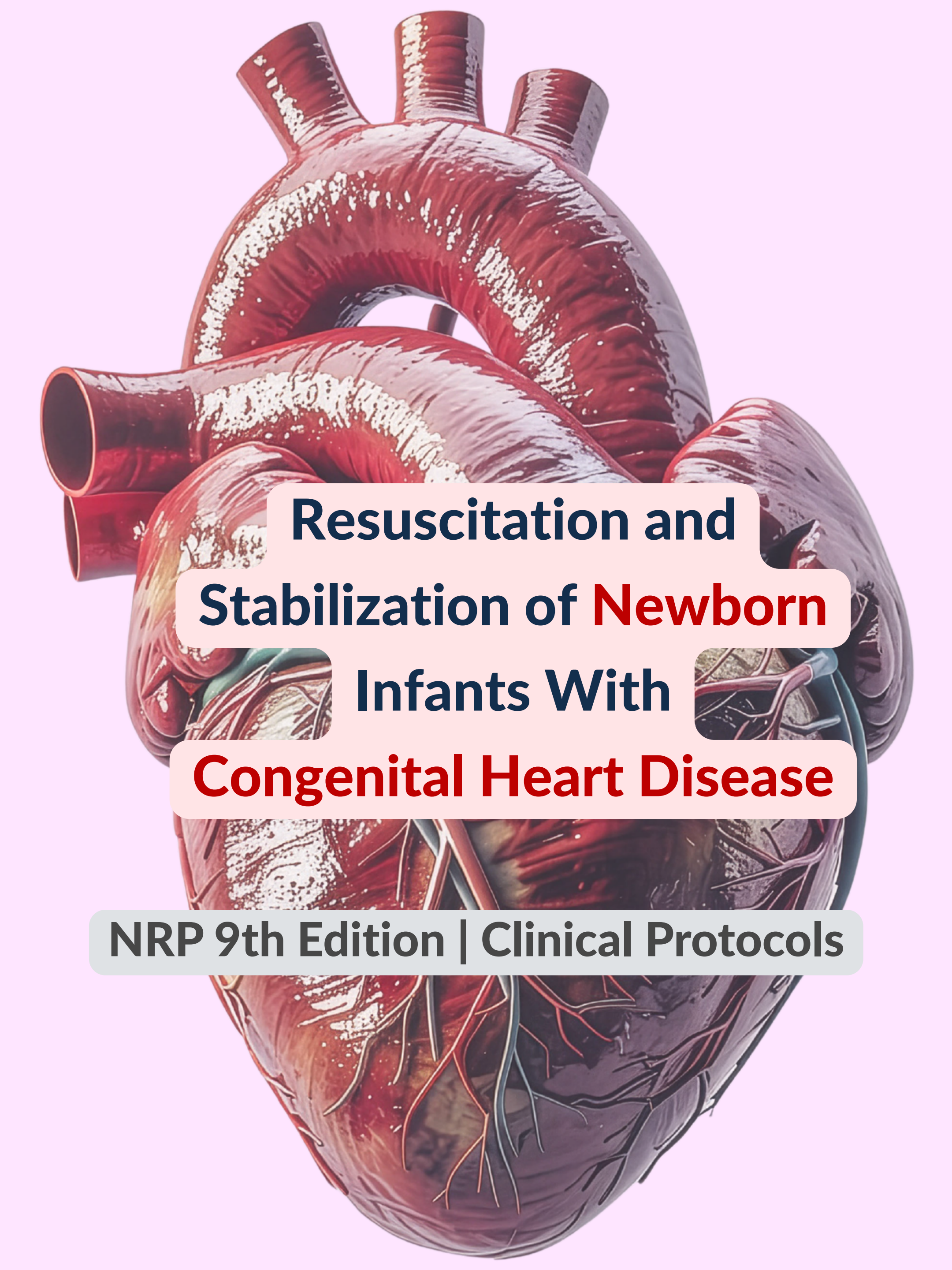
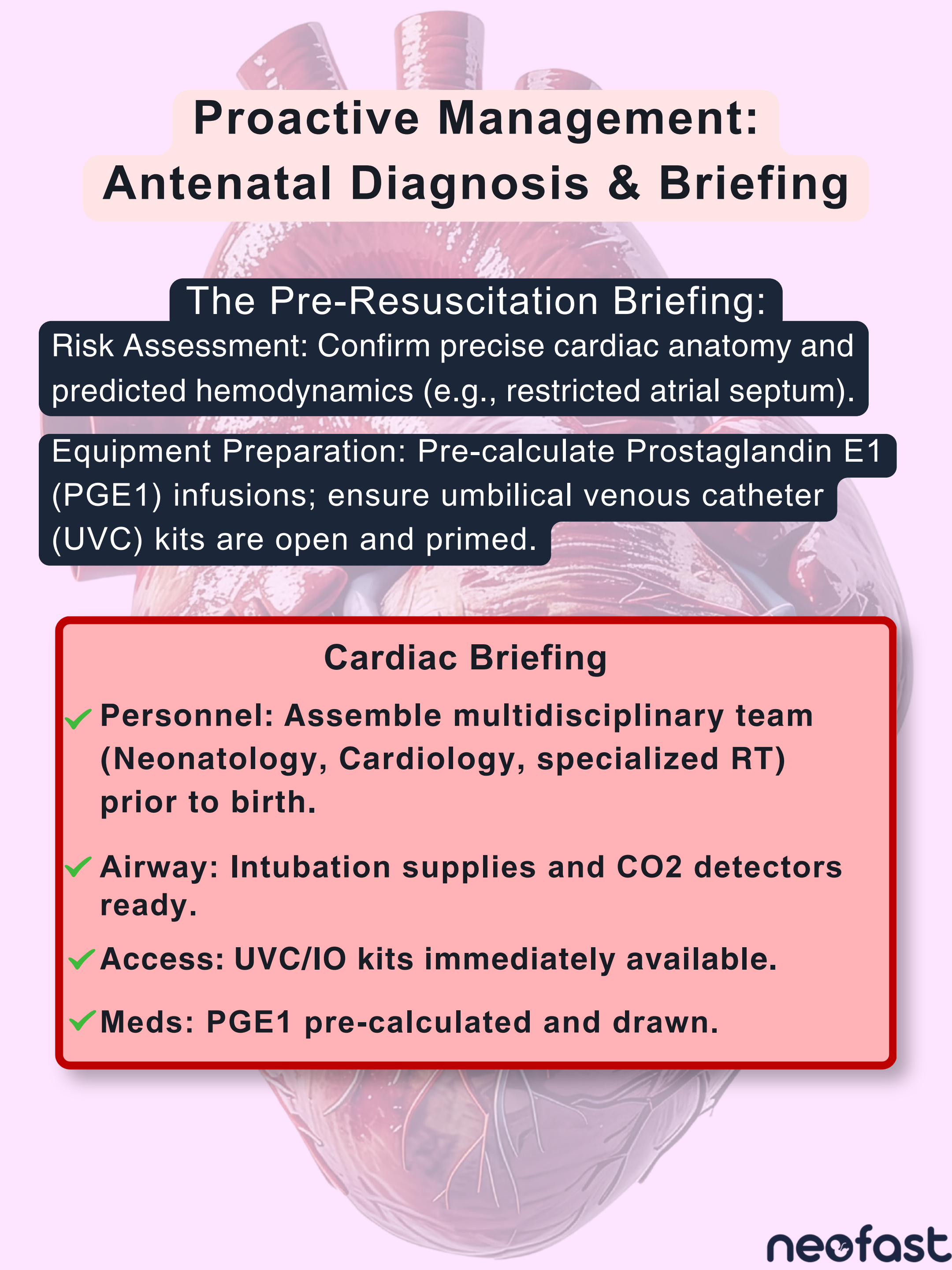


