Indiana Patient Safety Center
of the Indiana Hospital Association

Indiana Sepsis: Screening

December 10, 2019

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Our Mission

Indiana Patient Safety Center
of the Indiana Hospital Association

A State of Mind
Painting created by Regina Holliday during the 2018 Indiana Patient Safety Summit

Advancing Health in Indiana

- Engage and inspire health care providers
- Create safe cultures
- Create reliable systems of care
- Prevent patient harm in Indiana

PREVENT PATIENT HARM

To create high reliability organizations who collaborate and engage in continuous improvement to achieve best in class outcomes

IMPROVE COMMUNITY HEALTH

To partner with communities and stakeholders to develop, plan, and coordinate initiatives that span the prevention and care continuum

INCREASE PATIENT AND FAMILY ENGAGEMENT

To engage patients and families in all aspects of their care and seek their input and inclusion in advisory capacities throughout organizations

LEAD A CULTURE OF SAFETY

To create an environment of mutual trust, respect, and transparency among organizations, patients, and families

Sepsis Across the Continuum

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Sepsis Topical Conversations & Best Practice Sharing
Monthly IHA Office Hour
2nd Tuesday, 11a.m. -12p.m. EST

November 12: Sepsis Bundle Compliance
https://zoom.us/j/467670260
Phone +1 646 558 8656
Meeting ID: 467 670 260

December 10: Screening
https://zoom.us/j/762464469
Phone +1 646 558 8656
Meeting ID: 762 464 469

January 14: Post-Sepsis Syndrome & Readmissions
https://zoom.us/j/577595555
Phone +1 646 558 8656
Meeting ID: 577 595 555F

February 11: Prevention
https://zoom.us/j/227228146
Phone +1 646 558 8656
Meeting ID: 227 228 146

www.survivesepsis.com
2019 IHA Sepsis Toolkit & webinar recordings & podcasts

2018 Preventing Hospital Acquired Non-Vent Pneumonia – Dr. JoAnn Brooks

IHAconnect.org/Quality-Patient-Safety

2019 IHA Sepsis Toolkit Resources

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Might my infection become sepsis? with Dr. Lindsay ...

630 views • 2 months ago

A Daughter's Concerns in Care Transitions with Karin ...

58 views • 3 months ago

Lisa: A Widow's Journey: Grief to Advocacy

145 views • 3 months ago

Sepsis Treatment Successes with Joint Commission ...

38 views • 3 months ago

Recognizing Pediatric Sepsis with Dr. Brian Wagers

175 views • 3 months ago

Sepsis Bundle Compliance Success with Dr. Raymond ...

59 views • 3 months ago

Sepsis Survivors' Rehabilitation Research wit...

29 views • 3 months ago

Pediatric Sepsis Treatment with Dr. Arnold

119 views • 3 months ago

Sepsis Recovery - Suzanne's Story

217 views • 3 months ago

www.survivesepsis.com

IHAconnect.org/Quality-Patient-Safety

Connect to Purpose Narratives-Faces of Sepsis ™

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"I had been awake for nearly 24 hours and I craved a shower and a nap. Four hours later he called me. 'I'm in trouble!' he said. 'I need you to come back.' There was an odd sound to his voice, but I didn't question his concerns and I flew back to the hospital."

"At the second hospital they started antibiotics, 12 hours after she presented to the emergency room at the first hospital. She never received any of the care described in the Surviving Sepsis Guidelines. Because my mother was more than 70 years old, she was not being treated aggressively. My brother and I decided to immediately bring her home via air ambulance."

©Rebecca Hancock

"Why didn't anyone at the hospital or any of his doctors tell us that he had or could have sepsis? By the time I had hunted for his diagnosis on the paperwork sent home, he probably had the beginnings of what would become sepsis. There were no checklists for us—nothing that would have ever led us to believe that this infection would kill him."

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My Brother-in-Law Hadn't Felt Well for a Couple Days

He had flu-like symptoms and the doctor diagnosed him with pneumonia. On the third day of his symptoms persisting, my sister took him to a small local emergency room. The emergency room also thought it was pneumonia, admitted him and started him on antibiotics. Within an hour, he started having difficulty breathing, and an ambulance transported him to a larger hospital. He stopped breathing on the way. By the time I arrived, only 10 minutes after the ambulance, his skin was mottled and he was totally unresponsive. I have worked in emergency medicine on ambulances and in the fire service for 43 years and, aside from traumatic events, I have never seen anything progress so quickly. He was a great guy, and I miss him a lot. He was never sick and took good care of himself. His death was tragic and unexpected. I had never heard of sepsis until I saw the coroner's report.

Quotes from families of victims

- We can send people to another planet but we can't fix something that seems so simple….I miss her terribly Screw you sepsis.

- I know my entire family struggles every day with "what ifs" - had we only known the signs of Sepsis, this would have had a very different outcome.

Indiana sepsis volumes & mortalities- IHA Datalink

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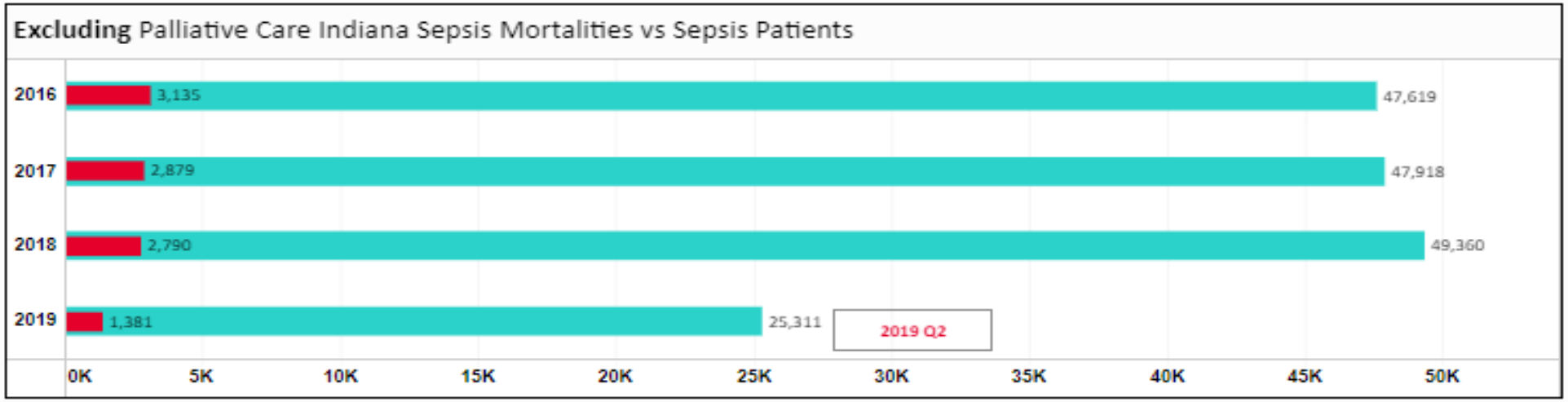
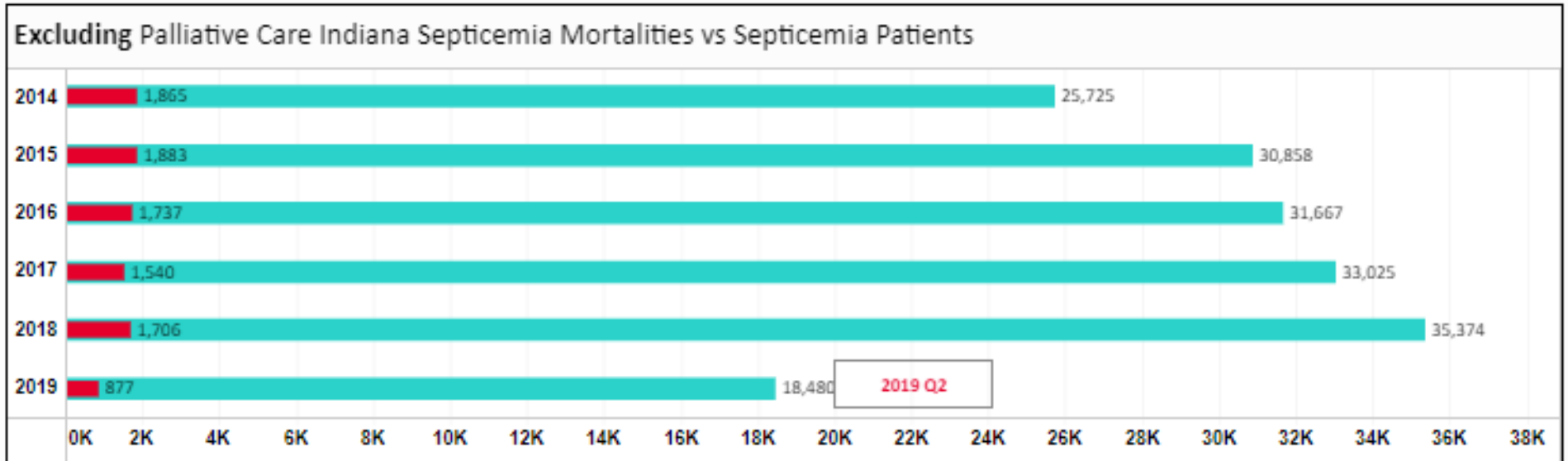
ICD-10 Sepsis Diagnosis Primary or Secondary



APR DRG 720 Septicemia Primary Diagnosis (72% of patients in 2018)



Post Op Sepsis

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- Increased risk for in hospital mortality with post-op sepsis: 33.95 odds ratio
- Per discharge impact on length of stay: 10 days
- Per discharge impact on costs: $45,264

Source: IBM Watson Truven Health Analytics Fact file, 2015

Objectives

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- *Identify signs of sepsis using SIRS criteria*
- *Briefly describe pathophysiology of sepsis*
- *Share successes from other hospitals*
- *Identify next steps in sepsis vigilance for screening*

Sepsis Screening DRAFT Gap Analysis

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- Does your organization have a sepsis screening tool/system in the ED ?
- Does your organization have a sepsis screening tool/system in inpatient departments?
- Is your sepsis screening automated within your organization's Electronic Medical Record with an early alert or warning system?
- Does your organization have a separate screening tool/system for children?

Sepsis Screening DRAFT Gap Analysis

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- Does your hospital screen every adult patient during initial evaluation in the ED
- Does your hospital utilize qSOFA to identify organ dysfunction in sepsis screening?
- Does your hospital utilize Systemic Inflammatory Response Syndrome (SIRS) criteria to screen for sepsis?
- Do you screen every adult inpatient once a shift and with acute changes in condition?

