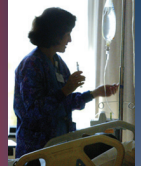

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Monitoring Hospitalized Adult Patients for Opioid-Induced Sedation and Respiratory Depression

Evidence-based practices for preventing, detecting, and managing adverse effects.

ABSTRACT: Opioid analgesics are commonly administered to hospitalized patients to treat acute pain, but these drugs put patients at risk for serious adverse events, such as unintended advancing sedation, respiratory depression, and death. Nurses play an important role in keeping patients safe by making clinical decisions about the frequency and intensity with which patients receiving IV and epidural opioids should be monitored. To make sound clinical judgments, nurses must be aware of the factors that place patients at elevated risk for adverse opioid-related effects and know how to screen and assess patients for these risks. The authors review the literature on unintended advancing sedation and respiratory depression associated with opioid administration and present evidence-based recommendations for clinical decision making and patient monitoring, using both nursing assessments and electronic technologies.

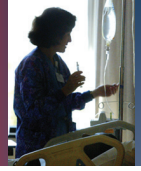
Keywords: acute pain, opioid-induced respiratory depression, opioid-induced sedation, opioids, pain guidelines, patient monitoring

Opioid analgesics are commonly administered to hospitalized patients to treat pain, but these drugs are associated with serious adverse events such as unintended advancing sedation, respiratory depression, and death. Hospitalized patients who experience opioid-related adverse events typically have poorer clinical outcomes than those who do not. For example, among postsurgical patients, opioid-related adverse events have been found to increase hospital stays by 55%, health care costs by 47%, 30-day readmission rates by 36%, and risk of inpatient mortality by 3.4 times.[1] In a study of more than 1.14 million nonsurgical admissions across 286 U.S. hospitals, about 50% of patients received opioid medications and 0.6% of these experienced serious adverse events (defined as naloxone exposure or an opioid-related adverse drug event).[2] In order to deliver safe and effective pain care to hospitalized patients receiving opioids, nurses must understand the risks associated with these analgesics, regularly assess patient pain and response to therapy, and appropriately monitor patients for opioid-related adverse events.

This article discusses evidence-based practices for preventing or minimizing, detecting, and managing unintended sedation and respiratory depression in adult hospitalized patients receiving opioids. The article does not address the administration of opioids for procedural or intended sedation. Rather, it reviews current recommendations for monitoring patients receiving opioids and explores such issues as the use of continuous versus intermittent pulse oximetry, whether monitoring practices should differ among patients in accordance with assessed risk, and the role of capnography.

UNINTENDED ADVANCING SEDATION AND RESPIRATORY DEPRESSION

Mild sedation from opioids is expected, especially in patients who are opioid naive. Unintended advancing sedation, however, may lead to respiratory depression and possibly death. Unintended advancing sedation is defined by the American Society for Pain Management Nursing (ASPMN) as sedation "that occurs at increasingly higher levels along the continuum of sedation as a result of opioid administration for pain management, impairing both arousal mechanisms



and content processing."[3] The continuum of sedation spans the complete range of consciousness levels from being fully alert with no sedation to complete loss of consciousness with respiratory arrest.[3]

The incidence of excessive or progressive sedation associated with the use of opioids for pain management is unknown. Gordon and Pellino retrospectively reviewed health records of the 10,511 adult inpatients who underwent surgery in their hospital in 2003. They found that 56 (0.53%) had received naloxone, 44 (79%) of whom received it for the purpose of reversing opioid sedation.[4] Although excessive sedation is the most important predictor of respiratory depression in hospitalized patients receiving IV opioid analgesics, in a 2013 study of clinician knowledge, only 20% of the 840 RNs surveyed correctly identified it as such; 49% incorrectly identified respiratory rate as the most important predictor.[5] The incidence of opioid-induced respiratory depression (OIRD) is also unknown because OIRD may resolve without precipitating a sentinel event and thus may not be tracked or reported as an adverse event. Cashman and Dolin analyzed data from 116 study groups that defined respiratory depression as a respiratory rate of either less than 10 breaths per minute (70 groups) or less than eight breaths per minute (46 groups).[6] Their analysis, which included data from 29,607 postsurgical patients, found that respiratory depression, as defined in these groups, occurred at a mean rate of 1.1% among patients receiving intramuscular, patient-controlled, or epidural opioid analgesia.[6] Although these findings suggest that rates for OIRD are low, such events can cause brain hypoxia, anoxia, and death.

