SEPSIS MANAGEMENT

Riverside County Regional Medical Center

Tammy Lowe, RN, Sepsis Coordinator
Christina Qi, Pharm.D., Clinical Pharmacist
OVERVIEW

- BUNDLE ELEMENTS
- RAPID IDENTIFICATION
- AGGRESSIVE TREATMENT
- EDUCATION/REINFORCEMENT
- DATA COLLECTION
- FEED BACK
- PATIENT OUTCOMES
SURVIVING SEPSIS CAMPAIGN BUNDLES

TO BE COMPLETED WITHIN THE FIRST 3 HOURS:

- MEASURE LACTATE LEVEL
- OBTAIN BLOOD CULTURE PRIOR TO ANTIBIOTIC ADMINISTRATION.
- ADMINISTER BROAD SPECTRUM ANTIBIOTICS
- ADMINISTER 30MLS/KG CRYSTALLOID FOR HYPOTENSION OR LACTATE ≥ 4MMOL/L
TO BE COMPLETED WITHIN FIRST 6 HOURS:

- APPLY VASOPRESSOR (FOR HYPOTENSION THAT DOES NOT RESPOND TO INITIAL FLUID RESUSCITATION) TO MAINTAIN A MEAN ARTERIAL PRESSURE (MAP) ≥ 65MM HG.

- IN THE EVENT OF PERSISTENT ARTERIAL HYPOTENSION DESPITE VOLUME RESUSCITATION (SEPTIC SHOCK) OR INITIAL LACTATE ≥ 4 MMOL/L.
  - MEASURE CENTRAL VENOUS PRESSURE (CVP).
  - MEASURE CENTRAL VENOUS OXYGEN SATURATION (SCV02).

- REMEASURE LACTATE IF INITIAL LACTATE WAS ELEVATED.
IDENTIFYING THE SEPTIC PATIENT

- TRIAGE/ EMERGENCY DEPARTMENT
- ADMISSION ASSESSMENT AND SHIFT ASSESSMENTS
- RAPID RESPONSE TEAM
Emergency Department
Sepsis Rapid Treatment

History suggestive of an infection??
Age > 55 and/or co-morbidities.
(chemo patient’s who complain
of fevers/chills)

- Temperature ≥ 38°C or ≤ 36°C
- Heart Rate > 90 bpm
- SBP ≤ 90 mm Hg
- Respiratory rate ≥ 20
  breaths/minute
- Altered mental status

2 or more of the above ESI level of 2!!

Antibiotics < 60 minutes
Suspect Sepsis??
Save your Patients LIFE!!!
SEVERE SEPSIS SCREENING

Infection: Does your patient have one or more of the following infection criteria?

• **DOCUMENTED OR SUSPECTED INFECTION** - Positive culture, Urinary tract infection, cellulitis, wound, pneumonia, decubiti, recent surgery, etc?
• **PERFORATED VISCOSUS** - Perforated hollow organ (bowel)?

A □ DID YOU CHECK ANY BOXES ABOVE?

SIRS: Does your patient have two or more of the following SIRS criteria?

• **TEMPERATURE** – Is the patient’s temperature ≥ 38°C or ≤ 36°C?
• **HEART RATE** – Is the patient’s heart rate ≥ 90 bpm?
• **RESPIRATORY RATE** – Is the patient’s respiratory rate ≥ 20 breaths/min?
• **WBC COUNT** – Is the patient’s WBC cont ≥ 12,000 or ≤ 4,000, or are there > 10% immature neutrophils (bands)?

B □ DID YOU CHECK TWO OR MORE OF THE BOXES ABOVE?

ACUTE ORGAN DYSFUNCTION: Does your patient have one or more of the following organ dysfunction criteria?

• **NEUROLOGIC** – Does the patient have ALOC/reduced GCS?
• **CARDIOVASCULAR** – Does the patient have a SBP ≤ 90 mmHg or MAP ≤ 65 mmHg despite adequate fluid resuscitation or patient requires vasopressor support?
• **RESPIRATORY** – Does the patient have severe respiratory distress, require bipap, or mechanical ventilation?
• **RENAL** – Does the patient have < 30 mls/hr urine output (despite adequate fluid resuscitation), increased creatinine(> 50% from baseline) or require acute dialysis?
• **HEPATIC** – Are the patient’s liver enzymes > 2x upper limit of normal?
• **HEMATOLOGIC** – Are the patient’s platelets < 100,000/mm³ or INR > upper limit of normal (not on Coumadin)?
• **METABOLIC** – Does the patient have a lactate ≥ 4?

C □ DID YOU CHECK ANY BOXES ABOVE?

