The Institute for Safe Medication Practices and Poison Control Centers: Collaborating to Prevent Medication Errors and Unintentional Poisonings

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Abstract This article provides an overview on the Institute for Safe Medication Practices (ISMP), the only independent nonprofit organization in the USA devoted to the prevention of medication errors. ISMP developed the national Medication Errors Reporting Program (MERP) and investigates and analyzes errors in order to formulate recommendations to prevent further occurrences. ISMP works closely with the US Food and Drug Administration (FDA), drug manufacturers, professional organizations, and others to promote changes in package design, practice standards, and healthcare practitioner and consumer education. By collaborating with ISMP to share and disseminate information, Poison Control centers, emergency departments, and toxicologists can help decrease unintentional and accidental poisonings.

Keywords Medication error · Poisoning · Poison control centers · Patient safety

Background

Previous presentation Presented at the ACMT Pre-Meeting Symposium, “At the Precipice of Quality Health Care: The Role of the Toxicologist in Enhancing Patient and Medication Safety,” at the 2014 North American Congress of Clinical Toxicology, New Orleans, LA, 17 October 2014.

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The Institute for Safe Medication Practices (ISMP), based in suburban Philadelphia, is the only independent 501c (3) non-profit organization devoted entirely to medication error prevention and safe medication use. The medication error prevention efforts were initiated in 1975 with a column in *Hospital Pharmacy* to improve understanding and educate healthcare professionals and others about medication error prevention. ISMP has an interdisciplinary staff of healthcare professionals including nurses, pharmacists, physicians, and trainees to fulfill this mission. In 2014, ISMP celebrated its 20th anniversary as a nonprofit organization [1].

The initiatives of ISMP, built upon a non-punitive approach and system-based solutions, fall into five key areas: knowledge, analysis, education, cooperation, and communication. The cornerstone of ISMP is based on voluntary practitioner error reports through the national Medication Errors Reporting Program (MERP).

From this error reporting program, on site consulting work, and other collaborative efforts, as well as interactions with healthcare professionals, organizations and consumers, ISMP catalogues errors occurring in multiple settings and identifies potential contributing factors and disseminates recommendations within the healthcare community. ISMP publishes five “ISMP Medication Safety Alert!” newsletters for healthcare professionals and consumers that reach over one million readers. These publications include a newsletter focused on acute care hospitals published twice a month; three monthly publications for nurses, community/ambulatory settings, and long term care; and a bi-monthly publication for consumers. The Institute also develops best practice guidelines; presents frequent educational programs, including teleconferences on current medication use issues for physicians, nurses, pharmacists, and other healthcare professionals; develops valuable

medication safety tools such as lists of high alert drugs and potentially dangerous abbreviations; and provides confidential consulting services to healthcare systems to proactively evaluate medication systems or analyze medication-related sentinel events. ISMP maintains a website for healthcare professionals where many of its resources and tools can be found as well as a separate consumer medication safety website that informs consumers about potential errors and offers pro-active error prevention strategies [2, 3].

ISMP has aligned with the National Coordinating Council for Medication Error Reporting and Prevention (NCCMERP), a group of over 20 organizations, to coordinate the distribution of timely, critical information through a National Alert Network (NAN). These alerts are rapidly distributed through member organizations and press releases. Over 40 years of analyzing medication error reports have enabled ISMP to suggest credible error reduction strategies. This is accomplished through constant contact with an advisory panel of practicing healthcare professionals, researchers, and experts in human factors and medication safety. These individuals collectively help ISMP offer evidence-based and practical error-reduction strategies. ISMP is also responsible for reviewing all medication error reports submitted by healthcare facilities to the Commonwealth of Pennsylvania Patient Safety Authority. In addition, ISMP is certified as a Patient Safety Organization (PSO) by the Agency for Healthcare Research and Quality.

As a FDA MedWatch partner, ISMP shares reports it receives with the FDA and receives reports on medication error events reported to the FDA. This relationship allows practitioners and others to report errors to ISMP with the knowledge that the report will reach the FDA, but also that errors due to practice issues, not necessarily addressed by the FDA, will be fully investigated and analyzed by ISMP.

Example Cases

ISMP has received many reports over the years of acetaminophen overdoses in children that resulted in hospitalization. One involved a 3-year-old child consuming 15 tablets from a Tylenol EZ open tablet bottle containing 500 mg tablets in easy to swallow pill form that resembled candy (e.g., red M&M's or Skittles). The child's acetaminophen level upon admission was greater than 300 mcg/mL, and he developed fulminant hepatic failure complicated by acute lung injury requiring a prolonged hospitalization. Upon investigation, these packages were not child resistant, contained easy to swallow pills, and were intended for households without children. ISMP was able to work with the manufacturer to suggest changes in the packaging and labeling of this product [4].

