Doxapram (doxa-pram)

Drug

Therapeutic: central nervous system stimulants

Pregnancy Category B

Indications

Used in carefully selected short-term situations with other supportive measures to treat postoperative patients with respiratory depression secondary to anesthesia. Prevention of acute hypercapnea during administration of oxygen to patients with acute respiratory insufficiency due to COPD (short-term only; less than 2 hr). Treatment of mild-to-moderate respiratory and CNS depression due to drug overdosage.

Action

In low doses, stimulates breathing by activating carotid receptors. Larger doses directly stimulate the respiratory center in medulla as well as produce generalized CNS stimulation. Therapeutic Effects: Transient increase in tidal volume, small increase in respiratory rate. Oxygenation is not increased.

Pharmacokinetics

Absorption: Administered IV only; results in complete bioavailability.

Distribution: Unknown.

Metabolism and Excretion: Rapidly metabolized; metabolites mostly excreted by the kidneys.

Half-life: 2.4–4 hr.

TIME/ACTION PROFILE (increases in minute volume)

<table>
<thead>
<tr>
<th>ROUTE</th>
<th>ONSET</th>
<th>PEAK</th>
<th>DURATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>IV</td>
<td>20–40 sec</td>
<td>1–2 min</td>
<td>5–12 min</td>
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</table>

Contraindications/Precautions

Contraindicated in: Hypersensitivity; Patients on mechanical ventilation; Head trauma; Seizures; Flail chest; Pulmonary embolism; Pneumothorax; Pulmonary fibrosis; Acute asthma; Extreme dyspnea; Cardiovascular or cerebrovascular disease; Pedi: Newborns (contains benzyl alcohol).

Use Cautiously in: Patients with a history of asthma or arrhythmias; Hyperthyroidism; Pheochromocytoma; Serious uncorrected metabolic disorders; Hepatic or renal impairment; OB, Lactation, Pedi: Pregnancy, lactation, or children <12 yr (safety not established).

Adverse Reactions/Side Effects

CNS: Seizures, apprehension, disorientation, dizziness, headache.

EENT: Gagging, mydriasis.


Hemat: Hemolysis.

Local: Phlebitis.

Misc: Fever.

Interactions

Drug-Drug: Pressor effects may be increased by concurrent use of adrenergic amines (sympathomimetics) or MAO inhibitors. May mask residual effects of skeletal muscle relaxants. Initial release of epinephrine caused by doxapram may cause adverse reactions when given concurrently with anesthetics known to sensitize the myocardium to the effects of catecholamines (wait 10 minutes following discontinuation of anesthetic to administer doxapram). Concurrent use with aminophylline or theophylline may worsen skeletal muscle hyperactivity.

Route/Dosage

Respiratory Depression following Anesthesia

IV (Adults): Intermittent injection—5–1 mg/kg (not to exceed 1.5 mg/kg) initially; may repeat every 5 min to a total of 2 mg/kg. Infusion—Initiate at 5 mg/min until response is achieved; then decrease infusion rate to 1–3 mg/min (total dose by infusion method should not exceed 4 mg/kg).

Drug-Induced CNS Depression

IV (Adults): Intermittent injection—Initial priming dose of 0.5–1 mg/kg; repeat in 5 min. May repeat at 1–2–hr intervals until sustained consciousness or total of 5–10 mg/kg administered. Infusion—Initial priming dose of 2–3 mg/kg by direct injection; repeat in 5 min. If no response, continue supportive measures for 1–2 hr and repeat priming dose. If some respiratory stimulation occurs, initiate infusion at 1–3 mg/kg. Discontinue if no response.

Use cautiously in patients with a history of asthma or arrhythmia, hypothyroidism, phosphate reabsorption, or severe uncorrected metabolic disorders. Hyper- or renal impairment. OB, Lactation, Pedi: Pregnancy, lactation, or children ≤12 yr (safety not established).
Acute Hypoaxanesis Secondary to COPD

**IV (Adults):** Infusion—1–2 mg/min (up to 3 mg/min). Should not be used for more than 2 hr.

**NURSING IMPLICATIONS**

- Because of narrow margin of safety and indications for use, patient must be monitored constantly when receiving doxapram and until patient is fully alert for 30–60 min.
- Monitor respiratory status (rate and depth of respirations) and ABGs. Ensure that patient has patent airway and is adequately oxygenated. Rales of respiratory depression may occur if CNS depression has long duration of action. Position patient on side, with head of bed elevated to encourage maximal chest expansion and to prevent aspiration.
- Monitor neurologic status (level of consciousness and deep tendon reflexes). Notify health care professional if reflexes become hyperactive or if spasticity occurs.
- Ensure that patient has patent airway and is adequately oxygenated. Rales of respiratory depression may occur if CNS depression has long duration of action. Position patient on side, with head of bed elevated to encourage maximal chest expansion and to prevent aspiration.
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**IV Administration**

- **Direct IV:** Administer undiluted. Administer over 5 min.
- **Intermittent Infusion:** Dilute: For patients with respiratory depression, following anesthesia or drug-induced CNS depression, dilute 250 mg in 250 ml of D5W, D10W, or 0.9% NaCl. Concentration: Concentration will be 1 mg/ml.
- **Diluent:** For patients with acute hypercapnea secondary to COPD, dilute 400 mg in 180 mL of D5W, D10W, or 0.9% NaCl. Concentration: 2 mg/mL. Rate: Does vary with patient's condition (see Route and Dosage section).
- **Administer via infusion pump to ensure accurate dosage.
- **Y-Site Compatibility:** ampicillin, caffeine citrate, calcium chloride, calcium gluconate, cefazolin, ceftazidime, erythromycin, fentanyl, gentamicin, heparin, insulin, metoclopramide, metronidazole, oxacillin, phenobarbital, ranitidine, vancomycin.
- **Y-Site Incompatibility:** clindamycin.

**Patient/Family Teaching**

- Instruct patient to notify health care professional immediately if shortness of breath worsens.

**Evaluation/Desired Outcomes**

- Treatment of postoperative respiratory depression not associated with skeletal muscle relaxants.
- Treatment of respiratory and CNS depression due to drug overdosage.
- Prevention of acute respiratory insufficiency in patients with COPD. Doxapram is not used often because of its narrow margin of safety.

**Potential Nursing Diagnoses**

- Ineffective breathing pattern (Indications)
- Deficient knowledge, related to medication regimen (Patient/Family Teaching)

**Implementation**

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**Why was this drug prescribed for your patient?**