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Labelling and Packaging: An Aggregate Analysis of Medication Incident Reports

The information presented on the inner and outer labels of health products and the design and layout of this information constitute an important mechanism of communication to end users, both healthcare practitioners and consumers. Since ISMP Canada began accepting voluntary incident reports in 2000, reporters have repeatedly identified issues related to the labelling and packaging of health products as a concern. Some of these incidents have been described in previous issues of the ISMP Canada Safety Bulletin. Health Canada has also communicated about labels and packages as factors that have contributed to medication incidents.[1-4] This ISMP Canada Safety Bulletin shares findings from an aggregate analysis of reports received by ISMP Canada related to the labelling and packaging of health products available in Canada. The full aggregate report is available from: www.ismp-canada.org/download/LabellingPackaging/ISMPC2013_LabellingPackaging_FullReport.pdf

Background

As a result of the number and types of errors submitted to reporting programs that relate to health product labels and packages, Health Canada recognized the need for a Canadian resource that would support manufacturers in designing labels and packages to be clear, accurate, and understandable. In 2012, Health Canada, in collaboration with ISMP Canada, began developing a guide outlining principles for the design of health product labels* and packages,with patient safety in mind. Its scope is intended to encompass all health products for human use: prescription and nonprescription pharmaceuticals, biologics, and natural health products. The guide is also intended to align with and support Health Canada's Plain Language Labelling Initiative.[5] The content of the guide will be based upon findings of the aggregate analysis and reviews of the literature, of national standards and initiatives, and of national and international regulations and guidance.

Methods of Analysis and Overview of Findings

The purpose of the aggregate analysis was to gain an overall understanding of labelling and packaging issues identified in voluntary reports received by ISMP Canada over a period of about 11.5 years (January 1, 2001, to May 15, 2012) and to gain a deeper understanding of potential systems-based contributing factors.

A search of the ISMP Canada database, in May 2012, for any report in which labelling or packaging was identified as a contributing factor or concern, yielded over 2000 reports. Additional inclusion criteria were applied to focus on reports specifying the

* Refers to the label on or affixed to an immediate container or the outside of a package. The product monograph and any other package inclusions were not included in the scope of this project.

manufacturer's labelling and/or packaging as an issue. A total of 474 incident reports remained after application of the inclusion and exclusion criteria. A qualitative analysis was then conducted.

A total of 7 main themes along with subthemes were identified.

Main Themes

1. Main Theme: Drug Selection Confusion

Three key subthemes were identified: product mix-ups (between products from the same or different manufacturers), 2-part products (e.g., medications supplied in powder format that must be reconstituted with a product-specific diluent, where the components were packaged either separately or together), and confusion about product information (as related to ingredients or appropriate use of the product according to information on the label or package).

Interestingly, mix-ups between products from the same manufacturer appeared to involve products of various formats and sizes. Conversely, reported mix-ups involving products from different manufacturers typically occurred with small containers (e.g., ampoules, vials, minims). The latter may be related to the incident reports received from facilities where storage constraints often led to medications being stored without their outer packages in the care areas where they were to be used. It is however, also important to recognize that the inner package and label may be the only information readily available during preparation and for the final check before administration, regardless of how it is stored. Product mix-ups involving "high-alert"[6] medications, whether involving the same or different manufacturers, are of particular concern because such incidents are more likely to cause patient harm.

A number of healthcare practitioners noted that repackaging or additional labelling was needed for certain types of medications. Examples included blister packs that had to be repackaged because the information on the foil package did not align with each tablet, suppositories that had to be repackaged because the generic name did not appear on the inner label, or alert labels that had to be added to products with look-alike potential or that had previously been involved in mix-ups. These examples suggest opportunities for manufacturers to consider enhancing labelling and packaging to meet the needs of end users.

Incident examples

- A patient with insulin-dependent diabetes mellitus had a prescription for insulin cartridges. The patient had recently obtained a refill of the prescription from the community pharmacy, which consisted of several boxes of 5 cartridges each. On the morning of the incident, the patient had inserted a new cartridge from one of the new boxes into an insulin pen. A short time after self-injecting the prescribed morning dose, the patient was found in a diaphoretic state, with pupils dilated and a decreased level of consciousness. It was discovered that, along with several boxes of the correct insulin cartridges containing 30% short-acting insulin and 70% intermediate-acting insulin, one box of ultrashort-acting insulin cartridges had been dispensed.[7]

- A clinic reported that in 4 cases of intended vaccination, it was likely that only the diluent had been administered, instead of the MMR (measles–mumps–rubella) vaccine that should have been prepared with the diluent. The error was identified when additional doses of the vaccine were received into stock, and the existing stock was counted. The count revealed 4 more vials containing MMR powder than vials of diluent. Staff at the clinic reviewed hundreds of charts but were unable to identify which patients might have received only the diluent.[8]

2. Main Theme: Strength or Dose Confusion

Under this theme, reported incidents relating to product strength or dose involved selection of the correct product but at the incorrect strength or dose. Analysis of the error reports yielded 3 subthemes: confusion within a product line, confusion related to dose expression or display, and confusion about product-use information.

