Pain Module

Opioid-RelatedRespiratory Depression (ORRD)

Characteristics of patients who are at higher risk for Opioid-Related Respiratory Depression (ORRD)

- Sleep apnea or sleep disorder diagnosis : typically male, obese (body mass index of 35kg.m^2 or more), hypertensive, large neck circumference (17 inches in men and 16 inches in women), snorer, nocturnal oxygen desaturations, frequent awakenings during the night. The **STOP-BANG** questionnaire is a tool used to assess for sleep disorders (**S**noring, **T**iredness during daytime, **O**bserved apnea, high blood **P**ressure, **B**ody mass index, **A**ge, **N**eck circumference, **G**ender).
- Older age
- Post-surgery, particularly if upper abdominal or thoracic surgery.
- Thoracic or other surgical incisions that may impair breathing.
- Longer length of time receiving general anesthesia during surgery.
- No recent opioid use (opioid-naïve).
- Increased opioid dose requirement, opioid habituation, or changing to a different opioid, route or dose.
- Receiving other sedating drugs, such as benzodiazepines, antihistamines, diphenhydramine, sedatives or other central nervous system depressants.
- Receiving or taking unprescribed drugs from a personal stash or external source.
- Preexisting pulmonary or cardiac disease or dysfunction or major organ failure
- Smoker

The following also increase the risk for ORRD:

- Giving IV opioids too fast.
- Giving too high of a dose at one time.
- Giving benzodiazepines, antihistamines, sedatives or other central nervous system depressants along with opioids.
- Eliminating the cause of the pain e.g., the kidney stone passed or the painful procedure is over.
  - Pain is an antagonist to respiratory depression. Once the pain is gone, any opioid in the system can more easily depress ventilation by affecting the respiratory control centers in the brain especially with regard to carbon dioxide response.
  - Certain drugs have a longer half-life than others e.g., fentanyl IV acts quickly and leaves the body quickly; whereas morphine takes longer to act and stays in the body longer.

Reducing the Risk

The risk for ORRD is highest during the first 24 hours of treatment; but it can happen at any time. Inform family members to tell you immediately if patient does not seem to be breathing normally or is snoring.

- Administer opioids slowly. IV means In very Slowly.
- Do not administer large boluses of opioids. Dilaudid 1.5 mg IV is approximately equivalent in potency to Morphine 10 mg IV. Obtain orders to titrate the opioid with additional increments as needed in order to assess patient response. The advantage of PCA is that smaller doses are administered more frequently which reduces the overall dose required to obtain pain control and is considered safer than nurse-administered boluses.
- Avoid coupling opioids with a drug that adds to sedation and respiratory depression.
- Be aware of the half-life of the various opioids and increase the frequency of assessment for patients who may still have opioids in their system after a painful procedure is over. Be prepared to administer a reversal agent or call a code if needed.

Two most important assessment points for ORRD: Sedation and Respiratory Status

SEDATION

- Sedation usually precedes respiratory depression and is typically the first and most important sign of impending respiratory depression.*
- Less opioid is required to produce sedation than to produce respiratory depression, a characteristic that makes sedation a particularly sensitive indicator of impending respiratory depression.
- Use of a sedation scale provides a consistent way to assess level of consciousness, ensures clear communication among staff, and helps evaluate the patient over time.
- POSS is a tool specifically designed to evaluate opioid-induced sedation. (Note that another tool, RASS, was developed for critical care areas and assesses agitation in addition to purposeful goal-directed sedation used for patients on vents.)
- POSS was created by pain expert, Chris Pasero, and has been shown to be valid and reliable, and is easy to use. The tool is shown on the next slide. Efforts are in progress to make this scale the BHSF standard.

* Patients receiving opioids via epidural or intrathecal route can experience respiratory depression while awake.

POSS
(Pasero Opioid-Induced Sedation Scale)

S=Sleep, easy to arouse

1. Awake and alert

2. Slightly drowsy, easily aroused

3. Frequently drowsy, arousable, drifts off to sleep during conversation (Unacceptable…must act)

4. Somnolent, minimal or no response to verbal or physical stimulation (Unacceptable…must act)

- Note: Observe how quickly the patient responds and their ability to stay awake if roused from sleep.
- When documenting sedation score, write "POSS" and the appropriate score S, 1,2,3, or 4. For example, "POSS #2".

Pasero, C. Assessment of Sedation During Opioid Administration for Pain Management, *Journal of PeriAnesthesia Nursing*, Vol 24, No 3 (June), 2009: pp 186-190

Assessing the Sleeping Patient

- Waking a patient will stimulate respirations thereby giving a false indication of respiratory status; therefore, respiratory status should be assessed **before** waking the sleeping patient.

- May allow a patient to sleep who has been receiving stable opioid doses for more than 24 hours and for whom, upon careful RN assessment of the rise and fall of the chest to determine **rate**, **depth**, and **regularity** of respirations, are deemed normal for the patient.

- Patients must be wakened if the nurse cannot determine if the patient is sleeping normally or is sedated.

- Waken any patient who is receiving opioids and is **snoring** because snoring can evolve into complete obstruction in a sedated patient.

Two most important assessment points for ORRD: Sedation and Respiratory Status

Respiratory Assessment

- Involves more than simply counting respirations and should be performed by a RN.
- Watch the rise and fall of the chest to determine **rate**, **depth**, and **regularity** of respirations.
  - Compare the rate with previous rates. Decreased rate, shallow respirations or periods of apnea require further evaluation and action.
- Listen for any snoring which requires immediate repositioning, further evaluation and action. Even subtle snoring can evolve into complete obstruction in a sedated patient.
- It is normal to have a lower respiratory rate during sleep, especially on opioids. Some people breathe at 6-8 per minute when they sleep, yet are well ventilated. However, the **hallmark of significant opioid-induced CNS depression requiring naloxone is change in the level of consciousness**.

