



JAMDA

journal homepage: www.jamda.com

Editorial

Post-acute and Long-term Care Settings as First Responders for the Surviving Sepsis Campaign

Robin L.P. Jump MD, PhD^{a,b,*}, Susan M. Levy MD, CMD^c,
Wayne S. Saltsman MD, PhD, CMD^{d,*}

^a Geriatric Research Education and Clinical Center (GRECC), Specialty Care Center of Innovation, Louis Stokes Cleveland Veterans Affairs Medical Center (VAMC), Cleveland, OH

^b Division of Infectious Diseases and HIV Medicine, Department of Medicine and Department of Epidemiology and Biostatistics, Case Western Reserve University, Cleveland, OH

^c SML Geriatric Medicine Consulting, Frankford, DE

^d Division of Geriatrics, Lahey Hospital and Medical Center, Burlington, MA

In 2016, the Society of Critical Care launched its Surviving Sepsis Campaign, emphasizing early recognition and management of sepsis.¹ Sepsis disproportionately affects older adults, particularly nursing facility residents who, compared to non-nursing facility residents, experience higher rates of intensive care unit admission (40% vs 21%), have a longer hospital length of stay (7 vs 5 days), and have higher in-hospital mortality (37% vs 15%).² Factors that contribute to an increased risk of adverse outcomes include age-related changes such as frailty, immune senescence, alterations in temperature regulation, cognitive decline, and malnutrition.³ Furthermore, the prevalence of colonization and infection with drug-resistant pathogens and *Clostridioides* (formerly *Clostridium*) *difficile* is high among nursing facility residents, which makes subsequent infections more difficult to treat.⁴

In a recent discussion about the challenges for recognizing early sepsis among nursing facility residents, Reyes et al reviewed 2 tools, the “Seeing Sepsis” 100-100-100 tool available from the Minnesota Hospital Association, and the quick Sepsis-Related Organ Failure Assessment (qSOFA).^{5–7} The authors also introduced an approach to early recognition of sepsis built around the freely available INTERACT tools. The effective implementation of each of these tools calls for further investigation. A retrospective study by Sloane et al of 236 residents from 31 community nursing facilities assessed the 100-100-100 and qSOFA tools for recognition of sepsis in residents and

suggested that the tools may offer sensitivity and specificity, respectively.⁸ In the nursing facility setting, a more sensitive screening test has the potential to promote earlier recognition of sepsis (true positives) while also leading to more potentially unnecessary transfers to the emergency department, diagnostic studies, and antibiotic exposure (false positives). A more specific screening test, however, although helping to avoid unnecessary transfers (true negatives) may also lead to delays in recognition of residents with sepsis, a longer time to initiate resuscitation, and increased morbidity and mortality (false negatives).

Over time, additional research may help identify strategies that strike a balance between sensitivity and specificity for early recognition of sepsis in nursing facility residents. Ideally, these strategies will be straightforward enough to implement in a large proportion of nursing facilities and validated using prospective randomized controlled trials. At present, however, the professional staff working in post-acute and long-term care (PALTC) settings must continue to recognize residents with an acute change in condition and, when appropriate, consider transferring them to acute care. Although these activities are important, they do not preclude initiating care for the affected residents. Here, we propose that PALTC professionals are poised to serve as first responders for residents with suspected sepsis. By engaging in timely and effective management of sepsis in the critical first hours, PALTC staff may help residents survive sepsis.

Early intervention and management of sepsis improves outcomes, demonstrated by the success of the hour-3 and -6 “sepsis bundles” in the reduction of mortality among hospitalized patients with sepsis.⁹ In 2018, the Surviving Sepsis Campaign introduced the hour-1 sepsis bundle, replacing the 3- and 6-hour bundles.¹⁰ The hour-1 bundle defines time zero as arrival to the emergency department or the earliest development of sepsis signs and symptoms among patients arriving from another care venue (Table 1). Nursing facilities that recognize and initiate early management of sepsis can improve outcomes through a swift response that begins before the resident arrives in the emergency room.

