Early Detection of Sepsis in Pennsylvania’s Long-Term Care Residents

INTRODUCTION

The word sepsis, first introduced by Hippocrates (ca. 460-370 BC), is derived from the Greek word sipsi, meaning to make rotten.1 One of the oldest syndromes known in medicine, sepsis remains an ongoing and significant challenge. It is a serious concern to healthcare providers, policymakers, and patients because of the large number of cases, high mortality rates, and associated costs.2

Sepsis impacts between 900,000 and 3 million people in the United States each year. With a mortality rate of 15% to 30%, it is the leading cause of death from infection. Sepsis incidence increases disproportionately in older adults. Over a two-year period, 486 potential occurrences of sepsis with 17 potential sepsis-related fatalities were recorded for residents in long-term care in Pennsylvania. Recognizing early sepsis and implementing evidenced-based therapies are actions that improve outcomes and decrease mortality. Despite the prevalence of sepsis and its serious consequences, awareness remains low, and sepsis is frequently under-diagnosed early, when it is still potentially reversible. The signs of both infection and organ dysfunction may be subtle, and recognizing sepsis in older adults with multiple comorbidities may be difficult. Using a sepsis screening tool to identify sepsis early in long-term care may help to optimize safety in this population. Holding simulation sessions using the tool and acting on positive sepsis screens can lead to user proficiency in resident assessment and improved communication with medical providers. Incorporating a sepsis screening tool into the electronic health record can potentially aid with early identification of sepsis. (Pa Patient Saf Advis 2016 Sep;13(3):108-113.)

METHODS

Analysts reviewed LTC events reported through the Pennsylvania Patient Safety Reporting System (PA-PSRS) from April 1, 2014, through March 31, 2016, to determine the number of residents with a healthcare-acquired infection (HAI) requiring transfer to either a higher level of care within the facility or to an acute-care facility. Analysts used data related to resident transfer in the context of an HAI as a surrogate because PA-PSRS does not include a specific field asking if the resident had a diagnosis of sepsis. Analysts interpreted the PA-PSRS transfer question as an indicator of increased acuity likely attributable to some degree as sepsis.

RESULTS

LTC Events

Pennsylvania’s LTCFs reported 486 events in which residents had an HAI requiring transfer to either a higher level of care within the facility or to an acute-care facility. Of those HAIIs, respiratory tract infections and urinary tract infections were the most common types of infections. Seventeen events were fatal. Figure 1 shows the breakdown of sepsis-related infection types reported to PA-PSRS. When the PA-PSRS data are stratified by infection type, there is external validity especially notable in the respiratory tract infection and urinary tract infection types, also found by Mylotte et al., which strengthens the authors’ use of surrogate data to identify sepsis within PA-PSRS.10

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Acute Care Narratives

Several narratives were found in the acute care PA-PSRS data during the time frame that reflected LTC patients transferred with systemic inflammatory response syndrome (SIRS), sepsis, or septic shock. The following are examples of sepsis-associated patient safety events reported through PA-PSRS. In each of these acute care reports, LTC residents were admitted with sepsis:

- **Patient from skilled nursing facility transferred to emergency department with dyspnea, fever, and hypotension. Patient diagnosed with sepsis due to pneumonia.**
- **Patient from extended care facility transferred to hospital with lethargy and a pulse ox [oximetry] in the 80s. Patient diagnosed with sepsis.**
- **Nursing home patient had labored breathing, edema, and decreased level of consciousness. Patient admitted to hospital with urinary tract infection and sepsis.**

Admit from nursing home with sepsis. Nursing home called patient’s PCP [primary care physician] because of temperature elevation, congested respirations, and decreased level of consciousness. Patient had been on antibiotic for several days for suspected aspiration pneumonia. Admitting physician notes coarse breath sounds. Impression was sepsis, suspect aspiration pneumonia, and lactic acidosis.

Patient was unstable and unable to sustain a [systolic] blood pressure higher than 90 [mm Hg]. Patient arrived from a nursing home with low blood pressure and an elevated white blood cell count. Patient required two liters of fluid while in the emergency department, but hypotension persisted. The patient was admitted with primary diagnosis of septic shock.

