Education Guidelines for Medications used during Sedation (Adults)

Drug	Dose	Onset/ Duration	Use	Precautions	Adverse Reactions	Contraindications	Nursing Concerns
BENZODIAZEPINES							
Midazolam (Versed)	**Titrate dose to desired effect.** **≤ 60 y.o.** **IV**: 0.01-0.035 mg/kg **Initial Dose**: 1mg administered over at least 2 min., titrated slowly in incremental doses to desired effect. **Incremental Dose**: 25% of initial dose given 2 or more mins. following previous dose. (Tot. dose = ≤ 10mg) (Max. single dose: 2mg) **IM**: 0.002-0.06 mg/kg **> 60 y.o.** **IV**: 0.01-0.035 mg/kg **Initial Dose**: 0.5mg administered over at least 2 min., titrated slowly in incremental doses to desired effect. **Incremental Dose**: 25% of initial dose given 2 or more mins. following previous dose. (Tot. dose = ≤ 3.5mg) (Max. single dose: 1mg) **IM**: 0.002-0.06 mg/kg	Onset: IV: 1-3min. IM: 15-30min. Duration: IV: 2-4hrs. IM: 3-4hrs. $T_{1/2}$: 2-4 hrs. (↑ in cirrhosis, CHF & elderly)	- Sedative/amnestic - Relieves tension & anxiety	Renal - If Cl_{cr} < 10ml/min. ↓ dose by 50% Elderly - Titrate slowly with small initial dose *Prolonged elimination half-life seen in elderly, obese, CHF patients, ESRD patients, and critically ill Drug Interactions - May produce ↑ sedation or CNS effects when used in combo with narcotics or barbiturates - When used with narcotics, ↓ narcotic dose by ½	Venous thrombosis, thrombophlebitis, respiratory depression, paradoxical excitation, hypotension, delirium, amnesia, laryngospasm, cardiac dysrhythmias, anaphylaxis, hypoventilation, over-sedation	- Patients with known hypersensitivity. - Patients with acute narrow and open angle glaucoma who are not under treatment	- 3-4x as potent as Diazepam - Wait 2 minutes between doses to evaluate sedative effects IV Administration rate: Inject slowly over 2-3 min. **Reversal Agent: Flumazenil** (See Below for Flumazenil information)
Diazepam (Valium)	**Titrate dose to desired effect.** **IV**: 0.03–0.08 mg/kg **PO**: 0.05-0.15 mg/kg (Max. single IV dose: 5mg) (Total dose ≤ 20mg)	Onset: IV: 1-3min. PO: 20-60min. Duration: IV: 2-6hrs. PO: 3-10hrs. (longer with chronic dosing) $T_{1/2}$: Parent Drug: 20-50 hrs. Active Metabolite: 50-100 hrs.	- Alternative agent for sedation - Relieves tension & anxiety	Renal - No dosing adjustment needed, but may accumulate in RF Hepatic - Reduce dose by 50% in hepatic failure Elderly - Not Recommended Drug Interactions - May produce hypotension, ↑ sedation or CNS effects when used in combo with narcotics or barbiturates - When used with narcotics, ↓ narcotic dose by ½	Venous thrombosis, thrombophlebitis, respiratory depression, paradoxical excitation, hypotension, delirium, over-sedation, laryngospasm, hypoventilation	- Patients with known hypersensitivity. - Patients with acute narrow and open angle glaucoma who are not under treatment	- Inject drug into large vein when possible due to thrombophlebitis or increase IV infusion rate to facilitate dilution of drug before it enters the vein. - Diazepam has an active metabolite (desmethyl-diazepam) with a long half-life IV Administration rate: 5mg/min. **Reversal Agent: Flumazenil** (See Below for Flumazenil information)

Lorazepam (Ativan)	**Titrate dose to desired effect.** **IV**: 0.01-0.05 mg/kg **IM**: 0.01-0.05 mg/kg (Max. single IV dose: 2mg)	Onset: IV: 3-7min. IM: 15-30min. Duration: IV: 4-8hrs. IM: 6-10hrs. $T_{1/2}$: 10-15 hrs. *Half-life extends to 30-70 hrs. in ESRD (renal dz.)	- Sedative/amnestic - Relieves tension & anxiety	Renal - No adjustment needed Hepatic - May have longer half-life and duration of action Elderly - Use lower doses Drug Interactions - May produce ↑ sedation or CNS effects when used in combo with narcotics or barbiturates - When used with narcotics, ↓ narcotic dose by ½	Hypotension, respiratory depression, pain on injection for peripheral infusion, drowsiness, dizziness, amnesia, hypoventilation, over-sedation	- Patients with known hypersensitivity. - Patients with acute narrow and open angle glaucoma who are not under treatment	- Must be diluted & refrigerated - Dilute with an equal volume of compatible solution (Sterile Water for Inj., Sodium Chloride Inj. or 5% Dextrose Injection) IV Administration rate: Inject over 1-2 min. (Do not exceed 2mg/min) **Reversal Agent: Flumazenil** (See Below for Flumazenil information)

