Clinical Pharmacology & Toxicology Pearl of the Week

~ Medication errors and solutions, Part 2 ~

Case

- ✓ An elderly woman with type 1 diabetes presented to the ED of a general hospital feeling weak and dizzy. She had recently experienced symptoms of a gastrointestinal infection and had not taken her insulin for 24 hours. She had been vomiting and felt dehydrated.
- ✓ Her glucometer reading in the ED was 24 mmol/L.
- ✓ Routine blood work was ordered, an IV line was started for hydration, and the attending physician wrote an order for ''10U insulin'' to be given intravenously.
- ✓ The nurse read the order as ''100 insulin'' and proceeded to give it. The patient subsequently became obtunded.
- ✓ The error was discovered almost immediately, and a bolus of IV dextrose was given.
- ✓ The patient was further stabilized in the ED over several hours, was transferred to the ICU, and made an uneventful recovery.

Background

- ✓ There are five steps in the sequence of ordering a drug to its delivery:
  - Prescription
  - Transcription
  - Dispensing
  - Administration
  - Monitoring
- ✓ Each of these stages represents a vulnerable link in a chain along which any variety of errors can occur. A breach along any one of the links in the chain may lead to an adverse drug event.
- ✓ In general, errors in healthcare can be divided into cognitive (human) and system errors.
- ✓ This pearl of the week will focus on solutions within each of these five steps.

1. Prescription

The following tips will help eliminate prescription errors:

- ✓ Have a drug reference system in place to assist physicians and nurses in the appropriate uses, applications, and dosages of drugs.
- ✓ Make liberal use of pharmacists' expertise in prescribing medications, especially when the drug is unfamiliar.
- ✓ Take a careful medical history, medication history, and allergy history on all patients. If available, refer to the patient's previous medical records.
- ✓ Order appropriate laboratory studies to identify patient characteristics that may place a particular patient at risk for an adverse drug event.
- ✓ When caring for pediatric patients, always have an accurate weight in kg recorded on the patient's chart and on the prescription.
- ✓ When caring for geriatric patients consider the following:
  - The possibility of drug-drug interactions when prescribing any new medications
  - The possibility of a fall occurring because of any new medication you prescribe
  - The patient's renal and hepatic function when prescribing new medication
  - The possibility that concomitant disease states may be adversely affected by any new medications
  - The patient's financial or mental status interfering with his or her ability to comply with the newly prescribed drug regimen
- ✓ Use extra caution when prescribing for pregnant patients: use category C drugs only if the anticipated benefits of the drug clearly outweigh the danger to the mother and/or baby of not using the drug.

2. Transcription

The following tips will help eliminate transcription errors:

- ✓ Write clearly and neatly: print or type if necessary.
- ✓ Prescribing vocabulary must be standardized: do not use apothecary terms (e.g. OD, OS, and OU).
- ✓ Manufacturers should avoid or eliminate ambiguities in drug names and dosing information.
- ✓ Include the drug's indication on all prescriptions to assist the pharmacist or nurse in dispensing the correct medication.
- ✓ Avoid acronyms and abbreviations.
- ✓ Take steps to avoid sources of confusion in written orders, such as trailing zeros: a misplaced or misread decimal point can result in a tenfold medication error.
- ✓ Minimize or eliminate oral orders: writing orders whenever possible and limiting verbal orders to urgent or emergency situations will eliminate many medication errors.
- ✓ Always include the prescriber's telephone or pager number on the medication prescription to enable the pharmacist or nurse to clarify any areas of confusion that may contribute to a transcription error.
- ✓ Using electronic medical records can virtually eliminate transcription errors.

3. Dispensing

The following tips will help eliminate dispensing errors:

- ✓ Arithmetic errors. Double-check your arithmetic, or have a second person do the arithmetic with you to confirm accuracy.
- ✓ Decimal points placement. If decimal points are used, confirm proper placement with the prescribing physician.
- ✓ Accurate weights. Confirm that the recorded weight is in kg, and that it is accurate.
- ✓ Confirmation of patient's allergy history. Confirm one last time that the patient is not allergic to the medication you are dispensing.
- ✓ The prescribing physician should not also dispense the medication. It is best to have two people prescribe and dispense any medication dispensed to enable one additional safety check in the process.
- ✓ Dispense only the quantity of medication necessary to carry the patient through to the time when he or she can properly have their prescription filled by a pharmacist.
- ✓ Keep proper records. Record all narcotics dispensed in a narcotics log and write all drugs dispensed from in the patient's medical record.
- ✓ Confirmation of right patient. In a hospitalized patient, always check the patient's wrist band before dispensing medication. Patients are often moved from one bed to another in the hospital, creating the potential that a medication intended for the ''patient in Bed A'' is given to another unintended patient if patients have been moved.

