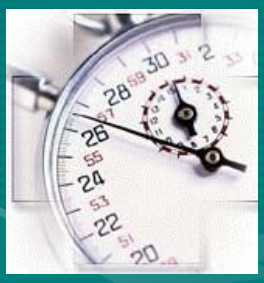
Second National Doctors of Nursing Practice Conference:

Transforming Care Through Education and Scholarly Practice
Defining Ourselves

September 2009

Think Sepsis: Implementation of an Evidence Based Emergency Department Sepsis Screening Tool



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Learning Objectives:

After the session, the attendees will be able to:

- **Outline the steps included in the Iowa Model of Translation Research.**
- **Identify the importance of screening Emergency Department patients for signs of sepsis, severe sepsis and septic shock.**
- **Name the resuscitation bundle components of Early Goal Directed Therapy.**

OUTLINE

I. Background
II. Purpose of Practice Change
III. Changes in Practice
IV. Implementation Strategies
V. Timeline and Budget
VI. Evaluation
VII. Risks and Challenges
VIII. Recommendations

I. Background

- **Incidence**

750,000 cases a year; 69% of cases in the ED[1]

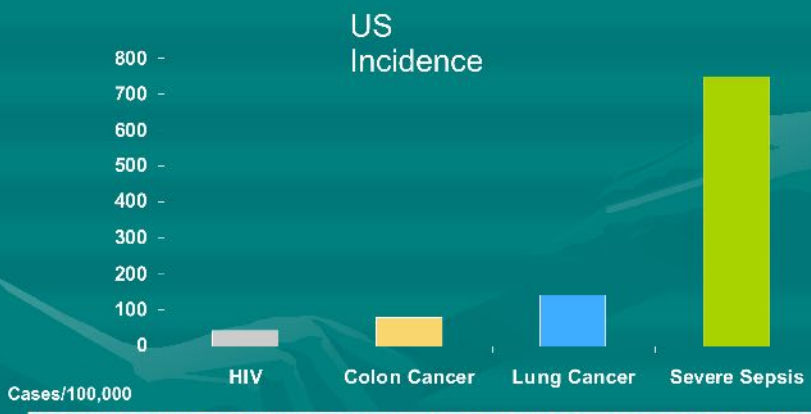
- **Mortality**

29% severe sepsis; 50-70% septic shock; 1.5% death rate each year[2]

- **Cost** 1.4 billion/year; ave. $55,000[3]
- **Availability of evidence to support change in practice** NNT 6 % 16% mortality reduction [4]

1. CDC http://www.cdc.gov/hiv/topics/surveillance/basic.htm#aidscases. Accessed 8/2006
2. Angus DC et al. *Crit Care Med* 2001;29(7):1303-1310.
3. Severe sepsis patients were identified by looking for combinations of ICD-9-CM codes indicating infection and new onset of acute organ failure following SCCM/ACCPguidelines as described in Angus DC, Linde-Zwirble WT, Lidicker J, et al. Epidemiology of severe sepsis in the United States: Analysis of incidence, outcome and associated costs of care. *Crit Care Med.* 2001;29(7):1303-1310.
4. Rivers E, et al. *N Engl J Med.* 2001

National Incidence of Severe Sepsis



Severe sepsis is more common than AIDS, colon cancer, and lung cancer combined

. CDC http://www.cdc.gov/hiv/topics/surveillance/basic.htm#aidscases. Accessed 8/2006

Mortality

Care Priorities	U.S. Incidence	# of Deaths	Mortality Rate
AMI	895,000	171,000	19%
Stroke	700,000	157,800	23%
Severe Sepsis	751,000	215,000	29%

Although it is the leading cause of death in the non-coronary ICU, severe sepsis often ranks low in terms of disease state priorities.

Angus DC et al. *Crit Care Med* 2001;29(7):1303-1310.

