



Surviving Sepsis Clinical Study: Baseline Report

Aggregate and Peer Group Results

Data Collection: Oct 2011
 Number of cases: 204 cases
 Report date: November 2011

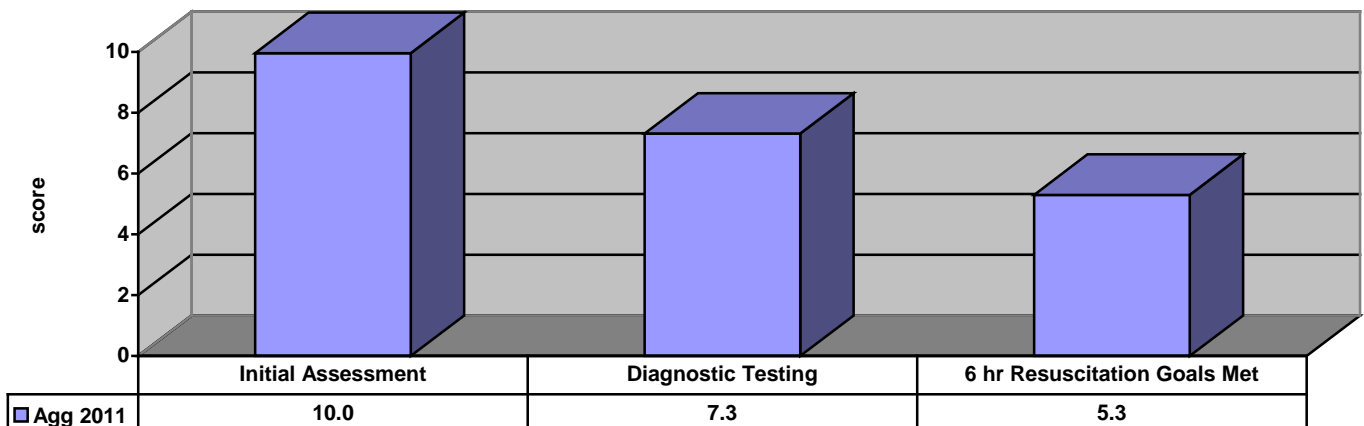
PROJECT SUMMARY

Abstract Severe sepsis is a high-risk, low-volume clinical diagnosis in a majority of MT CAHs. According to the *International Surviving Sepsis Campaign (2008)*, severe sepsis has an average mortality rate worldwide of about 30%. MT CAH providers expressed an interest in improving early identification of sepsis in order to rapidly initiate appropriate treatment, and thereby reduce its mortality rate in MT hospitals.

The PIN conducted a literature search focused on the *International Surviving Sepsis Campaign* research, tools and clinical care protocols. A baseline data collection study tool was developed to collect information about current CAH assessment, diagnosis and treatment of sepsis within the first six hours of the patient's presentation to the CAH, as compared with the *Campaign's* guidelines. The data has been analyzed to identify key areas for aggregate and facility-specific performance improvement. The PIN will provide support to CAHs for improving key areas, including provider and nurse education, clinical practice guidelines and other needed resources as they are identified.

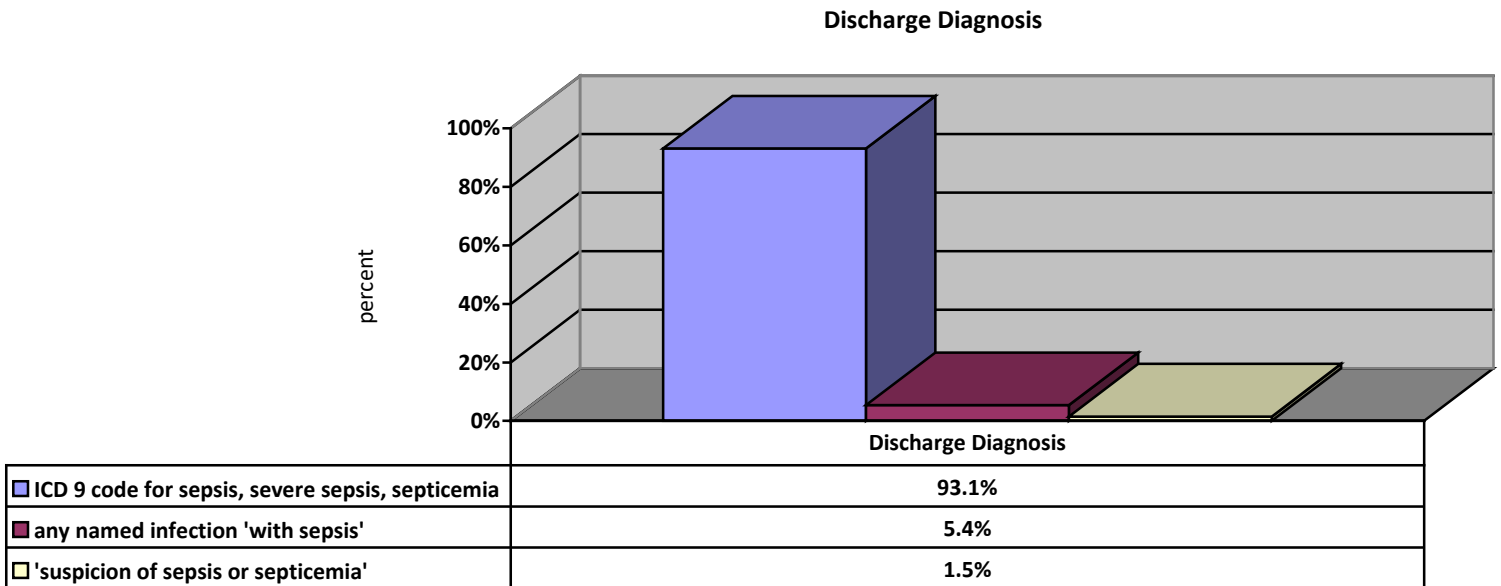
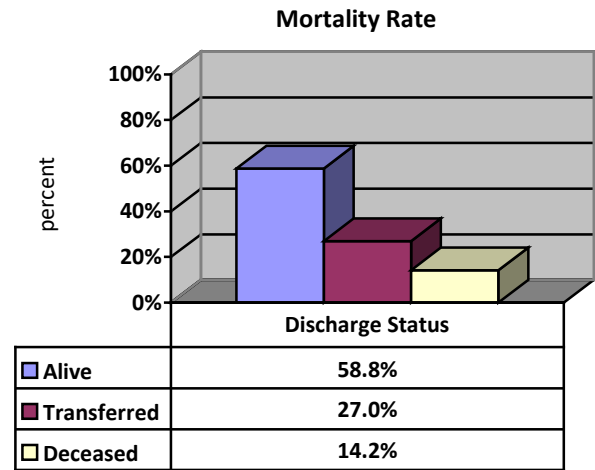
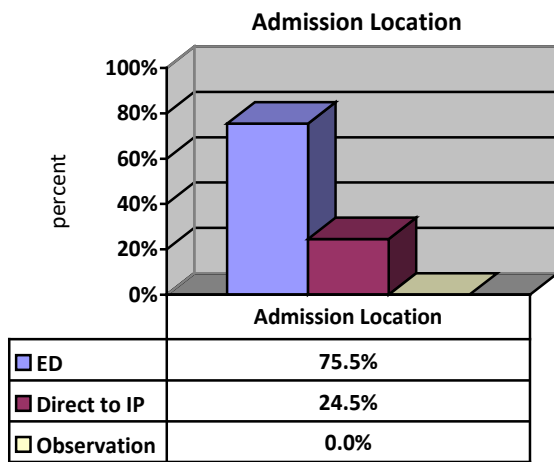
Participants Twenty one PIN participating facilities submitted baseline data for 204 sepsis cases for patients presenting to the CAH between Jan 1, 2010 and June 30, 2011. Participants from four of five PIN peer groups submitted baseline data for the study.

