

# PROCEDURAL SEDATION: PRIORITIES FOR THE PERIANESTHESIA NURSE

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## Journey of Sedation



- ❖ Ability to alter level of consciousness
- ❖ Herbs, naturally occurring substances
- ❖ Ether ~ alter consciousness for surgical procedures
- ❖ Specialized training
- ❖ Dental advances/outpatient sedation
- ❖ Pharmacologic advances: faster onset, shorter ½ life

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## Procedural Sedation

- ❖ Distinctions of levels of sedation along a continuum
- ❖ Balance patient comfort ~ patient safety
- ❖ Closely scrutinized by regulatory agencies
- ❖ Professional organizations: standards, statements
  - ❖ ASA, ASPAN, AORN, specialty
- ❖ Provider credentialing for intended level of sedation
- ❖ Nursing knowledge and skills
- ❖ Policies, order sets, documentation platforms.....

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## Regulatory Agencies

- ❖ TJC
  - ❖ Conditions of participation Anesthesia Services ~ anes oversees all aspects of sedation
- ❖ CMS
- ❖ State Boards of Nursing
- ❖ Organizations reflective of above ~ specific policies
  - ❖ Provider credentialing

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## Procedural Areas

- ❖ Interventional suites:
  - ❖ Cards, NIR/IR, Pain, GI, Bronch/PCC
- ❖ Bedside:
  - ❖ CC, ? PACU, ED
- ❖ MRI/CT scan
- ❖ Locations regulated by policy to ensure adequate monitoring capabilities, staff, knowledge & skills

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## Technological Advances

- ❖ Exponential rise in non-OR procedures
- ❖ Advances in imaging, provider skills, minimally invasive techniques
- ❖ > complexity
- ❖ Longer duration (risk of)
- ❖ >>>> demand for procedural sedation
  - ❖ Nurse-administered moderate sedation
  - ❖ Nurse-administered deep sedation ????
  - ❖ Anesthesia-provided care
  - ❖ Patient self-administered sedation ???

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## Patient Selection

- ❖ Planned procedure
  - ❖ Complexity
  - ❖ Duration
  - ❖ Painful/not
  - ❖ Complication risk
- ❖ Able to lie still, flat, ? follow commands
- ❖ Protect airway
- ❖ Co-morbidities

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## Definitions and Common Terms

- ❖ Analgesia: relief of pain w/o intention to render sedation
  - ❖ Altered mental status s/e
- ❖ Sedation ~ along a continuum
- ❖ Sedative agents: administered for anxiolysis and/or to achieve a level of sedation to perform planned procedure
  - ❖ Reduce anxiety
  - ❖ Mitigate recall
  - ❖ Facilitate lie still/flat for procedure

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## Levels of Sedation

- ❖ Minimal sedation (anxiolysis): pts respond normally to verbal commands. Resp unaffected
- ❖ Moderate Sedation: depression of consciousness
  - ❖ Airway/ventilation/CV OK
  - ❖ Purposeful response to verbal or tactile
  - ❖ if responsive only to pain: deeper than intended level of sedation
- ❖ Deep Sedation
  - ❖ Response after painful stimulus
  - ❖ Airway maybe needs to be supported
  - ❖ Spont ventilation maybe inadequate
  - ❖ CV OK



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## Levels of Sedation

- ❖ General anesthesia:
  - ❖ Unarousable even to pain
  - ❖ Airway supported
  - ❖ Inadequate spont ventilation
  - ❖ Impaired CV function
- ❖ Dissociative sedation:
  - ❖ Trance-like cataleptic state
  - ❖ Profound analgesia/amnesia
  - ❖ Airway patency preserved
  - ❖ CV stable



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## Levels of Sedation

- ❖ Not always possible to predict pt response
- ❖ May progress to deeper than intended level of sedation
- ❖ Plan/provider able to rescue pt from deeper than intended sedation
  - ❖ Airway management
  - ❖ Reversal agents
  - ❖ Abort procedure

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### Position on Monitored Anesthesia Care

Committee of Origin: Economics

(Approved by the House of Delegates on October 25, 2005, and last amended on October 17, 2018)

- ❖ **Specific anesthesia service ~ qualified anesthesia provider**
- ❖ Includes all aspects of anes care:
  - ❖ Preproc assessment/management of peri-procedural risk
  - ❖ Rx of clinical complications during procedure
  - ❖ Support of VS
  - ❖ Administration of sedatives, analgesics, hypnotics, anes agents
  - ❖ Psychological support/physical comfort
  - ❖ Provision as needed of add'l medical care
- ❖ Levels of sedation: across the sedation continuum

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www.asahq.org

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### Distinguishing Monitored Anesthesia Care ("MAC") From Moderate Sedation/Analgesia (Conscious Sedation)

