

# Mobile sepsis teams: Time is of the essence – Large academic hospital

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September 16, 2016

The project described is supported by Funding Opportunity Number 1C1CMS330975-01-00 from the U.S. Department of Health and Human Services, Centers for Medicare and Medicaid Services. The contents of these slides are solely the responsibility of the authors and do not necessarily represent the official views of the U.S. Department of Health and Human Services or any of its agencies. The research presented here was conducted by Houston Methodist. Findings might or might not be consistent with or confirmed by the independent evaluation contractor.

## No Disclosures to Report

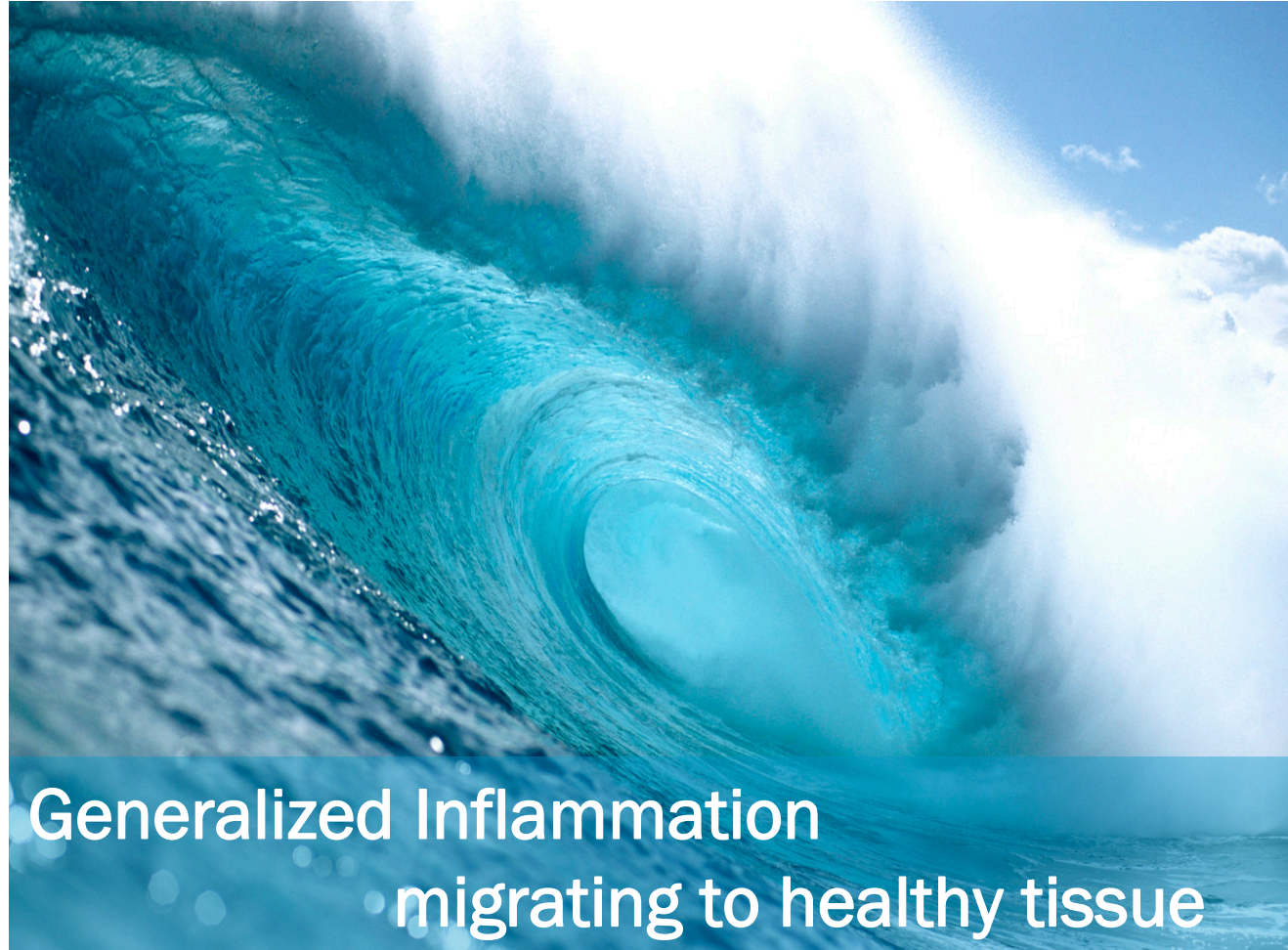
- Compare and contrast the outcomes between an evidenced based clinical pathway versus a mobile sepsis team in early identification of sepsis in a large academic medical center
- Describe the utilization of inpatient mobile sepsis team and how they affect hospital length of stay, morbidity, and mortality in a large academic center

