



Assessment of Sedation During Opioid Administration for Pain Management

Chris Pasero, MS, RN-BC, FAAN

LIFE-THREATENING respiratory depression is the most serious of the opioid adverse effects. To most nurses, it is one of the most frightening aspects of opioid administration. However, nurses can be the key to preventing clinically significant respiratory depression by performing systematic assessments of their patients' sedation levels. 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. Gradual increases in sedation are an early warning sign and must be attended to with a prompt reduction in opioid dose and more frequent monitoring until the patient demonstrates an acceptable level of sedation.¹⁻⁴

Sedation Assessment

Nursing assessment of opioid-induced sedation is convenient, inexpensive, and takes minimal time to perform. To ensure clear communication between members of the health care team and to evaluate trends in patients' levels of sedation, a simple, easy-to-understand sedation scale designed for use during opioid administration for pain management is recommended.² The use of sedation scales is common in hospitals in the United States. The author performed a survey of members of the American Pain Society and the American Society for Pain Management Nursing e-mail list service in 2006 that revealed all but one member institution used some type of sedation scale during opioid therapies, such as intravenous patient-controlled analgesia (IV PCA) and epidural analgesia (N = 64). The most commonly used sedation scale among those surveyed was the Pasero Opioid-induced Sedation Scale (POSS) (Table 1). Two studies have established validity and reliability (0.903⁵ and 0.909⁶ by Cronbach's alpha) of the POSS for sedation assessment during opioid administration for pain management.

Note that the POSS links nursing interventions to the various levels of sedation. Research has shown that nurses find this approach helpful in making appropriate decisions about how to proceed with opioid treatment.^{5,6} Actions may include increasing the opioid dose in a patient who is easy to arouse and reports unacceptable pain relief, or decreasing or holding the opioid dose in a patient who is excessively sedated.¹⁻⁴ Opioid analgesic orders or a hospital protocol should include the expectation that a nurse will decrease the opioid dose if a patient is excessively sedated.

Even sedated patients may rouse when the nurse enters the room, stands by the bed, or simply touches the patient. However, further evaluation is necessary. A proper sedation assessment requires the nurse to observe how quickly the patient rouses when stimulated by the presence of the nurse, a touch, or conversation. The patient's ability to stay awake once aroused is a critical indicator of level of sedation. To determine this, the patient should be asked to wake up and answer a simple question. A patient who is easy to arouse will be able to awaken readily and respond with a complete answer to the question without falling asleep (sedation level 1 or 2 on the POSS). Falling asleep mid-sentence indicates a sedation level of 3 on the POSS. Note that the POSS requires the nurse to decrease the opioid dose and increase monitoring frequency until the patient has a sedation level of less than 3 (see Table 1).

Sedation scales such as the Ramsay Scale⁷ or Richmond Agitation Sedation Scale⁸ are used to assess purposeful, goal-directed sedation during procedures or in ventilated, critically ill patients, and are not recommended for use during opioid administration for pain management because they incorporate assessment of other conditions in addition to sedation.² Most goal-directed sedation scales link anxiety or agitation to the sedation scale, which complicates assessment because agitation and anxiety are not indicators of increasing opioid-induced sedation. Patients may be either calm or anxious and sedated. Further, the scales used for assessment of purposeful, goal-directed sedation were not developed for assessment of sedation during opioid administration for pain management. Similarly, simple sedation scales such as the POSS were not developed for assessment of purposeful, goal-directed

Chris Pasero is a pain management educator and clinical consultant in El Dorado Hills, CA.

Address correspondence to Chris Pasero, 1252 Clearview Drive, El Dorado Hills, CA 95762; e-mail address: cpasero@aol.com.

© 2009 by American Society of PeriAnesthesia Nurses

1089-9472/09/2403-0011\$36.00/0

doi:10.1016/j.jpain.2009.03.005

Table 1. Pasero Opioid-induced Sedation Scale (POSS) With Interventions*

S = Sleep, easy to arouse

Acceptable; no action necessary; may increase opioid dose if needed

1. Awake and alert

Acceptable; no action necessary; may increase opioid dose if needed

2. Slightly drowsy, easily aroused

Acceptable; no action necessary; may increase opioid dose if needed

3. Frequently drowsy, arousable, drifts off to sleep during conversation

Unacceptable; monitor respiratory status and sedation level closely until sedation level is stable at less than 3 and respiratory status is satisfactory; decrease opioid dose 25% to 50%¹ or notify prescriber² or anesthesiologist for orders; consider administering a non-sedating, opioid-sparing nonopioid, such as acetaminophen or an NSAID, if not contraindicated.

