Monitoring Patients for Respiratory Depression: outside of the ICU

James D. Harrell, RCP
San Diego Patient Safety Council
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What is the San Diego Patient Safety Council?

- SDPSC consists of a Coalition of representatives from across multiple disciplines, including nurses, pharmacists, respiratory care practitioners and others. The representatives were from various health care organizations in the greater San Diego area.

Members met together:
- To reviewed literature,
- To consult institutional thought leaders,
- They applied process improvement and facilitation tools,
- They shared experiences and best practices

Why?
- In order to achieve consensus in building a comprehensive set of recommendations for safe and effective respiratory monitoring of patients who are at risk for respiratory depression outside of the intensive care units.
Why develop a tool kit?

- **Need for Change**—There is growing evidence supporting what clinicians, providers, anesthesiologists, and pharmacists know is a serious patient safety risk: Patients are subjected to significant harm or death while receiving sedating medications without appropriate monitoring and intervention.

The Anesthesia Patient Safety Foundation (APSF) stated in 2011 that preventable deaths and anoxic brain injury from unrecognized opioid-related sedation and respiratory depression remain a serious and growing patient safety concern.

In 2012, The Joint Commission’s Sentinel Event Alert Issue #49, identified sentinel events (related to opioid administration), and described their common underlying causes, and encouraged hospitals to prevent occurrences in the future.
The recommendations for bedside caregivers include 8 steps:

1. Assess for Risk
2. Identify Risk Level
3. Monitor?
4. Determine Monitoring Method
5. Educate/Engage/Coach
6. Monitor Patient
7. Intervene
8. Document, Evaluate & Communicate
What are the Tool Kit Recommendations?

Respiratory Monitoring Care Process Flow

1. Assess for Risk Factors
2. Identify Risk Level
3. Monitor?
4. Determine Monitoring Method
5. Educate/Engage/Coach
6. Monitor Patient
7. Intervene
8. Evaluate, Communicate, and Document

Monitoring Priority Identified
No
Do not monitor or discontinue monitoring
Yes

1. Assess for Risk of Respiratory Depression

The bedside caregiver assesses the patient for the presence of identified risk factors using standardized and validated tools.

Using validated tools screen patient for:

- **Obstructive Sleep Apnea (O.S.A.)** - 80-90% of OSA is undiagnosed
  - Stop/Bang Tool-recommended tool
  - Epworth Sleepiness Scale
  - Berlin Questionnaire
  - American Society of Anesthesia (A.S.A.) Checklist

**Sedation Assessment Tools**

- Richmond Agitation Sedation Scale (RASS)
- Riker Sedation Agitation Scale
1. Assess for Risk of Respiratory Depression

Respiratory Depression Risk Factors:

**Medication Related Risk Factors**
- Opioid-Infusion Therapy
- Unplanned Administration of Reversal Agent
- Opioids, Sedatives and Moderate Sedation
- General Anesthetics
1. Assess for Risk of Respiratory Depression

**Medical Condition/Physical State Factors:**

- Neurological Deficit
- Pulmonary/Cardiac/Renal Disease
- Diabetic Ketoacidosis
- History of Substance Abuse
- Uncontrolled Pain
- Opioid Tolerance/Opioid Naivety
- Pregnancy
- BMI greater than or equal to 35 kg/m$^2$ or less than 18 kg/m$^2$
- Anatomical Anomalies of the Upper Airway
- Supplemental Oxygen Therapy
- Age
2. Identify Risk Level

Respiratory Monitoring Risk Levels

Medication-Related and Known or Suspected OSA/Sleep Disorder Risk Factors

- **Very High Risk**
  - Opioid Infusion Therapy – PCA (with and without Basal), PCEA, or Epidural
    - Start Monitoring: Upon initiation of PCA
    - Stop Monitoring: When PCA discontinued; After 6 hours from discontinuing epidural
  - Recent Unplanned Administration of Reversal Agents
    - Start Monitoring: Upon administration of agent
    - Stop Monitoring: Up to 2 hours after the most recent administration
  - Known or Suspected OSA/Sleep Disorder (NOT using NIV as prescribed)
  - General Anesthesia within 1 to 4 hours
    (consider patient-specific complications for adverse risk from anesthesia)
    - Stop Monitoring: If no observed apnea or desaturation, discontinue after 1st 24 hours postop