I. Summary of Surviving Sepsis Composite Scale Scores



Overall, 69 % of PIN patients in this study had symptoms and test results consistent with severe sepsis or septic shock.

II. Demographics

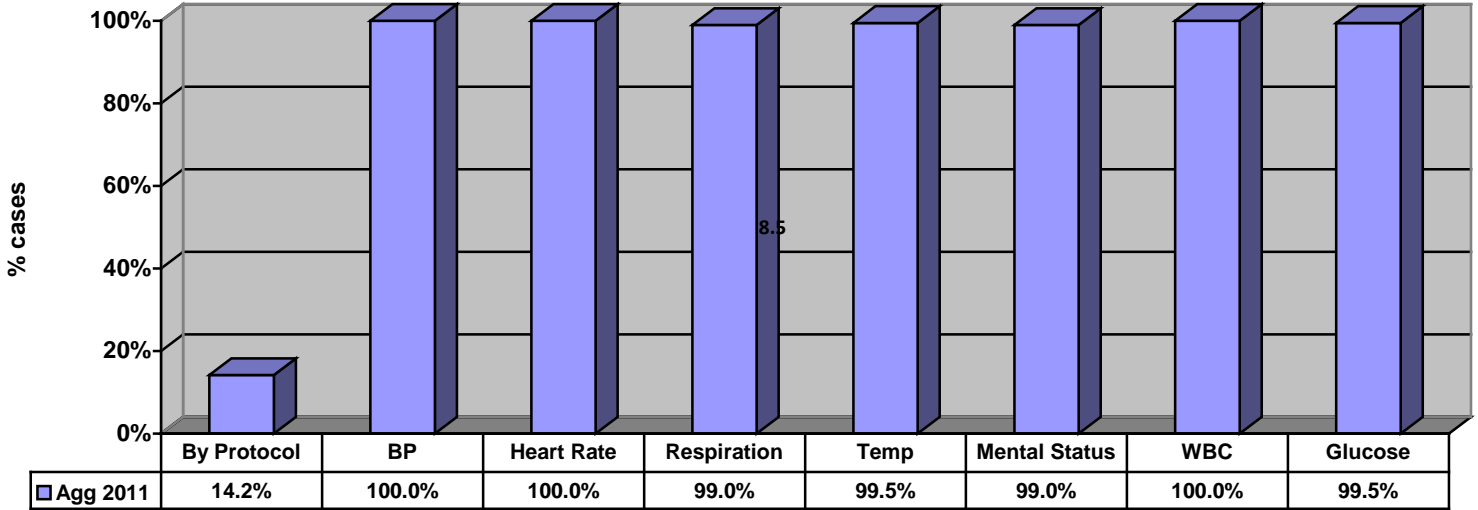


MT CAH Sepsis Patients in 2010

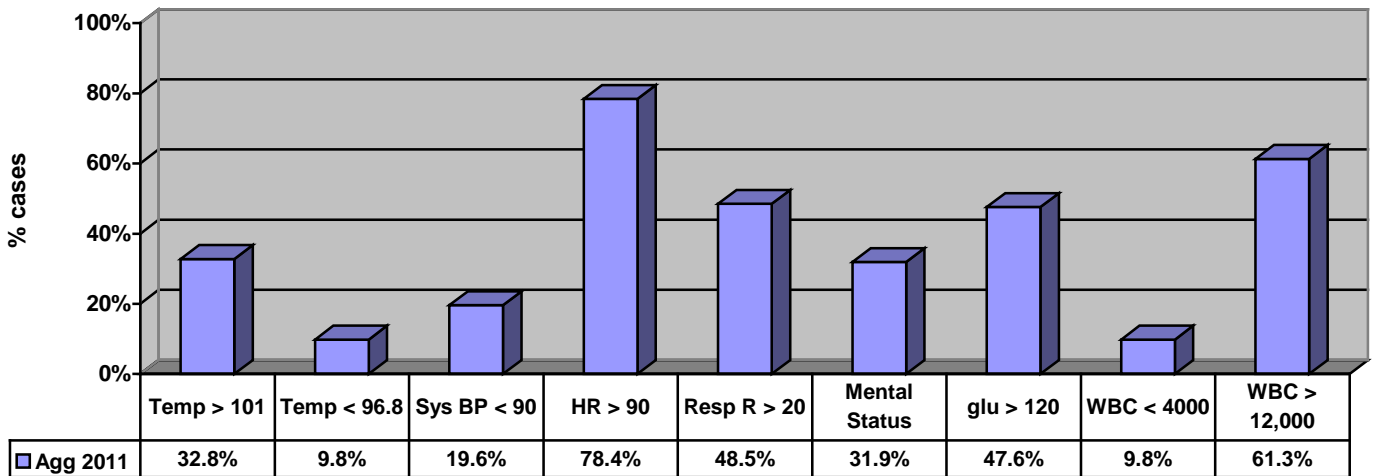
- *Three-fourths of the patients presented to the ED*
- *Slightly more than one-quarter of the patients were transferred to a facility offering a higher level of care*
- *The observed mortality rate among the cases submitted was 14%, less than the worldwide average of 30%, and has not been risk-adjusted for other patient factors*
- *Over 93% of the patients were discharged with an ICD 9 discharge code related to sepsis*

