

Hypotension in the Oncology Patient: Shock, Resuscitation, and Avoiding Pitfalls

July 16, 2026
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HARVARD MEDICAL SCHOOL
TEACHING HOSPITAL

APP Acute Care Curriculum Intro Survey





Learning Objectives

- **Develop a systematic approach to evaluating hypotension**
- **Differentiate major shock phenotypes using bedside clinical findings and lab data**
- **Apply evidence-based principles of fluid resuscitation**
- **Initiate appropriate first-line management, including vasopressor selection and escalation of care**
- **Recognize common diagnostic/management pitfalls**

Clinical Case

- Ms. Laura Ringer is a 68-year-old female with a history of hypertension, type 2 diabetes, and metastatic non-small-cell lung cancer affecting bones, liver, and pericardium presents to the emergency department after a fall and right hip pain. She is being treated with immunotherapy. X-ray shows a right hip fracture, and she is taken to surgery for right hip arthroplasty.

Clinical Case

On post-operative day 2, she develops cough, and progressive confusion. You go to see her at bedside.

Your exam reveals the following:

Temp 100.2°F, HR 118, **BP 78/42 (MAP 54)**, RR 28, SpO₂ 91% on RA

Neuro: Oriented only to person

Pulmonary: There are left lower lobe crackles

Cardiac: There is a normal S1 and S2 heart sound and the rate is rapid and regular

Abd: No abdominal pain to palpation

MSK: There is bruising and pain over the R hip surgical site

Clinical Case

Labs from this morning show:

- White cell count 18,000/mL
- Hemoglobin 9 g/dL
- Platelets 160k/mL

- Creatinine 1.0 mg/dL (was 0.5 this morning)
- Na 130
- K 4.8

What type of shock does she have?

- A. Distributive
- B. Hypovolemic
- C. Cardiogenic
- D. Obstructive

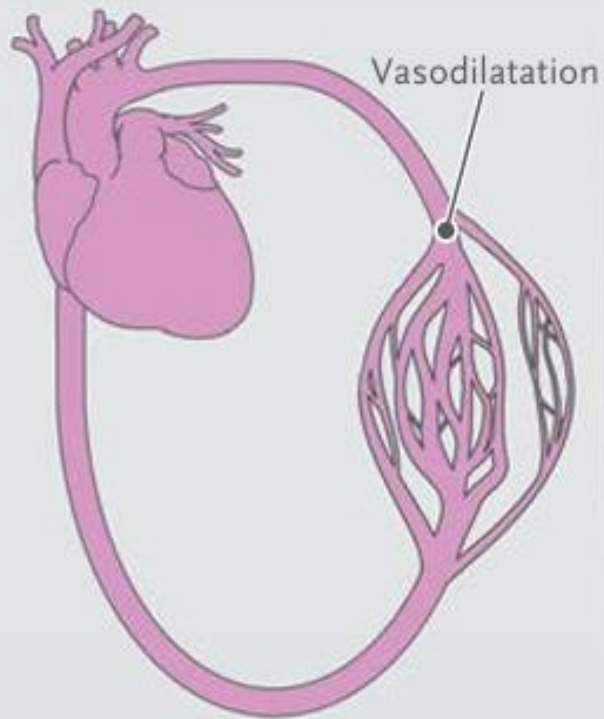
Differential for Ms. shock

Distributive	Hypovolemic	Cardiogenic	Obstructive

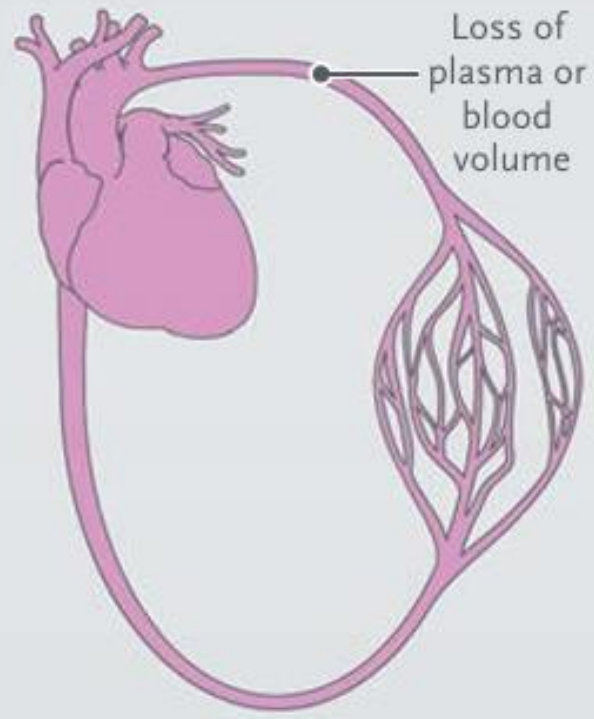
Educational Content: Types of Shock and Workup