**DISCUSSION: RISK REDUCTION STRATEGIES**

**Early Recognition and Treatment of Sepsis Saves Lives**

The Surviving Sepsis Campaign (SSC) is a joint effort between the Society of Critical Care Medicine and the European Society of Intensive Care Medicine to globally reduce mortality from sepsis and septic shock. In 2004, SSC published its initial guidelines of best practices based on evidence from the literature. According to SSC’s website, 30 international organizations now sponsor and support the evidence-based guidelines. The 2012 International Guidelines for Management of Severe Sepsis and Septic Shock states early recognition of sepsis and implementation of evidence-based therapies improves outcomes and decreases mortality. Routine screening of potentially infected, seriously ill patients for sepsis, to improve the early identification of sepsis and allow implementation of sepsis therapy, is listed as a grade 1C recommendation. A pilot study performed by Guerra et al. showed a potential decrease in mortality when prehospital personnel used a screening tool to identify patients with sepsis.

Using a sepsis screening tool to identify sepsis early is essential to optimize patient safety (see “Sepsis Screening Tools”). Sepsis screening tools that have been developed and validated generally

* The details of the PA-PSRS event narratives in this article have been modified to preserve confidentiality.
evaluate the patient for a known or suspected infection.

Although the key to survival is to identify sepsis early, the signs of both infection and organ dysfunction may be subtle and difficult to recognize in older adults with multiple comorbidities. Fever may be absent. There is a lower incidence of tachycardia and hypoxemia. Confusion, delirium, weakness, falls, anorexia, and incontinence may be symptoms of sepsis but can be non-specific in older adults.12

Similar practices among LTCFs (i.e., screening for and recognizing residents with sepsis) could promote treatment while awaiting transfer, saving precious time. The initial SSC bundle steps include measuring the lactate level and drawing blood cultures.12 This could be accomplished in LTCFs with laboratory capabilities. Intravenous access and administration of broad spectrum antibiotics and crystalloids, the next steps in the bundle, could also be accomplished prior to transfer.12

**Early Detection Screening Tools**

A validated sepsis screening tool could be adopted and used routinely on all residents.14 The certified nursing assistant (CNA), who is with the resident at the bedside, could perform the initial screening. Positive screening results should be reported to and verified immediately by the licensed nurse. The licensed nurse would then evaluate and document any acute changes and communicate the resident’s status to the nurse practitioner, physician assistant, or physician. After evaluating the resident and reviewing the resident’s advance directive, the clinician may direct medical management and/or transfer to a higher level of care within the facility or the hospital.15

Interventions to Reduce Acute Care Transfers (INTERACT), a LTC quality improvement program, provides educational and clinical tools to detect early acute changes in residents.16 STOP and WATCH is a vertical acronym that lists conditions that identify a potential change in a resident’s condition.

The “Stop and Watch Early Warning Tool” can be used by CNAs, therapists, dietary and environmental service workers, and family members to alert the licensed nurse that a resident has a potential change in condition that needs further clinical evaluation. INTERACT’s Situation, Background, Appearance, and Review and Notify (SBAR) is an assessment and communication tool that guides the nurse when a resident has a change in condition. The “SBAR Communication Form and Progress Note for RNs/LPN/LVNs” directs the nurse to evaluate the resident’s condition before contacting the clinician or other healthcare professional as appropriate. The nurse is then prompted to communicate this information to the primary care clinician. On the form is a space for the nurse to document the primary care clinician’s recommendations. In a study by Ouslander et al., the results indicated INTERACT tools can provide for better patient assessment and communication between medical providers, improve the quality of care of LTC residents, and contribute to reducing morbidity and hospitalization costs in this population.17

The Minnesota Hospital Association (MHA) has coordinated the development of the LTC-specific Seeing Sepsis Tool Kit to facilitate early detection of sepsis. MHA’s LTC resources include Seeing Sepsis cards and posters that alert the user to notify the nurse to screen for sepsis if the resident’s temperature is higher than 100°F, heart rate is greater than 100 beats per minute, and/or systolic blood

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**SEPSIS SCREENING TOOLS**

Sepsis screening tools should evaluate three areas.

