ISMP Canada identifies themes associated with fatal medication events in the home

Medication safety in the home is an important public health issue. Almost half of all Americans have taken at least one prescription medication in the last month, and more than three-quarters have taken an over-the-counter (OTC) medication. Almost two-thirds of Americans take at least one medication daily to treat a chronic health problem. Most of these medications are taken in the consumer’s home, group home, or other residential or community setting. In these settings, the risk of medication errors is ever present as consumers with variable health literacy and unlicensed healthcare personnel undertake the complex processes associated with safe medication management.

To learn more about medication errors that happen in the home, our sister organization, the Institute for Safe Medication Practices (ISMP) Canada, collaborated with several provincial Offices of the Chief Coroner and Chief Medical Examiner in Canada to conduct an analysis of medication events associated with deaths in the community setting. The goal of the analysis was to better understand the challenges faced by unlicensed healthcare personnel and consumers when managing medications in the home, and to identify opportunities to prevent similar tragic events in the future. This novel analysis uncovered clear themes and contributing factors that led to the fatal events. We believe these findings are noteworthy and valuable to US healthcare professionals, as there is good reason to believe that the same issues are causing fatal medication errors in US homes.

Investigations of 122 fatal medication events spanning over 6 years (2007-2012) were reviewed by an interdisciplinary team at ISMP Canada. Of these, 45 events occurred in a consumer’s home, group home, or other residential setting. In all of the 45 cases, the medications were administered by the consumer, family members, or unlicensed healthcare personnel. The overarching theme linking the 45 events was knowledge deficits leading to various patient safety risks. These fell into three key areas: knowledge deficits related to misperceptions about medications, knowledge deficits related to signs and symptoms of toxicity, and knowledge deficits about specific medications. ISMP Canada published a detailed account of its analysis, which is summarized with permission below.

Knowledge deficits related to misperceptions about medications

The largest category of knowledge deficits involved misperceptions about the medications, including a failure to appreciate the general risks associated with prescription and OTC drug therapy. Most of the deaths involved an intentional therapeutic overdose, therapeutic sharing, or unsafe storage of medications.

Intentional therapeutic overdose: “If one is good, two will be better.” A number of events involved a prescription or OTC medication that was taken or given at a higher dose than prescribed or recommended on the package. Either extra doses were taken, dosing instructions were disregarded, or “as needed” doses were continued on page 2—> Fatal events

check it out

Be sure to cover these topics when educating patients about the medications they take at home:

- The increased risk of side effects and serious toxicity if the dose of the medication is increased or the drug is taken more frequently (or treatment failure if taken less frequently) than prescribed or indicated
- The importance of following medication instructions on the label (for both prescription and OTC medications)
- The importance of seeking out assistance from a licensed healthcare provider if the directions for taking a medicine are unclear or say “take as needed”
- The potential side effects of medications, how to differentiate potentially dangerous effects (i.e., excessive sleeping, gurgling noises) from more benign ones, and the actions needed to mitigate harm
- The signs and symptoms of toxicity necessitating intervention by licensed healthcare providers
- The importance of not sharing medications with anyone or taking medications from others
- Specific safeguards for the most frequent medications involved in these fatal events, particularly high-alert medications such as opioids (e.g., how to evaluate the level of sedation and signs of toxicity, safe storage)
- The need to immediately communicate to a healthcare provider any changing or worsening symptoms related to the medications and conditions being treated, or unusual or sudden behavioral changes
- The importance of reporting all medication errors to a healthcare provider
- A plan to assess symptoms and medication effects (e.g., pain control when taking opioids) at regular intervals appropriate to the clinical situation

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used routinely. In the analyzed events, it appears that most consumers or unlicensed healthcare personnel lack awareness that a higher dose would increase the risk of side effects and serious toxicity, particularly with OTC medications. The following is an example of a fatal error in this category.

