Sepsis in Nursing Homes: Recognition and Response

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Learning Objectives

1. Review definitions of sepsis
2. Discuss screening tools for detection of sepsis in older adults
3. Discuss how to manage suspected sepsis while adhering to antibiotic stewardship principles

Case Presentation

• Mrs. S is a 92 year old nursing home resident with dementia, hypertension, congestive heart failure and remote history of UTI with sepsis 4 years ago.
• Change in Condition
  – Suddenly less alert/interactive
  – T = 97.8°F, BP = 102/58, P = 102, RR = 18
  – SPO₂ = 94% on room air
  – No dysuria, suprapubic pain, or frequency / urgency
  – Crackles heard on lung exam

What is the most likely diagnosis?

A) Pneumonia
B) Possible Sepsis
C) UTI
D) Congestive heart failure exacerbation
E) A, B and D
F) All of the above

What is Sepsis?

• Sepsis is life threatening organ dysfunction caused by a dysregulated host response to infection

https://www.cdc.gov/sepsis/what-is-sepsis.html
**What is Sepsis?**

- Sepsis is life threatening organ dysfunction caused by a dysregulated host response to infection
- Septic shock is a subset of sepsis with circulatory and cellular/metabolic dysfunction associated with higher risk of mortality

[https://www.cdc.gov/sepsis/what-is-sepsis.html](https://www.cdc.gov/sepsis/what-is-sepsis.html)

**Sepsis in Older Adults**

- Over 1.5 million people get sepsis each year in the U.S.
  - Older adults ≥ 65 years account for the majority (>60%) of sepsis cases
  - Nursing home residents → 7 fold increase in mortality compared to community dwelling adults (14% vs 1.9%)

[https://www.cdc.gov/sepsis/datareports/index.html](https://www.cdc.gov/sepsis/datareports/index.html)

**Sepsis Continuum**

- SIRS
- Sepsis
- Severe Sepsis
- Septic Shock

* Adapted from slide provided by David Nace, MD
### Changes in Sepsis Definitions

<table>
<thead>
<tr>
<th>Recommendations</th>
<th>SIRS*</th>
<th>Sepsis</th>
<th>Severe Sepsis</th>
<th>Septic Shock</th>
</tr>
</thead>
<tbody>
<tr>
<td><em><em>1992 ACCP</em>/SCCM</em> Consensus Statement**</td>
<td>T ≤ 36°C or &gt; 38°C</td>
<td>Pulse ≥ 90</td>
<td>WBC ≥ 12K or ≤ 4K</td>
<td>Septic Shock</td>
</tr>
<tr>
<td></td>
<td>RR ≥ 20</td>
<td>PaCO2 ≤ 32</td>
<td>Diff ≥ 10% bands</td>
<td>Infection + Sepsis + EOD*</td>
</tr>
<tr>
<td></td>
<td>Infected ≥ 2 SIRS criteria</td>
<td>Septic Shock + SBP &lt; 90 OR 40 mm below baseline OR Low perfusion after IV fluid bolus</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**2015 CMS Core Measure**
- Same
- Same
- Sepsis + EOD
- Lactate > 2

**2016 Sepsis 3**
- SIRS Eliminated qSOFA introduced
- Infection + 2 qSOFA criteria
- SBP < 90 AND Lactate > 2 after fluid bolus

**2017 SSCG**
- No SIRS
- Infection + EOD
- Eliminated

*Adapted from slide provided by David Nace, MD

### Sepsis – Early Identification Challenges

- Time from suspicion of sepsis to ICU or mortality is short (often < 24 hours)
- Most tools were intended for and tested in the ED settings
- Many parameters on existing detection/risk stratification tools are not available in LTC settings

### Atypical Presentation of Infection

- **Fever**
  - Fever Definition: T ≥ 38°C (100.4°F)
  - ACCP/SCCM: T ≥ 38°C (100.4°F)
  - IDSA LTC:
    - ≥ 37.8°C (100°F)
    - Repeated ≥ 37.2°C (99°F)
    - > 1.1°C (2°F) over baseline

- **Altered Mental Status**

  "Older is Colder"

