The ACMC Sepsis Journey
Presenter

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About ACMC

- **Our Mission:**
  
  *Caring, Healing, Teaching, Serving All*

- **475 licensed beds**

- **3 Hospital Campuses**

  - **Highland**
    - Acute inpatient

  - **Fairmont**
    - Acute rehabilitation
    - Skilled nursing care

  - **John George Psychiatric**
    - Acute psychiatric

- **4 Wellness Centers**

  - **Highland Wellness Center**
  - **Eastmont Wellness Center**
  - **Hayward Wellness Center**
  - **Newark Wellness Center**
Objectives

- What is sepsis?
- Why is sepsis a national priority?
- What are strategies we used that impact sepsis outcomes at ACMC?
  - ACMC Journey
  - Data
  - Strategies
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The Path to Septic Shock

Infection  SIRS  Sepsis  Severe Sepsis  Septic Shock
Relationship of Infection, SIRS, & Sepsis

- BACTEREMIA
- FUNGEMIA
- PARASITEMIA
- VIREMIA
- OTHER

INFECTION
• Positive Cultures?
• Suspected Infection?
• On Antibiotics?
SIRS = Systemic Inflammatory Response Syndrome

≥ 2 of the following:
- Heart Rate > 90
- Temperature > 38 or < 36
- RR > 20 or PCO₂ < 32
- WBC > 12,000 or < 4,000 or > 10% Bands

Pancreatitis
Trauma
Burns
Other
Relationship of Infection, SIRS, & Sepsis

SEPSIS
Where infection and systemic inflammation meet
Relationship of Infection, SIRS, & Sepsis

SEVERE SEPSIS

Sepsis + Organ dysfunction
Relationship of Infection, SIRS, & Sepsis

- bacteremia
- fungemia
- parasitemia
- viremia
- other
- INFECTION

SEPSIS

SEVERE SEPSIS

SEPTIC SHOCK

SIRS-
Systemic Inflammatory Response Syndrome

- pancreatitis
- trauma
- burns
- other
Objectives

- What is sepsis?
- **Why is sepsis a national priority?**
- What are strategies we used that impact sepsis outcomes at ACMC?
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The Impact of Sepsis

- Severe sepsis and septic shock cause >200,000 deaths/year in U.S.
- The mortality of severe sepsis is 30% to 50%; the mortality of septic shock is 50% to 80%
- Annual cost to treat is about $16.7 billion
- The incidence of sepsis is increasing and projected to rise at a rate of 1.5% per year
Severe Sepsis Kills

Severe sepsis kills

- Heart Attack: 895,000
- Stroke: 700,000
- Severe Sepsis: 751,000

Source: Centers for Disease Control

CDC2009
Epidemiology

Mortality

Sepsis in the United States

| Diagnosis |
|-----------------|-----------------|------------------|
| Systemic inflammatory response syndrome (≥2 of the following) |
| Septic shock (severe sepsis plus refractory hypotension) |
| Severe sepsis (sepsis plus organ failure) |
| Sepsis (systemic inflammatory response syndrome plus evidence of infection) |
| Crude mortality |
| 45% | 20% | 15% |
| Number of deaths annually |
| 90,000 | 60,000 | 60,000 |
| Total: 210,000 |

Martin, GS et al, NEJM 2003; 348:1546
Severe Sepsis/Septic Shock Mortality and Organ Failure

The more organs affected the higher the mortality

The goal of the protocol is to identify and intervene early to prevent the cascade of organ failure

Noncardiogenic Acute Respiratory Failure Is On The Rise

Figure 1. Incidence of noncardiogenic acute respiratory failure in the United States by race (1992-2007). Incidence rates are calculated using the age and sex distribution for each year as estimated by the U.S. Census and standardized to the age and sex distribution of the 2000 U.S. Census. Error bars represent 95% confidence intervals incorporating uncertainty of the multiple imputation process and the complex survey design of the National Hospital Discharge Survey.
Number of Failing Organs Correlates with Death from Non-Cardiogenic Acute Respiratory Failure

Figure 3. Percent of noncardiogenic acute respiratory failure patients who died during their hospital stay in the United States by race (1992-2007), by the number of organ failures. Estimates are based on the mean of the multiply imputed data and the complex survey design of the National Hospital Discharge Survey. Organ failures calculated using standard definitions (14). Error bars have been removed to improve clarity of interpretation.
Severe Sepsis is an Emergency

Trauma  Sepsis
Objectives

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The ACMC Journey Begins!

- 2008- Pre- INLP - lack of infrastructure- poor data definition, team without skills

- 2009- INLP Grant starts and the journey begins with the gift of wisdom and tools!

