

## Opioid Safety:

The balance between pain, sleep and breathing

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## Presentation Objectives

By the end of the presentation, the audience members should be able to:

- Contrast the risks and benefits of opioid medication use, evaluating factors such as patient selection, drug and route selection, monitoring, communication and potential gaps in the medication use process.
- Investigate options to reduce the risk of adverse drug events due to opioids in the hospital setting.
- Outline steps to improve the safety of opioid medication use in the community setting.

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## **STEP 1: DEFINING THE PROBLEM**

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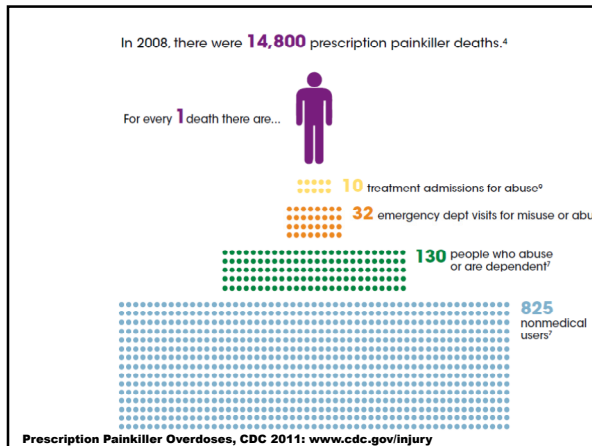
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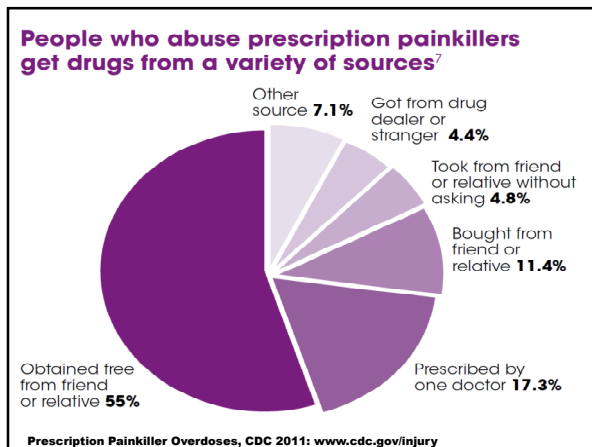
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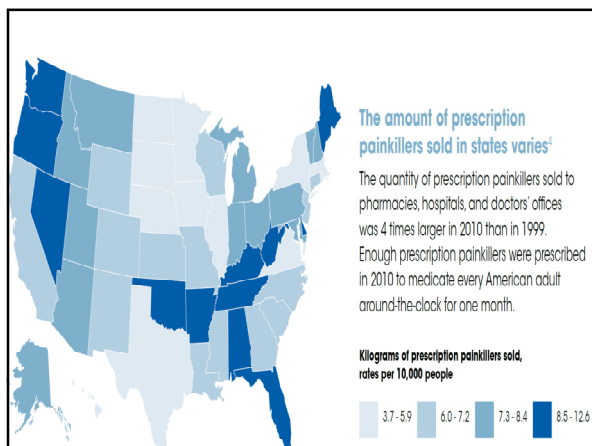
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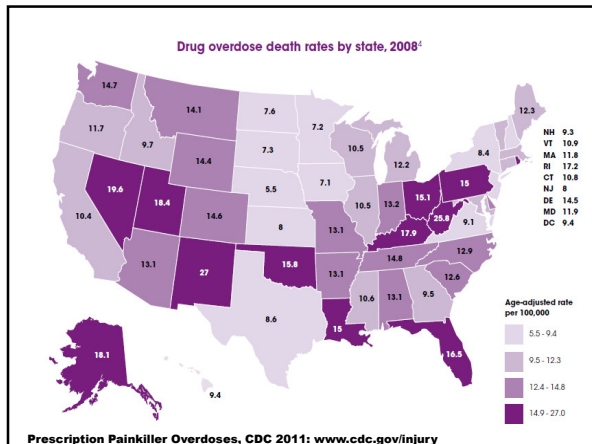
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*During the past year, the TDS has made 25 arrests, seized multiple weapons and computer equipment utilized for the creation of fraudulent prescriptions, and seized the following drugs:*

- 3,328 pills — prescription drugs
- 1,124 pills — MDMA (Ecstasy)
- 690 kilos of ephedrine
- 300 grams of heroin
- 4 pounds of methamphetamine
- 6 pounds of marijuana
- 5 gallons of GHB

*(Most drug crimes involve multiple types of drugs.)*

In Utah, there are more deaths from prescription drug overdoses, than from motor vehicle crashes.