After reviewing 357 claims from the Anesthesia Closed Claims Project database involving incidents that occurred between 1990 and 2009, Lee and colleagues determined that OIRD was possibly, probably, or definitely a factor in 92 cases, 77% of which involved events that resulted in severe brain damage or death.[7] The vast majority (88%) of events transpired within 24 hours of surgery, and 97% were deemed probably or possibly preventable with better monitoring. The fact that somnolence had been documented before the event in 62% of cases highlights the need for ongoing sedation assessment and recognition by nurses that excessive sedation is the cardinal sign of impending respiratory depression. In 42% of the cases, the interval between the last nursing assessment and the detection of respiratory depression was less than two hours, and in 16% of the cases, it was within 15 minutes. Not only did OIRD result in devastating patient outcomes, but it also had substantial financial consequences for the hospitals, with median litigation costs totaling $216,750 per claim in 2012 dollars.

IDENTIFYING PATIENT RISKS FOR OIRD

Recognizing the serious nature of OIRD, the Joint Commission, the Institute for Healthcare Improvement (IHI), and the Centers for Medicare and Medicaid Services (CMS) have issued alerts to draw attention to OIRD as a national problem and to urge hospitals to take actions to prevent opioid-related adverse events by increasing the frequency of patient monitoring.[8-11] The Joint Commission attributes OIRD sentinel events to inappropriate prescribing of opioids, administration of opioids by multiple routes (oral, parenteral, and transdermal, for example), lack of awareness regarding opioid potency differences, and insufficient patient monitoring.[10] The Joint Commission, IHI, and CMS emphasize that when patients receive opioids, assessment and monitoring must be informed by the risk of OIRD, which may be influenced by the interval following opioid administration, patient-related factors, procedural factors, and analgesic technique (see Table 1).[3, 12]

The first 24 hours. In one retrospective case–control analysis, 62 postoperative patients experienced an OIRD event following opioid administration: 48 (77.4%) within the first 24 hours after surgery and 35 (56.5%) within the first 12 hours after surgery.[13] In an observational study, postoperative sedation scores, a frequent harbinger of respiratory depression, were highest within the first four hours following discharge from the postanesthesia care unit.[14]

Obstructive sleep apnea. Studies have established a strong association between OIRD and obstructive sleep apnea in postsurgical populations.[15-17] Before hospitalized patients receive opioids or sedatives, they should be screened using the STOP-Bang questionnaire, a brief and useful tool for detecting obstructive sleep apnea,[18, 19] which is available online (see www.stopbang.ca/osa/screening.php).

Obesity hypoventilation syndrome. Nurses should also calculate patients' body mass index (BMI) and assess their serum bicarbonate level to screen for obesity hypoventilation syndrome, which puts patients at increased risk for OIRD.[19] This disorder manifests as hypercapnia and hypoxemia in obese patients with sleep-disordered breathing, such as obstructive sleep apnea. A BMI greater than 30 kg/m^2 and serum bicarbonate level at or below 28 mEq/L can be indicative of this syndrome.

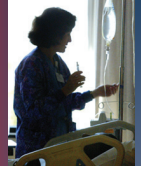
Prior experience with acute opioid treatment. Nurses should ask patients whether they have ever taken opioid medication for surgery, or for such procedures as dental extraction or colonoscopy—and, if so, how they responded (did they experience any adverse effects, such as excessive drowsiness, for example). This information can alert nurses to the need for closer monitoring.