- ❖ Moderate sedation: physician service/aligned CPT code
- ❖ Supervises/administers sedation/analgesic meds
- ❖ Proceduralist: performs procedure & supervises sedation
- ❖ Moderate sedation *level of sedation*
  - ❖ Successful performance of procedure
  - ❖ Patient comfort and cooperation
- ❖ Proceduralist: ID deeper level of sedation & rescue
- ❖ Non-relationship based care (usu) ~ consultant based
  - ❖ ? Knowledge of the patient
- ❖ MAC ~ qualified anesthesia provider

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## Moderate Sedation vs MAC

- ❖ Physician services
- ❖ Varying levels of sedation per provider credentialing
- ❖ Monitored anesthesia care:
  - ❖ Range of sedation along sedation continuum
  - ❖ "MAC" becomes a GA level of sedation whenever pt loses consciousness, responsiveness
  - ❖ Anesthesia standards of care
  - ❖ Phase I level of care immediate post procedure

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## PSA Considerations

- ❖ Extremes in age (< 6 mos/> 70)
- ❖ Sig medical comorbidities
- ❖ Difficult airway
- ❖ Aspiration risk:
  - ❖ Reflux, obstruction, HH
- ❖ OSA/obesity
- ❖ Able to lie still/flat

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## Anesthesia Considerations

- ❖ Airway protection
- ❖ Cognitively impaired
- ❖ CV disease
- ❖ Unable to lie flat/still
- ❖ ASA classifications

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## Provider Privileges for Moderate Sedation

- ❖ Anesthesia
- ❖ Non-anesthesia
  - ❖ Physicians, dentists, podiatrists
  - ❖ Appropriate education and training and licensure
  - ❖ Supervise administration of moderate sedation
  - ❖ Appropriate credentialing process from Medical Staff Office
  - ❖ ACLS/PALS

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## Provider Privileges for Deep Sedation

- ❖ Risks for progression to ga level of sedation
  - ❖ Provider able to ID and rescue
  - ❖ Knowledge & skills in airway management
  - ❖ ACLS/PALS or equivalent
- ❖ Qualified & trained in deep sedation
- ❖ May not delegate/supervise those who are not also qualified/trained in deep sedation

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## Regulatory Standards for Procedural Sedation

- ❖ Qualified provider
- ❖ H&P w/in 30 days and/or:
- ❖ Patient assessment prior to the procedure
  - ❖ Airway
  - ❖ CV
  - ❖ Past experience(s) anesthesia/procedural sedation
  - ❖ ASA score

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## Screening Questions

- ❖ Early ID ~ sedation plan
  - ❖ Moderate ~ MAC ~ further evaluation needed
  - ❖ Pt safety ~ risk mitigation
  - ❖ Avoid case cancelation
- ❖ Age, BMI, OSA/snoring, DM, heart & lung ds
- ❖ Substance use/misuse
- ❖ Opiates/benzo routine use
- ❖ Past procedures under moderate sedation or MAC?
- ❖ **Patient expectations**



<https://www.slidehare.net/SandyMcLellan/procedural-sedation>

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## Inpatient Challenges

- ❖ Already ill
- ❖ Disease etiology ~ r/t procedure?
- ❖ Provider evaluation procedure focused
- ❖ Screenings:
  - ❖ Stability
  - ❖ Active infectious/sepsis profile
  - ❖ Hemodynamically unstable
  - ❖ Airway concerns
  - ❖ Complexity of the procedure

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## Planning Pitfalls

- ❖ Already ill/decompensating
- ❖ Significant pain/analgesic use & need
- ❖ Complex procedure
- ❖ Likely sedation failure ~ recommend anes consultation & care
- ❖ Challenges w/ non-relationship care
- ❖ Issues/concerns ID'd day of procedure
  - ❖ *Or during/after*



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## Additional Screening Questions

- ❖ Med use and history
- ❖ Med/surgical hx
- ❖ Allergies and reactions
- ❖ Expectations
- ❖ Ability to lay flat/positioned per procedure
- ❖ Past adverse events r/t anes, sedation



<https://pedemmonck.com/tag/procedural-sedation/>

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## ASA Physical Status

ASA 1	Normal healthy patient
ASA 2	Pt. w/ mild systemic disease
ASA 3	Pt. w/ severe systemic disease that limits activity but not incapacitating
ASA 4	Pt. w/ incapacitating systemic disease that is constant threat to life
ASA 5	Pt. is not expected to survive 24 hours w/o the operation
ASA 6	Pt. has passed brain death criteria and is an organ donor
"E"	Emergent pt. w/ unknown or limited history

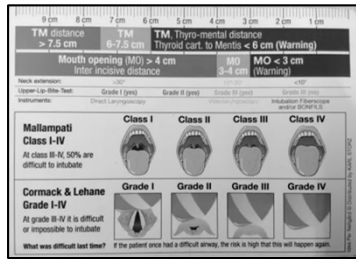
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## Airway Assessment