Shock Overview

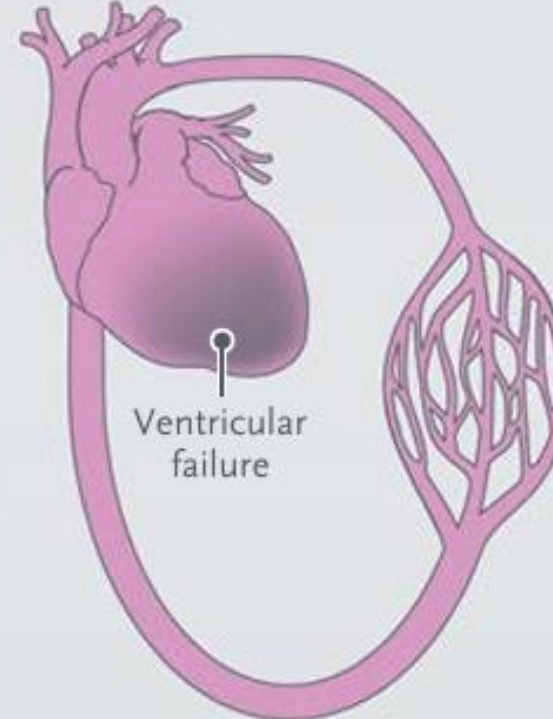
Distributive shock



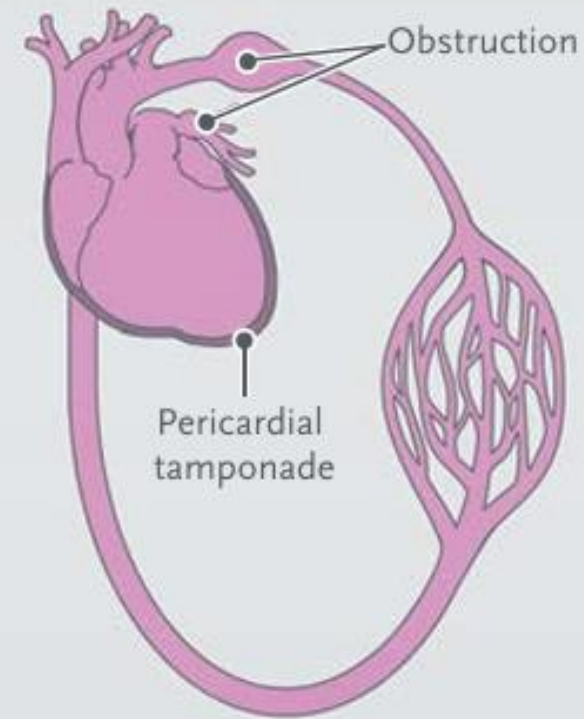
Hypovolemic shock



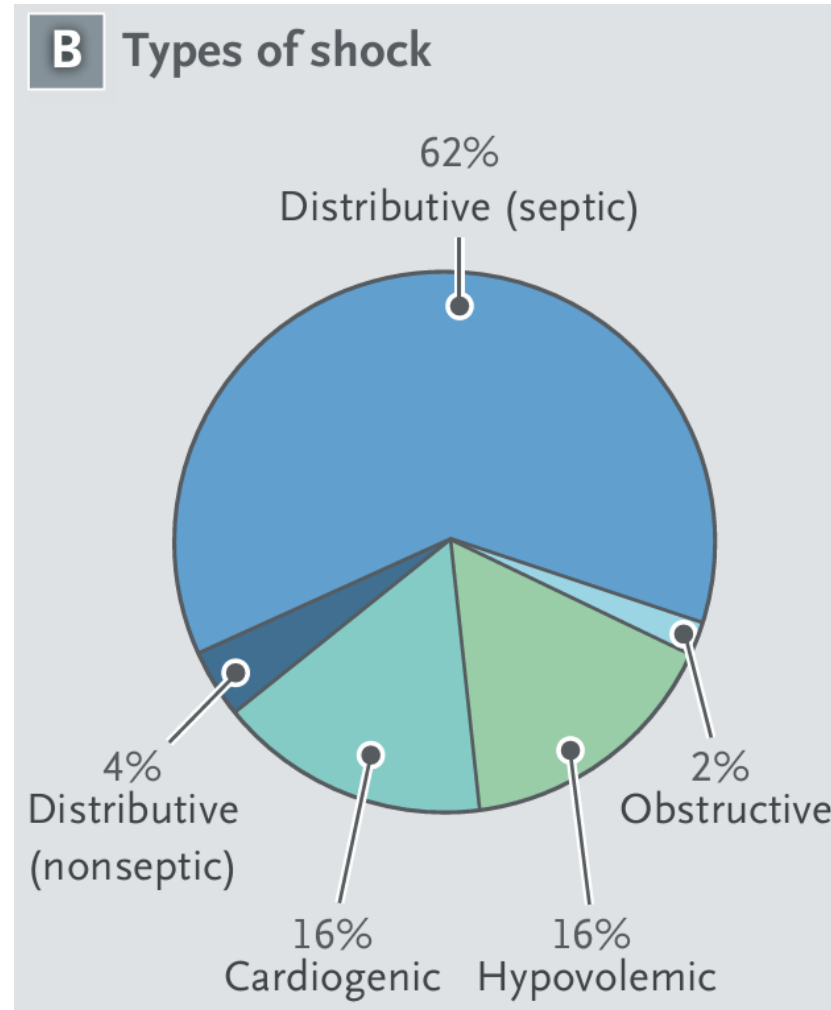
Cardiogenic shock



Obstructive shock

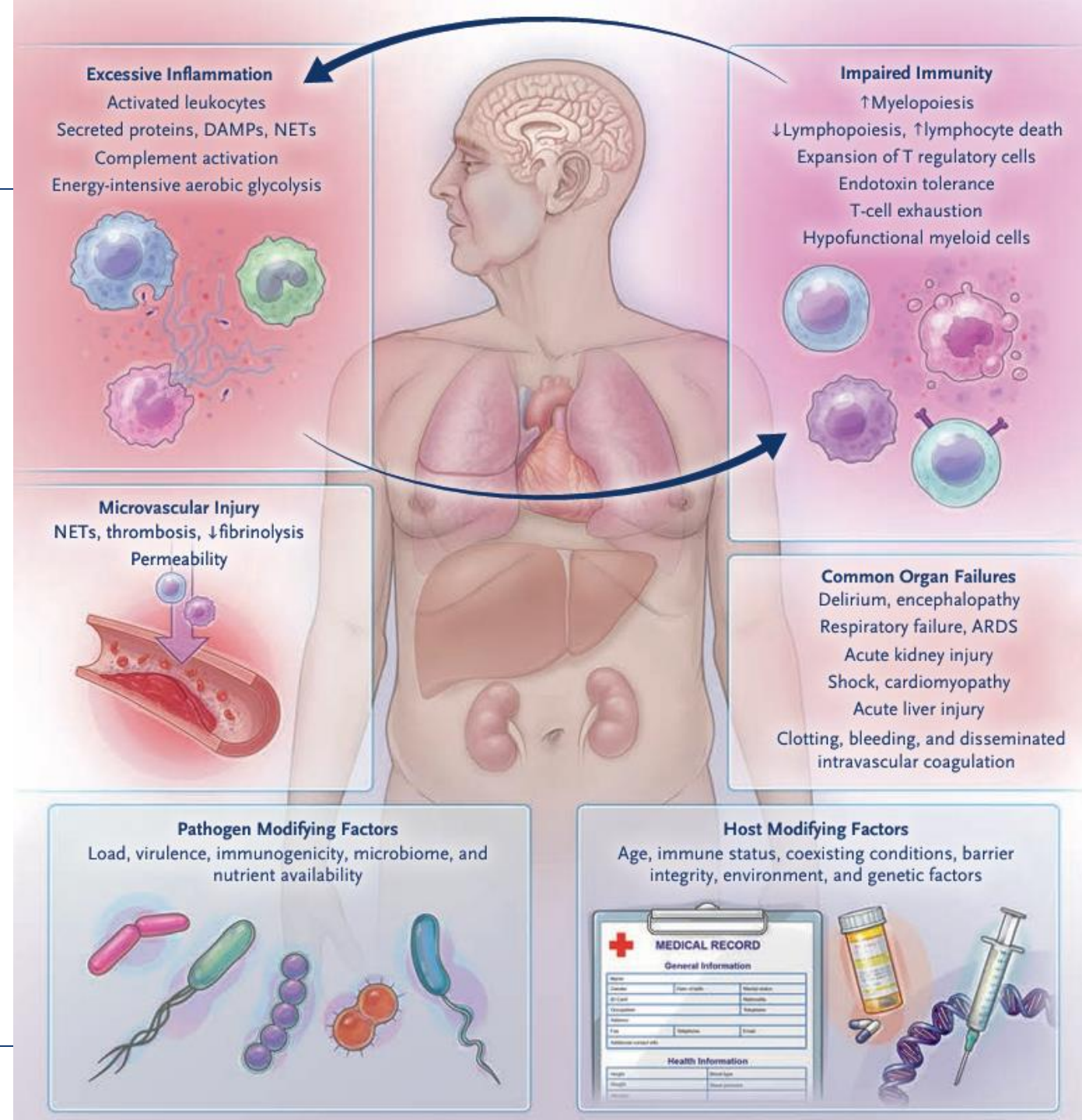


Shock Overview



Distributive Shock

- Acute organ dysfunction characterized by decreased low systemic vascular resistance
- Dysregulated inflammation and immunity
- Microvascular injury
- Includes sepsis, anaphylaxis, and neurogenic



Differential for shock

Distributive	Hypovolemic	Cardiogenic	Obstructive
Septic Shock (e.g. Pneumonia)			
Iatrogenic inflammation (e.g. Cytokine Release Syndrome)			
Anaphylaxis			
Neurogenic (e.g. acute cervical injury)			

Sepsis 6

Take 3	Give 3
Lactate	IV Fluids
Blood cultures	IV Antibiotics
Urine Output	Supplemental oxygen (if needed)

SEPSIS SCREENING TOOL - THE SEPSIS SIX

AGE 12+

PATIENT DETAILS:

DATE:TIME:
NAME:
DESIGNATION:
SIGNATURE:

COMPLETE ALL ACTIONS WITHIN ONE HOUR