Risk factors for sepsis

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- *Recent UTI, pneumonia, or operative event*
- *Diabetes*
- *Immunosuppressive therapy (chemo, transplant)*
- *Elective surgery*
- *Chronic renal failure*
- *Alcohol abuse*
- *Splenectomy*
- *Non-modifiable factors: age (very old or young), gender (M>F), race (B>W)*

(Kumar et al, 2006; Torres et al, 2004; Englert & Ross, 2015)

Most Common Sources of Sepsis

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Up to 22% sources unknown
(Kumar et al, 2006)

Pediatric

- Respiratory (57.2%)
- Genitourinary (21.6%)
- Device (9.3%)
- Abdominal (8.4%)
- Wound / soft tissue (2.9%)

All Adult

- Respiratory (44%)
- Genitourinary (21%)
- Abdominal (21%)
- Skin (6%); Wound (4%); Catheter (4%)

Older Adult

- Urinary (44%)
- Respiratory (33%)
- Abdominal (16%)
- Skin or soft tissue (7%)

(Ruth et al, 2014; Kumar et al, 2006; Levy 2010; ElSohl et al, 2008)

RHIC Sepsis Screening

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- *Jack Jaeger, MSN, RN, CCRN*
  - Director RHIC Simulation Center
  - Terre Haute, IN

Sepsis: Early Recognition Through Screening

Jack Jaeger, MSN, RN, CCRN, RHIC Director

jack.jaeger@therhic.org

812-237-8489

Rural Health Innovation Collaborative


RHIC


Indiana State
University


INDIANA UNIVERSITY
SCHOOL OF MEDICINE


IVY TECH
COMMUNITY COLLEGE


SAINT MARY-OF-THE-WOODS COLLEGE
SM
est. 1840
WC
INDIANA


Valley Professionals
Community Health Center
Caring Professionals in Your Community.


UNION
HOSPITAL


HAMILTON
CENTER, INC.
www.hamiltoncenter.org


INDIANA
AHEC


Indiana
Hospital
Association


Indiana State
Department of Health


INDIANA
RURAL
HEALTH
ASSOCIATION


Wabash Valley
Healthy Moms and
Babies
Optimizing Birth Outcomes for Rural
Providing
Starts for Babies
Building Ho
thy Neighborhoods!
RHIC
Mobile Simulation Unit

Case Study

- 50 year old woman comes into E.R. with 3 week history of respiratory infection.
- “I’m just not getting any better.”
- Unremarkable history

ED Notes

- Generalized weakness and malaise
- Skin warm and diaphoretic
- Awake and alert

- Shortness of breath
- Auscultation: Diminished in right lower lobe
- Coughing up yellow green sputum
- X Ray: RLL Pneumonia

Vital Signs	
Temp	99.7
HR	105
RR	22
BP	106/58
SpO2	86% on Room Air

Labs	
WBC	16.5
BANDS	12
HGB	9.9
PLT	234
Glucose	165
BUN	26
Creatinine	1.2

Where'd She Go?

- Patient was admitted to Med-Surg floor for observation with diagnosis of pneumonia

- Orders: Broad spectrum antibiotic, NS @ 75cc/hr, O2 @ 3l NC, and VS q6hrs.

Day 2

- Continued General Malaise
- Shortness of Breath and congestion
- Flushed Skin
- U/O: 20-30cc/hr

Vital Signs		Labs	
Temp	101.5	WBC	23.2
HR	120	BANDS	18
RR	28	HGB	9.9
BP	105/62	PLT	283
SpO2	93% on 4L NC	Glucose	195
		BUN	43
		Creatinine	1.4

No Sepsis Screening….

- Blood Cultures were drawn
- Given Tylenol 650mg PO
- Increased IV Fluid Rate to 100cc/hr
- Continued Observation
- Continued Antibiotic Therapy

Day 3 0730

- Pt is lethargic and responding only to repeated verbal stimuli
- Skin hot to touch. Diaphoretic
- Short, diminished breaths
- Course crackles in bases, rhonchi in upper lobes

Vital Signs	
Temp	103.1
HR	128
RR	30
BP	78/40
SpO2	86% on 50% VM

At this moment, the patient's average mortality rate:

Over 80%

Multi-Organ Dysfunction

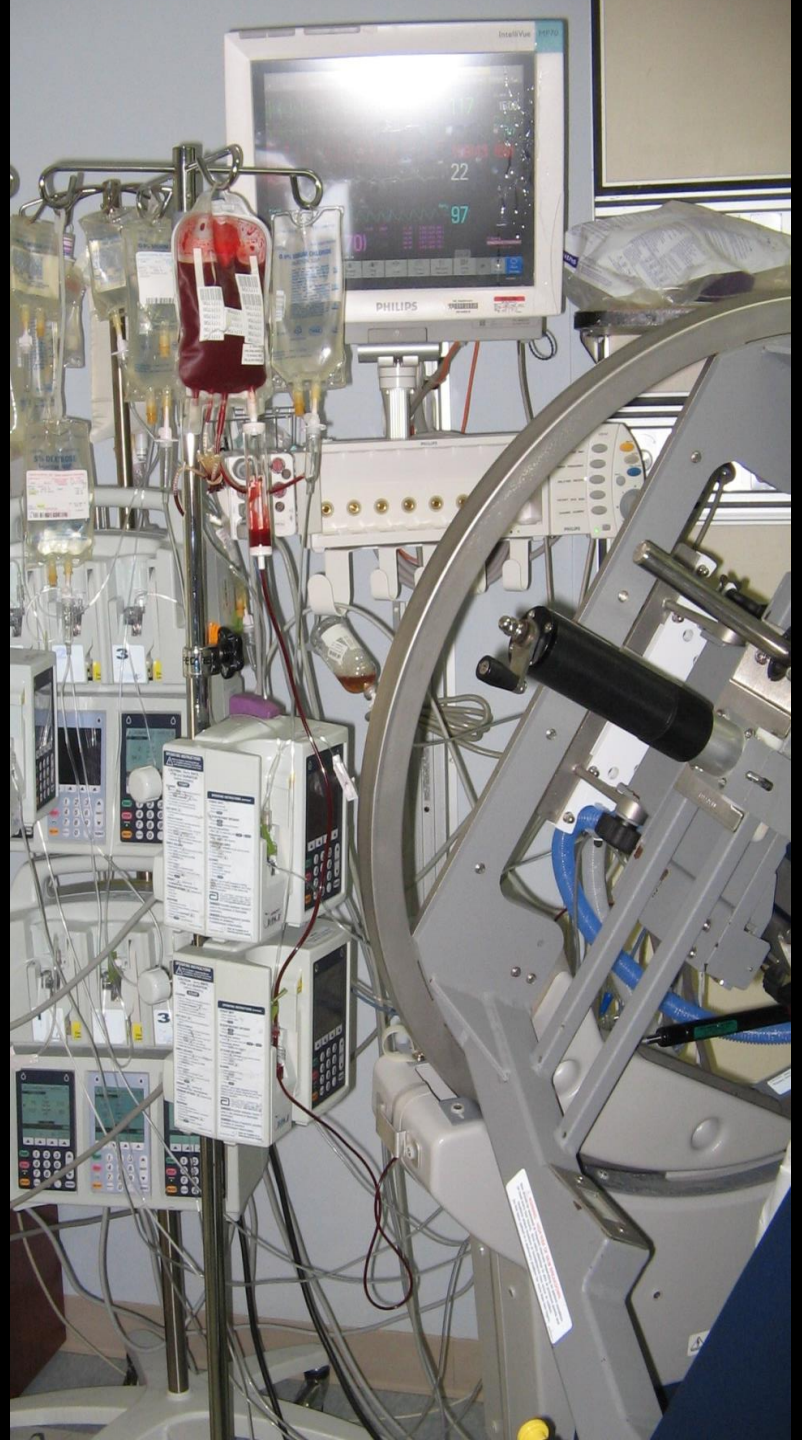
- Respiratory = 20%
- Cardiovascular = 20%
- Renal = 20%
- Neurologic = 20%
- Total = 80% or greater

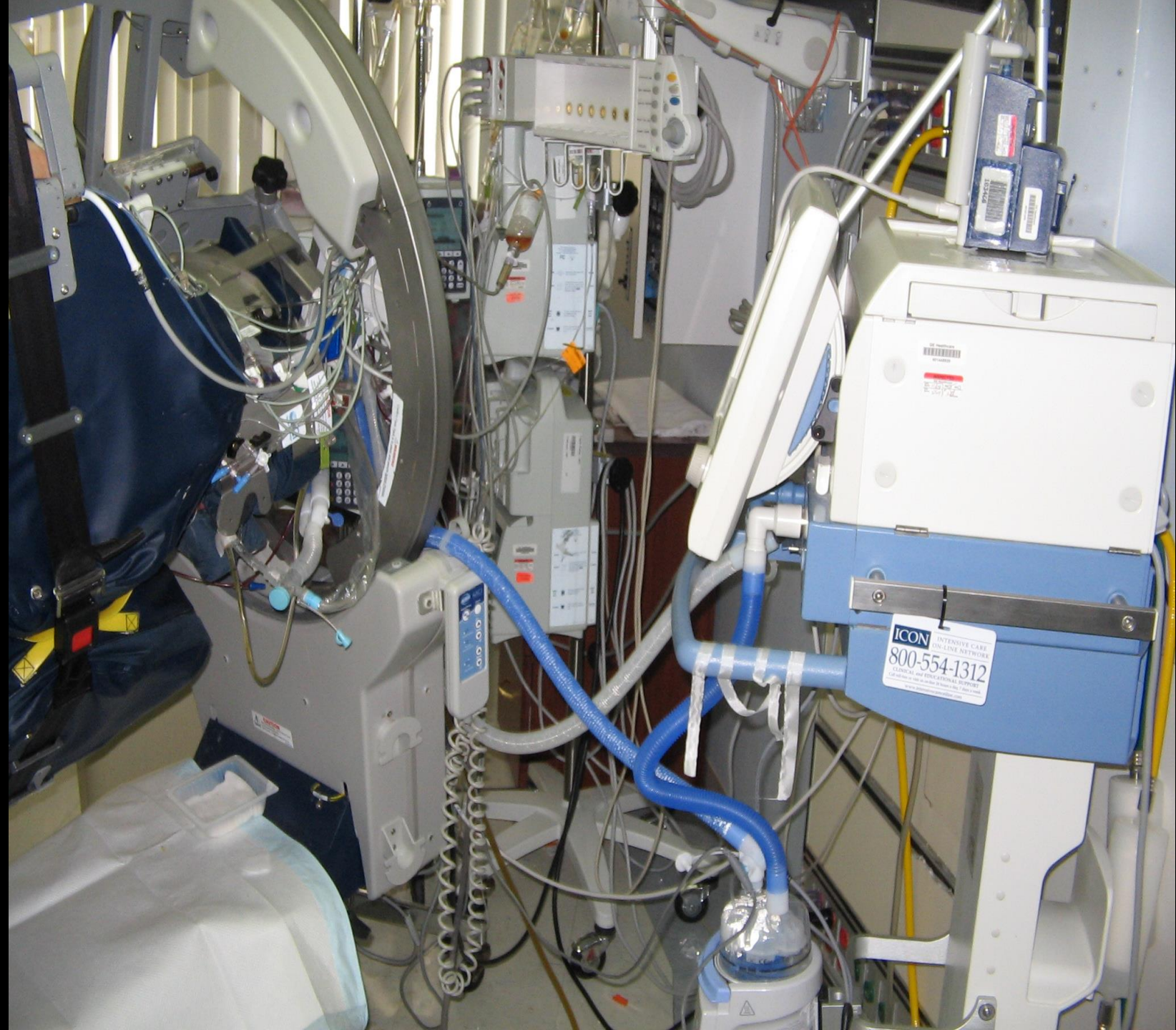
Transferred to the ICU

- NS @ 125cc/hr
- Continue BS ATB
- Phenylephrine gtt @ 100mcg/min
- Continue IVF through PIV

Over the Next Week….