Even under the best of circumstances, such as a transitional care unit physically connected to a tertiary care hospital that uses a shared electronic medical record, the transfer of a patient from a nursing

Dr. Jump reports support for this work in part through the Cleveland Geriatric Research Education and Clinical Center (GRECC) and the Specialty Care Center of Innovation at the Louis Stokes Cleveland Veterans Affairs Medical Center. The contents do not represent the views of the U.S. Department of Veterans Affairs or the United States Government.

Dr. Jump discloses research funding from Pfizer and Steris; she has served on advisory boards for Pfizer and Merck.

The authors declare no conflicts of interest.

* Address correspondence to Robin L.P. Jump, MD, PhD, GRECC 111C(W), Louis Stokes Cleveland Veterans Affairs Medical Center, 10701 East Blvd, Cleveland, OH 44106 or Wayne S. Saltsman, MD, PhD, CMD, Division of Geriatrics, Lahey Hospital and Medical Center, 41 Burlington Mall Road, Burlington MA.

E-mail addresses: robinjump@gmail.com (R.L.P. Jump), wayne.saltsman@lahey.org (W.S. Saltsman).

Table 1
Components of the Surviving Sepsis Campaign (SSC) Hour-1 Bundle that may Be Feasible to Implement in Post-acute and Long-term Care (PALTC) Settings

Surviving Sepsis Campaign Hour-1 Bundle ^{*,10}	Implementation in Post-Acute and Long-Term Care Setting
Measure lactate level. Remeasure if initial lactate is >2 mmol/L. Obtain blood cultures prior to administration of antibiotics	Blood cultures, urine culture from a newly placed urinary catheter. When appropriate, obtain a sputum culture and swabs of gross pus.
Administer broad-spectrum antibiotics	Administer broad-spectrum antibiotics (see text for details)
Begin rapid administration of 30 mL/kg of crystalloid for hypotension or lactate ≥4 mmol/L.	For hypotension (<90/60 mmHg for residents with a baseline ≥120/80), begin rapid administration of 1-2 L of crystalloid, with the first liter going in over 1 h.
Apply vasopressors if patient is hypotensive during or after fluid resuscitation to maintain a mean arterial pressure of ≥65 mm/Hg	

*Based on resources and staffing available in acute care settings.

facility to the emergency department or acute care ward consumes precious time. Factors that may contribute to delays in transfer include reaching the on-call provider for the nursing facility, finding an accepting physician at a hospital, determining the availability of a bed, arranging for transport, the physical distance between institutions, and additional confounders such as weather. Furthermore, insufficient information about a resident's goals of care or reconsideration of those goals may also lengthen the time between the recognition of a septic patient and transfer to an acute care setting.

Access to on-site practitioners who can diagnose and initiate treatment for possible sepsis varies. In most cases, practitioners are not present when PALTC staff notes a change in condition and must depend on the assessment of PALTC staff for making treatment decisions. Sepsis-screening tools may help PALTC staff assess residents for whom there is a concern for sepsis and also to communicate their findings to on-call practitioners. Similar nurse-led protocols have

improved sepsis-related outcomes in hospitals and emergency departments.¹¹

As first responders, PALTC staff can and should initiate efforts to support a resident with concerns for early sepsis. These activities should occur simultaneously with assessing the need for transfer to acute care and, provided that hospitalization is part of the resident's goals of care, making those arrangements when indicated. We recognize that the level of care possible varies widely across different nursing facilities. Even settings with limited resources, however, can initiate active management of a resident who may have sepsis until the emergency transport team arrives. At a minimum, this may include frequent monitoring of vital signs, oral rehydration, and recording the clinical events onto a flow sheet that may be shared with the transport team.

