HOSPITAL HARM IMPROVEMENT RESOURCE

# Medication Incidents

cpsi·icsp

Canadian          Institut
Patient           canadien
Safety            pour la sécurité
Institute         des patients

## ACKNOWLEDGEMENTS

## Discharge Abstract Database (DAD) Codes included in this clinical category:

| A10: Medication Incidents | |  |
|---|---|---|
| **Concept** | Medication-related events involving incorrect administration or dosage of medications identified during a hospital stay. | |
| **Notes** | This clinical group does not include events caused by medications in therapeutic use. | |
| **Selection criteria** | T36–T50 | Identified as diagnosis type (2) |
| **Codes** | **Code descriptions** | |
| **T36.–** | Poisoning by systemic antibiotics | |
| **T37.–** | Poisoning by other systemic anti-infectives and antiparasitics | |
| **T38.–** | Poisoning by hormones and their synthetic substitutes and antagonists, not elsewhere classified | |
| **T39.–** | Poisoning by nonopioid analgesics, antipyretics and antirheumatics | |
| **T40.–** | Poisoning by narcotics and psychodysleptics (hallucinogens) | |
| **T41.–** | Poisoning by anesthetics and therapeutic gases | |
| **T42.–** | Poisoning by antiepileptic, sedative-hypnotic and antiparkinsonism drugs | |
| **T43.–** | Poisoning by psychotropic drugs, not elsewhere classified | |
| **T44.–** | Poisoning by drugs primarily affecting the autonomic nervous system | |
| **T45.–** | Poisoning by primarily systemic and hematological agents, not elsewhere classified | |
| **T46.–** | Poisoning by agents primarily affecting the cardiovascular system | |
| **T47.–** | Poisoning by agents primarily affecting the gastrointestinal system | |
| **T48.–** | Poisoning by agents primarily acting on smooth and skeletal muscles and the respiratory system | |
| **T49.–** | Poisoning by topical agents primarily affecting skin and mucous membrane and by ophthalmological, otorhinolaryngological and dental drugs | |
| **T50.–** | Poisoning by diuretics and other and unspecified drugs, medicaments and biological substances | |

## OVERVIEW AND IMPLICATIONS

Medication incidents are defined as: *"any preventable event that may cause or lead to inappropriate medication use or patient harm while the medication is in the control of the healthcare professional, patient, or consumer. Medication incidents may be related to professional practice, drug products, procedures, and systems, and include prescribing, order communication, product labeling/packaging/nomenclature, compounding, dispensing, distribution, administration, education, monitoring, and use"* (ISMP Canada, Definitions, 2016). Medication safety is a shared responsibility among the healthcare team members, staff, and organizational leadership.
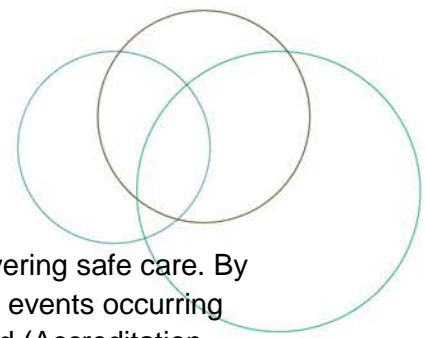
In the Canadian Adverse Events Study, drug- and fluid-related events were the second-most common type of adverse event (Baker et al., 2004). The Institute of Medicine (IOM) Committee on Identifying and Preventing Medication Errors estimated that at least 1.5 million preventable adverse drug events (ADEs) occur each year in the United States (Aspden et al., 2006). The Institute of Medicine report, *To Err is Human: Building a Safer Health System*, identified medication events as the most common type of adverse event in healthcare and highlighted that in the U.S., preventable medication events resulted in up to 7,000 deaths per year in hospitals and tens of thousands more in outpatient facilities.

A study by Lucian Leape and colleagues identified the frequency of occurrence of error at each stage of the hospital medication use process: prescribing 39 per cent, order processing and transcription 12 per cent, dispensing 11 per cent and administration 38 per cent. Nearly half of the prescribing errors were intercepted by nurses and pharmacists and about one third of transcription errors were identified and corrected prior to administration. However, only two per cent of errors occurring at the administration stage were intercepted (Leape et al., 1995). Several more recent studies have assessed the prevalence of medication incidents and cost to the health care system (Bell et al., 2011; Bishop et al., 2015; Scales et al., 2016; Lee et al., 2010).

