Medication Errors in Adults and Children

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Session Objectives

• Describe the role of technology and medication safety practices used in the medication use process
• Understand unique differences specific to pediatric patients that make them more vulnerable to adverse events

Institute of Medicine (IOM) Report, 1999: “To Err is Human”

• 44,000 to 98,000 people die in hospitals each year as a result of medical errors
• 7,000 deaths (770,000 injuries) from medication errors
• 8th leading cause of death
• Price tag as high as $29 Billion
• Most errors are preventable
• Healthcare is a decade or more behind other high-risk industries

Institute of Medicine (IOM), November, 1999; www.iom.edu

Not a “bad apple” problem

• Less than 1% of the time = negligence
• Whenever humans involved, the system will NEVER be perfect—we are all capable of making mistakes
Medication Use Process

- Procurement
- Prescribing/Ordering
- Transcribing
- Dispensing
- Administering
- Documenting
- Monitoring


Adverse Drug Events

Medication Error: An event that may cause or lead to inappropriate medication use or patient harm, while the drug is in the control of the health care professional, patient, or consumer (in any step of the medication-use process).

Adverse Drug Reaction (ADR): Non-preventable reactions due to side-effects or allergic reactions.

Near Miss/Near Hit/Close Call

Computerized Provider Order Entry (CPOE)

- Prescriber order entry for verification by RN and pharmacist
- Interface with pharmacy system
- Clinical decision support
- Access to important patient and drug information
- Provide forced functions by limiting choices for route and frequency
- Shown to reduce the frequency of medication prescribing errors


Pharmacy Verification System

- Interfaces with CPOE
- Interfaces with AcuDose®
- Prospective order review
  - Limit overrides
  - Drug interactions, dose checking
- Ready to administer doses
- Standardize concentrations


Barcode Medication Administration (BCMA)

- Right Drug
- Right Patient
- Right Dose
- Right Route
- Right Time

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Bar Code Medication Administration (BCMA)

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Smart Pump Technology

- Alaris® Infusion Pumps (Guardrails)
- Hospira® PCA Pumps
- Medfusion® Pumps
- Provides dosing guidelines for safe administration
- Promotes use of standard concentrations
- Promotes use of ready to administer doses
- Still requires human interface

Standards for Patient Safety

High-Alert Medications:
Medications that bear a heightened risk of causing significant patient harm when they are used in error. Although mistakes may or may not be more common with these drugs, the consequences of an error are clearly more devastating to patients.

- Familiarize yourself with the ISMP List
- Use extra vigilance when administering these medications
- Report adverse events involving high alert meds

Look Alike-Sound Alike Meds (LASA)
- Physician orders voriconazole in CPOE
- Pharmacy verifies through computerized pharmacy system (prospective review accurate)
- Pharmacy technician goes to shelf and pulls vecuronium
- Technician reconstitutes, prepares and places in window to be checked
- Upon final verification pharmacist recognizes error

Each of us may see things differently!

Look-alike vials have similarly colored labels and caps.

TALLMAN lettering
celeBREX/celsXA/CERExy
CISplatin/CARBOplatin
cloNIdine/clozanazePAM
DAUNOrubicin/DOXOrubicin/DArubicin
ePHEdrine/EPINEPHrine
hydrOXYzine/hydrALAZINE
lamiVudine/lamoTRIgine
levaFLOXacin/levaTIRACETAM/levaCARNitine
mycophenoLATE/mycophenoLIC acid
prismaSATE/prismaSOL
quNINE/quNiDine
vinBLASline/vinCRISTine
Patient Case:
Nurse checked before administration of Lortab® (hydrocodone/acetaminophen) and discovered that Tylenol® (acetaminophen) dosage had exceeded >4000 mg (admin in Lortab). Upon checking the record, it had been exceeded 7 times in 3 days. RN contacted MD to obtain non-Tylenol pain relief.

Enough of the swiss cheese already...
- Nurse-reported event has led to identification of a trend
- Cumulative dosing of acetaminophen to be evaluated across the Medication Use Process

Fewer holes in the swiss cheese...

Recent FDA Alert for Acetaminophen

Why should I report an event or near miss?
- To help prevent recurrence
- To identify trends and system improvement needs
- To help colleagues learn from your experience (Remember: if it happens to you, it’s likely to happen to your co-worker!)
- For the safety of our patients!