Incident example

- A patient was admitted to an intensive care unit with neurological bleeding. During medication reconciliation performed after admission, it was discovered that the patient had been taking low-molecular-weight heparin (via prefilled syringe) before the admission. However, because of a dispensing error (with the wrong prefilled syringes being dispensed), the patient had received a higher-than-intended dose of this medication for several weeks at home. The reporter noted that prefilled syringes with different total doses of the low-molecular-weight heparin had identical Drug Identification Numbers (DINs). Health Canada has since revised its procedure for issuing DINs for unit dose prefilled syringes.[9]

3. Main Theme: Nonprescription Product Confusion

Incidents involving nonprescription product confusion were reported by both healthcare practitioners and consumers and included reports submitted to ISMP Canada through the consumer reporting and learning program known as SafeMedicationUse.ca (www.SafeMedicationUse.ca), which was launched March 2010. Initiated as a pilot project, the SafeMedicationUse.ca program has become an established and integral aspect of ISMP Canada's efforts to improve medication safety.

Patients and consumers are key stakeholders in efforts to improve medication safety. Consumers and patients represent a unique source of information, often providing reports that are rich in detail. Much has already been learned, through reporting for prescription medicines, about the design factors that can lead to product confusion. Similar concerns are emerging about the design and layout of information on nonprescription products, many of which are available to consumers and patients for self-selection, without the assistance and intervention of healthcare practitioners. For example, reports categorized within this main theme involved confusion about the strength or dose of a product, as well as confusion about ingredients. The products implicated in these reports included oral solid formulations (e.g., tablets, capsules), oral liquids, and liquids for external application.

Incident example

- A consumer confused a hydrogen peroxide contact lens solution with a multi-purpose contact lens solution and used it to rinse lenses directly before placing them in the eyes. The product contains 3% hydrogen peroxide, which can cause pain and burning if it comes into contact with the eyes. The hydrogen peroxide solution is packaged with a special lens cleaning case. When the product is used with the special case, the hydrogen peroxide is neutralized to a solution that is safe for the eyes. Other reports have been received from consumers who have experienced harm after improper use of the same solution.[10]

4. Main Theme: Route Confusion

One of the earliest ISMP Canada Safety Bulletins highlighted published information about patient deaths from inadvertent intrathecal injection of vincristine intended for intravenous infusion.[11] Since that report (in 2001), the World Health Organization has published recommendations for the labelling of vincristine to prevent further such incidents.[12] However, route confusion involving other injectable, topical, oral and inhaled medications continues to occur and has been highlighted in subsequent safety bulletins.[13-15]

The type of container or the format of the medication is often used by end users as a cue to the intended route of administration. With an increasing trend towards standardization of available containers, sourcing of appropriate packaging can be challenging. When the container or the format or appearance of the medication differs from the anticipated appearance (e.g., topical medication in a vial format), the medication may be administered by the wrong route. Although some medications can be administered by more than one route, the appropriate dosage often differs markedly depending on the route. If the intended route of administration is not used, harm can occur or efficacy may be compromised.

Incident example

- Various operating room practitioners have brought to ISMP Canada's attention a specific concern about packaging for topical medications such as epinephrine. Although these medications are manufactured for topical use, the packaging may be similar to packaging used for vials containing injectable medications, specifically a vial with rubber stopper held in place by a metal ferrule. This format may lead some practitioners to use a needle and parenteral syringe to withdraw the medication before transferring it to an open container; the use of a parenteral syringe may lead to inadvertent administration by the intravenous route before transfer to the open container.[13]

5. Main Theme: Formulation Confusion

The main subtheme identified involved confusion of products with different durations of action. Some of these are high-alert medications (e.g., opioids), which have an increased risk of patient harm when there is a formulation mix-up.

Incident example

- In several incidents, the long-acting (depot injection) and short-acting formulations of an injectable medication were mixed up. Reports indicated that the labelling and packaging of the products were "nearly identical". One case involved a recent change in packaging, whereby 2 formulations of a drug were "standardized" to the same container type.

6. Main Theme: Solution Confusion

Analysis of the incidents uncovered 4 themes related to solution confusion: plain or base solutions, premixed medications, concentration, and route or purpose. Incidents of solution confusion involved solutions administered by healthcare practitioners, typically within a facility setting such as an acute care hospital. In some cases, the solutions implicated were used intravenously for hydration (plain or containing electrolytes). Other cases involved solutions used for dialysis (e.g., continuous renal replacement therapy [CRRT]), solutions used for irrigation or inhalation, and those used by pharmacy staff to prepare medications. A key component common to incidents in this category was the type of container (i.e., bag format). The use of this type of container entails labelling constraints and requirements (e.g., technological constraints) additional to those that come into play for labelling other types of container.