01

ENSURE SENIOR CLINICIAN ATTENDS

NOT ALL PATIENTS WITH RED FLAGS WILL NEED THE 'SEPSIS 6' URGENTLY. A SENIOR DECISION MAKER MAY SEEK ALTERNATIVE DIAGNOSES/ DE-ESCALATE CARE. RECORD DECISIONS BELOW

NAME:GRADE:

TIME
: :

02

OXYGEN IF REQUIRED

START IF O₂ SATURATIONS LESS THAN 92% - AIM FOR O₂ SATURATIONS OF 94-98%
IF AT RISK OF HYPERCARBIA AIM FOR SATURATIONS OF 88-92%

TIME
: :

03

OBTAIN IV ACCESS, TAKE BLOODS

BLOOD CULTURES, BLOOD GLUCOSE, LACTATE, FBC, U&Es, CRP AND CLOTTING
LUMBAR PUNCTURE IF INDICATED

TIME
: :

04

GIVE IV ANTIBIOTICS

MAXIMUM DOSE BROAD SPECTRUM THERAPY
CONSIDER: LOCAL POLICY / ALLERGY STATUS / ANTIVIRALS

TIME
: :

05

GIVE IV FLUIDS

GIVE FLUID BOLUS OF 10 ml/kg if age <16, 500ml if 16+
NICE RECOMMENDS USING LACTATE TO GUIDE FURTHER FLUID THERAPY

TIME
: :

06

MONITOR

USE NEWS2. MEASURE URINARY OUTPUT: THIS MAY REQUIRE A URINARY CATHETER REPEAT LACTATE AT LEAST ONCE PER HOUR IF INITIAL LACTATE ELEVATED OR IF CLINICAL CONDITION CHANGES