Problem Statement

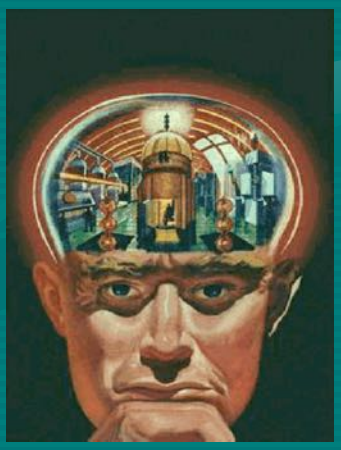
- UMC ED currently had no existing evidence based ED triage screening tool for patients with sepsis, severe sepsis and septic shock.
- Delayed and inaccurate diagnosis of patients
- Mortality 70% for severe sepsis and septic shock (MedPar data)

II. Purpose of Practice Change

1. Improving ED diagnosis of sepsis, severe sepsis and septic shock.
2. Improving timeliness of implementing sepsis resuscitation bundle (triage time to time to drawing of labs, initiation of the resuscitation bundle including time to antibiotics, IV fluids, CVP measurement time to transfer to ICU).
3. Improving patient outcomes including decreasing length of stay (LOS), mortality & cost of hospitalization.

Think Sepsis Initiative

- **UMC Think Sepsis Initiative aim to provide the best possible quality and safe patient care**
- **UMC Think Sepsis Initiative Goal: To achieve a 25% reduction in severe sepsis mortality by 2009.**



Synthesis of Literature: Early Goal-Directed Therapy

- **In-hospital mortality lower in EGDT group (46.5% vs. 30.5%; p=.009)**
- **Differences in outcome were noted despite the fact that the groups received the same treatment after the initial 6 hours**

Rivers, et. al. *NEJM* 2001;345:1368-77

III. EBP Changes

A. ED Screening of patients for sepsis, severe sepsis and septic shock for timely implementation of Early Goal Directed Therapy

EMSTAT SEPSIS SCREENING TOOL: Drop-Down Screen

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

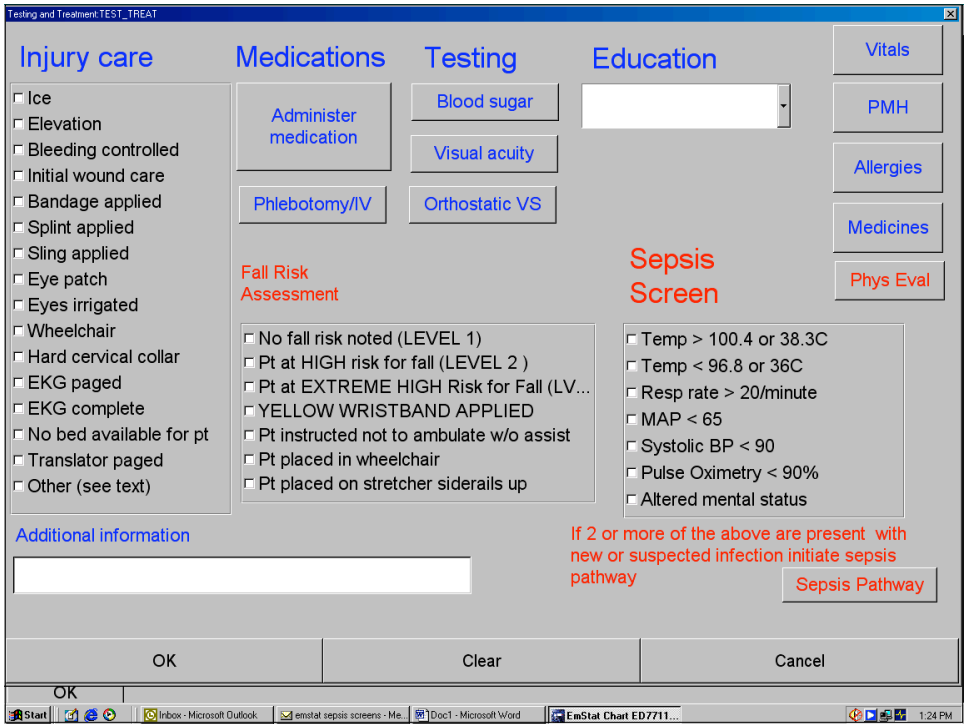
- Pneumonia (Pulmonary infiltrate)
- UTI
- Skin / Soft Tissue Infection
- Bloodstream Catheter Infection
- Implantable Device Infection
- Acute Abdominal Infection
- Wound Infection / Abscess
- Endocarditis (New murmur with fever)
- Possible Meningitis
- Bone/Joint Infection
- Other _____