4. Somnolent, minimal or no response to verbal or physical stimulation

Unacceptable; stop opioid; consider administering naloxone^{3,4}; notify prescriber² or anesthesiologist; monitor respiratory status and sedation level closely until sedation level is stable at less than 3 and respiratory status is satisfactory.

*Appropriate action is given in italics at each level of sedation.

¹Opioid analgesic orders or a hospital protocol should include the expectation that a nurse will decrease the opioid dose if a patient is excessively sedated.

²For example, the physician, nurse practitioner, advanced practice nurse, or physician assistant responsible for the pain management prescription.

³Mix 0.4 mg of naloxone and 10 mL of normal saline in syringe and administer this dilute solution very slowly (0.5 mL over two minutes) while observing the patient's response (titrate to effect) (Source: Pasero, Portenoy, McCaffery M. Opioid analgesics. In: *Pain: Clinical Manual*. 2nd ed. St. Louis, MO: Mosby; 1999:161-299; American Pain Society (APS). *Principles of Analgesic Use in the Treatment of Acute Pain and Chronic Cancer Pain*. 5th ed. Glenview, IL: APS; 2003.)

⁴Hospital protocols should include the expectation that a nurse will administer naloxone to any patient suspected of having life-threatening opioid-induced sedation and respiratory depression.

Copyright © 1994, Chris Pasero. Used with permission. Source: Pasero C. *Acute Pain Service: Policy and Procedure Manual*. Los Angeles, CA: Academy Medical Systems; 1994.

sedation. Many hospitals have appropriately decided to use two different sedation scales depending on the goals of treatment—one scale for purposeful sedation and a simpler sedation scale for assessment of sedation during opioid administration for pain management.^{5,6}

Respiratory Assessment

A comprehensive assessment of respiratory status goes hand-in-hand with sedation assessment and requires more than counting a patient's respiratory rate over a 30- or 60-second period. Although respiratory rate is an important parameter to obtain, clinically significant respiratory depression is not defined by a specific number of respirations per minute.¹ Rather, it is defined by several characteristics of a patient's respiratory status and is compared with the patient's baseline respiratory status.

A proper respiratory assessment during opioid treatment requires the nurse to watch the rise and fall of the patient's chest to determine the rate, depth, and regularity of respirations.⁹ Current respiratory rate should be compared with previous rates, and trends should be noted. Shallow respirations or periods of apnea, even brief periods, require further evaluation.

Listening to the sound of the patient's respiration is critical. Snoring indicates airway obstruction¹⁰ and

must be attended to promptly with repositioning,¹¹ a request for respiratory therapy consultation, and further evaluation for the presence of obstructive sleep apnea (OSA).¹⁰ Even subtle snoring can evolve into complete obstruction in a sedated patient, and so must be addressed.

Many times patients or their family members report that snoring is "normal" because the patient often snores at home. This thinking can lead to fatal consequences. In the home setting, patients are typically awakened by their own snoring and ineffectual respiration; however, in the context of opioid administration and perhaps other sedating medications, patients may be too sedated to self-arouse. Under these circumstances, snoring is an ominous sign and requires the nurse to arouse and further evaluate the patient to avert disaster.

All patients and their family members should be asked on admission about whether the patient snores. If the answer is yes, further evaluation such as a sleep study to diagnose OSA may be warranted before surgery or administration of sedating agents. At the very least, opioid doses should be decreased by 25% to 50% and continuous CO₂ monitoring (ie, capnography) implemented in patients with known or suspected OSA. Continuous pulse oximetry may be used, but it is important to remember that pulse oximetry may yield high oxygen

Table 2. Case Presentations*Case #1*

Mrs Gray is a 68-year-old female who has been on the clinical unit for six hours after a total abdominal hysterectomy. She is receiving acetaminophen orally and IV PCA with a PCA bolus dose of 0.2 mg of hydromorphone and a delay (lockout) interval of eight minutes. Upon entering the room, the nurse notes that Mrs Gray is asleep and has regular, sufficiently deep, and quiet respirations at a rate of 16 breaths per minute. The nurse knows that Mrs Gray's respiratory rate has been 18 or more during previous assessments. Mrs Gray arouses briefly when she hears the nurse talking to her family but falls quickly back to sleep. When the nurse arouses Mrs Gray and asks her to describe her pain, Mrs Gray says her pain is 4 (on a scale of 0 to 10) but then falls quickly asleep in the middle of her response.