Table 1. Risk Factors for Opioid-Induced Respiratory Depression

Patient may have one or more of the following to be considered high risk:
Age > 55 years
Obesity (e.g., body mass index ≥ 30 kg/m^2)
Untreated obstructive sleep apnea
History of snoring or witnessed apneas
Excessive daytime sleepiness
Retrognathia
Neck circumference > 17.5"
Preexisting pulmonary/cardiac disease or dysfunction, e.g., chronic obstructive pulmonary disease, congestive heart failure
Major organ failure (albumin level < 30 g/L and/or blood urea nitrogen > 30 mg/dL)
Dependent functional status (unable to walk 4 blocks or 2 sets of stairs or requiring assistance with ambulation)
Smoker (> 20 pack-years)
American Society of Anesthesiologists patient status classification 3-5
Increased opioid dose requirement
Opioid-naive patients who require a high dose of opioid in short period of time, e.g., 10 mg IV morphine or equivalent in postanesthesia care unit (PACU)
Opioid-tolerant patients who are given a significant amount of opioid in addition to their usual amount, such as the patient who takes an opioid analgesic before surgery for persistent pain and receives several IV opioid bolus doses in the PACU followed by high-dose IV patient-controlled analgesia (PCA) for ongoing acute postoperative pain
First 24 hours of opioid therapy (e.g., first 24 hours after surgery is high-risk period for surgical patients)
Pain is controlled after a period of poor control
Prolonged surgery (> 2 hours)
Thoracic and other large incisions that may interfere with adequate ventilation
Concomitant administration of sedating agents, such as benzodiazepines or antihistamines
Large single-bolus techniques, e.g., single-injection neuraxial morphine
Continuous opioid infusion in opioid-naive patients, e.g., IV PCA with basal rate
Naloxone administration: Patients who are given naloxone for clinically significant respiratory depression are at risk for repeated respiratory depression

Preexisting chronic pain. Hospitalized patients with preexisting chronic pain, particularly those who have been using opioids over a long period and require higher opioid doses to manage acute pain, pose a significant challenge for nurses. Opioid dependence, whether from long-term opioid treatment for chronic pain or opioid use disorder, puts patients at elevated risk for OIRD when they receive opioid analgesics for acute pain—especially if medications with synergistic sedative properties, such as benzodiazepines, gabapentin, or hypnotics for sleep, are administered concurrently.[20] If opioids are necessary to treat acute pain, however, nurses must not withhold them unless there are obvious signs of excessive sedation, OIRD, or other contraindications based on risk factors.

Multimodal analgesic regimens, which combine opioids with other classes of analgesics that target different pain mechanisms and pathways, should always be considered for treating pain in patients with preexisting chronic pain. The synergistic effects of multiple analgesics can maximize pain relief, reducing—and often eliminating—the need for opioids. Multimodal regimens might include IV or oral acetaminophen, nonsteroidal antiinflammatory drugs, anticonvulsants (gabapentin or pregabalin, for example), tricyclic antidepressants, serotonin norepinephrine reuptake inhibitors, and local anesthetics, delivered topically or regionally (through nerve blocks or epidurals). Nurses can collaborate with physicians, advanced practice RNs, physician assistants, and pharmacists to design



multimodal analgesic regimens. Moreover, nondrug pharmacologic interventions such as cold therapy, distraction, relaxation techniques, visual imagery, or massage can augment pain control when used consistently and in conjunction with analgesic therapies.

FREQUENCY AND DURATION OF PATIENT MONITORING

When opioids are administered for acute pain management, patient monitoring requires nurses to regularly observe, assess, and document specific patient responses to therapies. Plans for monitoring patients should be individualized, taking into account the following factors:

- the type of opioid therapy administered
- the route of opioid administration
- the patient's risk of adverse events
- postsurgical or postprocedural care
- adjustments in pain therapies

In addition, monitoring decisions should be informed by evidence-based guidelines. There is little consensus, however, on the precise frequency and duration of monitoring.

The Anesthesia Patient Safety Foundation strongly advocates continuous monitoring of oxygen saturation by pulse oximetry for all hospitalized, nonambulatory adult patients receiving parenteral opioids for acute postoperative pain.[21] For patients receiving supplemental oxygen, the foundation recommends using capnography or other monitoring technologies that measure the adequacy of ventilation and airflow. Not all hospitals, however, continuously monitor all postsurgical patients by pulse oximetry, and capnography technology is not universally available for patients receiving supplemental oxygen.

Although the American Society of Anesthesiologists Task Force on Neuraxial Opioids and the American Society of Regional Anesthesia and Pain Medicine recommend that all patients receiving continuous or intermittent neuraxial opioids be monitored for adequacy of ventilation, oxygenation, and level of consciousness, they do not specify that pulse oximetry should be used continuously but rather that it should be used "when appropriate."[22] They specify that patients should be monitored continually for the first 20 minutes after initiation of therapy and then at least once every hour for the first 12 hours of therapy, every two hours for the next 12 hours of therapy, and every four hours for the duration of therapy, provided no adverse events occur. For patients at high risk for sedation, they endorse increased monitoring (in terms of frequency, duration, or additional methods).