SIRS Criteria

- Hyperthermia T>38.3°C or 101°F
- Hypothermia T<36°C or 96.8° F
- Tachycardia>90
- Tachypnea>20
- Acutely altered mental status
- Chills with rigors
- SBP<90
- MAP<65

Risk Factors

- Underactive immune system: chemotherapy, HIV, organ transplant, any immune disorder
- Recent Surgery
- Being on mechanical ventilation
- Invasive procedures, indwelling catheters, dialysis patients
- Very young or very old patients
- Malnourished patients
- Nursing home patients
- Pt with chronic diseases: diabetes, heart failure, COPD
- Alcoholics and Drug abusers



Sepsis Pathway

SEPSIS PATHWAY

Vitals

Pulse Oximetry

Monitors

Physician Eval

Sepsis Screen Criteria

Pertinent Sepsis History

Sepsis Interventions

- ☐ Physician notified
- ☐ Pt brought straight back to room
- ☐ Nasal cannula oxygen 2L/min
- ☐ Saline lock placed
- ☐ Intravenous fluids initiated
- ☐ X ray of affected site ordered
- ☐ Labs drawn
- ☐ Other see note

Sepsis Pathway Labs

- ☐ CBC
- ☐ Comprehensive Metabolic Panel
- ☐ Lactic Acid level
- ☐ Blood Cultures x 2
- ☐ PT, PTT, INR
- ☐ Troponin level
- ☐ CK- MB
- ☐ Type and screen
- ☐ ABG with ionized calcium
- ☐ U/A and urine culture
- ☐ Sputum culture and gram stain
- ☐ Wound culture (affected site)

Note

OK | Clear | Cancel

ED Based Critical Care

"If critically ill ED patients cannot be taken rapidly to the critical care unit, then it is necessary to find new ways to take critical care to the patient"?

- 1. Cowan RM, Trzeciak S. *Crit Care* 2005;9(3):291-295.

B. Recognizing Sepsis Using a Decision making Tree

Timely and accurate diagnosis of severe sepsis is crucial, but it remains a challenge

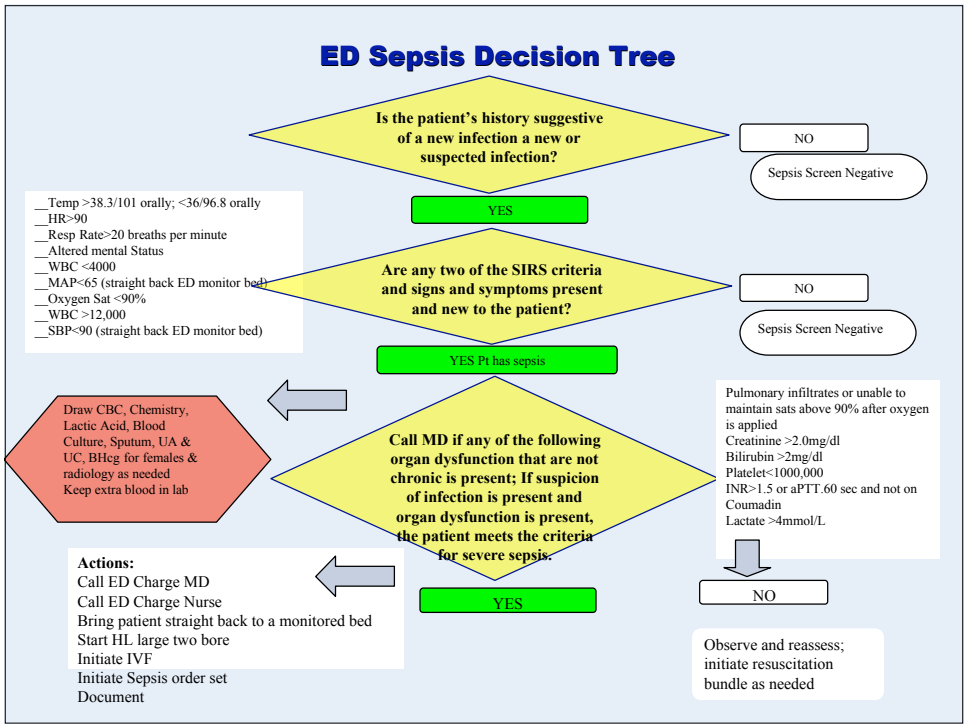
- The signs and symptoms are nonspecific
- Clinical definition is often not applied at the bedside
- No single test or biomarker exists
- Severe sepsis occurs throughout the institution