4. Administration

In addition to verifying the patient's allergy history, accurate weight, the following must be confirmed:

- ✓ Correct patient. Verify that the medication is being administered to the correct patient. Elimination of oral orders can prevent ambiguities that result in the administration of the ''right'' drug to the ''wrong'' patient.
- ✓ Correct drug. Verify that you are administering the correct drug; it is wise to double-check with the ordering physician.
- ✓ Correct dosage. Verify that you are administering the correct dosage.
- ✓ Compatibility. Verify that the drug you are about to administer is compatible with any co-administered drugs.
- ✓ Double-check IV lines. If the drug is ordered via IV, ensure that the patient has adequate IV access to avoid problems with infiltration of the drug.
- ✓ Confirm your arithmetic. Have a second person do the calculation with you.

- ✓ Correct route of administration. Verify that the route of administration is correct; make liberal use of references and consult a pharmacist when in doubt.

5. Monitoring

- ✓ Always monitor the patient for an appropriate time period following administration of medications for signs of an adverse drug reaction and/or toxicity.
- ✓ Be alert to the adverse effects profile of each prescribed medication and monitor for those side effects appropriately.
- ✓ Clearly inform patients of all potentially serious adverse drug effects that mandate return to a health care professional.
- ✓ Provide detailed yet simple to understand written instructions to all patients about their medications' purpose, proper mode of administration, and side effects profile.
- ✓ Inform all patients of the importance of any necessary monitoring tests (e.g. INR, electrolytes, renal or liver function tests, drug levels) in clear, easy to understand written instructions.
- ✓ Arrange for appropriate follow-up to ensure that proper monitoring is performed.
- ✓ To the extent possible, communicate with the patient's primary care physician regarding changes you make in the patient's drug regimen.

TABLE 2. The Medication Process, Error-producing Conditions, and Prevention Strategies in the Emergency Department (ED)*

Stage	Error-producing Conditions	Prevention Strategies
Prescribing	Incomplete knowledge of drug	Readily available drug reference systems
	Incomplete knowledge of patient	Pharmacist availability in the ED
		Take thorough medication/medical/allergy history
		Physician order entry
		Computerized decision support
		Pediatric patients
		Determine accurate weight in kilograms
		Be alert for calculation/decimal point errors
		Caution with "off-label" prescribing
		Geriatric patients
		Consider comorbidities and drug–drug interactions in particular
		Consider possibility of falls with new medications
		Consider renal and hepatic function
		Pregnant patients
		Rule out pregnancy if a possibility
		Careful evaluation of risk–benefit in pregnant patients
Transcribing	Verbal orders	Avoid verbal orders except for emergencies
	Poor penmanship	Write legibly; print if necessary
	Team communication errors	Electronic order transcription
		Attend carefully to drugs of like-sounding name
		Avoid acronyms or abbreviations
		Indicate decimal point clearly
		No trailing zeros
		Avoid apothecary terms
		Include physician phone no. and pager no. for patients leaving ED
Dispensing	Dispensing by nurses	Nurses dispense to another nurse and not themselves
	Dispensing by physicians	No dispensing by physicians
	Patient ID	Automated dispensing
		Check with emergency physician for any ambiguity in order
		Check correct placement of decimal points
		Check that weight is correct in kilograms
		Always check for allergies to drug class
		Doubly confirm patient identification; bar-coding
		Double-check arithmetic
Administration	Multiplicity of drugs used	Be prepared to challenge orders
	Potency of drugs	Clarify if any ambiguity or doubt concerning medication order
	Multiple patients in ED	Consistent consultation with reference materials
	Parenteral administration	Consultation with hospital pharmacist if available
	Drug incompatibilities	Call back verbal orders
	Physician administration	Implement systematic safety checks
		Avoid physician administration of drug wherever possible
Monitoring	Potent drugs	Ensure adequate monitoring technology
	Parenteral administration	Ensure adequate monitoring personnel
	Emergent procedures	Clear ED protocols for conscious sedation, rapid sequence intubation, etc.
	Complex procedures	Ensure adequate monitoring time following drug administration
Discharge drugs	Medicated patients leaving ED	No verbal discharge instructions to patients given amnestic
		Provide written information on drug to patient if possible
		Advise patients of any necessary follow-up after ED visit
		Consider effect of drug if patient driving home from ED

The Calgary Clinical Pharmacology physician consultation service is available Mon-Fri, 9am-5pm. The on-call physician is listed in ROCA. Click HERE for clinical issues the CP service can assist with.

ThePoison and Drug Information Service (PADIS) is available 24/7 for questions related to poisonings. Please call 1-800-332-1414, and select option 1.