# Sepsis

- 11<sup>th</sup> leading cause of death in the U.S.
- 10<sup>th</sup> leading cause of death for patients 65 and older
- Leading cause of death in non-coronary ICU units
- In 2011, 3<sup>rd</sup> most common reason for hospitalization
- Annual aggregate hospital costs of \$20.3 billion
- Mortality average nationwide 28-50%
  
- HMH sepsis mortality reached a high of 36% in 2009

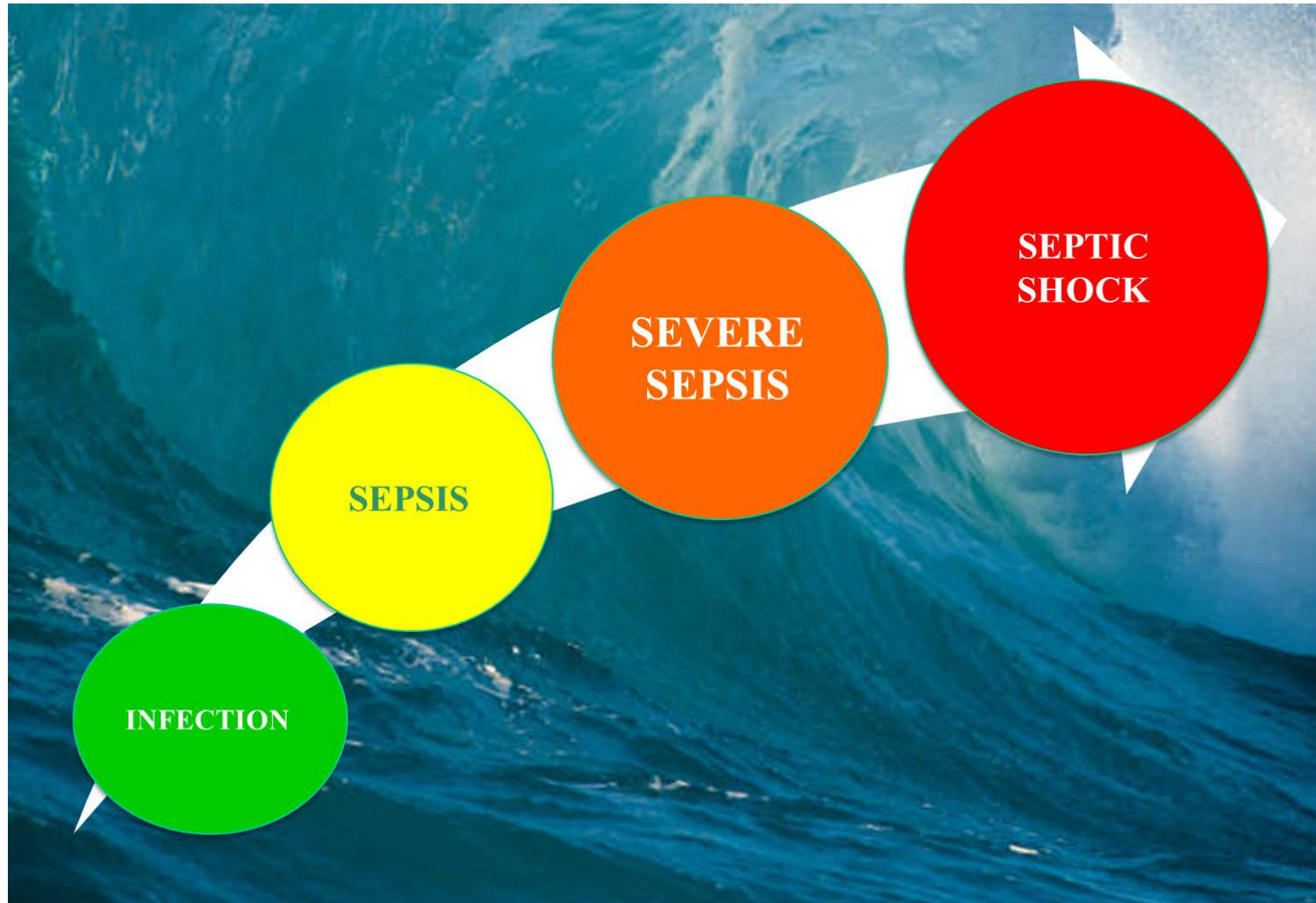
## Infection VS. Uncontrolled Infection

- Local inflammation
- Local vasodilatation & increased blood flow
- Edema from increased permeability of microvasculature



Generalized Inflammation  
migrating to healthy tissue