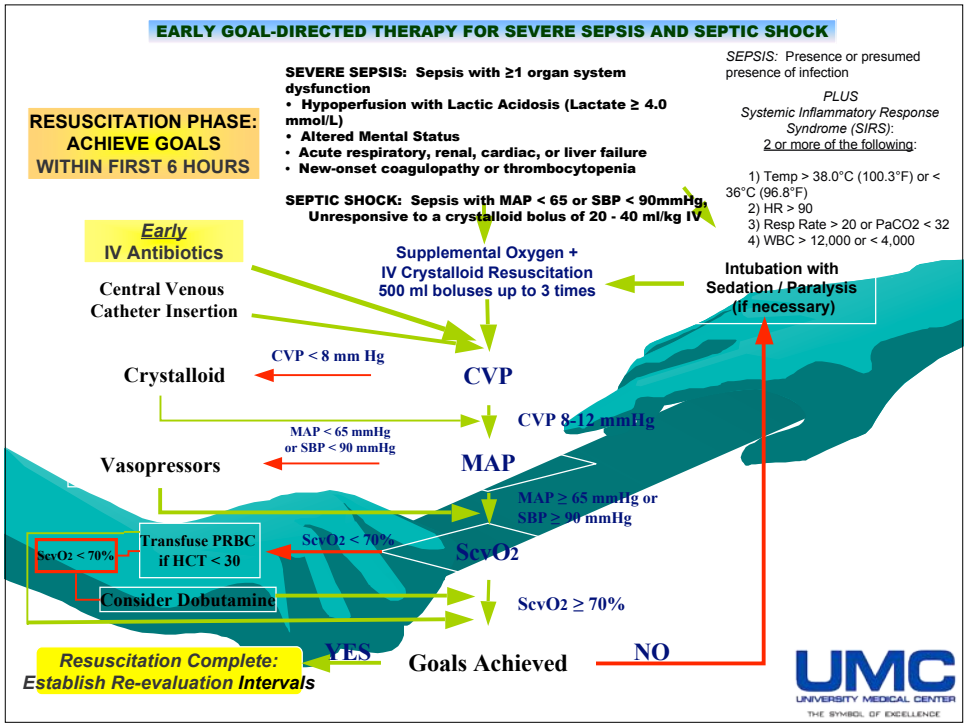
C. Sepsis Algorithm

D. Pre Printed Sepsis Order set

E. Competency development

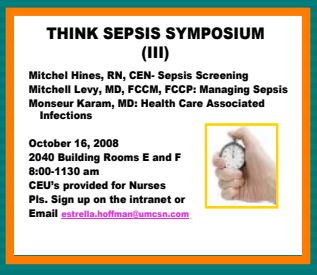
F. Data tracking and reporting (Changes in existing DRGS)