*Adapted from slide provided by David Nace, MD
**Tools - SIRS Criteria**

**Systemic Inflammatory Response System**

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Score ≥ 2 = Positive</th>
</tr>
</thead>
<tbody>
<tr>
<td>T ≤ 36°C or &gt; 38°C (96.8°F or 100.4°F)</td>
<td></td>
</tr>
<tr>
<td>Pulse ≥ 90</td>
<td></td>
</tr>
<tr>
<td>RR ≥ 20</td>
<td></td>
</tr>
<tr>
<td>PaCO2 ≤ 32</td>
<td></td>
</tr>
<tr>
<td>WBC ≤ 4 K or &gt; 12 K Diff ≥ 10% bands</td>
<td></td>
</tr>
</tbody>
</table>


www.qSOFA.org

- Sensitivity = Good; Specificity = Very Poor
- 90% of ICU patients and 50% of general ward patients met criteria
- Too many false positives

**Tools qSOFA**

**Quick Sequential Organ Failure Assessment**

<table>
<thead>
<tr>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Altered Mental Status – Glasgow Coma Score &lt; 15*</td>
</tr>
<tr>
<td>Systolic Blood Pressure &lt; 90 mm Hg</td>
</tr>
<tr>
<td>Respiratory Rate ≥ 22 breaths per minute</td>
</tr>
</tbody>
</table>

*Some studies use cutoff of 13


http://www.qsofa.org

- Meant for ED and general wards – NOT LTC settings
- Derived using data from ICU database
- Sensitivity = Poor; Specificity = Good;
- Part of the 2016 guidelines

**Tools 100-100-100**

**Seeing Sepsis Campaign**

Screening Mrs. S for sepsis

<table>
<thead>
<tr>
<th>Suspected infection and ≥ 2 SIRS criteria</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pulse ≤100</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>T ≤ 96.8 °F</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Respiratory Rate &gt; 20/SpO2&lt;90%</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Systolic Blood Pressure &lt; 100 mm Hg</td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>

Early sepsis detection

<table>
<thead>
<tr>
<th>qSOFA</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Altered Mental Status</td>
<td></td>
<td>?</td>
</tr>
<tr>
<td>Systolic Blood Pressure &lt; 90 mm Hg</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Respiratory Rate ≥ 22 bpm</td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>

What would you do next?

A) Check a urinalysis and culture
B) Send the patient to the ED for further evaluation
C) Discuss with covering clinician and continuing monitoring
D) Start empiric antibiotics
E) Start antibiotics “just in case”
Antibiotic Stewardship

Do not treat with antibiotics → Start Antibiotics

Principles of Antibiotic Stewardship

Treatment for Sepsis

Summary
- Identifying sepsis is hard!
- Tools that help identify a resident change in condition and provide a structured communication are critical
- Early detection of sepsis and antibiotic stewardship go together like PB&J

Antibiotic Use Protocols
Comparison of Nursing Home Screening Tools for Identifying Sepsis


- Retrospective chart audit of nursing home documentation in 236 residents hospitalized with sepsis and returned to the nursing home
- In up to 34% of cases, documentation of vital signs were missing

Most sensitive

100-100-100 criteria (79%), Temperature > 99.0°F (51%)

Most specific

Temperature > 100.2°F (93%), qSOFA (88%), SIRS (86%), Temperature > 99.0°F (93%)

Questions?

Thank You

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Identification of Sepsis

Bernardo J. Reyes MD
Assistant Professor Of Geriatrics
Associate Director
Internal Medicine Residency Program
Charles Schmidt College of Medicine

Objectives

- Limitations of current criteria to identify patients with sepsis in NF
- How to improve sensitivity and specificity
- Acute vs. Sub-Acute process of becoming septic
- The Value of Clinical Condition Variability
- Laboratory data as add-on criteria

Disclosure

Support through FAU for research on INTERACT from Point Click Care.

What is INTERACT?