# Sepsis Continuum



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ESTABLISHED IN 1812

MAY 1, 2014

VOL. 370 NO. 18

## A Randomized Trial of Protocol-Based Care for Early Septic Shock

The ProCESS Investigators\*

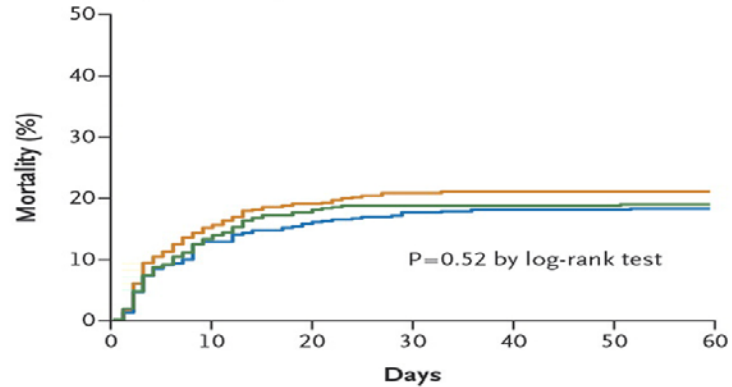
- Large RCT
- 1341 patients
- Multiple tertiary care centers in the US



# ProCESS trial

— Protocol-based EGDT — Protocol-based standard therapy — Usual care

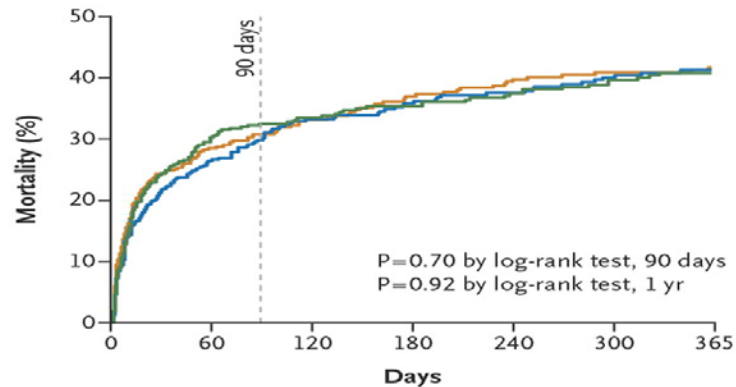
## A Cumulative In-Hospital Mortality to 60 Days



### No. at Risk

Protocol-based EGDT	439	373	356	348	347	347	347
Protocol-based standard therapy	446	389	376	368	366	366	365
Usual care	456	396	376	371	371	371	370

