Are We Safe Yet? The Role of the Advanced Practice Nurse in Support of Safe Medication Use Practices

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Disclosure

Susan Paparella declares no conflicts of interest, real or apparent, and no financial interests in any company, product, or service mentioned in this program
Objectives

• Review the most commonly reported prescribing error event types associated with serious events
• Identify causes and factors contributing to medication errors in the prescribing process
• Cite factors critical to the success for safe prescribing of medications
• Discuss the role of the APN in medication safety and safe prescribing practices
APN’s Role in Safe Medication Use

- Assess
- Prescribe
- Prepare
- Administer
- Monitor outcomes
- Create guidelines and order sets
- Educate providers
- Educate patients
- Research
Active Failure: Prescribing
Lessons from Denver

Criminally Negligent Homicide

Nurse practitioner: changing the route of administration based on common practice, not hospital policy

Nurses: failure to communicate directly with provider or pharmacist when questioning the volume of the dose
True or False

Compared to other practitioners, prescribers make the most medication errors

A  True
B  False
Where Errors Occur

Intercepted: 48%
Harm: 28%
Errors: 39%
Prescribing

Transcribing: 12%
Dispensing: 10%
Administering: 38%

33% 33% 2%
39% 12% 11%
33% 11% 51%
48% 11% 51%
38%
Medication Errors Originate in the Prescribing Phase

• Leape (et al): drug-drug interactions, failure to act on a test, wrong drug choice, and wrong dose errors occurred most frequently in the prescribing stage

• Bates (et al): 56% of preventable events originated in the prescribing stage

• Reported rates of prescribing errors: 3.13 to 62.4 errors per 1,000 medication orders
Medication Errors Originate in the Prescribing Phase

• Bobb et al: Most common clinically significant prescribing errors:
  - wrong dose (39.2%)
  - wrong frequency (20.2%)
  - nomenclature (9.4%)
  - drug allergy (6.4%)
  - wrong medication (6.4%)
  - duplication (5.5%)
  - omission (4.7%)\(^4\)

• Most common drug classes were anti-infectives, cardiovascular agents, and opioids\(^4\)
• Nearly 2/3 of the errors occurred upon hospital admission\(^4\)
Prescribing Errors

- Schiff (2015) 2003-2010- 1.04 million MEDMARX reports
  - 10,060 CPOE-related
  - Tested 13 different CPOE systems; 16 sites
  - 79.5% erroneous orders easily placed; 28% minor workarounds/no warnings

Table 2: Top 25 what happened? Codes

<table>
<thead>
<tr>
<th>Code</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Missing or incorrect directions/patient instructions</td>
<td>2088</td>
</tr>
<tr>
<td>Ordered wrong dose or strength</td>
<td>877</td>
</tr>
<tr>
<td>Missing quantity or wrong number ordered</td>
<td>877</td>
</tr>
<tr>
<td>Unknown</td>
<td>680</td>
</tr>
<tr>
<td>Wrong schedule entered</td>
<td>566</td>
</tr>
<tr>
<td>Duplicate order: same exact drug</td>
<td>510</td>
</tr>
<tr>
<td>Overdose or potential overdose</td>
<td>376</td>
</tr>
<tr>
<td>Ordered wrong formulation/dosage form</td>
<td>363</td>
</tr>
<tr>
<td>Order not processed/delayed</td>
<td>361</td>
</tr>
<tr>
<td>Extra dose potential</td>
<td>337</td>
</tr>
<tr>
<td>Ordered wrong drug</td>
<td>302</td>
</tr>
</tbody>
</table>