By contrast, an expert panel convened by the CMS in 2012 to develop a potential electronic quality measure for monitoring hospitalized patients receiving opioids by IV patient-controlled analgesia (PCA) arrived at the consensus that these patients should have their respiratory rate, sedation level, and oxygen saturation level monitored every two hours during the first 24 hours of therapy, though they agreed to set the monitoring threshold at every 2.5 hours to allow for documentation.[23] To determine adherence to the recommended monitoring practices, Jungquist and colleagues retrospectively analyzed 2012 monitoring data that the CMS had collected from the electronic medical records of eight U.S. hospitals, which had volunteered to act as beta testing sites for the electronic measure.[23] The researchers abstracted data from 287 randomly selected patient records and analyzed it for adherence to the proposed core measure. Their analysis showed that the core measure (assessment by all three parameters—respiratory rate, sedation level, and oxygen saturation level—at least every 2.5 hours) was met for only 8.4% of the selected patients, and only 26.8% of the selected patients received these assessments at least every 4.5 hours.[23] While these findings provide only a snapshot of monitoring practices, they show that nurses in these hospitals were either not providing sufficient monitoring for patients receiving IV PCA or not documenting the monitoring they provided.

Takeaway points. Despite differences among these recommendations, all point to the fact that, in patients receiving parenteral opioids, respiratory status and level of sedation should be monitored more frequently than vital signs, which are generally assessed every four hours for at least 24 hours following surgery. The American Pain Society, the American Society of Regional Anesthesia and Pain Medicine, and the American Society of Anesthesiologists' Committee on Regional Anesthesia recommend that the timing of assessments should coincide with peak drug effects, typically 15 to 30 minutes after parenteral opioid administration and one to two hours after oral administration.[3,24] Furthermore, most authoritative reports promote more intensive monitoring of patients at risk for opioid-related adverse events such as unintended advancing sedation and OIRD.[3,22] Respiratory status and level of sedation should be monitored frequently during the night, as some research suggests that patients are particularly vulnerable to fatal respiratory events between the hours of midnight and 6 AM, when they are sleeping and having fewer interactions with nurses.[25]

SEDATION SCALES

Levels of sedation should be assessed and quantified using reliable and valid sedation measures.[3,22] Over the past several years, many hospitals have implemented standard sedation scales in monitoring opioid-induced sedation. Practice analysis surveys conducted

by the ASPMN revealed that, in 2009, only 64% of 99 practicing nurses responding on behalf of their unit or institution endorsed the use of numbers to designate the patient's level of sedation,[26] whereas in 2013, all 102 respondents reported that their institutions used at least one type of sedation scale, and 90% endorsed the use of numeric sedation scales.[27] Both ASPMN surveys asked respondents to indicate which sedation scales were used in their practice settings (see Table 2 for a list of these scales).[27] In 2013, the Pasero Opioid-Induced Sedation Scale (POSS)[28, 29] and the Richmond Agitation–Sedation Scale (RASS)[30] were among the most commonly used.[27]

An ASPMN validity and reliability study found that the POSS scored higher than the RASS in ease of use, nursing confidence, and usefulness in clinical decision making.[28] The ASPMN recommends its use.[3, 22] Sedation scales should include guidelines or protocols that define threshold values for excessive or progressive sedation and specify nursing actions warranted to prevent or reverse disturbing trends in sedation levels.

ASSESSING RESPIRATORY STATUS

Peripheral capillary oxygen saturation levels as measured by pulse oximetry (SpO_2) normally range from 94% to 100%. The procedure for measuring oxygen saturation by pulse oximetry is to apply a sensor to the finger until a stable number is displayed.

Intermittent pulse oximetry is the minimum standard of care for assessing the respiratory status of a patient receiving opioids for acute pain. Supplemental oxygen therapy, however, can mask the effects of hypoventilation on oxygen saturation, and manually recorded, intermittent SpO_2 data have been found to be inaccurately inflated when compared with that collected through automated systems.[31] One possible reason for the inaccuracy is that, by rousing a sleeping patient to obtain a pulse oximetry reading, the nurse stimulates the patient to take a deep breath, thereby obscuring ongoing oxygen desaturation. For this reason, some believe that patients receiving IV opioids should be monitored by continuous pulse oximetry.