Drug	Dose	Onset/ Duration	Use	Precautions	Adverse Reactions	Contraindications	Nursing Concerns
OPIOIDS							
Fentanyl (Sublimaze)	**Titrate dose to desired effect.** **IV**: 0.5 - 1mcg/kg/dose Initial Dose: 25-50mcg IV administered at 3-5 min. intervals. (Tot. dose = ≤ 2mcg/kg) **IM**: 1 - 2mcg/kg/dose	Onset: IV: 1 - 3 min. IM: 7 - 15 min. Duration: IV: 0.5 - 1 hrs.* IM: 1 - 2 hrs. *Duration of action may be longer in elderly pts. or pts. with severe renal or hepatic failure $T_{1/2}$: 2-4 hrs.	- Relieves pain - Relieves tension & anxiety	Renal Cl_{cr} =10-50ml/min: 75% norm. dose Cl_{cr} < 10ml/min: 50% norm. dose Hepatic **Fentanyl is contraindicated in patients with hepatic failure.** Can accumulate in chronic liver disease. Elderly - Use lower doses. May be twice as sensitive as younger pts. to effects of fentanyl. Drug Interactions - May cause cardiovascular instability when used with droperidol. - CNS depressants, phenothiazines, TCA's, and MAO Inhibitors may potentiate the effects of fentanyl.	Dizziness, N&V, diaphoresis, respiratory depression, apnea, chest wall rigidity with rapid push, bradyarrhythmias, hypotension, laryngospasm	- Patients with known hypersensitivity. - Patients with increased intracranial pressure, hepatic failure, severe renal failure, or respiratory depression	- Respiratory depressant effects may last longer than analgesic effects - Potent Narcotic: 0.1mg fentanyl = 10mg morphine = 75mg meperidine IV Administration rate: Inject over 1 min. **Reversal Agent: Naloxone** (See Below for Naloxone information)
Morphine	**Titrate dose to the needs of patient.** **IV**: 0.05-0.1 mg/kg Incremental Dose: Increase dose by 1-2mg increments (Total dose = ≤ 10mg) **IM**: 2-15 mg	Onset: IV: 1-5min. IM: 30min. Duration: IV: 4-5hrs. IM: 4-5hrs. $T_{1/2}$: 2-4 hrs.	- Narcotic analgesic - Relieves tension & anxiety	Renal Cl_{cr}=10-50ml/min: 75% norm. dose Cl_{cr} < 10ml/min: 50% norm. dose Hepatic - excessive sedation may occur in severe disease (cirrhosis) Elderly - Use lower doses Drug Interactions - MAO Inhibitors and phenothiazines potentiate the effects of morphine	Confusion, dizziness, dysphoria, diaphoresis, N&V, Constipation, flushing, respiratory depression, hypotension, bradycardia, histamine release	- Patients with known hypersensitivity - Patients with severe respiratory depression or increased intracranial pressure	- Some preparations may contain sulfites which can cause allergic-type reactions in sulfite sensitive patients Administration rate: Inject over 2 min. (Best to dilute in 4-5ml of sterile water and administer slowly) **Reversal Agent: Naloxone** (See Below for Naloxone information)

Hydro-morphone (Dilaudid)	**Titrate dose to the needs of patient.** **IV**: 0.5-2mg **IM**: 0.5-4mg	Onset: IV: 4-5min. IM: 15-30min. Duration: IV: 3-4hrs. IM: 4-6hrs. $T_{1/2}$: 1-3 hrs.	- Narcotic analgesic - Relieves tension & anxiety	Hepatic - Consider dose reduction. Elderly - Use lower doses. Drug Interactions - CNS depressants, phenothiazines, and TCA's may potentiate the effects of hydromorphone.	Respiratory depression, histamine release, hallucinations, may slow/impair GI/GU functions, meiosis, hypotension, N&V, dizziness	- Patients with known hypersensitivity - Patients with severe hepatic or renal failure	- Avoid confusing highly concentrated injection with less concentrated injectable product - 1mg hydromorphone ≈ 3 - 5mg morphine IV Administration rate: Inject slowly over 2-3 min. **Reversal Agent: Naloxone** (See Below for Naloxone information)
Meperidine (Demerol)	**Titrate dose to the needs of patient.** **IV**: 0.5-1mg/kg Max. redose = 25mg up to 50mg total **IM**: 25-100mg IM doses should be given 30-90 min. prior to procedure	Onset: IV: 1-5min. IM: 15-30min. Duration: IV: 2-4hrs. IM: 3-4hrs. $T_{1/2}$: Parent drug: 2.5-4hrs. Active Metabolite: 15-30 hrs. (↑ in liver disease & elderly)	- Narcotic analgesic - Relieves tension & anxiety	Renal Cl_{cr}=10-50ml/min: 50% norm. dose Cl_{cr} < 10ml/min: do not use Hepatic Increased narcotic effect in cirrhosis; reduction in dose more important in oral vs. parenteral Elderly - Use 50% lower doses Drug Interactions - Phenytoin may decrease the analgesic effects - MAO Inhibitors, SSRI's, TCA's, and phenothiazines potentiate the effects of meperidine	Respiratory depression/arrest, shock, N&V, facial flushing, tachycardia, bradycardia, palpitations, hypotension, syncope	- Patients with known hypersensitivity - Patients with severe hepatic or renal failure - Patients who are taking or recently have been on MAO Inhibitors	Should not be used in renal failure; Active metabolite (Normeperidine) can accumulate in renal failure. This can ↑ potential for CNS side effects, tremors and seizures. IV Administration rate: Inject slowly over 2-3 min. (use 10mg/ml conc. for IV use) **Reversal Agent: Naloxone** (See Below for Naloxone information)

