Sepsis Screening Tools
Amanda Venable MSN, RN, CCRN

CASE

Mr. H is a 67-year-old man status post hemicolectomy four days ago. He was transferred from the ICU to a medical-surgical floor at 1700 last night. Overnight the nurse called the house officer regarding urine output less than 0.5ml/kg/hr and tachycardia of 105 beats per minute. The house officer ordered a one liter NS bolus. This morning the patient is exhibiting signs and symptoms of severe sepsis, including temperature 103.5°F, HR 117 beats per minute, mean arterial pressure 58 mmHg, decreased level of consciousness, and decreased urine output. His WBC is 21,000/µL. The patient is now critically ill and is being transferred to a critical care unit. Could there have been a better way to identify the problem the night before and intervene before this change in status became severe?

DISCUSSION

Scenarios like the one above occur commonly in hospitals. A study of septic patients in a surgical intensive care unit (SICU) showed that 47% of the patients admitted with sepsis, severe sepsis, or septic shock came from a surgical floor 1. Patients who develop sepsis as inpatients present different challenges from patients who present to the hospital with sepsis.

According to the Institute for Healthcare Improvement (IHI), the incidence of sepsis has increased to 750,000 new cases per year with at least 210,000 fatalities 2. Seventeen percent of hospitalizations with the diagnosis of septicemia or sepsis result in death compared with only 2% of other types of hospital admissions 2. Besides having a high mortality rate, sepsis can cause long periods of debilitation. Thirty-six percent of patients hospitalized with sepsis are transferred to other facilities, such as long term care, compared to 14% of other types of inpatients. Implementation of Early Goal Directed Therapy (EGDT) improves sepsis survival 3. However, early recognition of sepsis in the inpatient setting can be a challenge.

Early recognition of sepsis is imperative in improving mortality rates. A 2001 study showed improvement in mortality rates only if EGDT is initiated within six hours 4. The challenge is the complexity of sepsis which prevents early recognition from occurring consistently, particularly on medical-surgical units. However, clinical knowledge alone does not guarantee sepsis will be recognized. The clinician must have time to review patient data and determine whether the patient has signs of sepsis. This is challenging in today’s fast-paced clinical environment. The complexities of sepsis recognition can be overcome by implementing a systematic recognition program for sepsis. Screening tools are widely available and are effective in the recognition of sepsis 4-6.

It is important for each healthcare facility to choose a method for screening which is congruent with the workflow of the facility. A few of the considerations include:

1. Who should do the screening?
2. How often should the screening be done?
3. Should the screening be done on paper or electronically?

Although physicians and other healthcare providers have the ultimate responsibility in determining if a patient is septic, their contact with the patient is...
limited compared to the contact the nursing staff has with the patient. The requirement for early recognition makes it necessary for the nursing staff to be able to recognize potential sepsis in the patients and report findings to healthcare providers. Many institutions utilize the primary nurse for completing screening tools while others use charge nurses or rapid response teams. The frequency of screening is also a difficult question because some of the SIRS criteria, such as lab values, would have data points only once a day, while others, such vital signs, have more continuous assessments. Studies have examined screening tools used at a wide range of frequencies. Some screening tools are completed only on admission and with any sign of patient deterioration; others are done every time a new set of vital signs is entered into the medical record. Hospitals still using paper charting will implement a paper sepsis screening tool. Hospitals with electronic medical records may consider partially automating the screening tool using data already entered by nursing and ancillary staff. A multidisciplinary team should be formed in each institution to determine the best method for sepsis screening for the facility.

The University Medical Center Health System Critical Care Collaborative is a multidisciplinary team formed to improve the quality of critical care delivered in the facility. The Collaborative determined the need for a sepsis screening tool and developed one individualized for the facility based mostly on the screening tools available on the IHI website. The screening tool was completed by the primary care nurse on admission to the intensive care unit to determine its potential utility. After a one month trial it was determined the tool was adequate for identifying sepsis. However, use of the tool was not consistent because the tool was on paper and our hospital utilizes an electronic medical record. The Critical Care Collaborative worked with information technology professionals to develop an electronic sepsis screening tool. This tool works by “firing a rule” every time a nurse completes a head to toe assessment on the patient. The rule prompts the computer system to look for criteria identifying sepsis as the paper sepsis screening tool does. If the patient is identified as potentially having sepsis according to the computer,

**Key points**

1. Sepsis has a high morbidity and mortality.

2. Inpatients who develop sepsis may have delays in evaluation, testing, and treatment.

3. Sepsis screening tools based on SIRS criteria can provide a rapid method to help identify sepsis.

4. These tools are potentially useful for all health care providers but need to be used consistently.

**Key words-** sepsis, screening, electronic record, surviving sepsis guidelines
Figure 1. Paper Sepsis Screening Tool

University Medical Center Adult ICU
Sepsis Screening Tool

Step 1:
Is the patient already being treated for sepsis?  _____Yes  _____No
If answer is yes, STOP.
If answer is no, CONTINUE to step 2

Step 2: (Two or more of the following)
A) Sepsis Criteria
   _____ Temp > 100.9 or < 96.8 (in the last 24 hours)
   _____ HR > 90 (in the last 24 hours)
   _____ Respiratory Rate >20 or PaCO2 < 32 (in the last 24 hours)
   _____ WBC >12000, < 4000, or > 10% Bands
B) Other possible indicators
   _____ Acute change in Level of Consciousness
   _____ Glucose > 120 in non-diabetic
If less than two items checked, STOP.