### High Alert Medications

High-alert (or high-hazard) medications are medications that bear a heightened risk of causing significant patient harm when they are used in error. The Institute for Safe Medication Practices (ISMP) reports that, 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 (ISMP, 2011). Examples of high-alert medications include anticoagulants, hypoglycemic agents, opioids, concentrated electrolytes, cancer chemotherapy and paralyzing agents. For a complete list, see ISMP High-Alert Medications in Acute Care Settings. Known safe practices can reduce the potential for harm as listed below under Evidence-Informed Practices "Implement High Alert Medication Safety Processes" (IHI, 2012).

## Medication Reconciliation

Communicating effectively about medications is a critical component of delivering safe care. By identifying and resolving medication discrepancies, the likelihood of adverse events occurring within health care organizations across the continuum of care will be reduced (Accreditation Canada et al., 2012).

Medication reconciliation is a three-step process in which healthcare providers work together with patients, families and care providers to ensure accurate and comprehensive medication information is communicated consistently across transitions of care (*Safer Healthcare Now!* 2011). Medication reconciliation requires a systematic and comprehensive review of all the medications a patient is taking to ensure that medications being added, changed or discontinued are carefully evaluated. It is an essential component of medication management and will inform and enable prescribers to make the most appropriate prescribing decisions for the patient. The literature regarding the potential impact of medication reconciliation continues to expand. The reconciling process has been demonstrated to be a powerful strategy to reduce ADEs as patients move from one level of care to another (Alex et al., 2016; Boockvar et al., 2011; Eggnik et al., 2010; Vira et al., 2006; Whittington, Cohen, 2004; Rozich et al., 2004; Mekonned et al., 2016; Michels, Meisel, 2003).

## Never Events (Canadian Patient Safety Institute, 2015)

A Never Events Report for Hospital Care in Canada includes *Five Pharmaceutical Never Events* that result in serious patient harm or death, and that can be prevented by using organizational checks and balances*:*
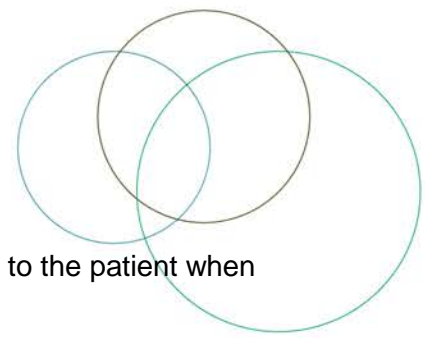
- Wrong-route administration of chemotherapy agents, such as vincristine administered intrathecally (injected into the spinal canal).

- Intravenous administration of a concentrated potassium solution.

- Inadvertent injection of epinephrine intended for topical use.

- Overdose of hydromorphone by administration of a higher-concentration solution than intended (e.g., 10 times the dosage by drawing from a 10 mg/mL solution instead of a 1 mg/mL solution, or not accounting for needed dilution/ dosage adjustment).

- Neuromuscular blockade without sedation, airway control and ventilation capability.

Capturing information about the incidence of never events and sharing the learning from reviews of incidents will be key to following system safety progress over time.

## GOAL

To prevent medication-related events involving incorrect administration or dosage of medications during a hospital stay.

## IMPORTANCE TO PATIENTS AND FAMILIES

Patients and families can play an important role in reducing errors and harm to the patient when they understand what medications the patient is taking and why (IHI, 2012).

### Patient Story

One son-in-law's pursuit to change the system

Claire Friedman was not the typical mother-in-law of sitcoms and punchlines. She was active, vibrant and loved by friends and family. So when Bernie Weinstein walked into the hospital that day in 2002 and saw his mother-in-law restrained in a chair, he was shocked.

## EVIDENCE-INFORMED PRACTICES

1. **Conduct a Medication Safety Self-Assessment**

   The ISMP Canada Medication Safety Self-Assessment for hospitals can be used to raise awareness of the many characteristics of a safe medication use system (ISMP Canada, 2016).

