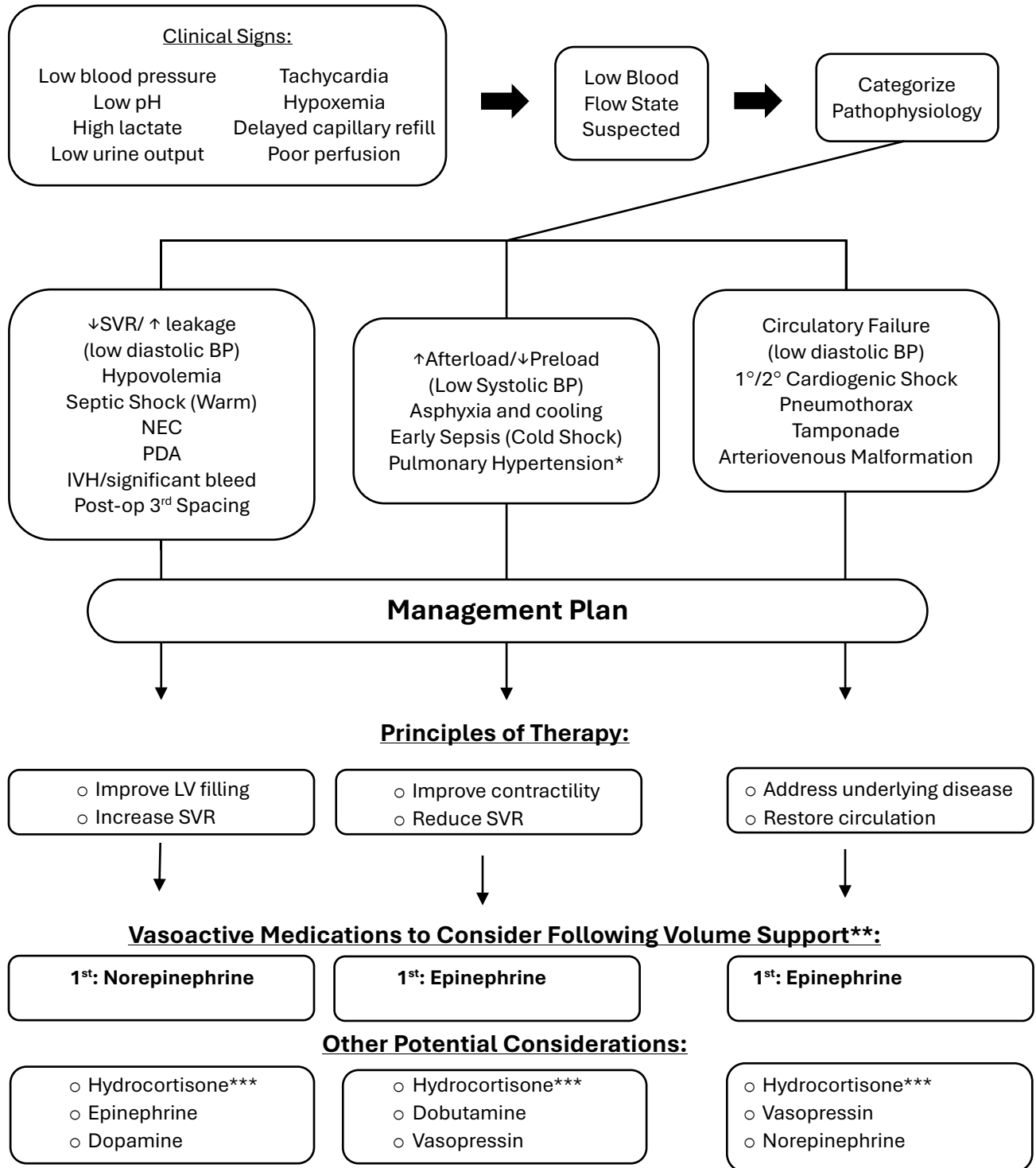


Neonatal Hypotension Reference



- *Consider avoiding the use of dopamine if pulmonary hypertension is also present
- **Consider volume support (10ml/kg of normal saline, packed red blood cells, or fresh frozen plasma depending upon clinical scenario) with a history of blood loss or if using an inodilator like milrinone with associated hypotension
- ***Consider hydrocortisone 1 mg/kg q6-8h IV if unresponsive to a single vasoactive agent (earlier if history of adrenal insufficiency or clinical concerns for current adrenal insufficiency (ie extreme prematurity))
- Do not treat a single indicator of low blood flow state in isolation, unless strong clinical evidence of antenatal event
- Central intravenous access should be obtained- side effects of vasoactive agents can have cutaneous effects
 - Can start with PIV or low-lying UVC until central access can be achieved
- Invasive arterial access should be obtained to monitor BP if on vasoactive agent
- Interpret cuff BP with caution in extremely preterm neonates
- Early echocardiogram is advised for neonates in hypotensive states. Once physiology on echocardiogram is identified, vasopressor choice should be tailored to the patient's specific physiology
- For CDH-associated hypotension, please see CDH guideline for recommendations
- Milrinone is often discussed with the vasoactive agents. While milrinone is often indicated for afterload reduction in several disease states, it is not used to treat hypotension. Milrinone's use still may be indicated in a hypotensive state, and volume support or another vasoactive medicine listed above may be needed to treat the subsequent low blood flow state.
- Oversedation is a frequent etiology of lower blood pressures. Consideration should be made to wean sedation as appropriate to support improved blood flow state provided adequate sedation is maintained. If sedation is weaned, and a low blood flow state is persistent, consideration for volume support and/or vasoactive medications may be indicated following the above physiologic recommendations.

