ISMP Canada. Tragic Error with a Compounded Pediatric Formulation – Shared Learning. *ISMP Canada Safety Bulletin* 2005; 5(6):1-2.
9. ISMP Canada. Lowering the risk of medication errors: Independent double checks. *ISMP Canada Safety Bulletin* 2005; 5(1):1-2.
10. ISMP Canada. Aggregate Analysis of Medication Incidents Involving Drug Interactions. *ISMP Canada Safety Bulletin* 2012; 12(5):1-4.
11. ISMP Canada. Automated Dispensing Cabinets in the Canadian Environment. *ISMP Canada Safety Bulletin* 2007; 7(3):1-3.