Utah Department of Health, [www.useonlyasdirected.org](http://www.useonlyasdirected.org)

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## The Balance

Pain Control  
5<sup>th</sup> Vital Sign  
HCAHPS  
Patient Satisfaction

Sleepy  
Sedation  
Respiratory Depression

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## Pain Control

- Pain as 5<sup>th</sup> Vital Sign
  - The Joint Commission Standards
- HCAHPS Questions
  - “How often was your pain well controlled”
  - “How often did the hospital staff do everything they could to help you with your pain”



Which Best Hospitals Are Best (and Worst) at Pain Management

It's no surprise that all facilities aren't equal, according to surveyed patients, at keeping pain under control

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## STEP 2: ASSESSING THE PROBLEM

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## Definitions

- Medication **Error**: Any preventable event that may cause or lead to inappropriate medication use or patient harm, while the medication is in the control of the health care professional, patient, or consumer\*
- Adverse Drug **Reaction** (ADR): Any adverse drug event where harm occurs
- Adverse Drug **Event**: Any medication error and/or adverse drug reaction

\*1996 - National Coordinating Council on Medication Error Reporting and Prevention  
Intermountain Healthcare Adverse Drug Event Policy

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## Simplified Definitions

- Medication **Error**: Someone made a mistake
- Adverse Drug **Reaction** (ADR): The patient had a reaction to his/her medication
- Adverse Drug **Event**: Any of the above happened

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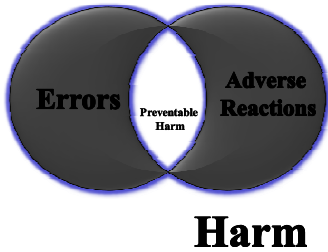
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## ADEs




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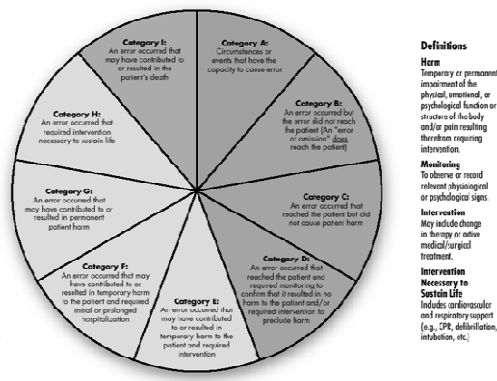
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## NCC MERP Index for Categorizing Medication Errors



### Definitions

**Harm:** Temporary or permanent impairment of the physical, emotional, or psychological function or structure of the body and/or pain resulting therefrom requiring intervention.

**Monitoring:** To observe or record relevant physiological or psychological signs.

**Intervention:** May include change in therapy or active medical/surgical treatment.

**Intervention Necessary to Sustain Life:** Includes cardiopulmonary and respiratory support (e.g., CPR, defibrillation, intubation, etc.).

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## Incidence of Medication Errors in Hospitals

- Institute of Medicine – 2007 publication
- Preventing Medication Errors (part III in series on medical errors)
- Based on published data on medication errors, estimates:  
**“One medication error occurs per patient per day in Hospital Care”**

IOM Preventing Medication Errors: 2007, National Academy of Sciences, p 111

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## Detecting ADEs

Classen DC, Pestotnik SL, et al. JAMA 1992; 267 (April 8): 1922

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## Simple Criteria for Detecting ADRs

Others: Dig level>2, Abrupt med stop or reduction, Vit K, Doubling of Creatinine, Kaopectate, Paregoric, Flumazenil.  
Classen DC, Pestotnik SL, et al. JAMA 1992; 267 (April 8): 1922

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## Trigger Tool

- Benefits
  - Increase reporting of adverse drug events
  - Some can catch changing status (creatinine, vitals, other labs)
- Challenges
  - High number of false positives
  - Requires someone to evaluate if ADE occurred
  - Most are retrospective

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## ADE: What to Report

- Patient information (service, location...)
- Drug Name (coded)
- Was there an error involved
- Level of Harm (A-I)
- Contributing factors
- Could it be prevented (smart pump, bar coding...)