- **Moderate to High Risk**
  - Opioids & Concomitant Sedatives/Medication Stacking/Other Sedating Medications
    - Start Monitoring: Monitor 1st 24 hours
    - Stop Monitoring: 24 hours unless risk level changes
  - Moderate (a.k.a. Conscious) Sedation
    - Start Monitoring: Upon administration of sedative; 15 minutes during procedure
    - Stop Monitoring: Follow standardized scoring system for your facility
  - General Anesthesia within 5 to 24 hours
    - Recommend monitoring postop (consider patient-specific complications for adverse risk from anesthesia)
    - Stop Monitoring: If no observed apnea or desaturation, discontinue after 1st 24 hours

- **Low to Moderate Risk**
  - Opioids, Sedatives
    - Start Monitoring: Monitor 1st 24 hours
    - Stop Monitoring: 24 hours unless risk level changes
  - Known or Suspected OSA/Sleep Disorder (using NIV as Prescribed in Facility)

- **Very Low Risk**
  - No known or suspected Medication-Related, OSA/Sleep Disorder, Medical Conditions/Diseases, Medical History/Physical State, or Other Considerations/Environmental Conditions Risk Factors
  - No continuous monitoring necessary

*When using supplemental oxygen, evaluate the patient need for EtCO2 monitoring independent of SpO2 values.*

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### Respiratory Monitoring Prioritization Recommendations Based on Risk Level

<table>
<thead>
<tr>
<th>Risk Level</th>
<th>Very Low Risk&lt;sup&gt;d&lt;/sup&gt;</th>
<th>Low to Moderate Risk</th>
<th>Moderate to High Risk</th>
<th>Very High Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monitor&lt;sup&gt;c&lt;/sup&gt;</td>
<td>Recommend periodic monitoring with Pulse Oximetry&lt;sup&gt;e&lt;/sup&gt;</td>
<td>Recommend continuously monitoring with Pulse Oximetry&lt;sup&gt;e&lt;/sup&gt;</td>
<td>Strongly recommend continuous EtCO2 monitoring</td>
<td>Strongly recommend continuous monitoring EtCO2 and Pulse Oximetry&lt;sup&gt;e&lt;/sup&gt;</td>
</tr>
<tr>
<td>Location</td>
<td>Bedside</td>
<td>Bedside</td>
<td>Remote/centralized and/or close proximity/high visibility</td>
<td>Remote/centralized and/or close proximity/high visibility</td>
</tr>
</tbody>
</table>

<sup>a</sup> SDPSC acknowledges many hospitals are not fully equipped to offer EtCO2 monitoring on patients that may benefit and that triaging the monitors for the most critical patients may be necessary (until the appropriate numbers of monitors are acquired).

<sup>b</sup> All risk factors identified apply to sedated patients outside the ICU (e.g., post anesthesia care unit, interventional radiology, endoscopy, catheterization laboratory, emergency).

<sup>c</sup> SDPSC monitoring recommendations are inclusive of existing best practices and standardized protocol for pulse oximetry monitoring

<sup>d</sup> An example of a patient with Very Low Risk is a marathon runner in the emergency department with a broken wrist and no health risks.

<sup>e</sup> When using supplemental oxygen, evaluate the patient for EtCO2 independent of SpO2 values.
4. Determine Monitoring Method

Ventilation and Oxygenation Monitoring Comparison

<table>
<thead>
<tr>
<th>EtCO₂ Monitoring</th>
<th>SpO₂ Monitoring</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Measures Ventilation)</td>
<td>(Measures Oxygenation)</td>
</tr>
<tr>
<td>Measures carbon dioxide</td>
<td>Measures oxygen saturation (oxygen attached to hemoglobin)</td>
</tr>
<tr>
<td>Reflects breath-to-breath ventilation</td>
<td>Reflects oxygenation</td>
</tr>
<tr>
<td>Detects hypoventilation immediately <strong>EARLY INDICATOR OF HYPOVENTILATION</strong></td>
<td>Detects hypoxia <strong>LATE INDICATOR OF HYPOVENTILATION</strong></td>
</tr>
<tr>
<td>Should be used with pulse oximetry</td>
<td>Should be used with EtCO₂ monitor</td>
</tr>
<tr>
<td>Both assist in non-invasive monitoring of physiological status</td>
<td></td>
</tr>
</tbody>
</table>

