Procedural Sedation - Pediatric Patients

Providence

This course provides an overview of procedural sedation for pediatric patients.

You will review information on each topic and then be presented with questions to test your understanding.

SEDATION COMPLICATIONS & RESCUE FOR PEDIATRIC PATIENTS

Content - Sedation Complications & Rescue for Pediatric Patients

Sedation Complications & Rescue for Pediatric Patients Review

CONCLUSION

References

Conclusion

Course and Concepts

Course Format

You will review information on each topic and then be presented with questions to test your understanding.

All activities must be completed before moving on to the next section.

The key concepts in this course are:

- Identify and describe the indications for use and desired outcomes in procedural sedation.
- Describe the sedation continuum.
- Define capnography.
- List at least one benefit that capnography offers that pulse oximetry does not.
- Differentiate between normal and abnormal capnography wave forms.
- List at least two potential causes for a loss of wave form.
- Identify potential actions to take if a patient's $EtCO_2$ is rising.
- State the role of the RN during the procedural sedation process.
- Verbalize use of the ASA Classification Risk Assessment Tool.
- Relate the necessity of documented airway assessment by provider (Mallampati).
- Describe the pre-intra-post nursing management of the patient undergoing procedural sedation.
- Identify the equipment required for procedural sedation procedures.
- Interpret the Ramsay scale, the Aldrete scale, the State Behavioral Scale (SBS), and the Richmond Agitation-Sedation Scale (RASS).
- Name the drugs most commonly used in sedation.
- Identify the recommended doses and side effects of the drugs used in sedation.
- Relate the clinical considerations with the drugs used in sedation.
- List potential complications of procedural sedation.
- Identify first line emergency interventions required for the most commonly seen sedation complications.

CONTINUE

Content - Levels of Sedation Defined

Continuum of Sedation

Analgesia and sedation comprise a continuum.

It is not always possible to predict how an individual will respond.

The RN must be prepared to care for the patient if a deeper than intended level of sedation is attained.

Four Levels of Sedation

Before you peek at the answers below, can you name the four levels of sedation in order, beginning with the state of awake?

- American Society of Anesthesiologists

- American Society of Anesthesiologists

Minimal Sedation

- American Society of Anesthesiologists

Moderate/Dissociative Sedation

- American Society of Anesthesiologists

Deep Sedation

- American Society of Anesthesiologists

General Anesthesia

Review each of the question marks above before moving on.

Select each section below to review the definitions of each of the levels of sedation.

Minimal Sedation

- A drug-induced state in which patients respond normally to verbal commands
- Cognitive function and coordination may be impaired
- Respiratory and cardiovascular functions are unaffected
- Patient has normal eye movements, respiratory rate and effort, and has intact protective reflexes

Dissociative Sedation

- A trance-like cataleptic state in which the patient experiences profound analgesia and amnesia
- Airway protective reflexes, spontaneous respirations, and cardiopulmonary stability are all maintained
- Ketamine is the pharmacologic agent used for procedural sedation that produces this state

Moderate Sedation

- A drug-induced depression of consciousness during which patients respond purposefully to verbal commands, either alone or accompanied by light tactile stimulation
- No interventions are required to maintain patent airway or adequate respirations
- Cardiovascular functions and protective reflexes are usually maintained

Desired Outcomes:

- The primary objective/outcome is the reduction of the patient's anxiety and discomfort
- Produce amnesia
- Enhance patient's cooperation
- Maintain stable vital signs
- Allay fear and anxiety with minimal medication
- Rapid recovery from the procedure

Deep Sedation

- A drug-induced depression of consciousness during which patients cannot be easily aroused, but respond purposefully following repeated or painful stimulation
- Patients may need assistance in maintaining a patent airway and respirations may be inadequate
- Cardiovascular function is usually maintained
- Requires a Licensed Independent Practitioner (LIP) certified in deep sedation and a certified registered nurse (RN) to be present at the patient's bedside throughout administration of sedation

Desired Outcomes:

- The primary objective/outcome is a drug-induced decrease of consciousness which allows for comfort in an otherwise painful medical procedure
- The patient in deep sedation cannot be easily aroused, but can respond purposefully following repeated or painful stimulation

Anesthesia

- A drug-induced loss of consciousness during which patients are not arousable, even with painful stimulation
- Patent airway, adequate respirations, and cardiovascular functions may be impaired and often require assistance
- Requires an Anesthesiologist/Anesthesia LIP

Expand and review the content above before moving on.

Four Levels of Sedation - Defined

System	Minimal Sedation	Moderate/Dissociative Sedation	Deep Sedation	General Anesthesia

System	Minimal Sedation	Moderate/Dissociative Sedation	Deep Sedation	General Anesthesia
Response LOC	Normal response to verbal stimulation	Drowsy; purposeful response to verbal or tactile stimulation	Purposeful response following repeated or painful stimulation	Unarousable even with painful stimulus
Airway	Unaffected	No intervention required	Intervention may be required	Intervention often required
Spontaneous ventilation	Unaffected	Adequate	May be inadequate	Frequently inadequate
Cardiovascular function	Unaffected	Usually maintained	Usually maintained	May be impaired

CONTINUE

Levels of Sedation Defined Review

Multiple Choice:

The desired outcomes for moderate sedation include:

- ◯ Reduction of patient anxiety and discomfort with minimal medications
- ◯ Produce amnesia and maintain stable vital signs
- ◯ Enhance the patient's cooperation
- ◯ Rapid recovery from the procedure
- ◯ All of the above

SUBMIT

Multiple Choice:

During the procedure the patient is not easily aroused and no longer able to follow commands. Their respirations are depressed.

What is your assessment of the patient's status?

- ◯ The patient is at the moderate sedation level and is ready for the procedure to start
- ◯ The patient has moved to a deep sedation level

- ◯ The patient's sedation is at the anesthesia level

SUBMIT

Multiple Choice:

The primary purpose of using moderate sedation is to:

- ◯ Reduce the number of involuntary muscle spasms
- ◯ Support cardiovascular functions and depress consciousness
- ◯ Reduce chance of seizures in patients during an invasive procedure
- ◯ Decrease anxiety and discomfort during an invasive procedure

SUBMIT

Multiple Choice:

Which of the following is **not** a characteristic of moderate sedation?

- ◯ Patient is easily arousable
- ◯ Patient is unable to purposely respond to verbal stimuli
- ◯ Minimally depressed level of consciousness
- ◯ Protective airway reflexes are maintained

SUBMIT

Select all that apply:

RN responsibilities during a procedure requiring moderate sedation include:

- [ ] The administration of medication ordered by a qualified licensed independent Practitioner (LIP)
- [ ] Continuous monitoring of patient status, including vital signs and level of sedation
- [ ] Assisting the LIP with the procedure

SUBMIT

Multiple Choice:

Your patient assessment findings are the patient is in a drug induced depression of consciousness but can respond to verbal commands. The patient can maintain his airway and respirations and pulse oximetry readings are 93% with the protective reflexes intact.

Which level of sedation is the patient in?

- ◯ Minimal sedation
- ◯ Moderate sedation
- ◯ Deep sedation
- ◯ General anesthesia

SUBMIT

Multiple Choice:

Which of the following is ***not*** a goal of procedural/moderate sedation?

- ◯ Guard patient safety and welfare
- ◯ Maintain adequate sedation with minimal risk
- ◯ Allay patient fear and anxiety
- ◯ Produce an unconscious patient

SUBMIT

Multiple Choice:

Expected outcomes of moderate sedation may include all of the following ***except***?

- ◯ A calm, cooperative patient
- ◯ A sleepy but easily arousable patient
- ◯ A sleepy patient who requires a chin lift to maintain a patient airway
- ◯ Amnesia related to the procedure

SUBMIT

Multiple Choice:

Your patient is receiving moderate sedation for the closed reduction of a fracture of the right tibia. Halfway through the procedure the patient's heart rate increases to 140, respirations increase to 24, and he is moaning and crying out in pain. He can respond to verbal commands and his protective reflexes remain intact.

What level of sedation is the patient exhibiting?

- ◯ Minimal sedation
- ◯ Moderate sedation
- ◯ Deep sedation
- ◯ General anesthesia

SUBMIT

Complete the content above before moving on.

Content - Capnography: End Tidal CO_2 Monitoring During Sedation

Benefits of Capnography

Click or tap the box to the left of each statement to mark it as read. Review all to move on.

- [ ] Improved ventilation assessment
- [ ] Assessment of blood flow
- [ ] Protection from misplacement of tubes
- [ ] Monitoring of ventilation
- [ ] Avoidance of poor outcomes (e.g., oversedation during sedation)
- [ ] Avoiding unnecessary tests (e.g., ABGs)

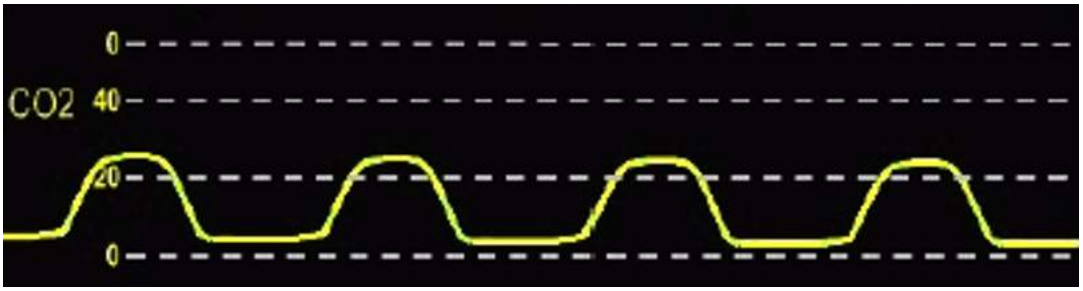
Complete the content above before moving on.