Step 3: Infection (Suspected or Confirmed)
Does this patient have a suspected or confirmed source of infection?  _____Yes  _____No
(Such as: Pneumonia, Invasive Catheter, UTI, Decubitis Ulcer, Acute Abdomen, Colitis, Meningitis, Pancreatitis, Cellulitis, Bone/Joint, or Wound)
If answer is NO, STOP.
If answer is YES, continue to step 4 and contact physician if necessary. The patient may have SEPSIS.

Step 4: Organ Dysfunction
   _____ Acutely altered mental status
   _____ SBP <90 or MAP <65
   _____ SPO2 < 90%
   _____ Creatinine > 2 mg/dl or urine output < 0.5 mg/kg/hr
   _____ Platelet count < 100,000
   _____ Bilirubin >2mg/dl, AST>90, ALT >90
   _____ Lactate > 2mmol/L
If one or more items are checked the patient may have SEVERE SEPSIS.

Step 5. If patient screens positive for SEPSIS or SEVERE SEPSIS, CALL PHYSICIAN NOW (if not already aware).
   _____ Early Goal Directed Therapy for Adult Sepsis orders were implemented
   _____ Early Goal Directed Therapy for Adult Sepsis orders were NOT implemented
WHY__________________________________________

Date ___________________________   Time___________________________
Not Part of the Medical Record
Figure 2. Electronic Sepsis Screening Tool
Sepsis Screening Tool (Complete form)
### Sepsis Screening Tool (In Sections)

#### Sepsis Screening Tool

- **Date/Time of Last Blood Culture and Lactate:**
  - Last Blood Culture: 04/01/2013 14:01 Status: In Process
  - Last Lactate: 04/02/2013 15:37

#### Vital Signs that met or exceed SIRS/Sepsis criteria within the previous 24 hours.

- **Heart Rate**
  - Date/Time: 04/01 16:00 Heart Rate: 103 bpm
  - Date/Time: 04/02 16:00 Heart Rate: 101 bpm

- **Respiratory Rate**
  - Date/Time: 04/01 16:00 Respiratory Rate: 12 bpm
  - Date/Time: 04/02 16:00 Respiratory Rate: 10 bpm

#### Lab values that meet or exceed SIRS/Sepsis criteria within previous 24 hours.

- **White Blood Cells**
  - Date/Time: 04/06 05:20 WBC: 16.7 K/uL

- **Platelets**
  - Date/Time: 04/05 05:20 Platelets: 63 K/uL

- **Bilirubin**
  - Date/Time: 04/06 06:10 Bilirubin: 5.2 mg/dL

#### Does the patient meet any of the following SIRS criteria?

- [ ] Temperature greater than 100.3 or less than 36.0
- [ ] Heart rate greater than 90
- [ ] Respiratory rate greater than 20 or PaCO2 less than 32
- [ ] WBC > 12,000 or < 4000 or >10% bands
- [ ] Acute change in level of consciousness
- [ ] Glucose greater than 120 and on insulin or diabetic

#### Does the patient have a suspected or confirmed infection?

- [ ] Pain
- [ ] Acute abdomen
- [ ] Bone/Joint
- [ ] Urinary
- [ ] Skin
- [ ] Septic
- [ ] Ascites
- [ ] Invasive catheter

#### Other Suspected or Confirmed Infection:

#### Vital Signs that met or exceed Organ Dysfunction criteria within the previous 24 hours.

- **Mean Arterial Pressure**
  - Date/Time: 04/04 15:00 MAP: 64 mmHg

- **PaO2**
  - Date/Time: 04/03 15:00 PaO2: 78 mmHg

#### Lab values that meet or exceed Organ Dysfunction criteria within the previous 24 hours.

- **Creatinine**
  - Date/Time: 04/02 05:20 Creatinine: 6.3 mg/dL

- **AST**
  - Date/Time: 04/02 05:20 AST: 100 IU/L

#### Does the patient meet any of the following Organ Dysfunction signs/symptoms criteria?

- [ ] Patient does not meet any of the listed criteria
- [ ] Acute alteration of mental status
- [ ] SpO2 less than 90%
- [ ] Platelet count less than 100,000
- [ ] Lactate greater than 2 mmol/L
- [ ] SBP less than 90 or MAP less than 65
- [ ] Creatinine > 2 mg/dL or urine output < 0.5 mg/dL/hr
- [ ] Bilirubin > 2 mg/dL, AST > 100, ALT > 90

#### If the patient meets any of the Organ Dysfunction signs/symptoms criteria, then please notify the primary team. A task will follow where the notification can be documented.

#### Rapid Response Team Notified

- [ ] Yes
- [ ] No
- [ ] N/A
Author Affiliation: Amanda Venable is the Nurse Director for the SICU and BICU at University Medical Center in Lubbock, TX.
Received: 1/23/2013
Accepted: 6/3/2013
Reviewers: R Alalawi MD, K Nugent MD
Published electronically: 7/15/2013
Conflict of Interest Disclosures: None

REFERENCES

4. Local Coverage Determination (LCD) for Hospice Cardiopulmonary Conditions (L31540). Federal Register, V. 70, No. 224, dated Tuesday, November 22, 2005, p. 70537.