IF YOU CHECKED:

A) INFECTION + B) SIRS + C) ORGAN DYSFUNCTION = POSITIVE SCREEN SUGGESTIVE OF SEVERE SEPSIS

☐ CALL RRT AND NOTIFY PHYSICIAN
**RAPID RESPONSE RECORD**

<table>
<thead>
<tr>
<th>Date</th>
<th>Time RRT Called</th>
<th>Event Location</th>
<th>Allergies</th>
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<tbody>
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**Vital signs at time of RRT call:**

<table>
<thead>
<tr>
<th>Time</th>
<th>HR</th>
<th>BP</th>
<th>RR</th>
<th>SpO₂</th>
<th>Temp</th>
<th>GCS</th>
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**Blood Glucose:**

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<th>M</th>
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**Illness Category:**
- Medical Cardiac
- Medical Non-Cardiac
- Surgical
- Trauma
- Nax

**Code Status:**
- Do Not Resuscitate (DNR)
- Other

**RRT Triggers:**
- Staff is worried about the patient
- Acute change in HR < 50 or > 120
- Acute change in BP < 90 or > 160
- Acute change in RR < 40 or > 40
- SPO₂ < 90%
- Tachycardia (HR > 120)
- Seizures
- Acute change in heart rate > 10%
- Acute change in blood pressure > 20%
- Acute change in body temperature > 2°F

**RRT Suspected Stroke Triggers:**
- Sudden numbness or weakness of face, arm, or leg, especially on one side of the body
- Sudden confusion or trouble speaking or understanding
- Sudden dizziness or loss of vision from one or both eyes

**RRT Interventions:**
- Give a medication
- Respiratory interventions
- Cardiac interventions
- External cardiac pacing
- Neural interventions
- Secure Precautions
- IOP Precautions
- Recovery Position

**Additional physician orders during event:**

- None

**RRT Outcome:**
- Patient stable
- Patient transferred to another hospital
- Patient deceased

- Other

**Comments:**
- Time first RRT member arrived: 00:00
- Time last RRT member departed: 00:00

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<th>RAPID DIAGNOSIS</th>
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<tbody>
<tr>
<td>✓ LACTATE</td>
</tr>
<tr>
<td>✓ BLOOD CULTURE</td>
</tr>
<tr>
<td>✓ CBC/CMP/INR</td>
</tr>
<tr>
<td>✓ TYPE AND SCREEN</td>
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<tr>
<td>✓ URINALYSIS</td>
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<tr>
<td>✓ SPUTUM CULTURE</td>
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<tr>
<td>✓ CHEST XRAY</td>
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<tr>
<td>✓ COMPUTED TOMOGRAPHY (CT SCAN)</td>
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</table>
AGGRESSIVE TREATMENT

- BROAD SPECTRUM ANTIBIOTICS WITHIN 60 MINUTES OF ARRIVAL TO TRIAGE OR ACTIVATION OF RRT.
- CRYSTOLLOID FLUID RESUSITATION 30ML/KG.
- PLACE CENTRAL LINE/ARTERIAL LINE IN PATIENTS NOT RESPONDING TO FLUID AND REQUIRING VASOPRESSOR THERAPY.
- MANAGE: OXYGENATION/VENTILLATION/PERFUSION/PRELOAD (CVP)/AFTERLOAD/ CONTRACTILITY AND ScV02.
EDUCATION AND REINFORCEMENT

❖ HOUSE WIDE INSERVICES INDIVIDUALIZED TO MEET THE NEEDS OF EACH NURSING UNIT AND PHYSICIAN SPECIALTY.

❖ EQUIPMENT INSERVICES INCLUDING HEMODYNAMICS, INVASIVE LINES, MONITORS, MEDICATIONS, TEMPERATURE SENSING CATHETERS.

❖ BADGE BUDDIES EDUCATIONAL TOOLS.

❖ DAILY ROUNDING, SUPPORT, REINFORCEMENT.

Tammy Lowe Sepsis Police
**SEPSIS QUICK CLINICAL PATHWAY**
- Draw Blood Cultures
- Initiate antibiotics 60 min of arrival to ED
- Place Precept Catheter
- Calibrate in vitro by opening side one prior to side 2
- Calibrate in vivo using the mixed venous gas drawn from the distal port (brown)
- Sv02 on VBG = ScVO2 on Vigileo
- Hemoglobin on VBG = Vigileo in g/dl
- **SET UP CVP**
  - Keep CVP between 8–12
  - Bolus Normal Saline to keep CVP 8–12, SBP > 90/MAP > 65
  - CVP > 8 with SBP < 90/Map < 65 start vasopressors Levophed/Dopamine
  - If patient is on 2 pressors and has adequate fluid resuscitation consider Steroid
- **BLOOD TRANSFUSION OF PRBC**
  - Hgb < 10/Hct < 30, SBP > 90/MAP > 65, CVP 8–12 Scv02 < 70
  - Call RRT if BP ≤ 90 after 30 mls/kg fluid and/or Lactate ≥ 4

