Adventist Health System Systematic Sepsis Improvement Process Scale and Spread Initiative (SIPSSI)

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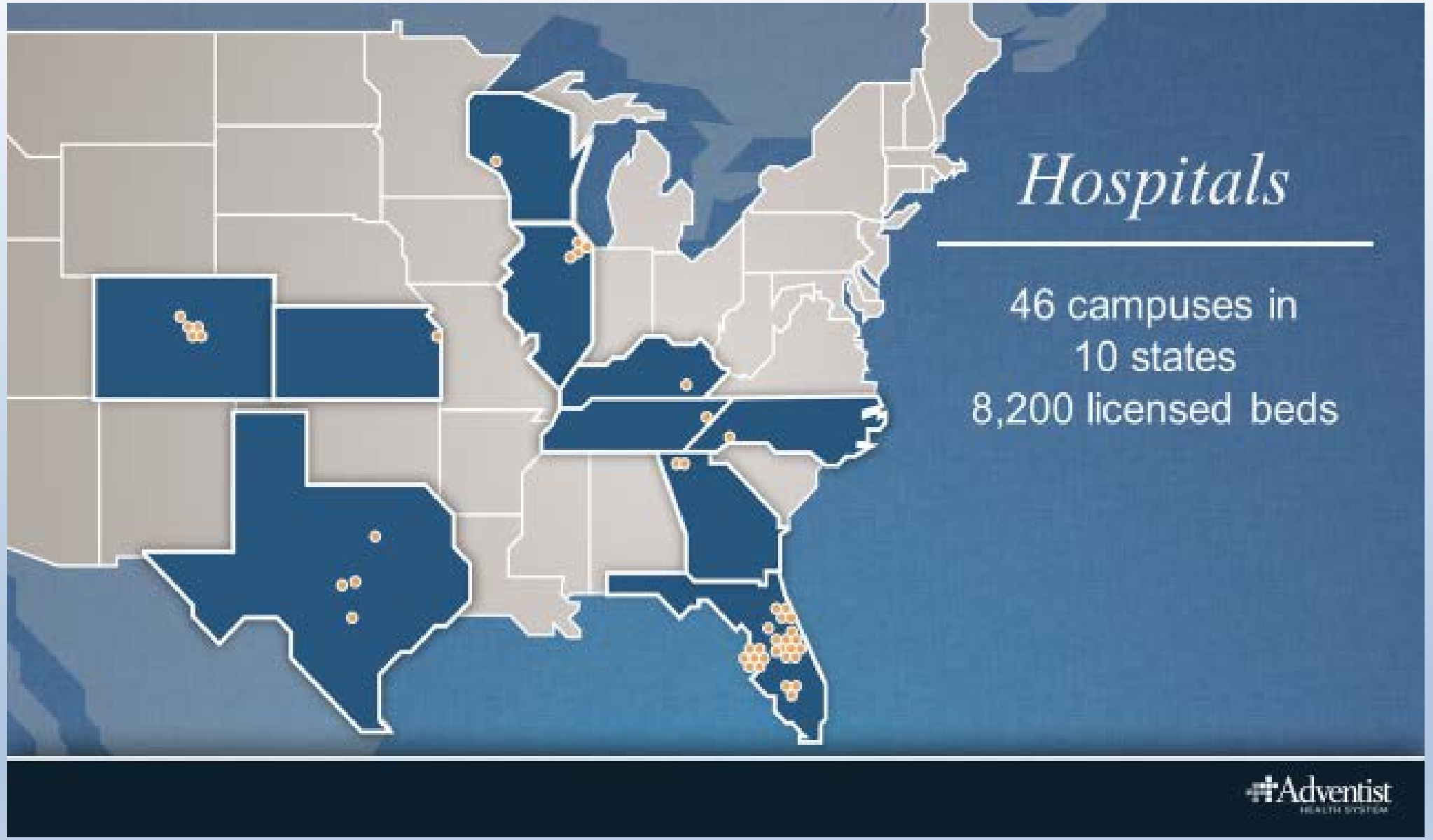
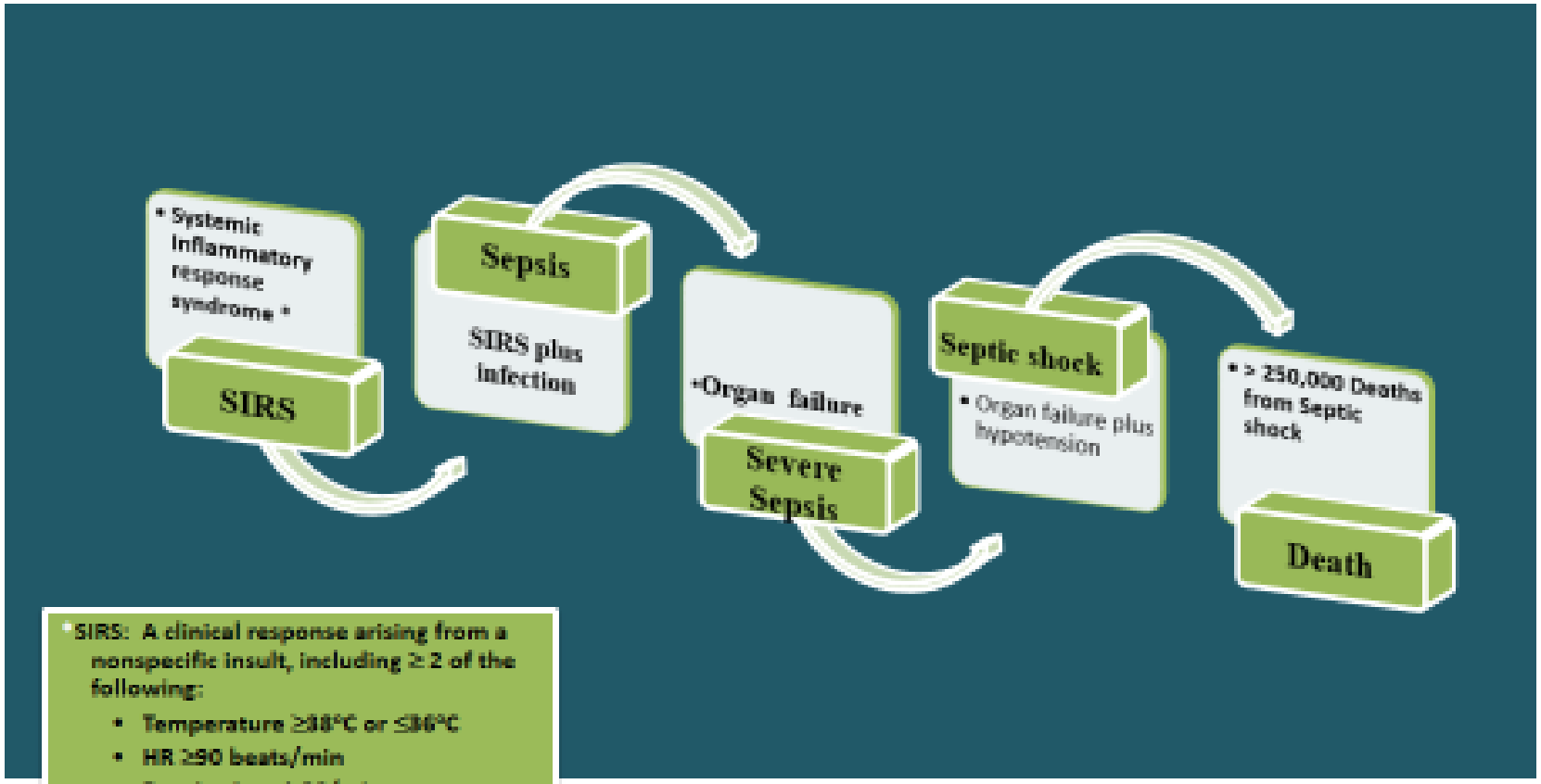
Adventist Health System