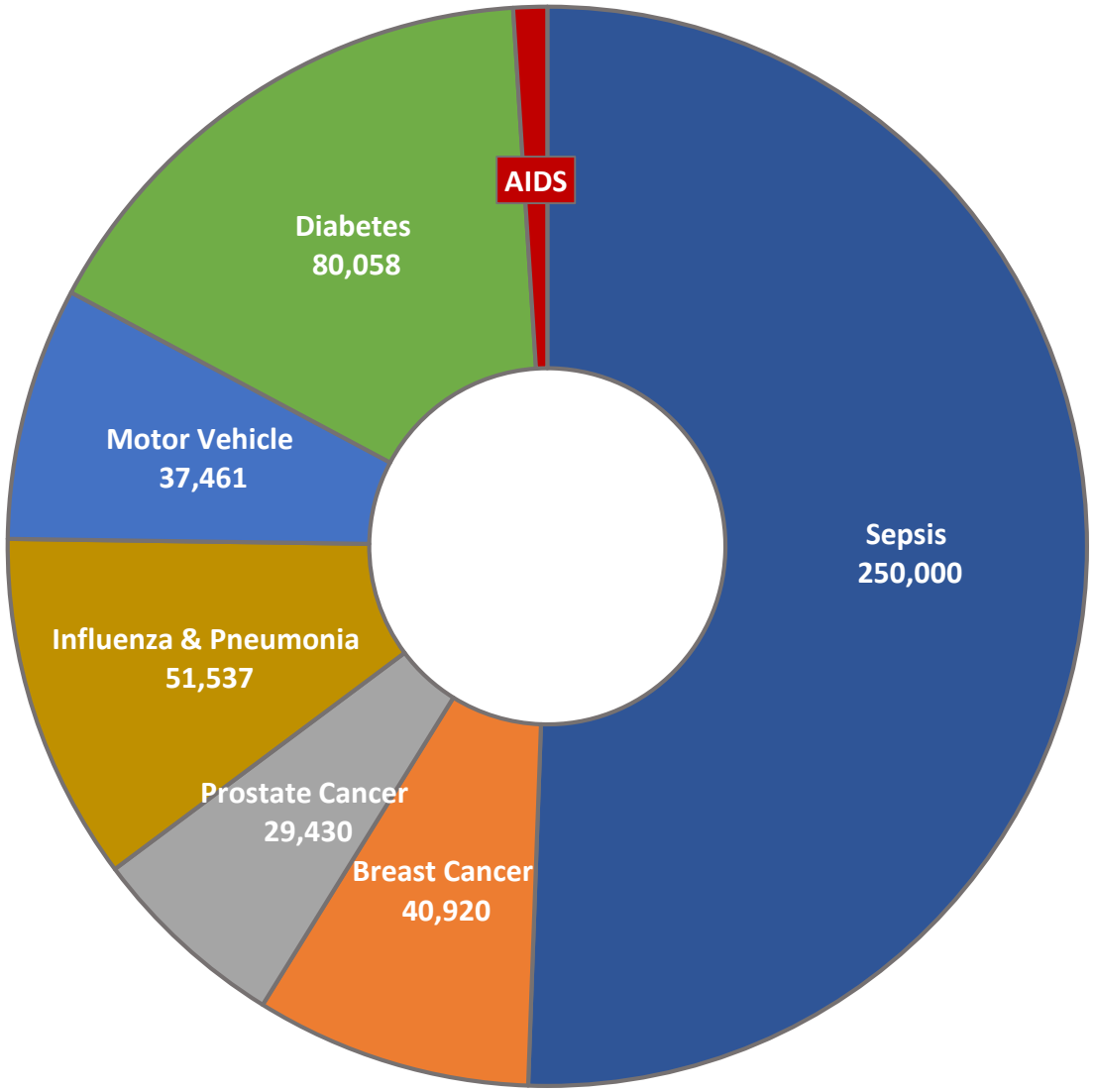
- Respiratory Failure: Intubated and Mechanical Ventilation
- Eventual Tracheostomy Placement
- Renal Failure (BUN:56, CREAT: 2.9)
- Hemodialysis and Hemofiltration
- Cardiovascular Failure. Vasopressors and Inotropic Agents
- Received **NUMEROUS** Procedures, Scans, and Tests


PHILIPS


ICON
INTENSIVE CARE ON-LINE NETWORK
800-554-1312

She remained in the ICU for 15 days prior to her death

Mortality Statistics



Sepsis Breast Cancer Prostate Cancer Influenza & Pneumonia Motor Vehicle Diabetes AIDS

Center for Disease Control. (2016). Making health care safer: Think sepsis. Time matters. Vital signs. Retrieved from https://www.cdc.gov/vitalsigns/sepsis/

An EPIDEMIC!

- Affects 1.7 million Americans per year
- 3rd leading cause of death in the US
- Occurs in just 10% of Hospital Patients, but contributes to as many as half of hospital deaths
- US Spends $24 BILLION per year to treat

- 700 People die each day from Sepsis in the US –ONE EVERY 2 MINUTES

Center for Disease Control. (2016). Making health care safer: Think sepsis. Time matters. Vital signs. Retrieved from https://www.cdc.gov/vitalsigns/sepsis/

What the CDC Tells Us

- 80% of sepsis begins outside of the hospital
- 7 out of 10 patients with sepsis had recently used health services or had chronic diagnosis requiring frequent care
- 4 types of infections most connected with Sepsis:
  - Lung
  - Urinary Tract
  - Skin
  - Gut

Center for Disease Control. (2016). Making health care safer: Think sepsis. Time matters. Vital signs. Retrieved from https://www.cdc.gov/vitalsigns/sepsis/

Early Screening is ESSENTIAL!!

- Decreased Mortality by 30% by Implementing Mandatory Sepsis Screening with Nurse-Driven Protocol for Drawing Lactates
  -Bushnell et al, 2014, Med Surg Nursing

- Decreased Mortality by 47% Across Health System By Implementing Mandatory Sepsis Screening
  -Sharp, 2015 Journal Of Health Affairs

- Adoption of an EMR-Based Screening Tool and a Sepsis Treatment Bundle Drove Down Mortality Rates Markedly Over Four Years by 65%
  -Cheney, 2019 Health Leaders

“Time-Sensitive Assessment and Treatment for a Time-Sensitive Situation”

Acute MI

- Pre-hospital 12 Lead ECG on Ambulance
- Rapid Response Call for Chest Pain
- Rapid Troponin Level
- D2B (Door To Balloon): Less than 90 Minutes from ER Doors to PCI
- Cath Lab Always Set Up for Emergent Cath

Acute Stroke

- Recognition of Symptoms (FAST)
- Rapid Response Team Alerted
- NIH Stroke Scale
- Rapid Labs: PT/PTT/INR/PLT
- From onset of stroke symptoms:
  - Rapid Response team notified immediately
  - 10 minutes or less to contact primary care physician
  - 20 minutes or less to obtain neurologist consult
  - 25 minutes or less to obtain head CT
  - 60 minutes or less to give thrombolytic for ischemic, non-hemorrhagic stroke

Golden Hour of Trauma

- From Moment of Injury to Definitive Treatment
- Assessment and Management
- Every Action Must Have Lifesaving Purpose
- Organized, Detail-Oriented, Selective, Rapid

"Except on few occasions, the patient appears to die from the body's response to infection rather than from it."

Sir William Osler – 1904
The Evolution of Modern Medicine

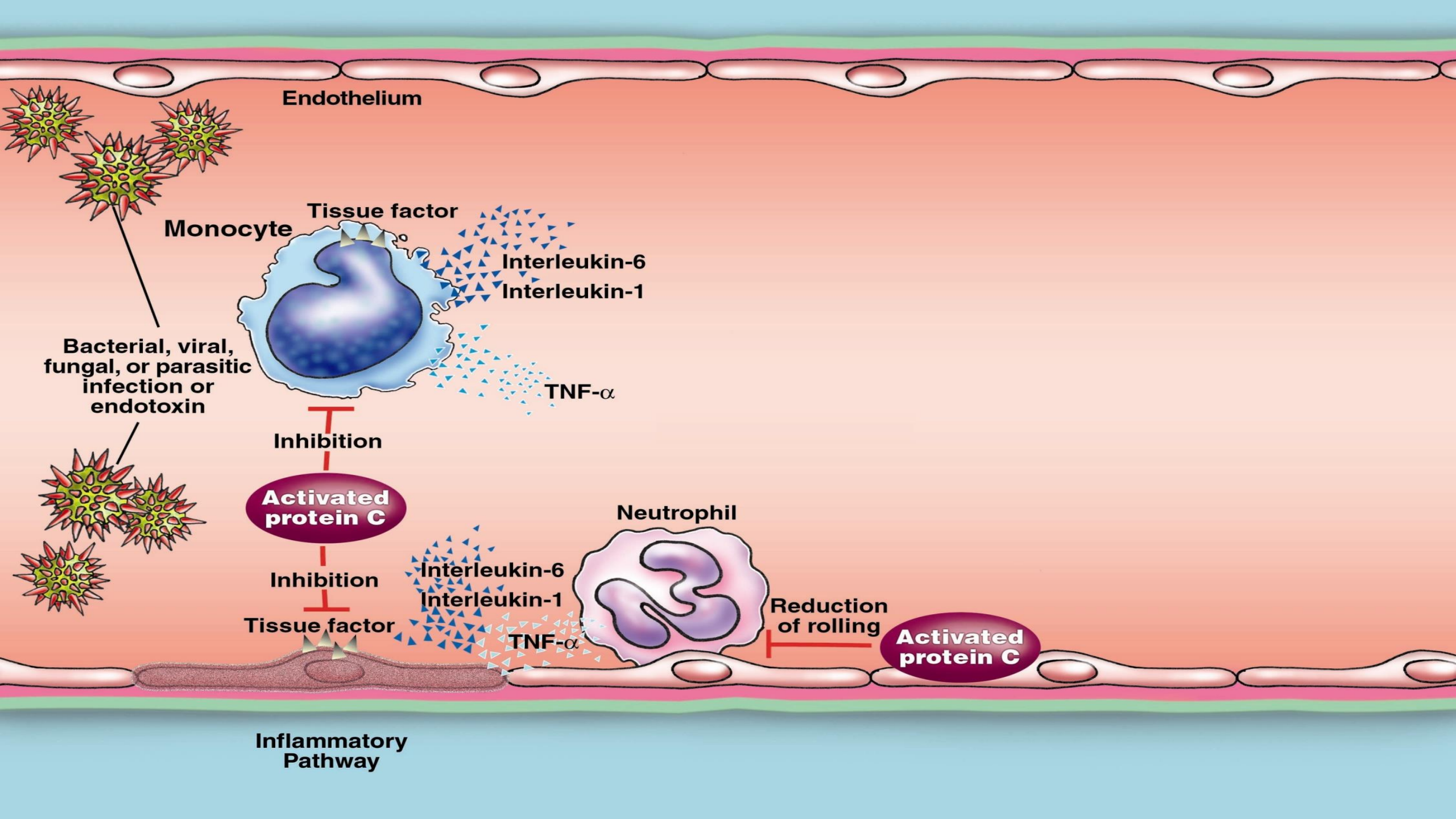
Defining Sepsis

- Infection
- Sepsis
- ~~Severe Sepsis~~
- Septic Shock

Infection

Possible infective processes present in sepsis

1. Pneumonia / Empyema
2. Urinary Tract
3. Acute Abdominal
4. Meningitis
5. Skin/Soft Tissue
6. Idiopathic
7. Bone/Joint
8. Wound Bed
9. Bloodstream Catheter
10. Endocarditis
11. Implantable Device
12. Perforated Viscus