**SEPSIS**
- Call RRT 911 for pts with a suspected/confirmed infection with a SBP < 90 that does not respond to 30 mls/kg or 1–2 liters of fluid and/or a lactate ≥ 4. **YOU DO NOT NEED A PHYSICIAN ORDER to call RRT.**
- Any patient with a known or suspected infection with any 2 of these documented symptoms needs antibiotics within 60 minutes.
  - SBP < 90 mmHg
  - HR > 90 BPM
  - RR > 20 BPM
  - WBC < 4,000 or > 12,000
  - Any patient with any of the 2 above symptoms with suspicion of Pnuemonia, UTI, Wound, Cellulitis, Abcess, ect is considered septic and needs antibiotics within 60 minutes.
  - Draw blood cultures prior to antibiotics. **DO NOT WAIT TO OBTAIN URINE OR SPUTUM PRIOR TO STARTING ANTIBIOTICS.**
  - If any patient is hypotensive and does not respond to fluids, place a central line (precept catheter). They will need this line for Vasopressors, antibiotics, CVP monitoring, ScVO2 monitoring.
    - Set up CVP and ScVO2 on every Septic patient that receives a central line.
    - Document every hour your CVP and ScVO2 on the ACCU vital signs flow sheet.
## RCRMC SEPSIS Rounding Tool

### ADMISSION DATE

<table>
<thead>
<tr>
<th>DIAGNOSIS:</th>
<th>Room #:</th>
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### Start Date/Time

<table>
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<th>RRT Date/Time</th>
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#### Missed RRT

- Yes [ ]
- No [ ]

#### Time Delay

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<th>Discharge Criteria Met</th>
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- Yes [ ]
- No [ ]

### PATIENT NAME

#### MEDICAL RECORD ID

#### ENCOUNTER #

#### EMERGENCY MD

#### ADMITTING MD

### B/P

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<tr>
<th>P</th>
<th>R</th>
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<th>SPO2</th>
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### #1 LACTATE:

### #2 LACTATE:

### #3 LACTATE:

### EXCLUSIONS

- Palliative Care/Do Not Intubate: Yes [ ]
- Refusal of Care: Yes [ ]
- PRF/transfer: Yes [ ]

### BLOOD C/V

<table>
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<tr>
<th>Data/Time</th>
<th>Antibiotic IV Min</th>
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### ANTI-BIOTIC IV MIN

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### INTRAVENOUS MONITORING

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### SEPSIS CRITERIA MET

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### SEVERE SEPSIS CRITERIA MET

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### BUNDELE COMPLIANCE

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### PATIENT EXPIRY

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### PATIENT FALL-OUT

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#### Was RRT called? Y/N

- If not why?

#### If so was the pt transferred?

### Are there any fall-outs? Y/N

- If yes why?

#### Staff Educated Signature:

#### Sepsis Team RN Signature:

#### Primary Care RN:
SEPSIS REPORT CARD

NURSE: 
MEDICAL RECORD NUMBER: 
SUSPECTED/KNOWN INFECTION: 
MET SIRS CRITERIA:

- Temperature ≥ 38°C or ≤ 36°C
- Heart Rate ≥ 90 BPM
- Respiratory Rate ≥ 20 breaths/min
- WBC ≥ 12,000 or ≤ 4,000 or ≥ 10% bands

ACUTE ORGAN DYSFUNCTION:

- Cardiovascular = SBP ≤ 90 mmHg or MAP < 65 mmHg despite 30 mls/kg fluid resuscitation. 
  RRT ACTIVATED Y □ N □
- Respiratory = require mechanical ventilation?
- Renal = U/O < 0.5 mls/kg/hr despite adequate fluid, increased creatinine > 50% from baseline, or require acute dialysis?
- Hematologic = platelets < 100,000 or INR > 1.1 (not on anticoagulant).
- Metabolic = lactate ≥ 4? RRT ACTIVATED Y □ N □
- Hepatic = liver enzymes > 2x upper limit of normal?
- CNS = ALOC or reduced GCS?

