alprostadil (systemic) (al-pros-ta-dil)
Prostaglandin E1, Prostin VR Pediatric, Prostin VR

Classification
Therapeutic: ductus arteriosus patency adjuncts
Pharmacologic: prostaglandins

Pregnancy Category UK

Indications
IV: Temporary maintenance of patent ductus arteriosus in neonates who depend on patency until surgery can be performed.

Action
IV: Directly relaxes smooth muscle of the ductus arteriosus. Therapeutic Effects: IV: Short-term maintenance of patent ductus arteriosus in neonates born with congenital heart defects who require patency to maintain blood oxygenation and perfusion of the lower body.

Pharmacokinetics
Absorption: After IV administration, absorption is essentially complete.
Distribution: Unknown.
Metabolism and Excretion: Up to 80% rapidly metabolized in the lungs.
Half-life: 5–10 min.

TIME/ACTION PROFILE (improvement in blood gases, pulmonary blood flow)

<table>
<thead>
<tr>
<th>ROUTE</th>
<th>ONSET</th>
<th>PEAK</th>
<th>DURATION</th>
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<tbody>
<tr>
<td>IV (ACHD†)</td>
<td>1.5–3 hr</td>
<td>15 min–11 hr</td>
<td>duration of infusion</td>
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<tr>
<td>IV (CCHD‡)</td>
<td>15–30 min</td>
<td>30 min</td>
<td>duration of infusion</td>
</tr>
</tbody>
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†Acyanotic congenital heart disease
‡Cyanotic congenital heart disease

Contraindications/Precautions
Contraindicated in: Respiratory distress syndrome.
Use Cautiously in: Pedi: Neonates with bleeding tendencies.

Adverse Reactions/Side Effects
CNS: SEIZURES, cerebral bleeding, irritability, jitteriness, lethargy.
Resp: APNEA, altered respiratory rate (slow and fast), hypercapnia, respiratory depression, wheezing.
CV: arrhythmia, bradycardia, edema, heart block, heart failure, hypotension, tachycardia.
GI: diarrhea, gastric regurgitation, hyperbilirubinemia, vomiting.
GU: anuria, hematuria.
Derm: flushing.
F and E: hypokalemia.
Hemat: disseminated intravascular coagulation, thrombocytopenia.
Metab: hypoglycemia.
MS: neck hyperextension, stiffness.
Misc: fever, hypothermia, sepsis.

Interactions
Drug-Drug: Risk of bleeding may be increased by concurrent use of anticoagulants, some cephalosporins, or antiplatelet agents. Concurrent use of epinephrine, or phenylephrine may decrease effectiveness of alprostadil. Concurrent use with other vasodilators increases risk of hypotension.

Route/Dosage
IV, Intraarterial (Neonates): 0.05–0.1 mcg/kg/min initially; may be increased up to 0.4 mcg/kg/min until satisfactory response, then decrease to maintenance dose by halving infusion rate. In some patients lower doses (0.01 mcg/kg/min) may be sufficient.

NURSING IMPLICATIONS
Assessment
- Monitor temperature, respiratory rate, pulse, BP, and ECG continuously during therapy.
- In neonates with aortic arch anomalies, monitor pulmonary artery and descending aorta pressures, and urinary output. Pulmonary arterial pulses frequently to assess circulation to lower extremities. BP may be monitored in a lower and an upper extremity simultaneously.
- Assess respiratory status (lung sounds, arterial blood gases) and heart sounds frequently. Monitor neurologic status closely. Observe for seizure activity. Monitor for the development of HF. Neonates <2 kg are at higher risk of developing respiratory (apnea, wheezing), cardiovascular (bradycardia, hypertension), and neurologic (seizures, lethargy, cervical bleeding) side effects. Apnea usually occurs during the first hour of the infusion. A ventilator should be readily available.
- During intra-arterial administration, assess frequently for facial or arm flushing; may indicate catheter displacement and necessitate repositioning of the catheter.
- Monitor for signs of bleeding, especially in neonates with bleeding tendencies, because of effects on platelet function.

Nursing Considerations
- Monitor for signs of bleeding, especially in neonates with bleeding tendencies, because of effects on platelet function.

Drug Name
- Genitive Implication
- OFFICIAL indicate most frequent.
Lab Test Considerations: Monitor arterial blood gases before and periodically throughout therapy. In cyanotic defects, PaO2 should increase within 30 min. In noncyanotic defects, correction of metabolic acidosis should occur within 4–11 hr.

May rarely cause ↑ serum glucose or ↑ serum bilirubin levels. May ↓ or ↑ serum potassium levels.

Toxicity and Overdose: Symptoms of overdose include flushing, hypotension, bradycardia, fever, and decreased respiratory rate or apnea. Infusion should be discontinued if apnea or bradycardia occurs.

Potential Nursing Diagnoses
Decreased cardiac output (Indications)
Ineffective tissue perfusion (Indications)

Implementation
IV Administration
May be administered intravenously through a peripheral or central line, intra-arterially through an umbilical artery catheter or pulmonary artery catheter.
Duration of therapy is usually limited to 24–48 hr. Closure of the ductus arteriosus usually begins within 1 or 2 hr after discontinuation of therapy.
Notify health care professional if fever or hypotension occurs. These side effects may resolve with a decrease in infusion rate.

Continuous Infusion: Dilution: 500 mcg/mL solution further in 0.9% NaCl or D5W. Concentration: Diluting 500 mcg of alprostadil in 250 mL of IV fluid will yield a final concentration of 2 mcg/mL; diluting 500 mcg in 100 mL of IV fluid will yield 5 mcg/mL; diluting 500 mcg in 50 mL of IV fluid will yield 10 mcg/mL; diluting 500 mcg in 25 mL of IV fluid will yield 20 mcg/mL. Do not use solution containing benzyl alcohol as a diluent. Stable for 24 hr at room temperature.
Rate: Administer the 2 mcg/mL solution at 0.05 mL/kg/min, the 5 mcg/mL solution at 0.02 mL/kg/min, the 10 mcg/mL solution at 0.01 mL/kg/min, and the 20 mcg/mL solution at 0.005 mL/kg/min.

Y-Site Compatibility:
ampicillin, cefazolin, cefotaxime, dobutamine, dopamine,
fentanyl, furosemide, gentamicin, methylprednisolone, nitroprusside, potassium chloride, tobramycin, vancomycin, vecuronium.

Y-Site Incompatibility:
levofloxacin.

Patient/Family Teaching
IV: Explain to the parents the purpose of alprostadil and the need for continuous monitoring.

Evaluation/Desired Outcomes
Maintained patency of the ductus arteriosus as evidenced by improved oxygenation in cyanotic disorders.
Improved circulation to the lower extremities.
Correction of metabolic acidosis.
Improved urine output in noncyanotic disorders.

Why was this drug prescribed for your patient?