- Quality improvement program designed to improve the care of older people with acute changes in condition in skilled nursing, long-term care, and assisted living facilities, and home health care
- Prevent conditions from becoming severe enough to require hospitalization through early identification and evaluation of changes in patient condition
- Manage some conditions without transfer when this is feasible and safe

http://www.interact-pathway.com/

Mr. M

- 89 y/o male previous community dweller
- Transferred to your NF from a local hospital after surgical repair of a hip fracture complicated with urinary retention (now resolved)
- PMH: Depression, AFib, HTN, MCI, CHF
- Three days after admission to your facility has less appetite
- On day 4, the patient feels weaker, you stop his diuretic and ACE inh and encourage PO intake
- On day 5, the RN calls your coverage at 3 AM reporting that the patient is disoriented, HR 78 BP 128/78, RR 22 and Temp 98.9
- Treat Pain
- On day 6 the patient is too weak to leave his bed. In the afternoon he develops fever and becomes somnolent. You evaluate the patient and decide to transfer the patient back to the hospital.

Questions for the Audience

Was the transfer necessary?
Was this situation avoidable?
The human and financial costs of acute transfers, hospital admissions and readmissions from NF are substantial. Significant proportion of them are considered potentially avoidable. Sepsis is a common cause of acute transfers among NF patients/residents. Established criteria to identify septic patients such as Quick Sepsis Related Organ Failure Assessment (qSOFA) and Systemic Inflammatory Response Syndrome (SIRS) lack both sensitivity and specificity. Require assessments that are not part of the regular work flow of the care providers in NF. Sepsis screening tools in distinguishing patients transferred from a NH to a hospital with early sepsis from patients without sepsis. • Sensitive (we don't want to miss sepsis) • Specific (we don't want to over-diagnose) • Able to identify sepsis early • Avoid the development of sepsis • Start treatment early • Triage those who need to be transferred. Right timing. Improving sensitivity.
• What does not happen that should happen?

Dementia
Prior strokes
Medication side effects
Dehydration

Use of Cardiovascular Drugs
Age-related changes in baroreceptor reflexes

https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0118308

Prior to hospitalization:

<table>
<thead>
<tr>
<th>SIRS/qSOFA/3x100</th>
<th>Infection</th>
<th>Complicated Infection</th>
<th>Septis</th>
<th>Septic Shock</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Sensitivity</td>
<td>Specificity</td>
<td>Sensitivity</td>
<td>Specificity</td>
</tr>
<tr>
<td>Initial Triggers</td>
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</tbody>
</table>
| Criteria should be designed to be used based on the capacities and available resources. “Typical” NFs and should be the result of common assessments already in place (do not add another task).
|                   |            |            |            |            |
| Using changes in the resident’s condition or function as the only parameters to identify septic patients may be very sensitive, the criteria may lack specificity, leading to overdiagnosis.

<table>
<thead>
<tr>
<th>Labs</th>
<th>Change From Baseline</th>
<th>13–72 h Prior to Hospitalization</th>
<th>≤12 h Prior to Hospitalization</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Nonsepsis</td>
<td>Sepsis</td>
</tr>
<tr>
<td></td>
<td>Sensitivity for sepsis</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Specificity for sepsis</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Temperature ≥99.0°F</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Met screening criteria</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>Specificity</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Best Criteria

Changes in an individual’s baseline function and vital signs may be more appropriate.
Evaluations/Timing

INFECTION
COMPLICATED INFECTION
SEPSIS
SEPTIC SHOCK

Change in Condition
Evaluation Vital
Signs Variability
Treatment +/
Transfer
CBC
CMP
LA

• We have experience with variability and outcomes
• Early warning systems suffer from high false-alarm rates
• Frequency of Assessments (as patients get sicker we evaluate them more often)
• How you calculate risk based on data entry thought the continuum
• AI (how to train your system)

What is the degree of change that is clinically relevant?

24-hour hospital mortality of general medical-surgical unit patients (N = 32,472)

• Do not alarm only based on fixed parameters (might not be sensitive or specific enough)
• Single point-in-time probability
• Personalized probability trends over time
• What is considered normal variance
• How you could incorporate good old fashion clinical judgment to any calculation?
• When we get an alert, what we should do?