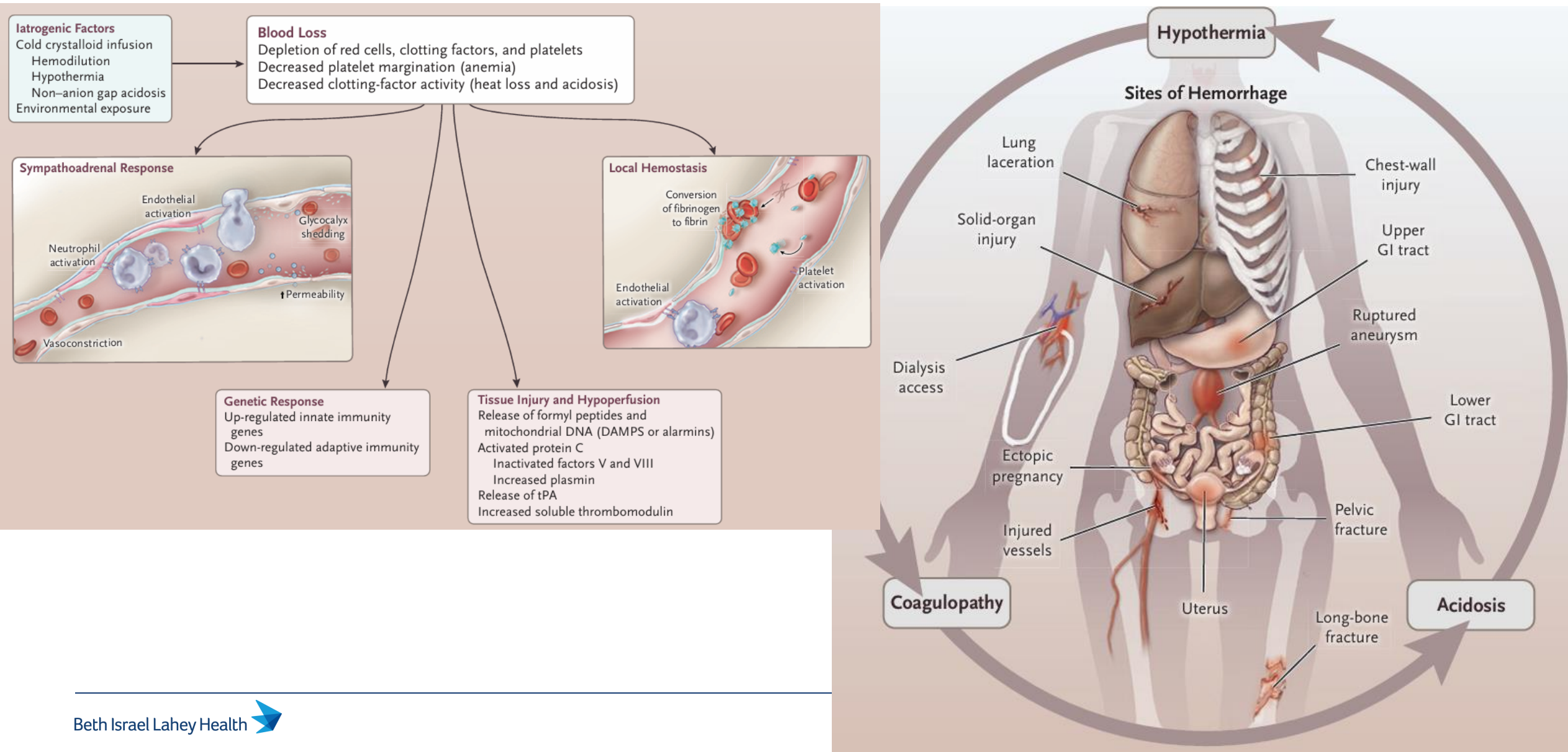
TIME
: :

RED FLAGS AFTER ONE HOUR – ESCALATE TO CONSULTANT NOW

Workup for distributive shock

Distributive subtypes	Clinical	Labs	Imaging
Septic Shock (e.g. Pneumonia)	Warm extremities Infectious findings (e.g. fever, urine, bowel, respiratory symptoms)	Viral and bacterial testing (blood, urine, stool) CBC with diff Renal fx, LFTs, lipase DIC labs	Chest XR Low threshold for CT POCUS
Iatrogenic inflammation (e.g. Cytokine Release Syndrome)	Fever	Above Ferritin Sometimes IL-6	"
Anaphylaxis	Airway swelling, wheezing	Serum tryptase IgE level	"
Neurogenic (e.g. acute cervical injury)	Clinical context		Stat MR Spine

Hemorrhagic/Hypovolemic Shock



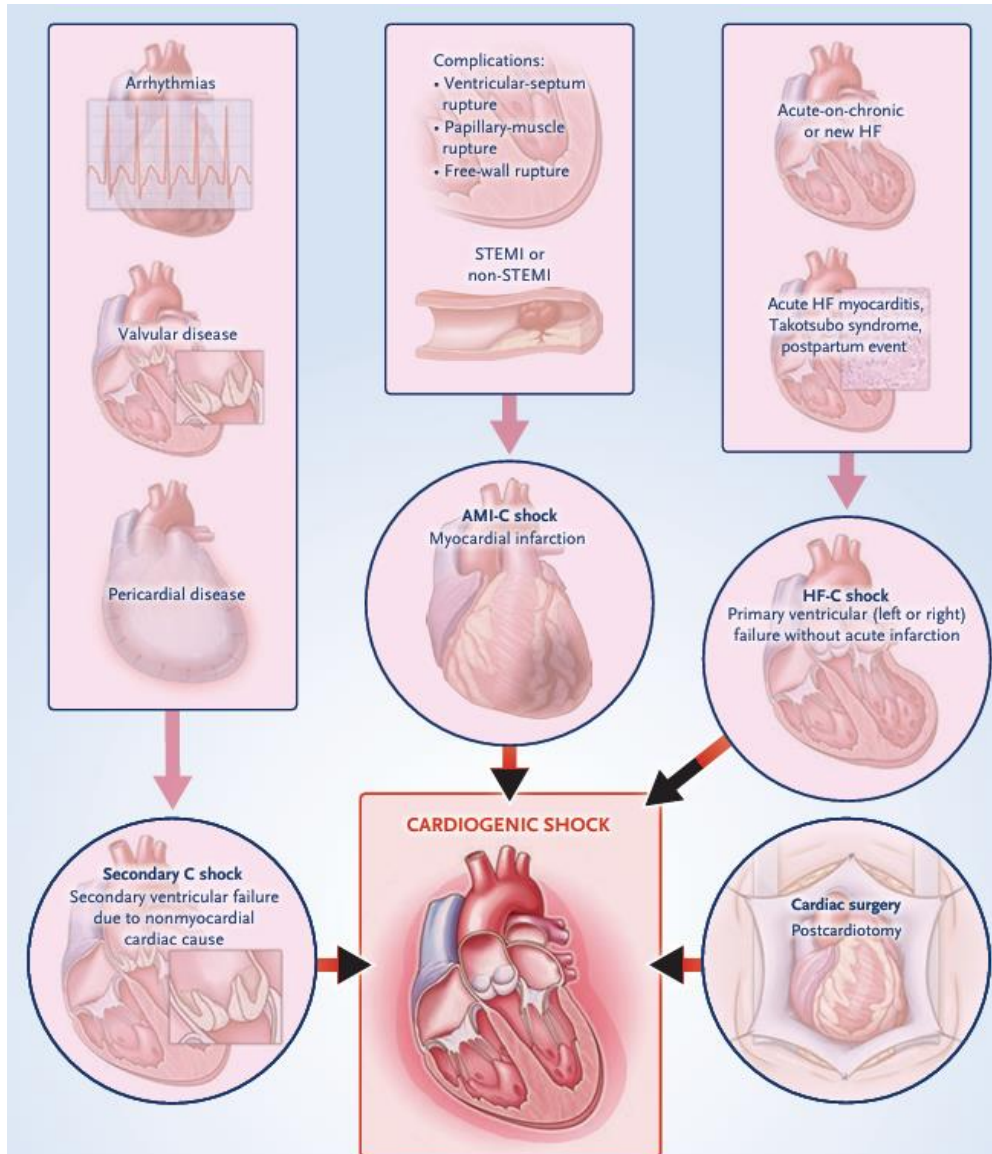
Differential for shock

Distributive	Hypovolemic	Cardiogenic	Obstructive
Septic Shock (e.g. Pneumonia)	Dehydration (e.g. diarrhea)		
Iatrogenic inflammation (e.g. Cytokine Release Syndrome)	Hemorrhage (e.g. lower GI bleed)		
Anaphylaxis (e.g. peanut allergy)			
Neurogenic (e.g. acute cervical injury)			

