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Sepsis in the ED

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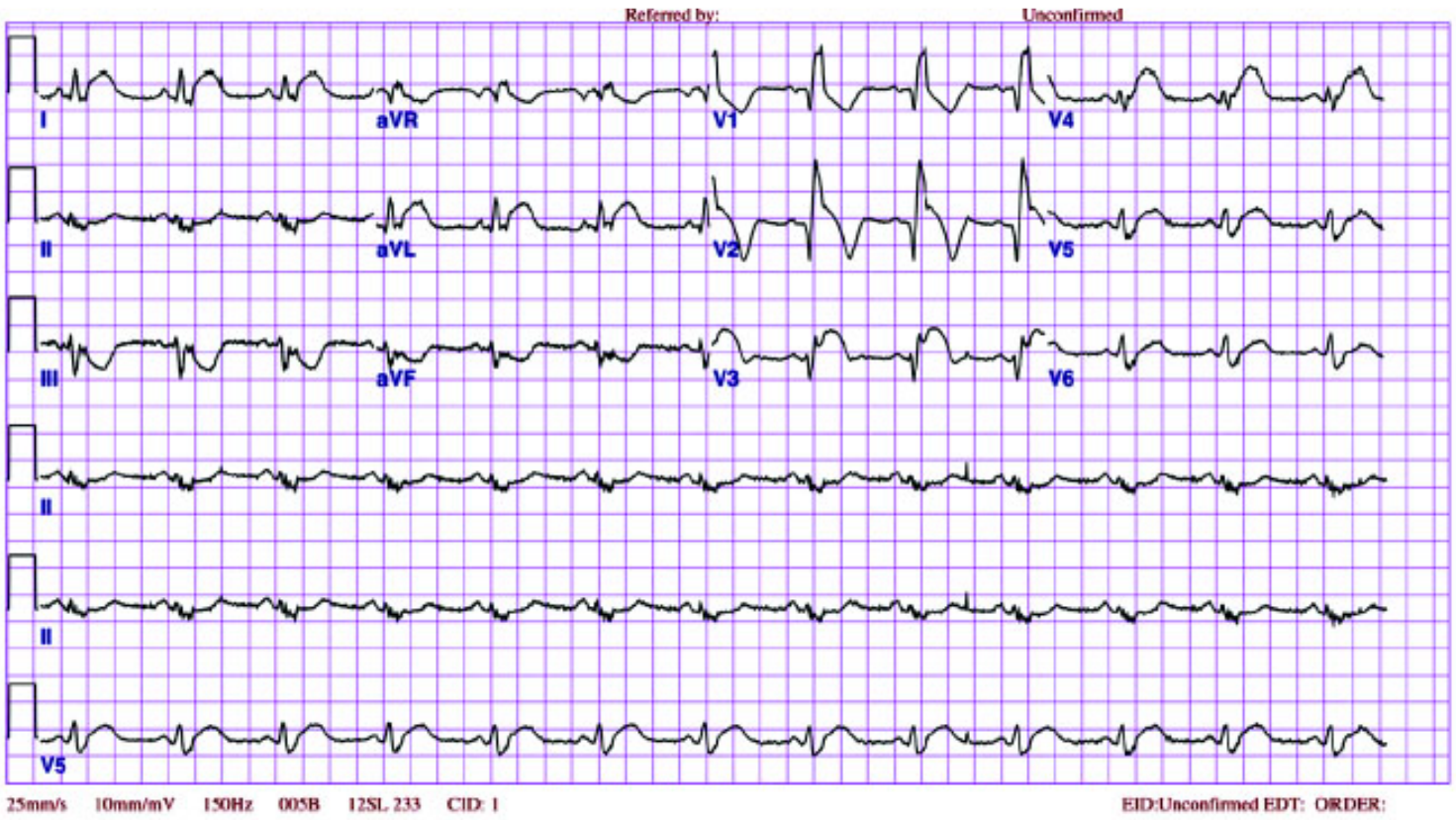
Case 1