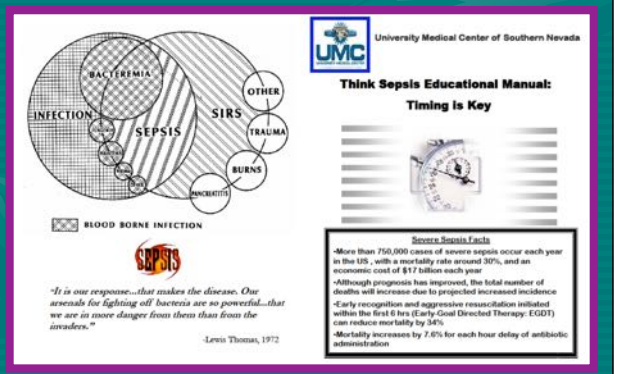

ED Sepsis Decision Tree
Is the patient's history suggestive of a new infection a new or suspected infection?
NO
Sepsis Screen Negative
YES
__Temp >38.3/101 orally; <36/96.8 orally
__HR>90
__Resp Rate>20 breaths per minute
__Altered mental Status
__WBC <4000
__MAP<65 (straight back ED monitor bed)
__Oxygen Sat <90%
__WBC >12,000
__SBP<90 (straight back ED monitor bed)
Are any two of the SIRS criteria and signs and symptoms present and new to the patient?
NO
Sepsis Screen Negative
YES Pt has sepsis
Draw CBC, Chemistry, Lactic Acid, Blood Culture, Sputum, UA & UC, BHcg for females & radiology as needed
Keep extra blood in lab
Call MD if any of the following organ dysfunction that are not chronic is present; If suspicion of infection is present and organ dysfunction is present, the patient meets the criteria for severe sepsis.
Pulmonary infiltrates or unable to maintain sats above 90% after oxygen is applied
Creatinine >2.0mg/dl
Bilirubin >2mg/dl
Platelet<1000,000
INR>1.5 or aPTT.60 sec and not on Coumadin
Lactate >4mmol/L
Actions:
Call ED Charge MD
Call ED Charge Nurse
Bring patient straight back to a monitored bed
Start HL large two bore
Initiate IVF
Initiate Sepsis order set
Document
YES
NO
Observe and reassess; initiate resuscitation bundle as needed


EARLY GOAL-DIRECTED THERAPY FOR SEVERE SEPSIS AND SEPTIC SHOCK
SEPSIS: Presence or presumed presence of infection
PLUS
Systemic Inflammatory Response Syndrome (SIRS):
2 or more of the following:
1) Temp > 38.0°C (100.3°F) or < 36°C (96.8°F)
2) HR > 90
3) Resp Rate > 20 or PaCO2 < 32
4) WBC > 12,000 or < 4,000
SEVERE SEPSIS: Sepsis with ≥1 organ system dysfunction
• Hypoperfusion with Lactic Acidosis (Lactate ≥ 4.0 mmol/L)
• Altered Mental Status
• Acute respiratory, renal, cardiac, or liver failure
• New-onset coagulopathy or thrombocytopenia
SEPTIC SHOCK: Sepsis with MAP < 65 or SBP < 90mmHg, Unresponsive to a crystalloid bolus of 20 - 40 ml/kg IV
RESUSCITATION PHASE: ACHIEVE GOALS WITHIN FIRST 6 HOURS
Early IV Antibiotics
Central Venous Catheter Insertion
Supplemental Oxygen + IV Crystalloid Resuscitation 500 ml boluses up to 3 times
Intubation with Sedation / Paralysis (if necessary)
CVP < 8 mm Hg
Crystalloid
CVP
CVP 8-12 mmHg
MAP < 65 mmHg or SBP < 90 mmHg
Vasopressors
MAP
MAP ≥ 65 mmHg or SBP ≥ 90 mmHg
ScvO2 < 70%
Transfuse PRBC if HCT < 30
ScvO2 < 70%
ScvO2
Consider Dobutamine
ScvO2 ≥ 70%
Resuscitation Complete: Establish Re-evaluation Intervals
YES
Goals Achieved
NO
UMC
UNIVERSITY MEDICAL CENTER
THE SYMBOL OF EXCELLENCE