Table 3: Top 25 why did it happen? Codes

<table>
<thead>
<tr>
<th>Code</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unknown</td>
<td>5326</td>
</tr>
<tr>
<td>Multiple systems (two or more electronic systems)</td>
<td>1211</td>
</tr>
<tr>
<td>Use of system or SIG abbreviations</td>
<td>494</td>
</tr>
<tr>
<td>Failure to follow established procedures or protocol</td>
<td>480</td>
</tr>
<tr>
<td>Profiling Issues: failure to perform or use correctly</td>
<td>443</td>
</tr>
<tr>
<td>Inexperienced end user</td>
<td>415</td>
</tr>
<tr>
<td>Lack of computer training/system knowledge</td>
<td>325</td>
</tr>
<tr>
<td>Typing error</td>
<td>206</td>
</tr>
<tr>
<td>Hybrid system (electronic and paper)</td>
<td>205</td>
</tr>
<tr>
<td>Communication issues</td>
<td>200</td>
</tr>
</tbody>
</table>
Case Study- Hidden Prescribing Error

• A dehydrated lung cancer patient admitted to the ED for IV hydration
• Patient from a MVA also in the ED was awaiting intubation and transfer to a local trauma center
• The same prescriber was caring for both patients
• Verbal orders given for vecuronium and midazolam for the MVA patient; however the prescriber entered the orders electronically into the cancer patient’s record
• Nurse caring for the cancer patient went on break; covering nurse administered the paralytic and sedative to the cancer patient even though he was not intubated
• The patient experienced a respiratory arrest and died
CPOE and Wrong Patient Errors

• Hyman and colleagues (2009)\textsuperscript{8}
  – 24% of wrong patient errors were orders placed on the wrong chart
  – Rapid discontinuation study
  – Retract and Reorder tool

• 5,246 wrong patient orders in 2009 (58 wrong patient errors per 100,000 orders)
  – 14 wrong patient errors/day
  – 1 in 6 clinicians
  – 1 in 37 admitted patients\textsuperscript{9}
PA Patient Safety Authority Analysis

Pennsylvania Patient Safety Reporting System Database

- Serious events resulting from medication errors
- Harm score E - I associated with the prescribing phase
- Occurred from July 2004 through June 2016
- A total of 811 event reports remained for final analysis

Figure 1. Harm Scores for Serious Events Associated with Prescribing Errors, as Reported to the Pennsylvania Patient Safety Authority
Prescribing Errors per Drug Class

**Figure 2.** Most Common Drug Classes Involved in Serious Events Associated with Prescribing Errors, as Reported to the Pennsylvania Patient Safety Authority

<table>
<thead>
<tr>
<th>DRUG CLASS</th>
<th>NUMBER OF REPORTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Opioid*</td>
<td>143 (17.6%)</td>
</tr>
<tr>
<td>Antibiotic</td>
<td>95 (11.7%)</td>
</tr>
<tr>
<td>Anticoagulant*</td>
<td>88 (10.9%)</td>
</tr>
<tr>
<td>Insulin*</td>
<td>88 (10.9%)</td>
</tr>
<tr>
<td>Anticonvulsant</td>
<td>58 (7.2%)</td>
</tr>
</tbody>
</table>
Common Event Types - Prescribing Errors

Figure 3. Event Types Involving Serious Events Associated with Prescribing Errors, as Reported to the Pennsylvania Patient Safety Authority, July 2004 through June 2016 (N = 811)
Most Common Drug Classes in Overdose Reports

**Figure 4. Most Common Drug Classes Involved in Serious Wrong Dose/Overdosage Events Associated with Prescribing Errors, as Reported to the Pennsylvania Patient Safety Authority, July 2004 through June 2016 (n = 261)**
Case Study

- An elderly patient admitted with leg edema and ulcers in significant pain
- Within an eight hour period the patient received:
  - Morphine 2 mg IV
  - HYDROmorphine 2 mg IV twice
  - Duragesic fentaNYL patch
- One hour later the patient was found unresponsive
- Naloxone was administered
- The patient responded immediately

Not reported as an error- but as an ADR (as not preventable)!
Wrong Dose/Overdose and Opioids

- HYDROmorphine was the medication most frequently involved (52.5%; n = 31 of 59)
  - 61.3% (n = 19 of 31) involved an intravenous (IV) HYDROmorphine dose of 1 mg or more
  - 41.9% (n = 13 of 31) involved an IV HYDROmorphine dose of 2 mg or more
- Naloxone, a reversal agent for opioids, was administered in 71.2% (n = 42 of 59) of the reported wrong dose/overdose errors involving opioids