An elderly woman with peripheral vascular disease died because of complications from overuse of an OTC Chinese herbal medicine containing methyl salicylate. The medicine was intended to be applied once or twice daily on the legs to provide relief from arthritic pain. The woman was frequently seen applying the medicine at least 3 or 4 times daily and would hide the medicine from the rest of the family after being reminded to use it less often. Overuse of the herbal medicine led to multiple medical problems, which contributed to her eventual death.

Therapeutic sharing: “What works for me will work for you.” In a few instances, well-meaning people shared their prescription medications with others. However, they were unaware that a medication’s effect is highly dependent upon the individual’s medical conditions, tolerance to the medication, drug interactions, and the pharmacologic properties of the drug itself. Many drugs require individual assessment, dosing, and monitoring, and cannot be safely shared from one person to another. Some consumers felt their symptoms were not being appropriately addressed by their healthcare provider, which may have led them to consider recommendations from a friend. An example in this category follows.

A man with chronic alcoholism and chronic pain from a work injury was found dead at home. A fentaNYL 100 mcg/hour patch was found on his body, although the drug had never been prescribed for him. The man told his wife that the patch had been provided by a friend. His death was attributed to alcohol and fentaNYL toxicity in an apparent opioid-naïve person.

Unsafe storage: “Does it really matter where I keep my medications?” In this category, death occurred when medications were accessed and taken by others for whom the medication was not intended, particularly children. Pre-pouring medications and unsafe storage of drugs contributed to the events. Opioids caused most of the deaths in this category.

A young child died after ingesting some of her father’s liquid methadone dose. The child’s father had taken part of the dose and mixed the remainder with orange juice in a cup that was accessible to the child. The child was later observed drinking what appeared to be juice. The following morning, the child could not be awakened and subsequently died in the hospital.

Knowledge deficits related to signs and symptoms of toxicity

Opportunities to mitigate harm or prevent death may exist even after the occurrence of a medication event. Unfortunately, in many of the events analyzed, caregivers or family members did not know or recognize warning signs of toxicity, which hindered timely recognition of distress and resulted in missed opportunities to rescue the consumer. Analysis revealed that the majority of deaths falling under this category involved: unconsciousness mistaken for sleep, a sudden change in behavior, or a reluctance or hesitancy to seek help.

Unconsciousness mistaken for sleep. In numerous events, family members or caregivers thought the person was sleeping when, in fact, he or she was unconscious. If unconsciousness is detected in a timely manner, there may be an opportunity to continue on page 3—Fatal events >
> Fatal events—continued from page 2

intervene and rescue the person from harm. Many caregivers or family members recalled hearing the person snore or make gurgling or groaning noises but did not know that unusual and irregular snoring is often a sign of dangerous stupor. In the events analyzed, family members or caregivers had not tried to awaken the person until it was too late, assuming that “sleep is good,” as in the following example.

A resident of a halfway house died from accidental oxyCODONE toxicity. He had been taking morphine and gabapentin prescribed by his family physician but was later referred to a pain specialist who suggested a long-acting oxyCODONE product. The written recommendation from the specialist was misinterpreted by the family physician, who prescribed a very high dose of oxyCODONE. After confirmation of the dose with the pharmacy and family physician, the medication was given to the resident for 3 days. On the day of death, the “sleeping” (but really unconscious) resident was not “awakened” for his scheduled dose of medication. Staff returned 2 hours later and found the resident was not breathing.

Sudden change in behavior. Analysis identified cases in which there was a notable change in the consumer’s behavior, which might have represented an opportunity for timely intervention. Behavior changes can be caused by drug toxicity. There are many medications used to treat a variety of conditions that can cause irregular behavior if given too frequently or at a higher dose than required. In the analyzed cases, the seriousness of the changed behavior prior to death was not recognized. An example follows.

A man with a history of mental illness was found dead at home. He had been taking multiple medications, including an opioid. A family member noted that, 2 days before his death, the man had been very groggy and did not seem like himself. The patient’s death was associated with opioid toxicity.