What is Capnography?

Capnography is the non-invasive measurement and numerical display of End-tidal CO_2 ($EtCO_2$), or the maximum expired CO_2 concentration during a respiratory cycle.

In an effective $EtCO_2$ tracing, note the rise and fall of expired CO_2 with each breath.

The normal range for $EtCO_2$ is 35-45 mm Hg



Waveform graphic courtesy of Covidien

Measuring Capnography

Exhaled carbon dioxide can be measured using various devices. The capnography equipment shown below are used to measure $EtCO_2$.

*These **examples** of capnography equipment **may not be representative of the equipment used at your ministry**.* **Be sure to familiarize yourself with the equipment you will be using.**

Oxygenation versus Ventilation

Pulse oximetry is used every day in the hospital setting, **but it is not enough to predict impending decline of a patient's pulmonary status!**

Case Study

Case Study

Let's review a patient scenario. You will want to consider what findings are expected and what findings are concerning to you. Think about whether important data is missing.

Let's get started!

Case Study - Peter

Peter, who is 11 years old, just had an EGD.

Case Study - Peter

	11:15	11:30	11:45
RR	15	16	16
SpO_2	98%	96%	98%
Oxygen	Room air	Room air	2L NC

The post procedure oxygenation status for Peter is shown above. Is there anything about this that concerns you?

When you're ready with your answer, go to the next slide.

Case Study - Peter

If you didn't have any concerns, you are correct! His values look fine.

Now, consider what $EtCO_2$ measurement can provide. Do you know what might be missing?

Go to the next slide when you think you know.

Case Study - Peter

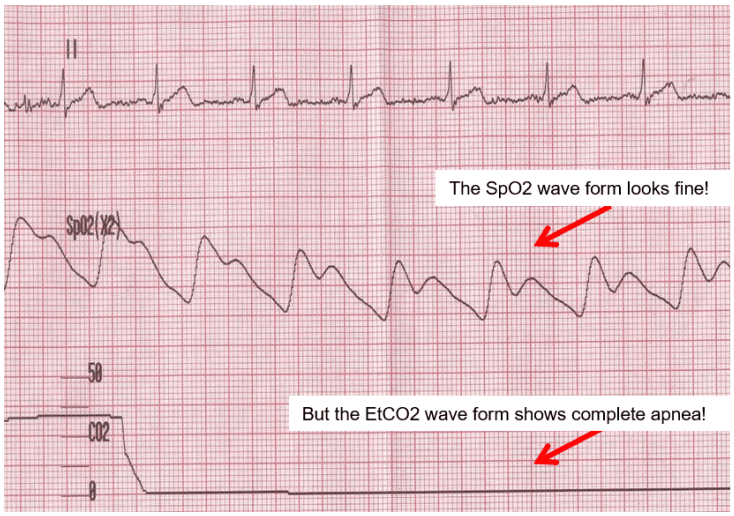
	11:15	11:30	11:45
RR	15	16	16
SpO_2	98%	96%	98%
Oxygen	Room Air	Room Air	2L NC
PaO_2	95	80	**90**
$PaCO_2$	39	54	**60**
pH	7.38	7.25	**7.23**

Note, the $PaCO_2$ is rising, which is causing a worsening pH.

- Pulse oximetry does not reveal dangerous changes in the pH!

So, even with good oxygenation you can have CO_2 retention, worsening patient condition, and poor outcomes.

Case Study - Peter



Oximetry versus Capnography

This wave form set demonstrates that $EtCO_2$ provides immediate indication of respiratory issues in an apneic episode.

Actions for abnormal EtCO2

Alert the LIP of the patient's status and your concern:

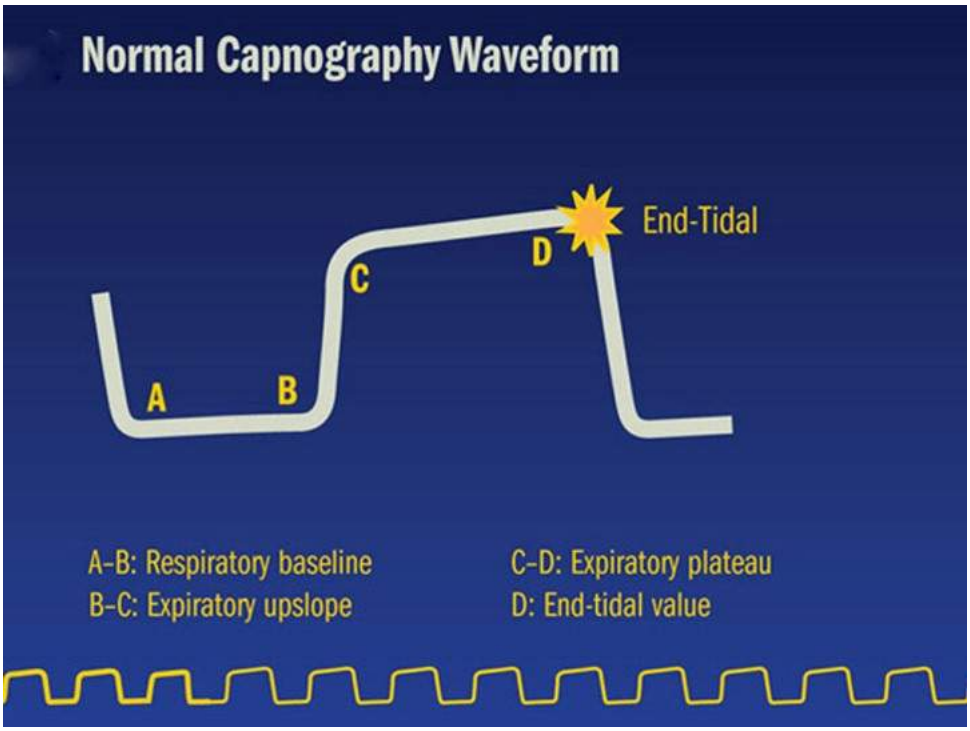
- If the $EtCO_2$ is high: Consider either inadequate ventilation (e.g., > 50 mmHg) or over sedation
- If the $EtCO_2$ is low, e.g., < 10 mmHg: Consider partial or complete airway obstruction or loss of cardiac output

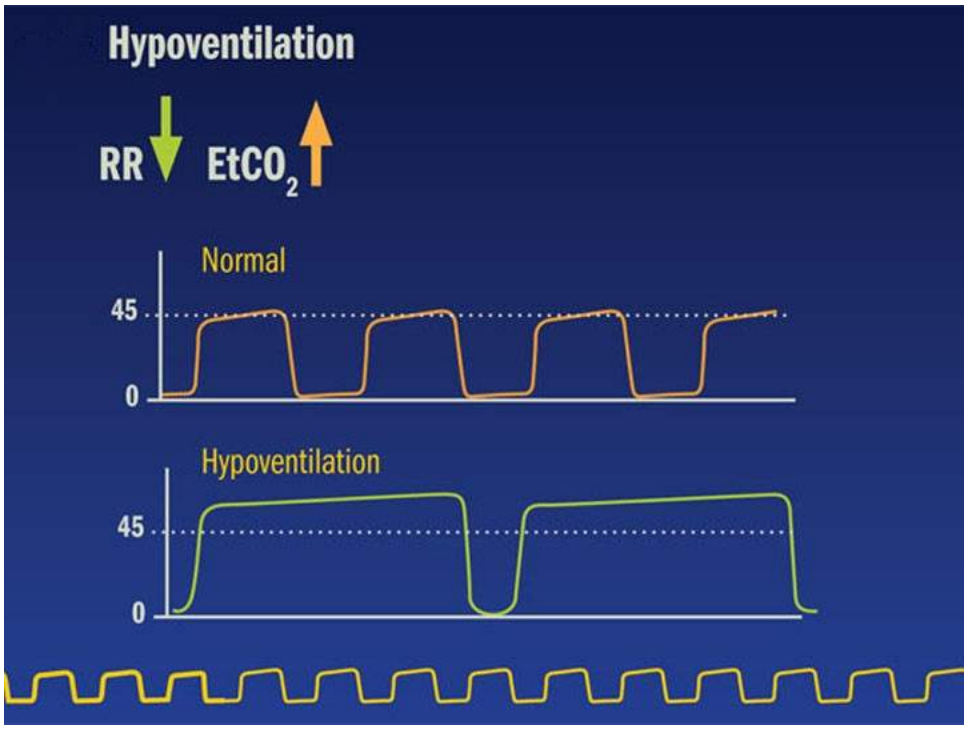
Interventions to consider include:

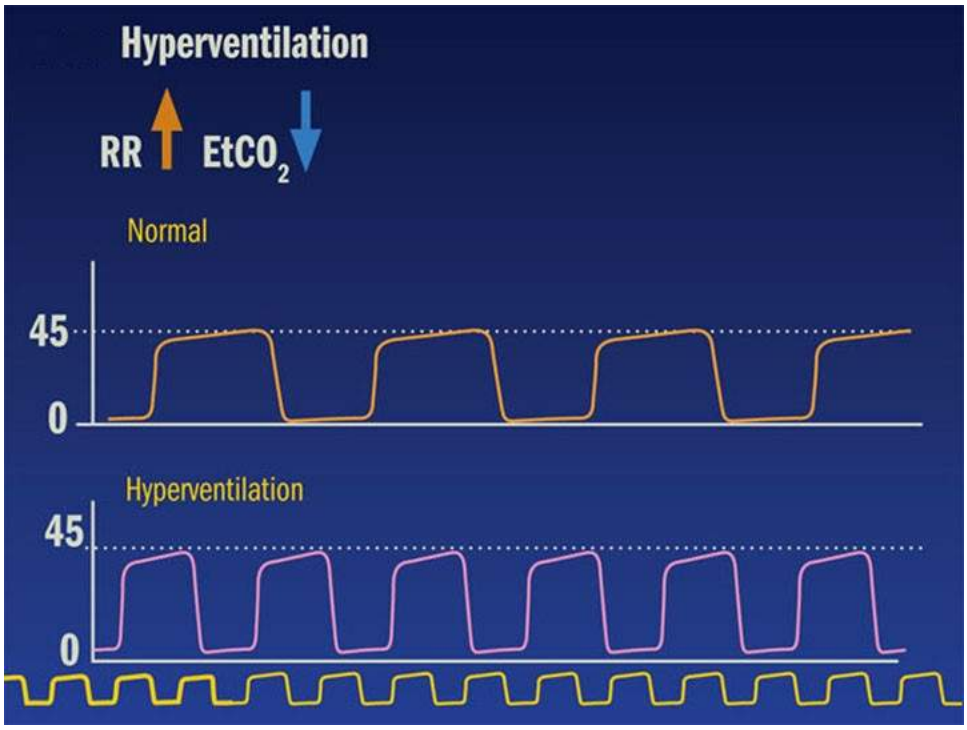
- Assess upper and lower airway patency and treat any obstruction or bronchospasm
- If concerned about decreased cardiac output, assess BP and pulse
- Treat per provider order

Review the case study above before moving on.

Capnography Wave Forms and Values







Waveform graphics courtesy of Covidien

CONTINUE

Determining Causes of Abnormal Wave Forms & Values

In the event of an abnormal wave form, check the equipment and the patient status

- Some abnormal wave forms can be due to poor connections, artifact, and misplaced cannulas rather than patient condition
- **Remember to check *both* equipment and patient!**

Abnormal wave forms may be seen during sedation. It is important to identify potential causes of these changes.

Select each section below to determine the causes of abnormal wave forms.

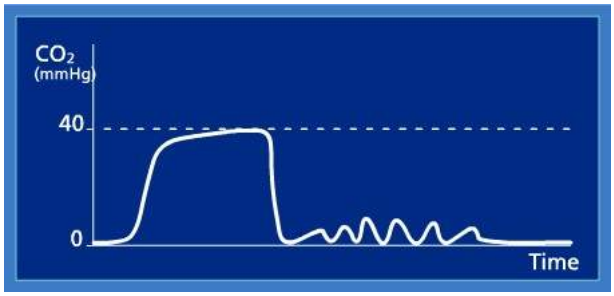
Abnormal Waveform - Loss of Waveform

Sudden loss of waveform and $EtCO_2$ to zero or near zero means no respiration is detected!

Possible causes:

- Kinked or displaced cannula (check equipment first!)
- Apnea

- Very shallow respirations
- Total airway obstruction

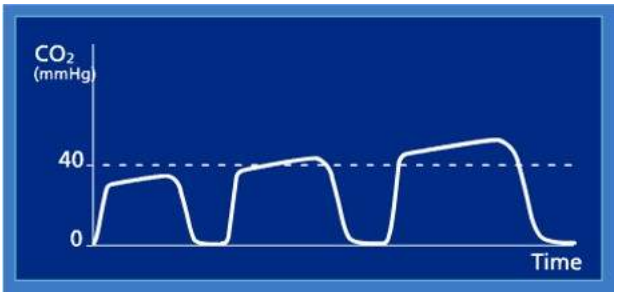


Abnormal Waveform – Increasing $EtCO_2$ Values

Gradual increase in $EtCO_2$ with normal waveform indicates CO_2 production, or decreasing systemic or pulmonary perfusion

Possible causes:

- Hypoventilation due to analgesia or sedation
- Sudden increase in delivery of CO_2 to pulmonary circulation

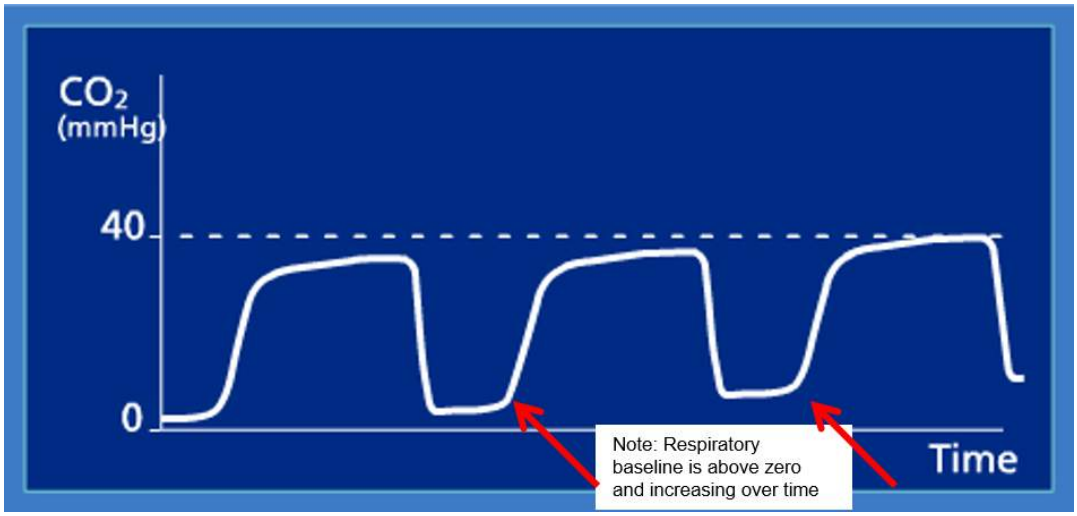


Abnormal Waveform – Rebreathing Exhaled CO_2

Rise in baseline CO_2 indicates rebreathing of CO_2

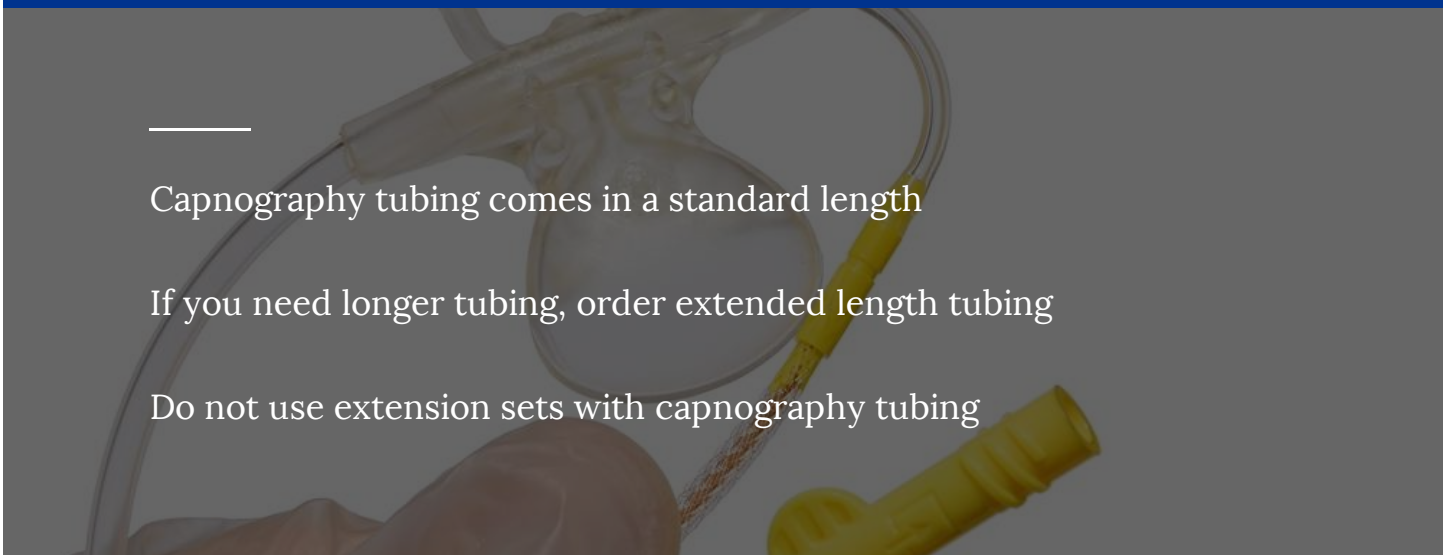
Possible causes:

- Poor head/neck alignment
- Draping at airway
- Insufficient flow to O_2 mask



Expand and review the content above before moving on.

Selecting the Correct Tubing



Capnography tubing comes designed for short term use or long term use. Review both uses by clicking or tapping on the flashcards below.

Short Term Use

Short term use tubing is only good for manufacturer recommended timeframe

- Typically used for monitoring during procedural sedation

Long Term Use

Long term use tubing has a filter for moisture control and can be used for longer durations

- This is the tubing to use if you anticipate the patient will need to be monitored after the procedure is complete

Complete the content above before moving on.

For more information on capnography or $ETCO_2$, click or tap the links below!

Capnography

Respiratory compromise

Capnography during sedation

CONTINUE

Capnography: End Tidal CO_2 Monitoring During Sedation Review

True or False:

The normal $EtCO_2$ range is 35–45 mmHg.

