glucagon (gloo-ka-gon)
(GlucaGen)

**Classification:** Therapeutic: Oxytremes Pharmacologic: Pancreatices

**Pregnancy Category B**

**Indications**
Acute management of severe hypoglycemia when administration of glucose is not feasible. Facilitation of radiographic examination of the GI tract. **Unlabeled Use:** Antidote to: Beta blockers, Calcium channel blockers.

**Action**
Stimulates hepatic production of glucose from glycogen stores (glycogenolysis). Relaxes the musculature of the GI tract (stomach, duodenum, small bowel, and colon), temporarily inhibiting movement. Has positive inotropic and chronotropic effects.

**Therapeutic Effects:** Increase in blood glucose. Relaxation of GI musculature, facilitating radiographic examination.

**Pharmacokinetics**
- **Absorption:** Well absorbed following IM and subcut administration.
- **Distribution:** Unknown.
- **Metabolism and Excretion:** Extensively metabolized by the liver, plasma, and kidneys.
- **Half-life:** 8–18 min.

**TIME/ACTION PROFILE**
- **ROUTE**
  - **ONSET**
    - **PEAK**
    - **DURATION**
  - **IM (hyperglycemic action)** within 10 min 30 min 12–27 min
  - **IV (hyperglycemic action)** 1 min 5 min 9–17 min
  - **Subcut (hyperglycemic action)** within 10 min 30–45 min 60–90 min
  - **IV (effect on GI musculature)** 45 sec (for 0.25–2-mg dose) unknown 9–17 min (0.25–0.5-mg dose); 22–25 min (2-mg dose)
  - **IM (effect on GI musculature)** 8–10 min (1-mg dose); 4–7 min (2-mg dose) unknown 9–27 min (1-mg dose); 21–42 min (2-mg dose)

**Contraindications/Precautions**
- Contraindicated in: Hypersensitivity; Pheochromocytoma; Some products contain glycerin and phenol—avoid use in patients with hypersensitivities to these ingredients.
- Use Cautiously in: History suggestive of insulinoma or pheochromocytoma; Prolonged fasting, starvation, adrenal insufficiency or chronic hypoglycemia (low levels of releasable glucose); When used to inhibit GI motility, use cautiously in geriatric patients with cardiac disease or diabetics; OB: Should be used during pregnancy only if clearly needed. Lactation: Safety not established.

**Adverse Reactions/Side Effects**
- **CV:** Hypotension.
- **GI:** Nausea, vomiting.
- **Misc:** Hypersensitivity reactions including anaphylaxis.

**Interactions**
- **Drug-Drug:** Large doses may enhance the effect of warfarin. Negate the response to insulin or oral hypoglycemic agents. Phenobarbital inhibits the stimulant effect of glucagon on insulin release. Hyperglycemic effect is intensified and prolonged by epinephrine. Patients on concurrent beta blocker therapy may have a greater increase in heart rate and BP.

**Route/Dosage**
- **Hypoglycemia**
  - **IV, IM, Subcut (Adults and Children >20 kg):** 1 mg; may be repeated in 15 min if necessary.
  - **IV, IM, Subcut (Children <20 kg):** 0.5 mg or 0.02–0.03 mg/kg; may be repeated in 15 min if necessary.

- **Radiographic Examination of the GI Tract**
  - **IM, IV (Adults):** 0.25–2 mg; depending on location and duration of examination (0.5 mg IV or 2 mg IM for relaxation of stomach; for examination of the colon 2 mg IM 10 min before procedure).

**Antidote (unlabeled)**
- **IV (Adults):** To beta blockers — 50–150 mcg (0.05–0.15 mg/kg), followed by 1–5 mcg/min infusion. To calcium channel blockers — 2 mg, additional doses determined by response.

**Radiographic Examination of the GI Tract**
- **IM, IV (Adults):** 0.25–1 mg; depending on location and duration of examination (0.5 mg IV or 2 mg IM for relaxation of stomach; for examination of the colon 2 mg IM 10 min before procedure).