Office of Clinical Effectiveness


Hospitals
46 campuses in
10 states
8,200 licensed beds
Adventist
HEALTH SYSTEM

Sepsis: Defining a Disease Continuum



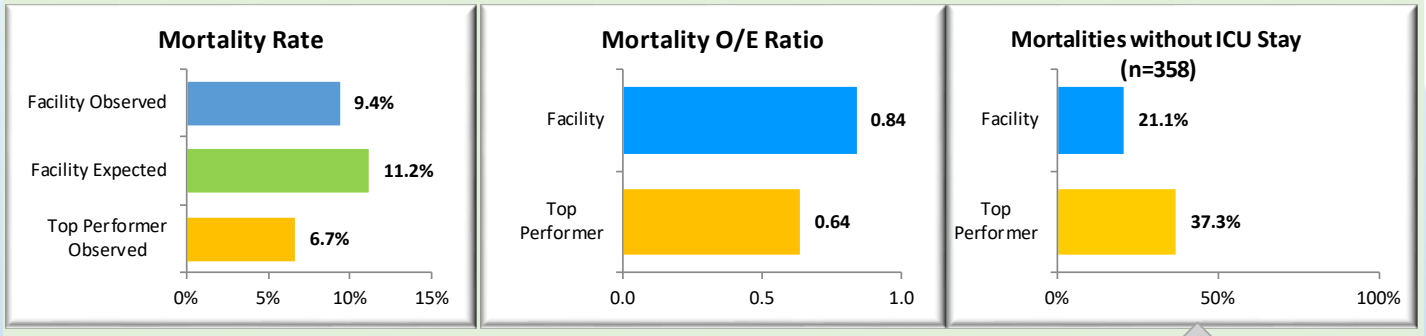
*SIRS: A clinical response arising from a nonspecific insult, including ≥ 2 of the following:

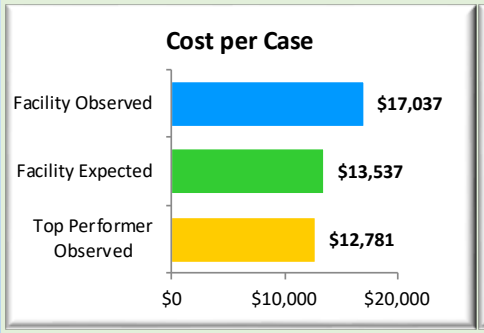
- Temperature ≥38°C or ≤36°C
- HR ≥90 beats/min
- Respirations ≥20/min
- Elevated WBC count

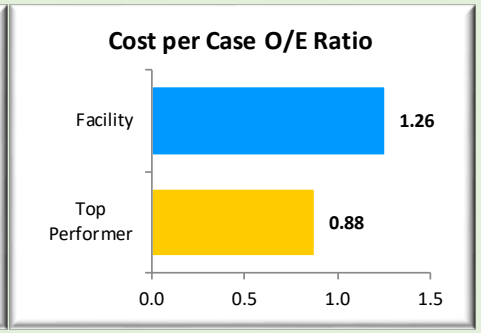
Key Indicator Overview Primary Sepsis

The vast majority of Primary Sepsis patients come into the hospital through the Emergency Department.

Primary Sepsis (n=18,037cases)

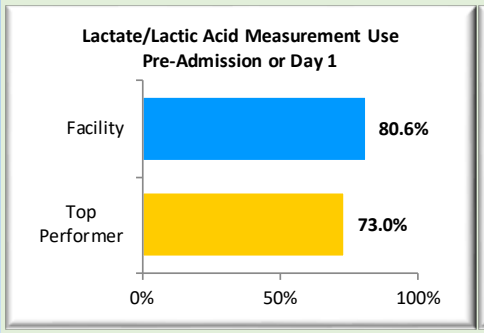


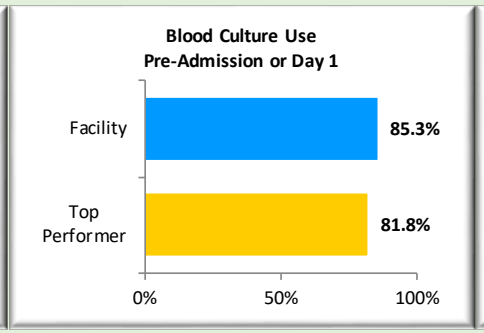


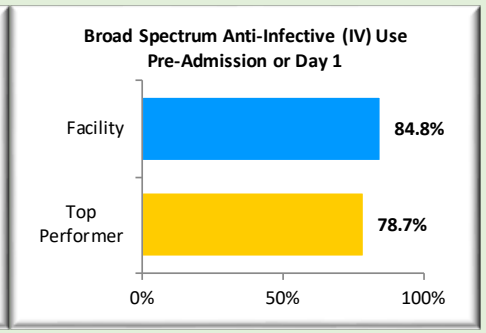


A high rate of "Mortalities without ICU Stay" indicates that gaps may exist in early identification and treatment. DNR status may impact mortality rates and level of care

High rates of Lactate Measurement, as well as Blood Culture and Broad Spectrum Anti-Infective use during pre-admission or Day 1 of stay are proxy measures indicating use of early goal-directed therapy.