Continuous pulse oximetry monitoring, in addition to more accurately reflecting oxygenation during sleep, allows for frequent trending of readings. In one 36-bed orthopedic unit, transfers to critical care units were significantly reduced with the introduction of a continuous pulse oximetry surveillance system that used wireless communication to alert nurses when SpO_2 levels fell outside established parameters.[32] SpO_2 readings alone, however, are insufficient indicators of respiratory vulnerability as decreasing values can be a late sign of OIRD.

Capnography measures end-tidal carbon dioxide ($ETCO_2$) level—that is, the maximal concentration of carbon dioxide at the end of an exhaled breath. Normal $ETCO_2$ values are 5% to 6%, which is equivalent to 35 to 45 mmHg. The use of capnography has increased over the past years with the mounting evidence that pulse oximetry accuracy is compromised in patients receiving supplemental oxygen. Capnography is a more sensitive measure of respiratory status than pulse oximetry, because carbon dioxide levels increase before oxygen levels decrease. Furthermore, there is sufficient evidence to support its feasibility and effectiveness in improving patient safety.[33-35]

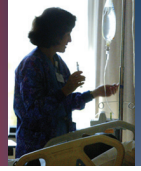
One disadvantage of capnography is that its cannulas fit just under the nose, which can be uncomfortable. As a result of this discomfort, patients may displace the capnography cannulas causing a false alarm. Additionally, the cannulas can disrupt the tight seal required for positive airway pressure masks, which are often used at bedtime by patients with obstructive sleep apnea.

Minute ventilation technology is also used to monitor respiratory status. Using two chest leads to assess tidal volume and respiratory rate, this technology is more comfortable for patients than capnography and is as effective as capnography in detecting

Table 2. Percentage of Nurse Respondents Using Sedation Scales in the American Society for Pain Management Nursing 2009 and 2013 Surveys

Sedation Scales	2013 (n = 102)	2009 (n = 90)
Pasero Opioid Scale[a]	53%	21%
Aldrete Scale	39%	30%
Ramsey Scale	17%	15%
Modified Ramsay Scale	13%	13%
Richmond Agitation–Sedation Scale[b]	42%	12%
Riker Scale/Modified Riker Scale	6%	8%
Scale developed at your institution	8%	<1%
Motor Activity Assessment Scale	1%	<1%
Glasgow Coma Scale	37%	<1%
University of Michigan Scale[c]	4%	<1%

[a] Refers to the Pasero Opioid-Induced Sedation Scale (POSS).
[b] Commonly abbreviated as the RASS.
[c] This is the Michigan Opioid Safety Score (MOSS).



OIRD.[36, 37] In addition to generating the patient's current output readings, it can compare those with the patient's predicted or baseline measures. To detect respiratory depression, nurses can look for trends in patient response by observing the percentage change from baseline.[38, 39]

Monitoring data trends. Typically, hospitals set monitoring thresholds based on physiological extremes—an SpO_2 at or below 90% or a respiratory rate below eight or 10 breaths per minute, for example—that will prompt nursing actions. To evaluate a patient's respiratory status with accuracy, nurses must interpret a wide range of data, noting trends in the patient's respiratory rate, sedation level, and pulse oximetry or capnography readings. It's important to remember that patients whose measurements trend downward can desaturate precipitously, possibly leading to respiratory arrest, even if SpO_2 readings remain in the normal range.[40]

NURSING INTERVENTIONS FOR EXCESSIVE SEDATION OR OIRD

When nurses note concerning trends, interventions include

- notifying the prescriber of the need to adjust or discontinue opioid therapy until sedation and respiratory parameters return to baseline.
- keeping the patient stimulated.
- continuing to monitor trends.

If respiratory parameters fall below established thresholds, nurses must immediately take the following actions:

- Help the patient into a seated position and talk to her or him.
- Call the rapid response team.
- Notify the opioid prescriber and the care team of the patient's status.
- Discontinue opioid therapy.

Naloxone use. When an opioid reversal agent, such as naloxone, is indicated, nurses should be able to find guidelines for its preparation and administration through their institution's policies and procedures manual or drug information system. Nurses may also consult with pharmacy experts, rapid response team members, anesthesiologists, or a nurse or physician pain management specialist.

