

**Project:** Ghana Emergency Medicine Collaborative

**Document Title:** Undifferentiated Shock

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# UNDIFFERENTIATED SHOCK

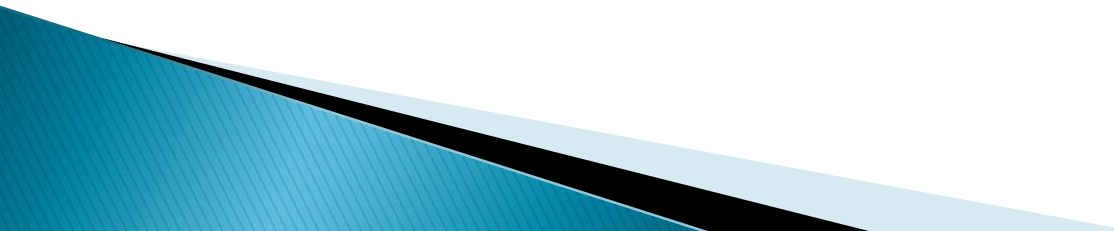
Randall Ellis, MD MPH  
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Vanderbilt University

# CASE 1

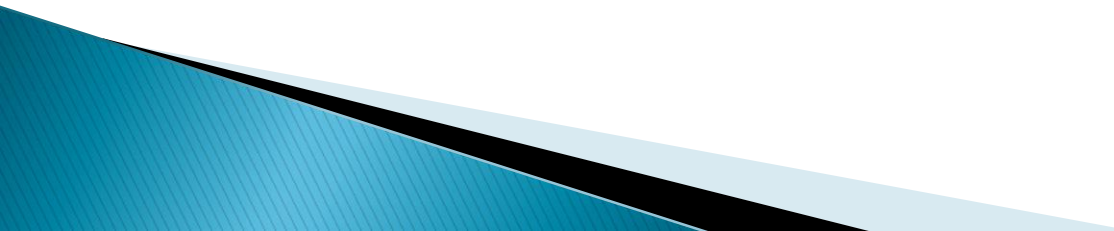
26 year old female found unconscious at a friend's house and brought to the ER. Has an unremarkable past medical history. We can not obtain a history from the patient.

PE: BP 70/40, P 138, RR 38, temp 99.2, O2 sats won't read

Moaning occasionally, cool extremities, moves all extremities, does not follow commands, has dried vomitus on her shirt, no evidence of trauma, lungs are clear, abd soft



# QUESTIONS

1. What would you do first with this woman?
  2. What is the differential diagnoses for this woman?
  3. What would you order?
- 

# CASE 1

Was put on a cardiac monitor and O2 mask. Had two 14 gauge IVs placed and given 2 liters of NS. BP improved to 90/50, pulse 128

RBS: High

BS on lab: 1240

ABG: pH 6.76, PCO2 9, PO2 206

Serum ketones: high

Diagnoses:

- 1) Hypovolemic shock
- 2) Diabetic ketoacidosis

# WHAT IS SHOCK?

Shock occurs when the circulatory system is unable to deliver adequate blood flow, depriving the vital organs of oxygen and nutrients. (Vital organs being brain, heart, lungs, liver, kidneys)



# PHYSIOLOGY OF SHOCK

- ▶ Reduced systemic tissue perfusion
- ▶ Decreased oxygen delivery to the tissues
- ▶ Increased oxygen consumption, which is greater than the oxygen delivery



# PHYSIOLOGY OF SHOCK

## Cellular Dysfunction:

- Intracellular edema
- Malfunctioning membrane pumps
- Leakage of intracellular contents

## Systemic Dysfunction:

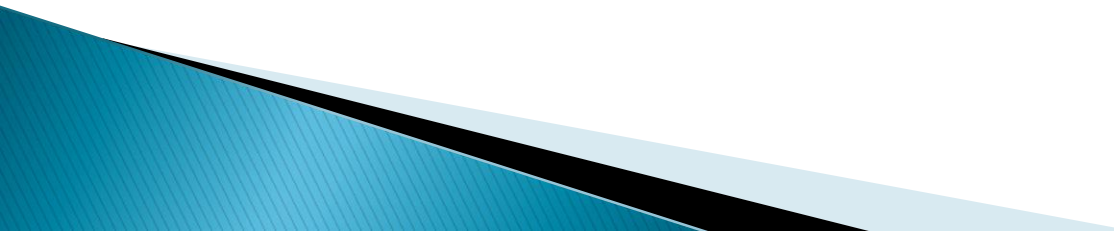
- Stimulation of the inflammatory cascade
  - Lactic acidosis
- 