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## STEP 3: LOOKING FOR SOLUTIONS

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# Health System Setting

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## The Joint Commission: “High-Alert” Medications

- Insulin
- Opiates/Narcotics
- Injectable Potassium Chloride (or Phosphate) concentrate
- Intravenous anticoagulants (heparin)
- Sodium Chloride solutions > 0.9%

www.jointcommission.org - Sentinel Event Alert Bulletin #11 - 11/19/1999

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**ISMP's List of High-Alert Medications**

High-alert medications are those that bear a heightened risk of causing significant patient harm when they are used in error. Although medication error is not an inevitable outcome with these drugs, the consequences of an error are usually more severe than in other patients. We hope you will use this list to identify which medications require special safeguards to reduce the risk of error. This may include strategies for improving access to information about these drugs, better access to high-alert medications using secondary checks and enhanced alerts, standardizing the labeling, storage, preparation, and administration of these products, and ensuring medications used in combination or together. Double-checks when necessary. (Note: several independent double-checks are not always the optimal error-reduction strategy and they are not practical for all of the medications on this list.)

| Chemical Class or Medication  | Specific Medication   |
|---|---|
| anticoagulant agents, including parenteral anticoagulants   | anticoagulant   |
| antibiotic agents, IV (eg, ampicillin, nafcillin, ticarcillin)  | antibiotic (IV)   |
| anticonvulsant agents, oral, including IV (eg, phenytoin, fosphenytoin)   | anticonvulsant (oral/IV)  |
| cardiovascular agents, including antiarrhythmics, inotropic agents, and vasodilators  | cardiovascular agent (eg, antiarrhythmic, inotropic, vasodilator)   |
| chemotherapy agents, including antineoplastic agents  | chemotherapy agent  |
| electrolyte solutions, IV, including potassium chloride IV, potassium phosphate IV, sodium chloride IV, and sodium bicarbonate IV | electrolyte solution (eg, potassium chloride IV, potassium phosphate IV, sodium chloride IV, sodium bicarbonate IV) |
| hypotensive agents, oral and IV   | hypotensive agent (oral/IV)   |
| insulin, oral and IV  | insulin (oral/IV)   |
| opioid analgesics, oral and parenteral  | opioid analgesic (oral/parenteral)  |
| sedative-hypnotic agents, oral and parenteral   | sedative-hypnotic agent (oral/parenteral)   |
| antitumor agents, IV (eg, cisplatin, carboplatin)   | antitumor agent (IV)  |
| antitumor agents, oral (eg, cyclophosphamide, methotrexate)   | antitumor agent (oral)  |
| antitumor agents, IV (eg, cisplatin, carboplatin)   | antitumor agent (IV)  |
| antitumor agents, oral (eg, cyclophosphamide, methotrexate)   | antitumor agent (oral)  |
| antitumor agents, IV (eg, cisplatin, carboplatin)   | antitumor agent (IV)  |
| antitumor agents, oral (eg, cyclophosphamide, methotrexate)   | antitumor agent (oral)  |

© ISMP 2005. This list is provided as a general reference and is not intended to be used as a substitute for professional medical advice. The information is current as of the date of publication. For more information, visit [www.ismp.org](http://www.ismp.org).  
 The Joint Commission for Safe Medication Practices

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Institute for Healthcare  
Improvement (IHI)  
High Alert Medications

- Anticoagulants
- Insulin
- Narcotics
- Sedatives

IHI 5 Million Lives Campaign – December 2006 ([www.ihio.org](http://www.ihio.org))

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The Joint Commission (TJC)  
Sentinel Event Alert (SAE)  
#49



A complimentary publication of  
The Joint Commission  
Issue 49, August 8, 2012  
Safe use of opioids in hospitals

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TJC: SAE #49

- For Opioid Related Adverse Drug Events  
(including deaths) from 2004-2011:
  - 47% were wrong dose medication errors
  - 29% related to improper monitoring
  - 11% other factors (excessive dose, medication interactions...)