IV. Implementation Strategies

- Use a Framework Iowa Model of Translation Research
- Obtain Administrative Support
- Form a Core Team
- Market the Idea
  - Communication: education manual
  - Sepsis web page and conferences
- Piloting the Change
  - August 2007 to August 2008
- Data Tracking and reporting





V. Timeline and Budget

May-July	July-Sept.	Sept.-Nov.	Nov-Dec.
Literature synthesis	Screening tool conversion & use	Eval of triage tool	Adoption of tool
Devt. Educational Plan	Pilot in the ED	Data tracking	First quarterly eval
Marketing	Marketing	Marketing	Marketing
Start Education	Education ED & ICU	Forum; booster ICU & ED	Last series of education for ICU; booster sessions

All ED nurses attended the 4-hour mandatory workshop. A total of $ 14,000 was spent on education for 100 ED nurses. A total of $ 4,840 was spent on the ICU workshop.

VI. Evaluation

Abstract data for the following:

- Total number of patients discharged with sepsis DRGs (ED and other)
- ED sepsis diagnosis (sepsis, severe sepsis and septic shock)
- Outcomes (LOS, mortality & cost) for ED diagnosed patients

SEPSIS MORTALITY
Preliminary results7/07-4/08

N=182

LOS=13.6 days (0-71 days)

Mortality=10%

Total charges=25,975,323.43

Average cost per pt=143, 510.07

Total Unreimbursed Balance: $9,821,694.33

Average unreimbursed balance per pt:$54, 263.50

Importance of the Iowa EBP Model for Quality Improvement

1. The importance of a quality improvement framework is crucial in the planning, implementation, evaluation and dissemination of project results.
2. With the current economic crisis and Medicare cuts hospitals will not receive reimbursement from CMS if patients are not assessed and evaluated in a timely and accurate manner with proper document of findings.
3. The fact that sepsis could be reasonably prevented through the application of evidence-based practice (EBP) guidelines, hospital leadership need to collaborate to determine the best possible methods to address sepsis by introducing, initiating, and adapting EBP clinical practice.

VII. Challenges

Sustainability of culture change

- **Lack of buy in from ICU physicians**
- **Lack of resources for education hours, data collection and data entry**
- **Spread of idea through out organization-management bundle**
- **Need for a leader to be the agent of change**

VIII. Recommendations

- **Streamline data tracking strategies**
- **Transparency in reporting**
- **Obtain audience from administration to increase resource support**
- **Accountability**
- **Reinforce screening of all patients in the ED**
- **Implement the same screening process in the ICU and other nursing units**

Collaborative Goals

- Public health service announcements and public education
- More provider education
- Collaboration with Infection Control agencies for surveillance, prevention & control
- Resources: technology and manpower for centralized valley wide data tracking
- Work collaboratively to achieve Joint Commission certification for disease specific care

Summary

- Early recognition of severe sepsis is key
- Patients may not look sick, but they are dying
- Timing is key: *The first 6 hours are critical*
  - Mortality rapidly increases with each passing hour
- Nurses play a key role in the early identification and diagnosis of sepsis patients with the use of an ED screening tool
- A nurse triggered sepsis pathway has a potential to save significant number of lives hospital wide
- Clinicians need to be educated on the use of a comprehensive EBP framework

- Leibovici, L., Greenshtain, S., Cohen, O. (2001). Bacteremia in febrile patients. A clinical model for diagnosis. Internal Medicine, 15:1801-1806.