- 75 yo male arrives to the Orange Zone, complains of chest pain and shortness of breath.
- VS P 110, BP 95/65, R 20 SaO2 91%
- PE: Pale, diaphoretic, talking in full sentences



PD-INEL Source Undetermined

Case 2

- 65 year old female, had the sudden onset of dysarthria, R sided hemiparesis about 1.5 hrs ago
- VS P 75 BP 155/75 R 16 SaO2 96%
- PE: Airway intact but drooling, R sided hemiparesis

Case 3

- 76 yo female, has been feeling generally weak for the last few days. Thought she had a fever today and came to ED.
- VS: 88/54, hr 105, t 38.5, 95% RA
- PE: Seems drowsy but will talk when stimulated, nl chest and abd exam

Who is most likely to die in the next 30 days?

- Case 1 — Acute MI - 9%
- Case 2 — Cerebrovascular Accident - 15%
- Case 3 — Septic Shock - 40%

Sepsis, Some Definitions

- SIRS: Systemic Inflammatory Response Syndrome
- Sepsis: SIRS + presence of known or suspected infection
- Severe Sepsis: Sepsis + end organ dysfunction
- Septic Shock: Sepsis + Shock

SIRS = 2 or more

- T >38 or < 36
- HR > 90
- RR > 20
- WBC > 12 K or < 4 K

What does the pt in case 3 have?

88/50, hr 105, t 38.5, rr 20, 95% RA

What if her vitals were…

100/65, hr 105, rr 20, t 38.5, 95% on RA

Sepsis Demographics

- 750,000 cases of severe sepsis in North America each year
- 200,000 cases of septic shock each year
- 30-35% mortality for severe sepsis
- 50% mortality for septic shock

Surviving Sepsis Campaign

Pathophysiology of Sepsis

- Triggered by bacterial toxins and inflammatory cascade
- Progressive end-organ dysfunction
  - Tissue hypoxia from inadequate O2 delivery
  - Mitochondrial dysfunction
  - Microthrombi deposition at capillary level
- Distributive shock

