TO INITIATE MONITORING, YOU NEED: **STARLING** MONITOR AND SENSORS

Power On > New Patient > Enter Patient ID/Age/Wt/Ht/Gender > Start Session > **Automatically Calibrates**

DOES MY PATIENT HAVE A LOW BLOOD PRESSURE/MAP OR PERFUSION PROBLEM (I.E., LOW UOP/HIGH LACTATE)? DO I NEED TO GIVE FLUID?

(only ~50% of hemodynamically unstable patients are fluid responsive![1])

DYNAMIC ASSESSMENT

PLR

3 min baseline → 3 min challenge

* Turn off SCDs for set up and duration of PLR.

BOLUS

3 min baseline → Challenge

250 ml in <5 min[2,3] OR 500 ml in <10 min

Bolus: Same position throughout baseline and challenge. Select dynamic assessment > end bolus. End bolus 1-2 minutes after infusion is complete (3-5 minutes with syringe technique).[2]

Results[3]: ≥10% ΔSVI patient is likely fluid responsive
<10% ΔSVI (including negative numbers) patient is not likely fluid responsive

"Would you like to start immediately from the challenge stage?" means "Can I use the last 3 minutes of SVI data as my baseline?" (i.e, no nursing interventions)

"Baseline shows unstable results" means the last 3 SVI readings have changed more than 10%. Consider repeating baseline.

Baxter

Starling

FLUID MANAGEMENT MONITORING SYSTEM

CALIBRATION VS. BASELINE:

Calibration = signal optimization occurs during initial pt. set-up.

Baseline = initial SVI readings of a dynamic assessment

SENSORS:

- "Box in" the heart
- Red dashes indicate right/left and upper/lower
- White tabs point to toes
- Can be on front or back in any combination

NEED TO RECALIBRATE:

(Session Controls > Recalibrate)

- If any or all sensors are moved or replaced
- Once a shift

PATIENT SELECTION TOOL

Patient
• Shock States/Low Blood Pressure: Sepsis, Low Vascular Tone, Low Cardiac Output, Hypovolemia, Neurogenic Shock[4]
• Patients treated with Inotropes, Vasopressors or Vasodilators[4]
• Surgical Patients: Perioperative Volume Management, Goal Directed Therapy, Enhanced Recovery After Surgery (ERAS)[5]
• Emergency/Trauma Patients[6]
• Other Critical Care Conditions: Acute Respiratory Distress (ARDS),[7] Sub-Arachnoid Hemorrhage (SAH),[8] Acute Kidney Injury (AKI),[9] and Congestive Heart Failure (CHF)[10]
• Patients undergoing Continuous Renal Replacement Therapy (CRRT) or patients undergoing hemodialysis[11]
ONLY ~50% of hemodynamically unstable patients will respond to fluid by increasing cardiac output and perfusion.[1]

CLINICAL SHOCK STATES[12]

Parameters	Normal Adult Range[13]	Cardiogenic Shock	Septic Shock	Hypovolemic Shock
BP (MAP)	> 65	↓	↓	↓
Heart Rate (HR)	60-100	↑	↑	↑
Cardiac Index (CI)	2.5–4.0 L/min/m^2	↓	early ↕ late	early ↕ late
Total Peripheral Resistance Index (TPRI)	1970–2390 dynes • sec/cm^5/m^2	↑	↓	↓
Common Stroke Volume Response (ΔSVI) to Dynamic Assessment		ΔSVI <10%	ΔSVI ≥10%	ΔSVI ≥10%
ΔSVI ≥10% Predictive of 15% increase in CO with 500cc[14]				

Dynamic Assessments Directly Challenge the Heart with Volume to Measure its Response:

Passive Leg Raise (PLR) Maneuver — Translocation of 250-300cc of blood from lower extremities into the heart[3] • Fluid Bolus Challenge (FB) — Rapid Infusion of 250cc of fluid over 3-5 minutes[3]

NORMAL HEMODYNAMIC PARAMETERS

Parameters	Equation	Normal adult range
Stroke Volume (SV)	CO/HR x 1000	60 – 100 mL/beat
Stroke Volume Index (SVI)	SV/BSA	33 – 47 mL/beat/m^2
Δ Stroke Volume Index (ΔSVI)	Change in SV after Dynamic Assessment	≥10% Likely to be Fluid Responsive[3] <10% Unlikely to be Fluid Responsive[3]
Cardiac Output (CO)	HR x SV/1000	4.0 – 8.0 L/min
Cardiac Index (CI)	CO/BSA	2.5 – 4.0 L/min/m^2
Mean Arterial Pressure (MAP)	(SBP + (2 x DBP))/3	70 – 105 mmHg
Total Peripheral Resistance (TPR)	80 x (MAP)/CO	800 – 1200 dynes • sec/cm^5
Total Peripheral Resistance Index (TPRI)	80 x (MAP)/CI	1970 – 2390 dynes • sec/cm^5/m^2
ΔSVI ≥10% Predictive of 15% increase in CO with 500cc[14]		

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