### PRINCIPAL INFORMATION ON SELECTED MEDICATIONS

#### Sedatives

**Midazolam (Versed™)**  
[Benzodiazepine]; Sedative, Amnestic  

**Onset:** 1 - 2 minutes  
**Duration:** 30 minutes to 2 hours  
**Elimination route:** Hepatic  
**Dose:** 1 - 2 mg bolus IV initially. Additional doses of 1 - 2 mg can be given at 2 to 5 minute intervals to desired level of sedation.  
**Light sedation dose:** 0.075 mg/kg (about 5 mg / 70 kg patient)  
**Induction of Anesthesia:** 0.2 – 0.3 mg/kg  
**Dose adjustment:** Doses must be reduced in the elderly (> 60 y.o.), debilitated patients, and chronically ill patients. Patients who receive concomitant opioids must have the dose reduced by 30-50%  
**Adverse effects:** Respiratory depression (decreased tidal volume and respiratory rate)  
Respiratory arrest  
Hypotension  
Tachycardia  
Inability to maintain airway  

**Diazepam (Valium™)**  
[Benzodiazepine]; Sedative, Amnestic  

**Onset:** 1 - 2 minutes  
**Duration:** 2 - 4 hours  
**Elimination route:** Hepatic  
**Concerns:** Irritating to veins  
**Dose:** 1 - 2 mg slow IV bolus; may repeat at 2 - 5 minute intervals until desired level of sedation is achieved  
**Adverse effects:** Respiratory depression (decreased tidal volume and respiratory rate)  
Respiratory arrest  
Hypotension  
Tachycardia  
Inability to maintain airway  

**Lorazepam (Ativan™)**  
[Benzodiazepine]; Sedative, Amnestic  

**Onset:** 20 - 40 minutes  
**Duration:** 4 - 6 hours  
**Elimination route:** Hepatic  
**Notes:** Fewer cardiovascular effects than diazepam  
Less irritating to veins  
Half-life is less variable  
No active metabolites  
**Concerns:** Slow onset  
Duration can become elimination dependent  
Accumulation can occur  
**Dose:** 2 - 4 mg IV bolus;  
Wait at least 30 minutes to assess the effect before giving additional doses
Conscious Sedation Course  
Department of Anesthesia & Critical Care, St. Louis University

Adverse effects:  
- Respiratory depression (decreased tidal volume and respiratory rate)  
- Apnea  
- Respiratory arrest  
- Inability to maintain airway

Flumazenil (Romazicon) Benzodiazepine Antagonist

<table>
<thead>
<tr>
<th>Onset</th>
<th>1 - 2 minutes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duration</td>
<td>30 - 60 minutes</td>
</tr>
<tr>
<td>Elimination route</td>
<td>Hepatic</td>
</tr>
<tr>
<td>Concerns</td>
<td>Administration of an antagonist is not a substitute for appropriate monitoring. Patients must be monitored for at least one hour after administration of flumazenil due to the risk of re-sedation occurring 30 - 60 minutes after the dose. Patients must be monitored for ONE HOUR if flumazenil is used as reversal due to the risk of re-sedation. The availability of this drug is not an excuse for over sedation</td>
</tr>
<tr>
<td>Dose</td>
<td>0.2 mg IV every minute until sedation is reversed; most patients do not require more than 1 mg for reversal after sedation; effective dose may need to be repeated if re-sedation occurs</td>
</tr>
<tr>
<td>Adverse effects</td>
<td>Seizures, agitation, emotional liability; Arrhythmia, tachycardia, angina</td>
</tr>
</tbody>
</table>

Narcotics

**Fentanyl (Sublimaze)**  
Narcotic analgesic

<table>
<thead>
<tr>
<th>Onset</th>
<th>1 - 2 minutes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duration</td>
<td>30 - 45 minutes (Single dose, distribution limited)</td>
</tr>
<tr>
<td>Elimination route</td>
<td>Hepatic (Inactive metabolites)</td>
</tr>
</tbody>
</table>
| Notes           | Rapid onset sedative and analgesic effect  
Synergy with benzodiazepines. Minimal histamine release  
Equianalgesic dose: Fentanyl 100 mcg = 10 mg morphine= meperidine 75 mg |
| Concerns        | Tolerance develops  
Accumulates over time |
| Dose            | 25 - 50 mcg initially (1 -2 ug/kg), IV bolus. Additional doses  
25 - 50 ug may be given at 5 - 10 min intervals |
| Adverse effects | Respiratory depression(decreased tidal vol & respiratory rate)  
Apnea / Respiratory arrest  
Inability to maintain airway |

**Meperidine (Demerol)**  
Narcotic analgesic

<table>
<thead>
<tr>
<th>Onset</th>
<th>10 - 20 minutes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duration</td>
<td>2 - 4 hours</td>
</tr>
<tr>
<td>Elimination route</td>
<td>Hepatic / renal</td>
</tr>
</tbody>
</table>
| Notes           | May produce less intense smooth muscle spasm.  
Equianalgesic dose: fentanyl 100 mcg = meperidine 75 mg =10 mg morphine |
| Dose            | 25 - 50 mg IV bolus.  
Additional doses may be given at 15 - 20 minute intervals |
| Adverse effects | Respiratory depression (decreased tidal volume and respiratory rate)  
Apnea  
Respiratory arrest  
Seizure (due to the metabolite normeperidine)  
Inability to maintain airway |
| Drug interaction | Monoamine oxidase inhibitors - do not give meperidine |
### Morphine

<table>
<thead>
<tr>
<th>Feature</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Onset</strong></td>
<td>10 - 20 minutes</td>
</tr>
<tr>
<td><strong>Duration</strong></td>
<td>2 - 4 hours</td>
</tr>
<tr>
<td><strong>Elimination route</strong></td>
<td>Hepatic</td>
</tr>
<tr>
<td><strong>Concerns</strong></td>
<td>Hypotension due to histamine release (especially with rapid IV administration) May accumulate Tolerance develops Decreases GI motility</td>
</tr>
<tr>
<td><strong>Dose</strong></td>
<td>2 - 4 mg IV bolus. Additional doses may be given at 15 - 20 minute intervals</td>
</tr>
<tr>
<td><strong>Adverse effects</strong></td>
<td>Hypotension due to histamine release Respiratory depression Apnea Respiratory arrest Nausea/vomiting Inability to maintain airway</td>
</tr>
</tbody>
</table>

### Naloxone (Narcan)

<table>
<thead>
<tr>
<th>Feature</th>
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</thead>
<tbody>
<tr>
<td><strong>Onset</strong></td>
<td>1 - 2 minutes</td>
</tr>
<tr>
<td><strong>Duration</strong></td>
<td>45 minutes</td>
</tr>
<tr>
<td><strong>Elimination route</strong></td>
<td>Hepatic</td>
</tr>
<tr>
<td><strong>Concerns</strong></td>
<td>The effects of the opiates can recur 30 - 60 minutes after naloxone administration because of the short half-life of the antagonist. Patients must be monitored at least 1 HOUR after reversal to detect possible reaction.</td>
</tr>
<tr>
<td><strong>Dose</strong></td>
<td>0.4 mg IV bolus; may repeat at 2 minute intervals until opiate effects are reversed; most do not need more than 0.8 mg to reverse the opioid effects during sedation</td>
</tr>
<tr>
<td><strong>Adverse effects</strong></td>
<td>Tremulousness, reversal of analgesia seizures, agitation; Arrhythmia, tachycardia, hypotension, angina; pulmonary edema Nausea/vomiting Sweating</td>
</tr>
</tbody>
</table>