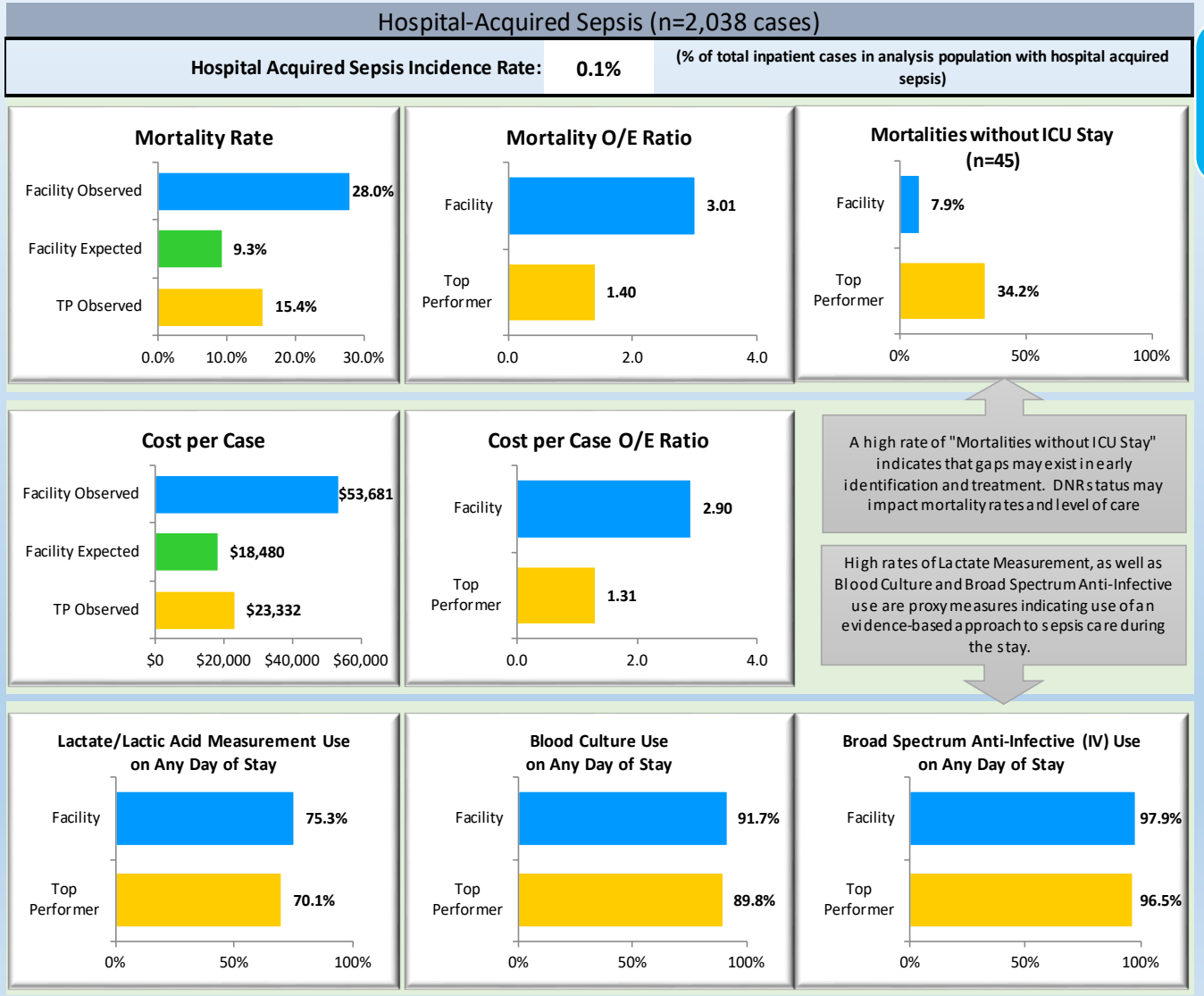


Primary Sepsis: Diagnosis code of septicemia with POA flag of "Yes"

- "Mortalities without ICU Stay" measure is useful in determining whether gaps may exist in transitioning patients to the appropriate level of care.
- Use of 3-hour sepsis bundle elements **on pre-admission or day 1** of stay are provided as proxy measures for use of early, goal-directed therapy

Key Indicator Overview Hospital-Acquired Sepsis

Patients with Hospital-Acquired Sepsis are typically admitted to the hospital for medical treatment unrelated to sepsis and acquire it at some point during their stay.



Hospital-Acquired Sepsis: Diagnosis code of septicemia with a POA flag of "No"

- Use of 3-hour sepsis bundle elements **on any day of stay** are proxy measures indicating use of an evidence-based approach to sepsis care

SSC Bundles

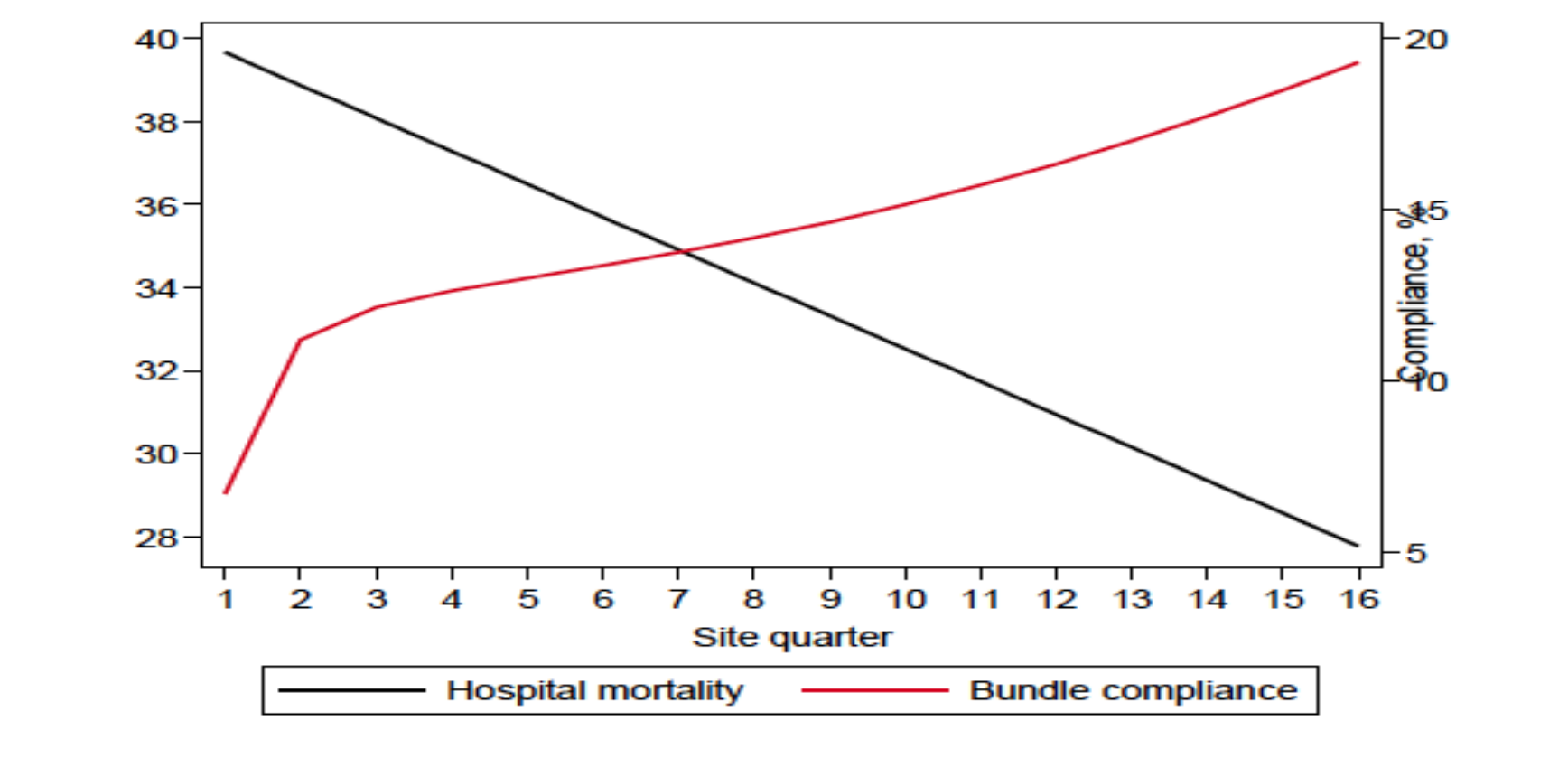
Three-hour Resuscitation Bundle was initiated if screen is positive or clinician suspects:

- Measure Lactate Level
- Obtain Blood Cultures Prior to Administration of Antibiotics
- Administer Broad Spectrum Antibiotics
- Administer 30 mL/kg Crystalloid for Hypotension or Lactate ≥4 mmol/L

Six-hour Septic Shock Bundle was initiated if hypotension developed or lactate increased after three-hour bundle:

- Apply Vasopressors (for Hypotension That Does Not Respond to Initial Fluid Resuscitation to Maintain a Mean Arterial Pressure (MAP) ≥65 mm Hg)
- In the Event of Persistent Arterial Hypotension Despite Volume Resuscitation (Septic Shock) or Initial Lactate ≥4 mmol/L (36 mg/dL):
  - Measure Central Venous Pressure (CVP)
  - Measure Central Venous Oxygen Saturation (ScvO2)
- Re-measure Lactate If Initial Lactate Was Elevated

Mortality in HIGH COMPLIANCE Sites with at least 48 months of data collection



<u>↓Mortality</u>: 42.9% to 26.2%

ARR: 16.7% P < 0.001

<u>RRR: 39%</u>

Source:Surviving Sepsis Campaign Database

Sepsis on the Floors Collaborative

- Collaboration between the Society of Critical Care Medicine and the Society of Hospital Medicine
- 17 faculty – Teams included intensivist, RN, hospitalist, improvement advisor, and project management
- 63 hospitals overall nation-wide participated
  - Academic medical centers
  - Teaching hospitals
  - Community hospitals
- 4 regional collaboratives with dedicated faculty
  - East Coast
  - West Coast
  - Midwest
  - Adventist Health System – 10 hospitals participating

Sepsis Collaborative Measures

Outcome measures:

- Mortality due to severe sepsis or septic shock
- ALOS for patients with sepsis

Process measures:

- Percentage of patients screened for sepsis at a designated interval
- Percentage of patients who screened positive for sepsis on the wards and are bundle eligible
- Percentage of time the 3-hour bundle is implemented for patients who screen positive and are bundle eligible

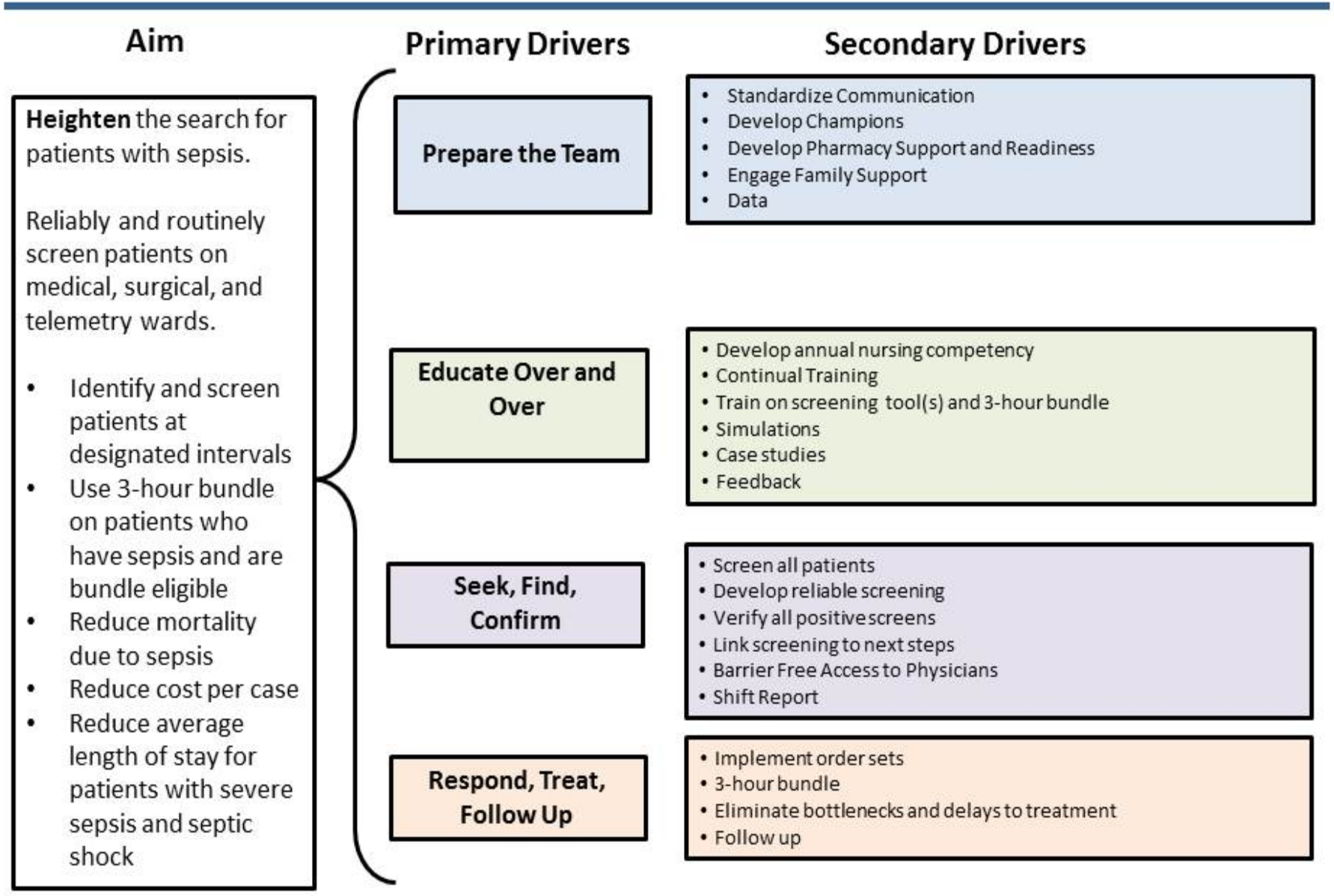
Balancing measures:

- Costs per case for patients discharges who experienced sepsis or septic shock

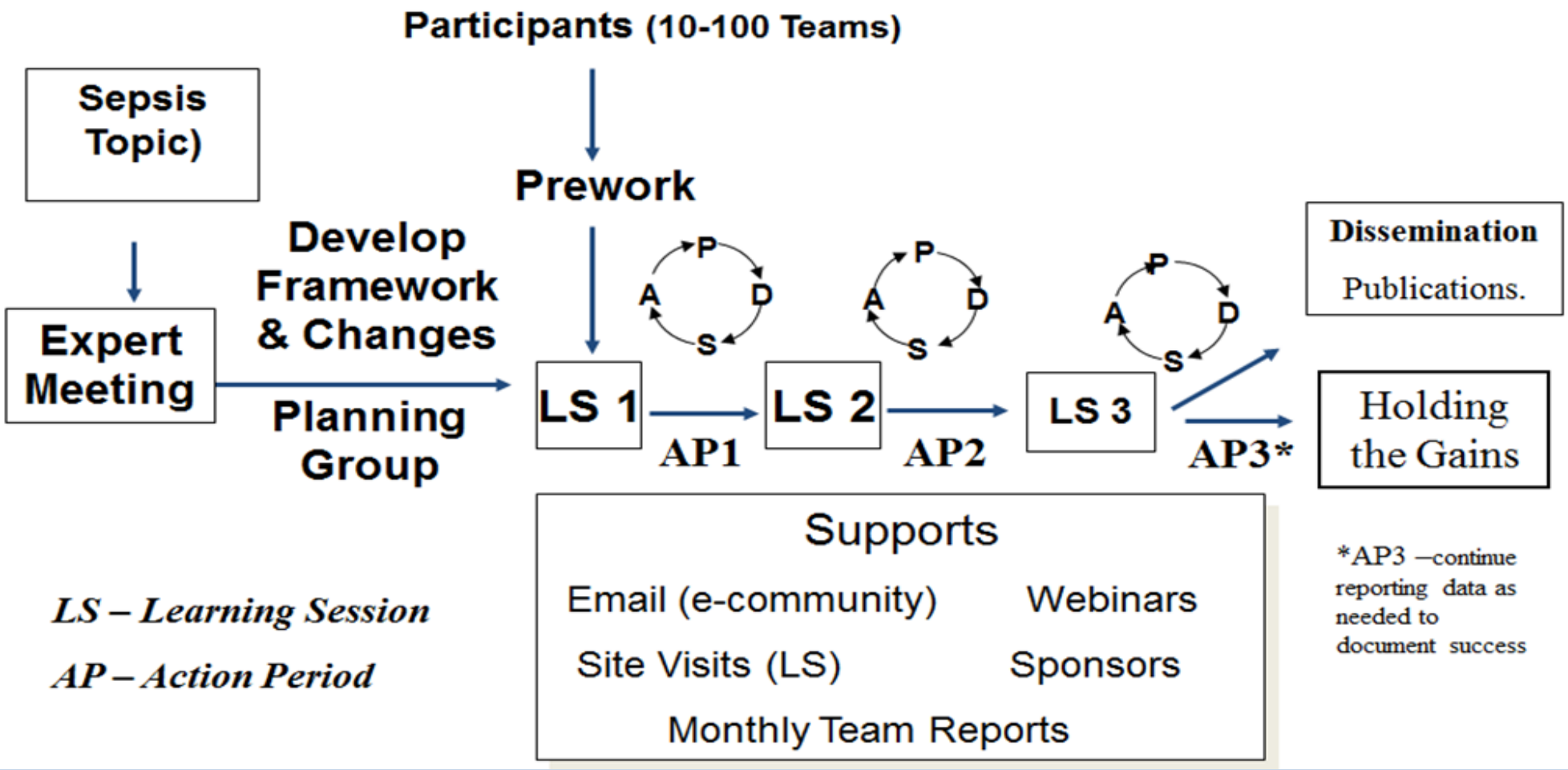
Benefits of the Collaborative Model

- Nationally recognized, expert faculty created change package ideas organized by primary and secondary drivers
- Set clear aim statement and objectives
- Provided structured learning and inquiry environment
  - Pre-set milestones
- Collaborative model provided:
  - Education
  - Tools
  - Opportunity to query, compare experiences/challenges, share and learn from one another
- Sense of community - breaking new, *important* ground together
- Recognition that there was not just one solution
- Data collection and comparison to aggregate

Surviving Sepsis Campaign Collaborative Driver Diagram



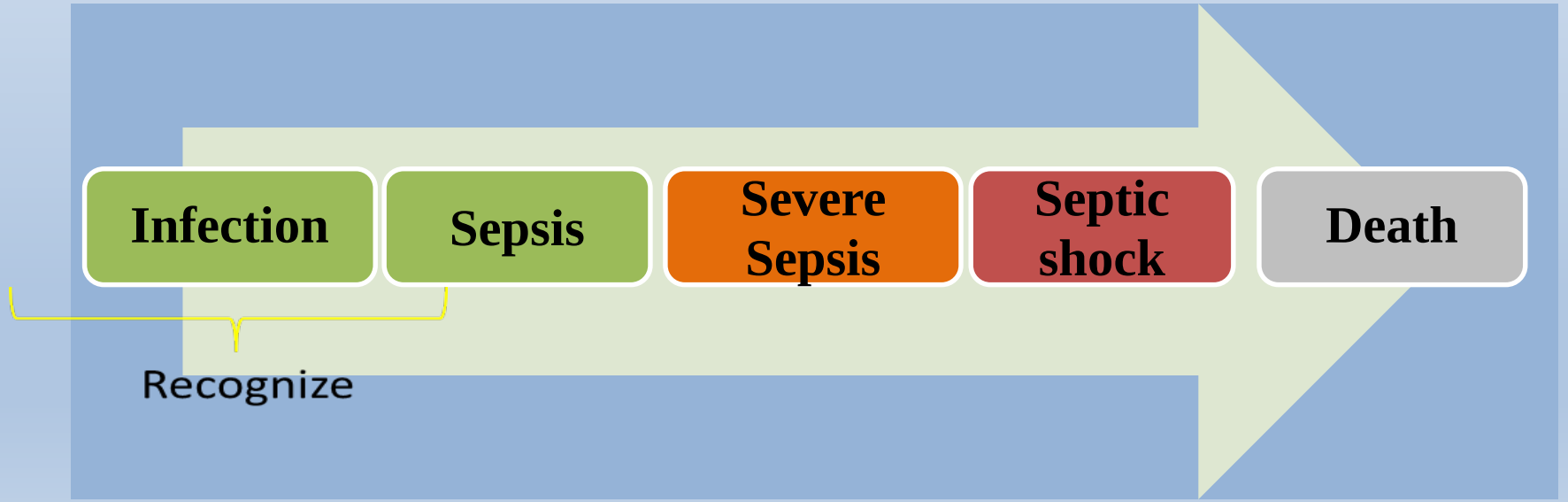
IHI Breakthrough Series
Adapted for Sepsis Collaborative Phase 4
(18 Months Time Frame)