III. Initial Assessment

Surviving Sepsis Guidelines for Initial Assessment



Signs and Symptoms Present on Initial Assessment of Participating Baseline Patients

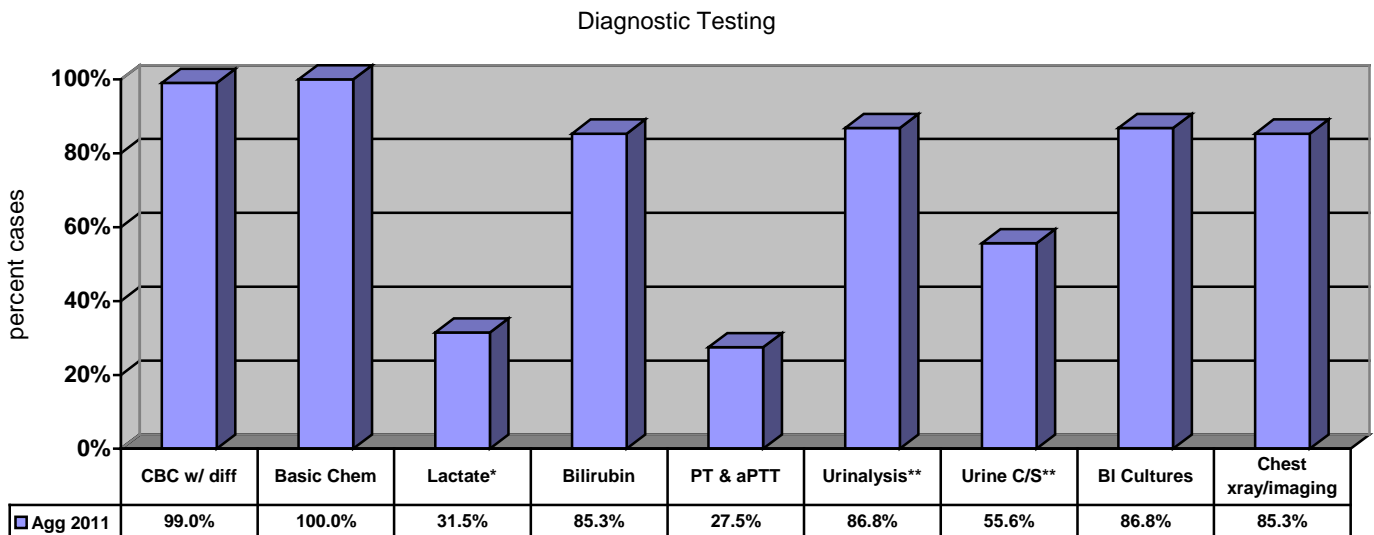


IV. Diagnostic Testing

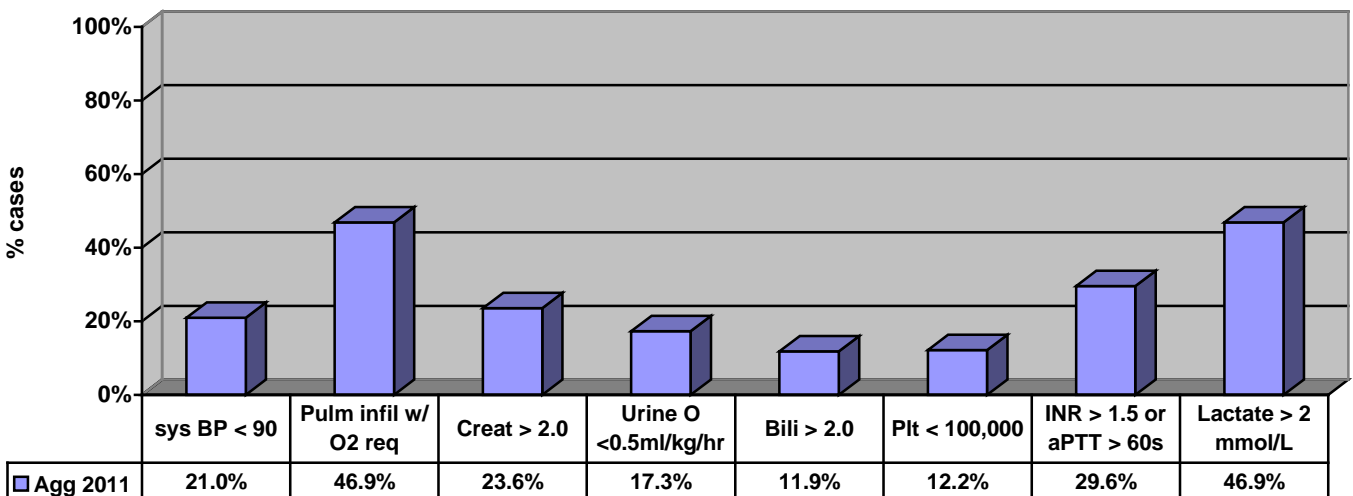
When two or more of the signs and symptoms above identified above are present on initial assessment, the Surviving Sepsis Guidelines recommend the following diagnostic testing be completed immediately. The graph below shows the percentage of CAH patients with two or more of the signs and symptoms on initial assessment receiving the recommended diagnostic testing.

* Note that the results for Lactate* excludes those patients for whom lactate testing is not available at the admitting CAH.

** The results for Urinalysis** and Urine C/S** exclude those patients who did not produce sufficient volume for those tests.



Diagnostic Test Results for Participating Baseline Patients



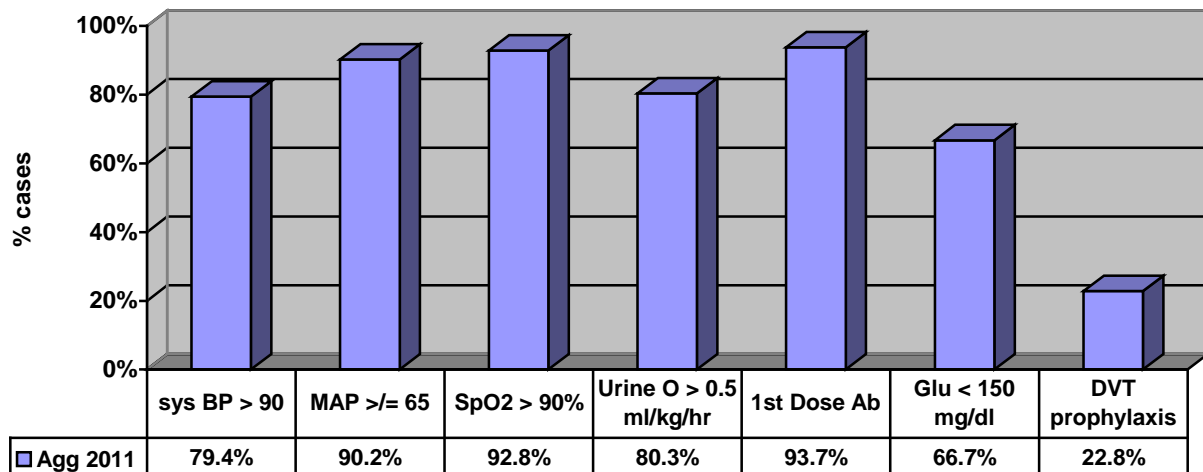
V. Surviving Severe Sepsis 6 hr Resuscitation Goals