What, if anything, should the nurse do? (See Table 1)

Case #2

Mr Richards is a 20-year-old male admitted to the clinical unit from the PACU after an exploratory laparotomy. The PACU nurse reported some difficulty getting Mr Richards comfortable after surgery. He received celecoxib and acetaminophen preoperatively and a total of 10 mg of IV morphine before discharge from the PACU. Mr Richards reported a pain rating of 8 (on a scale of 0 to 10) after transfer to his bed on the clinical unit. His sedation level was 2 and his respirations were deep and regular at a rate of 18 breaths per minute. His nurse administered 3 mg of IV morphine for pain after settling him in bed. When the nurse returns 30 minutes later to reassess Mr Richards, he is found to be sleeping. His respirations are quiet, regular, and sufficiently deep at a rate of 18 breaths per minute.

What, if anything, should the nurse do? (See Table 1)

Action for Case #1: Mrs Gray has a sedation level of 3 on the POSS (see Table 1). The nurse decreases Mrs Gray's PCA dose to 0.1 mg and tells the nursing technician to monitor Mrs Gray's sedation and respiratory status and tell her to turn, cough, and deep breathe every 10 minutes for the next 60 minutes. After talking with Mrs Gray's physician, the nurse gives Mrs Gray 15 mg of ketorolac IV. The nurse's reassessment 30 and 60 minutes later reveals Mrs Gray has a sedation level of 2 with deep, regular respirations at a rate of 20 breaths per minute. She is able to stay awake easily while talking with her daughter. Mrs Gray remained stable and her pain was well controlled with regularly scheduled doses of acetaminophen and ketorolac and IV PCA hydromorphone 0.1 mg per PCA bolus dose.

Action for Case #2: Knowing that Mr Richards has received a large amount of morphine over the past two to three hours for difficult-to-control pain, the nurse gently squeezes his shoulder and asks him how he feels. Mr Richards arouses readily, which indicates an acceptable sedation level ("S" on the POSS; see Table 1), says he feels much better, and rates his pain intensity as 3 (on a scale of 0 to 10). After talking two or three minutes longer in coherent sentences, he falls asleep and continues to demonstrate an acceptable respiratory status. Mr Richards remained stable and his pain was well controlled with regularly scheduled doses of celecoxib and IV morphine boluses of 3 mg or less about every two hours.

saturation readings despite the presence of respiratory depression in patients who are receiving supplemental oxygen.^{9,12} If supplemental oxygen is required and pulse oximetry is the only mechanical monitoring available, high-risk patients should be moved to a more closely monitored setting.⁹ The American Society of Anesthesiologists lists clinical signs suggestive of OSA such as frequent, loud snoring; neck circumference of 17 inches in men or 16 inches in women; and body mass index of 35 kg/m² or more, and provides recommendations for appropriate management in the perianesthesia/perioperative setting.¹⁰

Frequency of Sedation and Respiratory Status Assessment

The most dangerous time for a patient in terms of opioid-induced respiratory depression is during the first 24 hours of opioid therapy. This includes patients who are opioid tolerant (have been taking regular daily doses of an opioid for several days) and have been given opioid analgesia in addition to their usual amount, such as the patient who takes opioid analgesia for chronic pain and receives IV PCA for acute pain after surgery.

Sedation level and respiratory status should be assessed at least every one to two hours during the first 24 hours of opioid therapy, then every 4 hours in stable patients.¹⁻⁴ The need for more frequent assessment is common and should be based on the method of analgesic administration and patient response. For example, patients who have received single-dose epidural or intrathecal morphine injection should be assessed hourly for the first 12 hours then every two hours for the next 12 hours.¹³ Opioid-naïve patients who are receiving a basal rate with IV PCA should be assessed hourly and the basal rate discontinued promptly if increased sedation is noted.³ Patients should be assessed at the peak time of the last opioid dose when opioids are given by single doses such as an intramuscular or IV bolus or oral opioid. For example, the peak time after administration of an IV bolus of morphine is 15 to 30 minutes and 60 to 90 minutes after an immediate-release oral opioid.¹ Patients who are sedated at the peak time should be watched very closely until they demonstrate an acceptable sedation level and respiratory status. Charts containing pharmacokinetic information such as onset, peak, and duration of the various opioids by the various routes of administration can be posted on clinical units for reference.