# PHYSICAL FINDINGS WITH SHOCK

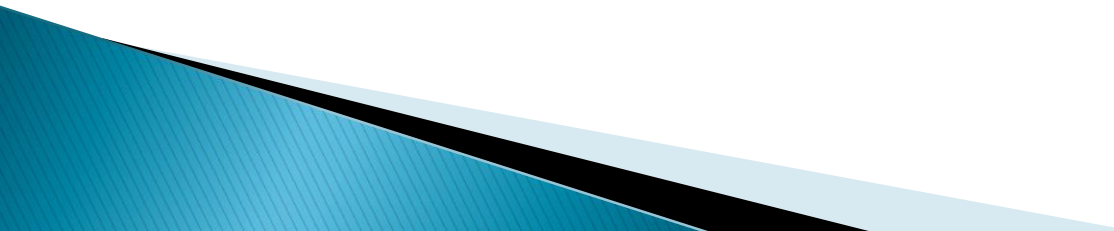
## Compensated Shock

- Tachycardia, but fairly normal BP
- Cool cyanotic extremities
- Tachypnea
- Common in children and young, healthy adults

## Uncompensated Shock

- Tachycardia
  - Hypotension
  - Tachypnea
  - Cool cyanotic extremities
  - Altered mental status (not perfusing their brain)
- 

# FOUR CATEGORIES OF SHOCK

1. HYPOVOLEMIC
  2. CARDIOGENIC
  3. DISTRIBUTIVE
  4. OBSTRUCTIVE
- 

# HYPOVOLEMIC SHOCK

## 1. Losing Fluid

Vomiting/ Diarrhea

Urine loss (DKA, hypercalcemia)

## 2. Losing Blood (hemorrhagic shock)

Trauma

GI bleeding

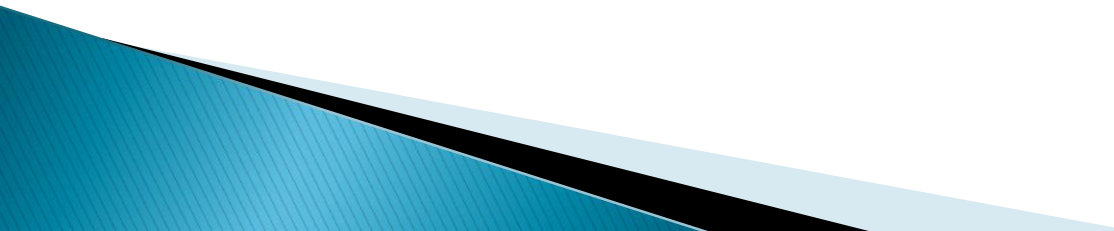
Ectopic pregnancy

Post-partum hemorrhage



# TRAUMA

Five places you will bleed to death with trauma:

1. On the floor
  2. Into the chest
  3. Into the abdomen
  4. Into the retroperitoneum
  5. Into the thighs (bilateral femur fractures)
- 

# CARDIOGENIC SHOCK

## Rhythm problem

- VT, SVT, A-fib with RVR, bradycardia

## Valve problem

- severe valvular stenosis or regurgitation

## Pump problem

- severe heart failure, acute MI
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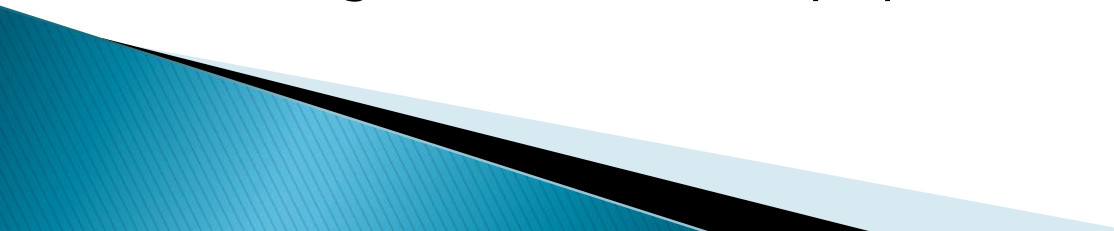
# DISTRIBUTIVE SHOCK