When one or more of the above test results indicates the presence of a new infection with hypotension and/or organ involvement, the Surviving Sepsis Campaign Guidelines recommend that the following resuscitation goals be achieved within 6 hours of the patients presentation to the CAH.

The graph below shows the percentage of CAH patients with two or more of the signs and symptoms on initial assessment receiving the recommended diagnostic testing.

* Note that the results for Lactate* excludes those patients for whom lactate testing is not available at the admitting CAH.

** The results for Urinalysis** and Urine C/S** exclude those patients who did not produce sufficient volume for those tests.



VI. Summary of Aggregate Baseline Performance

MT CAHs are consistently performing at the highest standard in the assessment of patients presenting with possible sepsis/severe sepsis when compared with the guidelines recommended by the *Surviving Sepsis Campaign*.

There are opportunities for MT CAHs to improve their performance in diagnostic testing, particularly in the areas of lactate and liver function testing.

There are opportunities for improving performance in consistently achieving the *Guidelines* recommended resuscitation goals, particularly in stabilizing systolic BP, managing blood glucose levels, and DVT prophylaxis.

* For more information about the Surviving Sepsis Campaign and/or the published evaluation and treatment guidelines, visit: <http://www.survivingsepsis.com/implement/resources/guidelines> .

Drill Down: Initial Assessment of Possible Sepsis Patients

exceptional performance

opportunity for improvement

	Protocol	BP	Heart R	Resp R	Temp	Mental Status	WBC	Glucose	Scale Score
Agg 2011 (n = 204)	14.2 %	100.0 %	100.0 %	99.0 %	99.5 %	99.0 %	100.0 %	99.5 %	9.96
PG 1 2011 (n = 95)	29.5 %	100.0 %	100.0 %	98.9 %	100.0 %	100.0 %	100.0 %	100.0 %	9.99
PG 2 2011 (n = 90)	1.1 %	100.0 %	100.0 %	98.9 %	98.9 %	100.0 %	100.0 %	98.9%	9.95
PG 3 2011 (n = 10)	0.0 %	100.0 %	100.0 %	100.0 %	100.0 %	100.0 %	100.0 %	100.0%	10.0
PG 4 2011 (n = 9)	0.0 %	100.0 %	100.0 %	100.0 %	100.0 %	77.8 %	100.0 %	100.0%	9.68

Doing Well

- Recording admission vital signs and mental status
- Documenting admission WBC and glucose

Opportunities for Improvement

- Implement a protocol for rapid evaluation and initial treatment of possible sepsis patients
- Evaluate and document mental status changes for 100% of these patients at presentation

Drill Down: Diagnostic Testing for Suspicious Sepsis Patients

exceptional performance

opportunity for improvement

	CBC w/ diff	Basic Chem	Lactate	Bili	PT & aPTT	UA	Urine C/S	Blood Cultures	Chest xray or Imaging	Scale Score
Agg 2011	99.0 %	100.0 %	31.5 %	85.3 %	27.5 %	86.8 %	55.8 %	86.8 %	85.3 %	7.3
PG 1 2011	99.0 %	100.0 %	46.2 %	79.0%	26.3 %	85.1 %	52.1%	88.4 %	85.3 %	7.3
PG 2 2011	100.0 %	100.0 %	13.2 %	92.2%	30.0 %	87.1 %	61.6%	85.6 %	84.4 %	7.3
PG 3 2011	90.0 %	100.0 %	0.0 %	90.0 %	30.0 %	100.0 %	60.0%	90.0%	90.0 %	7.2
PG 4 2011	100.0 %	100.0 %	0.0 %	77.8 %	11.1 %	87.5 %	33.3%	77.8%	88.9 %	6.4

Doing Well

- Diagnostic testing at presentation routinely includes CBC with diff, basic chemistry panel, bilirubin, urinalysis, blood cultures, and imaging to attempt to identify the source of a new infection

Opportunities for Improvement

- Elevated lactate is a hallmark test for diagnosis of sepsis/severe sepsis. Consider developing the ability to perform this test, and implement it as part of a protocol for the evaluation of all potential sepsis patients.
- Improve the consistency of ordering a PT/aPTT as part of evaluation of the liver for decreased organ function.
- Develop a method for ensuring collection of the UA and urine C/S when output is decreased.
- Improve the consistency of appropriate imaging and collection of blood cultures to 100% to assist with identifying the source of a new infection

Drill Down: Resuscitation Goals Met within 6 hours of Arrival of Sepsis Patients

exceptional performance

opportunity for improvement

	sys BP > 90	MAP (mean arterial pressure) >= 65	SpO2 > 90%	Urine O > 0.5 ml/kg/hr	1 st dose antibiotic admin	Glu < 150	DVT prophy	Scale Score
Agg 2011	79.4 %	90.2 %	90.8 %	80.3 %	93.7 %	66.7 %	22.8 %	5.3
PG 1 2011	86.1 %	95.1 %	90.1 %	66.7 %	93.1 %	65.1 %	17.4 %	5.5
PG 2 2011	73.2 %	76.9 %	98.2 %	93.8 %	93.0 %	70.6 %	33.3 %	5.2
PG 3 2011	66.7 %	80.0 %	83.3 %	75.0 %	100.0 %	83.3 %	16.7 %	6.3
PG 4 2011	71.4 %	66.7 %	85.7 %	0.0 %	100.0 %	42.9 %	0.0 %	4.5

Doing Well

- Consistently achieving within 6 hr of the patient's arrival the *Surviving Sepsis* resuscitation goals of:
 - MAP >= 65
 - SpO2 >= 90%
 - administration of the 1st dose of antibiotic