It is extremely important to remind staff that the use of mechanical monitoring, such as pulse oximetry and capnography, does not absolve the nurse of sedation and respiratory assessments. Some institutions implement periodic pulse oximetry readings (spot checks) during opioid treatment. These readings are typically obtained when vital signs are taken. However, periodic pulse oximetry readings may provide a false sense of security and can lead to inaccurate assumptions about the patient's respiratory status. The process of applying the pulse oximeter sensor is likely to stimulate the patient to take a deep breath, which can yield higher oxygen saturation readings than the patient has when not stimulated. Therefore, if mechanical monitoring is used, continuous rather than periodic monitoring is recommended.¹³

Assessment of the Sleeping Patient

Nurses often ask if they should awaken sleeping patients to determine level of sedation. It is acceptable to allow a patient to sleep who has been receiving stable opioid doses and demonstrates optimal respiratory status determined by a comprehensive respiratory assessment as described above. However, patients must be aroused if there is any question about whether the patient is sleeping normally or is sedated. It is important to realize that arousal will stimulate respiration, so respiratory depth, regularity, rate, and noisiness should be noted before arousing the sleeping patient to obtain a more accurate picture of the patient's respiratory status.

It is reassuring to know that patients who are sleeping normally and have well-controlled pain will fall back to sleep after they are aroused for the sedation assessment. Those who do not fall back to sleep require further evaluation because they may be experiencing pain and need analgesia. Note that patients who achieve pain control and fall asleep after a period of poor pain control should

be carefully assessed to be sure that what seems to be normal sleep is not actually excessive sedation.

Multimodal Therapy

A principle of safe pain management is to administer the lowest effective analgesic dose necessary for the patient to achieve satisfactory pain control.¹ This can be accomplished with the use of multimodal analgesic approaches that combine drugs with different underlying mechanisms, such as nonopioids (acetaminophen and nonsteroidal anti-inflammatory drugs [NSAIDs]), opioids, local anesthetics, and anticonvulsants.¹⁴ Lower analgesic doses have the potential to produce fewer adverse effects.^{15,16} Further, multimodal analgesia can result in comparable or greater pain relief than can be achieved with any single analgesic.¹⁷⁻¹⁹ Note that the POSS recommends administering a nonsedating nonopioid to excessively sedated patients (see Table 1). A preventive approach is preferred whereby nonopioids are routinely initiated preoperatively or at least at the same time as opioids in the PACU.^{1,14}

Summary

Patients are at highest risk for opioid-induced respiratory depression during the first 24 hours of opioid therapy. Sedation is a very sensitive indicator of impending opioid-induced respiratory depression and precedes clinically significant episodes. Systematic sedation assessment using a simple sedation scale during opioid administration for pain management is recommended. If increasing sedation is noted, opioid doses should be promptly decreased and the patient monitored more frequently until the sedation level is acceptable. Using multimodal analgesic approaches, such as adding acetaminophen and an NSAID to the opioid treatment plan, allows lower opioid doses and fewer adverse effects. See Table 2 for case presentations that demonstrate appropriate decision making based on sedation and respiratory assessments.

