Nurse-Driven Interprofessional Sepsis Education Program Decreases Mortality and Achieves Organizational Goal

Session # C 617
2013 ANCC National Magnet Conference®
October 3, 2013 ~ 11:00 am – 12 noon

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Penn State Hershey Medical Center, Hershey, PA
Key Nursing Roles

Patti Wengert:
- Director of Nursing, Project Champion: Nursing Leadership
- Process Owner: Co-Chair, Interdisciplinary Critical Care Committee

Erin Sarsfield:
- Clinical Nurse Specialist: Critical Care Units
- Clinical Expert, Nursing Education and Practice

Cheri West:
- Program Manager: Quality and Organizational Performance
- Project Facilitation, Interprofessional Consensus
Why Nurse Roles Are Key to Success

- Perform foundational work for organizational transformation
- Operationalize interprofessional patient care
- Standardize evidence-based care practices
Objectives

- Describe how nursing leadership lead to integrating evidence-based sepsis care into interprofessional practice and decreased sepsis mortality.

- Describe how interprofessional collaboration achieves Organizational Goals and patient outcomes.
Why focus on sepsis?

- Improve outcomes
- Standardize evidence-based practice and care
- Reduce Observed-to-Expected (O/E) mortality
- Generate interprofessional education
- Participate in bedside research and in publication of outcomes

_Earlier intervention saves lives!_
Impact of Sepsis

- Nationally:
  - Overall mortality 29%
  - Increased number and severity
- Hershey Medical Center:
  - 47% undiagnosed severe sepsis
  - 10% received antibiotics within 1 hour
Our Team

Nurse Quality Specialist
Physician champions
Advanced Practice Providers

Nurses from various clinical areas
Lab
IT
Medical Records
Pharmacist
Effective Teams: Nurse Leadership

- Diversify membership
- Work systematically as a team
- Be accountable!
  - As an individual and a team
- Communicate effectively
- Lead to consensus
- Assign leaders for workgroups
Initial Steps

- Historical chart review
- Needs Assessment
- Current state
- Benchmark
Historical Chart Review

1,000 patient chart reviews:

- 1/3 of all mortalities related to sepsis
- Mortality rate 15% higher than expected
- 65% of all sepsis patients admitted through the ED
- Focus on adult patients
**Needs Assessment Survey**

- Medical Staff, Nurses, Pharmacy, Coders
- 21% return rate

<table>
<thead>
<tr>
<th>Good News</th>
<th>Not So Good News</th>
</tr>
</thead>
<tbody>
<tr>
<td>Give antibiotics before organism known</td>
<td>Could not identify SIRS criteria</td>
</tr>
<tr>
<td>Give fluids for initial treatment of sepsis</td>
<td>Norepinephrine not recognized as first-line drug</td>
</tr>
<tr>
<td>Early detection, fluid, antibiotics reduce sepsis mortality</td>
<td>Accurate documentation of sepsis for proper coding</td>
</tr>
</tbody>
</table>

Go Back to the Basics!
## Hershey Medical Center

### Impact of sepsis on mortality and length of stay

<table>
<thead>
<tr>
<th></th>
<th>Penn State</th>
<th>Cases</th>
<th>% Deaths Observed</th>
<th>% Deaths Expected</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>2009 Total Discharges</strong></td>
<td>25,121</td>
<td>2.60</td>
<td>2.84</td>
<td></td>
</tr>
<tr>
<td><strong>2009 Total Sepsis Cases</strong></td>
<td>877</td>
<td>23.15</td>
<td>20.16</td>
<td></td>
</tr>
</tbody>
</table>

### Length of Stay

<table>
<thead>
<tr>
<th></th>
<th>Penn State</th>
<th>Cases</th>
<th>Mean LOS Observed</th>
<th>Mean LOS Expected</th>
<th>LOS Index</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>2009 Total Discharges</strong></td>
<td>25,121</td>
<td>5.51</td>
<td>5.34</td>
<td>1.03</td>
<td></td>
</tr>
<tr>
<td><strong>2009 Total Sepsis Cases</strong></td>
<td>877</td>
<td>15.89</td>
<td>12.40</td>
<td>1.28</td>
<td></td>
</tr>
</tbody>
</table>