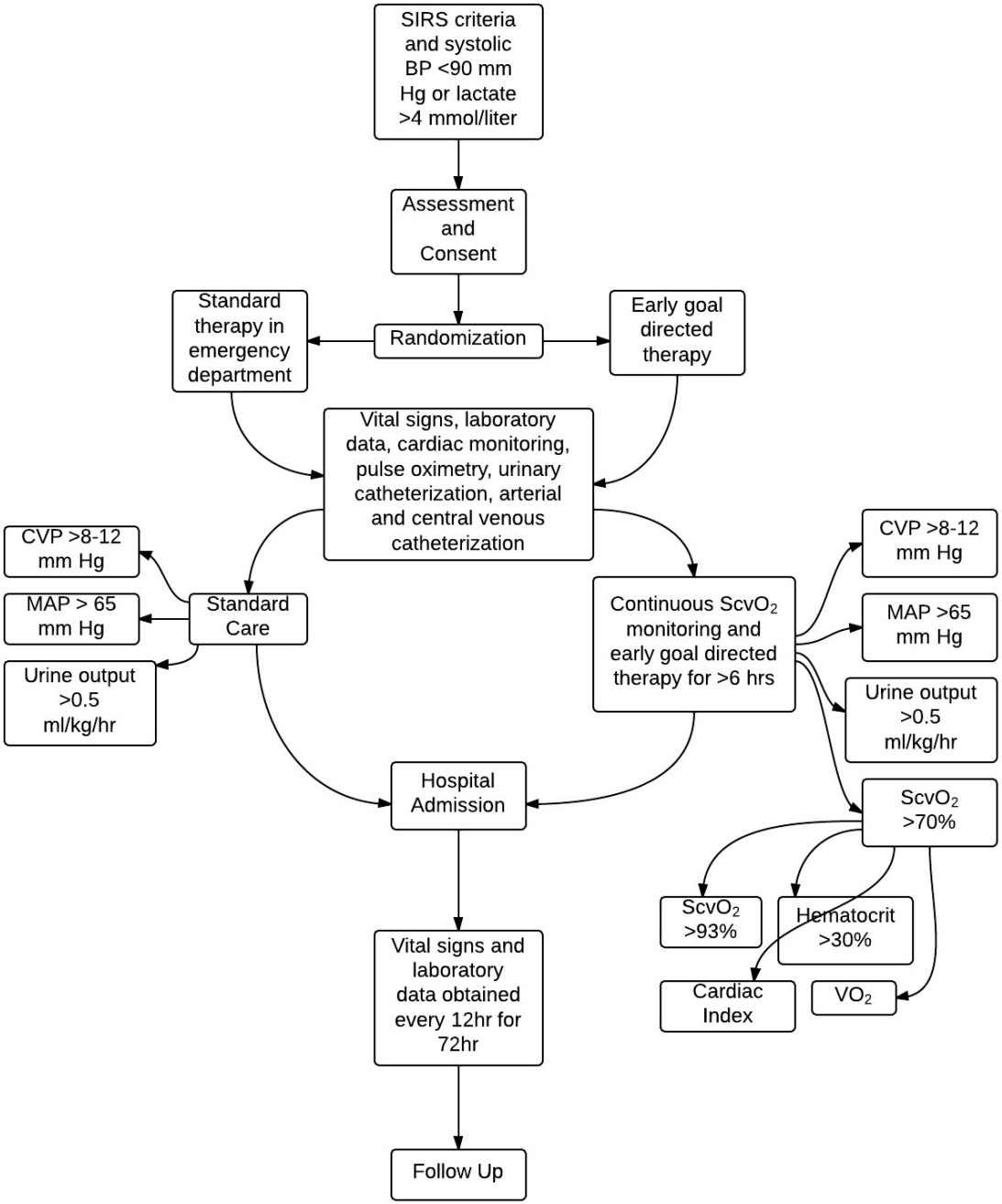
Severe Sepsis

- End-organ dysfunction
  - Altered mental status
  - Decreased urine output
  - Acute lung injury
  - Coagulopathy
  - Cardiac dysfunction
- Lactic Acidosis

