



Clinical Pharmacology & Toxicology Pearl of the Week

~ High-alert medications ~

Case:

- ✓ A 55-year-old female is diagnosed with a new DVT. After discussing risks and benefits of various medication options, she is started on warfarin, with tinzaparin as a bridging medication until her INR is therapeutic.
- ✓ She presents to hospital two weeks after starting warfarin 5 mg PO daily. She has multiple bruises on her arms and legs, and has been noticing black stools along with increased fatigue.
- ✓ Upon medication review, you notice that her warfarin medication was dispensed incorrectly and she has been taking 10 mg a day instead of 5 mg a day.
- ✓ The patient is treated appropriately for her bleeding disorder and the medication is changed to the appropriate dose.

Background:

- ✓ High-alert medications are medications that bear a heightened risk of causing significant patient harm when they are used in error.
- ✓ Although mistakes may not be more common in the use of these medications, when errors do occur, the impact on the patient can be significant.

Characteristics of high-alert medications:

- ✓ Low therapeutic to toxic ratio
- ✓ Inherent undesirable effects
- ✓ Unique dosing (e.g. units instead of mg)
- ✓ Pharmacokinetic/pharmacodynamic interactions
- ✓ Look alike-Sound alike (LASA) names
- ✓ Newly-approved drugs
- ✓ Off-label use
- ✓ Given to a higher-risk patient (e.g. geriatrics (multiple meds) or pediatrics (weight-based dosing calculations))

Examples of high-alert medications in acute care settings:

- ✓ Anticoagulants (oral and IV)
- ✓ Opioids
- ✓ IV fluids (potassium solutions and NaCl above 0.9%)
- ✓ Insulin and oral hypoglycemics
- ✓ Corticosteroids
- ✓ Chemotherapeutics
- ✓ Antibiotics
- ✓ Sedatives
- ✓ Non-opioid analgesics (e.g. acetaminophen and NSAIDs)
- ✓ Antipsychotics
- ✓ Antiplatelet drugs
- ✓ Cardiovascular drugs

Prevention:

- ✓ Prevention involves a combination of:
 - Standardized orders
 - Dose calculators
 - Smart pump programming
 - Computerized order entry with validation
 - Selective capitalization/Tall Man lettering
 - Accurate weight for pediatric patients
 - Organ function and falls assessment in geriatric patients
 - Avoiding acronyms and prohibited abbreviations
 - No trailing zeroes when writing prescriptions
 - No physician dispensing of medications
 - Clinical Decision Support for medications

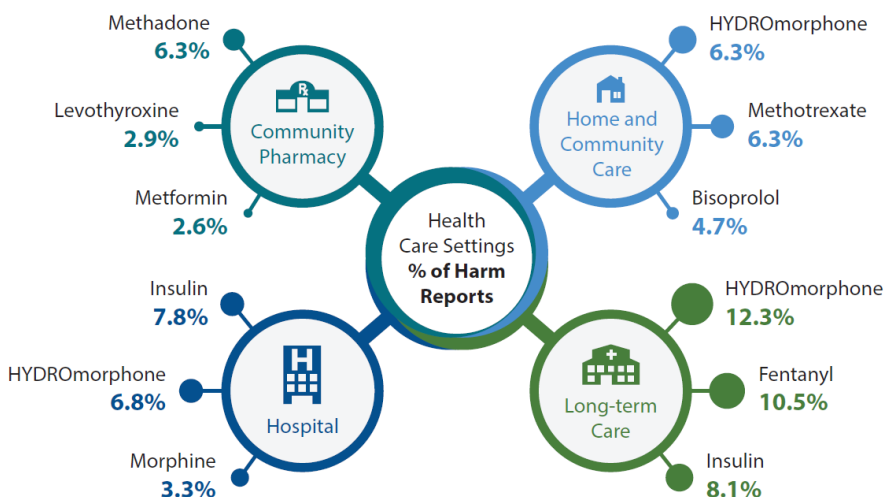
The Calgary Clinical Pharmacology physician consultation service is available Mon-Fri, 8am-5pm. The on-call physician is listed in ROCA. Clinical Pharmacology consultations are also available through the Netcare e-referral process and through Calgary Zone Specialist Link. Click [HERE](#) for more details.

The Poison and Drug Information Service (PADIS) is available 24/7 for questions related to poisonings. Please call 1-800-332-1414 (AB and NWT) or 1-866-454-1212 (SK).

References:

1. Benjamin, D. Journal of Clinical Pharmacology, 2003;43:768-783
2. Lin et al. Potentially high-risk medication categories and unplanned hospitalizations: a case-time-control study. Scientific Reports | 7:41035 | DOI: 10.1038/srep41035.
3. ISMP Canada. Medications Most Frequently Reported in Harm Incidents over the Past 5 Years (2015–2020). December 22, 2020. Available at <https://www.ismp-canada.org/download/safetyBulletins/2020/ISMPCSB2020-i11-Medications-Reported-Harm.pdf>

FIGURE 4. Medications most frequently cited in reports of harm incidents, by health care setting, over a 5-year period Jan 27, 2015 to Jan 26, 2020



ISMP Canada, 2020