Data source: UHC Co6; CY 2009 all available CC6 participants with sepsis cases (and diagnosis). Exclusions: normal newborns, non-viable neonates. ©2010 University HealthSystem Consortium.
Penn State: Sepsis rate per 1000

<table>
<thead>
<tr>
<th>Penn State</th>
<th>UHC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sepsis rate (per 1000)</td>
<td>Lowest observed</td>
</tr>
<tr>
<td>34.91</td>
<td>11.44</td>
</tr>
</tbody>
</table>

Date source: UHC CDB; CY 2009; all available CDB participants with sepsis cases (any diagnosis). Exclusions: normal newborns, non-viable neonates.
Team Goals

- Save one life per week
- Implement consensus sepsis bundle
- Assure 35% receive antibiotics, resuscitation fluids within 1 hour of arrival
- Educate clinicians
- Create Sepsis Toolkit, Website
Clinical Nurses Are Key to Success

- 24/7 bedside assessment and care
- First to identify changes in patient’s condition
- Coordinate clinical team activities
Priority Strategies

- Assign nurses as team leaders for workgroups
- Utilize Surviving Sepsis Guidelines
- Design education for all clinicians
- Use technology resources
Sepsis Education

All Residents, PAs, CRNPs, Fellows, Attendings (caring for adult inpatients) are required to complete required sepsis education as part of hospital orientation. Inpatient admitting services: Surgery, Medicine, PSCI, PSVH, Neurosciences, FCM, Hem/Onc, Emergency Department, and Anesthesiologists and residents (rotating through the ICU’s).

You must take both Phase 1: Sepsis Bundle and Phase 2: SIRS/ Severe SIRS Alert

If you need to enlarge your screen, right click on your desk top, select Properties, Settings, slide the screen resolution bar to the left to desired size, click OK.

Sepsis is a common cause of inpatient mortality. Early recognition of the signs of systemic inflammatory response syndrome (SIRS) and early interventions of fluid resuscitation and initial antibiotic coverage have been proven to reduce sepsis-related mortality and morbidity. Please consider potential sepsis as a differential diagnosis when evaluating/assessing your patients.

At HMC when 3 or more SIRS criteria and/or when 2 or more SIRS criteria plus one symptom of end organ damage is noted in the electronic record, a SIRS/Severe SIRS Alert will fire to the nurse. Nurses should respond to these alerts like other critical test results. The nurse will assess the patient, confirm the alert and notify the service provider. The providers should respond as they would any other medical emergency (ARRT): perform a bedside exam and evaluate if further work up and treatment needed. If the 1st level providers have not responded in 30 minutes, Attending Physicians will be notified.

- **Phase 1: Sepsis Bundle**
  Click here to review the Sepsis Bundle PowerPoint and take the Post Test. Upon successfully completion of the post test, you will be prompted to print out your CME certificate. Successful completion of the post test registers you as having completed the required education.

- **Phase 2: Systemic Inflammatory Response Syndrome Alerts**
  Click here to review the SIRS/Severe SIRS Alert Education Module and take the Post Test. Click on blue highlighted SIRS Alerts to open. Upon successful completion of the test, you will be prompted to print out your CME certificate. Successful completion of the post test registers you as having completed the required education.