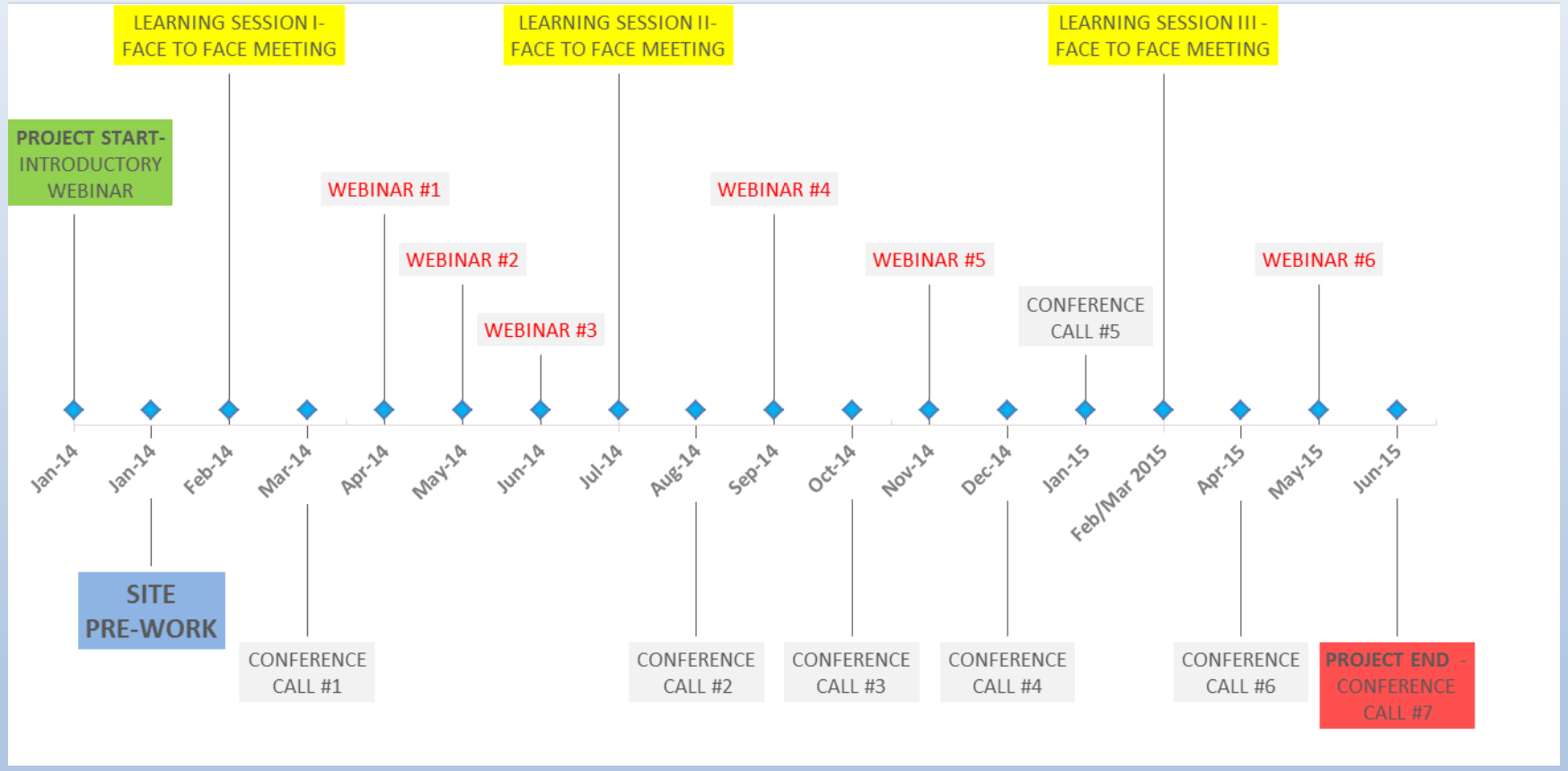
Strategies of Sepsis Initiative

1. Move **Recognize** to the left.
2. Decrease the time between **Recognize** and **Respond**
3. Improve and standardize **Rescue** of the patient.

Early detection, timeliness, competency of clinical response



Collaborative Schedule



The Collaborative extended to September for two months of additional data collection.