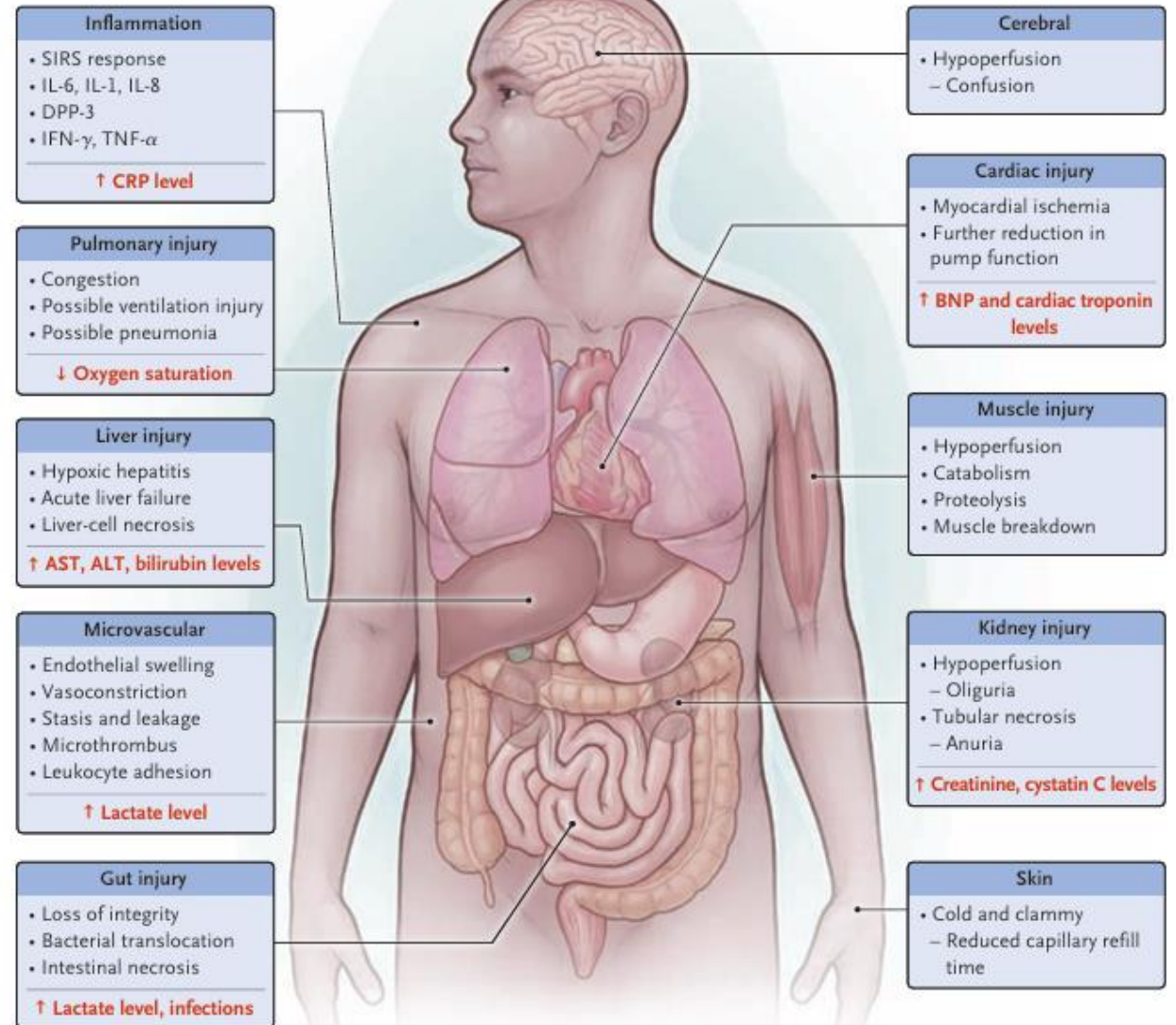
Workup for hypovolemic shock

Hypovolemic subtypes	Clinical	Labs	Imaging
Dehydration (e.g. diarrhea)	Lack of sweating Clinical context	BMP	...
Hemorrhage (e.g. lower GI bleed)	Visible bleeding Cold extremities Hypothermia	CBC	POCUS If targeting bleeding, obtain CTs with angio protocol of given area Other as needed