There is a normal intravascular volume and the pump is working normally. However, there is either extensive leaking of fluid through the capillaries or there is diffuse vasodilation.

## Capillary leak

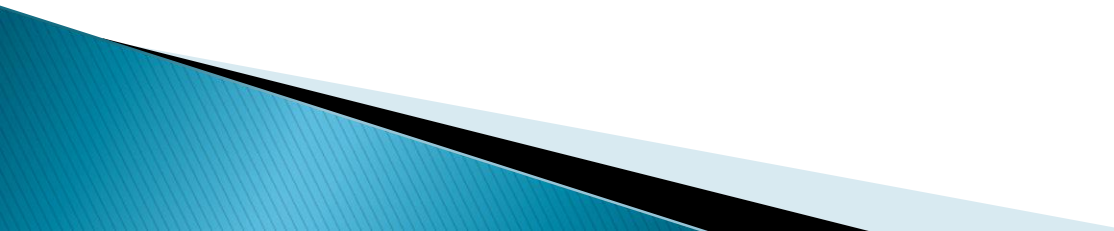
- Sepsis (septic shock)
- Extensive burns
- Severe pancreatitis
- Toxic Shock Syndrome

## Vasodilation

- Sepsis
  - Toxic Shock Syndrome
  - Anaphylaxis
  - Overdoses with antihypertensive or cardiovascular medications
  - Neurogenic shock (lose sympathetic tone)
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# OBSTRUCTIVE SHOCK

Something is blocking the forward movement of blood.

- Tension pneumothorax
  - Pericardial tamponade
  - Pulmonary embolus (large)
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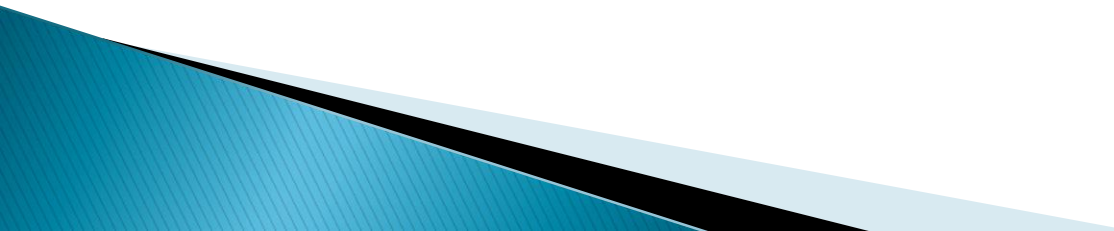


# WORK UP

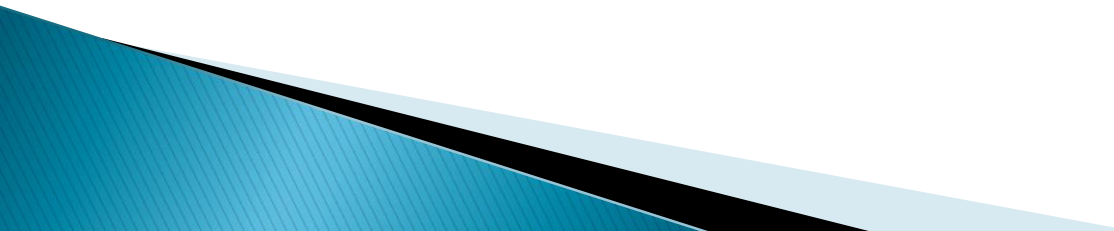
Immediately get:

- Finger stick Blood Sugar
- ECG
- 2 large bore IVs

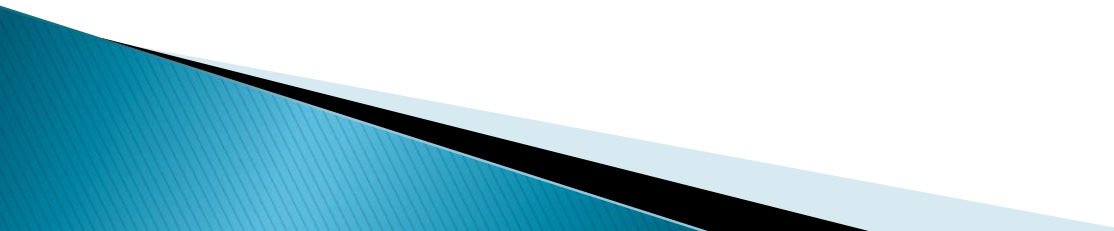
Also order:

- CBC
  - Renal Function
  - Liver Function
  - Lactate level
  - ABG
  - Cardiac enzymes
  - Urinalysis
  - CXR
  - Consider blood cultures
- 

# LACTATE IN SHOCK

- ▶ Lactate Levels have been shown to positively correlate with morbidity and mortality (the higher the initial lactate, the higher the morbidity and mortality)
  - ▶ Lactate Clearance has been shown to negatively correlate with morbidity and mortality (the greater the clearance, the lower the morbidity and mortality)
- 

# FOCUSED EXAMINATION WITH SHOCK

- ▶ Look for evidence of vomiting/diarrhea
  - ▶ Look for evidence of trauma or bleeding
  - ▶ Abdominal exam looking for tenderness or distention
  - ▶ Rectal exam for blood
  - ▶ Cardiac exam for murmur
  - ▶ Cardiac monitor and ECG early looking for rhythm and evidence of ischemia
  - ▶ Blood glucose early
  - ▶ Look for evidence of infection
  - ▶ Consider anaphylaxis or overdose
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# ULTRASOUND EXAM FOR SHOCK

RUSH – Rapid Ultrasound in Shock and Hypotension

- First published in 2009
- Reviewed in Critical Care Research and Practice 2012

# RUSH Examination

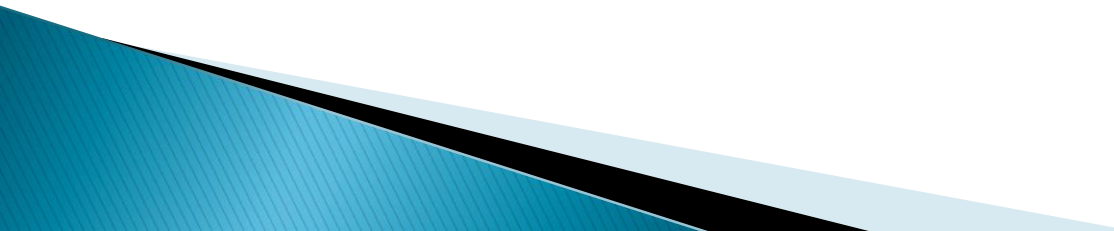
Involves six main components:

1. **Heart** (pericardial effusion, dilated RV, contractility of LV)
2. **Inferior Vena Cava** (collapsibility during inspiration)
3. **FAST exam** (free fluid)
4. **Aorta** (aneurysm > 5 cm)
5. **Pneumothorax** assessment
6. **DVT** assessment

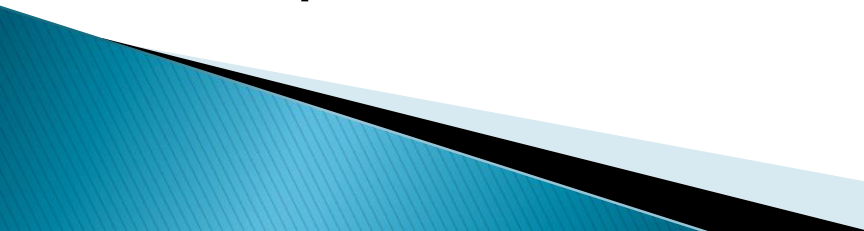
<http://emcrit.org/rush-exam/original-rush-article/>