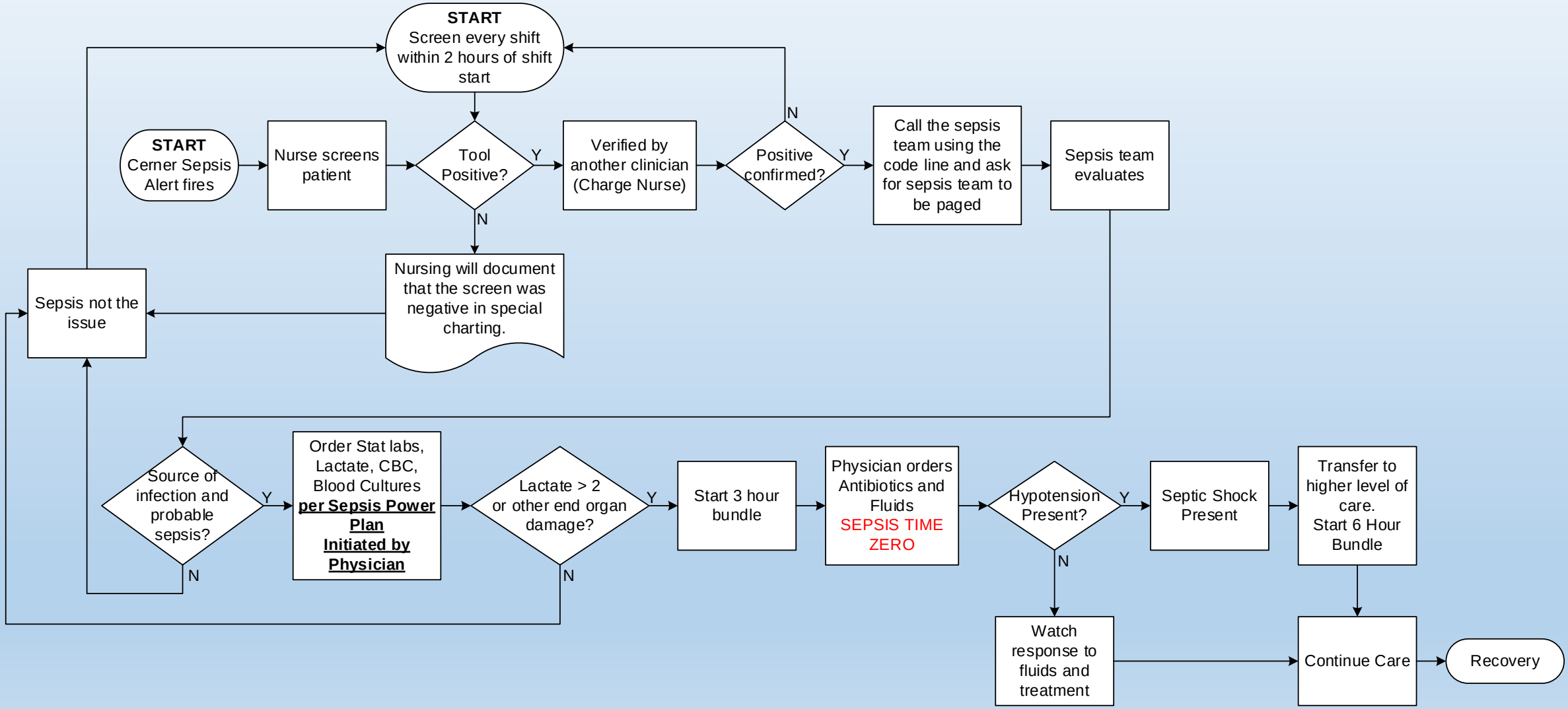
What AHSS did to scale lessons

- Physician driven collaborative from the corporate office
- Each facility designated physician champion
- Each facility designated sepsis leader
- Ten hospitals included in the SCCM study
- All efforts duplicated in a mirror study with the other 34 hospitals
- Used a paper screening tool developed by SCCM
- Screened twice a day, every day, every patient
- On site conferences every 6 months for 18 months
- Quarterly review of data

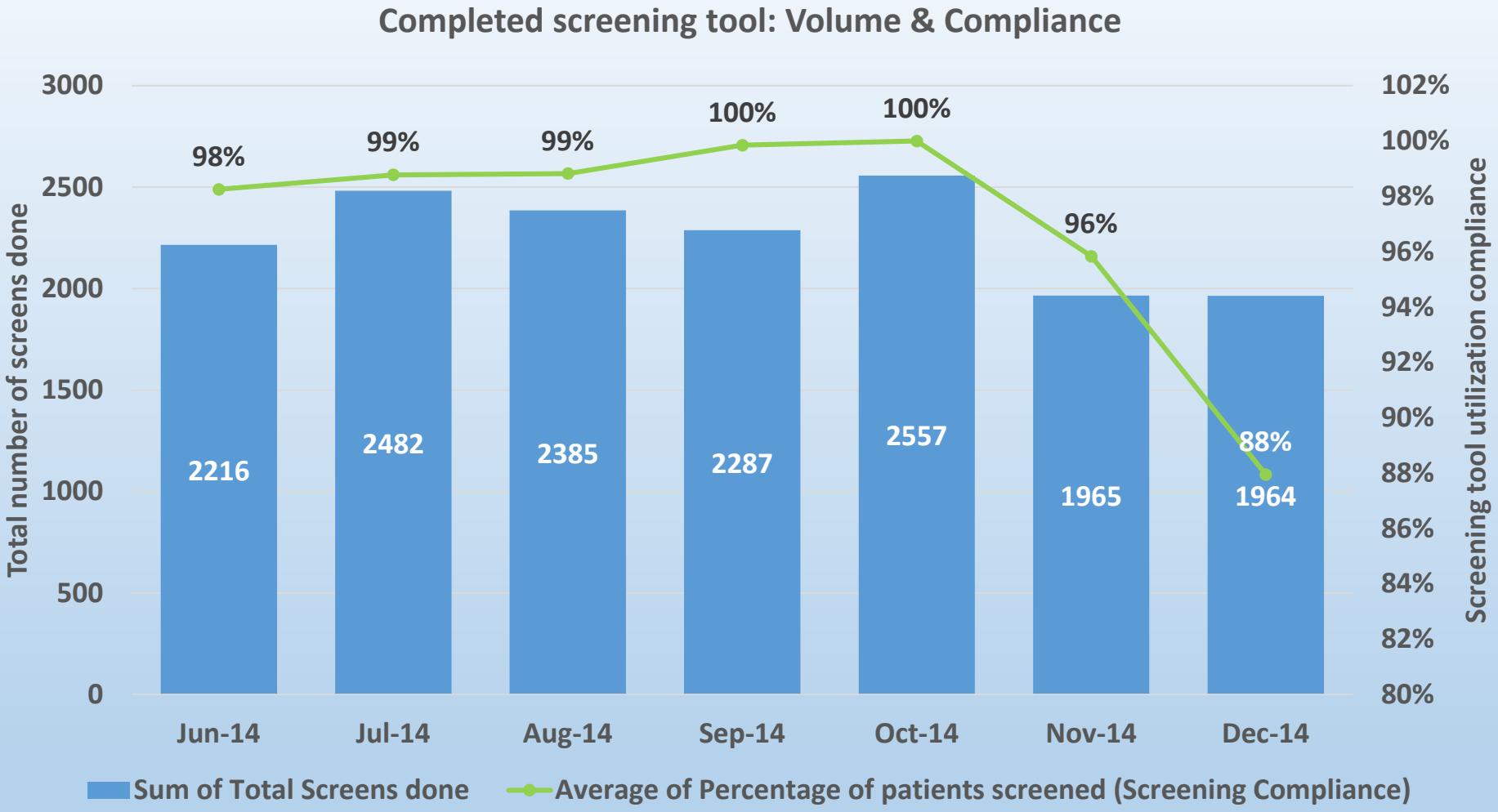
Shadow Collaborative

- After six months, AHSS launched “shadow” collaborative to spread system-wide
- 36 hospitals were smaller community facilities
- Located primarily in East (Florida), Midwest and West
- Scaled and spread learnings/lessons through staff involved in primary collaborative, whom served as faculty
- Data from the shadow collaborative was placed in the SCCM data base for reporting purposes but not used in publications