The Joint Commission, Sentinel Event Alert Issue #49, August 8, 2012

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## High Risk Patients

- Sleep apnea or other sleep disorders
- Morbid Obesity
- Snoring
- Older age
  - 61-70 are 3 x risk
  - 71-80 are 5 x risk
  - >80 are 9 x risk
- Post Surgery (longer length of anesthesia)

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## High Risk Patients

- Receiving other sedatives
  - Benzodiazepines, antihistamines, sedatives, other CNS depressants
- No recent opioid use (or habitual use)
- Increase opioid dose requirement
- Preexisting pulmonary or cardiac disease
- Thoracic or other incisions that impair breathing
- Smoker

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## Screening - STOPBANG

Please answer the following questions below to determine if you might be at risk.

**S** Snoring ?  
 Yes  No  
 Do you **S**nore Loudly (louder than talking or loud enough to be heard through closed doors) ?

**T** Tired ?  
 Yes  No  
 Do you often feel **T**ired, **F**atigued, or **S**leepy during the daytime ?

**O** Observed ?  
 Yes  No  
 Has anyone observed you **O**bey **B**reathling during your sleep ?

**P** Pressure ?  
 Yes  No  
 Do you have or are being treated for **H**igh **B**lood **P**ressure ?

**B** Body Mass Index more than 35 ? (view Table)  
 Yes  No

**A**ge older than 50 ?  
 Yes  No

**N**ack size large ?  
 Yes  No  
 Do you have a **N**eck that **M**easures more than 16 inches / 40 cm around (measure at Adam's Apple) ?

**G**ender = Male ?  
 Yes  No

[ See Result ]

©SA - Wright Rich, Barnes & B. ©  
 ©SA - International Sleep Medicine & B. ©  
 ©SA - Low Risk - Score 0-2  
 Questionnaire adapted from Fleury et al. Anesthesiology 2006; 105:813-821; and Chung et al. Anesth. 2013;119: 768-776.

Chung, et al. [www.stopbang.ca](http://www.stopbang.ca) accessed 8/29/13

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## Opportunities to Reduce Risk

- Medication History! (history of analgesic use or abuse, duration and side effects)
- Full Body assessment (fentanyl patch, pain pump...)
- Use an individualized, multimodal treatment plan
- Start at lowest effective dose
- Avoid rapid dose escalation
- Avoid “dose stacking” – give time for effect based on pharmacokinetics

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## Opportunities to Reduce Risk

- Set Treatment Goals
  - Involve patients on realistic goals for pain reduction
    - Cannot eliminate all pain
    - What is reasonable for that patient (e.g. 3/10 acceptable)
    - Use of non-opioid modalities
  - Education of patients on pain control, goals and side effects

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## Opportunities to Reduce Risk

- Dose Conversions (Changing from one opioid to another, including IV to PO)
  - Consult Pharmacist or Pain Management Expert
  - Incomplete cross tolerance
  - Patient specific differences in conversion
  - Disease state effects (e.g. absorption, renal clearance)
  - Multiple factors must be considered in conversion
  - Use extreme caution with conversion or “equal analgesic” charts – Sentinel events have been report to The Joint Commission when tools misused.