Cardiogenic Shock



B



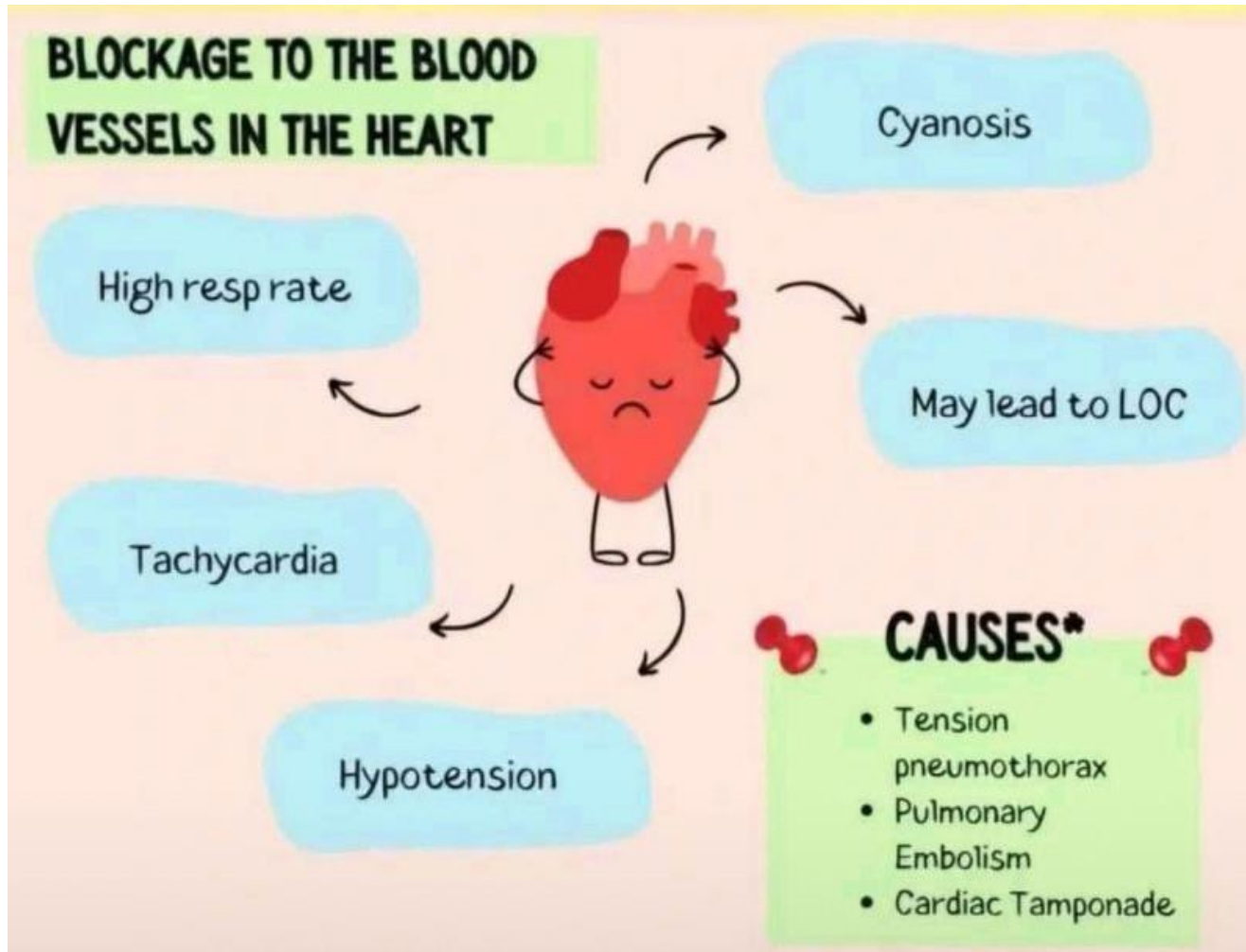
Differential for shock

Distributive	Hypovolemic	Cardiogenic	Obstructive
Septic Shock (e.g. Pneumonia)	Dehydration (e.g. diarrhea)	AMI (e.g. STEMI)	
Iatrogenic inflammation (e.g. Cytokine Release Syndrome)	Hemorrhage (e.g. lower GI bleed)	Heart Failure (e.g. myocarditis)	
Anaphylaxis (e.g. peanut allergy)		Non-myocardial (e.g. valve issue)	
Neurogenic (e.g. acute cervical injury)		Cardiac surgery (e.g. post-cardiotomy)	

Workup for cardiogenic shock

Cardiogenic subtypes	Clinical	Labs	Imaging
AMI (e.g. STEMI)	Chest pain	HS Troponins	EKG TTE
Heart Failure (e.g. myocarditis)	Lower extremity swelling Elevated JVP	NT-pro BNP	Above POCUS
Non-myocardial (e.g. valve issue)	Murmur, rub Chest pain?	CRP, ESR	Above For valve issues with normal TTE, consider TEE For myocarditis, cMR
Cardiac surgery (e.g. post-cardiotomy)	Clinical context	All above	Per surgery team

Obstructive Shock



Differential for shock

Distributive	Hypovolemic	Cardiogenic	Obstructive
Septic Shock (e.g. Pneumonia)	Dehydration (e.g. diarrhea)	AMI (e.g. STEMI)	Massive PE
Iatrogenic inflammation (e.g. Cytokine Release Syndrome)	Hemorrhage (e.g. lower GI bleed)	Heart Failure (e.g. myocarditis)	Cardiac tamponade
Anaphylaxis (e.g. peanut allergy)		Non-myocardial (e.g. valve issue)	Tension pneumothorax
Neurogenic (e.g. acute cervical injury)		Cardiac surgery (e.g. post-cardiotomy)	SVC Syndrome

Workup for obstructive shock

Obstructive subtypes	Clinical	Labs	Imaging
Massive PE	Chest pain Shortness of breath Hypoxemia	D-dimer	POCUS / Stat TTE CT Chest angiogram EKG
Cardiac tamponade	Elevated JVP Pulsus paradoxus Distant heart sounds	Troponins	POCUS / Stat TTE EKG
Tension pneumothorax	Elevated JVP Pulsus paradoxus Absent breath sounds	-	POCUS CXR
SVC Syndrome	Mediastinal tumor Elevated JVP Facial plethora	-	POCUS CT Chest Angio

Differential for shock (finalized)

Distributive	Hypovolemic	Cardiogenic	Obstructive	Other
Septic Shock (e.g. Pneumonia)	Dehydration (e.g. diarrhea)	AMI (e.g. STEMI)	Massive PE	Adrenal insufficiency
Iatrogenic inflammation (e.g. Cytokine Release Syndrome)	Hemorrhage (e.g. lower GI bleed)	Heart Failure (e.g. myocarditis)	Cardiac tamponade	Hypothyroidism
Anaphylaxis (e.g. peanut allergy)		Non-myocardial (e.g. valve issue)	Tension pneumothorax	
Neurogenic (e.g. acute cervical injury)		Cardiac surgery (e.g. post- cardiotomy)	SVC Syndrome	

Workup for other forms of shock

Other subtypes	Clinical	Labs	Imaging
Adrenal insufficiency	On immunotherapy	Glucose BMP AM cortisol TSH FSH LH	CT Abdomen/Pelvis MRI Pituitary
Hypothyroidism	On immunotherapy Bradycardia Hypothermia Myxedema	TSH Free T4	-

Educational Content: Fluid Resuscitation

Shock Stages

Phase Focus	Salvage	Optimization	Stabilization	De-escalation
	Obtain a minimal acceptable blood pressure Perform lifesaving measures	Provide adequate oxygen availability Optimize cardiac output, Svo₂, lactate	Provide organ support Minimize complications	Wean from vasoactive agents Achieve a negative fluid balance

Initial fluid resuscitation: start, then reassess

For Ms. Ringer: hypotension + confusion + AKI = treat as shock now.