Endothelium
Monocyte
Tissue factor
Interleukin-6
Interleukin-1
TNF-α
Bacterial, viral, fungal, or parasitic infection or endotoxin
Inhibition
Activated protein C
Inhibition
Tissue factor
Neutrophil
Interleukin-6
Interleukin-1
TNF-α
Reduction of rolling
Activated protein C
Inflammatory Pathway

SIRS Criteria

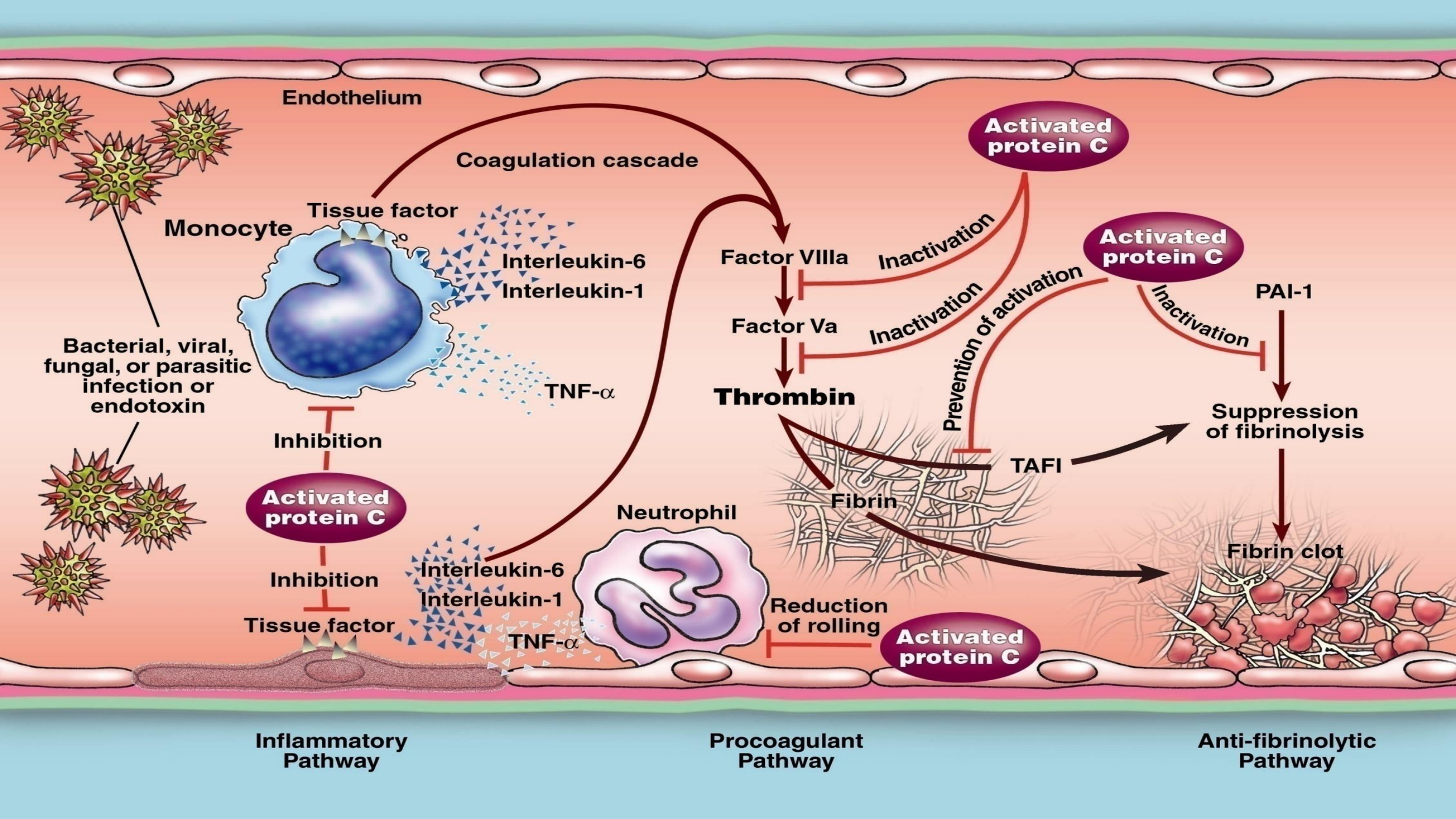
Infection | **SIRS** | Sepsis | Septic Shock | Death

A non-specific clinical response including ≥2 of the following:

- Temperature >38°C or <36°C
- Heart rate >90 beats/min
- Respiratory rate >20/min
- White blood cell count >12,000/mm^3 or <4,000/mm^3 or >10% immature neutrophils

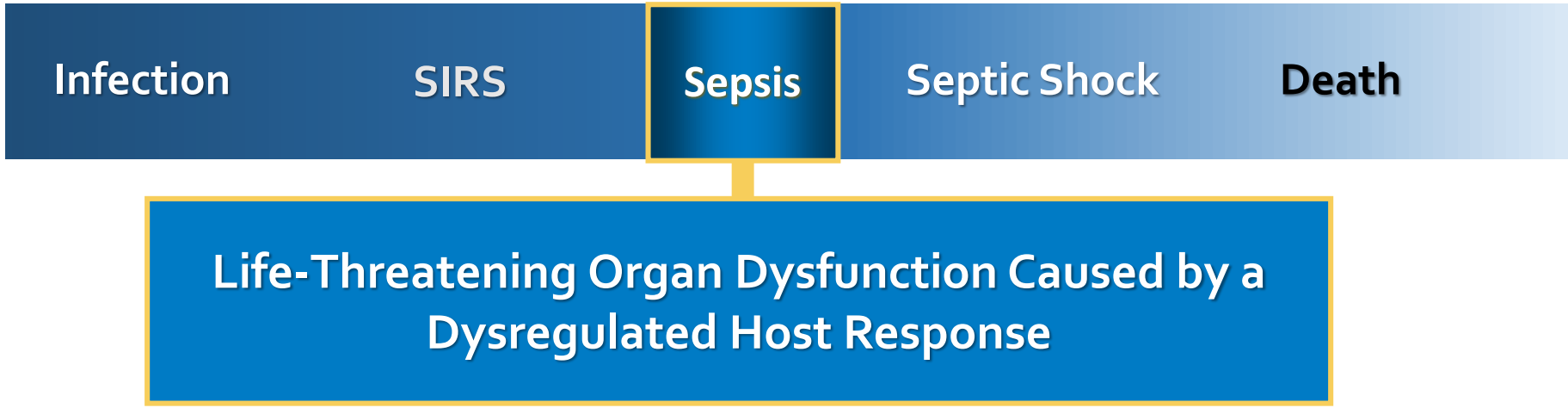
As well as infection, SIRS can also be caused by trauma, burns, pancreatitis and other insults

Bone, R., (1992). Definitions for sepsis and organ failure and guidelines for the use of innovative therapies in sepsis. *Chest, 101* (6), 1481-1483.

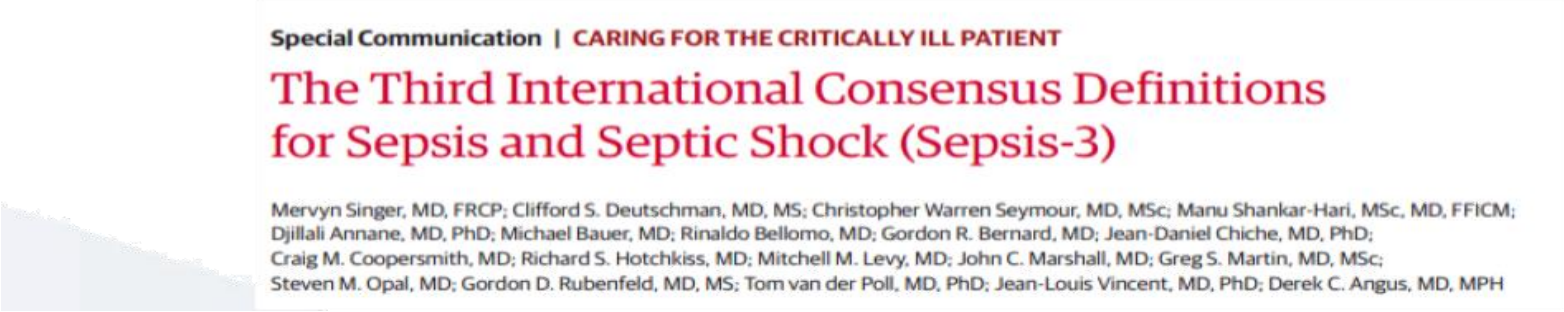

Endothelium
Coagulation cascade
Activated protein C
Tissue factor
Monocyte
Interleukin-6
Interleukin-1
Factor VIIIa
Inactivation
Activated protein C
Inactivation
Prevention of activation
Factor Va
Inactivation
PAI-1
Bacterial, viral, fungal, or parasitic infection or endotoxin
TNF-α
Thrombin
Suppression of fibrinolysis
Inhibition
TAFI
Activated protein C
Fibrin
Neutrophil
Fibrin clot
Inhibition
Interleukin-6
Interleukin-1
Reduction of rolling
Tissue factor
TNF-α
Activated protein C
Inflammatory Pathway
Procoagulant Pathway
Anti-fibrinolytic Pathway