- ◯ True
- ◯ False

SUBMIT

True or False:

Ventilation can be monitored with Pulse Oximetry.

- ◯ True
- ◯ False

SUBMIT

True or False:

Common causes of increase in $EtCO_2$ include hypoventilation and over sedation.

- ◯ True
- ◯ False

SUBMIT

Multiple Choice:

When monitoring a patient using capnography during procedural sedation, the RN will intervene in response the following changes:

- ◯ Decreased respiratory rate
- ◯ Increased $EtCO_2$ value
- ◯ Loss of capnography waveform
- ◯ All of the above

SUBMIT

Multiple Choice:

If observing significant changes from baseline $EtCO_2$ value, the RN will:

- ◯ Instruct patient to take a deep breath
- ◯ Ensure patient has an open airway

- ◯ Check the cannula and reposition, if necessary
- ◯ All of the above

SUBMIT

True or False:

An abnormal waveform can indicate equipment issues.

- ◯ True
- ◯ False

SUBMIT

True or False:

Pulse oximetry has limitations because there is a delay before oxygen saturation reflects hypoxia.

- ◯ True
- ◯ False

SUBMIT

Multiple Choice:

When is the best time to begin $EtCO_2$ monitoring?

- ◯ After the first dose of sedating medication
- ◯ When the pulse oximeter cannot display a reading
- ◯ Before any sedating medications are administered
- ◯ Only if supplemental oxygen is provided

SUBMIT

True or False:

Capnography provides a numeric value for $EtCO_2$ as well as a graphic display of the concentration of exhaled carbon dioxide in each breath.

- ◯ True
- ◯ False

SUBMIT

Multiple Choice:

Capnography should be utilized during procedural sedation:

- ◯ Only if supplemental oxygen is used
- ◯ To identify hypoventilation, apnea, or airway obstruction
- ◯ Instead of pulse oximetry
- ◯ If a patient needs to be intubated

SUBMIT

Multiple Choice:

Complete loss of the capnography waveform may result from:

- ◯ Hypoventilation
- ◯ Partial airway obstruction
- ◯ No detection of breath
- ◯ All of the above

SUBMIT

True or False:

Capnography provides caregivers with breath-to-breath information.

- ◯ True

False

SUBMIT

True or False:

Capnography ($EtCO_2$) refers to continuous noninvasive technique that measures exhaled carbon dioxide.

True

False

SUBMIT

Complete the content above before moving on.

Pre/Intra/Post Sedation Considerations Overview

Procedural Sedation

A continuum exists between minimal, moderate, deep sedation, and general anesthesia. One level of sedation can quickly change to a deeper level due to unique characteristics of drugs used, as well as physical status and drug sensitivities of individual patients.

The patient's age and pre-existing medical conditions may significantly alter dosing requirements needed to achieve a level of minimal or moderate sedation. Administration of sedating agents requires ongoing assessment and monitoring of the patient and ability to respond immediately to deviations from the norm.

> **Note: If moderate procedural sedation progresses to a deeper level of sedation than anticipated, appropriate measures are immediately taken to return patient to intended level of sedation. Sedation administrators must have skills to rescue the patient from a deeper level of sedation than intended for the procedure.**

Procedural Sedation Roles

The following caregivers must be present during procedural sedation.

Please note that this may vary by ministry and type of procedure (e.g., orthopedic LIP assist for orthopedic injuries).

RN | LIP | RT

Requires initial and annual competency verifying the following:

- **Evidence of current Advanced Cardiac Life Support (ACLS) certificate Pediatric Advanced Life Support (PALS) in ED.**
- **Familiarity with pharmacologic agents employed in moderate sedation; including administration, adverse reactions and possible interventions.**
- **Able to identify and recognize acceptable and unacceptable vital signs.**
- **Knowledge of documentation and monitoring standards, and nursing roles and responsibilities.**

RN | LIP | RT

Licensed Independent Practitioner (LIP)

RN | LIP | RT

Respiratory Therapist (RT)

Click or tap each tab above before moving on.

Desired Outcomes of Moderate Sedation

The desired outcome of moderate sedation is a patient who:

- [ ] Is sedate and cooperative
- [ ] Lacks awareness or recall of procedure (amnesia)
- [ ] Has reduced pain perception (analgesia)
- [ ] Has decreased anxiety (anxiolysis)
- [ ] Has modified behavior and/or movement to allow safe completion of the procedure
- [ ] Is returned to a state in which discharge from medical and/or dental supervision is safe

CONTINUE

Pre-Procedure Sedation Considerations

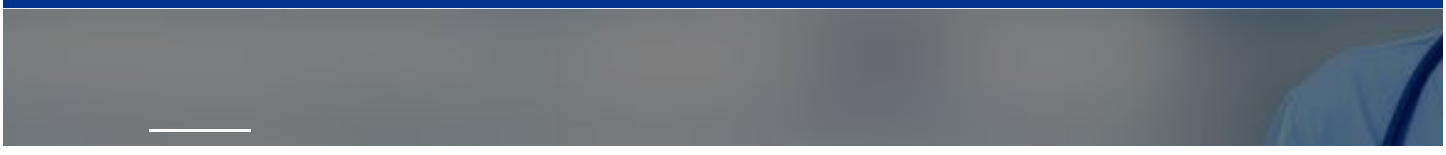
Roles and Responsibilities

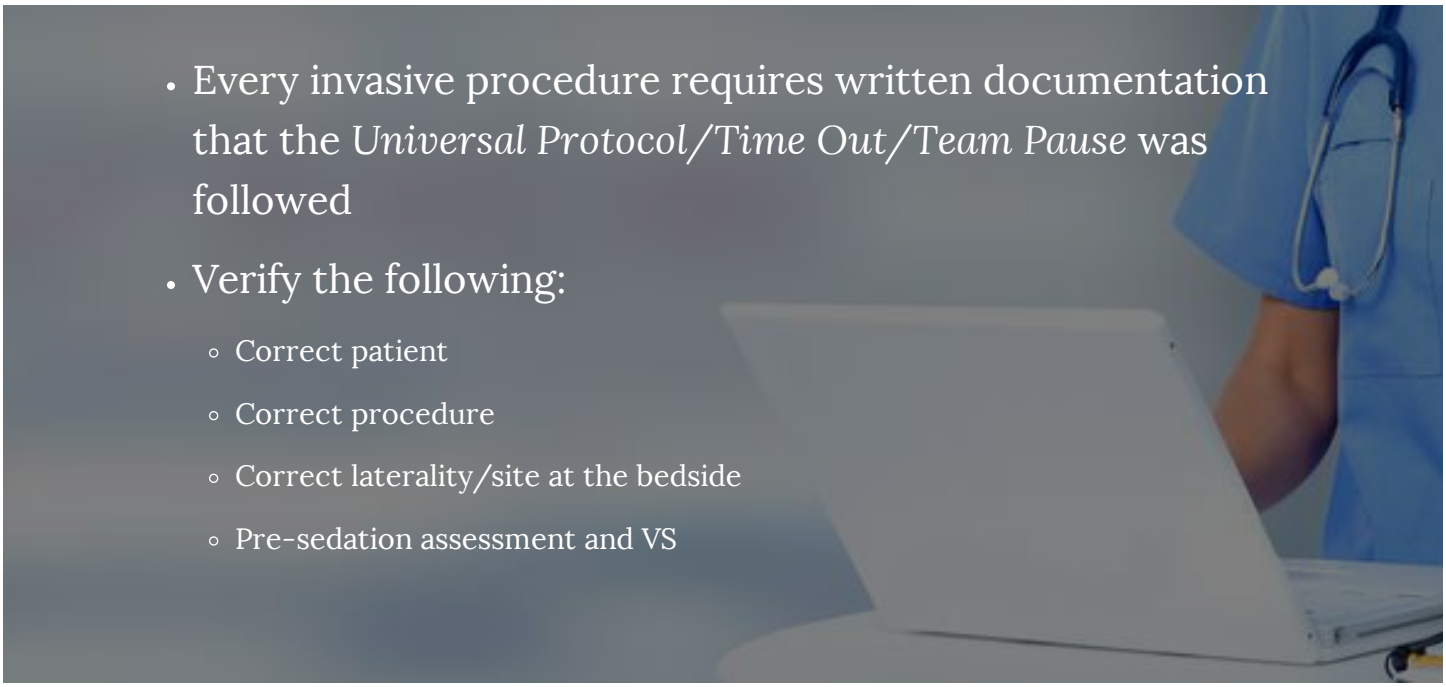
Pre-procedure

RN Responsibilities

- Verify ride contact info
- Add staff at bedside
- Baseline sedation score using ministry-specific sedation scale(s)
    - e.g., Ramsay, Aldrete, RASS, and/or SBS
- Temperature x1
- Baseline VS:
    - BP, HR, RR, $ETCO_2$, SPO_2, pain level
- Cardiac rhythm
- Confirm the LIP has completed the following:
    - Airway assessment (Mallampati classification)
    - American Society of Anesthesiologists (ASA) classification
    - Consents
- Universal Protocol/Team Pause/Time Out prior to procedure

Pre-Sedation Preparation - Universal Protocol/Time Out/ Team Pause





Sedation Team Responsibilities

Sedation team verifies the following required equipment is immediately available:

Suction –

Functioning suction and appropriately sized catheters

Oxygen –

Supplemental oxygen and appropriate delivery system (tubing, face mask, bag-valve mask, and nasal cannulas)

Airway –

Oral airways, nasopharyngeal and oropharyngeal airways, laryngeal mask airways, laryngoscopy blades, endotracheal tubes, and stylets

Pharmacy –

All the basic drugs needed to support life during an emergency

Reversal agents are at the bedside

Monitors

Pulse oximeter with appropriate sized probes, end-tidal carbon dioxide monitor, blood pressure cuffs, etc.