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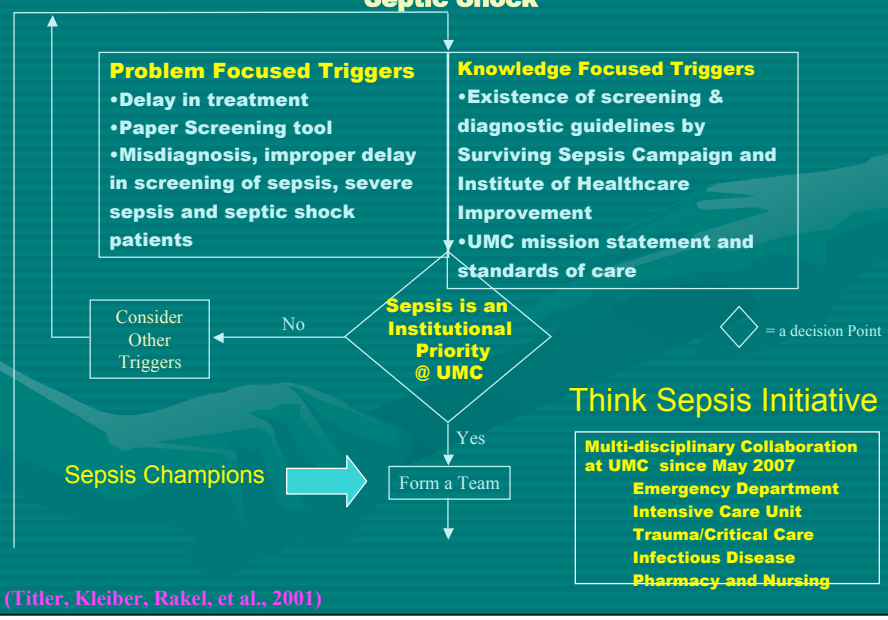
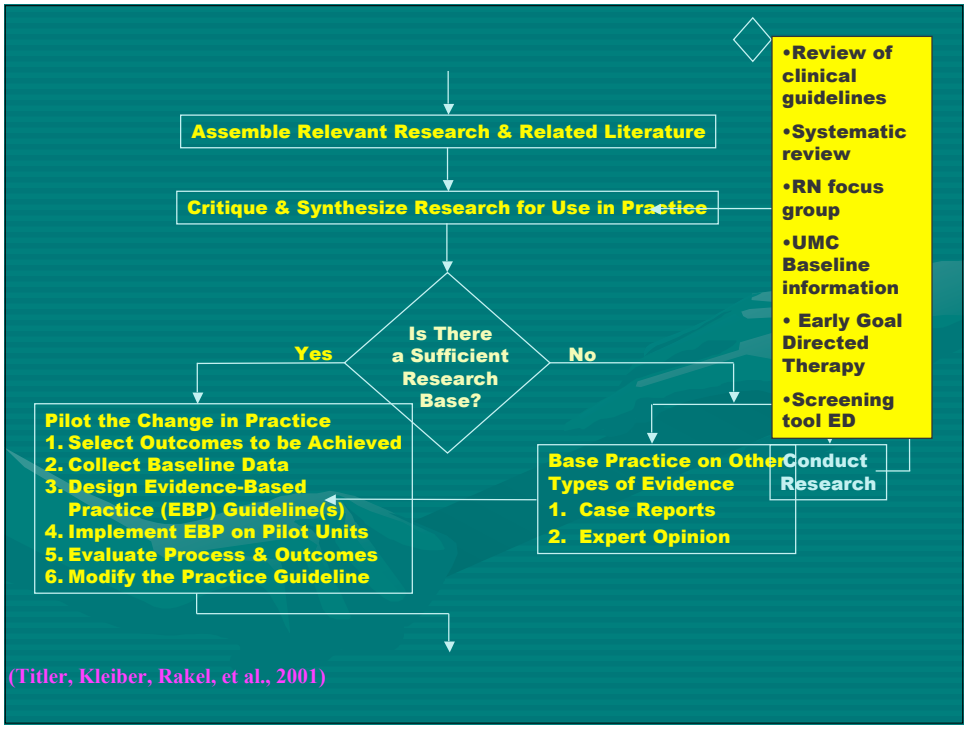
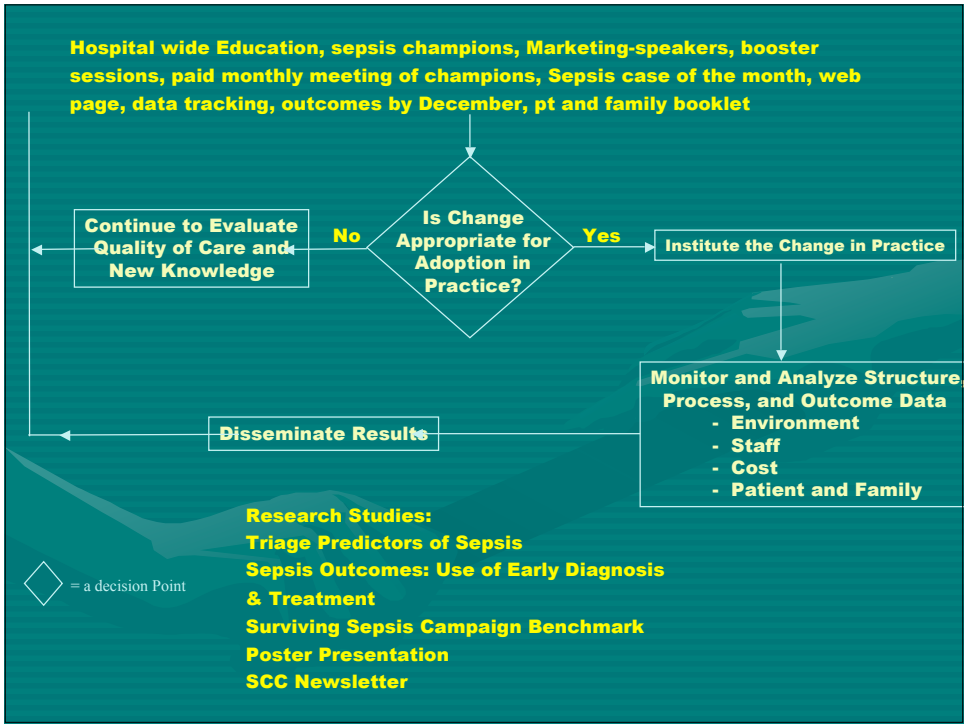
- Shapiro, N.I., Wolfe, R.E., Moore, R.B., Smith, E., Burdick, E., Bates, D.W. (2003). Mortality in Emergency Department Sepsis (MEDS) score: a prospectively derived and validated clinical prediction rule. Critical Care Medicine, 31:670 –5.