Reluctance or hesitancy to seek help. In a number of the cases reviewed, the consumers’ condition or pain had worsened, and they may have made changes in their medication regimen without seeking advice from a healthcare professional. In some instances, the consumer had told friends or family members of new or worsening symptoms lasting anywhere from 3 days to 3 weeks before death but had never reported these concerns to a healthcare provider. The following event illustrates a reluctance to seek help, even when an error was known to have occurred.

A man lived in a communal house for people with various mental health issues. The owner of the house was responsible for distributing medications to the tenants at mealtimes. On the day of the event, the owner was ill and asked a family member to oversee the medication routine. Instead of receiving his usual medications, the man was given someone else’s medications, including amitriptyline, QUEtiapine, loxapine, and OLANZapine. When the family member realized the error, he immediately notified the owner of the house, who thought the medications the man had received were not significant enough to warrant medical attention. The man went to bed that evening and was found dead in his room the following morning.

> Knowledge deficits related to specific medications

The most frequent medication classes identified during analysis of the fatal events included:

- opioids (20 cases)
- psychotherapeutic drugs (17 cases)

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Moderate dementia of the Alzheimer's type or mild to moderate dementia associated with Parkinson’s disease. Although Exelon isn’t available in a tablet, it is available as a patch and capsule. When used orally, the starting dose is just 1.5 mg twice a day with subsequent dose titration after tolerating that dose for 2-4 weeks. Then additional dose titration takes place again after 2-4 weeks, until a maximum dose of 12 mg daily is tolerated. Among the capsule strengths available are 1.5 mg, 3 mg, 4.5 mg, and 6 mg, so a 7.5 mg oral dose could be ordered and dispensed as two capsules (6 mg and 1.5 mg, or 3 mg and 4.5 mg). Fortunately, a pharmacist noticed the unusual Exelon dose and recognized the error when he received the order.

Perhaps the pharmacy label would have been a bit less error-prone if the manufacturer’s name was listed far away from the drug name—a recommendation we made to the mail order pharmacy that displayed the manufacturer’s name above the directions for use. This type of error also demonstrates the importance of including the drug indication with prescription communications. We have also notified Novartis, Exelan, and the US Food and Drug Administration (FDA). Exelon, a Novartis product, initially received FDA approval in 2000. Exelon, the company, was incorporated in 2010. Neither ISMP nor FDA have any similar reports of mix-ups between Exelan and Exelon in our databases.

Vecuronium and vancomycin vial mix-ups. An anesthesiologist reported a hazardous situation with look-alike vials of Mylan’s vecuronium 20 mg injection and vancomycin 1 g injection. The medications are stored in pharmacies and are both used in the operating room. Although their continued on page 4—S A F E T Y wires >
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- insulins (5 cases)
- OTC medicines (5 cases)
- cardiovascular drugs (4 cases)
- anticoagulants (3 cases)
- anticonvulsants (2 cases)

Several of these drug classes are also considered high-alert medications (e.g., opioids, insulin, anticoagulants). While the knowledge deficits associated with these medications are not generalizable to all events within the drug class, an illustrative example with insulin follows.

An older man died after an inadvertent insulin overdose. He and his family were recent immigrants, and there was a language barrier. Day-to-day care was provided by his adult children, who prepared meals and administered medications, including insulin. They believed that additional insulin was needed to treat low blood glucose and continued to give insulin when blood glucose readings were low.

**Conclusion**

ISMP Canada has highlighted important underlying knowledge deficits that contributed to preventable medication-related deaths in the home setting. The themes and contributing factors identified in this analysis illustrate the need to educate consumers about the medications they take at home. See the **check it out** column on page 1 (right column), for specific educational topics to help consumers, families, and caregivers prevent errors in the home.

**References**


**Special Announcements**

**ISMP webinar**. You don’t want to miss our next webinar, *Implementation of Best Practices for Safer Insulin Pen Use: Stories from the Frontline*, to be held on **March 28**. The webinar will explore challenges associated with the safe use of insulin pens from the pharmacy with the support of integrated electronic prescribing and bar-coding systems. To register, visit: www.ismp.org/sc?id=349.

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