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| Analgesic Name                             | Brand Name           | Dosage Forms           | Administration Kinetics |                  |          | Starting Dosage Ranges for Mod-Severe Pain | Side Effects/Comments   | Equianalgesic Doses   |
|--|----------------------|------------------------|-------------------------|------------------|----------|--|---|-----------------------|
|  |                      |                        | Class                   | T <sub>1/2</sub> | Duration |  |   |                       |
| <b>ADJUNCTS</b>                            |                      |                        |                         |                  |          |  |   |                       |
| Codeine <sup>16</sup>                      | Adrenorph, Duramorph | IV, Multiple Subitance | IV: Multiple            | 1-1.5 hrs        | 2-8 hrs  |  | Flushing, itching and hypotension may occur   | 10 mg                 |
| Hydrocodone <sup>16</sup>                  |                      |                        |                         |                  |          |  | Respiratory depression (slow, shallow breathing) that may progress to apnea (stop breathing) is more likely with hydrocodone than with codeine. | 0.1 mg=100 mg codeine |
| <b>OPIoids</b>                             |                      |                        |                         |                  |          |  |   |                       |
| Hydrocodone <sup>16</sup>                  |                      |                        |                         |                  |          |  |   |                       |
| Morphine <sup>16</sup>                     | Deloate              |                        |                         |                  |          |  |   |                       |
| <b>NSAIDs</b>                              |                      |                        |                         |                  |          |  |   |                       |
| Ibuprofen, immediate release <sup>16</sup> |                      |                        |                         |                  |          |  |   |                       |
| Ibuprofen, sustained release <sup>16</sup> |                      |                        |                         |                  |          |  |   |                       |
| Aspirin                                    |                      |                        |                         |                  |          |  |   |                       |
| Acetaminophen                              |                      |                        |                         |                  |          |  |   |                       |
| <b>Antidepressants</b>                     |                      |                        |                         |                  |          |  |   |                       |
| <b>Antipsychotics</b>                      |                      |                        |                         |                  |          |  |   |                       |
| <b>Anticonvulsants</b>                     |                      |                        |                         |                  |          |  |   |                       |
| <b>Anticoagulants</b>                      |                      |                        |                         |                  |          |  |   |                       |
| <b>Antihypertensives</b>                   |                      |                        |                         |                  |          |  |   |                       |
| <b>Anticholinergics</b>                    |                      |                        |                         |                  |          |  |   |                       |
| <b>Antiemetics</b>                         |                      |                        |                         |                  |          |  |   |                       |
| <b>Antibiotics</b>                         |                      |                        |                         |                  |          |  |   |                       |
| <b>Antifungals</b>                         |                      |                        |                         |                  |          |  |   |                       |
| <b>Antivirals</b>                          |                      |                        |                         |                  |          |  |   |                       |
| <b>Cardiovascular</b>                      |                      |                        |                         |                  |          |  |   |                       |
| <b>Chemotherapy</b>                        |                      |                        |                         |                  |          |  |   |                       |
| <b>Diuretics</b>                           |                      |                        |                         |                  |          |  |   |                       |
| <b>Enzymes</b>                             |                      |                        |                         |                  |          |  |   |                       |
| <b>Immunosuppressants</b>                  |                      |                        |                         |                  |          |  |   |                       |
| <b>Insulin</b>                             |                      |                        |                         |                  |          |  |   |                       |
| <b>Local Anesthetics</b>                   |                      |                        |                         |                  |          |  |   |                       |
| <b>Neuroleptics</b>                        |                      |                        |                         |                  |          |  |   |                       |
| <b>Neuromuscular Blockers</b>              |                      |                        |                         |                  |          |  |   |                       |
| <b>Phenothiazines</b>                      |                      |                        |                         |                  |          |  |   |                       |
| <b>Phenyltoleramines</b>                   |                      |                        |                         |                  |          |  |   |                       |
| <b>Proton Pump Inhibitors</b>              |                      |                        |                         |                  |          |  |   |                       |
| <b>Sedatives/Hypnotics</b>                 |                      |                        |                         |                  |          |  |   |                       |
| <b>Tricyclic Antidepressants</b>           |                      |                        |                         |                  |          |  |   |                       |
| <b>Uric Acid Lowering Agents</b>           |                      |                        |                         |                  |          |  |   |                       |
| <b>Vasodilators</b>                        |                      |                        |                         |                  |          |  |   |                       |
| <b>Weight Management</b>                   |                      |                        |                         |                  |          |  |   |                       |

## Issues to Consider Before Opioid Conversion

Issues to consider before opioid route conversion or rotation<sup>16</sup>

1. What are the indications for rotation/conversion?
2. Was the opioid given enough time to judge its efficacy before rotation?
3. What are the alternatives to opioid rotation?
4. Are there other factors interfering with analgesia?
5. Can the goals of rotation be best achieved by using a different route of administration (conversion) rather than different opioid?
6. Are there any factors that would interfere or change the equianalgesic dose?
7. Does the patient show signs of organ dysfunction such as renal failure?
8. Can equianalgesia change with dose?
9. Are there going to be drug-drug interactions with the change?
10. Is the rotation taking place between opioids with different half-lives?
11. Is the equianalgesic dose safe?
12. Is the pain syndrome responsive to the new opioid?
13. Has the patient been treated with opioids for a short period of time or chronically?