Equipment

Equipment to dispense medication (IV supplies), Broselow Cart with defibrillator and intubation supplies

Expand and review additional SOAPME details before moving on.

Sedation Risk Factor - Compromised Airway

COMPROMISED AIRWAY

Patients with anatomically compromised airways are at greater risk of respiratory complications

- The Mallampati assessment (performed by LIP) provides information regarding airway risk
  - Mallampati scores of 3 or 4 have higher risk for respiratory compromise

Image provided by UpToDate

CONTINUE

Sedation Risk Factor - Baseline Patient Condition

BASELINE PATIENT CONDITION

- The **American Society of Anesthesiologists (ASA) score** is a subjective assessment of the patient's overall health
- It is used to assess the fitness of patients before a procedure/surgery

Class I	Normal healthy patient
Class II	Patient with mild systemic disease
Class III	Patient with severe systemic disease
Class IV	Patient with severe systemic disease that is a constant threat to life
Class V	Moribund patient not expected to survive 24 hours.

Optimal ASA Class for Procedures with Sedation

- ASA scores 1 and 2 are the best predictors of a successful outcome for the patient
- ASA score of 3 or greater, special needs, anatomic airway abnormalities, or moderate to severe tonsillar hypertrophy present issues requiring additional and individual consideration.
    - The LIP is encouraged to consult with appropriate sub-specialist and/or an anesthesiologist prior to administration of sedation

CONTINUE

Sedation Risk Factor -
Other Complicating Conditions

PROCEED WITH CAUTION!

Patients presenting with the following conditions are known to have increased risks with sedation and are at the greatest risk of maintaining a patent airway or experiencing apnea during or following the sedation procedure.

Patients and their parents are instructed to refrain from pre-medicating for a procedure while at home or in route to the procedure.

1. Developmental disabilities
2. Younger than 6 years of age
3. Relevant diseases
4. Physical abnormalities (including genetic syndromes)
5. Neurological impairments
6. Obesity and/or a history of snoring or obstructive sleep apnea
7. History of seizures
8. History of prematurity

CONTINUE

Pre-Sedation Preparation - Sedation Plan

THIS IS IMPORTANT!

Click or tap the checkboxes to the left of each statement to mark them as read.

- [ ] Discuss sedation plan and target level of sedation (sedation score) with LIP
- [ ] The RN should consider potential risk factors that may increase the chance of complications associated with procedural sedation
- [ ] Communicate this information and any other concerns to the appropriate members of the healthcare team
- [ ] The LIP and RN must consider whether sedation and monitoring would be more appropriately managed by an anesthesiologist

Complete the content above before moving on.

Pre-Sedation Preparation - DNR/DNI Considerations

- DNR/DNI orders are not automatically rescinded during procedures
- The existing DNR/DNI status is to remain active unless the provider writes an order to initiate full code status during the procedure
    - However, pre-existing code status may not be appropriate for the procedural circumstances as techniques routinely undertaken in the course of sedation could be classified as resuscitation
- Every patient with DNR/DNI status, or their legal guardian, should have a conversation with the LIP regarding code status prior to the procedure

CONTINUE

Content - Intra-Procedure Sedation Considerations

Intra-Procedure Care & Documentation

Note: The monitored items listed below may change depending on ministry and/or procedure. Confirm with your preceptor and/or LIP.

Continuous monitoring means you must complete the following every 5 minutes during moderate or deep sedation (unless it interferes with procedure):

- Blood pressure
- Heart rate
- Respiratory rate
- SPO_2
- $ETCO_2$
- Pain level
- Sedation level (Ramsay, RASS, etc.)
- ECG

Medication

Medication administration is to be performed incrementally with adequate time between doses to assess full pharmacologic effects. This must be documented in in Epic.

The administration of each dose must be individualized based upon patient's condition and observed response to previous dose.

Note:

- Combinations of sedation and analgesic drugs may be administered but should be treated as individual components to achieve desired effects.
- IV sedative/analgesic drugs should be administered in small, incremental doses, or by titrating to desired endpoint allowing sufficient time to elapse between doses so peak effect of each dose can be assessed before subsequent drug administration.
- When drugs are administered by non-IV routes, allow sufficient time for absorption and peak effects of previous dose before supplementation is considered.

CONTINUE

Sedation Scales

Sedation scales are tools used to:

- Determine accurate and consistent drug titration
- Decrease the risk of excessive drug dosing
- Decrease the risk of over-sedation

Ramsay Sedation Scale

The Ramsay Score can be directly correlated to the ASA definitions of Levels of Sedation.

Ramsay Sedation Scale:

Clinical Status	Score
Patient awake, anxious, agitated, or restless	**1**
Patient awake, cooperative, orientated and tranquil	**2**
Patient drowsy, with response to commands	**3**
Patient asleep, brisk response to glabellar tap* or loud auditory stimulus	**4**
Patient asleep, sluggish response to stimulus	**5**
Patient has no response to firm nail-bed pressure or other noxious stimuli	**6**

Clinical Status	Score
*glabellar tap = tap on forehead between eyebrows	

Ramsay Sedation Scale correlation to ASA Levels of Sedation:

Score	Clinical Status	Level of Sedation Definition
1 2	**Patient awake, anxious, agitated, or restless** **Patient awake, cooperative, orientated and tranquil**	**Minimal Sedation:** A drug induced state during which patients respond normally to verbal commands. Cognitive function and coordination may be impaired, but respiratory and cardiovascular functions are unaffected.
3	**Patient asleep, responds to commands**	**Moderate Sedation:** A drug-induced depression of consciousness during which patients respond purposefully to verbal commands, either alone or accompanied by light tactile stimulation. No interventions are required to maintain patent airway or adequate respirations. Cardiovascular functions and protective reflexes are usually maintained.
4	**Patient asleep, brisk response to glabellar tap or loud noise**	**Moderate <---------> Deep**
5	**Patient asleep, sluggish response to light glabellar tap*, tactile stimuli, or noise**	**Deep Sedation:** A drug-induced depression of consciousness during which patients cannot be easily aroused but respond purposefully following repeated or painful stimulation. Patients may need assistance in maintaining a patent airway and respirations may be inadequate. Cardiovascular function is usually maintained.
6	**No response to light glabellar tap or laud noise**	**General Anesthesia:** A drug-induced loss of consciousness during which patients are not arousable even with painful stimulation. Patent airway, adequate respirations, cardiovascular functions may be impaired and often require assistance.

State Behavioral Scale (SBS)

A State Behavior assessment, especially in preverbal or nonverbal children is challenging. The SBS is a 6-point scale that describes state behavior on a scale of **-3 to +2**. Score the patient's response to voice then touch then noxious stimuli.

Score	Description	Definition
-3	**Unresponsive**	• No spontaneous respiratory effort • No cough or coughs with suctioning • No response to noxious stimuli

Score	Description	Definition
-2	**Responsive to noxious stimuli**	• Spontaneous yet supported breathing • Coughs with suctioning/repositioning • Responds to noxious stimuli
-1	**Responsive to gentle touch or voice**	• Spontaneous but ineffective non-supported breaths • Coughs with suctioning/repositioning • Responds to touch/voice
0	**Awake and able to calm**	• Spontaneous and effective breathing • Coughs when repositioned/occasional spontaneous cough • Responds to touch/no external stimulus is required to elicit response
+1	**Restless and difficult to calm**	• Spontaneous and effective breathing/having difficulty with ventilator • Occasional spontaneous cough • Responds to touch. No external stimulus is required to elicit response • Intermittently unsafe, increased movement (restless, squirming)
+2	**Agitated**	• May have difficulty breathing with ventilator • Coughing spontaneously • Unsafe (biting ETT, pulling at lines, cannot be left alone) • Unable to console

Richmond Agitation-Sedation Scale (RASS)

RASS is a 10-point scale, with:

- four levels of anxiety or agitation,
- one level denoting a calm and alert state, and
- five levels of sedation,

On one extreme of the RASS score, +4 represents a very combative, violent patient, who is considered dangerous to the staff. On the other extreme, -5 represents a patient who is unarousable, with no response to voice or physical stimulation.

Score	Definition
+4	Combative, overtly combative or violent, immediate danger to staff.
+3	Very agitated, pulls on or removes tubes or catheters or is aggressive.
+2	Agitated, frequent non-purposeful movement or ventilator dyssynchrony.
+1	Restless, anxious or apprehensive but movements not aggressive or vigorous.
0	Alert and calm.
-1	Drowsy, but sustains more than 10 seconds awake, with eye opening in response to verbal command.
-2	Light sedation: Awakens briefly (less than 10 seconds) with eye contact to verbal command.
-3	Moderate sedation: Any movement, except eye contact, in response to command.
-4	Deep sedation: No response to voice, but any movement to physical stimulation.
-5	Unarousable: No response to voice or physical stimulation.

Source: "The Richmond Agitation-Sedation Scale: validity and reliability in adult intensive care unit patients." *Am J Respir Crit Care Med* 2002;166:1338–1344.