In another example, ISMP learned of an accidental ingestion of a topical camphor-containing gel used for itching (Benadryl Itch Stopping Gel) and immediately notified

healthcare practitioners and the FDA of the unsafe packaging of this product. The product was packaged in a 118 mL (4 oz) bottle that is similar to containers with liquids meant for oral use. Camphor can cause serious symptoms including burning of the mouth, nausea and vomiting, irritability, confusion, seizures, and coma, and fatalities have been reported. Camphorated oil, another topical product, was removed from the market in the 1980s after multiple incidents of accidental ingestion. Subsequently, the FDA found seven other cases in their database of unintentional oral consumption with this product, and the company is now packaging the product in a tube container rather than a bottle [5].

Other examples of confusing packaging that have or could lead to inadvertent ingestion or topical application in error includes:

1. Products packaged in stick like containers that resemble moisturizers for the lips. These include glue sticks that have been applied to the eye or mouth and wart and corn sticks for application to warts or foot calluses.
2. Melatonin for oral ingestion that resemble candy mints or breath strips.
3. Contact lens soaking products that contain 3 % hydrogen peroxide (e.g., Clear Care) for cleaning and disinfecting with similar packaging as lens cleaning solutions.

In the last example, ISMP has received numerous reports of people accidentally using contact lens cleaning solution as a wetting solution. Many of these cases required treatment in emergency departments for ocular injury. These products are frequently stored side-by-side on supermarket and pharmacy shelves, although they have very different usages.

An additional major area of concern to ISMP is confusion between US liquid measurement and the metric system. The USA is one of only three countries in the world that doesn't use the metric system. And, although the majority of oral liquids and even soft drinks contain metric volume, practitioners and pharmacies, as well as many electronic medication ordering and dispensing systems, continue to use teaspoons and tablespoons for dosing of liquid medications. Examples of confusion between teaspoons and tablespoons and inaccurate measurements using household devices are unfortunately a common occurrence. Another problem leading to errors in dosing is that many over the counter products are not standardized in their concentrations among similar products. One example is Vitamin D (ergocalciferol) for infants and children. There are at least three products on the market that contain varying volumes for the same dose; 400 units/drop, 400 units/2 drops, and 400 units/1 mL. Parents have interchanged these products using the wrong measurement of dose.

More recently, inappropriate use or sharing of compounded medications has resulted in significant toxic events. The Philadelphia Poison Control Center had eight cases reported

involving topical compounded products over the last 12 months. These have included cases of children ingesting or applying creams, adults intentionally abusing products, as well as patients experiencing adverse effects with appropriate use. Many of these products may contain as many as eight or nine ingredients including gabapentin, ketamine, diclofenac, clonidine, nifedipine, bupivacaine, menthol, and cyclobenzaprine. Some contain DMSO to enhance absorption. In one case, an 18-month-old child was hospitalized after his mother applied a pain ointment, prescribed for her husband, to the child for diaper rash. The child had gasping respirations and was deeply sedated. Following resuscitation, the child was found to have a serum clonidine level of 9.2 ng/mL (reference range, 0.5–4.5 ng/mL) and a norketamine level of 41 ng/mL (reporting limit, greater than 20 ng/mL) [6, 7].

ISMP has also reported on cases of mix-ups between parenteral pharmaceutical products with similar packaging and labeling or ambiguous labeling of the concentration or volume in the vial or ampule. Many successful changes in product packaging and labeling, especially with the display of drug concentrations and total amount contained in vials, have been made secondary to ISMP reporting and its relationship with the FDA and/or manufacturers. ISMP has a list on its website of Tallman lettering for certain drug names that are frequently confused.

Discussion

ISMP's vigilance in error surveillance and prompt and expedient interactions with the FDA and manufacturers have resulted in changes of product packaging and labeling, product names, and content to help avoid errors and prevent unintentional toxicity. ISMP has also collaborated with poison control centers and medical toxicologists to share reports and information to help inform others of their occurrence and identify prevention strategies. This interaction with poison control centers and medical toxicologists should continue and expand. Medical toxicologists are involved in the diagnosis and treatment of individuals who may have toxic effects resulting from

medication errors. ISMP expertise is in exploring the underlying factors contributing to these errors. Collaboratively, poison control centers and ISMP can communicate error prevention strategies through their respective networks and publications, and identify those organizations that may help prevent further occurrences. ISMP can also call upon poison control center personnel and medical toxicologists for help in identifying the extent of a problem that may get reported to ISMP.

Conclusion

Medical toxicologists and poison control centers managing patients with unintentional medication toxicity can share experiences in confidence with ISMP. The Institute and medical toxicologists can explore and identify potential contributing factors for each occurrence and collaborate on recommendations and dissemination of prevention strategies.

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