Early Goal Directed Therapy

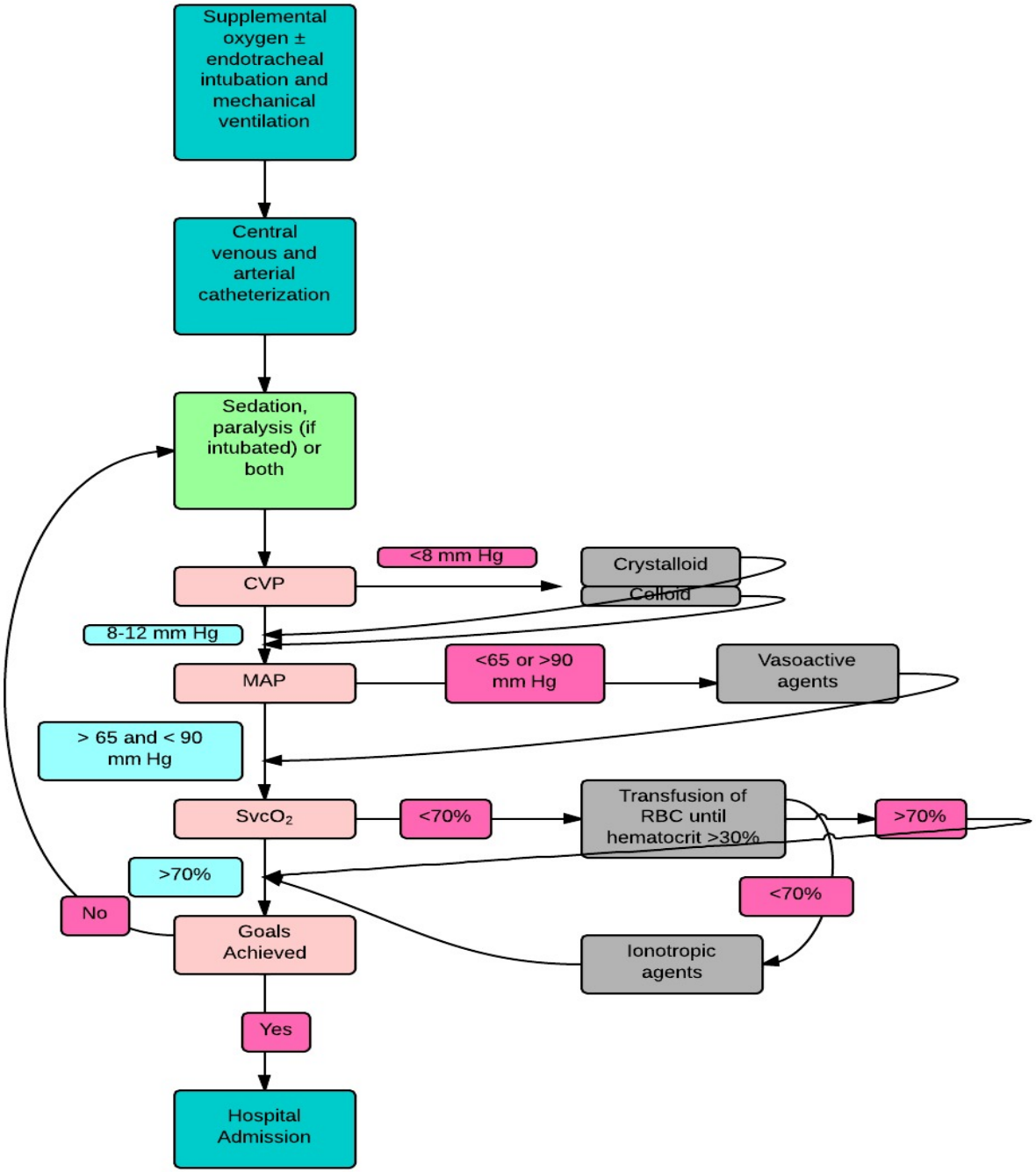
- Patients with severe sepsis or septic shock (sbp < 90 after 20-30 cc/kg bolus over 30 min OR lactate > 4)
- Randomized to normal ED care vs EGDT

Rivers et al. 2001 N Eng J Med: 345(19):1368



Lena Carleton, University of Michigan
Original Image: Rivers et al. 2001 N Eng J Med: 345(19):1368

Early Goal Directed Therapy in the Treatment of Severe Sepsis and Septic Shock



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EGDT Decreases Mortality

- In Hospital Mortality
  - Standard Therapy: 46.5%
  - EGDT: 30.5%
  - ARR: 16.5%
  - NNT: 7
- 28 Day Mortality
  - Standard Therapy: 49.2%
  - EGDT: 33.3%
  - ARR: 15.9%
  - NNT: 7
- 60 Day Mortality
  - Standard Therapy: 56.9%
  - EGDT: 44.3%
  - ARR: 12.6%
  - NNT: 8

Rivers et al. 2001 N Eng J Med: 345(19):1368

Implementing EGDT Reduces Mortality

- Carolinas Medical Center - Puskarich et al Crit Care Med 2009;13:R167
  - 1 year mortality pre-implementation vs post-implementation of EGDT protocol: 49% vs 37% P = 0.04 (ARR 12%, NNT 8)
- Robert Wood Johnson Medical Center - Trzeciak et al Chest 2006;129(2):225-232
  - In-hospital mortality pre vs post implementation of EGDT protocol: 43.8% vs 18.2% P = .09 (ARR 25.6%, NNT 4)
- Loma Linda - Nguyen et al Crit Care Med 2007;35(4):1105-12
  - EGDT Sepsis Bundle if completed decreases in-hospital mortality: 20.8% vs 39.5% P < .01 (ARR 18.7, NNT 6)

Do you need the whole package?