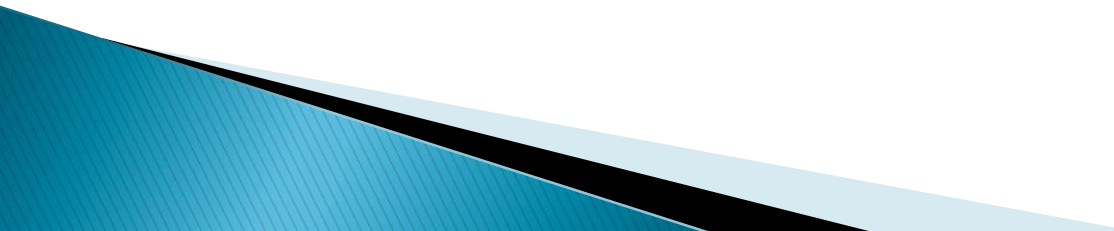
# TO MAKE IT SIMPLE: RUSH

1. Inferior Vena Cava – It tells you what to do with fluids. If the IVC collapses more than 50% during inspiration, give fluids rapidly. Repeat IVC exam after fluids are given.
  2. E-FAST exam
  3. Aorta exam
  4. DVT exam if concerned about large PE
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# TREATMENT HYPOVOLEMIC SHOCK

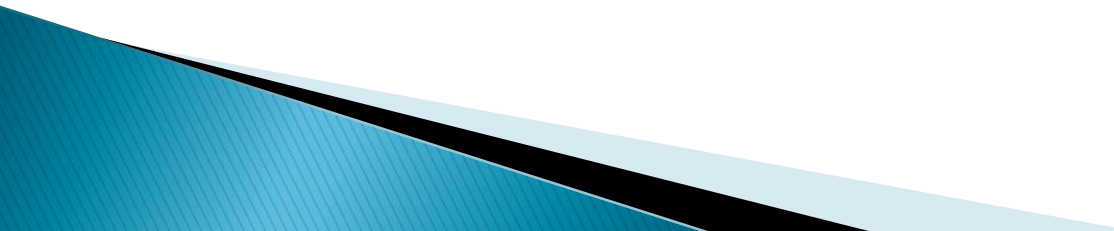
- Place at least two large bore IVs (18, 16, or 14 gauge)
  - Give 2 liters of NS or RL rapidly under pressure
  - Type and cross if bleeding
  - Get emergency blood from the blood bank if needed. O neg blood can be given to everyone. Can also use type specific blood.
  - Follow IVC by U/S – continue aggressive fluid resuscitation until IVC collapses <50% on inspiration
- 

# TREATMENT CARDIOGENIC SHOCK


- ▶ Cardiovert arrhythmias if in shock
  - ▶ Can give Atropine and externally pace if bradycardic and in shock
  - ▶ Give 500 ml of NS if needed
  - ▶ Consider vasopressors (Norepinephrine)
  - ▶ Consider dobutamine
  - ▶ Consider hyperkalemia as the cause of cardiogenic shock if widened QRS, bradycardic, and renal failure
- 



# TREATMENT DISTRIBUTIVE SHOCK

- ▶ Place 2 large bore IVs
  - ▶ Give 2 liters of NS or RL under pressure
  - ▶ Strongly consider vasopressors (Norepinephrine) after IVC collapses less than 50% with inspiration and still hypotensive
  - ▶ Consider antibiotics early if concerned about sepsis
- 

# TREATMENT OBSTRUCTIVE SHOCK

- Identify and treat the underlying cause
  - Bolus with fluid to maximize the intravascular volume
  - Needle decompression and chest tube for tension pneumothorax
  - Pericardiocentesis for pericardial tamponade
  - Consider giving TPA for massive pulmonary embolus
- 

# KEY POINTS

- Do not miss patients in compensated shock
  - Quickly identify patients in shock and treat aggressively
  - Children in shock will maintain a BP until they crash and code
  - Consider anaphylaxis or overdose if the cause is unclear
  - IV fluid boluses can be given for all causes of shock to maximize the intravascular volume
  - Vasopressors do not help in hypovolemic shock. These patients are already vasoconstricted.
- 