- Team Selection - Inviting front line staff to participate in improvement

- Discovering team dynamics - overcoming challenges

- The gift of leadership development - learning new tools
Board of Trustees & Chief Exec Officer Initiate HRT Effort

Medical Staff Accepts Challenge and Sets Goal

Chief Medical Officer and Quality Dept. Launch the Effort
What was new about this effort?

Leadership attention

Clear and compelling goal

Data focus

Involvement of all hospital communities
ACMC Teamwork

Nursing
- Theresa Cooper
- Karen Young

Quality
- Kerin Bashaw

Medicine
- Indhu Subramanian

IT

DSRIP

Pharmacy

Sepsis care
Analysis: There was a trend of high sepsis mortality rate in the first and third quarters of each year. We might expect the high rate to remain in the following months.
ACMC Bundle Compliance

**Graph 4: Annual Sepsis Resuscitation Bundle Compliance - Non ICD-9 Code Criteria**

<table>
<thead>
<tr>
<th>Percent</th>
<th>% Lactates / (+) Screening</th>
<th>Blood Cx / (+) Sepsis</th>
<th>Antibiotics / (+) Sepsis</th>
<th>Fluids / (+) Sepsis</th>
<th>Bundle Compliance / (+) Sepsis</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0%</td>
<td>10%</td>
<td>20%</td>
<td>30%</td>
<td>40%</td>
</tr>
</tbody>
</table>

- **2010 Average**:
  - % Lactates / (+) Screening: 56%
  - Blood Cx / (+) Sepsis: 93%
  - Antibiotics / (+) Sepsis: 60%
  - Fluids / (+) Sepsis: 59%
  - Bundle Compliance / (+) Sepsis: 40%

- **2011 Average**:
  - % Lactates / (+) Screening: 79%
  - Blood Cx / (+) Sepsis: 83%
  - Antibiotics / (+) Sepsis: 58%
  - Fluids / (+) Sepsis: 71%
  - Bundle Compliance / (+) Sepsis: 34%

- **2012 Average**:
  - % Lactates / (+) Screening: 84%
  - Blood Cx / (+) Sepsis: 78%
  - Antibiotics / (+) Sepsis: 53%
  - Fluids / (+) Sepsis: 71%
  - Bundle Compliance / (+) Sepsis: 34%

- **1Q-2012**:
  - % Lactates / (+) Screening: 79%
  - Blood Cx / (+) Sepsis: 73%
  - Antibiotics / (+) Sepsis: 61%
  - Fluids / (+) Sepsis: 61%
  - Bundle Compliance / (+) Sepsis: 34%

- **2Q-2012**:
  - % Lactates / (+) Screening: 85%
  - Blood Cx / (+) Sepsis: 70%
  - Antibiotics / (+) Sepsis: 48%
  - Fluids / (+) Sepsis: 81%
  - Bundle Compliance / (+) Sepsis: 30%

- **3Q-2012**:
  - % Lactates / (+) Screening: 86%
  - Blood Cx / (+) Sepsis: 81%
  - Antibiotics / (+) Sepsis: 51%
  - Fluids / (+) Sepsis: 66%
  - Bundle Compliance / (+) Sepsis: 34%

- **4Q-2012**:
  - % Lactates / (+) Screening: 87%
  - Blood Cx / (+) Sepsis: 88%
  - Antibiotics / (+) Sepsis: 50%
  - Fluids / (+) Sepsis: 76%
  - Bundle Compliance / (+) Sepsis: 38%

**Analysis**: There is opportunity for improvement of bundle compliance by improving one hour antibiotic administration and fluid resuscitation. Only the Lactate screening compliance improved in 2012.
Who Is The First To See It?

RN

Surviving Sepsis Campaign Protocol
Accomplishments:

- Baseline data
- Daily screening for Sepsis at 0800, 1600, 2400 in MERLIN
- Multidisciplinary Education
- Sepsis Protocol
- Standardized Procedure for nursing
- Sepsis Video
- Sepsis Order Sets
What the Teams Did: HRT Phase I

- Added sepsis bundle elements to Smart Orders
- Developed nurse early diagnosis screening protocol used at admission and transfer
- Developed lab ordering pathway for nurses to begin diagnosis independent of MDs
- Put point of care lactate testing on floors
- Added broad spectrum antibiotics to stock in ED and ICU
- Created innovative and fun Sepsis Diagnosis video on YouTube
Check out ACMCs YouTube Video
Over 22,400 Hits!

http://www.youtube.com/watch?v=mgYbIrbcFtQ
Surviving Sepsis Campaign Bundles

- **Sepsis Resuscitation Bundle** - within 6 hours
  - Early recognition of severe sepsis/septic shock
  - Early-Goal Directed Therapy to be completed in 6 hours

- **Sepsis Management Bundle (if EGDT not successful)** - within 24 hours
  - After all EGDT interventions implemented
  - Continues until patient recovers or expires
EGDT - The Six Hour Clock
Severe Sepsis Orders and Protocol
Pilot

6 HOUR BUNDLE

Time of Presentation: (lactic acid >4 or hypotensive) Time: ___ (RN fill in) Date: ___/___/___

Start Time for 6 Hour Bundle: Date: ___/___/___ (MD fill in) Time: ___ (24 Hr clock)
Immediately request transfer of patient to the ICU or SDU (if appropriate) and begin 6 hour bundle.
(Document start times on flow sheet. Note sequence in no particular order).