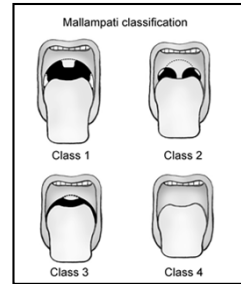
- ❖ Mallampati
- ❖ FB
- ❖ TM distance



<https://openairway.org/airway-assessment-cue-card/>

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## Mallampati Airway Classification



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## Anesthesia Consultation/Scheduling

- ❖ ASA score ~ III/IV/V
- ❖ Medically unstable/emergency
- ❖ Airway concerns ~ MP IV
- ❖ Aspiration high risk ~ need for protected airway
- ❖ Procedural complexity
- ❖ Patient request/concerns/past experience(s)

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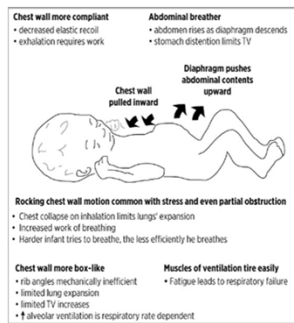
## Anesthesia Consultation

- ❖ URI
- ❖ OSA/obesity
- ❖ Muscular dystrophy
- ❖ BMI/pregnancy
- ❖ Substance use disorder
- ❖ Positioning concerns

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## Pediatric Concerns

- ❖ Fasting guidelines
  - ❖ Aspiration risks: ASA III/IV, airway/GI procedure, GI dg
- ❖ Neonates
- ❖ Wt < 5 kg
- ❖ Prematurity
- ❖ Obesity/OSA
- ❖ Congenital syndromes affecting airway



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The SPS Pediatric Sedation Pocket Card for Providers provides a checklist for providers. It includes sections for 'Mallampati Classification', 'Airway/Breathing Interventions', 'Management of Laryngospasm', 'Pediatric Sedation Pocket Card for Providers', and 'Society for Pediatric Sedation Safe and Sound'. It details criteria for Class I-IV Mallampati classification and Class I-IV pediatric sedation, including patient history, monitoring, and emergency preparedness.

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## Case Study

- ❖ 82 F scheduled for UGI/colonoscopy f/u screening
- ❖ ASA II, HTN, DM – diet, active
- ❖ Pre-procedure requested anesthesia ~ order entered for MAC
- ❖ Proceduralist ~ little knowledge of pt, otherwise healthy, scheduled for moderate sedation
- ❖ Day of procedure: consent, sedation is the plan
- ❖ Procedure aborted d/t patient's intolerance
- ❖ Review: despite order for MAC, proceduralist able to override and select moderate sedation
  - ❖ Previous outpt procedures done under MAC

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## Medically Unstable???

- ❖ Airway ~ protected or not?
- ❖ Hemodynamic instability
  - ❖ Vasopressor titration
  - ❖ MTP/colloid resuscitation
- ❖ Complex intervention ~ high risk
- ❖ Unable to lay still/flat/complete procedure



<https://www.medrxiv.org/content/10.1101/2018.03.29.18011111v1>

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## Fasting Guidelines

- ❖ R/t aspiration risk
- ❖ Clear liquids (what are they) 2 hours
- ❖ Meds w/ sip of water (no applesauce)
- ❖ High risk of aspiration ~ extend fasting period to ~ 6 hours or longer
  - ❖ GOO/HH/bowel obstruction
  - ❖ Prior e-gastrectomy, other
  - ❖ ?? candidates for anesthesia/protected airway

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American College of Emergency Physicians POLICY STATEMENT  
ADVANCING EMERGENCY CARE

### Pre-Sedation Oral Intake

Approved September 2018  
*Unscheduled Procedural Sedation:  
A Multidisciplinary Consensus  
Practice Guideline*

- ❖ Vomiting/aspiration rare during proc sedation
- ❖ Assess timing of last PO
- ❖ Urgency of procedure will dictate
- ❖ Pts w/ known risks: risks versus benefits ~ delay if possible
  - ❖ Consider ketamine

American College of Emergency Physicians – 2018

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## Day of Procedure Verifications

- ❖ Pt ID
- ❖ Consent
- ❖ Procedure and sedation ~ clear on what sedation plan is
- ❖ Risks:
  - ❖ Airway/intubation, proc abort, allergic response, n/v
  - ❖ Awareness
- ❖ Complications
- ❖ Transportation w/ resp individual
- ❖ NPO status

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## Day of Procedure

- ❖ Med review ~ OTC & prescribed
- ❖ Pt understanding of planned procedure/sedation plan
- ❖ Relevant labs/POCT (glucose, pregnancy)
- ❖ Discharge needs
- ❖ Additional screening????
  - ❖ Frailty
  - ❖ Positioning assistance
  - ❖ Fall risk/safety concerns