Teaching your EHR

Management of Possible Sepsis Using INTERACT Tools

• Sepsis is a common cause for acute transfers
• Some transfers are avoidable
• In order to treat sepsis in NF we need to identify it early
• Wide-used criteria are not sensitive or specific enough
• Optimal criteria should be based on every day assessments
• The most sensitive criteria is a change in condition
• Variability of vitals signs and other parameters instead of set values (train your EHR)
• Consider using POC Testing
• Plan what to do with the data

Thank you
Updates in Management of Common Infections in Post-Acute and Long-Term Care Facilities

Swati Gaur, MD, MBA, CMD, AGSF
Chief Operating Officer, Care Advances Thru Technology
Medical Director, Post-Acute Long Term Care, Northeast Georgia Health System

Learning Objectives

By the end of the session, participants will be able to:

• Objective 1: Know principles of sepsis clinical management
• Objective 2: Understand the role of communication cascade
• Objective 3: Discern whether to treat in LTC or transfer location

Case Presentation:

• 79 year old patient with indwelling foley and history of CVA with dense left hemi, diabetes, hypertension, and CAD.
• Called by NP – facility called with patient having constitutional symptoms – acute change in condition initial workup 12K white count, no localizing symptoms. Ceftriaxone started and now with fever despite it, she wants to add more antibiotics.
• Is this enough information for decision making?
• What did we do with patient?

Outcomes of the Surviving Sepsis Campaign in intensive care units in the USA and Europe: a prospective cohort study

Lancet 2012

Speaker Disclosures

Dr. Gaur has no financial relationships.
TREATMENT OF ACUTE SEPSIS

Effectiveness of the Bundles

- 263 patients
- 6 hour bundle vs traditional treatment
- In hospital mortality 30.5 vs 46.5 with P=0.009

Early-Goal-Directed Therapy in the Treatment of Severe Sepsis and Septic Shock
Emanuel Rivers, M.D., M.P.H., Bryant Nguyen, M.D., Suzanne Havstad, M.A., Julie Ressler, B.S., Alexandra Muzzio, B.S., Bernhard Knoblich, M.D., Edward Peterson, Ph.D., and Michael Tomlanovich, M.D. for the Early Goal-Directed Therapy Collaborative Group

NEJM 2001

What's in a bundle?

3 HR BUNDLE
- Measure lactate level
- Obtain blood cultures prior to administration of antibiotics
- Administer broad spectrum antibiotics
- Administer 30ml/kg crystalloid for hypotension or lactate ≥4mmol/L

6 HOUR BUNDLE
- Apply vasopressors (for hypotension that does not respond to initial fluid resuscitation) to maintain a mean arterial pressure (MAP) ≥65mmHg
- In the event of persistent hypotension after initial fluid administration (MAP<65mmHg) or if initial lactate was ≥4mmol/L, re-assess volume status and tissue perfusion.
- Re-measure lactate if initial lactate elevated.

Hour-1 Bundle
- Measure lactate level. Re-measure if initial lactate >2mmol/L
- Obtain blood cultures prior to antibiotic administration
- Administer broad- spectrum antibiotics
- Begin rapid administration of 30ml/kg crystalloid for hypotension or lactate ≥4mmol/L
- Apply vasopressors if patient is hypotensive during or after fluid resuscitation to maintain MAP≥65mm Hg

Antibiotic Choice

- Early – within 1 hour
- Appropriate —
  - Choice of antibiotic
  - Route of administration
  - Dose of antibiotic

![Graph showing survival fraction and cumulative antibiotic initiation over time from hypotension onset (hrs).](image)


Broad Goals

- Early Goal-directed therapy
  - Fluid bolus
  - Decrease in mortality
  - NNT-6

![Diagram illustrating the progression of shock and its stages.](image)

Communication

![Image of a fish with text.](image)

The single biggest problem in communication is the illusion that it has taken place.

George Bernard Shaw
### Seeing Sepsis: Identifying Sepsis

- **Is their temperature above 100?**
- **Is their heart rate above 100?**
- **Is their blood pressure below 100?**

And does the resident just not look right? Tell the nurse, screen for sepsis and notify the physician immediately.