## Conversion Recommendations

Clinical recommendations for opioid route conversion and rotation<sup>16</sup>

1. Equianalgesic dose ratio tables are only guidelines.
2. Be sure to titrate to effect and monitor clinically.
3. Rotation secondary to toxicity requires a dose 20%-50% lower than the equivalent dose of the second opioid because of incomplete analgesic cross-tolerance.<sup>18</sup>
4. Cross-tolerance may be directional (morphine to hydromorphone is not the same as hydromorphone to morphine).<sup>17</sup>
5. Rotation secondary to uncontrolled pain requires equianalgesic doses.<sup>19</sup>
6. Thirty percent on opioids need an alternative route,<sup>20</sup> as in severe nausea or pruritus.
7. Before rotation because of toxicity, consider treating side effects, lowering opioid dose (if pain is controlled), and use of adjunct analgesics.<sup>21</sup>
8. Consider pharmacokinetic changes with age, comorbid conditions, gender, interacting medications, and organ failure in starting or titrating opioids.
9. Opioids that are partial agonists have less analgesia per dose increment at higher doses than full agonists or opioids with high intrinsic efficacy (e.g., methadone),<sup>22</sup> therefore, equianalgesic ratios will change with dose.
10. Rotation between short- and long-acting opioids must be done carefully to avoid withdrawal or overdosing.<sup>24</sup>
11. Rotation in the setting of organ dysfunction is potentially disastrous despite the recommended doses from equianalgesic tables.<sup>25-27</sup>
12. Opioids may worsen intestinal colic, Dexamethasone, glycopyrrolate, or octeotide are better for such pains.<sup>28</sup>
13. Opioid-induced toxicity takes time to resolve. Persistent toxicity after rotation may be because of slow clearance of the first opioid and not the new opioid.
14. Rotating to a new opioid before reaching steady-state of the first opioid is pharmacologically meaningless.

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## Opportunities to Reduce Risk

- Communication is Critical!
  - Documentation of medications given
  - Handoff of patients from one service to another
  - Consider lingering effects from anesthesia and other sedatives given during surgery
  - Patient may not be at peak effect from previous medications given before transfer
  - Involve patient and their family/caregivers

The Joint Commission, Sentinel Event Alert Issue #49, August 8, 2012

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## Opportunities to Reduce Risk

- Use of Technology
  - Bar Coding
  - Dose Checking software
  - Smart Pumps with limits set
  - Standardized concentrations
  - PCA (not using continuous infusion mode)
  - Formulary Systems (remove Demerol/ Meperidine from formulary!)
  - Preprinted Orders or CPOE order sets

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## Monitoring

- Monitoring Options
  - Level of Sedation
  - Vital Signs (respiratory rate, pulse, BP...)
  - Pulse Oximetry (oxygenation)
  - Capnography (ventilation)
  - Other

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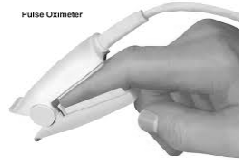
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## Pulse Oximetry

- Measures O<sub>2</sub> saturations (% bound hemoglobin)
- Non-invasive (finger)
- False readings if other gases bound to Hgb
- Reactive: Alerts AFTER saturation drops, often too late in process



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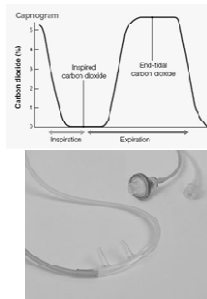
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## Capnography

- Measures:
  - Respiratory Rate
  - CO<sub>2</sub>
- Use nasal cannula or face mask
- Can catch ventilation changes before O<sub>2</sub> saturations decline
- American Society of Anesthesiologists (ASA) recommends use in moderate to deep sedation procedures



Walsh BK, et al. Capnography during mech vent Resp Care 2011; 46 (4): 530-9

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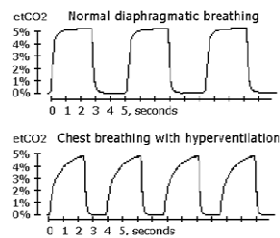
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## Capnography

- Limitations:
  - Requires calibration
  - Breathing frequency can affect CO<sub>2</sub> measurements
  - Contamination by secretions may lead to unreliable results
- Recommended to use with oximetry



Walsh BK, et al. Capnography during mech vent Resp Care 2011; 46 (4): 530-9

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## Community Setting

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## Reducing Risk in Community Setting

- Involves team approach
  - Prescriber
  - Pharmacy
  - Patient
  - Family/Caregivers

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## Reducing Risk in the Community Setting