Healthy volunteer

Sepsis Definition



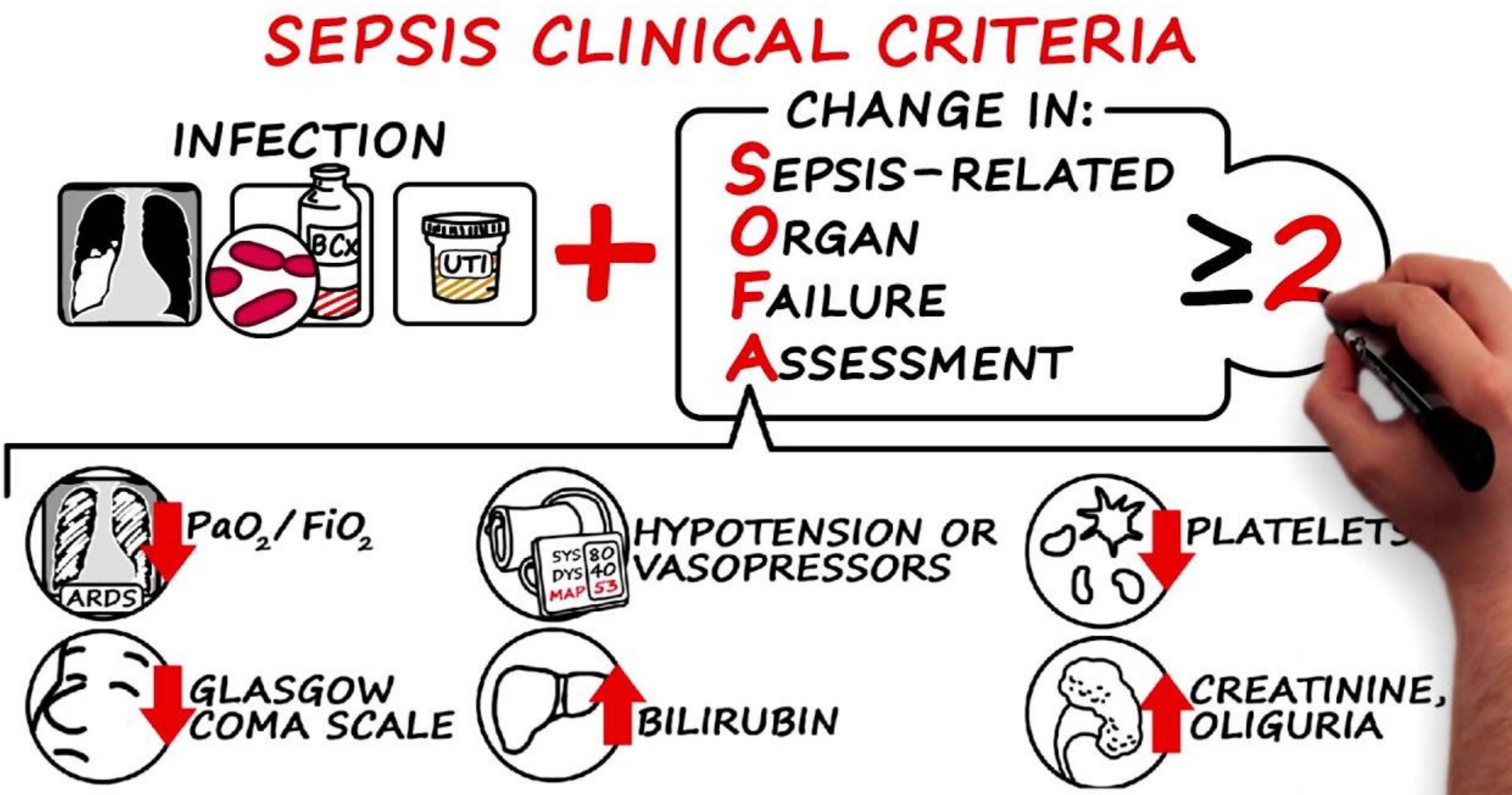
- JAMA, Feb. 23, 2016: Sepsis-3, New criteria for defining sepsis



Special Communication | CARING FOR THE CRITICALLY ILL PATIENT

The Third International Consensus Definitions for Sepsis and Septic Shock (Sepsis-3)

Mervyn Singer, MD, FRCP; Clifford S. Deutschman, MD, MS; Christopher Warren Seymour, MD, MSc; Manu Shankar-Hari, MSc, MD, FFICM; Djillali Annane, MD, PhD; Michael Bauer, MD; Rinaldo Bellomo, MD; Gordon R. Bernard, MD; Jean-Daniel Chiche, MD, PhD; Craig M. Coopersmith, MD; Richard S. Hotchkiss, MD; Mitchell M. Levy, MD; John C. Marshall, MD; Greg S. Martin, MD, MSc; Steven M. Opal, MD; Gordon D. Rubenfeld, MD, MS; Tom van der Poll, MD, PhD; Jean-Louis Vincent, MD, PhD; Derek C. Angus, MD, MPH



Journal of the American Medical Association. (2018). Consensus definition for sepsis and septic shock. Retrieved from https://youtu.be/1S8l5D2xr6w

Sequential (Sepsis-Related) Organ Failure Assessment Score (SOFA)

SYSTEM	SCORE				
	0	1	2	3	4
Pulmonary					
PaO2/FiO2, mmHg (kPa)	>400 (53.3)	<400 (53.3	<300 (40)	<200 (26.7 with respiratory support	<100 (13.3) with respiratory support
Coagulation					
Platelets, x10 /ul	>150	<150	<100	<50	<20
Liver					
Bilirubin, mg/dL (umol/L)	<1.2 (20)	1.2-1.9 (20/32)	2.0-5.9 (33-101)	6.0-11.9 (102-204)	>12.0 (204)
Cardiovascular					
	MAP >70 mmHg	MAP<70 mmHg	dopamine <5 or dobutamine (any dose)	dopamine 5.1-15 or epinephrine <0.1 or norepinephrine <0.1)	dopamine >15 or epinephrine >0.1 or norepinephrine >0.1
Central Nervous System					
Glasgow Coma Scale Score	15	13-14	10-12	6-9	<6
Renal					
Creatinine, mg/dL	<1.2 (110)	1.2-1.9 (110-170)	2.0-3.4 (171-299)	3.5-4.9 (300-440)	>5.0 (440)
Urine Output, mL/d				<500	<200

Rezaie, S. R. (2016, April). Sepsis gets an upgrade with SOFA/qSOFA. Retrieved from http://epmonthly.com/article/sepsis-gets-an-upgrade/

Sepsis Definition

Infection	SIRS	Sepsis	Septic Shock	Death

Life-Threatening Organ Dysfunction Caused by a Dysregulated Host Response

- Renal
- Respiratory
- Hepatic
- Hematological
- Central nervous system
- Unexplained metabolic acidosis
- Cardiovascular

Sepsis Definition

Infection | SIRS | Sepsis | **Septic Shock** | Death

Life-Threatening Organ Dysfunction Caused by a Dysregulated Host Response

- Renal
- Respiratory
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- Unexplained metabolic acidosis
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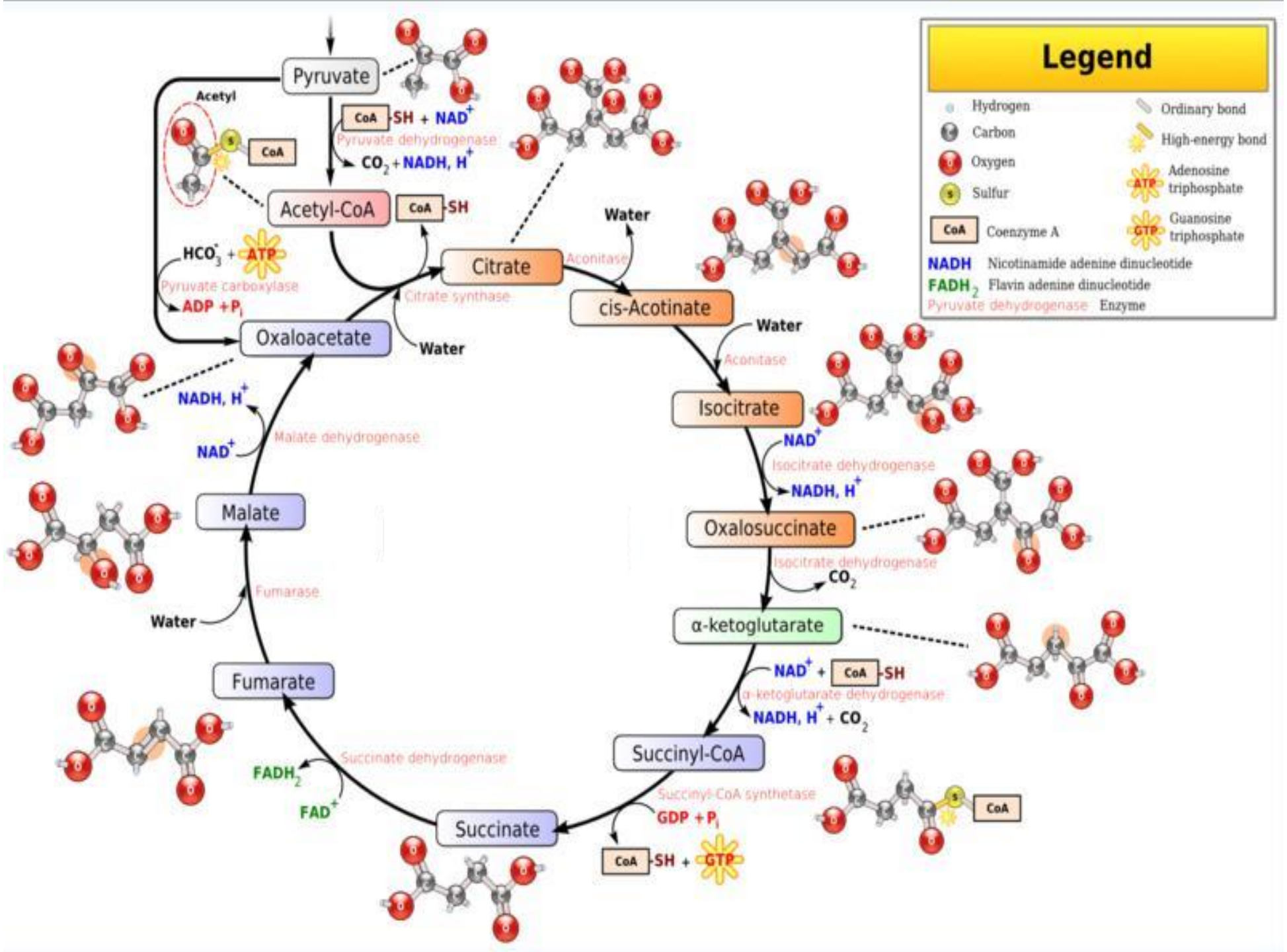
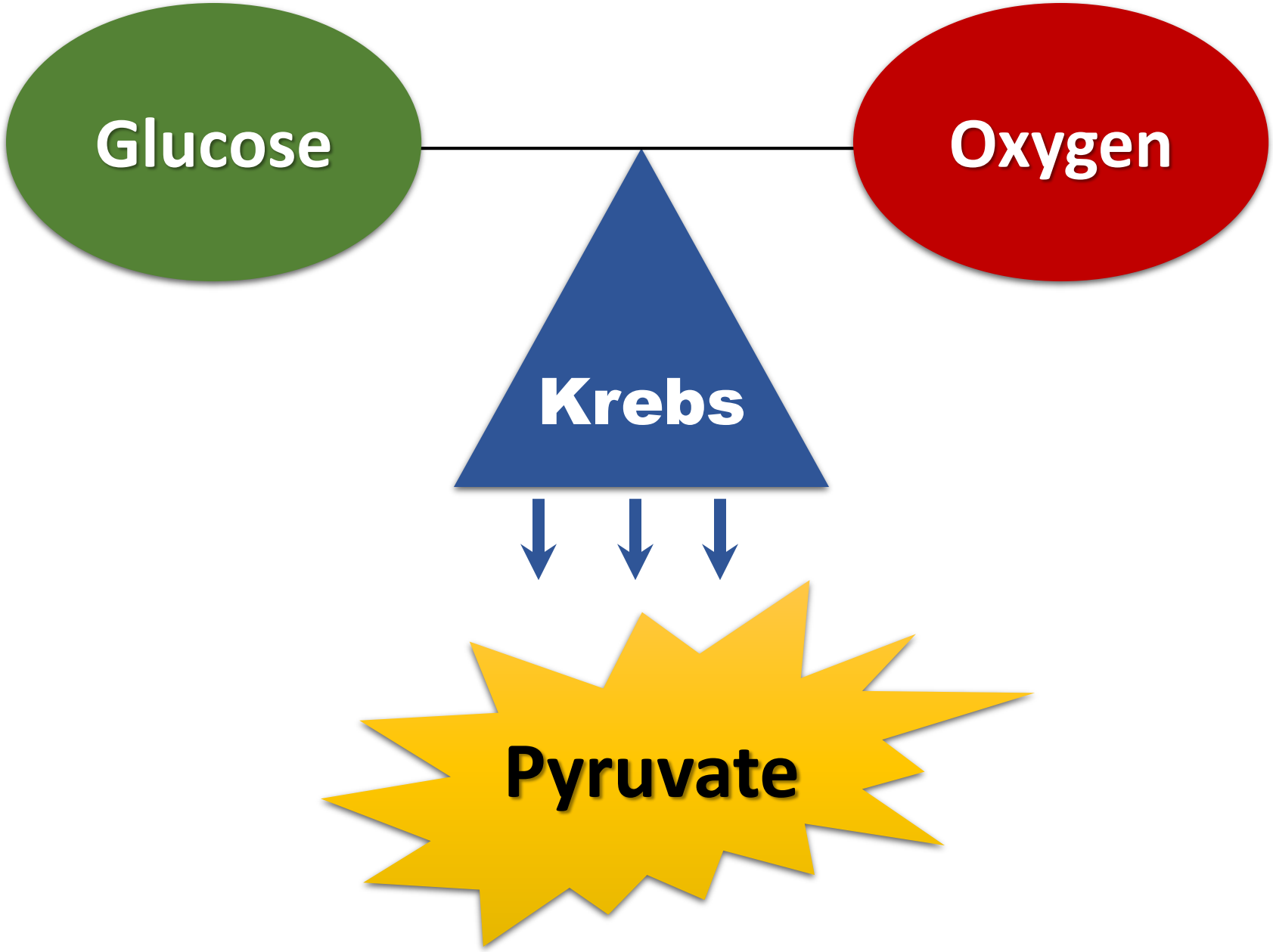
Septic shock