CONTINUE

Intra-Procedure Sedation Considerations Review

Multiple Choice:

You are taking care of a 13-year-old boy that is intubated for airway protection. While attempting to start an IV, your patient withdraws his hand from you and winces from the pain. You are able to calm him and start the IV. When you turn him on his side, he coughs and falls back asleep.

What is his SBS Score?

- ◯ -1
- ◯ -2
- ◯ 1

SUBMIT

Fill in the Blank:

You are in the middle of a procedure using moderate sedation, your patient is on her back. Her pulse oximetry measurement falls to 86% (her baseline was 92%), her $ETCO_2$ rises to 60 (from her baseline of 40), and she is making “crowing sounds."

What is the probable cause?

**Hint: type in your two word answer below.*

Type your answer here

SUBMIT

Select All That Apply:

Think about the patient in the question above. What should you do in this situation? Select the steps you should take from the list below.

- [ ] Open her airway by either repositioning her head, doing a head tilt/chin lift, jaw thrust, insert an oral/nasal airway, or ventilate with an ambu bag
- [ ] Provide supplemental oxygen and continue SaO_2 and $ETCO_2$ monitoring
- [ ] Anticipate the need for resuscitation and ensure you have emergency equipment at the bedside.

SUBMIT

Complete the content above before moving on.

Content - Post-Procedure Sedation Considerations

Post-procedural Monitoring

Who stays at the bedside?

During recovery, there is a minimum of:

- One qualified RN whose only responsibility is to constantly observe patients:
  - Vital signs
  - Airway patency
  - Adequacy of ventilation
  - Either administer medication or direct their administration

Post-Procedure Equipment

- [ ] Patent IV site with IV fluids
- [ ] Oxygen and O_2 delivery devices (flow meters, nasal cannulae, face mask)
- [ ] Pulse oximeter
- [ ] Blood pressure monitoring (use correct cuff size)
- [ ] Cardiac monitor
- [ ] Code cart/defibrillator immediately available (including one-way valve mask, airways, suction, ambu-bag, intubation equipment, emergency drugs)
- [ ] Drug antagonists nearby (Flumzaenil and Naloxone)

You should also consider monitoring $ETCO_2$ if you think the patient is at risk for post-procedure respiratory issues.

Post-Procedure Nursing Management

Continuous Monitoring

Once the procedure is complete and no further sedation has been given, continue to monitor and document until the patient achieves an Aldrete score of at least 8 (or the pre-procedure score if baseline is <8).

If score is less than 8 at the end of sedation phase, the monitoring nurse should contact the LIP and document the exception.

Monitor and Document

Monitor and document:

- Vital signs (BP, HR, RR, SpO_2, $ETCO_2$, pain level, sedation score) every 15 minutes (confirm frequency with your ministry) from administration of last dose of sedation mediation
- Aldrete score
- ECG

Additional Monitoring

After pharmacological reversal is completed, you must observe the patient to ensure that sedation and cardio-respiratory depression does not recur once the effect of the antagonist dissipates because duration of the medications administered for sedation may exceed the duration of the antagonist.

Aldrete Score

The Aldrete score evaluates recovery after sedation/anesthesia and patient readiness for discharge.

Level of Consciousness	• Fully awake or responds easily to verbal stimuli or pre-procedure baseline • Arousable on calling • Not responding ***must be at least 1 at end of monitoring**	**= 2** **= 1** **= 0**
Respirations	• Able to breathe and cough freely • Dyspnea or limited breathing • Apneic	**= 2** **= 1** **= 0**
Oxygen Saturation	• Maintains value ≥ 92% on room air • Requires supplemental O2 to maintain saturation at ≥ 90% • Saturation ≤ 90% with supplemental O2	**= 2** **= 1** **= 0**
Hemodynamic stability	• Blood pressure ± 20% baseline • Blood pressure ± 20-50% baseline • Blood pressure ± 50% baseline	**= 2** **= 1** **= 0**
Physical Activity	• Ability to move all extremities voluntarily or on command. • Moves 2 extremities voluntarily or on command • Moves 0 extremities voluntarily or on command	**= 2** **= 1** **= 0**

Discharge Criteria

Discharge Criteria

Patient may be discharged when:

- Cardiovascular function and airway patency are satisfactory and stable, vital signs are stable and similar to pre-procedure baseline measurements with no signs of respiratory distress
- Patient can:
  - Be easily aroused, and protective airway reflexes are intact
  - Talk (if age appropriate)
  - Sit up unaided (if developmentally appropriate)
    - If very young age, then patient should be back to pre-sedation level for that child

- State of hydration is adequate, has ingested and retained fluid
- No complications noted (e.g., no excessive bleeding from the wound, minimal nausea, vomiting, or dizziness)
- Pain is well tolerated
- Parents or guardians have received written instructions and prescriptions and demonstrate understanding of patient's post-procedural care needs, signs and symptoms of complications, reasons and how to contact the LIP, ensuring the parents or guardians can meet child's home care needs

Outpatient/Short Stay Discharge Criteria

Patient may be discharged from **facility** when:

- Provided written post-sedation/procedure instructions (signs and symptoms to monitor for, how to contact the care team prior to their follow-up appointment)
- Parent of guardian must be able to escort patient through post-discharge transportation (e.g., drive patient or travel with patient in taxi)
- Infants and toddlers in car seats require two adults present during transport so one may continuously observe the child during the drive
- Patients with anatomic airway problems, former preterm infants, underlying medical conditions (e.g., obstructive sleep apnea) should have a longer observation due to the increased risk to maintain a patent airway or experience apnea

Expand and review the content above before moving on.

Documentation Requirements

Document procedural sedation information:

- Pre-sedation assessment
- Patient education documented in Patient Education section in Epic
- Informed consent
- Current list of allergies and medications
- Time out/universal protocol/team pause (including pre-sedation assessment and VS)
- Documentation of vital signs, drugs, procedure details
- Post-sedation assessment
- Patient response to procedure/medications
- Discharge criteria met

Procedural Sedation Key Take-Aways

- [ ] Pre-procedure assessment must be completed by the LIP and include risk assessment, Mallampati, ASA score, and appropriate lab tests
- [ ] An informed consent must be obtained
- [ ] Monitoring of the patient during the sedation procedure is continuous

- When the RN is monitoring the patient, they may not leave the patient unattended or perform other tasks that would compromise patient monitoring including performance of the procedure itself

- [ ] Documentation of the sedation procedure will occur in a sedation narrator
- [ ] The RN must be familiar with the drugs used
- [ ] Use of reversal agents require additional monitoring post procedure
- [ ] Duration of monitoring:

  - From first dose of the sedating agent throughout the procedure.
  - Into the recovery phase until an Aldrete score of 8 is reached (or the pre-procedure score if baseline is <8).
  - Monitor continuously. Document a minimum of every 15 minutes or the frequency required by your ministry.
  - Document any deviations from baseline or expected results, and report to the LIP.

- [ ] If moderate sedation has progressed to deep sedation efforts need to be made to return the patient to the moderate sedation level
- [ ] The most common complications of procedural sedation are airway obstruction and over sedation
- [ ] Emergency equipment must be available at the bedside or within easy access during the procedure
- [ ] Post-procedure monitoring continues until discharge criteria are met
- [ ] Written discharge instructions will be provided
- [ ] The patient will be discharged to the care of a responsible adult

CONTINUE

Post-Procedure Sedation Considerations Review

Multiple Choice:

After his endoscopy, your patient is asleep, but arouses to voice (quickly falls back to sleep). He moves all extremities on command, his resp rate is 8, his BP is 110/60 (baseline was 158/88), and his SPO_2 is 93-94% on 2 liters O_2 (baseline was 98% on room air).

What is his Aldrete score?

- ◯ 5
- ◯ 6
- ◯ 7
- ◯ 8

SUBMIT

Multiple Choice:

After a chest tube insertion, your 16-year=old patient is awake and talking, is able to move all extremities, has a resp. rate of 12, his is BP 124/74 (baseline was 132/80), and his $Sa0_2$ is 96% on room air (baseline was 98%).

What is his Aldrete score?

- ◯ 7

- ◯ 8
- ◯ 9
- ◯ 10

SUBMIT

Complete the content above before moving on.

Pre/Intra/Post Procedure Sedation Considerations Review

True or False:

Pediatric Procedural sedation is a continuum that exists between minimal, moderate, deep sedation, but does not include general anesthesia.

- ◯ True
- ◯ False

SUBMIT

Select All That Apply:

Sedation scales are important because they:

- ☐ Determine the risk of under-sedation
- ☐ Determine the risk of over-sedation
- ☐ Determine accurate and consistent drug titration

SUBMIT

Multiple Choice:

SOAPME stands for:

- ◯ Suction, Oral, Airway, Pharmacy, Monitors, Equipment
- ◯ Supplemental Oxygen, Oral, Airway, People, Monitors, Equipment
- ◯ Suction, Oxygen, Airway, Pharmacy, Medications, Equipment
- ◯ Suction, Oxygen, Airway, Pharmacy, Monitors, Equipment

SUBMIT

Multiple Choice:

The Mallampati assessment identifies the following:

- ◯ Airway malformations
- ◯ Risk for respiratory compromise
- ◯ Risk for aspiration
- ◯ Seizure risk

SUBMIT

Fill in the Blank:

A Ramsay score of ____ indicates moderate sedation:

Type your answer here

SUBMIT

Multiple Choice:

During the post-procedure care, you should document vital signs (BP, P, RR, SpO_2) every _____.

- ◯ 5 minutes
- ◯ 8 minutes
- ◯ 10 minutes
- ◯ 15 minutes

SUBMIT

Complete the content above before moving on.