- Prescriber
  - Limit # of pills based on illness, patients expectations and past usage, ability for follow-up and other factors
  - Use database on opioid prescribing
  - Educating patients:
    - Not Sharing
    - Storage
    - Disposal

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## Prescribing Guidelines

- Assess patient for risk of non-medical use or medical misuse
- Watch for and treat co-morbid mental disease (depression/ anxiety)
- Caution with conversion tables
- Avoid concurrent benzodiazepines, especially during sleep
- Use methadone as 2<sup>nd</sup> or 3<sup>rd</sup> line and titrate very slowly
- Assess for sleep apnea
- Counsel patients on long-term opioids to reduce dose during respiratory illness
- Avoid long acting opioids for acute pain (surgery, trauma...)

Webster LR, et al. Zero Unintentional Deaths [www.yourlifeforce.org](http://www.yourlifeforce.org) accessed 8/30/13

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## Pharmacy Opportunities

- Patient Education!
- Complete Medication History
- Screening for other sedative medications (especially sleeping medications)
- Review prescriptions form other pharmacies (if available)
- Referrals for sleep apnea testing

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## Patient Education

- Save Use
- Safe Storage
- Safe Disposal

Use Only as Directed <http://www.useonlyasdirected.org/> accessed 8/30/13

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## Patient Education: Safe Use

- Never take prescription pain medications that are not prescribed to you
- Never share your prescription pain medications with anyone
- Never take your medications more often or in higher doses than prescribed
- Never drink alcoholic beverages while taking prescription pain medications

Use Only as Directed <http://www.useonlyasdirected.org/> accessed 8/30/13

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## Patient Education: Safe Use

- Driving under the influence (including prescription drugs) is illegal
- Taking prescription pain medication with other depressants, such as sleep, antianxiety, or cold medicines can be dangerous
- Tell your healthcare providers about ALL medications and supplements that you take

Use Only as Directed <http://www.useonlyasdirected.org/> accessed 8/30/13

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## Patient Education: Safe Storage

- Store prescription pain medications out of reach of kids, family and guests (preferably locked)
- Know where your prescription pain medications are at all times
- Keep pain pills in original bottle with label attached and child-resistant cap secure
- Keep track of how many pills are in your bottle, so you are aware if any are missing

Use Only as Directed <http://www.useonlyasdirected.org/> accessed 8/30/13

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## Pharm Parties

- Teens bring prescription drugs from home, mix together in bowl and grab a handful
- Also called: “bowling parties”, “trail mix”



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## Patient Education: Safe Disposal

- Do not flush
- Do not pour
- Take to permanent collections site or community take back event
- If cannot find location to take back:
  - Take out of original container
  - Crush and mix with undesirable substance (coffee grounds, cat litter, spoiled food), mix well and place in plastic bag
  - Wrap in duct tape or place in another container
  - Throw container in trash on pickup day.
  - Remove all identifying information from prescription bottles (use permanent markers)

Use Only as Directed <http://www.useonlyasdirected.org/> accessed 8/30/13

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## Summary

- Inappropriate opioid medication use is a cause of morbidity and mortality, both in health-systems and in the community
- Interventions to reduced adverse effects in the health systems is multifaceted and multidisciplinary
- Patient education is a key to reducing problems in the community setting

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## What Now?

Pick one potential solution to reduce opioid adverse drug events to take back to your workplace after this conference.

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## Questions?

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## Resources

- The Joint Commission
  - [http://www.jointcommission.org/sentinel\\_event.aspx](http://www.jointcommission.org/sentinel_event.aspx)
- Institute for Safe Medication Practices (ISMP)
  - [www.ismp.org](http://www.ismp.org)
- Institute for Healthcare Improvement (IHI)
  - [www.ihl.org](http://www.ihl.org)
- National Coordinating Council for Medication Error Reporting and Prevention (NCC-MERP)
  - [www.nccmerp.org](http://www.nccmerp.org)

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## Resources

- Centers for Disease Control and Prevention
  - <http://www.cdc.gov/injury/>
- Zero Unintentional Deaths (non-profit organization founded by Utah Pain MD)
  - <http://www.yourlifeforce.org/>
- Use Only as Directed (Utah Commission on Criminal Justice and Utah Division of Substance Abuse and Mental Health)
  - <http://www.useonlyasdirected.org/>

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