Tips for Reporting Med Errors
- They are ALL important!
- Be as timely as possible
- Be objective - state facts
- The story tells all
  - Usually more system failures than just the one being reported
  - Offer suggestions that could have improved situation
  - Offer what contributed to the problem, drugs involved, status of patient

Lessons From Other Industries (High Reliability Organizations)
Medication Errors in Pediatrics
- Complex system
- Limited buffer
- Pharmacokinetics
- Weight based dosing
- Lack of communication
- Limited data available
- Limited formulations available
- Neonates most vulnerable


Most Common Types of Errors in Pediatrics
- Improper dose/quantity (37.5%)
- Omission error (19.9%)
- Wrong administration technique
- Wrong time
- Drug prepared incorrectly
- Wrong dosage form
- Wrong route

Top 10 Causes of Errors in Pediatrics
Per USP data over 2 year period 2006-2007:
- Performance deficit (43%)
- Knowledge deficit (29.9%)
- Procedure/protocol not followed (20.7%)
- Miscommunication (16.8%)
- Calculation error
- Computer entry error
- Inadequate or lack of monitoring
- Improper use of pumps
- Improper documentation

JCAHO. Sentinel Event Alert. 4/11/08

Guidelines for Preventing Medical Errors in Pediatrics

JPTT

March 2007, Vol. 1, No. 1

JCAHO. Sentinel Event Alert. 4/11/08
Preventative Strategies

- AAP, ISMP, TJC guidelines
- Implementation of technology
- Standardize (physician orders, concentrations, ready to administer)
- Improve competency and training
- Readily available pediatric formulations
- Improved communication
- Clinically based pharmacists on unit

Joint Commission National Patient Safety Goals; www.jointcommission.org

Patient Case

- 3 d/o (3.4 kg, 7.5 lb) patient presents to ED w/fever and lethargy
- MD enters allergy and weight into system
- Orders antibiotics
  - Amoxicillin 750 mg IV q8h
    - Usual dose: 100 mg/kg/dose IV q8h
  - Gentamicin 19 mg IV q12h
    - Usual dose: 2.5 mg/kg/dose IV q12h

CPOE in Pediatrics

- Advanced Clinical Decision Support
- Customized Age and Weight-Based Dosing
- Standardization

![Image of patient chart and dose calculations]
Alyssa’s Story

- November 2007
- Las Vegas
- 3 week old infant dies
- 1000x overdose of zinc in TPN bag
- Order entry mg vs mcg in TPN system

BCMA

- Workflow
- Patient-specific doses
- Not all products available from manufacturer
**Patient Case**

- Patient admitted on 13 mg (13 mL) daily of methadone
- Admitted and prescribed 13 mL of methadone daily
- Entered into pharmacy computer and filled using 10 mg/mL concentration
- Patient received 130 mg methadone (10x intended dose)

**Medication Reconciliation**

- Reconcile medications across the continuum
- Know what your patient has received
- Admission, transfers, discharge (PAML)
- Multidisciplinary process
- Empower patients and families to understand more about their medications

**Recommendations for Discharge Meds**

- Effective teaching and patient/caregiver involvement
- Pharmacy participation on discharge counseling
- Utilize outpatient pharmacy especially for hard to find compounds
- Write drug name, dose, route, and frequency
  - Specify a concentration and write dose in mg, not mL
  - Remove specific dose prompts from eMAR

**Where Do We Go From Here?**

- Medication safety is everyone’s problem
- Focus for health care system and public policy
- Create the culture of safety
- Be proactive and preventative
- Internal/voluntary reports are limited but important
- Better use of technology to prevent errors
- Professional responsibility

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**Patient Case**

- 5 year old, 26 kg, male
- Ex-31 week preemie; triplet
- LLL pneumonia
- Fever, worsening chest pain, shortness of breath, tachypnea and cough
- Temp 101.5°F
- Acetaminophen 240 mg PO q6h PRN
- Suspension ordered (250/5mL) = 4.8mL
- Infant drops dispensed (100mg/mL) = 480 mg/4.8mL
- Patient received double the dose of acetaminophen for 24 hours
- Elevation in liver enzymes; recovered quickly

**Patient Case**

- 8 year old, 34 kg, male
- Orthopedic surgery – recurrent clubfoot
- Post-op pain well controlled with femoral block and morphine IV PRN
- POD 1 – Hydrocodone/APAP 5mg/500mg (Lortab®) PO q4h PRN (~90 mg/kg/day)
- POD 2 – Increased to 7.5mg/500mg PO q3h PRN due to poor pain control (~120 mg/kg/day)
- Received around the clock acetaminophen exceeding recommended daily maximum (90 mg/kg/day)
- Daily acetaminophen max NOT 4 grams!
What Can You Do?

- Don’t underestimate your role in the system
- Report errors (large and small)
- Recognize error-prone situations
- Double and triple check (high risk)
- Encourage/educate yourself and others
- Don’t get lulled into a sense of security
- Engage patients, families and caregivers

Take Home Points

- Technology does improve medication safety when used appropriately
  - There are limitations and unintended consequences
  - No substitution for good and effective communication
- Learn from and leverage mistakes to prevent future errors
- Our Goal = Best in Class Medication Safety
- Work collaboratively
- Show ownership in keeping our patients safe

When he got the wrong medication, no one would own up to it. They were real good at covering their own butts.