In addition to positioning PALTC staff as first responders, we also propose that each nursing facility develop a sepsis protocol tailored to its institution and in accordance with the care offered through its major referring hospitals. The protocol should take into account the skills of the staff, such as placing a peripheral intravenous catheter, and consider that staff members will need to provide close evaluation and management of the resident while making a decision to transfer and/or while awaiting the emergency transport team if transfer is part of the resident's goals of care (Figure 1).

First, the PALTC team should initiate early management for residents with suspected sepsis, incorporating elements from the Surviving Sepsis Campaign hour-1 bundle that are feasible in the skilled setting. Specifically, although few nursing facilities can measure a serum lactate level, most should be able to obtain blood samples to send for microbiological culture, initiate resuscitation with crystalloid fluids in residents who are hypotensive, and, when indicated, administer broad-spectrum antibiotics. To facilitate active management of residents with suspected sepsis, nursing facilities should consider having a sepsis "kit" (S-KIT), analogous to emergency medicine kits (E-KITs), stocked with several key components: dedicated equipment to monitor vital signs, including a pulse oximeter, supplies for placing peripheral intravenous catheters, crystalloid intravenous fluids, phlebotomy equipment, and tubes for typical laboratory tests (Table 2). Additional equipment should include bottles for collecting 2 sets of blood cultures and, when appropriate, swabs for purulent

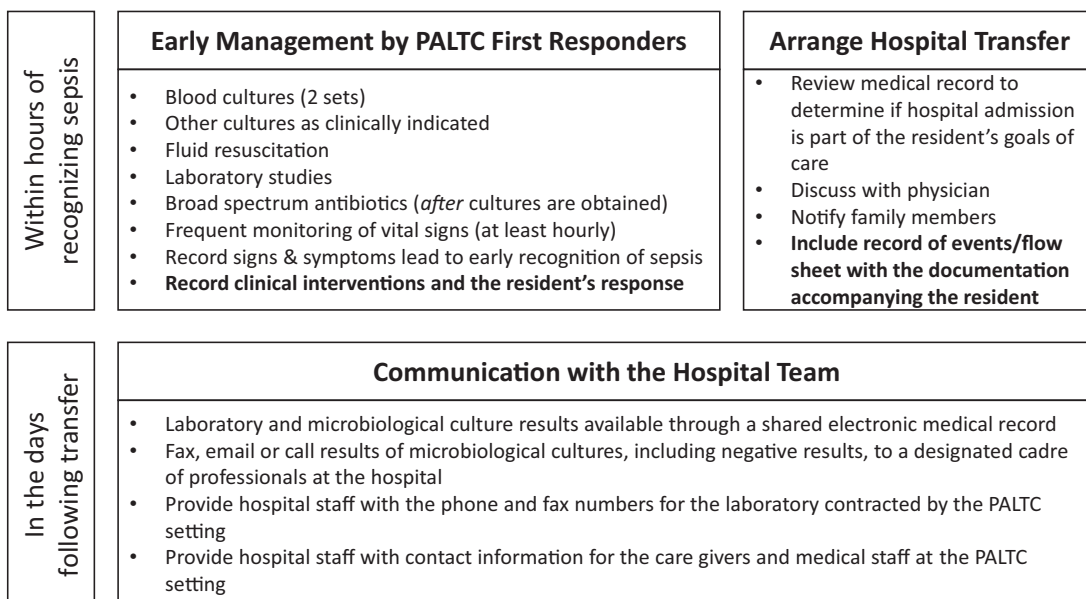


Fig. 1. Overview of a general protocol for early management of sepsis in a post-acute/long-term care (PALTC) resident, emphasizing the role of PALTC staff as first responders.