   Examples of recommendations for preventing medication-related errors include:
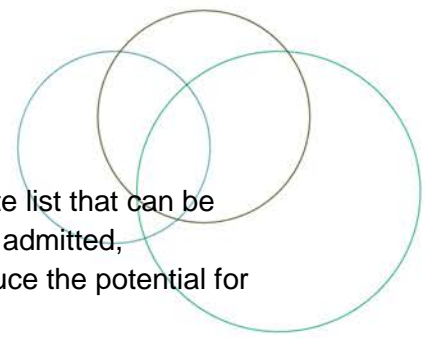
   - Prompts in electronic order entry systems (e.g. allergy and drug interaction warnings).

   - Availability and accessibility to drug information resources.

   - Inclusion of the indication for the medication within the prescription; avoidance of dangerous abbreviations or dose designations.

   - Communication of relevant patient information.

   - Use of decision support software.

   - Use of automated identification (e.g. barcoding).

2. **Implement Medication Reconciliation**
   (*Safer Healthcare Now!* Medication Reconciliation Getting Started Kit, 2011)

   1. Create a complete and accurate Best Possible Medication History (BPMH) of the patient's medications including name, dosage, route and frequency. This includes:
      a. A systematic process of interviewing the patient/family.
      b. A review of at least one other reliable source of information.

   2. Reconcile Medications: Use the BPMH to create admission orders or compare the BPMH against admission, transfer or discharge medication orders; identify and resolve all differences or discrepancies.

   3. Document and Communicate any resulting changes in medication orders to the patient, family/caregiver and to the next provider of care.

Ultimately, the goal is to develop a process which provides an accurate list that can be used for medication orders by all healthcare providers as patients are admitted, transferred through the institution, and eventually discharged and reduce the potential for ADEs.

3. **Implement High Alert Medication Safety Processes**
   (IHI, 2012)

   1. Methods to prevent harm include:
      a. Develop order sets, preprinted order forms, and clinical pathways or protocols to establish a standardized approach to treating patients with similar problems, disease states, or needs.
      b. Minimize variability by standardizing concentrations and dose strengths to the minimum needed to provide safe care.
      c. Include reminders and information about appropriate monitoring parameters in the order sets, protocols, and flow sheets.
      d. Consider protocols for vulnerable populations such as elderly, pediatric, and obese patients.
      e. Adopt TALL man lettering for pharmacy produced labels to differentiate drug names with potential for mix-up.

   2. Methods to identify errors and harm include:
      a. Include reminders and information about appropriate monitoring parameters in the order sets, protocols, and flow sheets.
      b. Ensure that critical lab information is available to those who need the information and can take action.
      c. Implement independent double-checks where appropriate.
      d. Instruct patients on symptoms that indicate side effects and when to contact a health care provider for assistance.

   3. Methods to mitigate harm include:
      a. Develop protocols allowing for the administration of reversal agents without having to contact the physician.
      b. Ensure that antidotes and reversal agents are readily available.
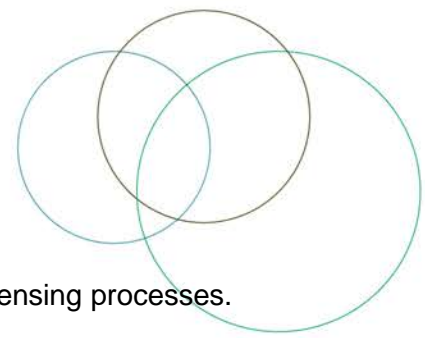      c. Have rescue protocols available.

For details on changes to improve management of specific categories of medications (i.e. Anticoagulants, Narcotics, Insulin, and Sedatives) refer to the How- to Guide: Prevent Harm from High-Alert Medications, 2012.

4. **Improve Core Processes for Ordering Medications**
   (IHI, 2016)

   Several practices have been shown to improve the overall safety of ordering processes. IHI has a listing for several changes for improvement.
   http://www.ihi.org/resources/Pages/Changes/ImproveCoreProcessesforOrderingMedications.aspx

**5. Improve Core Processes for Dispensing Medications**
(IHI, 2016)

Several practices have been shown to improve the overall safety of dispensing processes. IHI has a listing for several changes for improvement.
http://www.ihi.org/resources/Pages/Changes/ImproveCoreProcessesforDispensingMedications.aspx