- Isn’t it enough to place a line and do appropriate blood pressure and fluid management?
- Do I really need to do the whole package if their vital signs stabilize?

ScvO2

Just placing a line is not enough

- Septic patients who were normoxic (ScvO2 70-89%) had lower mortality rate than those with hypoxia (ScvO2 < 70%)
  - 22% (95% CI 18-27%) vs 40% (95% CI 29-53%)
- Septic patients who were initially hypoxic but were resuscitated through EGDT and became normoxic within 6 hrs, had similar mortality rates to those who were initially normoxic.
  - 22% (95% CI 18-27%) vs 19% (95% CI 13-25%)

Pope et al. Ann Emerg Med January 2010

Cryptic Shock
Normalized VS Are Not Enough

- 86% of standard therapy group had normalization of vitals signs by 6 hrs (MAP > 65, CVP > 8, UOP > 0.5 ml/kg/hr) vs 95% of EGDT group
- 39.8% had persistent global tissue hypoxia (elevated lactate or ScvO2 < 70) compared to 5% of EGDT group
- In house mortality for this group with cryptic shock was 56.5% vs 30.5% for EGDT group

Otero et al Chest 2006;130:1579-1595

Sepsis Bundle Goals

1. Initiate CVP/ScvO2 monitoring within 2 hrs
2. Antibiotic administered within 4 hrs
3. EGDT complete within 6 hrs
4. Corticosteroid given if persistently hypotensive despite vasopressors
5. Lactate monitored for clearance

Nguyen et al Crit Care Med 2007;35(4):1105-12

Sepsis Protocol

- Identifying Appropriate Patients
- Nurse Initiated Sepsis Order Set
  - Labs
  - Telemetry
  - Initiation of IVF
- Activation of Sepsis Protocol if pt persistently hypotensive or lactate > 4.

Appropriate Patients

- Inclusion Criteria: SIRS criteria with known or suspected infection
- Exclusion Criteria:
  - Acute cerebral vascular event
  - Acute coronary syndrome
  - Acute pulmonary edema
  - History of congestive heart failure

Nurse Initiated Order Set

- Labs
  - Lactate drawn first (to avoid prolonged tourniquet time)
  - cbc, cmp, troponin, blood cxs x 2
  - UA - cath UA if unable to void in 30 min
- Other Studies
  - Cxr - if respiratory symptoms, RR > 20, or hypoxemia
  - EKG - if hypotensive, tachycardic, or having chest pain or SOB
- Telemetry
- If sbp < 90 or lactate > 4
  - Notify MD immediately
  - Initiate IVF with 20 cc/kg NS IV over 30 min
  - Re-assess after IVF

Sepsis Protocol

- Initiate if SBP < 90 after 20 cc/kg bolus or Lactate > 4
- Notify ED Physician
- Move pt to Room 1 or 2 if available
- Page out “sepsis protocol in ED now” to:
  - ED pharmacist
  - MICU attending
  - MICU resident