## B Cumulative Mortality to 1 Yr



### No. at Risk

Protocol-based EGDT	439	289	217	194	175	156	145
Protocol-based standard therapy	446	308	212	196	179	158	142
Usual care	456	285	211	199	181	164	139

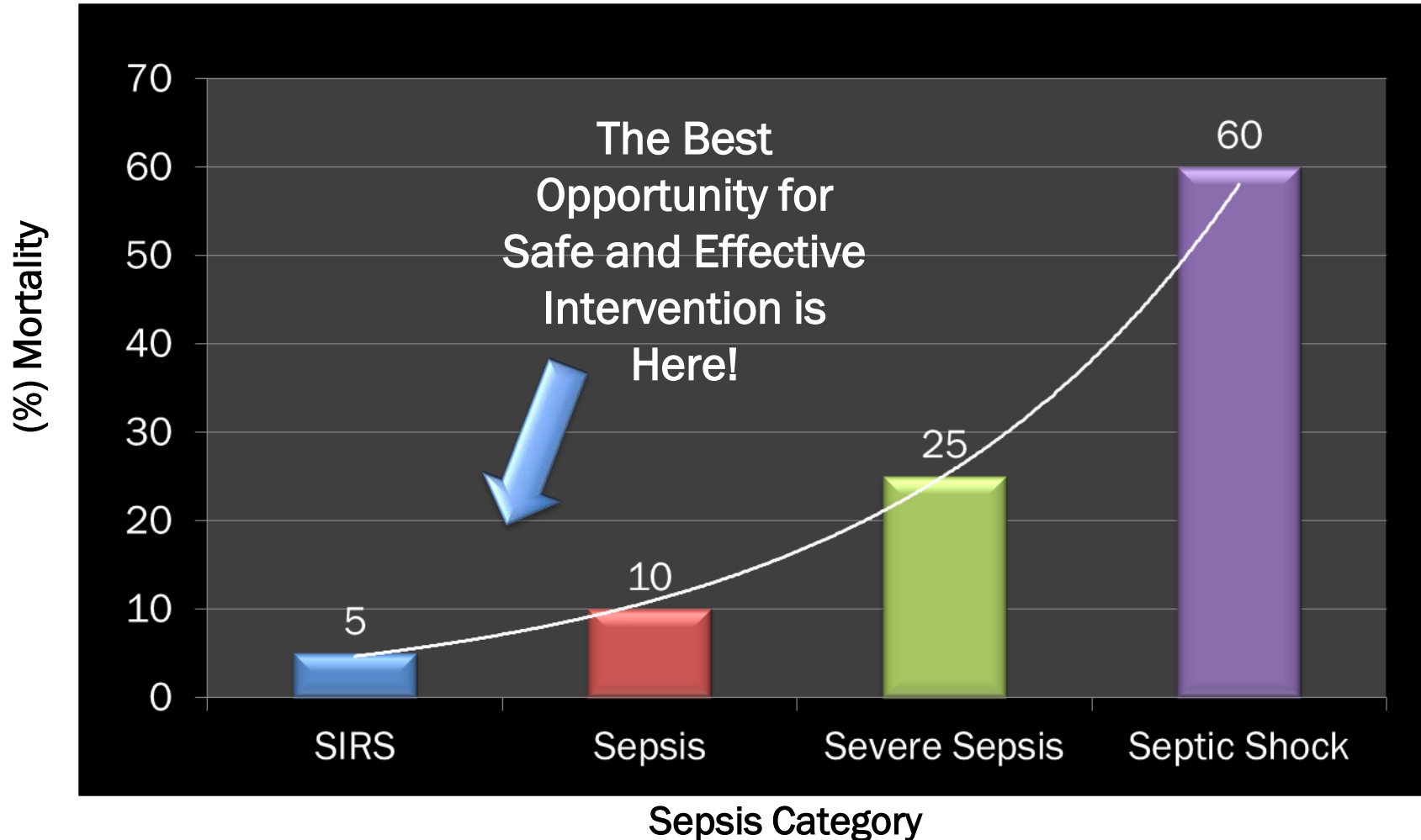
## Conclusion

- “In a multicenter trial conducted in the tertiary care setting, protocol-based resuscitation of patients in whom septic shock was diagnosed in the emergency department did not improve outcomes”