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## Day of Procedure ~ Bedside

- ❖ Partner w/ assigned nurse
- ❖ Sedation plan ~ med management
- ❖ Monitoring
- ❖ Post procedure care

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## Immediate Re-evaluation

- ❖ Patient stable for procedural sedation
- ❖ No changes in pt status since initial assessment
- ❖ VS w/in ~ 5-10 minutes prior to 1<sup>st</sup> sedating medication
  - ❖ VS
  - ❖ O2 sats
  - ❖ Pain
  - ❖ Baseline sedation level/LOC

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## Sedation Monitoring Requirements

- ❖ Continuous EKG, BP, pulse oximetry
- ❖ Capnography
- ❖ BIS monitor
- ❖ Audible alarms
- ❖ Visible to staff
- ❖ BVM device
- ❖ Code cart immediately available
- ❖ ACLS staff member



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## Capnography Monitoring for Patients Undergoing Moderate Sedation

- ❖ RD occurs prior to hypoxia
- ❖ PetCO<sub>2</sub>: ventilation wave form & numerical values
- ❖ Use a/w reduced frequency of RD

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## Catastrophic Sedation Errors Can Be Avoided by Using CO<sub>2</sub> Monitoring And Following Guidelines

- ❖ Assessment of ventilation
- ❖ Supplemental O<sub>2</sub> shifts the oxyhemoglobin curve
- ❖ Impedance resp monitoring
- ❖ Visualization???
  - ❖ Dark procedural rooms
  - ❖ Prone positioning
  - ❖ Airway occluding procedures ~ non-verbal

Anesthesiology News April 12, 2021

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## Practice Guidelines for Moderate Procedural Sedation and Analgesia 2018

- ❖ Periodically monitor pt response to verbal commands
  - ❖ Signal thumbs up/down
- ❖ Vent function qualitatively
  - ❖ Capnography
  - ❖ Pulse oximetry
- ❖ Determine BP prior to sedation

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Anesthesiology, V 128 • No 3

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## Additional Equipment

- ❖ Suction (working)
- ❖ O<sub>2</sub> source
- ❖ Code button/ability to call for assistance
- ❖ Pharmaceutical agents ~ reversals
- ❖ Additional IV supplies
- ❖ Documentation platform

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## Moderate Sedation Staffing

- ❖ RN caring for/monitoring patient shall have no other responsibilities that would leave the pt unattended/unmonitored
  - ❖ Interruptible procedural tasks

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## Knowledge & Skills

- ❖ Pharmacology ~ PSA and reversal agents
- ❖ Monitoring physiologic parameters
- ❖ Airway management & rescue~ early ID, BVM, open airway
- ❖ Principles of oxygenation & ventilation
- ❖ Complications of PSA
- ❖ Advocate for pt as needed
- ❖ Nurses' resp & liability in event of adverse event

2021-2022 PeriAnesthesia Nursing Standards, Practice Recommendation 7.  
The Role of the 'RN' in the Management of the Patient Undergoing Procedural Sedation

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## Pharmacology

- ❖ Moderate sedation:
  - ❖ Opiates +/- benzodiazepine
  - ❖ **Synergistic effects ~ effects of two drugs exceeds their sum**
    - ❖ **Risk of deeper than intended level of sedation**
- ❖ Deep sedation ~ ED (possible):
  - ❖ Propofol
  - ❖ Ketamine
  - ❖ Precedex
  - ❖ Etomidate
  - ❖ **Risk of deeper than intended level of sedation**
- ❖ Critical care
  - ❖ Continuous infusions ~ titration guidelines +/- add'l for procedures

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## Pharmacology

- ❖ Drug-drug interactions
- ❖ Pharmacokinetics: onset /duration
  - ❖ Age ~ Body composition
  - ❖ Renal function ~ clearance
  - ❖ Hepatic function ~ metabolism
  - ❖ Cardiac function ~ perfusion/distribution
  - ❖ Bioavailability
- ❖ Pharmacodynamics ~ how drugs achieve effects ~ receptors
  - ❖ Genetic differences
  - ❖ Enzyme activity

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## Pharmacology

- ❖ Sedation medications by non-anesthesiologist highly regulated
- ❖ State BONs
- ❖ Professional organizations
- ❖ Hospital policies, procedures
- ❖ Carefully investigate prior to implementing change

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## Risks

- ❖ Depression of resp
  - ❖ Ability to protect airway
  - ❖ Loss of airway patency
  - ❖ > risk of aspiration
- ❖ Depression of CV system: BP, HR
- ❖ Unexpected sensitivity to pharmacologic agents
- ❖ Procedural-related need for deeper sedation

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## Administration

- ❖ Provider order?
  - ❖ VO
  - ❖ EHR
    - ❖ Goal-directed ~ sedation/pain scales
    - ❖ Dosing guidelines
- ❖ Plan of care
- ❖ Wt based dosing? IBW??