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REVERSAL/RESCUE AGENTS							
Naloxone (Narcan)	**IV**: 0.4 - 2mg (If no improvement, may repeat every 2-3min. up to a total of 6mg) (May need to repeat doses every 20-60min.) (If no response is observed after 6mg, question the diagnosis)	Onset: IV: Within 2 mins. Duration: IV: ≈ 1hr. (Dose dependent)	Narcotic antagonist	Use with caution in opioid dependent patients and in patients with existing cardiac disease	Excitement, N&V, sweating, tachycardia, hypotension, seizures, ventricular arrhythmias, pulmonary edema	- Patients with known hypersensitivity - Patients with known opioid dependency	- Have other emergency equipment readily available -Duration of opioids may exceed that of naloxone -Patients must be monitored for 120 minutes after administration of Narcan
Flumazenil (Romazicon)	**IV**: 0.1 - 0.2mg over 15sec. (Can be repeated every 1	Onset: IV: 1-2 min	Benzodiazepine antagonist	Hepatic - give same initial dose and decrease each subsequent dose by	Flushing, N&V, diaphoresis,	- Patients with known hypersensitivity to	- Re-sedation can occur; flumazenil has a short half-life

	min., up to a total of 1mg) If resedation occurs: repeat dosing of 0.2mg at 20min. intervals Total dose should not exceed 3mg in 1 hour.	(Peaks in 6-10mins.) Duration: IV: 30-60min.		50% Patients with known alcohol or drug dependency. Decreases effect of epinephrine and dopamine.	nervousness, blurred vision, confusion, arrhythmias, may precipitate withdrawal seizures	flumazenil or benzodiazepines - Patients who take benzodiazepines for life-threatening conditions (i.e. status epilepticus) - Patients with suspected TCA overdose	and may require re-dosing -Patients must be monitored for 120 minutes after administration of Romazicon - Flumazenil does not consistently reverse amnesia effects - Does not reverse the respiratory depression of benzodiazepine/narcotic combination

SSRI's = Selective Serotonin Reuptake Inhibitor
TCA's = Tricyclic Antidepressants
Cl_{cr} = Creatinine Clearance

Intravenous Sedative Agents Reference (Adults)

DRUG	ONSET / PEAK EFFECT	DURATION	DOSAGE	HALF-LIFE
Diazepam (IV)	1 - 3 min. / 3 - 5 min.	2 - 6 hrs.	0.03 - 0.08 mg/kg	Parent Drug: 20 - 50 hrs. Active Metabolite: 50 - 100 hrs.
Lorazepam (IV)	3 - 7 min. / 15 - 20 min.	4 - 8 hrs.	0.01 - 0.05 mg/kg	10 - 15 hrs. ESRD: 30 - 70 hrs.
Midazolam (IV)	1 - 3 min. / 3 - 5 min.	2 - 6 hrs.	0.01 - 0.035 mg/kg	2 - 4 hrs. ↑ in cirrhosis, CHF & elderly
Fentanyl (IV)	1 - 3 min. / 5 - 8 min.	0.5 - 1 hr.	0.5 - 1mcg/kg/dose	2 - 4 hrs.
Hydromorphone (IV)	4 - 5 min. / 30 - 60 min.	3 - 4 hrs.	0.5 - 2 mg	1 - 3 hrs.
Meperidine (IV)	1 - 5 min. / 15 - 20 min.	2 - 4 hrs.	0.5 - 1 mg/kg	Parent Drug: 2.5 - 4 hrs. Active metabolite: 15 - 30 hrs. ↑ in liver disease & elderly
Morphine (IV)	1 - 5 min. / 15 - 20 min.	4 - 5 hrs.	0.05 - 0.1 mg/kg	2 - 4 hrs.