- ARISE trial (2014)– large RCT in Australia
- Conclusion –
  - “In critically ill patients presenting to the emergency department with early septic shock, EGDT did not reduce all-cause mortality at 90 days” (ARISE trial)
- ProMISE (2015) – large RCT in Europe
- Conclusion –
  - “In patients with septic shock who were identified early and received intravenous antibiotics and adequate fluid resuscitation, hemodynamic management according to a strict EGDT protocol did not lead to an improvement in outcome”

# Mortality Escalates along the Sepsis Continuum: A Clear Trend Exists

## Sepsis Mortality Continuum



# What have we learned?

Early Recognition



Early Intervention



Improved Survival



- 4 work teams were created
  - Education/ Awareness Team
  - Resuscitation Team
  - Measurement Team
  - Screening Implementation Team

## Screening Implementation Team

- Scheduled routine screening on pilot floor and SICU
- ED Screen, high risk conditions identified
- NP “Sepsis Team” screening
  - High risk patient population
  - Early Goal Directed Therapy

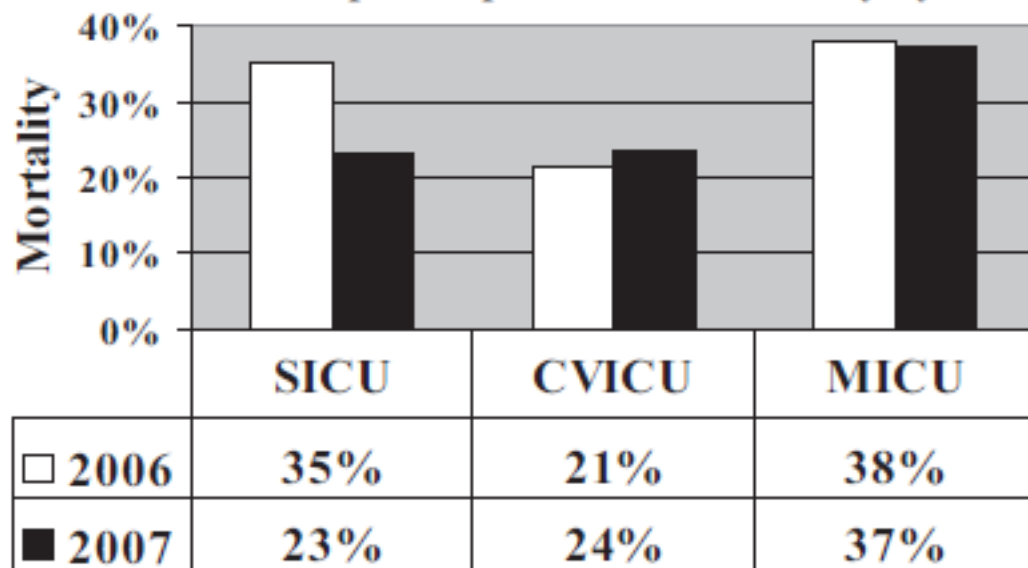
- Initially the sepsis team
  - Acute Care Nurse Practitioners
  - 2 NPs covering 6-7 days/week
  - 12 noon to 12 midnight
  - Focus patient population



# Validation of a Screening Tool for the Early Identification of Sepsis

Laura J. Moore, MD, Stephen L. Jones, MD, Laura A. Kreiner, MD, Bruce McKinley, PhD, Joseph F. Sucher, MD, S. Rob Todd, MD, Krista L. Turner, MD, Alicia Valdivia, RN, and Frederick A. Moore, MD

**Severe Sepsis/Septic Shock Mortality by ICU**



Article in The Journal of trauma · June 2009

DOI: 10.1097/TA.0b013e3181a3ac4b · Source: PubMed

# Recognize the Signs

Tachycardia

Hyperthermia/Hypothermia

Elevated/Low WBC Count

Tachypnea

Acute Change in Mental Status

These vital signs may seem easy to spot, but are often overlooked!