Start

- Balanced crystalloid is first-line for sepsis-induced hypoperfusion.
- Give at least 30 mL/kg IV crystalloid in the first 3 hours—then individualize.

Check each bolus

- Perfusion: MAP goal 65, mentation, capillary refill, urine output.
- Congestion: lungs, oxygen need, JVP/POCUS when available.
- End organ: Lactate threshold of 4

Fluid selection

- Lactated Ringers (LR) is first choice
- If high K, Ca, administer Normal Saline

Tips

- Administer to gravity with pressure bag through peripheral IV or IO
- Use actual body weight; consider adjusted/ideal weight when BMI >30. Modify the initial volume for the clinical context and reassess frequently.

Treat the cause in parallel with resuscitation

Fluids (and pressors) buy time. They do not correct the mechanism of shock.

Send workup in parallel

Draw cultures and lactate and monitor urine output. Send lab and imaging as your clinical suspicion directs. Obtain an EKG and evaluate with POCUS early.

Treat Likely Causes Empirically

Do not delay antimicrobials. In septic shock, give antimicrobials immediately, ideally within 1 hour. If bleeding, activate the local major-hemorrhage pathway. Type and cross, provide blood products as indicated

Consult urgently

When narrowing onto a diagnosis, consult urgently with the appropriate services. Engage multidisciplinary care

After the initial bolus, let physiology direct fluids

More fluid is helpful only when it improves forward flow and perfusion.

Check each bolus

- Perfusion: MAP goal 65, mentation, capillary refill, urine output.
- Congestion: lungs, oxygen need, JVP/POCUS when available.
- End organ: Lactate threshold of 4

Switch to Maintenance

Once shock resolves, switch from rescue fluids to replacement / maintenance. Account for all inputs / outputs.

Stop / De-resuscitate

Escalating oxygen need, crackles/B-lines, rising JVP, edema, or no perfusion gain: stop blind boluses. After the acute phase, consider active fluid removal when safe.

When fluids are not enough: vasopressors

Use vasopressors to restore perfusion while the diagnosis and definitive therapy move forward.

Start

Norepinephrine is first-line in septic shock. Start peripherally rather than delaying for central access; follow local infusion protocols.

Target

Initial MAP target: 65 mm Hg. In adults ≥ 65 , 60–65 mm Hg may be appropriate initially. Individualize to perfusion and chronic hypertension.

Escalate

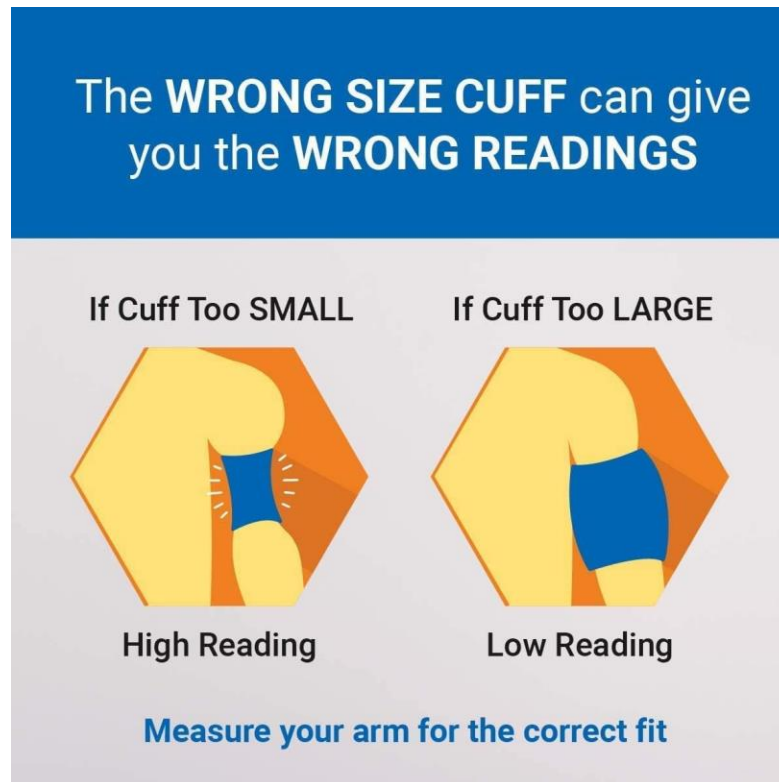
Escalating norepinephrine: add vasopressin. Persistent low MAP: add epinephrine. Cardiac dysfunction with persistent hypoperfusion: consider dobutamine plus norepinephrine or epinephrine.

A patient needing rescue on the floor is already overdue for a higher level of care.