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## Opioids

- ❖ Bind to opioid receptors ~ *agonist* effect
- ❖ Dose-dependent effect
- ❖ More common:
  - ❖ Fentanyl
  - ❖ Hydromorphone
  - ❖ Morphine
  - ❖ Meperidine

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## Fentanyl

- ❖ Rapid onset ~ 30-60s    Duration ~ 30-60 min    Peak ~ 10 mins
- ❖ Cumulative doses ~ longer duration
- ❖ Caution: ~ 100X more potent than morphine
- ❖ Recommended dosing:
  - ❖ Adult ~ 0.5 mcg-1mcg (or 0.05-2mcg/kg) every 1-2mins until desired effect
  - ❖ Max dose ~ 5mcg/kg or 250 mcg
- ❖ Advantages ~ less histamine release, rapid onset
- ❖ Disadvantages/risks:
  - ❖ Chest wall rigidity
  - ❖ Resp depression

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## Remifentanyl/Alfentanil

- ❖ Ultra-short acting    Duration ~ 5 mins
- ❖ Alfentanil ~ 1/5-1/10 as potent as fentanyl
- ❖ Remi: 0.5mcg/kg ~ 1 minute
- ❖ CAUTION: resp depressant

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## Other Intravenous Opioids

Opioid	Initial dose	Onset	Peak	Duration
Morphine	1-2 mg slowly	5-10 mins	15-30 mins	3-4 hours
Hydromorphone	0.1-0.2 mg	3-5 mins	8-20 mins	2-3 hours
Meperidine	10 mg	1-5 mins	10 mins	1-3 hours

- ❖ Morphine: vasodilation; histamine release; dysphoria
- ❖ Hydromorphone: less histamine; inactive compounds
- ❖ Meperidine:
  - ❖ RF/toxic metabolites
  - ❖ MAO inhibitors ~ contraindicated ~ serotonin syndrome
  - ❖ Atropine-like sx: dry mouth, tachycardia, dilated pupils

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## Benzodiazepines

- ❖ Anxiolysis ~ minimal ~ moderate sedation
- ❖ Midazolam ~ lipophilic ~ crosses the BBB
  - ❖ 0.02-0.03 mg/kg or 0.5-1 mg ~ titrated to effect
  - ❖ Onset 1-5 mins Duration 1-2.5 hours
  - ❖ Repeat every 2-5 minutes as needed
- ❖ Concerns: amnestic effects (good)
  - ❖ Age ~ debilitated ~ reduced doses
  - ❖ Resp depression

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## Reversal Agents

- ❖ Antagonists ~ targets receptor binding site(s) of PSA meds
- ❖ Must be immediately available
- ❖ Indications:
  - ❖ Restore airway reflexes
  - ❖ Reverse resp depression
- ❖ Flumazenil (benzo): 0.2 mg/15 secs, repeat PRN
- ❖ Naloxone (opioids): 0.4 mg titrated to effect
- ❖ Caution w/ return of unседation/RD
  - ❖ Cont pt observation ~ 2 hours post reversal agent

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## Propofol

- ❖ Deep sedation/general anesthesia depth of sedation
- ❖ Highly lipophilic ~ crosses BBB rapidly
- ❖ Onset 40 secs ~ duration 6 mins (excluding subsequent doses)
- ❖ Dose: 0.5-1 mg/kg
- ❖ Caution: no analgesic effects ~ pain on injection
- ❖ S/E:
  - ❖ Hypotension
  - ❖ Resp depression/apnea

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## Etomidate

- ❖ RSI ~ induction agent
- ❖ Non-barbiturate hypnotic
- ❖ Doses: 0/1-0.15 mg/kg
- ❖ Rapid onset ~ duration 5-15 mins
- ❖ Considerations:
  - ❖ No analgesic properties
  - ❖ CV stability
  - ❖ Caution in elderly/ESRD/ESLD
- ❖ S/E: myoclonus, adrenal insufficiency, n/v
  - ❖ No continuous infusions

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## Adjuncts

- ❖ Diphenhydramine
- ❖ Scopolamine
- ❖ NSAIDS
- ❖ Acetaminophen
- ❖ Clonidine
- ❖ Local anesthetics

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## Intra-Procedure

- ❖ **RN shall have no tasks that prevent RN from monitoring pt**
- ❖ Physiologic variables:
  - ❖ Cardiac monitoring, BP, cont. pulse ox, PetCO<sub>2</sub>
  - ❖ Audible alarms
- ❖ Depth of sedation ~ validated sedation scale
  - ❖ Verbal pt response
  - ❖ Non-verbal response



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## Complications

- ❖ Resp depression w/ hypoxia +/- hypercarbia
- ❖ Aspiration
- ❖ CV derangements
- ❖ Emergence reactions
- ❖ Inadequate sedation
- ❖ Procedural-related complications