An IV HYDROmorphine dose of 1 mg is equivalent to approximately 7.5 mg of IV morphine. The current maximum starting dose of HYDROmorphine for an opioid-naïve patient is 0.2-1 mg
Claims Data for Nurse Practitioners

Claims Data for Nurse Practitioners

- The claim involved a NP, NP practice, or NP student
- Claim closed between January 1, 2012 and December 31, 2016
- The claim resulted in an indemnity payment of $10,000 or greater
- 287 professional liability claims for in-depth analysis
## Frequency and Severity of Medication-related Claims

<table>
<thead>
<tr>
<th>Allegation sub-category</th>
<th>Percentage of closed claims</th>
</tr>
</thead>
<tbody>
<tr>
<td>Failure to properly instruct patient regarding medication</td>
<td>1.0%</td>
</tr>
<tr>
<td>Failure to recognize contraindication and/or known adverse interaction between ordered medications</td>
<td>4.3%</td>
</tr>
<tr>
<td>Improper management of medications</td>
<td>3.9%</td>
</tr>
<tr>
<td>Improper prescribing/management of anticoagulant</td>
<td>3.2%</td>
</tr>
<tr>
<td>Prescribing error, wrong dose</td>
<td>2.4%</td>
</tr>
<tr>
<td>Prescribing/administering error, intravenous fluids and/or medication</td>
<td>0.7%</td>
</tr>
<tr>
<td>Prescribing error, wrong route</td>
<td>0.3%</td>
</tr>
<tr>
<td>Improper prescribing/managing of controlled drugs</td>
<td>12.9%</td>
</tr>
<tr>
<td>Prescribing error, wrong medication</td>
<td>0.7%</td>
</tr>
<tr>
<td><strong>Overall</strong></td>
<td><strong>29.4%</strong></td>
</tr>
</tbody>
</table>
Best Practices for Opioid Therapy

• When prescribing opioid drugs, use an appropriate opioid dose based on patient age and opioid tolerance
  – Opioid naïve
  – Opioid tolerant

• PA Patient Safety Authority-Opioid Knowledge Assessment Tool:
  [link](http://patientsafety.pa.gov/pst/Documents/Opioids/assessment.pdf)
  – 11 question tool
  – Case study application of principles
“Opioid Tolerant”

- Patients receiving, for 1 week or longer, at least:
  - 60 mg oral morphine/day
  - 25 mcg transdermal fentanLYL/hour
  - 30 mg oral oxyCODONE/day
  - 8 mg oral HYDROmorphine/day
  - 25 mg oral oxyMORphone/day
  - 60 mg oral HYDROcodone/day
  - or an equi-analgesic dose of another opioid, including heroin and/or non-prescribed opioids
Knowledge of “Opioid Tolerant”

% Answering Correctly
Wrong Dose/Overdose and Anticoagulants\textsuperscript{10}

- Half (50.0\%, \(n = 12\) of 24) of the wrong dose/overdose events involving anticoagulants mentioned the use of a reversal or rescue agent (e.g., vitamin K, protamine)
- Factors that contributed to anticoagulant overdose included:
  - Prescribing the treatment dose instead of the prophylaxis dose
  - Wrong patient weight used to calculate dose
  - Inappropriate dose based on patients’ laboratory studies
  - Omission upon transition of care
Wrong Dose/Overdose and Chemotherapy

• 72-year-old with a history of rheumatoid arthritis
• Oral methotrexate 10 mg once weekly
• 3 months into therapy changed to 10 mg BID once weekly
• Admitted for pulmonary infection; medication history correctly recorded as 10 mg BID on Mondays
• Transcribed to the discharge sheet as 10 mg BID daily
• Visiting nurse discovered the error after patient complained of mucositis and diarrhea
• Seen in ED pancytopenia due to methotrexate toxicity
• Patient never instructed about weekly dosing regimen
Wrong Dose/Overdose and Chemotherapy

Targeted Best Practice #2 Methotrexate

• Use a weekly dosage regimen default for oral methotrexate in electronic systems