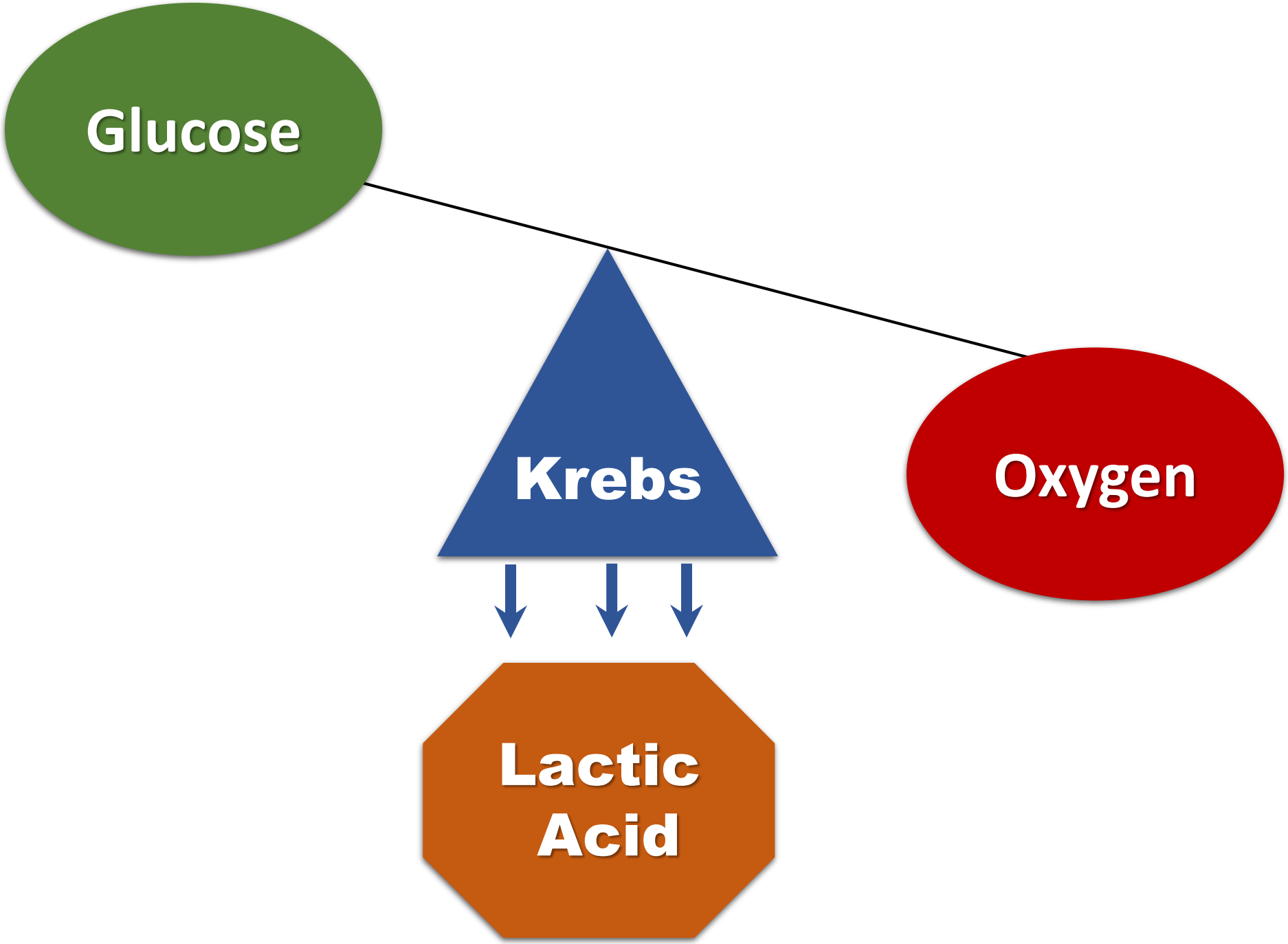
Severe sepsis with hypotension refractory to adequate volume resuscitation

BIOMARKERS

The Krebs Cycle


Legend
Hydrogen
Carbon
Oxygen
Sulfur
CoA Coenzyme A
Ordinary bond
High-energy bond
ATP Adenosine triphosphate
GTP Guanosine triphosphate
NADH Nicotinamide adenine dinucleotide
FADH2 Flavin adenine dinucleotide
Pyruvate dehydrogenase Enzyme
Pyruvate
Acetyl
CoA
CoA-SH + NAD+
Pyruvate dehydrogenase
CO2 + NADH, H+
Acetyl-CoA
CoA-SH
HCO3- + ATP
Pyruvate carboxylase
ADP + Pi
Oxaloacetate
Citrate synthase
Citrate
Water
Aconitase
cis-Acotinate
Water
Aconitase
Isocitrate
NAD+
Isocitrate dehydrogenase
NADH, H+
Oxalosuccinate
Isocitrate dehydrogenase
CO2
α-ketoglutarate
NAD+ + CoA-SH
α-ketoglutarate dehydrogenase
NADH, H+ + CO2
Succinyl-CoA
Succinyl-CoA synthetase
GDP + Pi
CoA-SH + GTP
Succinate
Succinate dehydrogenase
FADH2
FAD+
Fumarate
Fumarase
Water
Malate
Malate dehydrogenase
NADH, H+
NAD+


Glucose
Oxygen
Krebs
Pyruvate


Glucose
Krebs
Oxygen
Lactic Acid

Measurement of Lactate

Lactate Level	Result
1.0 to 2.0 mmol/dl	Normal Lactate Level
2.0 to 4.0 mmol/dl	Diminished Oxygenation
Greater than 4.0 mmol/dl	Global Tissue Hypoxia

↓

ORGAN FAILURE

Important Steps…

- Education, Education, Education!!!
  - The "KNOW WHY for BUY IN" principle
- Standardized Screening Tool (SSC)
- Implementation in ED, ICU, MED SURG, Oncology, Post Partum/OB
- Status Sepsis in ED and RRT (Similar to Code STEMI)
- Computer Documentation and Automization
- Measurement is Essential
- Nurse-Driven Protocols for Ordering Appropriate Labs and beginning Bundle Initiation.
- Compliance with Screening, Bundles, Outcomes
- Unit Auditors/Mentors/Super-users
- Standardized Handoff Measures/SBAR (that include sepsis)

Chart record – use patient label. Do not remove from chart

Evaluation for Severe Sepsis Screening Tool

Instructions: **Use this optional tool to screen patients for severe sepsis in the emergency department, on the medical/surgical floors, or in the ICU.**

1. Is the patient's history suggestive of a new infection?

- ☐ Pneumonia, empyema
- ☐ Urinary tract infection
- ☐ Acute abdominal infection
- ☐ Meningitis
- ☐ Skin/soft tissue infection
- ☐ Bone/joint infection
- ☐ Wound infection
- ☐ Blood stream catheter infection
- ☐ Endocarditis
- ☐ Implantable device infection
- ☐ Other infection _____

___ Yes ___No

2. Are any two of following signs & symptoms of infection both present and new to the patient? Note: laboratory values may have been obtained for inpatients but may not be available for outpatients.

- ☐ Hyperthermia > 38.3 °C (101.0 °F)
- ☐ Hypothermia < 36 °C (96.8°F)
- ☐ Altered mental status
- ☐ Tachycardia > 90 bpm
- ☐ Tachypnea > 20 bpm
- ☐ Leukocytosis (WBC count >12,000 µL–1)
- ☐ Leukopenia (WBC count < 4000 µL–1)
- ☐ Hyperglycemia (plasma glucose >140 mg/dL) or 7.7 mmol/L in the absence of diabetes

___ Yes ___No

If the answer is yes, to both questions 1 and 2, *suspicion of infection* is present:

- ✓ Obtain: **lactic acid, blood cultures**, CBC with differential, basic chemistry labs, bilirubin.
- ✓ At the physician's discretion obtain: UA, chest x-ray, amylase, lipase, ABG, CRP, CT scan.

3. Are any of the following organ dysfunction criteria present at a site remote from the site of the infection that are NOT considered to be chronic conditions? Note: in the case of bilateral pulmonary infiltrates the remote site stipulation is waived.

- ☐ SBP < 90 mmHg or MAP <65 mmHg
- ☐ SBP decrease > 40 mm Hg from baseline
- ☐ Creatinine > 2.0 mg/dl (176.8 mmol/L) or urine output < 0.5 ml/kg/hour for 2 hours
- ☐ Bilirubin > 2 mg/dl (34.2 mmol/L)
- ☐ Platelet count < 100,000 µL
- ☐ Lactate > 2 mmol/L (18.0 mg/dl)
- ☐ Coagulopathy (INR >1.5 or aPTT >60 secs)
- ☐ Acute lung injury with PaO2/FiO2 <250 in the absence of pneumonia as infection source
- ☐ Acute lung injury with PaO2/FiO2 <200 in the presence of pneumonia as infection source

___ Yes ___No

If *suspicion of infection* is present AND *organ dysfunction* is present, the patient meets the criteria for SEVERE SEPSIS and should be entered into the severe sepsis protocol.