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## Recovery and Discharge

- ❖ Safe transport
- ❖ Criteria based
- ❖ RR area: monitoring equipment, O2 sats, ETCO2
  - ❖ Phase I for immediate post sedation/anesthesia care
  - ❖ Fast-track if post procedure monitoring occurred in proc area
    - ❖ Post anesthesia care ~ Phase I
- ❖ Emergency airway equipment ~ Ability to call for help
- ❖ Nsg assessment(s):
  - ❖ Sedation and pain levels
  - ❖ PONV

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## Criteria

- ❖ Pts observed until determined no longer @ risk for cardioresp depression
  - ❖ Maintain IV access
- ❖ Responsible individual to accompany pt home
- ❖ Pt alert, responds to commands, baseline mental status
- ❖ SpO2 > 95% or @ baseline w/o supp. O2 and stimulation
- ❖ VSS w/in baseline
- ❖ Discharge criteria if used
- ❖ Discharge instructions specific to sedation administered

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## Future Trends??

- ❖ Nurse-administered prop/dex/other
- ❖ Dexmedetomidine/precedex
- ❖ N2O
- ❖ Ketamine
- ❖ PCSA
- ❖ CAPS (computer-assisted)
- ❖ BIS monitoring
- ❖ Remimazolam (anesthesia)
- ❖ Oliceridine (mu agonist)

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## Ketamine

- ❖ Deep sedation ~ restricted credentialing per policy
- ❖ Dissociative
- ❖ Trance-like state
- ❖ Airway patency preserved ~ analgesic properties
- ❖ Rapid onset ~ short duration
- ❖ Short, painful procedures
- ❖ Dosing: 1-2 mg/kg

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## Ketamine Side-Effect Profile

- ❖ Emergence reactions: disorientation, hallucinations
  - ❖ Pre-treat w/ small dose benzo
- ❖ Laryngospasm ~ > risk w/ anatomical abnormality
  - ❖ Surgery/stimulation of oropharynx
- ❖ Tachycardia, > BP (usu mild)
- ❖ Salivation
- ❖ > ICP/IOP

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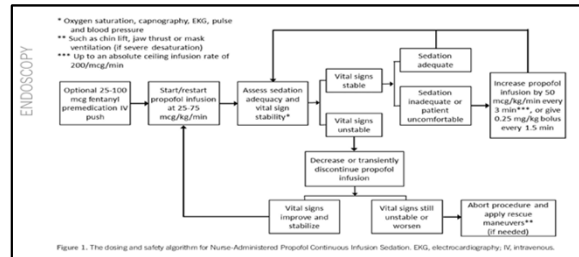
## Dexmedetomidine

- ❖ Alpha-2 adrenergic agonist
- ❖ Clinical effects: hypnosis & analgesia
- ❖ Nil resp depression
- ❖ Risk of hypotension/bradycardia

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## Nurse-Administered Propofol Continuous Infusion Sedation: A New Paradigm for Gastrointestinal Procedural Sedation



Lin et al. (2021). American Journal of Gastroenterology, 116.

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## Problem Areas Leading to Catastrophic Outcomes

- ❖ Unnecessary deep sedation ~ not clinically indicated
- ❖ Lack of oversight by anesthesiologists
- ❖ Lack of adherence to societal recommendations/guidelines
- ❖ Lack of proper monitoring ~ ventilation by quantifiable and continuous PetCO<sub>2</sub>

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## Case Study

- ❖ Outpt procedure under moderate sedation
- ❖ 48 yo female, previous failed procedure 2 weeks prior
- ❖ Told MD she was “too awake and in pain”
- ❖ Anesthesia consulted for MAC
- ❖ Day of procedure, MD delayed in clinic-late start
- ❖ Anesthesia no longer available
- ❖ Case performed with MD, administered “deep” sedation

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## Case Study

- ❖ Prone position - lights dimmed
- ❖ RN watched pt movement during procedure to assess RR
- ❖ Near procedure end, sats <<<
- ❖ Pt turned supine- BVM
- ❖ Arrest, code called
- ❖ ROSC
- ❖ Anoxic brain injury- removal from life support

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## Case Study

- ❖ Failure to proceed as planned
- ❖ Failure to monitor
  - ❖ Chest wall impedance is NOT equal to spontaneous RR
    - ❖ Where were the leads placed?
  - ❖ ETCO<sub>2</sub> earlier identification of cessation of RR
- ❖ Provider credentialing for deep sedation?
- ❖ Adherence to policy??