If you need to enlarge your screen, right click on your desk top, select Properties, Settings, slide the screen resolution bar to the left to desired size, click OK.
IT Solutions

- Eliminate variation and confusion
- Promote consistency
- Antibiotic Algorithm
- Sepsis Bundle/Order Sets
- Hospital Dashboard
PSHMC Antibiotic Algorithm

SEPSIS/SEVERE SEPSIS/SEPTIC SHOCK INITIAL ANTIBIOTIC PROTOCOL

**STEP 1**
Initiate within 1 hour
All Patients (Regardless of source)

- **CEFEPIME 2 G IV**
  * (If history of resistant gram negative organism use MEROPENEM 1g IV and call ID for further advice)

- **OR**
  **IF PCN ALLERGIC: AZTREONAM 2G IV PLUS MOXIFLOXACIN 400mg IV**
  * (If history of resistant gram negative organism call ID for further advice)

**NOTE:**
All recommendations are for one dose only; Recently used antibiotics generally should be avoided.

**STEP 2**
Within 1 - 3 hours
Suspected source of infection

- **CNS**
  (If meningitis strongly suspected give DECADRON 10mg IV Q6H)
  ADD VANCOMYCIN loading dose of 30mg/kg IV (up to 3g) AND if age >50, immunocompromised, chronic ETCH:
  ALSO ADD AMPCILIN 2g IV, or
  **IF PCN ALLERGIC: BACTRIM 10mg/kg IV**

- **LUNG**
  Add MOXIFLOXACIN 400mg IV
  **IF HEALTHCARE ASSOCIATED:**
  ADD LINEZOLID 600mg IV and give CIPROFLOXACIN 400mg IV (instead of MOXIFLOXACIN)

- **GI**
  ADD METRONIDAZOLE 500mg IV

- **LINE OR SKIN/BONE/Joint**
  ADD DAPTOMYCIN 8mg/kg IV AND
  **IF on TPN or NEUTROPENIC:**
  ADD CASPOFUNGIN in loading dose of 70mg IV

- **UNKNOWN SOURCE or URINE**
  ADD VANCOMYCIN loading dose of 30mg/kg IV (up to 3g)

**STEP 3**
Reassess

Reassess antibiotic selection based on clinical picture, and as imaging and cultures become available.
## Order Set: Initial Sepsis Bundle

<table>
<thead>
<tr>
<th>Component</th>
<th>Order Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peripheral IV Insertion</td>
<td>STAT, 2 Large Bore IVs</td>
</tr>
<tr>
<td>Vital Signs</td>
<td>q15min, For 4 doses/times</td>
</tr>
<tr>
<td>Vital Signs</td>
<td>T.N=60, q30min, For 2 doses/times</td>
</tr>
<tr>
<td>Vital Signs</td>
<td>T.N=120, q1h</td>
</tr>
<tr>
<td>Blood Culture (Aerobic AND Anaerobic)</td>
<td>STAT</td>
</tr>
<tr>
<td>Blood Culture (Aerobic AND Anaerobic)</td>
<td>STAT</td>
</tr>
<tr>
<td>Unless Contraindicated Give Fluid Bolus:</td>
<td></td>
</tr>
<tr>
<td>Sodium Chloride 0.9% Bolus (NS Bolus)</td>
<td></td>
</tr>
<tr>
<td>Ceftazidime</td>
<td>1,000 mL, Infuse Over: 60 min., injection, IV, ONCE, STAT</td>
</tr>
<tr>
<td>If PCN Allergy Give Both Moxifloxacin &amp; Aztreonam:</td>
<td></td>
</tr>
<tr>
<td>Aztreonam</td>
<td>400 mg, injection, IV, ONCE, STAT</td>
</tr>
<tr>
<td>Moxifloxacin</td>
<td></td>
</tr>
</tbody>
</table>

### Obtain as Indicated:
- Complete Urinalysis (Basic & Micro) (Urine Analysis, Basic & Microscopic) STAT
- Urine Culture STAT
- Sputum Culture w/ Smear STAT

### Assess for End Organ Damage:
- Lactate, Nurse, PO/ED STAT
- Comprehensive Metabolic Panel (CMP) STAT, Clinician to Collect
- Prothrombin Time w/ INR (PT/INR) STAT, Clinician to Collect
- Partial Thromboplastin Time (PTT) STAT, Clinician to Collect
- Complete Blood Count w/ Differential (CBC w/ Platelets and Diff) STAT, Clinician to Collect
- Arterial Blood Gases (ABGs) STAT

**IMPORTANT NOTE** to ordering clinicians:
- Review above lab results when available.
- If lab results DO indicate end organ damage, place orders in “Severe Sepsis/Septic Shock” orderset.
- If lab results DO NOT indicate end organ damage, place orders in “Sepsis, Step 2 Antibiotics” orderset.
Order Set: Severe Sepsis, Septic Shock

These orders are to be placed after the “Septis, Step 1” orderset if there is evidence of severe sepsis/septic shock with lab results consistent with end organ damage.