Table 2
Components of an S-KIT*

Category	Specific Components
Durable equipment	Automated digital blood pressure machine Blood pressure cuffs (disposable) in several sizes Pulse oximeter Thermometer
Supplies	Mask and tubing for supplemental oxygen Kits for placing intravenous catheters (include several sizes) Blood-drawing equipment, including tourniquets Chlorhexidine swabs for cleansing skin prior to placing intravenous catheters and collecting blood cultures Kit for placing urinary catheter to monitor urine output Sterile gloves (include several sizes) for placing the urinary catheter Personal protective equipment including gowns, gloves, and masks (include several sets) Dressing supplies, packing, and tape Bags of sterile crystalloid fluid (eg, normal saline or lactated ringers)
Laboratory Tests	Blood culture bottles (at least 2 sets of aerobic and anaerobic bottles) Collection tubes for common laboratory studies [†] Sterile containers to collect additional specimens as clinically indicated: urine (from a newly placed catheter) sputum culture stool, particularly if liquid Bacterial culture swabs
Antibiotics	Viral culture swabs and transport medium Oral: amoxicillin/clavulanic acid and linezolid Intravenous: piperacillin/tazobactam and intravenous vancomycin If penicillin allergy: levofloxacin If concern for <i>Clostridioides</i> (formerly <i>Clostridium</i>) <i>difficile</i> infection: oral vancomycin or fidaxomicin

S-KIT, sepsis “kit.”

*When appropriate, the components of the S-KIT should be labeled with an expiration date and replaced. Durable equipment should be checked quarterly for proper functioning and the supplies replaced at least annually.

[†]Lavender top for a complete blood count; light blue for prothrombin time/international normalized ratio; gold top or red with a gold center for basic and complete metabolic panels, cardiac enzymes and C-reactive protein; gray top for lactic acid.

material and sterile containers for sputum or urine (collected from a freshly placed urinary catheter). The availability of a urinary catheter for insertion may help monitor urine output.

The S-KIT should also contain specific intravenous and oral formulations of broad-spectrum antimicrobials. We strongly assert that efforts to collect samples for microbiological culture should occur prior to initiation of any antibiotics. Reasonable agents for empiric treatment are intravenous vancomycin and piperacillin/tazobactam or oral linezolid and amoxicillin/clavulanic acid. Again, these medications could be further arranged in conjunction with area referring hospitals. For residents with a severe penicillin allergy, a fluoroquinolone may be used instead of either beta-lactam/beta-lactamase inhibitor combination. Areas with a high incidence of *C difficile* infection may also consider stocking oral vancomycin for solution.

The PALTC team of first responders will also need to document the clinical findings that prompted the concern for sepsis, the interventions, and the clinical response of the resident to those interventions. Nursing facilities might consider developing an event “flow sheet” that includes the INTERACT sepsis tools,⁸ the Surviving Sepsis Campaign bundles, and a worksheet that prompts serial monitoring of vital signs and physical examination findings. That flow sheet should allow for identification of patient improvement or identify the patient who, on further assessment, might not have sepsis

after all. In that scenario, the plan of care might change to one with less intense monitoring and potential ongoing management within the nursing facility.

The second component of the protocol is arranging a hospital transfer. After reviewing the medical records to ascertain if hospital transfer is part of the resident’s goals of care, PALTC staff should begin the process of arranging for a hospital transfer, specifying a concern for sepsis as part of that communication. The PALTC staff must also notify potential patient surrogates of the change in status. Although simple in concept, coordinating the transition of care for a critically ill resident may become a time-consuming process. Team members arranging the transfer, along with those engaged in early management, should ensure that a copy of the event flow sheet goes with the resident to the hospital.