Date: ____/____/____ (circle: dd/mm/yy or mm/dd/yy) Time: ____: ____ (24 hr. clock)

Version 7.2.13

Sepsis Screening Tool

- ○ Complete sepsis screening
- ○ Patient already identified as Septic

Date/Time of Last Blood Culture and Lactate

Last Blood Culture: 04/01/2013 14:01 **Status:** InProcess

Last Lactate: 04/02/13 15:37

Vital Signs that meet or exceed SIRS/Sepsis criteria within the previous 24 hours.

Out of Range Vital Signs in the past 24 hours

***** No Out of Range Temps Found *****

Heart Rate

Date/Time: 04/04 18:00 Heart Rate: 103 bpm
Date/Time: 04/04 17:00 Heart Rate: 116 bpm
Date/Time: 04/04 16:00 Heart Rate: 98 bpm
Date/Time: 04/04 15:00 Heart Rate: 101 bpm

Respiratory Rate

Lab values that meet or exceed SIRS/Sepsis criteria within previous 24 hours.

Out of Range Labs in the past 24 hours

***** No Out of Range PaCO2 Results Found *****

White Blood Cells

Date/Time: 04/05 05:28 WBC: 16.7 K/uL

***** No Out of Range Bands Results Found *****

***** No Out of Range Glucose Results Found *****

Does the patient meet any of the following SIRS criteria?

- ☐ Patient does NOT meet any of the listed criteria
- ☐ Temp greater than 100.9 or less than 96.8
- ☐ Heart rate greater than 90
- ☐ Respiratory rate greater than 20 or PaCO2 less than 32
- ☐ WBC > 12000, < 4000 or >10% bands
- ☐ Acute change in level of consciousness
- ☐ Glucose greater than 120 and pt non-diabetic

Does the patient have a suspected or confirmed infection?

- ☐ Patient does NOT have a suspected or confirmed infection
- ☐ Acute abdomen
- ☐ Bone/Joint
- ☐ Cellulitis
- ☐ Colitis
- ☐ Decubitus Ulcer
- ☐ Invasive catheter
- ☐ Meningitis
- ☐ Pancreatitis
- ☐ Pneumonia
- ☐ UTI
- ☐ Wound
- ☐ Other

Other Suspected or Confirmed Infection:

Vital Signs that meet or exceed Organ Dysfunction criteria within the previous 24 hours.

Out of Range Vital Signs in the past 24 hours

***** No Out of Range SBPs Found *****

Mean Arterial Pressure

Date/Time: 04/04 15:00 MAP: 64 mmHg

***** No Out of Range Oxygen Sats Found *****

Lab values that meet or exceed Organ Dysfunction criteria within the previous 24 hours.

Out of Range Labs in the past 24 hours

***** No Out of Range Creatinine Results Found *****

Platelets

Date/Time: 04/05 05:28 Platelets: 63 K/uL

Bilirubin

Date/Time: 04/05 05:10 Bilirubin: 5.2 mg/dL

***** No Out of Range AST Results Found *****

Does the patient meet any of the following Organ Dysfunction signs/symptoms criteria?

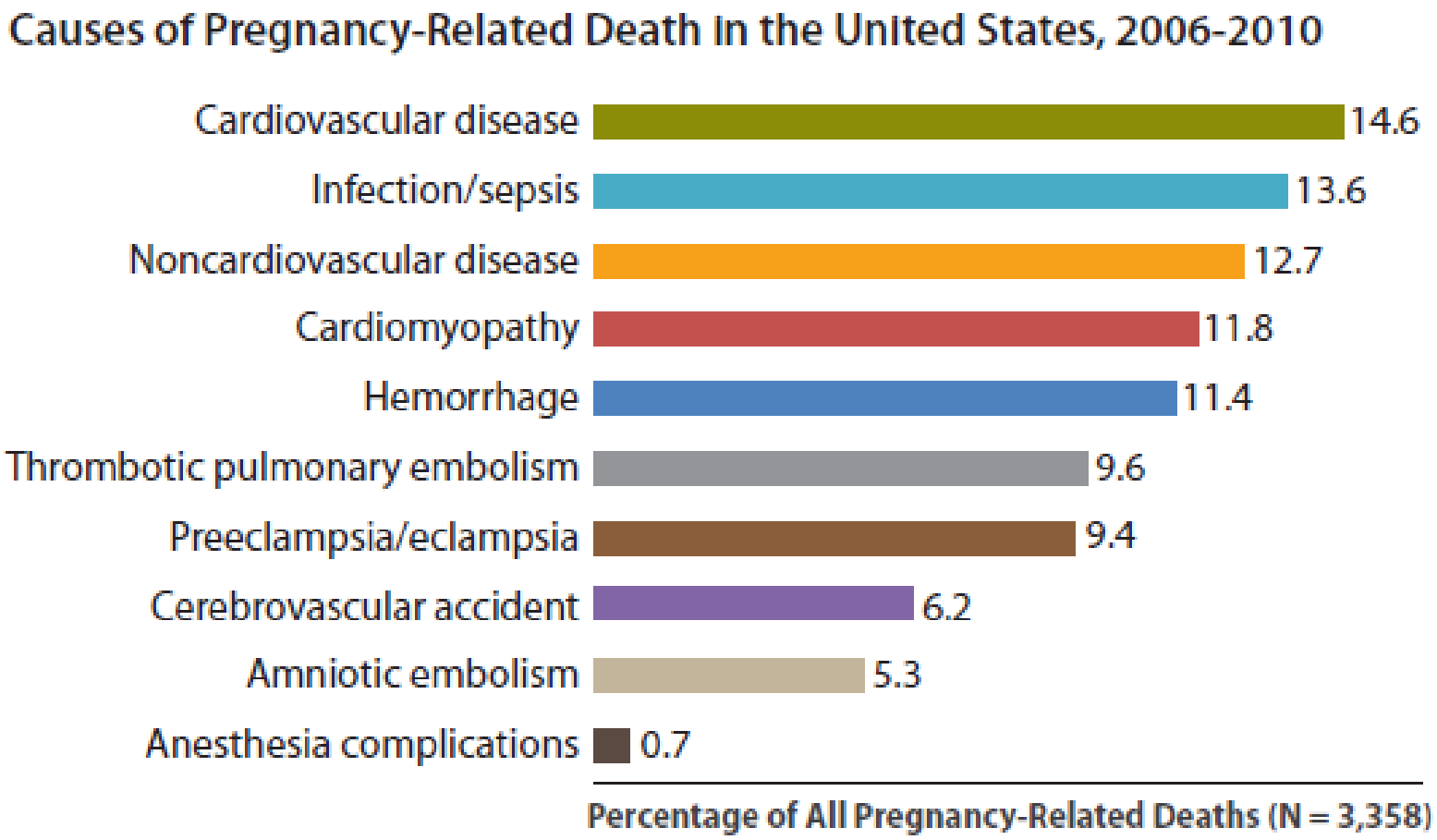
- ☐ Patient does NOT meet any of the listed criteria
- ☐ Acutely altered mental status
- ☐ SpO2 less than 90%
- ☐ Platelet count less than 100,000
- ☐ Lactate greater than 2mmol/L
- ☐ SBP less than 90 or MAP less than 65
- ☐ Creatinine > 2mg/dL or urine output < 0.5mg/kg/hr
- ☐ Bilirubin > 2mg/dL, AST > 90, ALT > 90

If the patient meets any of the Organ Dysfunction signs/symptoms criteria, then please notify the primary team. A task will follow where the notification can be documented.

Rapid Response Team Notified

- ○ Yes
- ○ No
- ○ N/A

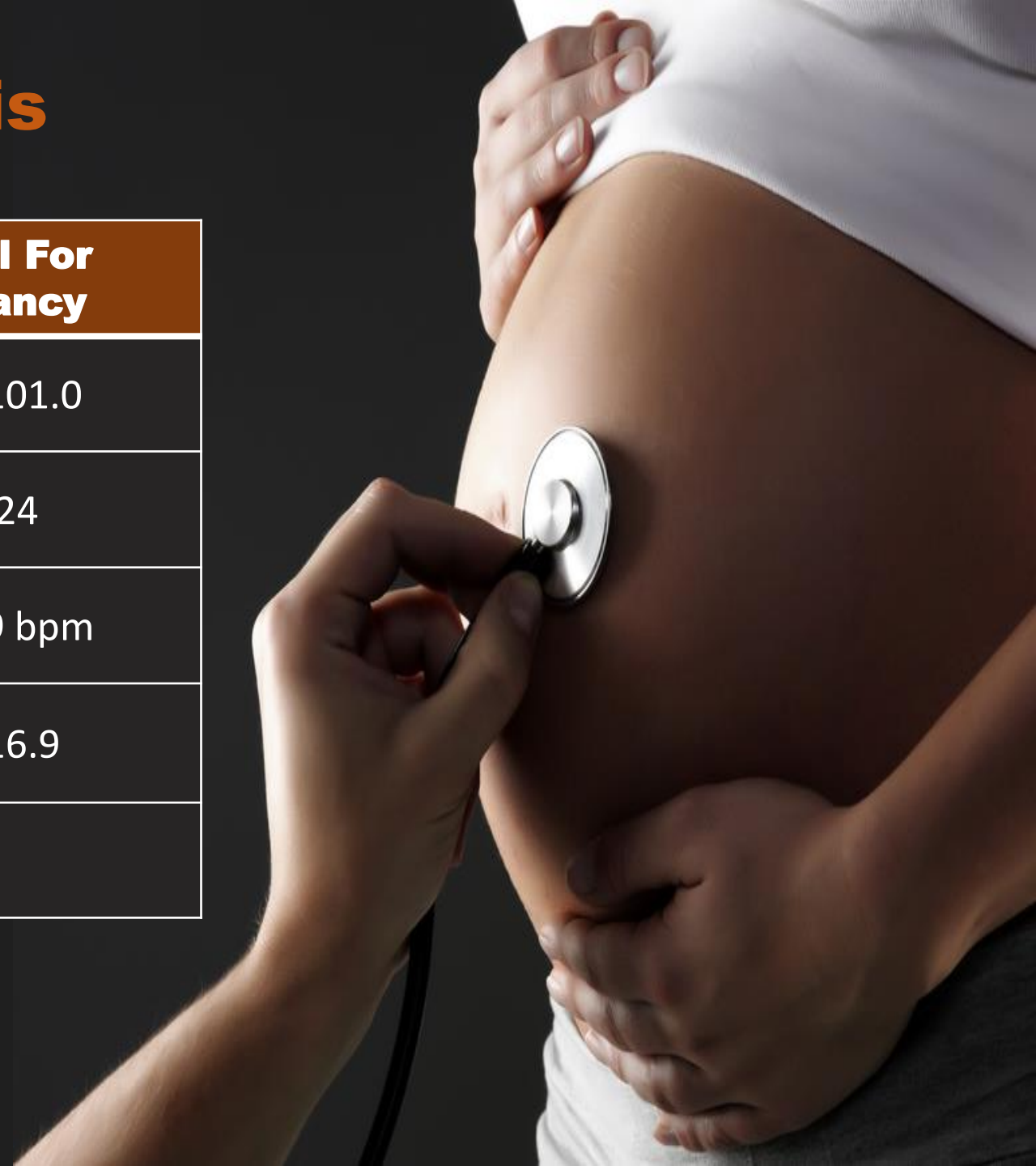
Causes of Maternal Death in US



Notes: The cause of death is unknown for 4.7% of all pregancy-related deaths. "Noncardiovascular disease" refers to endocrine, hematologic, immunologic, and renal conditions.