• Require a hard stop verification of an appropriate oncologic indication for all daily oral methotrexate orders

https://www.ismp.org/sites/default/files/attachments/2017-12/TMSBP-for-Hospitalsv2.pdf
Wrong Dose/Overdose and Chemotherapy

Targeted Best Practice #2 Methotrexate

• For non-CPOE systems or those that cannot provide a hard stop—clarify all daily orders if the patient does not have a documented oncologic diagnosis
• Provide specific patient and/or family education for all oral methotrexate discharge orders

Wrong Dose/Overdose and Insulin

- **Product concentration**
  - Medication list read “Lantus 100 units/ml vial inject 15 units sub q at bedtime”
  - Prescriber wrote for “Lantus 100 units at bedtime”

- **Incorrect order entry**
  - Human regular insulin 150 units sq qam prn entered with reason “patient was on at home”

- **Hold order**
  - A patient on continuous enteral feedings receiving subcutaneous insulin
  - Feedings were held for a CT scan; no one addressed the insulin
  - When the BG was checked = 26 mg/dL
Dose Omission Errors

- Dose omissions (14.3%, n = 116 of 811)
  - 3rd highest event type in PA
- Harm related to dose omission:
  - Anticoagulants (18.1%, n = 21 of 116)
  - Anticonvulsants (17.2%, n = 20)
  - Antibiotics (12.9%, n = 15)
  - Insulin (10.3%, n = 12)
- 27.6% maintenance medication was omitted upon admission
- 14.7% medication was omitted upon discharge
- 10.3% occurred postoperatively
Factors Contributing to Medication Errors in the Prescribing Process

• **Patient Information**
  – Age, height/weight, allergies, opioid status, lab values
  – Insufficient medication reconciliation

• **Drug Information**
  – Outdated, Unavailable
  – No standard expectations
    - No protocols, practice guidelines, or order sets
  – Drug shortages- unfamiliar/nonformulary products= ordering without clinical decision support
  – Lack of collaboration with pharmacist
Factors Contributing to Medication Errors in the Prescribing Process

• **Communication** challenges
  – CPOE availability; remote access
  – Fragmented EHR use/prescribing on paper
  – E-prescribing= Patient lack of knowledge
  – Limited functionality/little or no clinical decision support
  – Lack of collaboration with attending
  – Use of unsafe abbreviations and dose expressions
  – Verbal orders
  – Texting orders
**Texting Orders Can Result in Added Risk**

<table>
<thead>
<tr>
<th>Order</th>
<th>Intended meaning</th>
<th>Confusion/Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slomag 64mgTID2day</td>
<td>today</td>
<td>For 2 days</td>
</tr>
<tr>
<td>Diclofenac 1% gel4g2 rightknee</td>
<td>to</td>
<td>2 grams</td>
</tr>
<tr>
<td>Carafate 1gPOb/4 mealsand hs</td>
<td>Before meals and at bedtime (4 doses)</td>
<td>With 4 meals and at bedtime (5 doses)</td>
</tr>
<tr>
<td>Ibuprofen 600 mg PO 3D</td>
<td>3 times a day</td>
<td>For 3 days</td>
</tr>
<tr>
<td>After bag MT 100 ml/h</td>
<td>empty</td>
<td>Order too ambiguous; required clarification</td>
</tr>
</tbody>
</table>
Factors Contributing to Medication Errors in the Prescribing Process

• Environmental factors
  – Number and location of computers for order entry
  – Distractions and interruptions

• Staffing/workflow
  – Poor handoffs between providers

• Education and training
  – Lack of ongoing training for safe prescribing and CPOE use
  – Are safety risks of the system shared with the prescriber?

• Quality and risk management
  – Pharmacy interventions?
  – What feedback do you get about your prescribing practices?
E.D. Patients Left Confused After Visits

• Researchers followed 140 English-speaking patients discharged from EDs and measured their understanding in four areas
  – Diagnosis
  – E.D. treatment
  – Instructions for their at-home care
  – Warning signs of when to return to the hospital

• 78% of patients did not understand at least one area and about half did not understand two or more areas.