Incident example

- A patient received an intravenous infusion of sterile water, instead of the intended normal saline solution. Unfortunately, close to 600 mL of sterile water was infused before the error was discovered, through the presence of blood in the patient's urine. The patient experienced renal complications as a result of the damaging effects of hypotonic sterile water on red blood cells and required admission to the intensive care unit.[16]

7. Main Theme: Other Sources of Confusion

Health Canada requires that several specific types of information be included on product labels, including expiry dates and lot numbers. Under this theme, there was confusion related to expiry dates (i.e., ambiguity of the dates expressed), lot numbers and package size or type.

Incident example

- One reporter expressed concern about expiry dates presented in a compressed form (e.g., 2 digits each for year, month, and day). The reporter noted that, in some situations, it could be impossible to tell what each 2-digit number represents.

Potential Contributing Factors

Factors potentially contributing to reported incidents are described in more detail, categorized by subthemes, in the full aggregate report. Examples of contributing factors include:

- Look-alike labelling and packaging; of particular concern are high-alert medications
- Trade dress and brand name prominence
- Lack of prominence of generic name or ingredients
- Crowding of information on labels
- Look-alike, sound-alike drug names, including product-line extensions
- Storage of small containers without their outer packages (e.g., ampoules, vials)
- Readability, font size, background (e.g., clear), colour contrast between background and printing
- Labelling and packaging of diluent for 2-part products
- Same DIN for different volumes of liquid with same concentration
- Total amount of injectable drug per total volume absent or not prominent
- Confusing layout of information (required volume for specified dose of injectable drug difficult to determine)
- Amount of drug identified as salt versus base or element not clear
- Mismatch between display of information and perforations on blister pack
- Use of dangerous abbreviations or other designations (e.g., trailing zero)[17]
- Warnings unclear or absent
- Similar containers for formulations intended for different routes of administration or purposes (e.g., topical liquid product provided in a vial)
- Use of abbreviations to indicate release duration (e.g., CD, CR, ER, IR, XL)
- Ambiguity of expression of dates (e.g., 11-01-12 or 20130301)

Conclusion

Voluntary reports identifying labelling, packaging, and naming issues as factors contributing to medication incidents offer an important opportunity for improvements to support the safe and effective use of health products by healthcare professionals, patients, and consumers. Over the years, such reports have led to valuable learning and more than 60 voluntary changes by manufacturers, some of which have been highlighted in past bulletins.[18-22] It is clear that many manufacturers are open to dialogue and are willing to make changes to labelling and packaging to enhance medication safety. The results of the aggregate analysis shared in this bulletin provide insights into issues experienced by the users of health products and will help to inform the development of a guide for manufacturers to support the design of labels and packages with patient safety in mind. These results are being reviewed in conjunction with a wide range of other available information to identify the topics to be covered in the guide. It is anticipated that a draft version of the guide will be released by Health Canada for consultation in 2014.

For more information, please email cmirps@ismp-canada.org

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Consumers Can Help Prevent Harm From Opioid Use - Video with Subtitles Now Available!

ISMP Canada is pleased to announce that the video "Consumers Can Help Prevent Harm from Opioid Use" is now available with subtitles. The subtitles have been added in response to requests from healthcare providers who wish to play the video without sound in patient waiting areas. Subtitled versions are available in both English (http://youtu.be/SDMz4IqnpPk) and French (http://youtu.be/FNfUrZLUZU8).

This video provides information about the steps consumers can take to avoid being harmed by an error with opioids. It also educates consumers about how to recognize signs of opioid overdose and the actions to take if an overdose is suspected. For information on how to obtain a copy of the video with subtitles to play in your waiting area, please contact info@ismp-canada.org.

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The Canadian Medication Incident Reporting and Prevention System (CMIRPS) is a collaborative pan-Canadian program of Health Canada, the Canadian Institute for Health Information (CIHI), the Institute for Safe Medication Practices Canada (ISMP Canada) and the Canadian Patient Safety Institute (CPSI). The goal of CMIRPS is to reduce and prevent harmful medication incidents in Canada.

HIROC

The Healthcare Insurance Reciprocal of Canada (HIROC) provides support for the bulletin and is a member owned expert provider of professional and general liability coverage and risk management support.

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The Institute for Safe Medication Practices Canada (ISMP Canada) is an independent national not-for-profit organization committed to the advancement of medication safety in all healthcare settings. ISMP Canada's mandate includes analyzing medication incidents, making recommendations for the prevention of harmful medication incidents, and facilitating quality improvement initiatives.

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