**6. Improve Core Processes for Administering Medications**
(IHI, 2016)

Several practices have been shown to improve the overall safety of administration processes. IHI has a listing for several changes for improvement.
http://www.ihi.org/resources/Pages/Changes/ImproveCoreProcessesforAdministeringMedications.aspx

**7. Conduct Clinical and System Reviews**

## Clinical and System Reviews, Incident Analyses

Occurrences of harm are often complex with many contributing factors. Organizations need to:

1. Measure and monitor the types and frequency of these occurrences.

2. Use appropriate analytical methods to understand the contributing factors.

3. Identify and implement solutions or interventions that are designed to prevent recurrence and reduce risk of harm.

4. Have mechanisms in place to mitigate consequences of harm when it occurs.
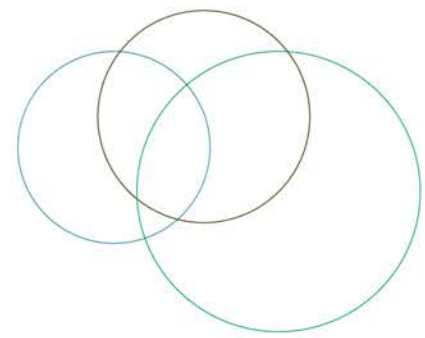
To develop a more in-depth understanding of the care delivered to patients, chart audits, incident analyses and prospective analyses can be helpful in identifying quality improvement opportunities. Links to key resources for analysis methods are included in the section Resources for Conducting Incident and/or Prospective Analyses.

Chart audits are recommended as a means to develop a more in-depth understanding of the care delivered to patients identified by the HHI. Chart audits help identify quality improvement opportunities.

Useful resources for conducting clinical and system reviews:

- Chart Audit Review Process (see Introduction to the Improvement Resource)

- Canadian Incident Analysis Framework

- CPSI Patient Safety and Incident Management Toolkit

- Institute for the Safe Medication Practices Canadian Failure Mode and Effects Analysis Framework

- Institute for Healthcare Improvement Failure Mode and Effects Analysis Tool

## Additional Medication Safety Guidance

### Medicine Optimisation
(NICE, 2015)

Medicine optimisation is defined as: *'a person-centred approach to safe and effective medicines use, to ensure people obtain the best possible outcomes from their medicines. Shared decision‑making is an essential part of evidence‑based medicine, seeking to use the best available evidence to guide decisions about the care of the individual patient, taking into account their needs, preferences and values'.*

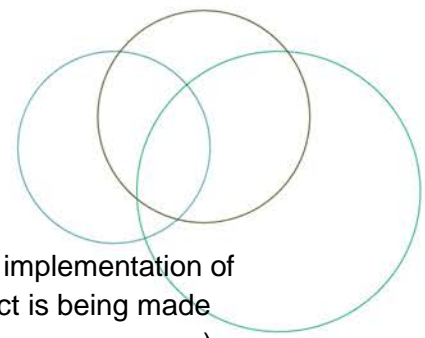Eight recommendations for Medicine optimisation include:

1. Systems for identifying, reporting and learning from medication incidents.
2. Medication-related communication systems when patients move from one care setting to another.
3. Medication reconciliation.
4. Medication review.
5. Self-management plans.
6. Patient decision aids in consultations involving medications.
7. Clinical decision support.
8. Medication-related models of organisational and cross-sector working.

### Medication Error Prevention
(NCC-MERP, 2016)

1. Encourage standardization of processes to prevent error-prone aspects of drug procurement, prescribing, dispensing, administration, and disposal.
2. Encourage shared accountability and systems-based solutions to enhance the safety of medication use and to minimize the potential for human error.
3. Promote/encourage the safe use and understanding of technology in the prevention of medication errors.
4. Increase awareness of the need for distinctive packaging, labeling, and nomenclature of products associated with actual or potential medication errors.
5. Educate consumers and patients regarding strategies to prevent medication errors for both prescription and non-prescription medications.
6. Educate healthcare professionals about causes of medication errors and strategies for prevention.

## MEASURES

Vital to quality improvement is measurement, and this applies specifically to implementation of interventions. The chosen measures will help to determine whether an impact is being made (primary outcome), whether the intervention is actually being carried out (process measures), and whether any unintended consequences ensue (balancing measures).