### Communication flow Cascade

- **CNA**
  - STOP AND WATCH 100-100-100 Algorithm
  - Active surveillance

- **NURSE**
  - SBAR for sepsis
  - POLST/advance care plan

- **PHYSICIAN/PROVIDERS**
  - Diagnosis
  - Treatment plan

- **FAMILY**
  - Decision

### Decision cascade

- **Sepsis SBAR**
- **Goals of care**
  - Do not transfer
  - No established goals of care
  - Call 911
  - Treat in LTC facilities
  - Order labs, fluids, abx, call family

### Let's not make our patients do this!

*DO not put this person on artificial support of any kind for any reason what so ever. DO harvest reusable parts when he is dead, and then cremate all that remains.*
Site of treatment

To treat or not to treat...
in the facility

To transfer or NOT to transfer

<table>
<thead>
<tr>
<th>Patient with severe sepsis</th>
<th>Nursing home residents</th>
<th>Non nursing home residents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rate of ICU admission</td>
<td>40%</td>
<td>21%</td>
</tr>
<tr>
<td>Hospital LOS</td>
<td>7 days</td>
<td>5 days</td>
</tr>
<tr>
<td>In-hospital mortality</td>
<td>37%</td>
<td>15%</td>
</tr>
</tbody>
</table>


Treat

- 30ml/kg X 60 KG= fluid bolus.
- Sepsis is NOT a crisis of clysis!
- Keep MAP >65 [(diastolic X 2)+systolic]/3
- Keep that VS machine in the room- Like Really!
- Follow up the lactate if the first level was high-
- What color tube is that anyway?

Treat

- Send all Cultures before the first dose of antibiotics which should be within 1 hour-
- Do we even have culture bottles?
- Start with broad spectrum antibiotics (2 with shock) and narrow a.s.a.p. –
- Its 2 am, how long do I have to hold to get the ebox list?
- Duration 7-10 days (typical)
- Will be tailored to the organ of origin
**The S-Kit: Making it operational**

- **Category**: Specific Components
- **Specific Components**
  - **Oral**: amoxicillin/clavulanic acid and linezolid
  - **Intravenous**: piperacillin/tazobactam and intravenous vancomycin
  - **If penicillin allergy**: levofloxacin
  - **If concern for C. difficile infection**: oral vancomycin or fidaxomicin

**Monitor**
- Close monitoring of vital signs
- Watch for system failure with O2 monitoring, labs (glucose, creatinine, platelet)
- Watch for response (CBC, lactate level)
- Follow up on the Cultures

**Communicate**
- Call family to discuss prognosis and goals of care.

**Watch out for complications**
- Pressure ulcers
- DVT/ stress ulcer
- Deconditioning
- Nutrition
- Delirium

**Treatment in LTC**
- Treat
- Monitor
- Communicate
In summary:

• Patient level intervention: 3 big goals:
  - Start antibiotics
  - Maintain perfusion
  - Support patient through acute infection

• Facility level intervention: 3 big goals:
  - Don't miss it!
  - SBAR: Education!!!
  - Determine site of treatment:
    - Goals of care
    - Early intervention...regardless of site of care

Questions:

Role of Medical Director

• Nurture the Antimicrobial Stewardship Committee
• Actively participate in QAPI
• Know the LTC capabilities checklist
• Help develop capabilities – blood culture bottles, stat labs, IV fluids, E box antibiotics
• Standardization of Advanced Care Planning

Role of Practitioners

• Know the capabilities
• High level of suspicion
• Education of nursing staff
• Proactive discussion of goals of care

Mindful approach to treatment of Infections

Always Team Work

Role of Practitioners
To transfer or NOT to transfer

- Nursing home residents with severe sepsis, compared with non-nursing home residents, had significantly higher rates of ICU admission (40% vs 21%), hospital LOS (median, 7 vs 5 days), and in-hospital mortality (37% vs 15%).

Be aware:

- Mortality of sepsis is high if not following the full bundle!!
- May start treatment but several lab/monitoring/treatment resources may not be available in LTC facilities.
- The chance that patient will deteriorate despite initial treatment is high and we have no immediate ICU supportive interventions