The naloxone dosage required to reverse opioid-induced sedation or OIRD varies depending on the severity of the patient's condition, the opioid regimen in use, and the patient's response to the initial naloxone dose. The initial dose of naloxone for hospitalized adult patients with signs of analgesic overdose is 40 mcg (0.04 mg) administered intravenously slowly over one minute and repeated every two minutes until the desired effect is achieved—the patient is alert, respiratory rate is more than 10 breaths per minute, and pulse oximetry or capnography readings are within established parameters. (For suggested monitoring strategies, see Table 3.[3, 12, 23, 29, 41, 42])

ALARM FATIGUE

One of the challenges in using continuous monitoring on general care units is alarm fatigue, which occurs when device alarms sound frequently or without a sign of emergent patient danger.[43] As a consequence, nurses either stop recognizing an alarm as a sign of emergent danger or are slower to respond. The U.S. Food and Drug Administration and the Joint Commission recognize that alarm fatigue has contributed to adverse events in hospital settings.[44]

Actions nurses can take to reduce false alarms include

- ensuring proper fitting and secure connection of finger sensors when measuring SpO_2.
- ensuring stability of capnography cannulas and adopting the most appropriate patient-centered monitoring device.
- setting safe parameter thresholds for alarms on all monitoring devices.

DEVELOPING A PLAN OF CARE

Developing a patient's plan of care requires the nurse in collaboration with other care team members to select an appropriate validated pain scale to measure pain intensity and to determine the monitoring practices (the frequency, duration, and types of monitoring) appropriate for the patient and the prescribed analgesic regimen. Goals and expectations for pain management should be established in collaboration with the patient and the family, who should understand that patient safety is a priority requiring regular assessment of respiratory status and level of sedation.

Patients need to be informed that their pain management plan will balance their need for opioid medications with their response to therapy. Practice guidelines from the American Pain Society, the American Society of Regional Anesthesia and Pain Medicine, and the American Society of Anesthesiologists' Committee on Regional Anesthesia recommend that "clinicians adjust the pain management plan on the basis of adequacy of pain relief and presence of adverse events."[24]

Nurses should prepare patients that some monitoring technology may be uncomfortable, make it inconvenient to get out of bed or walk around, or be disturbing if alarms are triggered frequently. It is also helpful to alert patients that they will likely be awakened during the night so that their respiratory status, level of sedation, and oxygenation can be evaluated.

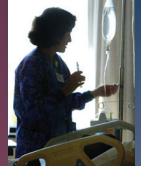
Table 3. Nurse Monitoring Strategies for Patients Receiving Opioids for Acute Pain[3, 12, 23, 29, 41, 42]

Monitoring Strategy	Nursing Assessments and Actions
Respiratory rate (RR)	• Measure RR and count respirations for a full minute. • Observe the respirations while the patient is resting or sleeping in a quiet environment. Note the regularity, the rhythm, and the depth of chest excursion (deep or shallow). • For patients in respiratory depression (RR < 10 or < 8 breaths per minute as defined by hospital protocols or policies), immediately stimulate the patient, encourage deep breaths, discontinue opioid therapy, initiate a rapid response team call, and notify the physician or health care provider responsible for the patient's care. • If the patient cannot be roused or RR remains < 10 or < 8 breaths per minute, an opioid reversal agent may be indicated. Administer IV naloxone slowly at an initial dose of 40 mcg (0.04 mg) over one minute, repeated every two minutes until the desired effect is achieved (excessive sedation or respiratory depression is reversed). o Use caution with opioid-dependent patients (recommended doses, slow administration, and dose titration to desired effect) so as not to precipitate physiological withdrawal, which can be dangerous in a patient who is hemodynamically unstable. • Continue to observe and monitor the patient's RR, sedation level, and pulse oximetry or capnography readings, and consider transfer to a higher level of care, such as a critical care or intermediate care unit, if the patient's condition warrants. • Continue to assess pain, as naloxone can reverse the analgesic effects of opioids.
Level of sedation	• Use a sedation measure validated for opioid-induced sedation. • Initially assess patients while at rest or asleep without touching or stimulating the patient, as touch or stimulation can arouse the patient, possibly giving a false impression of the sedation level. • Awaken the patient during the night to measure sedation. Allow the patient to acclimate to the environment before obtaining a sedation scale score, again without stimulating the patient. • If the patient exhibits somnolence, has slurred speech, drifts off to sleep during conversation, or is slow to arouse, contact the prescriber to discuss decreasing the opioid dosage, keep the patient stimulated, and continue to monitor closely. • If the patient is difficult or impossible to arouse, immediately stimulate the patient, discontinue opioid therapy, initiate a rapid response team call, and notify the physician or health care provider responsible for the patient's care. Consider administering naloxone as described above. • Continue to observe and monitor the patient's sedation level frequently (RR or pulse oximetry or capnography readings), and consider transfer to a higher level of care, such as a critical care or intermediate care unit, if the patient's condition warrants.