Recommendations Regarding Use of Monitoring Equipment

Anesthesia Patient Safety Foundation: *Essential Monitoring Strategies to Detect Clinically Significant Drug- Induced Respiratory Depression in the Postoperative Period*

- Although careful screening for conditions that may be associated with an increased risk of postoperative respiratory insufficiency (obstructive sleep apnea, obesity, chronic opioid therapy) is recommended, applying electronic monitoring selectively based upon *perceived* increased risk is likely to miss respiratory depression in patients without risk factors.

- Continuous electronic monitoring of oxygenation and ventilation should be considered for all patients and would reduce the likelihood of unrecognized clinically significant ORRD. Continuous electronic monitoring systems should integrate multiple physiologic parameters to identify clinically significant changes earlier and more reliably.

- Intermittent "spot checks" of oxygenation (pulse oximetry) is not adequate for reliably recognizing clinically significant evolving ORRD. **All patients receiving opioids should have oxygenation monitored by <u>continuous</u> pulse oximetry for at least the first 24 hours.** Monitoring continuous oxygenation and ventilation from a central location (telemetry or comparable technologies) is desirable.

- **Capnography or other monitoring modalities that measure the adequacy of ventilation and airflow is indicated when patients require supplemental oxygen to maintain acceptable oxygen saturations. Pulse oximetry is ineffective in detecting hypoventilation when patients are receiving oxygen.**

- **Electronic monitoring should complement and not replace structured nursing assessment and vigilance by RNs.** Threshold-based alarm limits on individual physiologic parameters may result in the caregiver failing to recognize early signs of progressive hypoventilation by either being too sensitive (excess false alarms) or insufficiently sensitive.

End-Tidal CO_2 Monitoring (Capnography) versus SaO_2 Monitoring (Pulse Oximetry)

- Expired CO_2 (capnography)
  - Highly reliable measure of quality of ventilation
  - Early indicator of impending respiratory depression
- Pulse oximetry
  - Reports falling arterial oxygen saturation
  - A patient receiving high-flow supplemental oxygen could develop severe hypercapnia despite adequate pulse oximetry readings
  - May appear normal even with shallow respirations
  - May even be adequate in those with severe hypercapnia (hypercarbia), a condition where there is too much carbon dioxide in the blood.
  - Late finding in respiratory depression

Interventions for ORRD

- STOP opioid if being infused.
- Attempt to arouse patient. COACH patient to take deep breaths. Remind the patient to breathe; though narcotized, patients report hearing concerned staff and being unable to open their eyes or respond. Reminders to "take a deep breath" are often followed.
- Call the appropriate code if necessary.
- Place patient in Fowlers position
- Place pulse oximeter if not already present.
- Initiate oxygen at 3 liters/minute nasal cannula. (**Higher levels of oxygen may decrease respiratory drive**.)
- Insure patent IV. If no IV present, start an IV NS at KVO rate (25ml/hr).
- Monitor vital signs at least every 5 minutes.
- If patient not breathing or breathing very little, and patient cannot be aroused or coached to breathe, administer undiluted naloxone 0.2 mg-0.4 mg IV.
- If patient is over sedated, difficult to arouse, or otherwise requires reversal of opioid effects, administer diluted naloxone (0.4 mg in 9 mls NSS) and titrate 2 ml q 1-2 minute intervals until patient becomes alert.
- Notify attending physician.
- Discontinue the naloxone administration as soon as patient is responsive to physical stimulation and able to take deep breaths when told to do so.
- Additional doses of naloxone may be needed because the duration of naloxone is shorter than the duration of most opioids. An IV drip may be required to reverse the effects of long-acting opioids such as OxyContin and Duragesic patch.
- Assign a staff member to monitor sedation and respiratory status.
- For respiratory depression due to a benzodiazepine (Valium, Ativan, Versed), the reversal agent is flumazenil (Mazicon).
- Administer flumazenil 0.2 mg IV over 15 seconds. Wait 1 minute, and then give another 0.2 mg if needed. May be repeated several more times at 1 minute intervals if required. The maximum dose is 1 mg.
- If patient with respiratory depression has received both a benzodiazepine and an opioid, administer the flumazenil before the naloxone.

Comments Regarding Naloxone: A drug that must be given correctly!

- Patients should meet the following criteria before naloxone is administered for ORRD:
  - Depressed mental status: difficult to arouse or unarousable.
  - Shallow respirations or rate < 8 associated with evidence of inadequate ventilation (e.g. low oxygen saturation, hypotension).
- A typical response is noted after 2-4 milligrams of naloxone with deeper breathing and greater level of arousal.
- If the patient does not respond to a total of 0.8 mg naloxone (2 amps), consider other causes of sedation and respiratory depression (e.g. benzodiazepines, CVA) or a medical condition .
- Depending on the dose administered, naloxone administration to a patient physically dependent on opioids will cause the abrupt return of pain and can precipitate an Abstinence Syndrome, with symptoms ranging from mild anxiety, irritability and muscle aches to life-threatening tachycardia and hypertension.
- Once thought to be devoid of side effects, naloxone can cause cardiovascular collapse and pulmonary edema, probably through abrupt increase in sympathetic nervous system activity associated with opioid reversal. Suction and Code Cart should be available when giving naloxone.