An anatomical illustration of a human heart, showing the four chambers (right and left atria and ventricles) and the major blood vessels (superior and inferior vena cava, aorta, and pulmonary artery/vein). The heart is rendered in a realistic style with detailed textures and colors, set against a light pink background.

Resuscitation and Stabilization of **Newborn Infants With **Congenital Heart Disease****

NRP 9th Edition | Clinical Protocols

A detailed anatomical illustration of a fetal heart, showing the four chambers (right and left atria and ventricles) and the major blood vessels (superior and inferior vena cava, pulmonary arteries and veins, and aorta). The heart is shown in a cross-section view, with the ventricles at the bottom and the atria above them. The major vessels are shown entering and exiting the heart. The illustration is in a realistic style with various shades of red, pink, and white.

Proactive Management: Antenatal Diagnosis & Briefing

The Pre-Resuscitation Briefing:

Risk Assessment: Confirm precise cardiac anatomy and predicted hemodynamics (e.g., restricted atrial septum).

Equipment Preparation: Pre-calculate Prostaglandin E1 (PGE1) infusions; ensure umbilical venous catheter (UVC) kits are open and primed.

Cardiac Briefing

- ✓ **Personnel:** Assemble multidisciplinary team (Neonatology, Cardiology, specialized RT) prior to birth.
- ✓ **Airway:** Intubation supplies and CO2 detectors ready.
- ✓ **Access:** UVC/IO kits immediately available.
- ✓ **Meds:** PGE1 pre-calculated and drawn.