Adaptation of the Iowa Model of Evidence-Based Practice to Promote Quality Care for ED Patients with Severe Sepsis and Septic Shock



(Titler, Kleiber, Rakel, et al., 2001)


•Review of clinical guidelines
•Systematic review
•RN focus group
•UMC Baseline information
• Early Goal Directed Therapy
•Screening tool ED
Assemble Relevant Research & Related Literature
Critique & Synthesize Research for Use in Practice
Is There a Sufficient Research Base?
Yes
No
Pilot the Change in Practice
1. Select Outcomes to be Achieved
2. Collect Baseline Data
3. Design Evidence-Based Practice (EBP) Guideline(s)
4. Implement EBP on Pilot Units
5. Evaluate Process & Outcomes
6. Modify the Practice Guideline
Base Practice on Other Types of Evidence
1. Case Reports
2. Expert Opinion
Conduct Research
(Titler, Kleiber, Rakel, et al., 2001)


Hospital wide Education, sepsis champions, Marketing-speakers, booster sessions, paid monthly meeting of champions, Sepsis case of the month, web page, data tracking, outcomes by December, pt and family booklet
Is Change Appropriate for Adoption in Practice?
No
Yes
Continue to Evaluate Quality of Care and New Knowledge
Institute the Change in Practice
Monitor and Analyze Structure, Process, and Outcome Data
- Environment
- Staff
- Cost
- Patient and Family
Disseminate Results
= a decision Point
Research Studies:
Triage Predictors of Sepsis
Sepsis Outcomes: Use of Early Diagnosis & Treatment
Surviving Sepsis Campaign Benchmark
Poster Presentation
SCC Newsletter