Content - Pharmacology

Nursing Management Topics

Pharmacological Considerations

Verify the sedation plan with the LIP:

- Moderate versus deep sedation?
- Is the LIP certified for the intended level of sedation?

Goals of Medication Administration

- A rapid and predictable onset of action following drug administration
- Minimal adverse respiratory and/or cardiovascular effects
- Allow for quick recovery
- Optimal patient satisfaction

Titrating Sedation Medications

- The administration of each dose of medication will be by the order of the LIP performing the procedure
- RN must be familiar with sedation medication, appropriate dosing, time to peak effect, and side effects
- Dosages and rates of administration must be individualized to patient response

Titrate each drug **individually** for desired effect:

- Use incremental doses
- Allow adequate time between doses to achieve peak pharmacologic effects
- Assess effectiveness of each dose before administering more medication

Consider your patient's response before administering the entirety of an ordered dose. It is acceptable to provide the ordered dose in incremental doses to assess effectiveness before administering the next portion.

Remember: the risk of respiratory depression increases when multiple agents are used.

Review each tab above before moving on.

Medications Used for Procedural Sedation

The two main types of medications used for procedural sedation are Opioids/Synthetic Opioids and Benzodiazepines. Barbiturates can be used for sedation, but they are used infrequently.

Note: Combining drugs increases the risk of adverse effects in all age groups.

Drugs Commonly Used in Procedural Sedation

Medication	Pharmacology	Effect	Adverse Effect

Dexmedetomidine	• Dose:
	  ◦ IN: 1-2 mcg/kg
	  ◦ IV: 0.2-0.4 mcg/kg
	• Onset: 5-10 minutes
	• Duration: 30-70 minutes
	May only be used during a moderate or deep sedation if the LIP is immediately available to respond during administration or patient is already intubated and ventilated
		• Sedation
		• Analgesia
			• Bradycardia
			• Hypotension
			• Hypertension
			Note: Use with caution in hypovolemia or reduced cardiac function

Medication	Pharmacology	Effect	Adverse Effect

Fentanyl	**Note:** 100 times more potent than morphine. ADMINISTER SLOWLY!
	• Dose:
	  ◦ IN: 0.5-2 mcg/kg (max 100mcg/dose)
	  ◦ IV: 0.5-1 mcg/kg (max 50 mcg/dose)
	  ◦ IM: 1-2 mcg/kg (max 50 mcg/dose)
	• Onset: 5-10 minutes
	• Duration: 30-60 minutes
		Analgesia only (does not produce amnesia)	• Respiratory depression
			• Hypotension
			• **WARNING:** Rapid administration of Fentanyl can cause chest wall rigidity, which may be fatal
			
			Note: Can produce profound sedation when used in combination with benzodiazepines and other CNS depressants
			
			Avoid in patients with gastrointestinal obstruction

Midazolam (Versed)	• Dose:
	  ◦ IN: 0.2-0.5 mg/kg (max 10 mg/dose)
	  ◦ IV: 0.05-0.1 mg/kg (max 10 mg/dose)
	  ◦ IM: 0.05-0.15 mg/kg (max 10 mg/dose)
	• Onset: 1-3 minutes
	• Duration: 15-60 minutes
		Sedation	Respiratory depression, apnea, hypotension
			
			Provides sedation with no analgesia
			
			Avoid in patients with acute narrow-angle glaucoma
			
			Is associated with paradoxical reactions in pediatric patients such as aggressive behavior or hyperactivity

Etomidate	• Dose: ◦ IV: 0.2-0.4 mg/kg (max 50 mcg/dose) • Onset: .05-1 minute • Duration: 2-5 minutes	• General anesthesia • Sedation	• Myoclonus • Nausea • Vomiting *Not to be given to patients with adrenal insufficiency* *Reduces intracranial pressure* *Lowers seizure threshold*

Medication	Pharmacology	Effect	Adverse Effect

Ketamine	• Dose:
	  ◦ IN: 3-6 mg/kg
	  ◦ IV: 1-2 mg/kg
	  ◦ IM: 2-5 mg/kg
	• Onset: 1-2 minutes
	• Duration: 15-30 minutes
	May only be used during a moderate or deep sedation if the LIP is immediately available to respond during administration or patient is already intubated and ventilated
		• Anesthesia
		• Sedation
			• Hypotension
			• Dysphoria
			• Hypersalivation
			• Vomiting
			When given with Propofol, reduce initial dose
			Seizures and agitation should be treated with benzodiazepines
			Ketamine-induced dystonia can be treated with diphenhydramine
			Not to be given to patients with known or suspected psychosis

Abbreviations:

IN= intranasal

IV= intravenous

IM= intramuscular

Other Pharmacological Agents

- Anesthetic agents such as Propofol, Etomidate, and Ketamine may be used in planned deep sedation
- Planned deep sedation by non-anesthesia may be performed only by LIPs certified in deep sedation
- Ketamine may only administered by personnel trained in administration of anesthesia (unless there is a departmental protocol approved by the medical staff)

Reversal Agents

REMINDER: Not every medication has a reversal agent!

Test Yourself

Before you click or tap to flip each card below to reveal the corresponding reversal agent, test yourself to see if you can recall what they are. Review all cards before moving on.

Opioids - Fentanyl	**Reverse with nalaxone (Narcan)**

1 of 5

Benzodiazepines - Midazolam	**Reverse with flumazenil (Romazicon)**

2 of 5

Ketamine

No specific reversal agent (treat symptoms and provide supportive therapy)

Dexemedtomidine

No specific reversal agent (treat symptoms and provide supportive therapy)

Etomidate

No specific reversal agent (treat symptoms and provide supportive therapy)

Naloxone (Narcan)

- Duration is shorter than most opioids, so will likely need repeated doses (every 20-30 minutes)
- May titrate dose to reverse hypoventilation without reversing analgesic effect
- Dose:
  - IN: 2-4 mg
  - IV: 0.1 mg/kg (max 2 mg/dose)
  - IM: 0.1 mg/kg (max 2 mg/dose)
- Onset:
  - IN: 8-13 minutes
  - IV: 2 minutes
  - IM: 2-5 minutes
- Duration:
  - 30-120 minutes
    - ***IV route has the shortest duration**

Flumazenil

- Duration can be shorter than some benzodiazepines, so may need repeat doses
- Should be avoided in patients with seizure disorders or patients who take chronic benzodiazepines
- Dose:
  - IV: 0.01 mg/kg (max 0.2 mg/dose)
    - Maximum cumulative dose: 0.05 mg/kg or 1 mg (whichever is lower)
      - ***May repeat dose every 1 minute until total**

- Onset:
  - 1-2 minutes
- Duration:
  - 19-50 minutes

Complete the content above before moving on.

Treating Oversedation

If your patient progresses beyond the goal of therapy, supportive therapy should be provided.

- Consider reversal agent (per LIP order)
- Continue continuous monitoring every 10 minutes for at least 30 minutes (every 5 minutes for deep sedation) until adequate respiratory effort
  - May require 2 or more hours of additional monitoring
- Provide respiratory support
  - Examples include:
    - Increasing oxygen
    - Jaw thrust/chin lift
    - Oral airway
    - Ambu bag
    - Prepare for intubation, etc.

Watch for post-procedure sedation

Once the stimulation from the procedure is over, the patient may progress to a deeper level of sedation than assessed throughout the procedure.

Maintain intra-procedure level of monitoring until patient is at least a 3 on the Ramsey Sedation Score.

CONTINUE

Pharmacology Review

True or False:

Fentanyl should be given quickly in order to avoid chest wall rigidity.

- ◯ True
- ◯ False

SUBMIT

Multiple Choice:

The reversal agent for Fentanyl is:

- ◯ Flumazenil
- ◯ Naloxone
- ◯ Morphine
- ◯ None available

SUBMIT

Multiple Choice:

Etomidate should be used with caution since it can:

- ◯ Increase clotting
- ◯ Decrease heart rate
- ◯ Lower seizure threshold

SUBMIT

Multiple Choice:

If a patient progresses beyond the goal of therapy, you should:

- ◯ Provide respiratory support
- ◯ Consider reversal agent
- ◯ Monitor patient every 10 minutes if in moderate sedation
- ◯ All of the above

SUBMIT

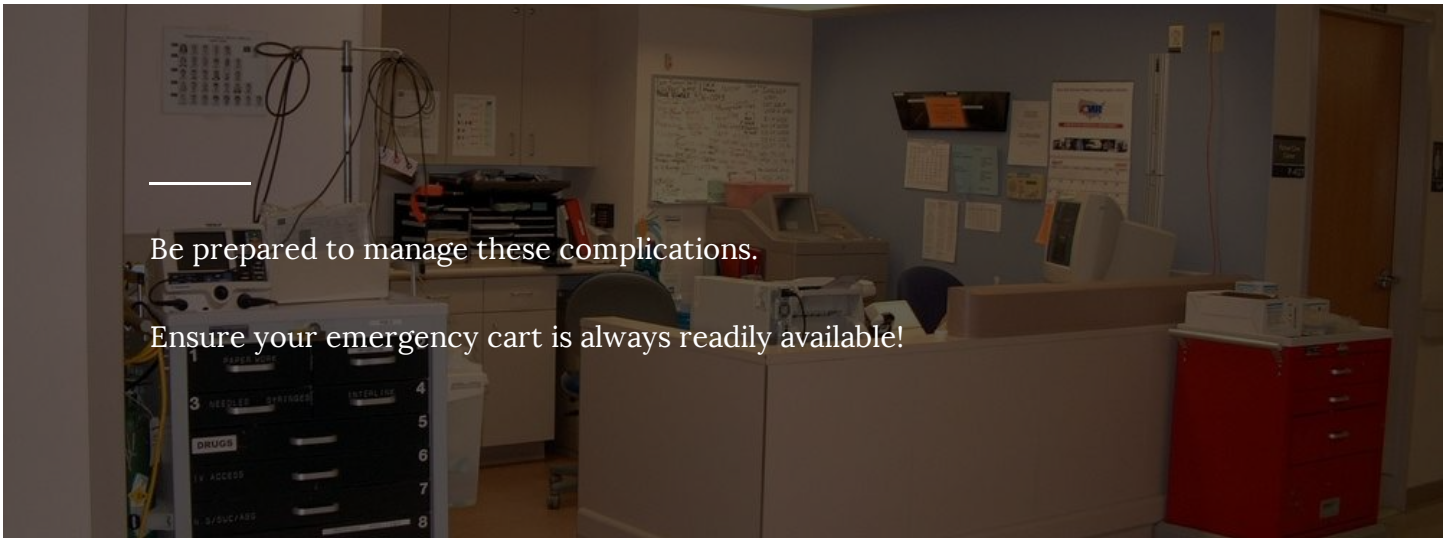
Complete the content above before moving on.