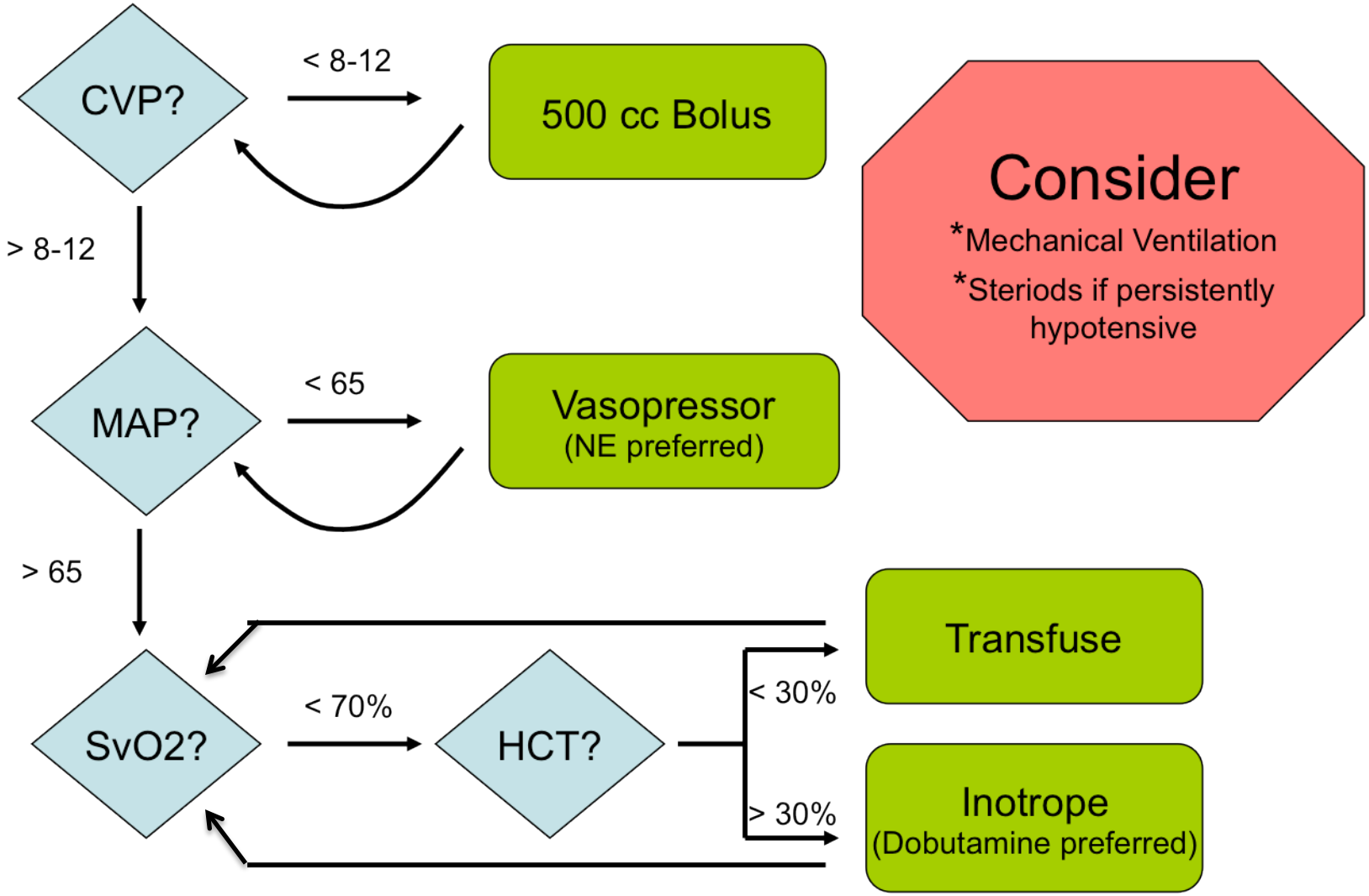
Central Line Placement < 2hrs

- Nursing/EMT will do sterile prep for central line
  - Discuss planned site and type of catheter with MD
  - Position the patient
  - Prep and drape the patient
  - Open and prep the central line kit
  - Notify MD that central line is ready for placement
- MD will place line with Nursing/EMT sterile assistance
- CVP monitoring to be recorded with vital signs
- Labs
  - VBG with lactate off central line
  - PT/INR, PTT
  - Type & Screen
- STAT pcxr for line placement

Early Antibiotics < 4hrs

- Broad Spectrum
- Ensure blood cxs drawn x 2
- ED pharmacist facilitates

EGDT



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Summary

- Sepsis and septic shock are common presentations in the ED
- Vital signs are vital in defining sepsis
- Early recognition and prompt treatment of sepsis can significantly reduce mortality

Questions?