• The greatest confusion surrounded home care — instructions about things like medications, rest, wound care and when to have a follow-up visit with a doctor.

Annals of Emergency Medicine, July 2008
Lack of Patient Education

- 15 month-old cuddling with his mother, sleeping on her chest
- Mother wearing a fentaNYL transdermal patch for pain associated with multiple sclerosis
- Mother awoke and found son unresponsive
- Rushed to the hospital by ambulance
- Resuscitation efforts without success
- Later the mother noticed the patch was missing.
- The child apparently ingested the patch, never found; vomited during intubation
- Medical examiner confirmed pulmonary edema and acute fentaNYL intoxication
- No professional had ever taught/warned the mother about the proper use, or potential dangers of this transdermal medication.
Risk Reduction Strategies

Patient Information

- Verify the patient’s identity using two identifiers
  - Consider the number of charts open at a time
- Standardize and **use** the baseline patient information needed to prescribe medications
  - Actual metric weight
  - Renal dose adjustment
  - Serum drug levels
  - Allergies and reactions
- Monitoring **impact of drug therapy on patients**
- **Actively** participate in the medication reconciliation process
Risk Reduction Strategies

Drug Information

• Assess current CPOE functionality
  – Understand your EHR system!

• Well-designed CPOE systems allow providers to:
  • Select the patient name from a list of patients assigned instead of a much larger list of patients
  • Default to safe ordering parameters; filters out inappropriate selections
  • Avoid free text options
- Single and cumulative dose limits
- Therapeutic duplication (Same drug; same class)
- Allergies
- Inappropriate routes
- Drug-Drug interactions
- Contraindications/dose based on:
  - diagnosis
  - age/weight
  - laboratory values
1.2 The indication for insulin use is clearly documented in the EHR
1.3 Organizations develop and utilize evidence-based insulin protocols, and/or evidence-based insulin order sets with decision support capabilities
1.6 Eliminate the use of sliding scale insulin doses based on blood glucose values as the only strategy for managing hyperglycemia
1.7 Insulin orders are free of error-prone abbreviations and dose expressions

https://www.ismp.org/guidelines/subcutaneous-insulin
Risk Reduction Strategies

Communication of Drug Information

• Limit the use of verbal orders to emergency situations
• Avoid texting orders
• Use caution when prescribing medications with known toxicities e.g., anticoagulants, antibiotics, antidiabetic agents, opioids, and psychoactive medications
  – Teach patients about possible toxicities
  – Provide orders for rescue agents
Risk Reduction Strategies

Standardization

• Create/use standard order sets to minimize incorrect or incomplete prescribing
• In order sets, use an appropriate opioid dose based on patient age and opioid tolerance. Consider default doses for three types of patients:
  – Most patients
  – Patients older than 64 years or with risk for OSA
  – Opioid-tolerant patients
Safe Transitions of Care for Patients

Patient Education

• Create a process to ensure that patients will have the necessary prescriptions, supplies, a follow-up care plan, and printed instructions for all discharge medications and monitoring.
Summation *(aka… Not Safe Yet!)*

- Prescribing practices can contribute to preventable medication errors
- Errors including wrong dose/overdose, wrong patient, omission with high-alert medications and antibiotics are common

**APNs have an important role in prescribing safety:**
- Collect and use essential patient and drug information
  - Appropriate monitoring
- Engage in clear, concise communication
- Maximize the use of CPOE with improved clinical decision support
- Standardize practice using evidence-based tools for high-alert medications
Summation *(aka…Not Safe Yet!)*

- Focus attention during vulnerable times and vulnerable patients
- Stay active on integrated teams that impact prescribing efforts
- Report errors and close calls; share lessons learned
- Learn from external sources of error

www.ismp.org
Questions?
References


References


12. PA PSA Results of the Opioid Knowledge Assessment from the PA Hospital Engagement Network Adverse Drug Event Collaboration. Available online at: http://patientsafety.pa.gov/ADVISORIES/Pages/201303_19.aspx


16. PA PSA CPOE Toolkit available online: http://patientsafetyauthority.org/EducationalTools/PatientSafetyTools/prescribing/Pages/eval.aspx