Below are some recommended measures to use, as appropriate, to track your progress. In selecting your measures, consider the following:

- Whenever possible, use measures you are already collecting for other programs.

- Evaluate your choice of measures in terms of the usefulness of the final results and the resources required to obtain them; try to maximize the former while minimizing the latter.

- Try to include both process and outcome measures in your measurement scheme.

- You may use different measures or modify the measures described below to make them more appropriate and/or useful to your particular setting. However, be aware that modifying measures may limit the comparability of your results to others.

- Posting your measure results within your hospital is a great way to keep your teams motivated and aware of progress. Try to include measures that your team will find meaningful and exciting (IHI, 2012).

For more information on measuring for improvement, contact the Canadian Patient Safety Institute Central Measurement Team at measurement@cpsi-icsp.ca

### Outcome – Medication Reconciliation

1. Per cent of Patients Reconciled on Admission.

2. Per cent of Patients Reconciled on Transfer.

3. Per cent of Patients Reconciled at Discharge.

4. Per cent of Patients Undergoing Medication Review on Admission.

### Outcome – High Alert Medications

1. Adverse Drug Events Related to Narcotic per 100 Admissions with Narcotic Administered.

2. Adverse Drug Events Related to Anticoagulant per 100 Admissions with Anticoagulant Administered.

3. Adverse Drug Events Related to Insulin per 100 Admissions with Insulin Administered.

4. Adverse Drug Events Related to Sedative per 100 Admissions with Sedative Administered.

5. Per cent of Patients Receiving Warfarin with INR Outside Protocol Limits.

6. Per cent of Patients Receiving Heparin with a PPT Outside Protocol Limits.

7. Per cent of Patients Receiving Insulin with Blood Glucose Level Outside Protocol Limits.

8. Per cent of Patients Receiving Narcotic Who Require Subsequent Treatment with Naloxone.

9. Per cent of Patients Receiving Sedative Who Require Subsequent Treatment with Flumazenil.
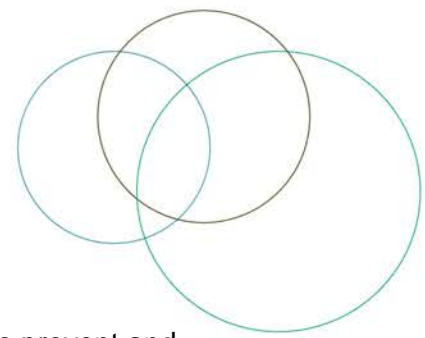
## Process – Medication Reconciliation

1. Percentage of Patients Using More Than One Source for BPMH.

2. Percentage of Patients For Whom Actual Medication Use Was Verified by Patient/Caregiver.

3. Percentage of Patients For Whom BPMH and Admission Orders has Drug Name, Dose, Route, and Frequency for Each Medication.

4. Percentage of Patients For Whom Every Med in BPMH is Accounted For in Admission Orders.

5. Percentage of Patients For Whom Prescriber Has Documented Rationale For Holds and Discontinued Meds.

## Process – High Alert Medications

1. Per cent of Narcotic Administrations Appropriately Managed According to Protocol.

2. Per cent of Anticoagulant Administrations Appropriately Managed According to Protocol.

3. Per cent of Insulin Administrations Appropriately Managed According to Protocol.

4. Per cent of Sedative Administrations Appropriately Managed According to Protocol.

5. Per cent of Unreconciled Medications.

6. Unreconciled Medications per 100 Admissions

In addition to the above measures you may need to create your own process improvement measures based on the results of your clinical and system review and the focus of your improvement efforts.

## STANDARDS AND REQUIRED ORGANIZATIONAL PRACTICES

### Accreditation Canada Standards

The Medication Management Standards promote a collaborative approach to prevent and reduce patient safety incidents involving medications by addressing all aspects of the medication management process, from prescription, selection, preparation and dispensing, to administration of the medication and ongoing monitoring of clients. The Medication Management Standards also contain a number of Required Organizational Practices aimed at preventing medication incidents.

### Accreditation Canada Required Organizational Practices

1. *Concentrated Electrolytes:* Organizations are required to evaluate and limit the availability of concentrated electrolytes to avoid stocking formats that can cause harmful medication incidents in client service areas.

2. *Heparin Safety*: Organizations are required to evaluate and limit the availability of heparin products to avoid stocking formats that can cause harmful medication incidents in client service areas.