Opportunities for Improvement

- Work to achieve for 100% of these patients the *Surviving Sepsis* goals of:
 - systolic BP greater than 90 mm/Hg
 - improving and/or maintaining urine output at greater than 0.5 ml/kg/hr
 - stabilizing blood glucose in the absence of diagnosed diabetes, to a level greater than the CAH's normal lower limit, but less than 150 mg/dl
 - providing a form of DVT prophylaxis
- Maintain the benchmark performance achieved in the other resuscitation goals



Surviving Sepsis Clinical Study: Re-measurement Report

Aggregate Results

Data Collection: Oct 2011; June 2012
 Number of cases: 204 cases; 103 cases
 Report date: November 2011; July 2012

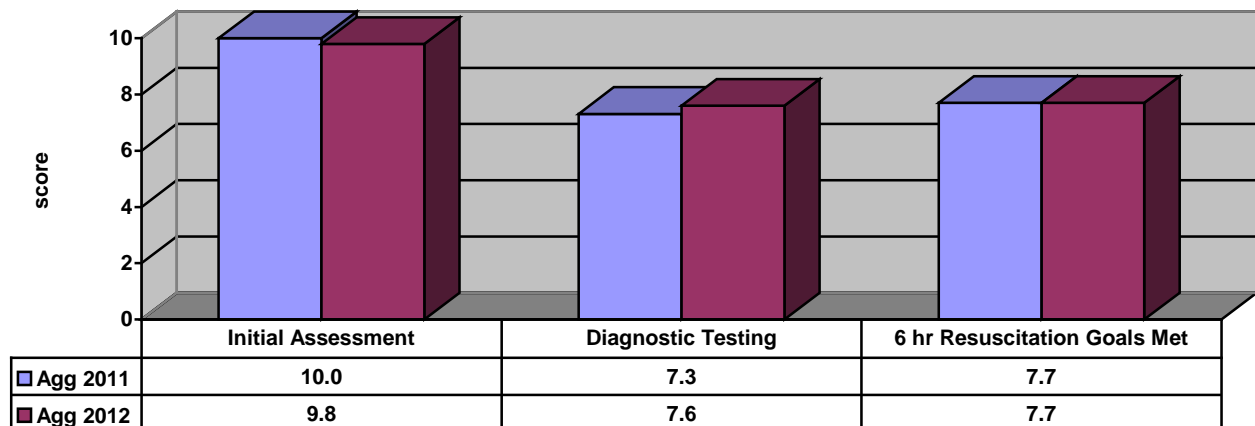
PROJECT SUMMARY

Abstract Severe sepsis is a high-risk, low-volume clinical diagnosis in a majority of MT CAHs. According to the *International Surviving Sepsis Campaign (2008)*, severe sepsis has an average mortality rate worldwide of about 30%. MT CAH providers expressed an interest in improving early identification of sepsis in order to rapidly initiate appropriate treatment, and thereby reduce its mortality rate in MT hospitals.

The PIN conducted a literature search focused on the *International Surviving Sepsis Campaign* research, tools and clinical care protocols. Baseline data was collected to assess MT CAH performance compared with the *Campaign's* guidelines. Key areas for performance improvement were identified. The PIN provided support to CAHs for improving key areas, including provider and nurse education, clinical practice guidelines and other needed resources. Re-measurement data was collected to assess improvement and additional opportunities for ongoing improvement work.

Participants Twenty one PIN participating facilities submitted baseline data for 204 sepsis cases for patients presenting to the CAH between Jan 1, 2010 and June 30, 2011. Eleven facilities submitted re-measurement data. Although members from four of the five PIN peer groups, only peer group 2 submitted a sufficient number of re-measurement cases to evaluate peer group performance improvement.

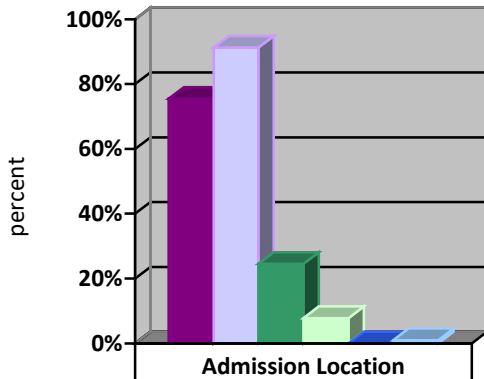
I. Summary of Surviving Sepsis Composite Scale Scores



Overall, 94 % of the patients included in the re-measurement data collection had symptoms consistent with severe sepsis or septic shock, compared with 100 % at baseline.

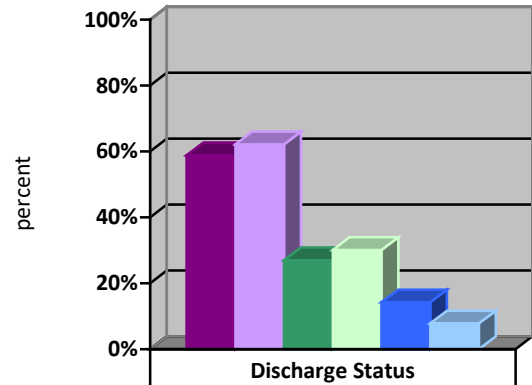
II. 2012 Case Submission Demographics

Admission Location



Admission Location	Percent
ED 2011	75.5%
ED 2012	91.3%
Direct to IP 2011	24.5%
Direct to IP 2012	7.8%
Observation 2011	0.0%
Observation 2012	1.0%