Options for Continuous Monitoring

• ET Co2 Monitor
• Pulse Oximeter
• Multi-Parameter Monitor
• Transcutaneous CO2 Monitor
4. Determine Monitoring Method

**Medical History/Physical State**

Consider any of the following conditions affecting airway maintenance:

- **Surgical Considerations:**
  - Prolonged surgery (greater than 2 hours)
  - Thoracic/lower incisions (if interfere with adequate ventilation)
  - High risk for venous thrombembolism

- **Physical Conditions:**
  - BMI equal or greater than 35 kg/m², equal or less than 18.5 kg/m²
  - Anatomical nasal obstructions
  - (Abnormalities of the bony and soft tissues of the head and neck)
  - Neck circumference (17 in. males, 16 in. females)

- **Medical History Considerations:**
  - Smoking
  - Age (older than 65 years or younger than 14 years)
  - History with difficult intubation
  - Decreased level of consciousness/condition
  - Spinal cord injury
  - Non-adherence to prescribed non-invasive ventilation therapy
  - Need for supplemental oxygen

- **Other Medical Conditions/Diseases:** Any condition that may negatively affect patient ventilatory status, such as:
  - Pulmonary/cardiac/renal comorbidity
  - (e.g., hypertension, congestive heart failure, acute respiratory distress, chronic renal disease)
  - Neurological deficit (i.e., current stroke, active seizures persisting)
  - Diabetic Ketoacidosis
  - History of substance abuse
  - Opioid tolerant
  - Hypercoagulation disorder
  - Uncontrolled pain
  - Pregnancy

**Other Considerations/Environmental**

- If poor visibility, evaluate patient's need for ETCO₂ monitoring. Rapid Response Team rounding, or higher level of care. Recommend centralized monitoring. If not centralized, recommend local monitors with automatic pause of infusion, if available.

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Educate
Provide printed educational materials to the patient and family/care partner at the appropriate time:

Ensure materials are at the appropriate reading level and address any learning challenges (e.g., language, hearing impaired).

Address specific concerns as they arise.

Explain the importance of alerting staff of any breathing problems or other reactions.

Engage Before Monitoring

The purpose and importance of monitoring.

How long the patient will be using the monitoring device.

Explain what the alarms are for and why they’re important
Engage While Monitoring
Continuously reinforce the importance of monitoring to the patient and family/care partner:
Stress the importance of wearing the monitoring cannula or Non-Invasive Ventilation (NIV) appropriately.
Discuss that some alarms are false but to never silence an alarm without consulting the bedside caregiver.

Engage When Discontinuing Monitoring
Explain to the patient and family/care partner that the monitoring will be provided until no longer deemed necessary by the provider or no longer clinically indicated.
Recognize and address possible patient and family/care partner anxiety with discontinuing the monitoring (e.g., they may perceive it as premature).
6. Monitor Patient

**SPO2, ETCO2, or both?**

- Ensure adequate surveillance of the patient: Spot checks vs continuous monitoring vs central monitoring
- Ensure alarms are audible, consider alarm hearing distance, and set strategies to ensure adequate volume levels - avoid nuisance alarms.