**Antidote (unlabeled)**
- **IV (Adults):** To beta blockers — 50–150 mcg (0.05–0.15 mg/kg), followed by 1–5 mcg/min infusion. To calcium channel blockers — 2 mg, additional doses determined by response.
NURSING IMPLICATIONS

Assessment
- Assess for signs of hypoglycemia (sweating, hunger, weakness, headache, dizziness, tremor, irritability, nausea) prior to and periodically during therapy.
- Assess neurologic status throughout therapy. Institute safety precautions to protect patient from injury caused by seizures, falling, or aspiration. For insulin shock therapy, 0.5–1 mg is administered after 1 hr. Initial dose may be repeated in 10–25 min. If no response occurs, repeat the dose. Feed patient supplemental carbohydrates orally to replenish liver glycogen and prevent secondary hypoglycemia as soon as possible after awakening, especially pediatric patients.
- Assess nutritional status. Patients who lack liver glycogen stores (starvation, chronic hypoglycemia, adrenal insufficiency) will require glucose instead of glucagon.
- Assess for nausea and vomiting after administration of dose. Protect patients with depressed level of consciousness from aspiration by positioning on side; ensure that a suction unit is available. Notify health care professional if vomiting occurs; patient will require parenteral glucose to prevent recurrent hypoglycemia.
- Lab Test Considerations: Monitor serum glucose levels throughout episode, during treatment, and for 3–4 hr after patient regains consciousness. Use of bedside fingerstick blood glucose determination methods is recommended for rapid results. Follow-up lab results may be ordered to validate fingerstick values, but do not delay treatment while awaiting lab results, as this could result in neurologic injury or death.
- Large doses of glucagon may cause a fall in serum potassium concentrations.

Potential Nursing Diagnoses
Risk for injury (Indications)
Noncompliance (Patient/Family Teaching)

Implementation
- May be given subcut, IM, or IV. Reconstitute with diluent supplied in kit by manufacturer. Inspect solution prior to use; use only clear, water-like solution. Solution is stable for 48 hr if refrigerated, 24 hr at room temperature. Unmixed medication should be stored at room temperature.
- Administer supplemental carbohydrates IV or orally to facilitate increase of serum glucose levels.

IV Administration
- Dilute: 0.5–1 mg/mL
- Direct IV: Diluent: Reconstitute each vial with 1 mL of an appropriate diluent. For doses <2 mg, use diluent provided by manufacturer. For doses ≥2 mg, use sterile water for injection instead of diluent supplied by manufacturer to minimize risk of thrombophlebitis, CNS toxicity, and adverse reactions from phenol preservative in diluent supplied by manufacturer. Reconstituted vials should be used immediately. Concentration: Not exceed 1 mg/mL. Rate: Administer at a rate not exceeding 1 mg/min. May be administered through IV line containing D5W.
- Continuous Infusion: Diluent: Reconstitute vials as per directions above (see Route/Dosage section). Further dilute 10 mg of glucagon in 100 mL of D5W. Concentration: 0.1 mg/mL. Rate: See Route/Dosage section.
- Y-Site Compatibility: No information available.

Patient/Family Teaching
- Teach patient and family signs and symptoms of hypoglycemia. Instruct patient to take oral glucose as soon as symptoms of hypoglycemia occur—glucagon is reserved for episodes when patient is unable to swallow because of decreased level of consciousness.
-Home Care Issues: Instruct family on correct technique to prepare, draw up, and administer injections. Health care professional must contact immediately after each dose for orders regarding further therapy or adjustment of insulin dose or diet.
- Advise family that patient should receive oral glucose when alertness returns.
- Instruct family to position patient on side until fully alert and to explain that glucagon may cause nausea and vomiting. Aspiration may occur if patient vomits while lying on back.
- Instruct patient to check expiration date monthly and to replace outdated medication immediately.
- Review hypoglycemic medication regimen, diet, and exercise programs.
- Patients with diabetes mellitus should carry a source of sugar (such as a packet of sugar or candy) and identification describing disease process and treatment regimen at all times.
glucagon

Evaluation/Desired Outcomes
- Increase of serum glucose to normal levels with improved level of consciousness.
- Smooth muscle relaxation of the stomach, duodenum, and small and large intestines in patients undergoing radiologic examination of the GI tract.

Why was this drug prescribed for your patient?