Mortality Rate



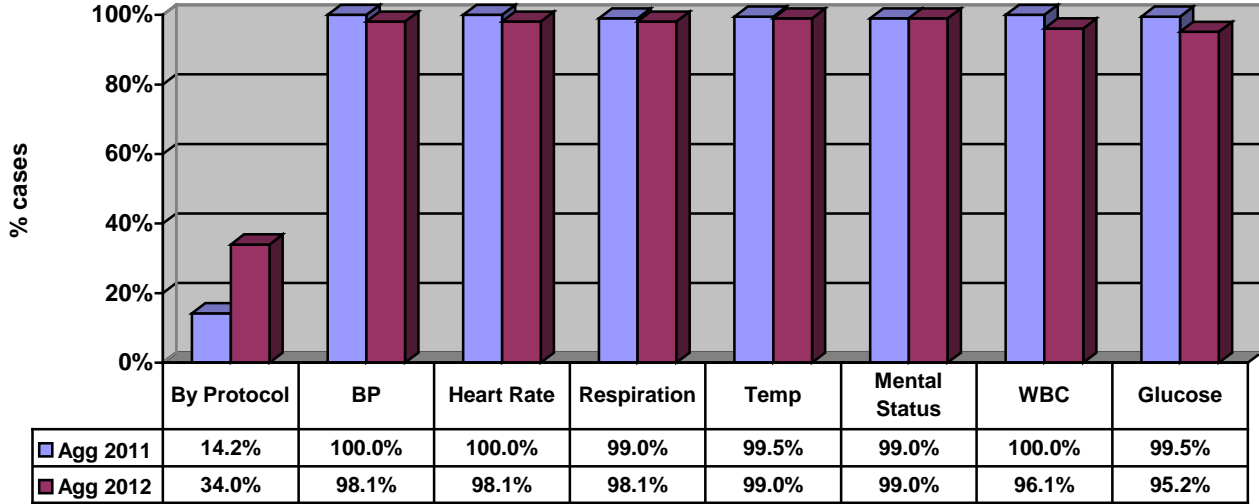
Discharge Status	Percent
Alive 2011	58.8%
Alive 2012	62.1%
Transferred 2011	27.0%
Transferred 2012	30.1%
Deceased 2011	14.2%
Deceased 2012	7.8%

MT CAH Sepsis Patients in 2012

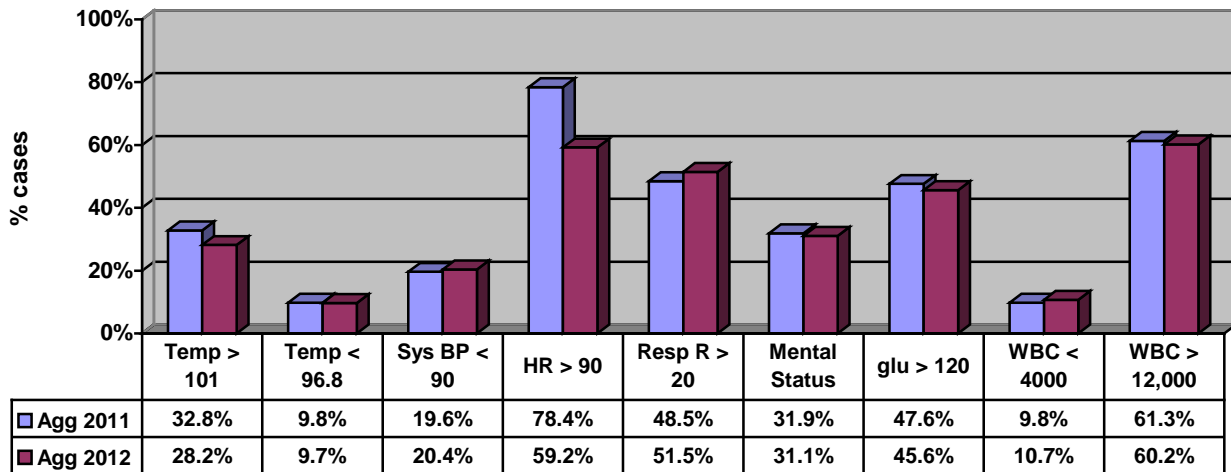
- *Over 90 % of the patients included in the re-measurement data collection presented to the ED, compared with 75% at baseline*
- *Slightly more patients were transferred to a facility offering a higher level of care compared with baseline patients*
- *The 7.8 % observed mortality rate among re-measurement cases is almost one-half of the 14% baseline rate*

III. Initial Assessment

Surviving Sepsis Guidelines for Initial Assessment



Signs and Symptoms Present on Initial Assessment of Participating Baseline Patients