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Analysis of Adverse Events Associated With Adult Moderate Procedural Sedation Outside the Operating Room

Sergey Kanunov, MD,\* Natalia Sarkisian, PhD,† Rebecca Grummer, DMD,\* Wendy L. Gross, MD, MHCN,\* and Richard D. Urman, MD, MBA\*

N=52 (143K)

Patient-related adverse events

- ❖ Oversedation/apnea
- ❖ Hypoxemia
- ❖ Hypotension
- ❖ Pt discomfort
- ❖ Aspiration
- ❖ Cardiac arrest
- ❖ Laryngospasm

Provider-related adverse events

- ❖ Miscommunication
- ❖ Provider not credentialed
- ❖ Incomplete H&P
- ❖ Inappropriate monitoring
- ❖ Inappropriate code status
- ❖ Improper use of propofol

(2017) *Journal Patient Safety*, 13(3), 111-121

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Patient Characteristics

- ❖ BMI
  - ❖ Hypoxemia
  - ❖ Intubation
- ❖ Age
  - ❖ Reversal agents
  - ❖ Oversedation
  - ❖ Hypoxemia
- ❖ Sex
  - ❖ F: oversedation, BVM, reversal agents

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Case Study

- ❖ 70 yo Asian female, scheduled for EGD w/ "MAC"
- ❖ Initial airway assessment OK
- ❖ Induction dose prop, scope advanced
- ❖ Bite block out, scope removed, reinserted
- ❖ Proceduralist having difficulty
- ❖ Anes noted de-sat ~ 10 mins
- ❖ Abort

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Case Study cont.

- ❖ Anes unable to BVM, open mouth
- ❖ Call for help
- ❖ Attending Anes id'ed pt likely unable to intubate- no view, tongue massively swollen
- ❖ "Need surgical airway"
- ❖ 2nd call for help ~ need surgical airway
- ❖ Code called ~ PEA arrest
- ❖ 3 surgeons arrive ~ trach @ bedside ~ ROSC

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Closed Claims Case ~ MAC

- ❖ Anesthesia closed claims cases from ~ 1990-2002
  - ❖ N = 1,952
- ❖ Claims assigned an injury severity score
  - ❖ Temporary-non-disabling
  - ❖ Disabling-permanent
  - ❖ Death
- ❖ MAC cases- 121
  - ❖ Age > 70
  - ❖ ASA 3- ASA 5

Bhananker, S. et al. (2006). Injury & liability associated with monitored anesthesia care. *Anesthesiology*, 104:228-234.

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Closed Claims Case ~ MAC

- ❖ Death and permanent injury common versus temporary injury
  - ❖ Inadequate oxygenation/ventilation
  - ❖ Equipment-related events
  - ❖ Inadequate anesthesia/patient movement
  - ❖ Adverse drug events

Bhananker, S. et al. (2006). Injury & liability associated with monitored anesthesia care. *Anesthesiology*, 104:228-234.

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## Death or Permanent Brain Injury

- ❖ Delay in resuscitation d/t prone position
- ❖ Inattention
- ❖ Case occurring in MRI
- ❖ Poor resuscitation
- ❖ Lack of vigilance / Lack of monitoring
- ❖ Capnography
- ❖ Electrical impedance monitoring
- ❖ Alarms: parameters, audible

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Bhananker, S. et al. (2006). Injury & liability associated with monitored anesthesia care. *Anesthesiology*, 104:228-234.

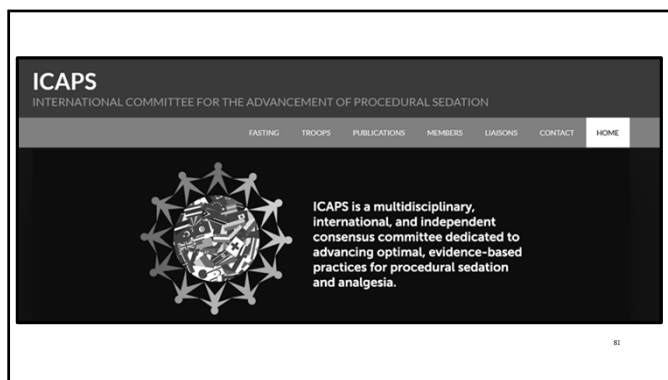
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## Quality Data

- ❖ Adverse events:
  - ❖ De-saturations
  - ❖ Airway rescue
  - ❖ Transfer higher level of care
  - ❖ Cardiac arrest
- ❖ Reversal agents
- ❖ Inadequate sedation
- ❖ Case cancellation

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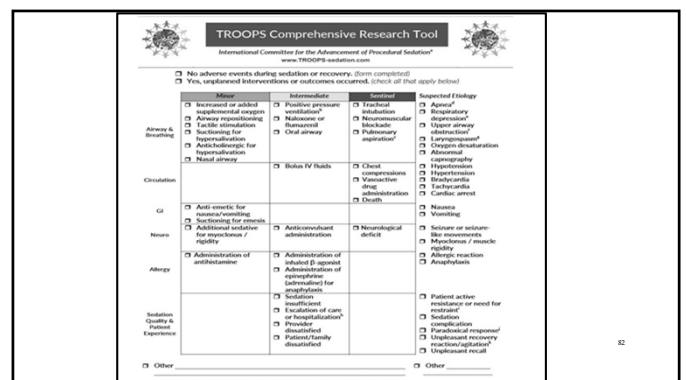