3. *High-Alert Medications*: Organizations are required to implement a comprehensive strategy to manage high-alert medications, based on the ISMP list of high-alert medications.

4. *Narcotics Safety*: Organizations are required to audit and remove from client service areas formats of narcotic (opioid) products that can cause harmful medication incidents.

5. *The "Do Not Use" List of Abbreviations (formerly called Dangerous Abbreviations)*: Organizations are required to identify and implement a list of abbreviations, symbols, and dose designations that should not be used in the organization. The list must be in accordance the ISMP List of Error-Prone Abbreviations, Symbols, and Dose Designations.

6. *Medication Reconciliation (MedRec) at Care Transitions*: MedRec is required for the following services: Acute care, Ambulatory care, Emergency department, Home and community care, Long-term care, and Substance misuse. Organizations are required to initiate or complete MedRec for all clients or a target group, depending on the setting and the population served.
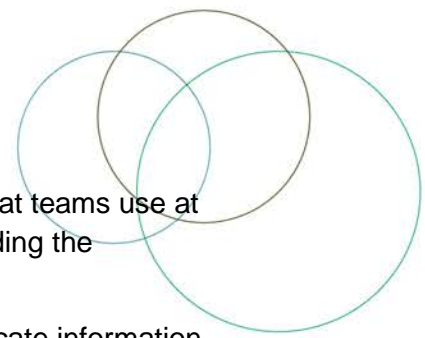
Additional ROPs, although not specific to medications that either address or help to prevent medication incidents:

- *Patient Safety Incident Management* is an ROP found in the Leadership standards that requires organizations to report, learn from, and act upon patient safety incidents, including those relating to medications.

- *Client identification (formerly called Two client Identifiers)* requires that teams use at least two person-specific identifiers before providing a service (including the administration of medications)

- *Information Transfer at Care Transitions* requires teams to communicate information effectively during care transitions.

- *Infusion Pump Safety (formerly called Infusion Pumps Training)* requires teams to be trained on infusion pump use, evaluate competence, and report and act upon problems with infusion pumps.

## GLOBAL PATIENT SAFETY ALERTS

Global Patient Safety Alerts (GPSA) provides access and the opportunity to learn from other organizations about specific patient safety incidents including alerts, advisories, recommendations and solutions for improving care and preventing incidents. Learning from the experience of other organizations can accelerate improvement.
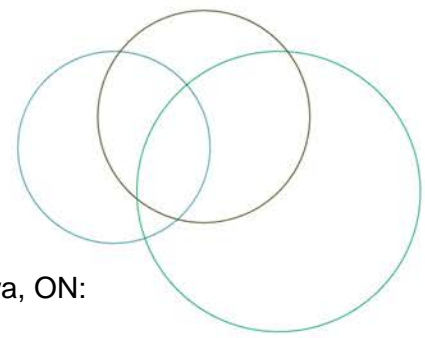
**Recommended search terms:**

- High alert medication
- Medication
- Medication administration
- Medication dispensing
- Medication error
- Medication incident
- Medication orders
- Preventable adverse drug event

## MEDICATION INCIDENTS PREVENTION SUCCESS STORIES

- Implementing MedRec at Horizon Health Network

- Toolkit for Safe Implementation of Insulin Pens

## REFERENCES

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## MEDICATION INCIDENTS RESOURCES

### Professional Associations and Helpful Websites

- Institute for Safe Medication Practices Canada
- Canadian Patient Safety Institute
- The National Coordinating Council for Medication Error Reporting and Prevention (NCC MERP)
- Cross County MedRec Check-up

### Guidelines for the Prevention of Medication Incidents

*Safer Healthcare Now!* Medication Reconciliation Getting Started Kit. Canadian Patient Safety Institute; 2011. http://www.patientsafetyinstitute.ca/en/toolsResources/Pages/Med-Rec-resources-getting-started-kit.aspx

Institute for Healthcare Improvement (IHI). *How-to Guide: Prevent harm from high-alert medications.* Cambridge, MA: IHI; 2012. http://www.ihi.org/resources/Pages/Tools/HowtoGuidePreventHarmfromHighAlertMedications.aspx

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## Additional Resources for the Prevention of Medication Incidents

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