SEPSIS NOW A PRIORITY: DEVELOPMENT AND IMPLEMENTATION OF A SEPSIS ALGORITHM IN THE EMERGENCY DEPARTMENT OF AN ACADEMIC HOSPITAL USING AN INTEGRATED KNOWLEDGE TRANSLATION APPROACH

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Introduction: Sepsis is a leading cause of in-hospital mortality, and is growing in incidence. The crude mortality rate for all patients presenting to hospital with sepsis is approximately 30%. Recognizing the importance of sepsis, Mount Sinai Hospital (MSH) has been interested in improving sepsis recognition and management for several years. We undertook a retrospective audit of 364 charts of patients diagnosed with sepsis at MSH in 2010-2011 to understand existing management practices and opportunities for improvement.

Objectives: The aim of the sepsis algorithm project was to improve sepsis management and outcomes by identifying patients as early as possible, and to provide them with rapid, protocolized care in the MSH emergency department (ED).

Methods: The prior chart audit was the basis for the development of the SNAP recognition and management algorithm, and allowed for gaps or deficiencies in care to be addressed within the algorithm. The practice changes that were then implemented in the ED were: 1) employment of the SNAP algorithm into the ED with aggressive timelines for clinicians in order to quickly identify and treat septic patients; 2) pre-printed order sets for initial and ongoing management of sepsis; 3) development of a patient tracking board sepsis symbol with linked data collection reports; 4) revised electronic order set for sepsis symptoms; and 5) revised nursing medical directives that align with the algorithm.

Results: The SNAP algorithm was implemented on July 21st, 2014. Data collected to date has demonstrated that the timelines of the algorithm are being met and that septic patients are being flagged at triage and treated swiftly. On the first week of implementation there were a total of twelve cases of sepsis of which ten met the algorithm blood work timelines (83%). Ongoing post-implementation review that evaluates the algorithm usage by assessing patient outcomes: mortality, morbidity, length of stay and process measures (i.e. time to diagnosis, time to appropriate antibiotic, etc.) will continue to occur.

Conclusion: The ability to recognize sepsis early is essential to improving outcomes. Sepsis can be easily missed, as there is no single lab parameter or symptom cue to the health care team for sepsis. The intent of the SNAP algorithm is to allow for early recognition of septic patients, early intravenous fluids and early antibiotics. By implementing this concise quality improvement tool that optimizes diagnosis and treatment, we hope to improve outcomes for patients with sepsis.

References: N/A
MSH ED Sepsis Recognition and Management Algorithm

**0 minutes**
- **Identify Sepsis**
  - If they have a suspected infection OR
  - If patient has any of the following risk factors:
    - Hospitalized in the last 3 weeks
    - Receiving treatment for active cancer
    - Invasive catheter present
    - Central line present
  - AND
  - 2 or more of the SIRS variables
  - OR
  - Unexplained low blood pressure
  - OR
  - Triage patient as a CTAS 2 or 1 and assign to major triage nurse to trigger sepsis flag in FirstNet
  - Notify team leader and major NO to sign sepsis pre-printed order set

**5 minutes**
- **Resuscitate**
  - Primary nurse to complete the following utilizing the ED sepsis symptom order set as signed by major NO:
    1. Apply oxygen to maintain O2 sat greater than or equal to 90% consult RT if patient does not respond to O2 therapy or requires >12% greater than or equal to 50% oxygen therapy
    2. Start two 18-20 gauge IVs and include 1 liter of normal saline over 30-60 minutes
    3. Start sepsis blood work in priority sequence: CRP, WBC, L/D, glucose, hemo, bUN, creatinine, INR, aPTT and liver enzymes, albumin, blood cultures x 2
    4. FBS
    5. Chest x-ray if appropriate by medical directive
    6. Start ongoing vital signs q30 minutes and PRN

**35 minutes**
- **Refine Diagnosis and Management**
  - Patient investigation suggests sepsis
    - NO
      - Major doctor to consider alternate diagnosis and continue ongoing management primary nurse to repeat VBG with lactate level in 2 hours from start of first bolus
    - YES
      - Major doctor to initiate further investigation and antibiotics [*see guidance in reverse]
        - if CT scan and/or ultrasound required follow sepsis imaging protocol
        - Primary nurse to:
          - assess fluid resuscitation status
          - monitor urine output
          - if MAP less than 65 increase 2nd liter of normal saline and immediately notify doctor
          - continue vital signs q30 minutes and PRN
          - repeat VBG with lactate level in 2 hours from start of first bolus

**Completion time 65 minutes**
- Ongoing monitoring
  - Refer to appropriate service for reassessment of antibiotic therapy
    - NO
    - Patient remains hypotensive with MAP less than 65 and/or high lactate concentrations greater than or equal to 3mmol
      - YES
    - Major doctor to discuss goals of care with the patient/relative/decision maker
      - Major doctor to consult ICU and/or appropriate service and consider central line or arterial line insertion and vasopressor or transfusion fluids and antibiotic therapy
**Antibiotic Recommendations**
Antibiotics and doses provided are appropriate for first time dose, patients with no known allergies and normal renal function
Please consult pharmacy if necessary

1) **Community Acquired Pneumonia:** ceftriaxone 1g IV q24h + azithromycin 500mg IV daily

2) **Community Acquired Urinary Tract Infection:** ampicillin 2g IV q6h + ceftriaxone 1g IV q24h

3) **Community Acquired Intra Abdominal Infection:** ceftriaxone 1g IV q24h + metronidazole 500mg IV q12h

4) **Febrile Neutropenia:** piperacillin-tazobactam 4.5g IV q8h + gentamicin(5mg/kg) IV q24h

5) **Undifferentiated Sepsis and/or Hospital Acquired Infection (hospital exposure within the last 6 weeks):** piperacillin-tazobactam 4.5 g IV q8h + vancomycin 15mg/kg IV q12h +/- gentamicin (5mg/kg) IV q24h (for hospital acquired infection)

Best practice guidelines can be found under clinical tools on the intranet or at www.antimicrobialstewardship.com