Blood Pressure Reference Ranges for Preterm Neonates

Gestation	Sys 3%	Dias 3%	Mean 3%
24	32	15	26
25	34	16	26
26	36	17	27
27	38	17	27
28	40	18	28
29	42	19	28
30	43	20	29
31	45	20	30
32	46	21	30
33	47	22	30
34	48	23	31
35	49	24	32
36	50	25	32

Neonatal Continuous Infusion Titration Table

HR = heart rate

SVR = systemic vascular resistance

CO = cardiac output

PVR = pulmonary vascular resistance

BP = blood pressure

Drug	Typical Starting Dose	Typical Dose Range	Dose Titration	Incremental Titration Rate	Soft Maximum <i>(consider adding another agent)</i>	Physiologic Effects				
						HR	SVR	PVR	CO	BP
Dobutamine	2 mcg/kg/min	2-20 mcg/kg/min	1-2 mcg/kg/min	5-15 minutes	15 mcg/kg/min	↑	↓	=	↑↑	↔
Dopamine	Indication-dependent (see table below)	2-20 mcg/kg/min	1-5 mcg/kg/min	5-15 minutes	15 mcg/kg/min	Dose-dependent (see table below) ↑↑↑				
Epinephrine	0.01-0.05 mcg/kg/min	0.01-1 mcg/kg/min	0.01-0.05 mcg/kg/min	5-15 minutes	0.5 mcg/kg/min	↑	↑↑	↑↑	↑	↑
Norepinephrine	0.01-0.05 mcg/kg/min	0.01-2 mcg/kg/min	0.01-0.05 mcg/kg/min	5-15 minutes	0.5 mcg/kg/min	↑	↑↑	↓/=	↔/↑	↑↑
Phenylephrine	0.1-0.5 mcg/kg/min	0.1-2 mcg/kg/min	0.2 mcg/kg/min	5-15 minutes	1 mcg/kg/min	↔	↑↑	↑↑↑	↓	↑↑
Vasopressin	0.3 milliunits/kg/min	0.1-10 milliunits/kg/min	0.1-0.3 milliunits/kg/min	15-60 minutes	1 milliunits/kg/min	↔	↑↑	↓/=	↓	↑
Milrinone <i>*Not a vasopressor*</i>	0.25 mcg/kg/min	0.125-1 mcg/kg/min	0.125 mcg/kg/min	15-30 minutes	0.75 mcg/kg/min	↔	↓	↓↓	↑↑	↔/↓

Vasopressor Medication Pearls

Medication	Pearls
Dobutamine	<ul style="list-style-type: none"> ○ Useful for physiologic states where main issue is bradycardia without any hypotension, therefore, typically not helpful when in septic shock
Dopamine	<ul style="list-style-type: none"> ○ Not a strong vasopressor and do not recommend using alone as sole vasopressor <p><u>Indication-dependent dosing:</u></p> <ul style="list-style-type: none"> ○ 2-5 mcg/kg/min is the dosing used for renal perfusion (main receptor stimulation is dopamine) ○ 5-10 mcg/kg/min is the dosing used for cardiac assistance (main receptor stimulation is beta) ○ 10-20 mcg/kg/min is the dosing used for blood pressure assistance (main receptor stimulation is alpha) <p><u>Dose-dependent physiologic effects:</u></p> <ul style="list-style-type: none"> ○ 2-5 mcg/kg/min: HR ↔, SVR ↓, CO ↑, BP ↓ ○ 5-10 mcg/kg/min: HR ↑, SVR ↔, CO ↑, BP ↔ ○ 10-20 mcg/kg/min: HR ↑↑, SVR ↑↑, CO ↑, BP ↑↑
Epinephrine	<ul style="list-style-type: none"> ○ Best empiric vasopressor for most indications, including septic shock, due to its widespread effects on all physiologic responses (HR, BP, CO, SVR, etc.)
Milrinone	<ul style="list-style-type: none"> ○ Strongest recommendation/indication for use is heart failure with confirmed reduced ejection fraction ○ Not recommended for use in hypotensive states such as septic shock due to vasodilating properties ○ Not recommended for use in renal failure (or dose reduce if must be on milrinone) due to drug accumulation resulting in vasodilation and hypotension
Norepinephrine	<ul style="list-style-type: none"> ○ Best vasopressor to choose for septic shock, especially if hypotensive with no major bradycardia or heart failure concerns, based on the receptors it acts on
Phenylephrine	<ul style="list-style-type: none"> ○ Generally, not very effective for increasing blood pressure; can consider as an adjunctive vasopressor if needed ○ Avoid if patient has reduced ejection fraction as it can decrease cardiac output further ○ Often not used in the NICU, though may be used in a neonatal patient by Anesthesia/PICU
Vasopressin	<ul style="list-style-type: none"> ○ Avoid if patient has reduced ejection fraction as it can decrease cardiac output further ○ Do not use as monotherapy for septic shock or hypotension; works best as an adjunctive therapy with norepinephrine or epinephrine

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