References

1. Pasero C, Portenoy RK, McCaffery M. Opioid analgesics. In: *Pain: Clinical Manual*, 2nd ed. St Louis: Mosby; 1999:161-299.
2. Pasero C, McCaffery M. Monitoring opioid-induced sedation. *Am J Nurs*. 2002;102:67-68.
3. Pasero C, McCaffery M. Safe use of continuous infusion with IV PCA. *J Perianesth Nurs*. 2004;19:42-45.
4. Pasero C, Manworren RCB, McCaffery M. IV Opioid range orders. *Am J Nurs*. 2007;107:52-59.
5. Nisbet A, Mooney-Cotter M. Post Opioid Sedation Scales. Validity, Reliability, Accuracy, and Performance in Adult Non-critical Care Settings. Poster presentation, ASPMN National Meeting, Tucson, Arizona, September 4-6, 2008.
6. Dempsey SJ, Davidson J, Cahill D, et al. Selection of a Sedation Assessment Scale for Clinical Practice: Inter-rater Reliability, Ease of Use and Applicability Testing of the Richmond-Agitation-Sedation and Pasero Opioid-Induced Sedation Scales (2008). Poster presentation, National Association of Orthopedic Nurses Congress, Tampa, Florida, May 6-10, 2009.
7. Ramsay M, Savege T, Simpson B, et al. Controlled sedation with alphaxolone-alphadolone. *BMJ*. 1974;2:656-659.
8. Sessler CN, Gosnell M, Grap MJ, et al. The Richmond Agitation-Sedation Scale. Validity and reliability in adult intensive care unit patients. *Am J Res Crit Care Med*. 2002;166:1338-1344.
9. Stemp LI, Ramsay M. Oxygen may mask hypoventilation—Patient breathing must be ensured [letter to the editor]. *APSF Newsletter*. 2005;20:80.
10. Isono S, Tanaka A, Nishino T. Lateral position decreases collapsibility of the passive pharynx in patients with obstructive sleep apnea. *Anesthesiology*. 2002;97:771-773.
11. American Society of Anesthesiologists (ASA). Practice guidelines for the perioperative management of patients with obstructive sleep apnea. *Anesthesiology*. 2006;104:1081-1093.

12. Overdyk F, Moon R, Oglesby H, et al. Challenges in the prevention of postoperative respiratory depression and opioid therapy. Initiatives in Safe Patient Care, November, 2008.
13. American Society of Anesthesiologists (ASA) Task Force on Neuraxial Opioids. Practice guidelines for the prevention, detection, and management of respiratory depression associated with neuraxial opioid administration. *Anesthesiology*. 2009;110:218-230.
14. Pasero C. Multimodal analgesia in the PACU. *J Perianesth Nurs*. 2003;18:265-268.
15. Ashburn MA, Caplan RA, Carr DB, et al. Practice guidelines for acute pain management in the perioperative setting. An updated report by the American Society of Anesthesiologists task force on acute pain management. *Anesthesiology*. 2004;100:1573-1581.
16. Schug SA, Manopas A. Update on the role of non-opioids for postoperative pain treatment. *Best Prac Res Clin Anesth*. 2007;21:15-30.
17. Busch CA, Shore BJ, Bhandari R, et al. Efficacy of periarticular multimodal drug injection in total knee Arthroplasty. *J Bone Joint Surg*. 2006;88a:959-963.
18. Cassinelli EH, Dean CL, Garcia RM, et al. Ketorolac use for postoperative pain management following lumbar decompression surgery: A prospective, randomized, double-blinded, placebo-controlled trial. *Spine*. 2008;33:1313-1317.
19. Huang YM, Wang CM, Wang CT, et al. Perioperative celebrex administration for pain management after total knee arthroplasty—A randomized, controlled study. *BMC. Musculoskelet Disord*. 2008;9:77.

Calendar of Events

July 18, 2009. Perianesthesia Review. Lois Schick MBA, MN, RN, CPAN, CAPA, Speaker. Mayo Clinic, Jacksonville, FL. For further information, contact Nancy Fishman at 904.956.3101 or fishman.nancy@mayo.edu.

October 9-10, 2009. Perianesthesia Nurses Association of California (PANAC) 30th Anniversary Meeting/Conference at Hilton Garden Inn, San Francisco/Oakland Bay Bridge, Emeryville, CA. For information, contact Sheryl Michelson, 408-252-8723; michelson.clayborn@sbcglobal.net or visit www.panac.org.

October 23-25, 2009. FLASPAN's 40th Annual Conference. The Magic is Still Strong after 40 Years. Regal Sun Resort, Lake Buena Vista, FL. For further information contact Kim Godfrey at 904.622.6322 or pacurn32068@hotmail.com.

November 18-20, 2009. The Joanna Briggs Institute invites you to attend its biennial 2009 International Convention, Ripples to Revolution: from Bench to Bedside, to be held at the Hyatt Regency in Adelaide, South Australia. We've specially designed the event to bring together evidence-based researchers and reviewers, guideline developers, clinicians, educators, policy makers, administrators and consumers from all over the world to work toward an integrated approach to improving global health care using evidence-based guidelines. ** Abstracts accepted until 22 June 2009 ** For further information contact Chris Cafcakis, (08) 8303 3637, chris.cafcakis@adelaide.edu.au, (08) 8303 4881 (fax) or visit the website at: <http://www.joannabriggs.edu.au/events/2009JBICnv/index.html>.