- APN Interventions
  - Screening tool: SIRS screening tool developed by a surgical intensivist
  - Nine hundred and fifty-nine general non-ICU patients were screened to validate the screening tool
    - 99.9% sensitivity
    - 95.9% specificity
    - High negative predictive value
  - Screening and protocol initiation on one unit and SICU

# HMH Sepsis Team

## Goals

- HR < 100 bpm
- SBP >90mmHg or MAP >70 mmHg
- RR <20
- Temperature normalized
- Lactic acid <1.5 mmol/L
- Urine output >0.5 ml/hr/kg
- Source control
- Return to baseline mentation

- Early Goal Directed Therapy
  - Fluid resuscitation
    - Fluid challenge should be titrated to BP, HR and CO
    - Fluid requirements may be as much as 3.5 liters
  - Labs and diagnostic tests
    - Lactic acid: trend until normalized
    - Bedside testing with iStat for lactic acid levels
  - Pan Culture
    - Blood cultures, urine, sputum, wounds, viral and stool cultures as indicated
  - Antibiotics
    - Initiate within 1 hour of recognition of sepsis

- NP collaborate with care teams to facilitate rapid identification and care of the septic patient
- NPs can initiate sepsis workup and appropriate tests and diagnostics prior to physician involvement
  - Especially helpful with critically ill patients when time is of the essence
  - And during the typical none working time periods, such as nights, weekends and holidays
- Sepsis core measure experts

- Now the NP lead team is called the Emergency Response Team
  - 10 NPs
  - Coverage is 2 NPs in house 24/7
- Respond to all sepsis consults/screens, all rapid responses, and code blues in the hospital, except in ICU
- As of 2015:
  - Current mortality rate is 12.2%
  - 1000 lives have been saved since 2009
  - \$19 Million dollars saved

# Participants through 12/31/2015

(Preliminary Results - Acute Care Only)

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## Program Participants

Total Screens: **816,371**

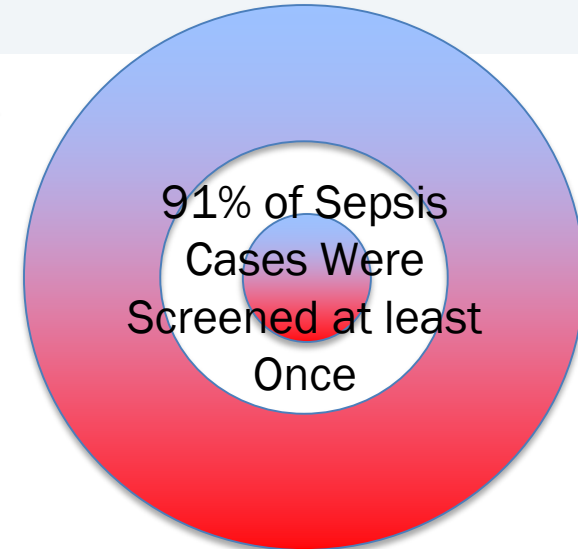
Total # of Patients  
Screened: **71,299**

24,808 NP evals  
8,528 patients

5,154  
Professionals  
Trained @HMH

### Acute Care Participants Since Go Live

Average Length of Stay (HMH)	6 days
Average Length of Stay (Community Acute Care)	3.9 days
Average Number of Screens per Patient (per day)	11.4 (1.9/day)



