Septic Shock

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A 6 y.o. previously healthy boy presents to the ED with 7 days of fever accompanied by chills. Further history reveals the patient has also been experiencing dysuria for the past 6 days, abdominal pain for the past 3 days, and 2 episodes of NBNB emesis for 1 day. His Mother states that the patient has “not been acting himself” since the night prior to presentation and had been trying to control both the fever and the pain with alternating Tylenol and Motrin at home to no avail. Last dose of Tylenol given 4 hours PTA.

- **Past Medical/Surgical History:** None
- **Vaccines:** UTD
- **Allergies**: PCN (anaphylactic reaction)
- **Family History:** Non-contributory
- **Social History:** Negative

Tc **40.1** BP **76/43** HR **170** RR **35** sat 96% on RA
Wt: 20 kg (50th percentile) and Ht: 115 cm (50th percentile)

General: **Ill-appearing** and **listless**.

HEENT: Normocephalic and atraumatic. **Dry mucus membranes**. TMs clear. EOMI. PERRLA. Nares clear. No pharyngeal erythema or exudates.

Neck: Supple with no lymphadenopathy. Trachea midline.

Cardio: **Tachycardic**, but regular rhythm. No M/R/G. **Cap refill sluggish at 5 sec.** 1+ peripheral pulses.

Respiratory: **Tachypneic**. No W/R/R/C. No stridor. Breath sounds bilateral. Good air entry. Symmetric chest expansion.

GI: Abd soft and non-distended. **Suprapubic tenderness**. **+ Guarding suprapubically**. No rebound tenderness. Normoactive BS.

GU: CVA tenderness. Penis uncircumcised. Foreskin fully retractable. No surrounding erythema or pus. Testes descended bilaterally.

Musculoskeletal: Full ROM

Skin: Extremities warm to touch. No edema. No rashes or other skin lesions.

Neuro: **Disoriented**. **GCS 8/15**.

As the ED resident taking care of this patient, you immediately recognize that he is in septic shock, most likely secondary to urosepsis. What should your initial plan of management be?

A. Administer IV fluid bolus
B. Ensure that the airway and breathing are secure
C. Order STAT labs
D. Start antibiotics
E. Panic and run out of the ED, never to return to residency again

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- Septic shock is defined as sepsis plus cardiovascular dysfunction that persists despite administration of **at least** 40 ml/kg of isotonic fluid in 1 hour.
- It is characterized by dysfunction of at least 2 or more organs.
- Clinical diagnosis can be made in children based who have signs of inadequate tissue perfusion, suspected OR proven infection and two or more criteria for SIRS.

		Heart Rate	Systolic Blood Pressure	Respiratory Rate	WBC Count
School-age Children		Greater than 130 bpm	Less than 83 mm Hg	Greater than 18 breaths/min	Greater than 13.5 OR Less than 4.5

Airway and Breathing → All patients should initially receive 100% supplemental oxygen and continuous pulse oximetry. Once adequate perfusion is restored, supplemental oxygen can be titrated. Endotracheal intubation with rapid sequence intubation may be indicated (Ketamine is preferable sedation).

Correct ↓Glucose and ↓ Ca → Hypoglycemia can be corrected by rapid IV infusion of dextrose. After initial hypoglycemia is reversed, continuous infusion should maintain blood glucose between 70-150. Hypocalcemia can be corrected with 10% Ca Gluconate by slow IV infusion or IO infusion over 5 minutes.

IV Fluid Therapy → Initial therapy should be initiated with 20 ml/kg bolus of isotonic colloid (NS or LR) infused rapidly. In fluid-refractory shock, vasoactive therapy should be initiated in patients who don't respond after 40-60 ml/kg of IVFs.

Antibiotic Therapy → Antibiotics should be administered within 1 hour of presentation and after cultures are collected. Delaying antibiotic therapy can increase mortality. Delivery should be at a different port site than IVFs.

After making sure the airway is secured, you obtain IV access and administer three 20 ml/kg boluses of Normal Saline. The patient is still unresponsive so you administer a Norepinephrine infusion and start MIVFs. The patient finally responds (HR 125, BP 92/62, RR 22). Labs are obtained and you are ready to start antibiotic therapy. Which antibiotic regimen do you choose?

A. Vancomycin + Ceftriaxone
B. Vancomycin + Cefepime
C. Vancomycin + Ceftriaxone + Amphotericin B
D. Vancomycin + Meropenem + Gentamicin
E. Bactrim

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		Antibiotic Regimen
< 28 Days Old		Vancomycin + Cefotaxime + Gentamicin + Ampicillin * May add Acyclovir for suspected HSV infection *
Healthy AND > 28 Days Old		Vancomycin + Cefotaxime OR Ceftriaxone * May add Gentamicin for suspected GU infection * * May add Zosyn, Clindamycin, or Metronidazole for suspected GI infection *
Immunocompromised OR *Pseudomonas* Risk AND > 28 Days Old		Vancomycin + Cefepime * May add an Aminoglycoside or Carbapenem in locations where extended-spectrum beta-lactamase resistant bacteria are prevalent *
PCN Allergy OR Recently Received Broad-Spectrum Antibiotics		Vancomycin + Meropenem * May substitute Aztreonam OR Ciprofloxacin + Clindamycin for Meropenem *
At Risk for Fungal Infection		Add Amphotericin B OR Echinocandin (i.e. Micafungin)

- *Septic Shock: Rapid Recognition and Initial Resuscitation in Children*. Web. 25 Feb. 2015. http://www.uptodate.com/contents/septic-shock-rapid-recognition-and-initial-resuscitation-in-children?source=search_result&search=septic shock&selectedTitle=3~150.
- Dellinger RP, Levy MM, Rhodes A, et al. *Surviving sepsis campaign: internattional guidelines for management of severe sepsis and septic shock*: 2012. Crit Care Med 2013; 41: 580.