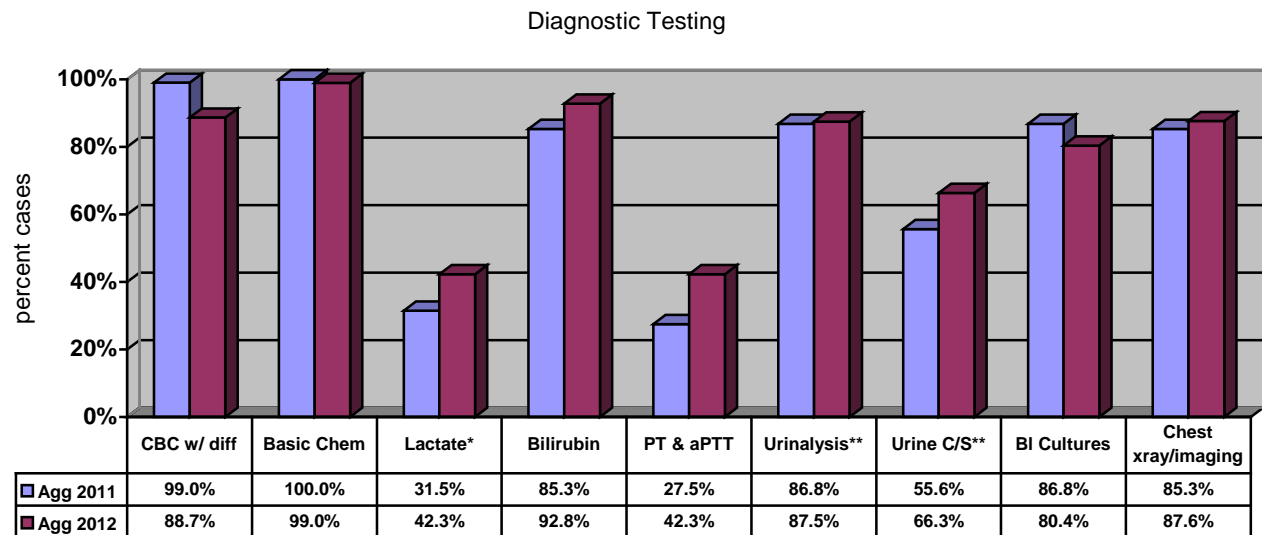


IV. Diagnostic Testing

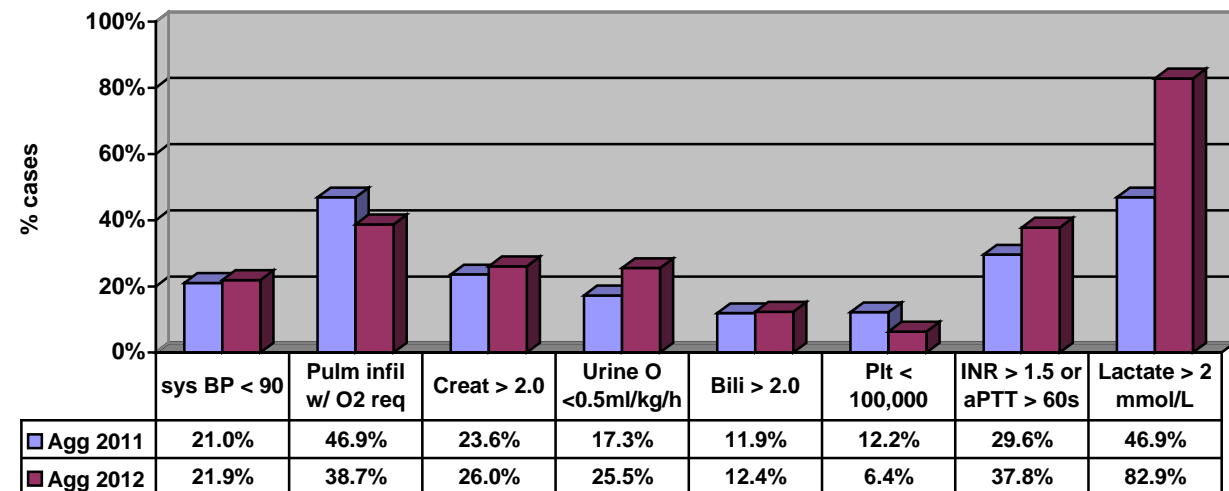
When two or more of the signs and symptoms above identified above are present on initial assessment, the Surviving Sepsis Guidelines recommend the following diagnostic testing be completed immediately. The graph below shows the percentage of CAH patients with two or more of the signs and symptoms on initial assessment receiving the recommended diagnostic testing.

* Note that the results for Lactate* excludes those patients for whom lactate testing is not available at the admitting CAH.

** The results for Urinalysis** and Urine C/S** exclude those patients who did not produce sufficient volume for those tests.



Diagnostic Test Results



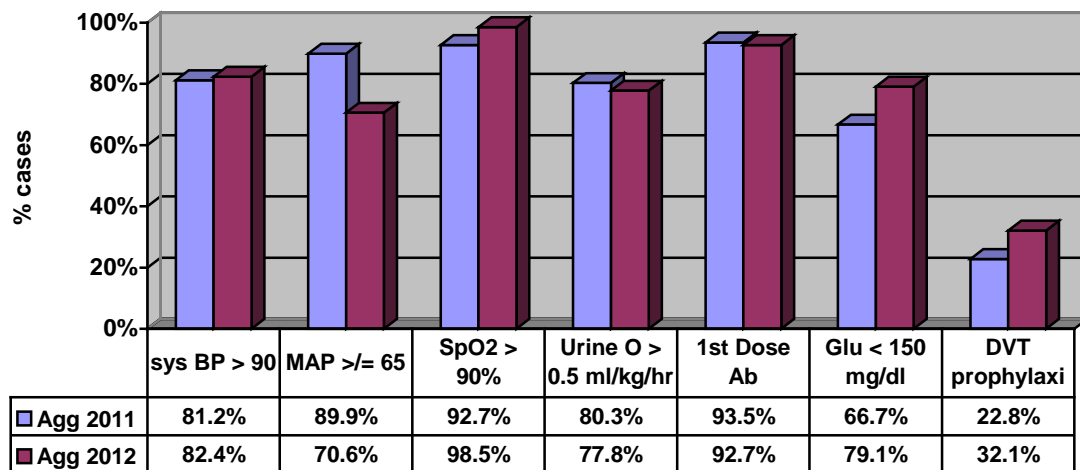
V. Surviving Severe Sepsis 6 hr Resuscitation Goals

When one or more of the above test results indicates the presence of a new infection with hypotension and/or organ involvement, the Surviving Sepsis Campaign Guidelines recommend that the following resuscitation goals be achieved within 6 hours of the patients presentation to the CAH.

The graph below shows the percentage of CAH patients with two or more of the signs and symptoms on initial assessment receiving the recommended diagnostic testing.

* Note that the results for Lactate* excludes those patients for whom lactate testing is not available at the admitting CAH.

** The results for Urinalysis** and Urine C/S** exclude those patients who did not produce sufficient volume for those tests.



VI. Summary of Aggregate Performance

Roughly 20% more patients included in the re-measurement data collection were assessed, diagnosed and treated following a facility-improved sepsis care protocol compared with the baseline. More patients presented and received initial assessment in the emergency room, and participating PIN members appear to have significantly reduced the mortality rate among presenting sepsis patients.

MT CAHs consistently performed at the highest standard in the assessment of patients presenting with possible sepsis/severe sepsis when compared with the guidelines recommended by the *Surviving Sepsis Campaign*. It appears participating CAHs increased lactate, bilirubin and aPPT/PT testing as part of the diagnostic workup.

Participating CAHs appear to have improved achieving the *Campaign's* 6 Hour Resuscitation goals in SpO2 levels, regulating glucose and implementing DVT prophylaxis.

Opportunities remain for additional MT CAHs to develop and implement a sepsis care in protocol, consistently complete all recommended rapid diagnostic testing, particularly in the areas of lactate and liver function, and continuing work to consistently achieve the *Campaign's* 6 Hour Resuscitation Goals, especially use of a calculated mean arterial pressure for monitoring patient status, glucose stabilization and providing DVT prophylaxis for all sepsis patients.

* For more information about the Surviving Sepsis Campaign and/or the published evaluation and treatment guidelines, visit: <http://www.survivingsepsis.com/implement/resources/guidelines> .



Surviving Sepsis Data Tool- Baseline Collection

Use this tool for abstracting medical records for the baseline data collection period,
January – December 2010 cases.

Cases to Include: For facilities with less than or equal to 30 cases throughout 2010: all qualifying cases, including ED, CAH direct admissions, intensive care, observation patients and patients who were transferred, regardless of LOS. For patients admitted to more than one service location during the stay, count the entire episode of care as one case.

For facilities with greater than 30 cases throughout the 2010: abstract a random sample of no more than 30 cases, including ED, CAH direct admissions, intensive care, observation patients and transferred patients, regardless of LOS. For patients admitted to more than one service location during the stay, count the entire episode of care as one case.

ICD 9 Codes: 038.1 – 038.9; 785.52 and 995.91 – 995.92

Cases to Exclude: All newborn and hospice admissions; ambulatory care patients.

