Monitoring Patient Outcome and Safety

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Purposes of Sedation

• Tolerate unpleasant procedures
• Relieve anxiety, discomfort or pain
• Attenuate undesirable autonomic response
• Reduce involuntary movement
• Most complications of sedation are cardiorespiratory
• Degree of sedation may be difficult to ascertain and to control
• Sedation that is too light for the procedure may be no safer than oversedation
• Tachypnea and tachycardia can be very dangerous during a cardiac intervention
# Sedation: A Continuum of States

(American Society of Anaesthesiologists Sedation Guideline)

<table>
<thead>
<tr>
<th></th>
<th>Minimal Sedation</th>
<th>Moderate Sedation/Conscious Sedation</th>
<th>Deep Sedation</th>
<th>General Anaesthesia</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Responsiveness</strong></td>
<td>Normal</td>
<td>Purposeful Response (verbal)</td>
<td>Purposeful Response (pain)</td>
<td>Unarousable</td>
</tr>
<tr>
<td><strong>Airway</strong></td>
<td>Unaffected</td>
<td>No Intervention</td>
<td>May require Intervention</td>
<td>Intervention often required</td>
</tr>
<tr>
<td><strong>Spontaneous ventilation</strong></td>
<td>Unaffected</td>
<td>Adequate</td>
<td>May be Inadequate</td>
<td>Frequently Inadequate</td>
</tr>
<tr>
<td><strong>Cardiovascular function</strong></td>
<td>Unaffected</td>
<td>Usually Maintained</td>
<td>Usually Maintained</td>
<td>May be required</td>
</tr>
</tbody>
</table>
Purposes of Monitoring

- Enhance safety
- Reduce risks
- Patient’s comfort
- Facilitate completion of planned procedures
Causes of Risks

- Due to procedure
- Due to patient’s health status
- Due to sedation medication/ technique
Potential Risks

- Depression of airway reflex
- Loss of airway patency
- Depression of respiration
- Depression of cardiovascular system
- Drug interactions
- Drug adverse reactions including anaphylaxis
• Individual variation in response to drugs
• Possible deeper sedation and/or anaesthesia
• Risks inherent to the procedure
• Unexpected extreme sensitive to drugs, sedation procedure
What should we monitor during sedation procedure?

- Level of consciousness
- Pulmonary ventilation
- Oxygenation
- Hemodynamic
Level of Consciousness

• Reduce risks for moderate and deep sedation
• Patients response to verbal commands must be routine
• Reflex withdrawal from a painful stimulus: a state of general anaesthesia
• Loss of patient response to verbal commands
  – Loss of airway reflex
  – Respiratory depression
  – Cardiovascular depression
## Observer’s Assessment of Alertness/Sedation (OAA/S) Scale

<table>
<thead>
<tr>
<th>Score</th>
<th>Responsiveness</th>
<th>Speech</th>
<th>Facial expression</th>
<th>Eyes</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>Readily to normal tone</td>
<td>normal</td>
<td>normal</td>
<td>No ptosis</td>
</tr>
<tr>
<td>4</td>
<td>Lethargic to normal tone</td>
<td>Mild slurring</td>
<td>Mild relaxation</td>
<td>Glazed or mild ptosis</td>
</tr>
<tr>
<td>3</td>
<td>Responds only after loud/repeated calling</td>
<td>slurring</td>
<td>Marked relaxation</td>
<td>Glazed and marked ptosis</td>
</tr>
<tr>
<td>2</td>
<td>Responds only after mild prodding or shaking</td>
<td>Few recognized words</td>
<td>Marked relaxation</td>
<td>Glazed and marked ptosis</td>
</tr>
<tr>
<td>1</td>
<td>No response to mild prodding or shaking</td>
<td>No words</td>
<td>Marked relaxation</td>
<td>Glazed and marked ptosis</td>
</tr>
</tbody>
</table>
Ramsay Sedation Score (RSS)

- Patient is anxious and agitated or restless, or both
- Patient is co-operative, oriented, and tranquil
- Patient responds to commands only
- Patient exhibits brisk response to light glabellar tap or loud auditory stimulus
- Patient exhibits a sluggish response to light glabellar tap or loud auditory stimulus
- Patient exhibits no response
Pulmonary Ventilation

• Drug induced respiratory depression and airway obstruction: **Primary causes of morbidity**
• Observation or auscultation: reduce risks
• Capnography (especially for deep sedation)
• Oxygenation monitoring: not a substitute
Oxygenation

• Oximetry: effectively detect oxygen desaturation and hypoxia
• Decrease the likelihood of adverse outcomes such as cardiac arrest and death
• Monitor with pulse oximetry continuously with appropriate alarm
Hemodynamic

- Sedative or analgesic: may blunt the appropriate autonomic response
- Too light sedation: may develop harmful autonomic stress response such as hypertension and tachycardia
• Early detection change in heart rate and blood pressure crucial
• Electrocardiography (ECG): reduce risks
• ECG should be used for patients with cardiovascular disease during conscious and deep sedation
• Blood pressure should be determined before sedation procedure
• Once sedation/analgesia is stabilized, blood pressure should be taken at least every 5 minutes during procedure
• Invasive blood pressure may be considered for patients with significant cardiovascular disease
Recording of Monitored Parameters

• Frequency of recording: depends on:
  – Type and amount of medications
  – Length of procedure
  – General condition of the patient
• Minimum:
  – Before the beginning of the sedation
  – After administration of sedative medication
  – Regular interval during the procedure
  – During the initial recovery
  – Before discharge
• Alarm set to alert the care team to critical changes in patient status
Individual Responsible for Patient Monitoring

• A designated individual other than the person performing the procedure to monitor the patient’s status

• Especially for moderate and deep sedation
• The designated individual
  – Should have no other responsibility during deep sedation
  – During moderate sedation, this individual may help for minor, interruptible tasks if the sedation level and vital signs are stable, with continuous adequate monitoring
References:

3. Australian and New Zealand College of Anaesthetists. Guidelines on Sedation and/or Analgesia for Diagnostic and Interventional Medical or Surgical Procedures.
4. The Hong Kong College of Anaesthesiologists. Guidelines on Sedation.
I wish you wouldn't bring your work home with you!!