- Central Line Care
- Central Venous Pressure (CVP Reading)
- Intake and Output (I&O)

Choose ONE:
- Sodium Chloride 0.9% Bolus (NS Bolus)
- Lactated Ringers Bolus (LR Bolus)

Initiate Septis, Step 2 Antibiotics orderset:
- Septis, Step 2 Antibiotics

Order Details:
- Central Line Care
- Central Venous Pressure (CVP Reading)
- Intake and Output (I&O)

Choose ONE:
- Sodium Chloride 0.9% Bolus (NS Bolus)
  - 20 mL/kg. Infuse Over 15 minutes if SBP < 90, injection IV, ONCE, STAT
- Lactated Ringers Bolus (LR Bolus)
  - 20 mL/kg. Infuse Over 15 minutes if SBP < 90, injection IV, ONCE, STAT
Integration with Shared Governance

- Department Practice and Education Council
- Unit-Based Practice and Education Councils
- Small Group/1:1
Education Plan

- Providers, Nurses, Pharmacists, Coders
- E-learning modules, clinical vignettes
- Shared governance councils
- Faculty, resident conferences
- Education and ongoing orientation

Resources:
- Pocket guide
- Posters
- Website
Next Steps

- ED pilot
- Evaluate results
- Rapid cycle process improvement
- Global sepsis education
- House-wide implementation
Pilot – Emergency Department

Early Adopters

Point of Care Testing

65% of all Sepsis patients

Protocols

Time Stamp
Results of Pilot

- Improved antibiotic time from 4-6+ hours to 1-3 hours
- Met goal of fluid resuscitation and antibiotic within 1 hour
- Posted results on dashboard
Project Results 2009-2011

- Saved 65 lives (pilot)
- 120 lives saved in 2 years!
- Decreased sepsis O/E mortality by 37%
- Reduced overall mortality by 9%
- Decreased ICU days by 1.07
- Achieved an overall reduction of 2.15 days
Mortality Results

Trend in observed mortality rate for patients with sepsis by quarter, 2009-2011

Trend in ratio of observed mortality to expected mortality by quarter, 2009-2011.
Length of Stay (LOS) and Cost Results

Trend in average length of hospital stay for patients with sepsis by quarter, 2009-2011

Trend in average hospital costs for patients with sepsis by quarter, 2009-2011
30% Decreased Risk of Dying

- Education
- Protocol Development
- Order Sets
- Compliance Monitoring

SEPSIS
Our Continuing Journey: 2011 to Present

- SIRS Alert education for all clinicians
- Cloud based electronic alerts
- Nurse alerts: key to early intervention
- Piloted in SICU, Medicine unit
- House-wide implementation
Continuous Efforts for Improvement

Sepsis Mortality Index
(43% improvement from baseline)

Observed vs Expected Deaths

% Deaths (Exp)

% Deaths (Obs)
Conclusions

- Nurses as Leaders
- Diversify Team
- Sepsis Bundles and Education
- Active adjunct SIRS alerts
Acknowledgements...Thank You!

- Scott Armen, MD
- Tonya Crook, MD
- Marissa Grifasi, PharmD, BCPS
- Sonja Heisey, BA
- Chris Hollenbeak, MD, PhD
- Amy Leib, MS III
- Kristine Reynolds, MSN, RN
- Victoria Schirm, PhD, RN
- John Showalter, MD, MSIS
- Pat Swetland, RHIT
- Cynthia Whitener, MD
References

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Contact Us!

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