The third component of the protocol occurs after the resident has left the nursing facility and consists of communicating information to the acute care setting after the time of transfer, sometimes over subsequent days. In addition to sharing documentation of the early course of care in the skilled setting, the PALTC teams will need to communicate to the hospital any results of subsequently reported laboratory tests, diagnostic studies, and most importantly, microbiological cultures. Culture results are especially important as those come from samples collected before the initiation of antibiotics and can strongly influence management. Even negative results can inform clinical decisions. Ideally, the information will be included in an electronic medical record shared between the nursing facility and the hospital. When this is not possible, the nursing facility should work with their regional hospitals to obtain detailed contact information (ie, e-mail, telephone, or facsimile) for personnel in designated roles to communicate with the receiving medical team. These designated roles may include members of the antibiotic stewardship team, clinical pharmacists, infection “preventionists,” or practitioner colleagues caring for nursing facility residents. Additionally, the flow sheet sent to the hospital with the resident should include the details about how to reach the nursing facility’s contracted laboratory. Including contact information for the PALTC team may facilitate additional communication, including important information that rounds out the hospital team’s understanding of the resident’s clinical and social history. This communication of information during and after the events that lead to hospital admission is both an important and vulnerable component of the successful transitions of care.

Just as medical teams practice resuscitation “codes,” nursing facilities should consider practicing their sepsis protocols (ie, a “sepsis code”) to help staff become familiar with processes, materials, workflows (ie, through the event flow sheets), and communication pathways with hospital personnel. These sepsis “codes” may also help identify opportunities to improve or streamline the process prior to invoking it for an actual resident.

The appropriate diagnosis and management of sepsis may become an opportunity for nursing facilities and acute care settings to work together to improve the outcomes of residents who develop sepsis. The recognition of PALTC staff as first responders in potential sepsis identification also positions them to become champions for their residents. They can be empowered with the potential to reduce mortality. Early recognition and management of sepsis in PALTC residents may mitigate some of the long-term effects related to critical illness. Evidence to support this supposition may help advance the development of policies that encourage strong engagement of nursing facilities in acute illness management strategies.

References

1. Rhodes A, Evans LE, Alhazzani W, et al. Surviving Sepsis Campaign: international guidelines for management of sepsis and septic shock 2016. *Crit Care Med* 2017;45:486.

2. Ginde AA, Moss M, Shapiro NI, Schwartz RS. Impact of older age and nursing home residence on clinical outcomes of U.S. Emergency Department visits for severe sepsis. *J Crit Care* 2013;28:606–611.
3. High KP, Bradley SF, Gravenstein S, et al. Clinical practice guideline for the evaluation of fever and infection in older adult residents of long-term care facilities: 2008 update by the Infectious Diseases Society of America. *Clin Infect Dis* 2009;48:149–171.
4. Dumyati G, Stone ND, Nace DA, et al. Challenges and strategies for prevention of multidrug-resistant organism transmission in nursing homes. *Curr Infect Dis Rep* 2017;19:18.
5. Reyes BJ, Chang J, Vaynberg L, et al. Early identification and management of sepsis in nursing facilities: Challenges and opportunities. *J Am Med Dir Assoc* 2018;19:465–471.
6. Minnesota Hospital Association. 1. Seeing Sepsis - LTC Poster.pdf. Available at: <https://www.mnhospitals.org/Portals/0/Documents/ptsafety/SeeingSepsisLTC/1.%20Seeing%20Sepsis%20-%20LTC%20Poster.pdf>. Accessed October 4, 2018.
7. Dorsett M, Kroll M, Smith CS, et al. qSOFA has poor sensitivity for prehospital identification of severe sepsis and septic shock. *Prehosp Emerg Care* 2017;21:489–497.
8. Sloane PD, Ward K, Weber DJ, et al. Can sepsis be detected in the nursing home prior to the need for hospital transfer? *J Am Med Dir Assoc* 2018;19:492–496.e1.
9. Rhodes A, Phillips G, Beale R, et al. The Surviving Sepsis Campaign bundles and outcome: Results from the International Multicentre Prevalence Study on Sepsis (the IMPReSS study). *Intensive Care Med* 2015;41:1620–1628.
10. Levy MM, Evans LE, Rhodes A. The Surviving Sepsis Campaign Bundle: 2018 update. *Intensive Care Med* 2018;44:925–928.
11. Kleinpell R. Promoting early identification of sepsis in hospitalized patients with nurse-led protocols. *Crit Care* 2017;21:10.