Prehospital/Transport

- Use an early detection and treatment protocol (EMS personnel)

Potential Sepsis

- Early Recognition: ED
  - As part of triage, routinely screen for sepsis; components may include:
    - Fever
    - Hypotension
    - Tachycardia
    - Tachypnea
    - Unimpaired consciousness (UOC)
  - Notify MD of potential sepsis
  - Initiate standard sepsis order set (bundled)

- Early Intervention: ED, IP, ICU
  - 3-hour bundle (9-hour if IP or ICU)
    - Measure lactate level within first hour
    - Obtain 2 blood cultures prior to antibiotic administration (if antibiotics not delayed >1 hour); consider cultures from other potential infection sites (e.g., urine, CSF, sputum)
    - Give broad-spectrum antibiotics (1B) within 1 hour of recognition (1B; septic shock)
    - If hypotensive or lactate >4 mmol/L, provide fluid resuscitation with 30 mL/kg crystalloid
    - Consider albumin if large volume of crystalloids needed
    - Obtain labs for organ dysfunction or inflammation (e.g., creatinine, bilirubin, INR, platelets, CRP, procalcitonin)
    - Target resuscitation to achieve normal lactate level
    - Do timely transfer to ICU as indicated
  - Sepsis order set includes (3- and 6-hour bundles)
  - Standardized sepsis protocol w/reminders
  - Antimicrobial guide/algorithms
  - Lactate: % of patients with lactate measured within 1 hour of triage/recognition
  - Blood culture: % of patients with blood cultures drawn before antibiotics
  - Antibiotics: % of patients who received broad spectrum within 1 hour of recognition (IP, ICU) or within 3 hours of triage (ED)
  - Fluid resuscitation: % of patients who received appropriate fluid resuscitation (30 mL/kg crystalloid); % of patients with fluid resuscitation within 1 hour of recognition (IP, ICU) or 3 hours of triage (ED)
  - 3-hour bundle: % of eligible patients for whom all components of 3-hour bundle were met; time from triage to recognition of completion bundle

- Early Therapy for Sepsis (6-hour Bundle)
  - 6-hour bundle:
    - Give vasopressors for hypertension that does not respond to initial fluid resuscitation, maintain MAP ≥ 65 mm Hg; use norepinephrine before other vasopressors (1B)
    - If persistent arterial hypotension after initial fluid administration (MAP < 65 mm Hg) or initial lactate ≥ 4 mmol/L, reevaluate volume status and tissue perfusion and document findings with:
      - Repeat focused exam (after initial fluid resuscitation) by licensed independent practitioner (vital signs, cardiopulmonary, capillary refill, pulse, skin findings)
    - OR two of the following:
      - Measure CVP
      - Measure SvO2
      - Bedside cardiovascular ultrasound
      - Dynamic assessment of fluid responsiveness with passive leg raise or fluid challenge
    - Note: Central line placement is no longer required
    - If initial lactate was elevated, repeat lactate measure
  - Sepsis order set includes (3- and 6-hour bundles)
  - Early goal-directed therapy checklist
  - Vasopressors: % of patients who received vasopressors within 6 hours; % of patients who receive norepinephrine before other vasopressors
  - Volume status/tissue perfusion: % of eligible patients with documented volume status and tissue perfusion findings within 6 hours
  - Repeat lactate: % of eligible patients who had repeat lactate within 6 hours
  - 6-hour bundle: % of eligible patients for whom all components of 6-hour bundle were met; average time to completion of 6-hour bundle

- Supportive Therapy of Sepsis: ICU
  - Continue goal-directed therapy from 6-hour bundle (1C)
  - For sepsis-induced ARDS, target tidal volume of 6-ml/kg predicted body weight (1A); measure plateau pressures (1B); apply PEEP (1B)
  - For mechanically ventilated patients, minimize continuous or intermittent sedation (1B); target specific titration endpoints; elevate head of bed 30-45 degrees (18; follow ventilator protocol (1A)
  - For hemoglobin < 7 g/dL after tissue hypoperfusion has resolved, transfuse RBC to target a concentration of 7-9 g/dL in adults (1B)
  - For persistent hypotension, consider low-dose steroids with standardized ICU policy within 24 hours
  - % compliance with ventilator weaning protocol (if data available)
  - Ventilator days
  - Time on vasopressors

Sepsis Outcomes Improvement Packet

LEGEND

- Outcome Metrics
- Process Metrics
- Recommended initial improvement focus areas
- Recommended standardized knowledge assets
- Areas to prevent or avoid OR areas to consider only after careful review of indicators
- Time-measured processes

ABBRIVATIONS

- ICU: Intensive Care Unit
- ED: Emergency Department
- IP: Inpatient
- SSC: Sepsis and Septic Shock
- MD: Medical Doctor
- SEP: Sepsis
- BUN: Blood Urea Nitrogen
- CrCl: Creatinine Clearance
- LFT: Liver Function Tests
- ALT: Alanine aminotransferase
- AST: Aspartate aminotransferase
- TBL: Total Bilirubin
- INR: International Normalized Ratio
- WBC: White blood cells
- CRP: C-reactive protein
- CPR: Cardiopulmonary resuscitation
- CRP: C-reactive protein
- LFT: Liver function test
- PTT: Partial thromboplastin time
- APTT: Activated partial thromboplastin time
- BD: Blood draw
- MD: Medical Doctor
- RN: Registered Nurse
- Sepsis: Life-threatening organ dysfunction caused by a dysregulated host response to infection, includes severe sepsis (prospects 3)
- Septic shock: A subset of sepsis in which underlying circulatory and cellular/metabolic abnormalities are profound enough to substantially increase mortality in excess of 40% (sepsis 3)

BEST PRACTICE PRACTICES

- Unless otherwise indicated, key best practices are from:
  - Practices with the strongest recommendation level (Grade A and B) and high to moderate quality of evidence (Class A or B), based on the grading system used in the above guidelines, are noted as such.
  - See the Sepsis Outcomes Improvement Packet for aims, interventions, and sources related to each of these areas of focus.

Electronic Medical Record (EMR)
- Billing: Professional and Hospital
- Financial

Home

Discharge
- Provide antibiotics and other discharge medications
- Establish pain management plan
- Instruct patient/family on wound treatment, monitoring signs and symptoms
- Make follow-up appointments

Care Facility
- % of patients with patient/family education documented
- % of patients with follow-up appointment scheduled
- % of patients discharged to home versus care facility

Monitoring/Maintenance
- Identify and control infection sources within 12 hours if feasible
- Reassess antibiotic regimen daily for potential deescalation (1B)
- Manage blood glucose per protocol; target upper blood glucose ≤ 180 rather than ≤110 mg/dL (1A)
- Provide daily VTE prophylaxis (1B)
- Provide stress ulcer prophylaxis with H2 blocker, or proton pump inhibitor if bleeding risk (1B)
- Discuss goals and prognosis with patients and families (1B); incorporate goals into treatment and end of life care (1B)

Financial
- Variable cost per case

Supportive Therapy of Sepsis: ICU
- Time on vasopressors
- % of eligible patients for
- Time on vasopressors
- Discharges to home (vs. long-term care)