**Alarm Parameters**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>High: 60 mmHg</th>
<th>Low: 10 mmHg</th>
</tr>
</thead>
<tbody>
<tr>
<td>ETCO2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Respiratory Rate</td>
<td>High: 48 breaths per minute</td>
<td>Low: 7 breaths per minute</td>
</tr>
<tr>
<td>No breath delay</td>
<td>30 seconds</td>
<td></td>
</tr>
<tr>
<td>Pulse Oximetry</td>
<td>(&lt;90) on room air</td>
<td></td>
</tr>
</tbody>
</table>
7. Intervene

Respiratory Status Zones

- **HARM ZONE**
  - Adverse Event, Respiratory Arrest
  - Intervention:
    - Code
    - Intubation
    - ICU Transfer

- **RISK ZONE**
  - Respiratory Depression
  - Intervention:
    - RRT Intervene
    - Reversal Agent

- **SAFE ZONE**
  - Effective Oxygenation and Ventilation
  - Intervention:
    - Effective monitoring for early detection

Respiratory Depression Warning Signs

- A – Abnormal slowness of respiration (<8 or <10 breaths/minute)
- T – Too long to arouse
- M – Mental status change or reduced level of consciousness
- O – Oxygen saturation is low
- S – Snoring or other noisy respirations
- P – Poor respiratory effect/quality (i.e., paradoxical rhythm with little chest excursion)
- H – Hypoxia (deficiency of oxygen reaching body tissues)
- E – Elevated level of carbon dioxide in the circulating blood
- R – Rapid breathing
- E – EtCO₂ alarming
7. Intervene

Respiratory Monitoring Alarm Response Algorithm

**Respiratory Monitor Alarming**

1. **Assess patient**
   - Look for **Respiratory Depression Warning Signs → ATMOSPHERE**
   - (see Figure 10D in the tool kit)

1a. **Is patient arousable?**
   - **Yes**
     - **Risk Zone**
     - **Breathing effective?**
       - **Yes**
         - **Risk Zone**
         - **Contact Rapid Response Team or provider**
       - **No**
         - **Risk Zone**
         - **Troubleshoot equipment**
   - **No**
     - **Risk Zone**
     - **Call code**

1b. **Is patient breathing?**
   - **Yes**
     - **Risk Zone**
     - **Contact Rapid Response Team or provider**
   - **No**
     - **Risk Zone**
     - **Troubleshoot equipment**

2. **Is alarm valid?**
   - **No**
     - **Risk Zone**
     - **Troubleshoot equipment**
   - **Yes**
     - **Re-assess patient and intervene (per protocol)**

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- Consult respiratory care practitioners
- Check medications
- Consider obtaining ABGs
- Consider administering reversal agent
- Consider referral to a higher level of care
- Consider initiating supplemental oxygen (and jointly provide an intervention to support ventilation)
Document

• Document risk screening results, risk level and sedation score.
• Document when initiating the monitoring protocol then check and document per recommendations.
• Document as patient condition changes.

Evaluate

• The decision to discontinue respiratory monitoring must be determined after conducting a re-assessment of the patient and a thorough evaluation of the patient’s respiratory risk factor.

Communicate

• Notify patient and family/care partner of patient’s respiratory risk level including precautions and warning signs
• Apprise all care team members and review at shift-to-shift reporting.
Summary of Recommendations

**Risk Stratification for Respiratory depression** using the tools in this kit or at your institutions disposal.

Be mindful of any potential co-morbidity when assigning risk for respiratory depression to the patient.

Once risk is identified **monitor the patient appropriately** per recommendations.

Be aware of the risk level to your patient and know their baseline condition.

Engage the patient and their families or caregivers in the monitoring process.

Intervene-if your monitor is alarming there is a reason.

Reassess risk as patient condition changes or improves.

Document, Communicate & Evaluate.
Implementation in San Diego County

- Scripps Health system- 5 Hospitals- (100%, use Alaris)
- Sharp Healthcare System- 5 Hospital (Partially, full implementation early 2015)
- Tri-City Medical Center (almost, full implementation January of 2015)
- Palomar Pomerado System- 3 Hospitals- Use Alaris Pumps, still need to bring monitoring to Procedural Areas
- Alvarado Hospital- (partial implementation)
- Paradise Valley Hospital- (partial implementation)
- Vibra Hospital- Did not respond
- Kindred Hospital- Monitor with Pulse Oximetry
Questions?

james.harrell@sharp.com

James D. Harrell
Office Number
(858) 939-3277