Screening and Code Sepsis Best Practices

1. **Sepsis screening should be an ongoing evaluation, but at least once per shift and with a change in patient condition**
    a. Initial trigger for assessing a patient for sepsis include the following three elements:
        i.   Two new SIRS criteria within last 24 hours: WBC < 4,000 or > 12,000 or > 10% bands, temperature < 36°C or > 38°C, HR > 90, RR > 20
        ii. Known or suspected infection
        iii. Assess for sepsis-related organ dysfunction (new within last 24 hours and not due to a chronic condition or medical treatment): lactate > 2.0 mmol/L, hypotension (SBP < 90 or MAP < 65), acute kidney injury - creatinine > 2.0 or urine output < 0.5 mL/kg for two consecutive hours, respiratory failure requiring invasive or non-invasive mechanical ventilation, platelets < 100k, INR > 1.5 or PTT > 60 seconds (not on anticoagulation), total bilirubin > 2.0 mg/dL
    b. If the patient has all three elements, they screen positive for severe sepsis. Use facility protocol to initiate sepsis treatment algorithms or order sets immediately.

2. **Create a standardized sepsis treatment bundle (as an order set if possible).** Include lactate, blood cultures (from two sites whenever possible), broad-spectrum antibiotics appropriate for suspected infection source and 30 mL/kg crystalloid fluid bolus for hypotension or lactate ≥ 4 mmol/L.
    a. Educate providers and nursing staff to order the sepsis bundle.
    b. Facility-approved, nurse-driven protocols for when a patient screens positive for severe sepsis can save critical time. For example, with a positive severe sepsis screen, RN could order the initial lactate and blood cultures.
    c. For repeat lactate when the initial lactate is elevated (> 2 mmol/L), consider using reflex lactate orders. A reflex lactate is an automatically generated order based on the previous result.

3. **Use technology, as available, to supplement routine severe sepsis screening practices**
    a. Many electronic health records (EHRs) have a platform for identifying potential sepsis or deterioration based on vital signs and lab values.
    b. Work with the EHR designer to devise electronic options, if possible.
    c. Create checklist for providers and bedside staff to support sepsis treatment.

4. **Develop process for "Code Sepsis" or "Sepsis Alert"**
    a. Options for triggering an alert could be: two SIRS + infection + organ dysfunction [elevated lactate (> 2 mmol/L) or hypotension (SBP < 90 mmHg or MAP < 65 mmHg)]
    b. Code Sepsis or Sepsis Alerts should include:
        i.   Mobilizing resources to the patient's bedside, as available in the facility: laboratory technologists, pharmacists, house managers, respiratory therapists or rapid response teams.
        ii. Roles of each person responding should be well-defined.
        iii. As soon after the alert as possible (before end of shift), gather the team to review/assess the case to identify exceptional care recognition or opportunities for improvement (debrief).

5. **Evaluate patient outcomes and performance**
    a. Determine key sepsis measures that are meaningful to frontline staff, providers and administration. Suggestions include:
        i. Number of sepsis cases (sepsis, severe sepsis, septic shock)
        ii. Number of sepsis related transfers out of or into the facility
        iii. Sepsis-related mortality (all sepsis, simple sepsis, severe sepsis, septic shock)
        iv. Three-hour bundle compliance obtained
            1. Lactate drawn
            2. Blood cultures x2, prior to antibiotic administration
            3. Fluid bolus if hypotensive or lactate ≥ 4
        iv. Six-hour bundle compliance obtained
            1. Vasopressors with persistent hypotension
            2. Repeat lactate
            3. Documented reassessment of tissue perfusion
        v. Compliance with facility protocol for routine screening
    b. Collect baseline data and track facility progress over time
    c. Initiate process improvement programs to evaluate key actions to improve patient outcomes
        i. More timely identification of patients with sepsis
        ii. Ways to initiate treatment rapidly
        iii. Hardwire sepsis bundle completion
    d. Share facility data and sepsis treatment updates with staff at regular intervals, in a standardized format

References

- Surviving Sepsis Campaign. (2108, December 20). *SSC Hour-1 Bundle*. Retrieved from Surviving Sepsis Campaign: http://www.survivingsepsis.org/Bundles/Pages/default.aspx
- Surviving Sepsis Campaign. (2018, December 20). *Implement and improve*. Retrieved from Surviving Sepsis Campaign: http://www.survivingsepsis.org/Improvement/Pages/default.aspx

Article summaries below are from a code sepsis evidence table created and shared by Dr. Brenda Tousley, DNP, CNS, ACCNS-AG, AGCNS-BC, CCRN-K, CLNC as part of her DNP project (Greeley, CO). The articles were from a literature review and may provide a sepsis team with ideas for developing a Code Sepsis Response.

- Bruce, H. R., Maiden, J., Fedullo, P. F., & Kim, S. C. (2015). Impact of nurse-initiated ED sepsis protocol on compliance with sepsis bundles, time to initial antibiotic administration, and in-hospital mortality. *Journal of Emergency Nursing*, *41*(2), 130-137.