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No adverse events during sedation or recovery. (form completed)  
 Yes, unanticipated interventions or outcomes occurred. (check all that apply below)

	Minor	Intermediate	Severe	Suspected Etiology
Airway / Breathing	<input type="checkbox"/> Increased or altered respiratory effort <input type="checkbox"/> Airway obstruction <input type="checkbox"/> Tachicardia <input type="checkbox"/> Hypoxemia <input type="checkbox"/> Hypertension <input type="checkbox"/> Bradycardia	<input type="checkbox"/> Positive pressure ventilation <input type="checkbox"/> Bag-mask ventilation <input type="checkbox"/> Endotracheal intubation <input type="checkbox"/> Oral airway	<input type="checkbox"/> Tracheal intubation <input type="checkbox"/> Resuscitation <input type="checkbox"/> Hypoxemia <input type="checkbox"/> Hypertension <input type="checkbox"/> Bradycardia <input type="checkbox"/> Cardiac arrest	<input type="checkbox"/> Airway <input type="checkbox"/> Respiratory depression <input type="checkbox"/> Upper airway obstruction <input type="checkbox"/> Laryngospasm <input type="checkbox"/> Airway obstruction
Circulation	<input type="checkbox"/> Tachycardia <input type="checkbox"/> Hypertension <input type="checkbox"/> Bradycardia <input type="checkbox"/> Hypotension	<input type="checkbox"/> Blood IV fluids <input type="checkbox"/> Oxygen administration <input type="checkbox"/> Medication administration	<input type="checkbox"/> Death <input type="checkbox"/> Cardiac arrest	<input type="checkbox"/> Anemia <input type="checkbox"/> Hypertension <input type="checkbox"/> Hypotension <input type="checkbox"/> Bradycardia <input type="checkbox"/> Tachycardia <input type="checkbox"/> Cardiac arrest
GI	<input type="checkbox"/> Anti emetic for nausea/vomiting <input type="checkbox"/> Securing for emesis <input type="checkbox"/> Additional sedation for symptoms / rigidity	<input type="checkbox"/> Anticonvulsant administration <input type="checkbox"/> Administration of analgesic / opioid	<input type="checkbox"/> Death	<input type="checkbox"/> Nausea <input type="checkbox"/> Vomiting <input type="checkbox"/> Seizure or seizure-like movements <input type="checkbox"/> Myoclonus / fasciculation <input type="checkbox"/> Allergic reaction <input type="checkbox"/> Anaphylaxis
Allergy	<input type="checkbox"/> Administration of antihistamine	<input type="checkbox"/> Administration of analgesic / opioid <input type="checkbox"/> Administration of sedative / hypnotic <input type="checkbox"/> Administration of respiratory agent <input type="checkbox"/> Administration of reversal agent		<input type="checkbox"/> Patient active resistance or need for restraint <input type="checkbox"/> Sedation complication <input type="checkbox"/> Paradoxical response <input type="checkbox"/> Unplanned recovery <input type="checkbox"/> Medication / equipment malfunction <input type="checkbox"/> Unplanned recall
Sedation, Quality of Patient Experience		<input type="checkbox"/> Sedation insufficient <input type="checkbox"/> Escalation of care <input type="checkbox"/> Provider disoriented <input type="checkbox"/> Patient/family disoriented		<input type="checkbox"/> Other

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## Final Thoughts

- ❖ PSA not w/o risk ~ ensure patient monitoring
- ❖ Collect outcome data
- ❖ Report adverse events
- ❖ Ensure practice reflects policies
- ❖ Knowledge & skills of nursing staff
  - ❖ Annually!
  - ❖ If NORA, ensure MH, knowledge of anesthetic agents

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THANK YOU!!!

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### Question

Moderate sedation is best defined as:

- a) level of sedation in which the patient responds purposefully to voice or light touch
- b) level of sedation in which the patient responds to noxious stimuli
- c) sedation administered in procedural areas
- d) lightened anesthesia such as when the patient is waking up

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### Question

Monitored anesthesia care is best defined as:

- a) moderate sedation
- b) deep sedation
- c) anesthesia in NORA locations
- d) anesthesia care provided by a qualified anesthesia provider

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### Question

During nurse-administered moderate sedation, the nurse monitoring the patient may:

- a) leave the procedure room to obtain supplies provided that the patient's monitor alarms are audible
- b) assist the proceduralist, provided that any task may be interrupted to care for the patient
- c) shut off the audible physiologic alarms if she remains by the patient's bedside
- d) administer the same sedative medications as an anesthesia provider

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THANK YOU!!!

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