Content - Sedation Complications & Rescue for Pediatric Patients

Manage Complications of Sedation

Signs and symptoms of over sedation:

- [ ] Respiratory depression
- [ ] Airway compromise (most common sedation complication)
- [ ] Unresponsiveness
- [ ] Cardiovascular instability



Airway Management

- Airway obstruction is the most common complication in sedation
- Follow ACLS/PALS airway management guidelines
- Airway resuscitation equipment must be at the bedside or immediately available (Airways, Ambu Bag, Suction)
- Oxygen mask or nasal cannula must be immediately available

Airway Rescue Algorithm

Complete the content above before moving on.

Click or tap on the numbers below to review five ways to manage sedation complications. Review all to move on.


Management of Sedation Complications
1
2
3
4
5

Do NOT give more sedation medication

Initiate emergency airway management

Communicate patient status to LIP

Consult with LIP about further management of patient status including use of reversal agents

If reversal agents are used, ensure assessments are adequate to identify over-sedation recurrence once the effect of the antagonist dissipates (may require up to 2 hours of increased observation)

Review all five ways to manage sedation complications above before moving on.

Identifying Patients Transitioning to Deep Sedation

If the patient transitions to deep sedation, it is imperative that you initiate rescue procedures!

- The patient has transitioned to deep sedation if they cannot be easily aroused (even if they respond purposefully following repeated or painful stimuli)
    - These patients may have trouble breathing and often require assistance in maintaining a patent airway
- A score of 5 or 6 on Ramsay sedation score is indicative of transition to deep sedation
- In pediatric patients, a score of less than 0 on the State Behavior Scale indicates a transitions to deep sedation

Actions for When Sedation Progresses Deeper Than Planned

Let's take a look at the steps to take when a patient progresses deeper into sedation than anticipated.

Appropriate measures need to be taken to return patient to planned sedation level.

1

Notify team involved with the procedure of patient's status.

"The patient's sedation is increasing and has transitioned to a deeper sedation level than planned. We need to address sedation level before proceeding."

2

Assess patient's airway.

If respirations are impaired, prepare rescue procedures:

1. Manually open airway (jaw thrust).
2. Consider insertion of oral or nasal airway.
3. Assist with ventilations (bag/valve mask).
4. Prepare for intubation: consider calling for anesthesia or code blue as appropriate to situation.
5. Suction airway PRN.

4

Be aware that the progression towards deep sedation varies from person to person.

5

Be alert to accumulation of secretions in the airway as aspiration is the most common cause of death in procedural sedation.

6

If deep sedation has occurred, measures to return to the planned level of sedation need to be instituted.

Monitor patient for signs of decreased respiratory status and airway compromise.

Follow airway rescue algorithm as needed.

8

Administer reversal agents per LIP orders.

Document patient status every 5 minutes, including:

- BP
- Pulse
- Respirations
- $ETCO_2$
- Pulse oximetry
- Sedation level
- ECG pattern

Remember!

Only LIPs certified in endotracheal intubation may perform airway intubation.

Complete the content above before moving on.

Reversal Agents

Remember, the half-life of reversal agents can be shorter than sedative medications - close and continued monitoring is essential.

- If a reversal agent is used, the patient must be observed and monitored long enough to ensure that sedation and cardio-respiratory depression does not recur once the effect of the antagonist dissipates.
- May require observation and monitoring at least 2 hours after last dose of a reversal agent.

Complications: Allergic Reactions

Allergic Reactions

Although they are rare, allergic reactions to medications do occur. Be sure to note allergies and symptoms at the pre-procedure assessment.

The following are the most common signs of an allergic reaction:

- Generalized flush with tingling

- Pruritus
- Tachycardia
- Urticaria
- Angioedema
- Inspiratory stridor
- Wheezing
- Sudden hypotension
- Cardiac arrhythmias
- Loss of consciousness
- Seizures

Responding to an Allergic Reaction

1. Stop procedure
2. Administer appropriate drugs to counteract the allergic response as ordered:
    a. Epinephrine
    b. Benadryl
    c. Hydrocortisone, etc.
3. Monitor blood pressure
4. Support cardiovascular system with emergency medications/fluids
5. Keep airway patent
6. Anticipate possible endotracheal intubation
7. Consider calling RRT

CONTINUE

Sedation Complications & Rescue for Pediatric Patients Review

Multiple Choice:

Your patient has progressed to unplanned deep sedation during the procedure. He does not have spontaneous respirations, the SpO_2 has dropped to 65% on 6 L of O_2, and the $ETCO_2$ waveform is flat. The LIP decides to stop the procedure to intubate the patient.

What should you do?

- ◯ As your ACLS/PALS certification is current, you intubate the patient
- ◯ Call for assistance (anesthesia or code) and support the airway until an LIP trained in pediatric intubation arrives
- ◯ Call an RRT
- ◯ Transfer the patient to the critical care unit immediately, then intubate

SUBMIT

Multiple Choice:

Your patient has received 4 mg of morphine sulfate IV. You notice during your procedural assessment that hives are forming. He is now having difficulty breathing with high pitched crowing on inspiration with stridor. His blood pressure has dropped from 140/78 to 80/40. You alert the LIP of the suspected allergic reaction.

Which of the following interventions would you **NOT** perform?

- ◯ Stop the procedure

- ◯ Administer medications to reverse the allergic reaction per LIP order
- ◯ Intubate the patient immediately
- ◯ Call RRT
- ◯ Support the airway

SUBMIT

Select All That Apply:

Your patient's baseline vital signs are HR 78, RR 16, B/P 132/78, O_2 saturation 96%, and $ETCO_2$ 35 mmHg on room air. 15 minutes into the procedure, you obtain the following vital signs: HR 65, RR 10, B/P 120/70, O_2 saturation 94%, $ETCO_2$ 47 mmHg.

Which parameter(s) is/are of concern and bears closer observation?

- ☐ RR of 10
- ☐ $ETCO_2$ of 47
- ☐ HR of 65
- ☐ B/P of 120/70
- ☐ O_2 saturation of 94%

SUBMIT

Multiple Choice:

What would be the first line intervention if airway obstruction is suspected?

- ◯ Administer the appropriate reversal agent
- ◯ Continue pulse oximetry monitoring
- ◯ Intubate the patient immediately
- ◯ Reposition the airway using techniques for opening the airway

SUBMIT

True or False:

The most common cause of death in procedural sedation is respiratory depression.

- ◯ True
- ◯ False

SUBMIT

Multiple Choice:

Your patient has received large doses of midazolam (Versed) and fentanyl for painful debridement of a wound. 20 minutes into the procedure, the patient begins to have sonorous respirations. You perform a chin lift and reassess the patient's status. The patient does not respond to verbal, tactile, or painful stimuli.

Which level of sedation describes the patient's current status?

- ◯ Minimal sedation
- ◯ Moderate sedation
- ◯ Deep sedation
- ◯ General anesthesia

SUBMIT

Multiple Choice:

Your patient has received a total of 10 mg of IV morphine sulfate for procedural sedation. She is restless and agitated. Her respirations are 10 and shallow.

What may be the cause?

- ◯ The patient is responding to the painful procedure and needs more medication
- ◯ The patient is showing early signs of an allergic response to the morphine sulfate
- ◯ The patient may be showing signs of hypoxemia and further assessment is needed
- ◯ The patient is having an opposite effect with the use of morphine sulfate and a different drug should be administered

SUBMIT

Select All That Apply:

Which of the following would indicate that your patient has drifted into deep sedation?

- [ ] Vital signs are stable, but oxygen saturation has decreased slightly
- [ ] Respirations have decreased to 10/minute, oxygen saturation remains at 99%, and $ETCO_2$ is 3mm Hg above baseline
- [ ] Patient attempts to open eyes only after pain stimulus (e.g., sternal rub)
- [ ] A chin lift is required to maintain a patent airway and $ETCO_2$ has risen 10 mm Hg above baseline

SUBMIT

Complete the content above before moving on.

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CONTINUE

Conclusion

Thank you for completing the Procedural Sedation - Pediatric Patients course!

If you have any unit-specific questions, please contact your nursing unit manager or preceptor.

Exit

Click to exit the course.

EXIT