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Editorial

Early Identification and Management of Sepsis in Nursing Facilities: Challenges and Opportunities

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In this issue of *JAMDA*, Sloane and collaborators share the results of a retrospective study among 236 patients in 31 nursing facilities (NFs) that examines signs and symptoms prior to a hospitalization related to sepsis.[1] The authors compared the frequency of various clinical parameters among patients diagnosed with sepsis and those diagnosed with other conditions. They also compared the accuracy of 4 different tools and 2 different temperature thresholds to screen for sepsis.

This article is timely for a number of reasons. The human and financial costs of emergency department visits, hospital admissions, and readmissions from NFs are substantial, and a significant proportion of them are considered potentially avoidable.[2–11] As the Centers for Medicare and Medicaid (CMS) continues to move toward value-based payment models, skilled NFs (SNFs) will be under increasing pressure to manage acute changes in condition without hospital transfer when it is clinically safe and feasible to do so.[12,13] Infections that can lead to sepsis represent at least one-third of all readmissions from SNFs, and sepsis is the most common admitting diagnosis for patients transferred to the hospital from SNFs.[5,13] The increasing incidence of sepsis, especially among older adults, its high mortality rate, and its often subtle and rapid progression make its prompt recognition and treatment imperative. To add to these challenges, new federal regulations require NFs to have an infection control practitioner and an antimicrobial stewardship program. Criteria and definitions for various infections common in NFs are available (see Table 1), but the identification and management of sepsis in NFs have not been well studied. Better strategies are needed for the early identification of sepsis, and for distinguishing between patients who should stay in the NF for treatment versus transfer to a higher level of care.

Over the last 3 decades, there have been several attempts to define sepsis and the best way to treat it. Although criteria have changed over the years, early identification and treatment have been consistently considered as beneficial.[18–20] Criteria to identify sepsis have been based on changes in physiologic parameters as well as laboratory values. Screening tools such as the Systemic Inflammatory Response Syndrome (SIRS),[20] the Logistic Organ Dysfunction System,[21] and the Sequential [Sepsis-related] Organ Failure Assessment (SOFA)[22] scores were developed in an effort to simplify screening for sepsis and identification of a patient's mortality risk. One limitation of these scoring systems is the need for laboratory data to assess risk, thus limiting their rapid use at the bedside. A simplified version of the SOFA (the quick or "qSOFA"; Table 2)[23] does not require laboratory data and it appears to identify high-risk patients with suspected sepsis, thus necessitating a thorough assessment for organ dysfunction.[22] The heterogeneity and atypical nature of clinical presentations of infection in the NF population makes the diagnosis of sepsis even more challenging. Because of the atypical way that NF residents with dementia and/or multiple comorbidities present with acute illnesses, using qSOFA to identify SNF patients who need early management of sepsis could result in failure to identify sepsis and suboptimal treatment. On the other hand, the use of qSOFA could falsely identify patients as having sepsis by using physical examination findings that are due to other disease processes prevalent in the SNF population.

Strategies to identify early sepsis in the NF setting must account for the atypical presentations of illness that are common in this patient population. These include the following:

- ***Mental status changes:*** Many factors can affect mental status, including dementia, prior strokes, medication side effects, and dehydration among others.
- ***Respiratory rate:*** Tachypnea and other respiratory symptoms may be due to asthma and chronic cough, and/or chronic obstructive pulmonary disease, all of which are common in the NF population. Age-related physiologic changes also affect respiratory rate. As people get older, the alveoli lose their elasticity, the spine becomes more restricted, and muscles stiffen. This causes decreased tidal volume and the need to

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Table 1
Examples of Criteria for Selected Infections in Skilled Nursing Facilities

Vital Sign Criteria For Infection

Vital Sign	McGeer Criteria 2012 for Surveillance[14]	AHRQ Minimum Criteria for Common Infections Toolkit[15]	INTERACT 4.0 Criteria for Clinician Notification[17]
Temperature/Fever	• Single oral temperature >37.8°C (100°F) • Repeated oral temperatures >37.2°C (99°F) or rectal temperatures >37.5°C (99.5°F) • Single temperature >1.1°C (2°F) over baseline from any site (oral, tympanic, axillary)	Suspected lower respiratory tract infection: ≥102°F (38.9°C) (need to check respiratory rate and O_2 saturation) 100°F (37.9°C) and <102°F (38.9°C) (need to check respiratory rate and pulse) Suspected urinary tract infection: With indwelling catheter: see McGeer criteria. Without indwelling catheter: single temperature of 100°F (37.8°C)	>100.5°F INTERACT Fever Care Path uses McGeer definition
Apical heart rate or pulse	N/A	Suspected lower respiratory infection: Pulse >100	>100 or <50
Respiratory rate	Pneumonia and lower respiratory tract (bronchitis/ tracheobronchitis) criteria: ≥25 breaths/min	Lower respiratory tract infection: ≥25 breaths/min	>28/min or <10/min
Blood pressure	N/A	Urinary tract infection: With indwelling catheter. Hypotension (significant change from baseline BP or a systolic BP <90)	<90 or >200 systolic
Oxygen saturation	Pneumonia and lower respiratory tract (bronchitis or tracheobronchitis) criteria: O_2 saturation <94% on room air or a reduction in O_2 saturation of >3% from baseline	Lower respiratory tract infection: O_2 saturation <94% on room air or a reduction in O_2 saturation of >3% from baseline	<90%

Lower Respiratory-Tract Infection

McGeer Criteria 2012 for Surveillance	AHRQ Minimum Criteria for Common Infections Toolkit	Loeb Criteria Minimum Criteria for Initiation of Antibiotics in Long-term Care Residents[16]	INTERACT 4.0 CARE PATH Symptoms of Lower Respiratory Tract Infection
Pneumonia (all 3 criteria must be present) 1. Interpretation of a chest radiograph as demonstrating pneumonia or the presence of a new infiltrate 2. At least 1 of the following: a. New or increased cough b. New or increased sputum production c. O_2 saturation <94% on room air or a reduction in O_2 saturation of >3% from baseline d. New or changed lung examination abnormalities e. Pleuritic chest pain f. Respiratory rate of ≥25 breaths/min. 3. At least 1 of the "constitutional" criteria: a. Fever b. Acute mental status change c. Acute functional decline d. Neutrophilia (>14,000 leukocytes/mm^3) or a left shift (>6% bands or ≥1500 bands/mm^3)	Criteria are met if 1 of the 4 situations are met: 1. Resident with a fever of 102°F (38.9°C) or higher and 1 of the following: a. Respiratory rate of >25 breaths/min b. New or worsened cough c. New or increased sputum Production d. O_2 saturation <94% on room air or a reduction in O_2 saturation of >3% from baseline 2. Resident with a *fever* of 100°F (37.8°C) and less than 102°F (38.9°C); *cough* and at least 1 of the following: a. Pulse >100 b. Delirium c. Rigors (shaking chills) d. Respiratory rate >25 breaths/min	1. Fever >38.9°C (102°F) and at least 1 of the following: a. Respiratory rate >25 b. Productive cough 2. Fever >37.9°C (100°F) or a 1.5°C (2.4°F) increase above baseline temperature, but ≤38.9°C (102°F) and cough and at least 1 of the following: a. Pulse >100 b. Rigors c. Delirium d. Respiratory rate >25 3. Afebrile resident with COPD and age >65 y and new or increased cough with purulent sputum production	Symptoms of lower respiratory tract infection • New or worsened cough • New or increased sputum production • New or worsening shortness of breath • Chest pain with inspiration or coughing New or increased findings on lung examination (rales, wheezes)