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Continuous medication



Alprostadil (Prostin® and Prostavasin®)



IV continuous

500mcg/mL Solution

10mcg/mL Powder

20mcg/mL Powder

No Fluid Restriction

Fluid restriction



Weight (kg)

2



Desired dose (mcg/kg/min)

0.05

Suggested dose: 0.01 to 0.4 mcg/kg/min



Intended drip (mL/h)

0.6

Alprostadil (Prostin® and Prostavasi... IV continuous - 500mcg/mL Solution

Dose	0.29mL
Dilute with NS	14.11mL
Final concentration	10mcg/mL
Total in 24 hours	14.4mL

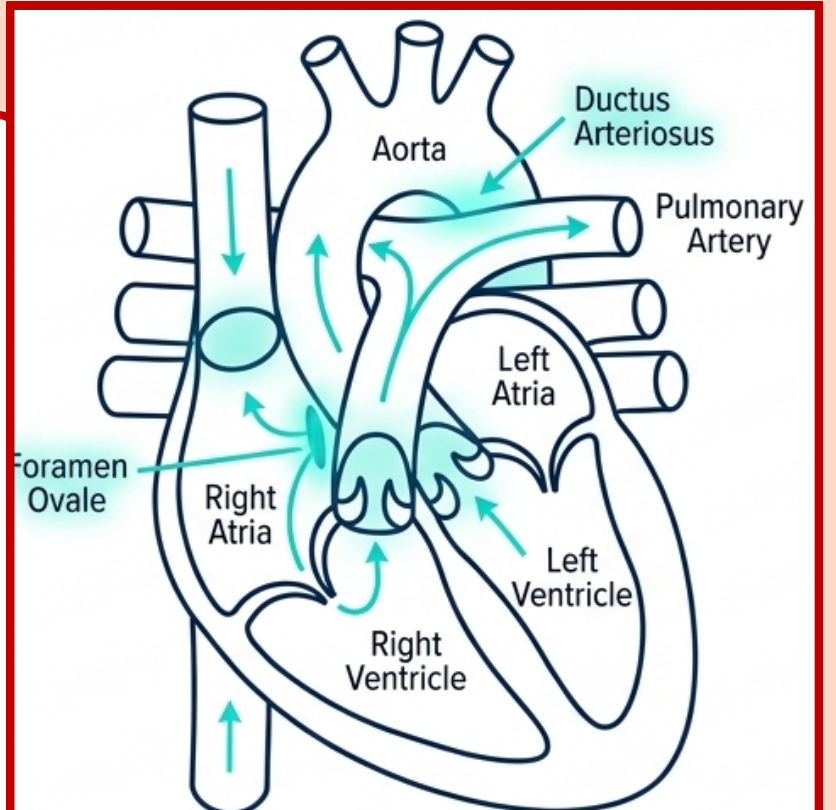
**Mark the route of administration and presentation of PGE1. Fill the desired weight, dose and drip.
And that's it, go to catheterization!**

Ductal-Dependent Lesions

Survival in critical CHD dictates that the Ductus Arteriosus (DA) remains patent to bypass anatomical obstructions.

Clinical Presentation:

Rapid deterioration, **profound central cyanosis**, or cardiogenic shock occurring as the DA naturally constricts in the first hours of life.



Two Primary Mechanisms of Failure:

- Restricted Pulmonary Blood Flow (Right-to-Left Lesions): The DA is required to retrogradely supply blood to the lungs.
- Restricted Systemic Blood Flow (Left-to-Right Lesions): The DA is required to supply blood to the systemic circulation.

Differentiating Ductal-Dependent Pathologies

Parameter	Cyanotic (Pulmonary)	Acyanotic (Critical Systemic)
Primary Deficit:	Pulmonary Blood Flow	Systemic Blood Flow
Key Pathologies:	Tetralogy of Fallot w/ Atresia, Tricuspid Atresia, Critical PS	Hypoplastic Left Heart (HLHS), Interrupted Aortic Arch, Critical AS
Clinical Presentation:	Profound central cyanosis, fails to improve with O ₂	Cardiogenic shock, weak pulses, severe metabolic acidosis, pallor
PGE1 Objective:	Perfuse the lungs	Perfuse the body (systemic organs)

The Hyperoxia Test: Isolating Cardiac Cyanosis

Protocol

Purpose: Differentiate profound cyanosis caused by pulmonary pathology vs. fixed right-to-left cardiac shunts.

1. Obtain baseline pre-ductal ABG (Arterial Blood Gas) on room air.
2. Administer 100% FiO₂ for 10 uninterrupted minutes via hood or secure airway.
3. Repeat pre-ductal ABG.

PaO₂ 150 mmHg

Pulmonary disease highly likely. Oxygen effectively crosses alveoli into circulation.