Educational Content: Common Pitfalls

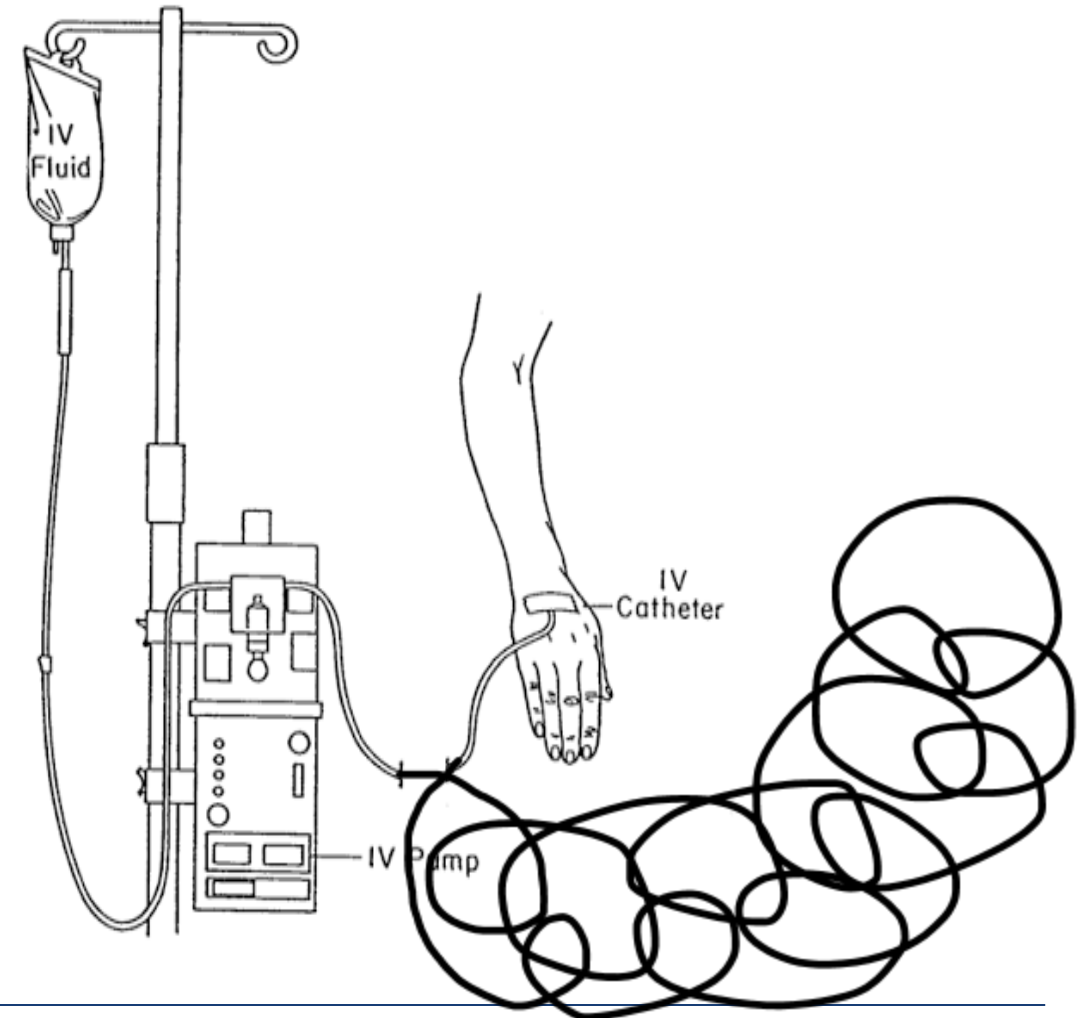
Initial workup mistakes

- Appropriate blood pressure evaluation



Fluid resuscitation mistakes

- Pump @ 999, long IV lines



The response to a deteriorating patient is not automatically another liter of fluid.

Too little, too late

Persistent oxygen debt → AKI, delirium, ischemia, worsening lactate.

Response: restore perfusion, identify the cause, and escalate early.

Too much

Pulmonary edema, worsening oxygenation, peripheral edema, dilutional anemia, and impaired wound healing.

Response: stop blind boluses; reassess and de-resuscitate when safe.

Wrong target

Treating a BP number while missing hemorrhage, obstruction, cardiogenic shock, medication effect, or an endocrine emergency.

Response: reframe the phenotype after every intervention.

Clinical Case

- Ms. LR, 68-year-old female, metastatic NSCLC with mets to bones, liver, and pericardium develops right hip fracture and gets surgery. On post-op day 2 she has confusion and blood pressure measurement is **BP 78/42 (MAP 54)**

Clinical Case Variation 1

On post-operative day 2, she develops cough, and progressive confusion. You go to see her at bedside.

Your exam reveals the following:

Temp 100.2°F, HR 118, **BP 78/42 (MAP 54)**, RR 28, SpO₂ 91% on RA

Skin: Dry mucous membranes

Labs:

Na 122

K 5.9

Gluc 58

Cr 1.3

Lactate 4.5

Clinical Case Variation 1

What diagnosis should be strongly considered?

- A. ICI-related adrenal insufficiency
- B. Massive PE
- C. Acute MI
- D. Hemorrhagic shock

Clinical Case Variation 1

What is the diagnostic test?

- A. D-dimer and pulmonary angiography
- B. AM cortisol, TSH, FSH, LH
- C. Troponin and interventional cardiology
- D. Serum tryptase and IgE

Clinical Case Variation 1

MAP remains at 58mmHg after fluid boluses. What is the next treatment?

- A. Tenecteplase
- B. Hydrocortisone and fludrocortisone
- C. Use diuretics for volume overload
- D. Aspirin and Ticagrelor

Clinical Case Variation 2

On post-operative day 2, she develops cough, and progressive confusion. You go to see her at bedside.

Your exam reveals the following:

Temp 101.2°F, HR 118, **BP 78/42 (MAP 54)**, RR 28, SpO₂ 89% on RA
Pulm: RLL crackles

Labs:

WCC 19,000

Cr 1.8

Lactate 4.5

Clinical Case Variation 2

What is the appropriate initial management

- A. Wait for blood cultures before administering antibiotics
- B. Crystalloid fluid bolus, blood cultures, antibiotics
- C. Epinephrine IM
- D. Methylprednisolone and tocilizumab

Clinical Case Variation 2

MAP remains at 58mmHg after fluid boluses. The patient has increasing oxygen requirement and new bilateral B-lines on lung ultrasound. What is the next treatment?

- A. Start norepinephrine peripherally
- B. Furosemide IV
- C. Consult thoracic surgery for chest tube placement
- D. Consult interventional cardiology for pericardial drain placement

Learning Objectives

- **Develop a systematic approach to evaluating hypotension**
- **Differentiate major shock phenotypes using bedside clinical findings and lab data**
- **Apply evidence-based principles of fluid resuscitation**
- **Initiate appropriate first-line management, including vasopressor selection and escalation of care**
- **Recognize common diagnostic/management pitfalls**

Recommended Resources

- Reading
 - NEJM Sepsis and Septic Shock: [Sepsis and Septic Shock | New England Journal of Medicine](#)
 - NEJM Hemorrhagic shock: [Hemorrhagic Shock | New England Journal of Medicine](#)
 - NEJM Cardiogenic shock: [Cardiogenic Shock | New England Journal of Medicine](#)
- Podcasts
 - Curbsiders
 - JAMA Clinical Reviews
 - Two Onc Docs

Questions?