Hemodynamics - Adult

REFERENCE

NORMAL RANGES

Systolic 100-140 mmHg; diastolic 70-105 mmHg

Pulse 60-100; respiratory rate 12-20; EtCO2 35-45; cap refill <5 seconds

Cardiac output 4.0-8.0 L/min; MAP 70-105 mmHg; stroke volume 60-100 mL/beat

SVR 800-1000 dynes/sec/cm2; afterload (systolic BP) 90-140

PRELOAD — HOW MUCH FLUID IS COMING IN

- Low BP suggests low preload, especially in hypovolemic shock
- JVD suggests high preload — heart failure or fluid overload
- Crackles can indicate pulmonary edema from high preload
- Cool, clammy skin or delayed cap refill suggests low preload
- Low preload: hypovolemia, venous pooling, tamponade, tension pneumothorax, obstructive shock, excessive PPV
- High preload: heart failure, fluid overload, chronic hypertension

AFTERLOAD & SVR — WHAT THE HEART PUMPS AGAINST

- High BP suggests increased afterload; low BP may mean decreased afterload (septic/distributive shock)
- Bounding pulse suggests high afterload; weak, thready pulse, low afterload
- Pale, mottled skin = vasoconstriction (high SVR); flushed, warm skin = vasodilation (low SVR)
- High afterload: hypertension; low afterload: septic, anaphylactic, neurogenic shock

CARDIAC OUTPUT & CONTRACTILITY

- CO rises and falls with heart rate, but very fast or slow rates reduce it via stroke volume
- Low BP with a weak pulse, altered mental status, and cool clammy skin indicate low CO
- Low contractility: heart failure, MI, beta blockers, acidosis, hypoxia, shock
- High contractility: stress/exercise, push-dose epi

Take Home Message:

Monitoring is not therapy — read preload, afterload, and cardiac output in the vitals and the body in front of you.