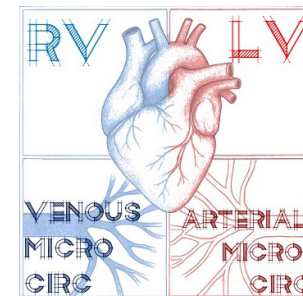


I-RUSH EXAM

Interface-Informed Rapid Ultrasound for Shock & Hypotension (RUSH 2.0)



Perform Clinical Exam and HIMAP Ultrasound Exam

Clinical Exam • MAP, DBP, SBP and Pulse Pressure • Capillary Refill Time (CRT) (≤ 3 sec) • Pulse Ox Waveform and Perfusion Index (PI) (>2.0) • Mottling • Distal Skin Temperature by Palpation/IR • Mentation Note: These clinical exam findings are also essential to determining if your patient is actually in shock	HEART PLAX • Pericardial Effusion/Tamponade • LV Ejection Fraction (Visual or EPSS) A4C • Chamber Sizes (Qualitative) Consider Adding (if time/skillset): • LVOT VTI if CRT is abnormal • TAPSE (>1.7 cm) & Tricuspid Regurg Velocity (≤ 2.8 m/s), if enlarged RV • Qualitative Valve Assessment • PSAX for septal eval and WMA	Ivc • Collapsibility • Size at end expiration (< 2 cm) Consider Adding (if time/skillset): • Additional VEXUS views if IVC is plethoric, especially Portal Vein • Recheck after fluid boluses
Morison's Perform if hypotension or suspected bleeding: • Single view of the RUQ Kidney/Liver Interface all the way down to the inferior pole of the kidney with the patient in Trendelenberg	Aorta Perform if hypotension or suspected bleeding: • 4 Views of the Abdominal Aorta	Pulmonary • One view of each anterior, upper chest for pneumothorax and interstitial edema Consider Adding: • One view of each postero-lateral lower chest for interstitial edema

items in (parentheses) are normal values

CRUSH Exam

If Patient is crashing, perform only Crashing RUSH Exam (CRUSH):
Heart for chamber size/effusion, IVC, Morison's, Aorta, and Pulmonary just for tension
(Do all 5 regardless of hypotension/suspected bleeding. Should be performed in <30 seconds)

See Page 2 for Interface and Synthesis



I-RUSH EXAM

Rapidly Consider Each of the Four Interfaces (**ART MicroCirc, LV, Venous Microcirc, RV**)

Arterial Microcirculatory-Does CRT and PI indicate adequate tissue perfusion?

LV-How is the LV handling its afterload. Is cardiac output adequate? Is patient hypovolemic?

LVOT VTI: Normal VTI (18-22) → Good coupling. Low VTI (<18) → Low stroke volume vs high SVR vs mitral regurgitation. High VTI (>22) → Vasoplegia vs high output heart failure vs aortic insufficiency

RV-Is RV function impaired? Is RV afterload too high (increased PA pressures)? Integrate Septum/TAPSE/TV Regurg Jet measurements

Venous Microcirculatory-Does the venous system appear congested or collapsed? Integrate VEXUS (especially portal vein)

LV/ART MicroCirculatory Interface²

Look at CRT/PI and Blood Pressure

If CRT/PI normal, but the patient is hypotensive--consider **vasodilatory shock**

Hypotension with decreased pulse pressure and/or decreased LVOT VTI--consider decreased **cardiac output** (intrinsic cardiac or hypovolemia)

Repeat LVEF and/or LVOT VTI after interventions (especially vasopressors) as these are load-dependent variables

Frequently recheck CRT and PI for effects on the microcirculation

Venous Microcirc/RV Interface²

Look at IVC collapsibility and size

Non-plethoric, collapsible IVC usually implies acceptable Venous Interface with Right Heart Function (may miss RV Infarct). If hypotensive, these patients may be hypovolemic (or bleeding) but only if clinical milieu and other indicators support it.

High VEXUS Score-Patient may need right heart augmentation, decrease in RV afterload, and/or diuresis

RV/LV Interface²

Is RV size impacting LV Function (evaluate septum)? Is RV providing adequate preload to the LV?

Synthesize, Categorize and Phenotype Shock/Hypotension

<i>Shock Phenotype</i>	<i>Exam</i>	<i>LV</i>	<i>ART MicroCirc</i>	<i>Venous MicroCirc</i>	<i>RV</i>
Vasodilatory Shock	Low DBP/Wide Pulse Pressure, Warm skin	Normal or elevated LVEF/VTI	Normal or abnormal CRT/PI		
LV Cardiogenic Shock	Low Pulse Pressure. Cool skin. Pulmonary Congestion	Decreased LVEF/VTI	Abnormal CRT/PI		
Acute Pulmonary HTN/RV Failure		Eventual LV Cardiogenic Shock	Abnormal CRT/PI	Plethoric, Non-Collapsing IVC	Increased RV Size, Decreased TAPSE
Bleeding/Profound Hypovolemia	Low Pulse Pressure. Cool Skin	Hyperdynamic LVEF/VTI until end stages.	Abnormal CRT/PI	Flat IVC	

Obstructive Phenotype: Not discussed as RUSH Views should have ruled it out

Consider other causes: Occult Bleeding (Gastrointestinal, Retroperitoneal), Abdominal Compartment Syndrome, Dynamic LVOTO, Addisonian Crisis, Tox, Hypocalcemia, Cardiac Valvular Dysfunction

Hemodynamic Coherence: If the I-RUSH/Vitals have normalized, but the patient is STILL in shock, consider primary microcirculatory dysfunction