Nurses should reassure patients that in the event it becomes unsafe to administer opioids, other pharmacologic and nondrug pain interventions can be used.

Assessing pain. For more than a decade, the Joint Commission has focused on the importance of regular pain assessments—treating pain as the fifth vital sign—to improve pain outcomes. This initiative, however, has not produced the anticipated measurable improvements in either the inpatient or outpatient setting.[45, 46] In fact, one hospital that instituted an aggressive pain treatment policy by which opioid analgesia was based on patients' stated numeric pain score in compliance with the National Comprehensive Cancer Network's Numerical Pain Treatment Algorithm saw opioid-induced adverse effects rise from 11 to 24.5 per 100,000 inpatient days.[47]

Treat the patient, not the number. It is neither appropriate nor safe to medicate according to a pain intensity scale number without evaluating the patient's response by assessing sedation level, respiratory rate, and respiratory status (by pulse oximetry, capnography, or minute ventilation technology). A recent position statement from the ASPMN emphasizes that dosing opioids solely on a patient's report of pain



intensity "should be prohibited because it disregards the relevance of other essential elements of assessment and may contribute to untoward patient outcomes, such as excessive sedation and respiratory depression."[48]

While the 0-to-10-point numeric rating scale is most commonly used to assess pain intensity levels, other scales, such as the Faces Pain Scale–Revised (http://bit.ly/2cpNNPD) or a verbal descriptor scale such as the Iowa Pain Thermometer (http://bit.ly/2ciWgET), may be more appropriate for selected populations, such as older adults and patients with cognitive impairment. More information on recommendations for selecting pain assessment scales can be found in the evidence-based guidelines on the management of postoperative pain from the American Pain Society, the American Society of Regional Anesthesia and Pain Medicine, and the American Society of Anesthesiologists' Committee on Regional Anesthesia (see http://bit.ly/2c44sYA).[24] Other important considerations in assessing a patient's pain and response to pain therapies include the patient's perceptions of

- pain relief.
- the quality and character of the pain.
- temporal factors (whether pain is worse at certain times of day).
- situational factors (activities or positioning that worsen or lessen the pain, for example).

IMPLICATIONS FOR NURSES

Safe and effective pain management involves a patient-centered approach. Monitoring plans for patients on IV or epidural opioid analgesics should always include

- sedation levels, using a valid measure with discrete ratings.
- frequent assessment of respiratory rate and depth of respirations.
- intermittent or continuous pulse oximetry or, for high-risk patients, continuous capnography.

While the frequency of monitoring is not always well defined, evidence-based guidelines and expert consensus reports emphasize the need to individualize plans of care. Some recommend the use of continuous electronic monitoring as the safest strategy, especially in patients at high risk for OIRD. Alarm thresholds on electronic monitoring devices should be based on a patient's risk of OIRD and pattern of response to pain therapy.

Data show that hospitals with higher rates of opioid prescribing have higher rates of severe opioid-related adverse events.[2] Jungquist and colleagues have designed a step-by-step, action-oriented framework that offers best practices based on evidence-based processes for systemically identifying and resolving issues contributing to opioid-related adverse events.[49] Key components include interdisciplinary collaboration and communication between leaders and clinicians to develop, implement, and evaluate policies and protocols that guide safe opioid prescribing and administration, adverse event reporting, monitoring programs, and educational initiatives.

Hospitals are encouraged to

- form pain oversight committees.
- invest in such resources as acute pain services and rapid response teams.
- determine needs for technology-supported monitoring and allocate financial resources necessary to support such technologies.

Quality improvement experts and resources should be available to conduct root-cause analyses of opioid-related adverse events and identify system-, provider-, and patient-related contributors to these events and eliminate them. ▼

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