Facility Name: _____ Case Number: _____

Facility Contact: _____

1. Date of admission (mm/dd/yy): _____ - _____ - _____

2. Admitted to: _____ ED _____ acute care/inpatient service _____ direct admit to OBS

For patients admitted to more than one service location throughout the stay (eg, ED then acute care), give the first location he/she presented to as this admission location.

3. Length of stay (LOS): _____ equal to or greater than 6 hours from presentation to final discharge
_____ less than 6 hours from presentation to final discharge

4. Discharge Diagnosis _____ ICD 9 code 038.1-038.9; 785.52; 995.91; 995.92
_____ any named bacterial infection with septicemia/sepsis
_____ suspicion of sepsis/septicemia

5. Discharge Status _____ alive _____ transferred _____ deceased



Answer each of the remaining questions using the medical record documentation from the first six (6) hours of the patient's stay, regardless of his/her location within the CAH.

6. Was the initial assessment of this patient conducted using a facility-approved sepsis assessment, guideline or protocol?

_____ Yes _____ No

7. Were the following elements evaluated as part of the provider's initial assessment of the patient?

Initial assessment of this patient included the following elements:	Yes	No
a. blood pressure		
b. heart rate		
c. respiratory rate		
d. temperature		
e. mental status		
f. WBC		
g. glucose		

8. A **suspicion of new infection** is said to exist when the patient has either a history suggesting a new infection OR two or more of the signs/symptoms of a new infection below are identified when the patient first presents to the CAH.

Which of the following signs and symptoms of a new infection were present in the patient's first set of vital signs and diagnostic testing?	Yes	No
a. temperature greater than 101.0° F (38.3 ° C)		
b. temperature less than 96.8 ° F (36.0 ° C)		
c. systolic blood pressure less than 90 mmHg		
d. heart rate greater than 90 beats per minute		
e. respiratory rate greater than 20 breaths per minute		
f. acutely altered mental status		
g. glucose greater than 120 mg/dl in the absence of treated diabetes		
h. WBC less than 4000		
i. WBC greater than 12,000		

9. Did you answer 'yes' to two or more of the signs and symptoms listed above in Table 8?

_____ No (STOP ABSTRACTION; DO NOT SUBMIT THIS CASE; not a qualifying case)

_____ Yes complete the following table

When the patient had two or more signs/symptoms of a new infection (see table 8 above), were the following diagnostic tests completed within 6 hours of the patient's presentation?	Yes	No	Not Available
a. CBC with differential			
b. Basic chemistry panel			
c. Lactic acid (lactate) <i>if your CAH does not do this test, check NA</i>			
d. Bilirubin			
e. PT and aPTT			
f. Urinalysis <i>(mark NA only if ordered but output was not sufficient to collect)</i>			
g. Urine C & S collected <i>(mark NA only if ordered but output not sufficient to collect)</i>			
h. Blood cultures <i>(must have been drawn within 6 hours of arrival and prior to the first antibiotic administration)</i>			
i. Chest x-ray or other imaging studies to confirm the source of infection			

10. For each of the diagnostic criteria listed in the table below, check 'yes' if the patient's **FIRST** test value fell within the range given for that test. Check 'no' if the patient's first test value fell outside of the range given for that test.

If a test or calculation was not performed, answer 'unknown' for that test.

For example, if your CAH does not routinely measure/calculate and document the MAP of sepsis patients, and there are no documented MAP values in the clinical record, check 'unknown'.

If your CAH does routinely measure/calculate and document the MAP of sepsis patients, and there are no documented MAP values in the clinical record, check 'no'.

This patient's diagnostic tests results included....	Yes	No	Unknown
a. Systolic blood pressure less than 90 mmHg			
b. Mean arterial pressure (MAP) less than 65 mmHg <i>(calculation below*)</i>			
c. Pulmonary infiltrates with new or increased O2 requirement to maintain the SpO2 at greater than 90%			
d. Creatinine greater than 2.0 mg/dl			
e. Urine output less than 0.5 ml/kg/hour for greater than 2 hours** <i>(check 'unknown' if volume was QNS to measure, or if the output was collected for UA but not measured & documented)</i>			
f. Bilirubin greater than 2.0 mg/dl			
g. Platelet count less than 100,000 when there is no prior diagnosis of cirrhosis			
h. INR greater than 1.5 <u>OR</u> aPTT greater than 60 seconds when the patient has not been on coumadin (warfarin) or heparin			
i. Lactic acid (lactate) greater than 2 mmol/L(18.0 mg/dl)			

* **Mean Arterial Pressure Calculation:** $MAP = [(2 \times \text{diastolic}) + \text{systolic}] / 3$

MAP Calculation reference website: <http://www.globalrph.com/map.cgi>

** **Urine Output Calculation:** (total output in ml/patient weight in kg)/# hours in the collection



11. Did you answer 'yes' to one or more diagnostic criteria in Table 10 above?

___ No (STOP ABSTRACTION; submit this case)

___ Yes: answer question 12

12. If you answered 'yes' to question 11 above, were the following sepsis resuscitation goals met **within 6 hours of the patient's arrival?**

** Check 'Unknown' if the patient was transferred or expired prior to achieving the goal, or if there is no documentation indicating that the testing/calculations used to measure progress toward the goal were performed while resuscitating the patient.*

<i>For this patient, were the following sepsis resuscitation goals achieved <u>within 6 hours</u> of patient presentation?</i>	Yes	No	Unknown
a. Systolic blood pressure greater than 90 mmHg			
b. Mean arterial pressure (MAP) greater than or equal to 65 mm Hg			
c. SpO2 greater than 90%			
d. Urine output greater than or equal to 0.5 ml/kg/hour <i>(check 'no' if volume was QNS to measure; check 'unknown' if the output was not measured & documented)</i>			
e. First dose of antibiotic administered			
f (1). Glucose greater than the lower limit of facility's normal range & with a median value less than 150 mg/dl achieved within 6 hr*			
f (2) The patient a known diabetic			
g. Low dose heparin , compression hose or sequential compression devices for DVT prophylaxis initiated			

* Mean Arterial Pressure Calculation: $MAP = [(2 \times \text{diastolic}) + \text{systolic}] / 3$

MAP Calculation reference website: <http://www.globalrph.com/map.cgi>

[Submit this case using the web page, by mail, or email no later than Sept 30, 2011.](#)

Submit no more than 30 total cases for all of 2010

Contact for questions:

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Note: This study has been developed using the *Surviving Sepsis Campaign International Guidelines for Management of Severe Sepsis and Septic Shock: 2008*; and IHI, 2005.