PaO₂ 100 mmHg

Highly suggestive of cyanotic CHD. A fixed anatomical shunt is preventing oxygenation regardless of FiO₂.

Adapting the NRP Algorithm for Suspected CHD

Ventilation remains priority:

Respiratory failure is still the most common cause of neonatal depression. Establish effective ventilation before pivoting to cardiac algorithms.

Targeted Oxygenation:

Visual assessment of cyanosis is unreliable. Strictly utilize pre-ductal pulse oximetry.

The Oxygen Paradox:

Avoid targeting 100% SpO₂ in ductal-dependent mixing lesions. Standard CHD targets often range from 75%-85% to maintain a balanced systemic-to-pulmonary blood flow ratio (Q_p:Q_s).

Target Oxygen Saturation Table	
2 min: 65%-70%	3 min: 70%-75%
4 min: 75%-80%	5 min: 80%-85%
10 min: 85%-95%	

WARNING: Cardiac Targets May Differ.

Chest Compressions:

If HR <60 bpm despite effective ventilation, proceed with standard NRP chest compressions and 100% FiO₂.

Hemodynamic Balancing: The Q_p:Q_s Ratio

In single-ventricle physiology (e.g., HLHS), the systemic and pulmonary circulations are in parallel. Blood blindly follows the path of least resistance.



The Danger of Hyperoxia & Hypocarbica (Over-ventilation):

Physiologic Effect: These act as potent pulmonary vasodilators.

Catastrophic Result: Pulmonary Vascular Resistance (PVR) plummets, causing massive pulmonary over-circulation and systemic steal (shock, gut/kidney ischemia).

Clinical Strategy: **Allow permissive hypercapnia** and accept lower SpO₂ to keep PVR elevated, forcing blood into the systemic circulation.

Pharmacotherapy: Prostaglandin E1 (PGE1) Protocol

Indication: Lifesaving intervention for suspected ductal-dependent lesions. Do not delay for echocardiogram confirmation if clinical suspicion is high.

Administration Route: Continuous IV infusion (UVC preferred for immediate, reliable central access; peripheral IV acceptable if UVC delayed).

Starting Dose: 0.01 to 0.05 mcg/kg/min.

Titration (Up): May increase up to 0.1 mcg/kg/min if rapid ductal reopening is required in a crashing infant.

Maintenance: Once patency is confirmed (improved hemodynamics/SpO₂) and patient is stable, titrate down to the lowest effective dose to minimize adverse effects.

The screenshot shows the neofast mobile application interface for continuous medication administration. The app has a blue header with the 'neofast' logo and a hamburger menu icon. Below the header is an orange bar labeled 'Continuous medication'. The main content area is white and contains several input fields and buttons. At the top, there is a dropdown menu for 'Alprostadi (Prostin® and Prostavasin®)' with a plus icon on the left and a dropdown arrow on the right. Below this is a green button labeled 'IV continuous'. Underneath are three buttons for concentration: '500mcg/mL Solution', '10mcg/mL Powder', and '20mcg/mL Powder'. Below these are two buttons for fluid restriction: 'No Fluid Restriction' (highlighted in red) and 'Fluid restriction'. At the bottom, there are three input fields: 'Weight (kg)', 'Desired dose (mcg/kg/min)' (with a slider control), and 'Intended drip (mL/h)'. A black arrow points from the 'Starting Dose' text above to the 'Desired dose' slider.

Anticipating PGE1 Complications



Hyperthermia

Action: May mimic sepsis.

Monitor temperature continuously.



Apnea

Incidence: 10-20% (**Most common and severe**).

Action: Team must be continuously prepared for emergent endotracheal intubation the moment infusion begins.



Hypotension & Vasodilation

Action: Monitor central blood pressure. Prepare volume expanders (Normal Saline 10 mL/kg) or inotropic support if perfusion drops.

General Rule: The risk of side effects is **highly dose-dependent**. Rapid upward titration requires maximum team vigilance.

Key Takeaways

- **Proactive Planning:** Antenatal diagnosis dictates the necessity of a multidisciplinary, specialized DR preparation briefing.
- **Diagnostic Differentiation:** CHD cyanosis will not resolve with supplemental oxygen; rely on the Hyperoxia test and pre-ductal SpO2 monitoring.
- **The Oxygen Paradox:** Strictly avoid hyperoxia and hyperventilation to prevent catastrophic systemic steal in mixing lesions.
- **Anticipate Apnea:** PGE1 is a lifesaving, temporizing medication, but the team must be immediately ready to intubate upon administration.
- **Behavioral Execution:** Flawless teamwork, anticipation of complications, and closed-loop communication remain the ultimate determinants of infant survival.

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Your neonatal tool at all times

