

Shared learning to advance medication safety: A multi-incident analysis on metformin-related medications

By Mi Qi Liu and Certina Ho

As the first line pharmacological therapy for type 2 diabetes, metformin plays a crucial role in disease management, and it is among the top 10 prescription medications in 2015. With advancement in the pharmaceutical industry, newer classes of diabetes medications have been developed, with examples including the sodium-glucose

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co-transporter 2 (SGLT2) inhibitors and dipeptidyl peptidase-4 (DPP-4) inhibitors. Considering factors such as

disease progression and patient adherence, products combining metformin and other classes of oral diabetes med-

ications including the newer classes aforementioned have been utilized. Yet, metformin and combination products containing metformin can also be a double-edged sword. Listed in the Institute for Safe Medication Practices (ISMP) High-Alert Medications in Community/Ambulatory Healthcare, metformin, if used incorrectly, can pose significant threats to patient safety.

Table 1. Theme 1 – Therapeutic role in diabetes management

In order to achieve optimal therapeutic effect and the goal of managing diabetes, metformin treatments often involve dosing adjustments and the continuous efforts of dosing maintenance. Furthermore, tablet-splitting is often necessary to ensure correct dosing. Combination products containing metformin may be utilized, considering factors such as disease progression, patient adherence, convenience, and cost.	
Subtheme - Dosing adjustment and maintenance	
Potential Contributing Factors	Recommendations
Therapeutic management itself is associated with a fair amount of dosing adjustments, based on patients' response/tolerance to the medication or the control/progression of the medical condition Copying of previous prescriptions on patient profile Mixing up of the old and new dosing regimens at the prescribing stage	Actively engage patients in their health/disease management, as patient's awareness and understanding of dosing regimen changes can serve as an independent double check; remind and train pharmacy staff to check with patients for further information when they present to the pharmacy with prescriptions of possible dosing adjustments, or proactively contact patients via phone if they are not physically present in the pharmacy before preparing the prescription. The "copy" functionality is readily available in most pharmacy software systems to improve pharmacy workflow. Policies may be considered within the pharmacy to limit the use of the "copying" function from previous prescriptions (where applicable). Emphasize to pharmacy staff and remind them of the importance of timely and effective communication with prescribers when encountering concerns related to dosing adjustment and maintenance.
Subtheme – Tablet-splitting	
Potential Contributing Factors	Recommendations
Tablet-splitting may be required/needed when patients undergo dosing adjustments or have difficulties swallowing tablets	Perform independent double checks during prescription preparation, especially for medications with special prescriber/patient requests such as tablet-splitting.

Table 2. Theme 2 – Choice of agent

Incorrect choice of agent, which can encompass the inappropriate selection of drug, formulation and strength, can either result in sub-optimal management of diabetes potentially leading to metabolic complications in the worst case scenario or expose patients to risks such as hypoglycemia.	
Subtheme – Drug selection	
Potential Contributing Factors	Recommendations
Look-alike/sound-alike medications Mixing up of metformin, metformin-containing combination products and other classes of oral diabetes medications	Create a section on the shelf where the most commonly dispensed metformin related products, formulations and strengths are organized and away from the products dispensed less frequently (creation/organization will be based on each pharmacy's individual product demand) – in an effort to minimize the chance of accidentally selecting the wrong one out of a pool of look-alike/sound-alike products, when all are kept in close proximity.
Subtheme – Formulation selection and Subtheme – Strength selection	
Potential Contributing Factors	Recommendations
Environmental factors such as distractions from other pharmacy staff/patients, heavy workload and staff shortage Lack of knowledge or awareness of pharmacy staff on the availability of various formulations and strengths of a medication Confirmation bias	Provide regular educational updates and training to pharmacy staff regarding new drug information (including new formulations and available strengths of existing medications). Offer patient education and counselling for both new and refill prescriptions to serve as the final independent double check for production selection and therapeutic appropriateness before the medications are handed over to patients.

In order to identify potential contributing factors and improve medication safety via possible error-reduction strategies, ISMP Canada conducted a multi-incident analysis on metformin-related medications. Relevant incidents in 2015 were extracted from the ISMP Canada's Community Pharmacy Incident Reporting (CPhIR) program (<http://www.cphir.ca>). Three main themes were identified, with sub-themes extending from each main theme, as presented in Tables 1, 2 and 3.

Learning from medication incidents is a critical step in safety enhancement. It is hoped that findings from this multi-incident analysis can provide a platform for healthcare professionals to reflect upon previous errors and facilitate shared learning. The potential recommendations provided in this article attempt to aid with the adoption of system-based error reduction strategies, which would then contribute to a safe medication practice environment and safety culture. ■

Table 3. Theme 3 – Prescription preparation

As the mainstay in type 2 diabetes management, metformin is dispensed frequently; combination products containing metformin are used often as well. Prescription-preparation incidents involving technical errors often include incorrect data entry and blister pack (or multi-medication compliance aids) preparation.	
Subtheme - Data entry of prescription and patient care information	
Potential Contributing Factors	Recommendations
External influences such as distractions and heavy workload, potentially leading to an increased chance of technical errors Confirmation bias	Incorporate independent double checks into workflow whenever possible.
Subtheme – Blister pack (or multi-medication compliance aids) preparation	
Potential Contributing Factors	Recommendations
Complexities and vulnerabilities associated specifically with blister pack (or multi-medication compliance aids) preparation	Create a list of high-alert medications that are frequently used or dispensed in blister packs (or multi-medication compliance aids) based on the pharmacy's individual product demand. This list can be displayed in the dispensary area as a reminder for all staff members. Adopt a checklist that outlines the procedures of blister pack (or multi-medication compliance aids) preparations, with an extra section of precautions/tips specifically for high-alert medications. Consider redesigning the work environment, so that there is a specific workspace for blister pack (or multi-medication compliance aids) preparation, in order to minimize distractions and mixing up with other prescription-preparation procedures.

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