1. Known or suspected infection
2. Systemic manifestations of sepsis including:
   - Acute mental status change
   - Hyperglycemia
   - Hyperthermia or hypothermia
   - Leukocytosis or leukopenia
   - Tachycardia
   - Tachypnea
3. Indications of new or worsened organ dysfunction including:
   - Coagulopathy
   - Elevated lactate, creatinine, or bilirubin level
   - Hypotension
   - Increasing oxygen requirements
   - Thrombocytopenia

pressure is lower than 100 mmHg and the resident “doesn’t look right.” The Act Fast document for LTC includes the same screening alerts plus next steps for medical providers in the event of a positive sepsis screen.\textsuperscript{18}

**Simulation**

Providing experiential education allows participants to develop new knowledge and skills in a controlled, supported learning environment, without direct risk to patients.\textsuperscript{19} Guidelines released from the National Council of State Boards of Nursing cite a study by Lakin et al. that found that simulation improves critical thinking, performance skills, and knowledge of subject matter and increases clinical reasoning in certain areas.\textsuperscript{20} The Society for Simulation in Healthcare states a core benefit of simulation training in healthcare is the measurable improvement in patient safety. Simulation training for LTC staff in recognizing early sepsis symptoms and promptly communicating those symptoms among the healthcare team may improve performance and reduce errors in patient care.\textsuperscript{21} After the initial training of the staff on the standardized screening tool and communication algorithm for identifying sepsis, a facilitator can lead participants through realistic scenarios. These sessions may be recorded for playback during the debriefing process shortly after the simulation concludes. During debriefing the group reflects and engages in safe conversations to identify the strengths, weaknesses, and opportunities for improvement during the simulation. Participants gain confidence while discussing what went well and what could be improved. A study by Mihaljevic and Howard incorporated interdisciplinary sepsis simulations including licensed nurses, CNAs, and therapy staff, using INTERACT’s Stop and Watch and SBAR tools throughout 19 LTCFs. The goal was for these healthcare providers to communicate effectively and intervene quickly on behalf of residents in sepsis. After the sepsis-simulation sessions, participants completed a survey to provide feedback on their experience. An overwhelming majority found a high level of satisfaction with the experience and looked forward to similar education and training in the future. Simulation helped implement sepsis education and reinforced interdisciplinary communication in the LTC setting, stimulating adoption of these tools in many LTC organizations.\textsuperscript{22}
Electronic Health Record

The United States is moving toward implementing electronic health record (EHR) systems in all healthcare facilities. Although hospitals and medical groups have implemented EHR systems at a brisk pace, LTC settings have been slower to adopt such technology. In 2004, 1,174 nursing homes responded to the National Nursing Home Survey (NNHS) conducted by National Center for Health Statistics at the Centers for Disease Control and Prevention. NNHS reported 42% of the nursing home respondents used an electronic information system for patient medical records. The EHR’s automated access to information has the potential to streamline clinicians’ workflow. Its clinical decision tools offer the possibility of identifying patients in sepsis. A diagnosis of sepsis may be elusive to clinicians because they may not recognize the constellation of clinical, physiologic, and laboratory abnormalities that comprise the sepsis syndrome. The EHR has the strong potential to improve the detection of sepsis early by collecting and organizing the clinical data required to make the diagnosis. A study by Nguyen et al. sought to evaluate the accuracy of an automated EHR sepsis-detection system. The authors concluded that a specific EHR clinical support system identified patients presenting with sepsis and provided a viable strategy for sepsis identification. Given the success of Nguyen’s study, LTCFs that use EHRs could consider incorporating their chosen sepsis screening tool into their system to aid in early identification of sepsis.

CONCLUSION

Early recognition of sepsis and implementation of evidence-based therapies have the potential to save lives. Despite the prevalence and serious consequences of sepsis, its early diagnosis is challenging for LTC team members; therefore, sepsis may be under-diagnosed when it is still potentially reversible. The use of a validated sepsis screening tool by LTCFs and embedding the screening tool into the EHR, to identify sepsis early and to standardize communication among LTC team members, may decrease adverse outcomes. Simulation sessions using a sepsis screening tool have been shown to improve the user’s ability to effectively recognize and communicate changes in a resident’s condition that may indicate sepsis.

Acknowledgments

Edward Finley, BS, Pennsylvania Patient Safety Authority, contributed to data collection and analysis for this article.

NOTES


An Independent Agency of the Commonwealth of Pennsylvania

The Pennsylvania Patient Safety Authority is an independent state agency created by Act 13 of 2002, the Medical Care Availability and Reduction of Error (Mcare) Act. Consistent with Act 13, ECRI Institute, as contractor for the Authority, is issuing this publication to advise medical facilities of immediate changes that can be instituted to reduce Serious Events and Incidents. For more information about the Pennsylvania Patient Safety Authority, see the Authority’s website at http://www.patientsafetyauthority.org.

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