Flumazenil (flu-ma-z-e-nil)

- Indications
  Complete/partial reversal of effects of benzodiazepines used as general anesthetics, or during diagnostic or therapeutic procedures. Management of intentional or accidental overdose of benzodiazepines.

- Action
  Flumazenil is a benzodiazepine derivative that antagonizes the CNS depressant effects of benzodiazepine compounds. It has no effect on CNS depression from other causes, including opioids, alcohol, barbiturates, or general anesthetics. Therapeutic Effects: Reversal of benzodiazepine effects.

- Pharmacokinetics
  Absorption: IV administration results in complete bioavailability.
  Distribution: Unknown.
  Protein Binding: 50% primarily to albumin.
  Metabolism and Excretion: Metabolism of flumazenil occurs primarily in the liver.
  Half-life: Children: 20–75 min; Adults: 41–79 min.

- Contraindications/Precautions
  Contraindicated in: Hypersensitivity to flumazenil or benzodiazepines; Patients receiving benzodiazepines for life-threatening medical problems, including status epilepticus or intracranial pressure; Serious cyclic antidepressant overdosage.
  Use Cautiously in: Mixed CNS depressant overdose (effects of other agents may emerge when benzodiazepine effect is removed); History of seizures (seizures are more likely to occur in patients who are experiencing sedative/hypnotic withdrawal, who have recently received repeated doses of benzodiazepines, or who have a prior history of seizure activity); Head injury (may worsen intracranial pressure and risk of seizures); Severe hepatic impairment; OB, Lactation: Safety not established; Pedi: Children <1 yr (safety not established).

- Adverse Reactions/Side Effects

- Drug-Drug: None significant.

- Route/Dosage
  Reversal of Conscious Sedation or General Anesthesia
  IV (Adults): 0.2 mg. Additional doses may be given at 1-min intervals until desired results are obtained, up to a total dose of 1 mg. If resedation occurs, regimen may be repeated at 20-cm intervals, not to exceed 3 mg/hr.
  IV (Children): 0.01 mg/kg (up to 0.2 mg). If the desired level of consciousness is not obtained after repeating an additional 0.1 mg, further increments of 0.01 mg/kg (up to 0.2 mg) can be administered and repeated at 60-sec intervals when necessary (up to a maximum of additional 4 times) to a maximum total dose of 0.05 mg/kg or 1 mg, whichever is lower. The dose should be individualized based on the patient's response.

  Suspected Benzodiazepine Overdose
  IV (Adults): 0.2 mg. Additional 0.3 mg may be given 30 sec later. Further doses of 0.5 mg may be given at 4-min intervals, if necessary, to a total dose of 3 mg. Usual dose required is 1–3 mg. If resedation occurs, additional doses of 0.5 mg every 2 min may be given at 20-min intervals (given no more than 1 mg at a time, not to exceed 3 mg/hr).
  IV (Children): 0.01 mg/kg (maximum dose 0.2 mg) with repeat doses every minute up to a cumulative dose of 1 mg. In an alternative regimen, continuous infusions of 0.005–0.01 mg/kg/hr have been used.
NURSING IMPLICATIONS

Assessment
- Assess level of consciousness and respiratory status before and during therapy. (Observe patient for at least 2 hr after administration for the appearance of resolution. Hypoventilation may occur)
- Overdose: Attempt to determine time of ingestion and amount and type of benzodiazepine taken. Knowledge of agent ingested allows an estimate of duration of CNS depression.

Potential Nursing Diagnoses
Risk for injury (Indications)
Risk for poisoning (Indications)

Implementation
- Do not confuse flumazenil with influenza virus vaccine.
- Ensure that patient has a patent airway before administration of flumazenil.
- Observe IV site frequently for redness or irritation. Administer through a free-flowing IV infusion into a large vein to minimize pain at the injection site.
- Optimal emergence should be undertaken slowly to decrease undesirable effects including confusion, agitation, emotional lability, and perceptual distortion.
- Institute seizure precautions. Seizures are more likely to occur in patients who are experiencing sedative/hypnotic withdrawal, patients who have recently received repeated doses of benzodiazepines, or those who have a previous history of seizure activity. Seizures may be treated with benzodiazepines, barbiturates, or phenytoin. Larger than normal doses of benzodiazepines may be required.
- Suspected Benzodiazepine Overdose: If no effects are seen after administration of flumazenil, consider other causes of decreased level of consciousness (alcohol, barbiturates, opioid analgesics).

IV Administration
- pH: 4.0
- Direct IV: Dilution: May be administered undiluted or diluted in syringe with D5W, 0.9% NaCl, or LR. Diluted solution should be discarded after 24 hr.

Concentration: Up to 0.1 mg/mL.
Rate: Administer each dose over 15–30 sec into free-flowing IV in a large vein. Do not exceed 0.2 mg/min in children or 0.5 mg/min in adults.

Patient/Family Teaching
- Flumazenil does not consistently reverse the amnestic effects of benzodiazepines. Provide patient and family with written instructions for postprocedure care. Inform family that patient may appear alert at the time of discharge but the sedative effects of the benzodiazepine may occur. Instruct patient to avoid driving or other activities requiring alertness for at least 2–6 hr after discharge.
- Instruct patient not to take any alcohol or nonprescription drugs for at least 18–24 hr after discharge.
- Resumption of usual activities should occur only when no residual effects of the benzodiazepine remain.

Evaluation/Desired Outcomes
- Improved level of consciousness.
- Decrease in respiratory depression caused by benzodiazepine. Why was this drug prescribed for your patient?