Height ______ (feet) ______ (inches) Weight ______ (kg)

DRUG ALLERGY: ___________________________ (reaction: __________)

Draw labs:
- Blood cultures x2, CMP, CBC, PT/PTT/INR, U/A, Lactic acid

Administer Antibiotic within one hour of diagnosis. Please check box and fill in space(s) if needed
- *Piperacillin/Tazobactam (Zosyn®) 4.5 gram IVPB q 6 hrs (Do Not Use in PCN allergy)
- *Vancomycin (15 mg/kg) (actual dry body wt) IVPB q 12 hrs
  (Each vancomycin dose should NOT exceed 1500 mg per dose or 1.5 gram per dose)
- *Aztreonam 2 gram IVPB q 8 hrs (Typical, use in penicillin allergic patient)
- Metronidazole 500 mg IVPB q 6 hrs
- Clindamycin 900 mg IVPB q 8 hrs
- Doxycycline 100 mg IVPB q 12 hrs
- *Levofloxacin 750 mg IVPB q 24 hrs (Do Not Use in patients concerned for MTB)
- Linezolid ( Zyvox®) 600 mg IVPB q 12 hrs
- *Amikacin (15 mg/kg) (adjusted body wt if obese) IVPB q 24 hrs
  (Adjusted body wt = Ideal body wt + 0.4 x (Total body wt – Ideal body wt))
- *Amikacin (15 mg/kg) (adjusted body wt if obese) IVPB x 1
- Ceftriaxone 2 gram IVPB q 12 hrs
- Other
- Other

*RENAI DOSING for Zosyn, Levofloxacin, Vancomycin, Amikacin, please check appropriate box(es) and fill in space(s) if needed. (CrCl = "creatinine clearance")

Piperacillin/Tazobactam (Zosyn®)
- 4.5 gram IVPB q 8 hrs
  (if CrCl = 20–40 ml/min)
- 4.5 gram IVPB x 1, then 2.25 gram IVPB q 6 hrs
  (if CrCl< 20 ml/min)
- 4.5 gram IVPB x 1, then 2.25 gram IVPB q 8 hrs plus additional 0.75 gram IVPB after each hemodialysis session
  (if on hemodialysis)

Vancomycin
- (15 mg/kg) IVPB q 24 hrs
  (if CrCl = 20–40 ml/min)
- (15 mg/kg) IVPB x 1, then check Vancomycin random level 24 hrs after dose.
  Redose with same dose when level < 15 mcg/ml
  (if CrCl< 20 ml/min, or on hemodialysis)
  (Each Vancomycin dose should NOT exceed 1500 mg per dose or 1.5 gram per dose)

Levofloxacin
- 750 mg IVPB q 48 hrs
  (if CrCl = 20–40 ml/min)
- 750 mg IVPB x 1, then 500 mg IVPB q 48 hrs
  (if CrCl< 20 ml/min or on hemodialysis)

Aztreonam
- 2 gram IVPB x 1, then 1 gram IVPB q 8 hrs
  (if CrCl = 10–30 ml/min)
- 2 gram IVPB x 1, then 500 mg IVPB q 8 hrs
  (if CrCl< 10 ml/min)
- 2 gram IVPB x 1, then 500 mg IVPB q 8 hrs plus additional 250 mg IVPB after each hemodialysis session
  (if on hemodialysis)
Assessment Tool for Screening Patients
Assessment Tool for Screening Patients
What we are doing now...

- Improved Bundle Compliance
  - Continue to work on improving compliance - hardwire

- Improve Process and Protocols
  - “Sepsis nurse” to begin
  - New Nurse Champion (Began Q1 2013)
  - Re-launch education via sepsis video & other tools
  - Real-time sepsis case review (Pilot Q1 2013 in ED)
    - Spread to the floors

- Data Management
  - Align data collection via Soarian
  - Compare ICD-9 with non-coded data
  - Keep data fluid and transparent
Sincere Thanks to

The Gordon and Betty Moore Foundation INLP
(Integrated Nurse Leadership Program)

&

DSRIP
(Delivery System Reform Incentive Payments)
Thank You!

Questions?