## Screened Positive Participants

Total Positive Screens: **22,582 (2.8%)**

Total Positive Screens with  
Evaluation: **24,808 (3.0%)**

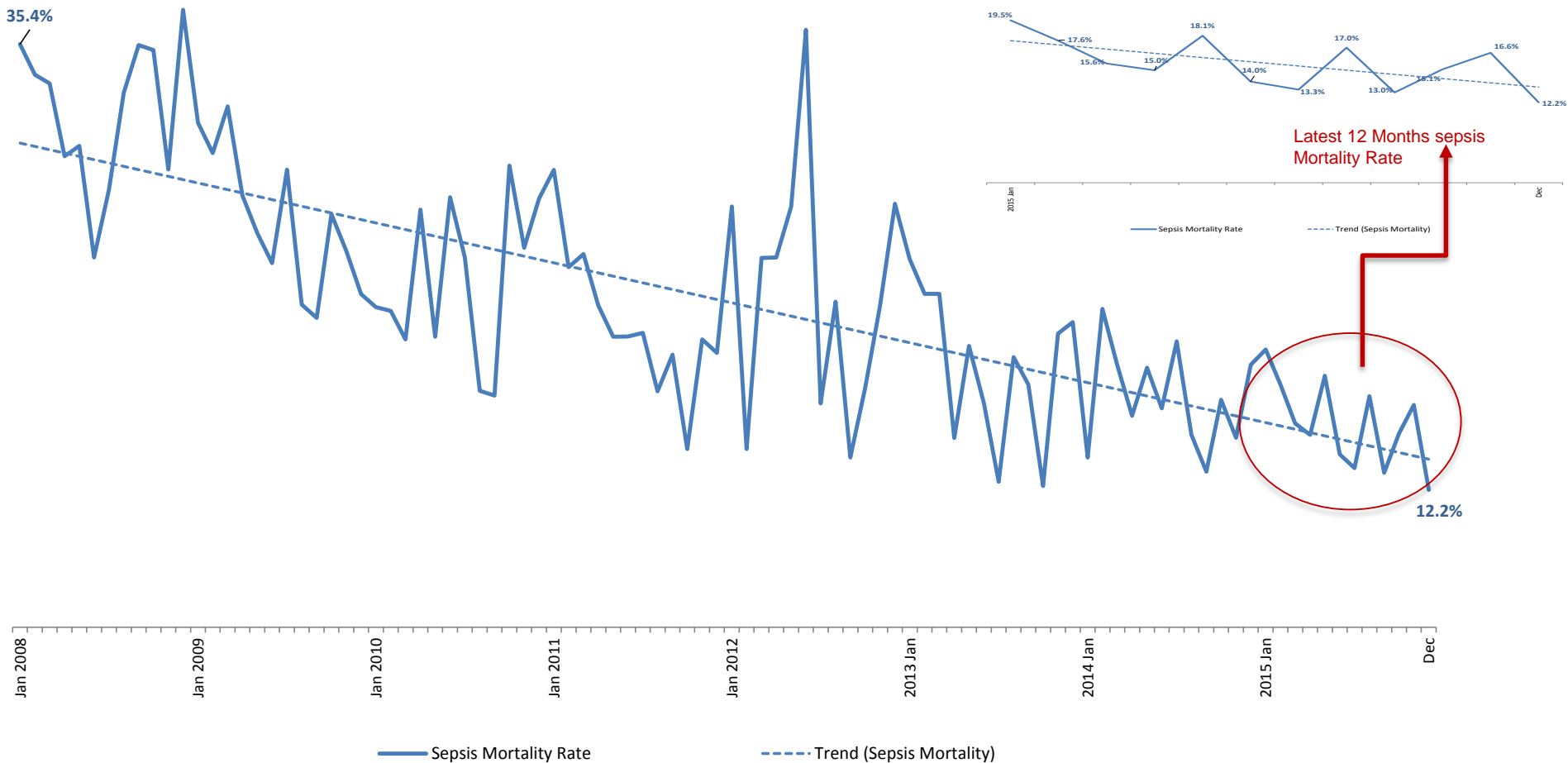
Evaluation/Intervention

Rate:  
**109%**



# 2008-2015 Sepsis Mortality – Trend

Sepsis Mortality Latest 12 Months



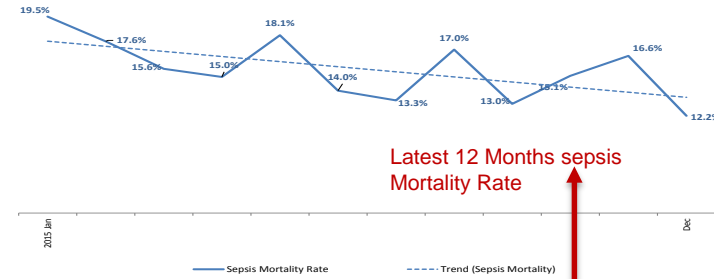
# 2012-2015 SEPSIS MORTALITY – TREND

~~SEP-1~~

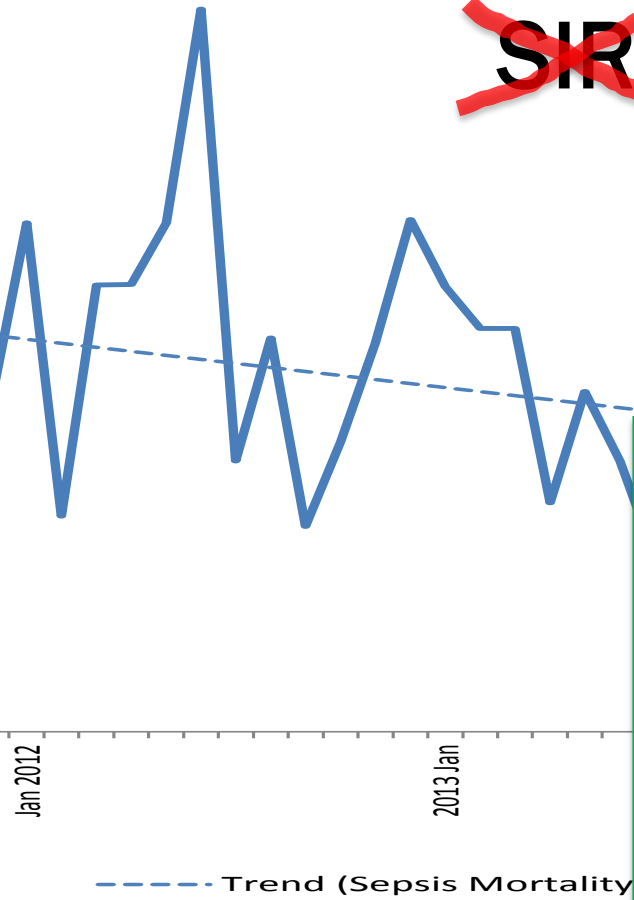
~~SIRS~~

~~qSOFA~~

Sepsis Mortality Latest 12 Months



Sepsis Associated Mortality  
Reduced 66% from baseline  
Facility-Wide And sustained  
for 12 months



- Training of NPs, RNs and PCAs
  - E-Learning
  - Team based sepsis simulation using interactive simulation manikins and modules
- NPs as second level providers
  - E-learning
  - Simulation lab scenarios
- NPs as second level providers for early recognition and interventions for any patient with a score of 4 or greater

# Ongoing Education

Courses	Houston Methodist
Bedside Nurse Training (In-Person)	2,227
Bedside Nurse Training (Online)	2,409
Bedside Module – 1 CE	278
Second Level Responder	162
New Simulation Scenarios Second Level	0
Second Level Refresher	29
Train the Trainer	33
Train the Trainer: Second Level	16
<b>Total</b>	<b>5,154</b>

1. Which criteria does not affect the sepsis score
  - a) Heart rate
  - b) Blood pressure
  - c) Temperature
  - d) Respiratory rate
  
2. Houston Methodist Hospital has decreased sepsis associated mortality by 66% from 2009 to 2015.
  - a. True
  - b. False

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