  Outcome Measures: Three-hour bundle compliance; time to initial antibiotic administration; hospital length of stay; in-hospital mortality; 2008 Surviving Sepsis Guidelines used when study started

  Study Results: Compliance with measuring an initial lactate improved from 83.9 percent to 98.7 percent (P = .003); antibiotic administration time decreased from 135 minutes to 108 minutes (P = .021); compliance with adequate fluid administration improved from 67.9 percent to 80.6 percent (P = .139) – not statistically significant; no differences noted in mortality or hospital length of stay between pre and post protocol implementation; predictors of in-hospital mortality included respiratory or CNS dysfunction, UTI as infection source, administration

  Comments: ED triage RN initiated protocol to start IV, get lactate, blood cultures, urine, chest x-ray and EKG based on triage assessment; code sepsis initiated by ED provider; time-zero was triage time

  Limitations: ED staff helping to develop the protocol at same time baseline data was being collected may have influenced baseline data

- Grek, A., Booth, S., Festic, E., Maniaci, M., Shirazi, E., Thompson, K., ... & Moreno Franco, P. (2017). Sepsis and shock response team: impact of a multidisciplinary approach to implementing Surviving Sepsis Campaign guidelines and surviving the process. *American Journal of Medical Quality*, *32*(5), 500-507.

  Outcome Measures: Bundle compliance; mortality; hospital length of stay; CLABSI rates related to insertion of central lines for CVP and/or $ScvO_2$ measurements

  Study Results: Improvement in individual elements and overall bundle compliance; all or nothing bundle compliance improved to 51 percent in six months; hospital mortality decreased from 32 percent to 9.4 percent; hospital length of stay decreased from a median of eight days to four days; central line utilization and CLABSI rates did not change significantly during the study period

  Comments: Created and implemented a Sepsis and Shock Response Team (SSRT) – intensivist, advanced practice provider, nursing supervisor, pharmacist; used DMAIC and PDSA cycles; FMEA used to identify barriers and develop interventions to overcome prior to implementation; QI team had ongoing oversight; looked at balancing measures – unintended increase in central line use and CLABSI rates

  Limitations: Small baseline sample; changes in CLABSI definitions during study; changed the goals to track only four elements of the 'all or nothing' elements – timing not specified

- Hayden, G. E., Tuuri, R. E., Scott, R., Losek, J. D., Blackshaw, A. M., Schoenling, A. J., ... & Hall, G. A. (2016). Triage sepsis alert and sepsis protocol lower times to fluids and antibiotics in the ED. *The American Journal of Emergency Medicine*, *34*(1), 1-9.

  Outcome Measures: time from triage to iv fluid bolus (improved); time from triage to antibiotics (improved); length of stay; mortality (improved); discharge to hospice (declined)

  Study Results: Used mean times to report data; improved time to fluid bolus by 30 minutes; improved time to antibiotic by 58 minutes; improved percentage of time antibiotics were given within 60 minutes of triage – 11.1 percent preSWAT and 36.2 percent postSWAT; both mean time to fluids and time to antibiotic were quicker in the swat A group; did not find statistical difference in mortality rates; did find a 'notable' difference in number of patients discharged to hospice in the post-swat group

  Comments: SWAT (Sepsis Workup and Treatment) protocol; electronic sepsis alert from EMR used to trigger SWAT; data collected for pre/postSWAT and further divided into SWAT A – sepsis with hypotension and SWAT B – sepsis without hypotension

  Strength: Authors checked inter-rater reliability for the data abstraction

- Kakebeeke, D., Vis, A., de Deckere, E. R., Sandel, M. H., & de Groot, B. (2013). Lack of clinically evident signs of organ failure affects ED treatment of patients with severe sepsis. *International Journal of Emergency Medicine*, *6*(1), 4.

  Outcome Measures: Bundle compliance; evaluated how severity of illness using PIRO (predisposition, infection, response and organ failure) and where patient was admitted (ICU vs. floor) affected bundle compliance; multivariate binary logistic regression used to evaluate differences in treatment and bundle compliance

  Study Results: Severity of illness (PIRO score) didn't predict compliance; more elements of bundle were completed in patients admitted to ICU vs. floor; PIRO score was an independent predictor of mortality; antibiotics and fluid resuscitation were timelier and more aggressive in patients with clinically evident organ dysfunction; based on PIRO and MEDS scores, found no difference in predicted mortality between the two groups

  Comments: Study was part of larger QI program to improve adherence to Surviving Sepsis Campaign guidelines; received IRB exception from informed consent as it was an observational study with no intervention; found that bundle compliance was much better when the patient 'looked sick' and had 'clinically evident' signs of organ dysfunction vs. patients who only had abnormal labs to indicate organ dysfunction; severity of illness score didn't correlate with bundle compliance; found older patients were less likely to receive the full bundle

- Doerfler, M. E., D'Angelo, J., Jacobsen, D., Jarrett, M. P., Kabcenell, A. I., Masick, K. D., ... & Stier, L. (2015). Methods for reducing sepsis mortality in emergency departments and inpatient units. *The Joint Commission Journal on Quality and Patient Safety*, *41*(5), 205-AP4.

  Outcome Measures: Decrease mortality by 25 percent in one year; reduce variation in treatment of patients with sepsis

  Study Results: Decreased mortality by 50 percent between 2008-2013; spread QI initiative across 11 hospitals in their system

  Comments: Developed triage process to identify possible/probable sepsis patient early using their Super SIRS criteria – HR $\geq$ 120; RR $\geq$ 24; temp $\leq$ 36°C or $\geq$ 38°C; SBP < 90 or new unexplained alteration in mental status; used rapid response team on inpatient units to quickly identify possible/probable sepsis patients; improved handoff communication between ED and inpatient; developed 'code sepsis' in ED; involved pharmacy and lab on inpatient side to expedite lab turnaround times and pharmacy verification of medications in EMR; developed a 'list serve' to allow communication across the system about what was working and not working