1ST HOUR:

- Lactate drawn
- Blood Cultures drawn
- Broad spectrum antibiotics given
- 30 mls/kg fluid bolus

1ST 6 HOURS:

- CVP > 8
- ScVO2 > 70

NURSE SIGNATURE: __________________________ DATE/TIME ___________
EDUCATION = INCREASED RRT

- **Total number of RRT’s called 2012**
  - January = 34
  - February = 30
  - March = 25
  - April = 31

- **Total number of RRT’s called 2013**
  - January = 82
  - February = 73
  - March = 74
  - April = 73
Sepsis Management
A Multidisciplinary Approach
Rapid Response Team (RRT)

- Clinical Pharmacist
- Critical Care RN/Code–team RN
- Respiratory Therapist
- House Supervisor*

- Medical Staff/physician
- Bedside RN
- Bedside NA/technician

Collaborative Management
Pharmacist-Driven Program

Follow Patients on Sepsis Bundle for the First 24 Hours From Recognition
Sepsis Definitions

SIRS

SEPSIS

SEVERE SEPSIS

SEPTIC SHOCK

RRT Goal– Early Recognition of Severe Sepsis
Evaluation
  ◦ Met Severe Sepsis Criteria?
    • 2 SIRS criteria
    • Suspected/confirmed source of infection
    • Signs of acute organ damage/hypoperfusion
  ◦ Discuss potential differential diagnosis
    • Comorbid conditions/non–infectious causes
  ◦ Prepare to initiate Sepsis Bundle if met criteria
  ◦ Documentation
Role of the Pharmacist

- Initiate Sepsis Bundle
  - Sepsis Standard Labs
  - Serum Lactate (q3h x 3)
  - Blood Culture Prior to Antibiotics
  - Fluid resuscitation
  - Empiric Broad-Spectrum Antibiotics
  - *Recommend appropriate antibiotics regimen*
  - *Facilitate medication delivery to bedside*

Ensure Initiation Within 60 Minutes
Role of the Pharmacist

- **Patient Monitoring**
  - **Hour 3**
    - Review labs
    - Hemodynamics, fluid status
    - Need for vasopressors?
    - CVC placement?
  - **Hour 6**
    - Early Goal-Directed Therapy Targets
      - CVP, ScvO$_2$
  - **Hour 24**
    - Glycemic control
    - Low-dose steroid usage?
    - Protective ventilation?
Role of the Pharmacist

Data Collection
- All patients with activated RCRMC Sepsis Bundle
- All elements of Resuscitation and Management Bundle Compliance Information
  - IHI definition
  - SCC 2012 Sepsis Guideline definition
- Concurrent data collection and review
How is RCRMC doing?

Compliance & Mortality Data
Early Recognition By RRT

HOSPITAL ACQUIRED AND PRESENT ON ADMISSION

- Total patients
- RRT's called
- Mortality

Linear (Total patients)
Linear (RRT's called)
Linear (Mortality)
Compliance & Mortality

RCRMC Sepsis Bundle Compliance & Mortality

<table>
<thead>
<tr>
<th></th>
<th>2nd QTR 2012</th>
<th>3rd QTR 2012</th>
<th>4th QTR 2012</th>
<th>1st QTR 2013</th>
</tr>
</thead>
<tbody>
<tr>
<td>RCRMC Sepsis Bundle Compliance</td>
<td>8%</td>
<td>29%</td>
<td>43%</td>
<td>44%</td>
</tr>
<tr>
<td>RCRMC Sepsis Bundle Mortality</td>
<td>8%</td>
<td>14%</td>
<td>11%</td>
<td>8%</td>
</tr>
<tr>
<td>RCRMC Sepsis OVERALL Mortality</td>
<td>28%</td>
<td>25%</td>
<td>31%</td>
<td>27%</td>
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**Overall Mortality** denotes IHI definition with Severe Sepsis & Septic Shock diagnosis only.
SEPSIS MORTALITY
2013 HASC Definition

SEPSIS MORTALITY
2009 HASC Definition

SEPSIS MORTALITY
HASC Definitions

2013 HASC
PRIMARY dx of severe sepsis with causative microorganism specified (38.0 through 38.9, 995.92) excluding "no codes "present on admission (v4986 POA) or comfort care only (v667)

2009 HASC
ANY dx of sepsis, severe sepsis, septic shock with causative microorganism specified(38.0 through 38.9, 995.91, 995.92, 785.52) ; no exclusions
Challenges & Solutions

Limited number of RRT activations
- Education of bedside staff
- Designated team members/code team RN rounds

Antibiotics availability
- Empiric antibiotics in ED & ICU Pyxis
- Pharmacist at bedside

Lab result availability
- Point of Care lactate, BMP. (in ED & ICU)
- Unique colored lab slip system

Central line placement
- Designated procedure team
- Designated code team RN
- Early recognition for need

Early Goal-Directed Therapy (CVP, ScvO2)
- Early CVC placement
- Proper documentation of goal attainment
- Protocol-driven, pre-set form for documentation
RCRMC GOALS

- Know Sepsis Bundle elements.
- Identify septic patients rapidly.
- Provide aggressive precise treatment.
- Educate, Educate, Educate, Reinforce, Reinforce, Reinforce!!
- Collect data to determine whether program implemented is effective.
- Provide immediate constructive & supportive feedback.
- Ultimately → REDUCE MORTALITY!
QUESTIONS???