SIRS Criteria for Sepsis

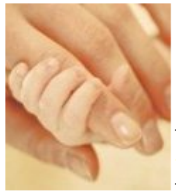
Variable	SIRS Criteria	Normal For Pregnancy
Temperature	> 100.4 or < 95.0	96.8 – 101.0
Respiratory Rate	> 20	12 – 24
Heart Rate	> 90 bpm	60 – 119 bpm
White Blood Cell Count	> 12.0 or < 4.0	5.7 – 16.9



Sepsis Obstetric Scoring System (SOS)

Variable	High abnormal range				Normal	Low abnormal range			
Score	+4	+3	+2	+1	0	+1	+2	+3	+4
Temperature (°C)	>40.9	39-40.9		38.5-38.9	36-38.4	34-35.9	32-33.9	30-31.9	<30
Systolic Blood Pressure (mmHg)					>90		70-90		<70
Heart Rate (beats per minute)	>179	150-179	130-149	120-129	≤119				
Respiratory Rate (breaths per minute)	>49	35-49		25-34	12-24	10-11	6-9		≤5
SpO_2 (%)					≥92%	90-91%		85-89%	<85%
White Blood Cell Count (/µL)	>39.9		25-39.9	17-24.9	5.7-16.9	3-5.6	1-2.9		<1
% Immature Neutrophils			≥10%		<10%				
Lactic Acid (mmol/L)			≥4		<4				

Sepsis Obstetric Scoring System (SOS)



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Wednesday, October 02, 2019

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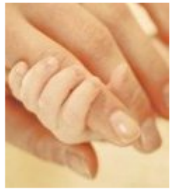

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Calculation of Sepsis in Obstetrics Score -**BETA TESTING**

Home > Calculators >Calculation of Sepsis in Obstetrics Score

Severe sepsis with acute organ dysfunction has a mortality rate of up to 40%, which increases to 60% if septic shock develops.[2] The early recognition of sepsis and implementation of evidence-based therapies have been documented to improve outcomes and decrease sepsis-related mortality [3]

The Sepsis in Obstetrics Score (S.O.S.) was created by modifying validated scoring systems in accordance with recognized physiologic changes of pregnancy. " The Sepsis in Obstetrics Score is a validated pregnancy-specific score to identify risk of ICU admission for sepsis with the threshold score of 6 having a negative predictive value of 98.6%." A score of less than 6 rules out the need for ICU admission [1,7].

Sepsis Obstetrics Scoring System			
Temperature (Centigrade) (º C) * 36 - 38.4 C (96.8 - 101.1 F)		SpO2% blood oxygen saturation >= 92%	
Systolic blood pressure (mmHg) > 90		White blood count uL 5.7 - 16.9	
Heart Rate (beats per minute) <=119		% Immature Neutrophils <10%	
Respiratory Rate (breaths per minute) 12 - 24		Lactic Acid (mmol/L) <4	

Calculate Sepsis Obstetrics Score (S.O.S)

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A Better Way

PATIENT INFO

- 42 year old female with a 2 week history of a urinary tract infection.
- Seen in physicians office 1 week earlier & received oral antibiotic
- Presented to the E.R. with fever and general malaise.
- Admitted as an inpatient on to Med-Surg Unit for IV antibiotic treatment.
- This is her third day in the hospital.

1600 Assessment

- Patient has Become More Lethargic, But Still Following Commands
- Pupils Round and Reactive
- Warm, Flushed Skin
- Cloudy, Amber Urine in F/C, Decreased Output
- Lung Fields With Congestion In Lower Lobes

Vital Signs	
Temp	102.5
HR	120
RR	24
BP	122/68
SpO2	91% on 2L NC

Labs	
WBC	18.0
BANDS	14
HGB	8.9
PLT	112
Glucose	195
BUN	43
Creatinine	1.4

```
ENTER ASSESSMENT              SEVERE SEPSIS SCREENING          08/02/06  1124
WC  / 202801      TWOC-060606 ,PT#1                        PT#:       15037658
                  RANGASWAMI BALA CHAND                    ADM DATE: 06/06/06
-------------------------------------------------------------------------------
************************* CONFIRMED OR SUSPECTED INFECTION ******************
_       ? PNEUMONIA,EMPYEMA                  _       ? BLOODSTREAM CATHETER INFECTN
_       ? URINARY TRACT INFECTION            _       ? ENDOCARDITIS
_       ? ACUTE ABDOMINAL INFECTION          _       ? IMPLANTIBLE DEVICE INFECTION
_       ? MENINGITIS                         _       ? PERFORATED VISCUS
_       ? SKIN/SOFT TISSUE INFECTION         _       ? OTHER        ---------------
_       ? BONE/JOINT INFECTION
_       ? WOUND INFECTION                    _       ? NO FACTORS

************************** S.I.R.S. CRITERIA ********************************
_      ? HYPERTHERMIA (>38.3C/101F)          _      ? ACUTELY ALTERED MENTAL STATUS
_      ? HYPOTHERMIA (<36.0C/96.8F)          _      ? LEUKOCYTOSIS (WBC >12,000)
_      ? TACHYCARDIA (>90 BPM)               _      ? LEUKOPENIA (WBC < 4,000)
_      ? TACHYPNEA (>20 BPM)                 _      ? HYPERGLYCEMIA (PLASMA GLUCOSE
                                                      > 120 IN ABSENCE OF DIABETES)

                                             _      ? NO FACTORS
-------------------------------------------------------------------------------
! (PF15) EXIT PATHWAY          & (PF6) PREV PAGE      PRESS ENTER TO CONTINUE
H1111500* Must select something in each category, even if it's "NO FACTORS"
```

ENTER ASSESSMENT SEVERE SEPSIS WARNING SCREEN 08/22/07 1505

2WC / 202901 TRAINING ,MAK3 PT#: 15046790

RANGASWAMI BALA CHAND ADM DATE: 08/10/07

********** W A R N I N G **********

THIS PATIENT MAY BE AT RISK FOR SEVERE SEPSIS. A STAT LACTATE LEVEL WILL BE ORDERED AUTOMATICALLY BY THE COMPUTER.

*** RE-CHECK THE PATIENT'S BLOOD PRESSURE ***

IF POSSIBLE, ASSESS THE FOLLOWING FOR SIGNS OF ORGAN DYSFUNCTION:

1. Lactate level >= 4.0 mmol/L
2. Decreased urine output (< 0.5 cc/kg/hr)
3. Increased Creatinine level (> 0.5 mg from baseline level)
4. PaO2 < 70 mm Hg
5. Systolic blood pressure < 90 mm Hg
6. Platelets < 100,000
7. New onset of decreased level of consciousness

IF ANY PRESENT, CONTACT OPERATOR TO ACTIVATE RAPID RESPONSE TEAM TO ASSESS PT

? PHYSICIAN ORDERED NOT TO DRAW LACTATE LEVEL

REASON: _____

PRESS ENTER TO CONTINUE

1630

- Rapid Response Team Activated
- Physician Called and RRT Recommendation to Transfer to ICU
- Warm, Flushed Skin
- Cloudy, Amber Urine in F/C, Decreased Output
- Lung Fields With Congestion In Lower Lobes

Lab Results		Further Orders
Lactate	4.4	Fluid Bolus of 30ml/kg of Lactated Ringers over 30 min.
		Levaquin IV Stat
		Repeat Lactate in 4 hours
		Norepinephrine IV gtt for MAP <65
		TXM for 2 units PRBC

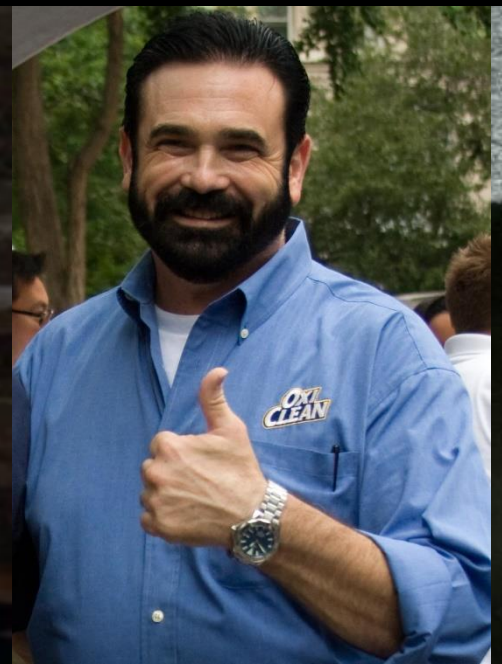
Next day

• Lactate Level	1.8
• BUN/Creat	33/1.3
• Temp	100.5
• BP	110/64
• Resp	22
• Sat	94% on 3L NC

- **PATIENT ALERT AND FOLLOWING COMMANDS**

PATIENT REMAINED IN ICU FOR 3 DAYS PRIOR TO TRANSFER.

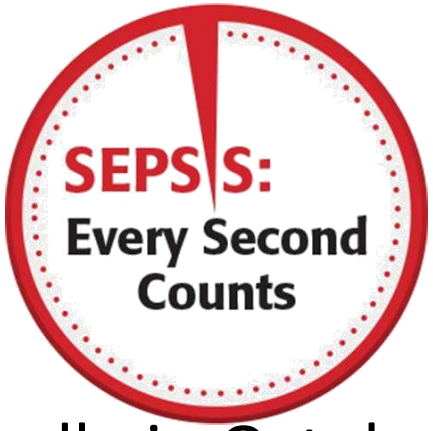
DISCHARGED TO HOME ON DAY 7



Thank you! Questions?

RHIC

Jack Jaeger
RHIC Director
jack.jaeger@therhic.org
812-237-8489



- Went live with Sepsis bundle in October 2013
- Change sepsis screening tool last year – listed criteria for sepsis as first step, second step source of infection
- Participate in daily multidisciplinary rounds in ICU
- Round daily in medsurg and ED for sepsis
- Partnering with neighboring LTC facility for sepsis prevention, education and bundle with processes specific for that institution

Judy Brohm RN, CCRN 812-283-2849

Judy.brohm@clarkmemorial.org

Call to Action

Indiana Patient Safety Center
of the Indiana Hospital Association

- *Assess your Emergency Department and inpatient areas for sepsis screening (& rapid treatment) processes.*
- *Plan community education event to reduce Time to Treatment.*
- *Educate hospital staff to be leaders in sepsis awareness.*

Quotes from Survivors

- Knowing my body, I realized that something was horribly wrong with me. I called an ambulance and asked the EMT's to transport me to the hospital I go for my medical care. By the time I arrived at the Emergency Room, my fever was 103.9. I don't remember much of what went on in that room in the Emergency Department that night
- My Infectious Disease Doctor told me that when I had the shakes, coldness and shivering that a bacteria was invading my body and if that ever happened again I should go directly to the emergency room. Education is every with sepsis. I know that my Doctor saved my life.

Q & A & Innovation Sharing

Indiana Patient Safety Center
of the Indiana Hospital Association

- *Further questions/comments:*
  - Rebecca Hancock, PhD, RN, CCRC
  - Sepsis Topic Lead, Indiana Hospital Association
  - rhancock@ihaconnect.org

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