Work Flow – Identification and Treatment



Screening tool utilization compliance



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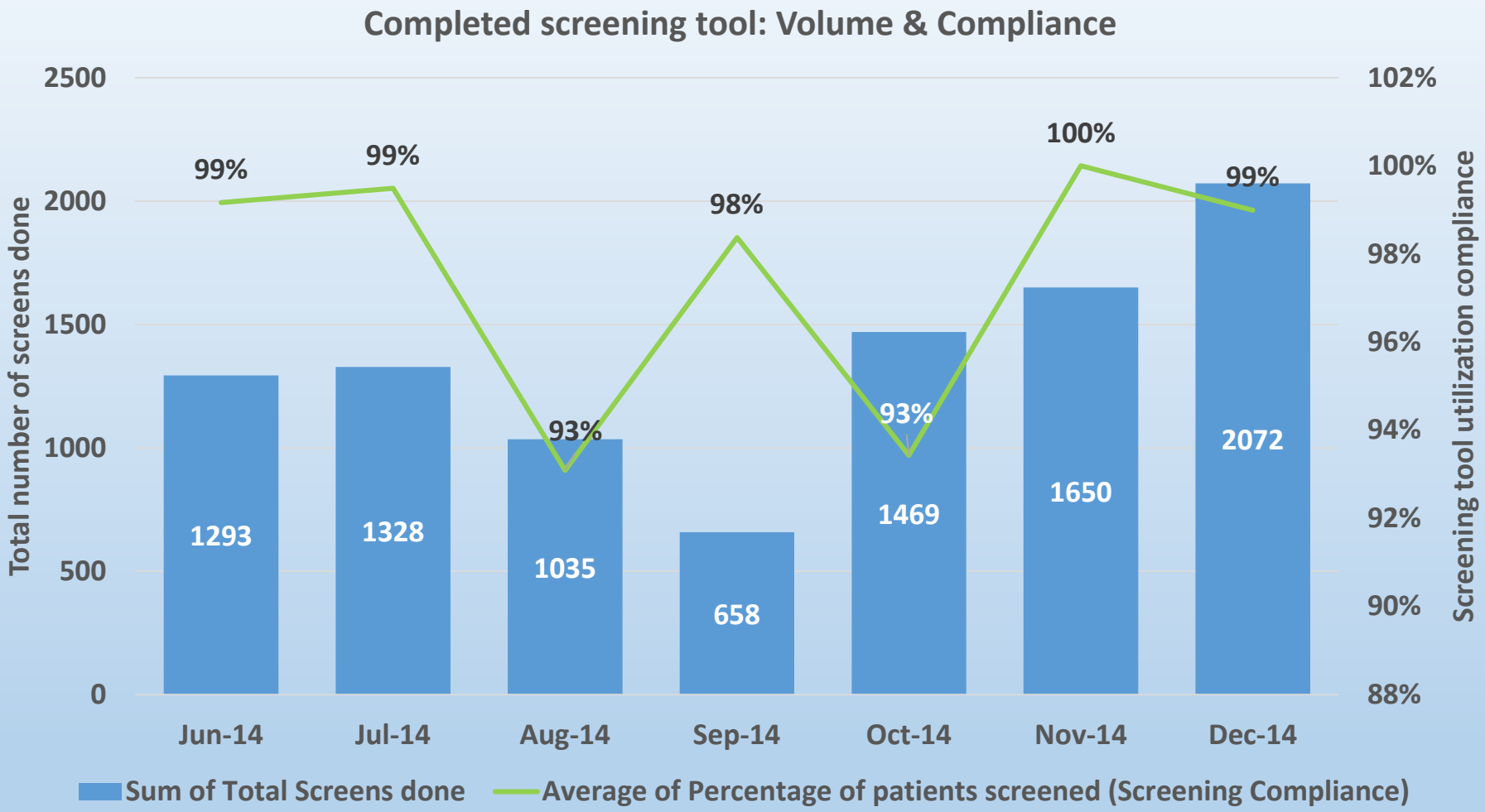


Case Study: CVPCU

- Nurses on Cardio Vascular Progressive Care Unit had sepsis recognition training and screened patients as soon as the sepsis alert fired.
- After 14 months the nursing staff has become so aware of the early signs of sepsis they routinely recognize and screen for sepsis before the alert fires.
- One patient, a 54-year-old male post op AAA had a minor temperature elevation and was slightly lethargic. He had a screen, evaluation by the Rapid Response Team and the three hour bundle started before the alert fired. He lived.

Case Study: Behavioral Health

- Forty-seven year-old female admitted to inpatient Behavioral Health unit for depression.
- On morning of second day of stay, was still in bed in the afternoon
- Nurse entered room to encourage her to get up and try to eat
- Nurse had been through sepsis training the week before
- The patient appeared to have an altered level of consciousness that couldn’t be explained by diagnosis or prescribed drugs. This was a new onset of altered mental status.
- Nurse considered sepsis, did a screen and it was positive.
- Patient was admitted to ICU, had infection in bowel, received the bundle and survived.

Quotes

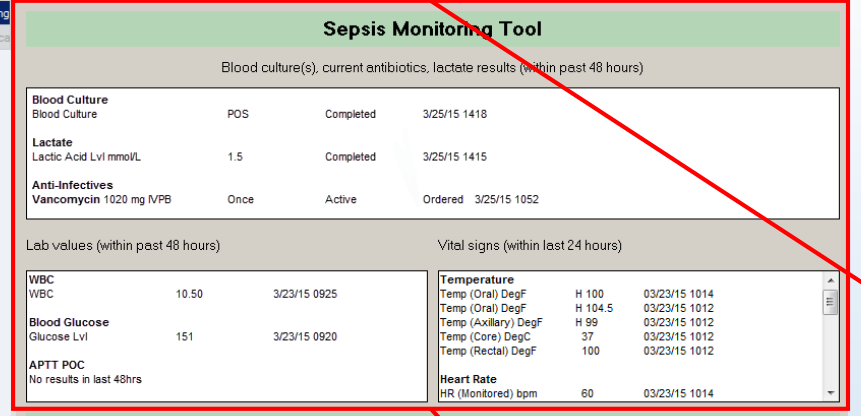
- “Patients are being consistently recognized in early sepsis.”
- “Fewer of the septic patients need ICU care.”
- “We know we have decreased mortality related to sepsis.”
- “This has truly changed me as a nurse and I’ve been an RN for 18 years.”
- “A preliminary review of Code Blue patients reveals a decrease in codes as a result of sepsis.”
- “Our nurses assess their patients with more scrutiny about sepsis.”

Adventist Health System Results

- A total of 217 patients were entered into the SCCM database
- These patients had severe sepsis or shock, not present on admission
- Sixty three percent of the patients received all the bundle elements
- Compliance with the bundle increased 9% a month
- 93% of the patients were detected in severe sepsis, not septic shock
- The AHS pre-collaborative mortality rate was 36-38% (coded data)
- The AHS post-collaborative mortality rate was 17.5% (on collaborative units)
- The odds of death from severe sepsis decreased 6% a month

Lessons Learned

- Wide practice variations once sepsis is suspected
- Post sepsis huddles were helpful
- Need to share data universally
- Did not remember to obtain second lactate without reminder
- SBAR for discussion on fluid bolus streamlined this discussion
- CBL for physicians was well received
- Include ancillary staff – nurse techs, RTs in sepsis education
- Review protocols and standing physician orders for current practice



Sepsis Monitoring
Other Communica

Sepsis Monitoring Tool

Blood culture(s), current antibiotics, lactate results (within past 48 hours)

Blood Culture			
Blood Culture	POS	Completed	3/25/15 1418
Lactate			
Lactic Acid Lvl mmol/L	1.5	Completed	3/25/15 1415
Anti-Infectives			
Vancomycin 1020 mg IVPB	Once	Active	Ordered 3/25/15 1052

Lab values (within past 48 hours)

WBC		
WBC	10.50	3/23/15 0925
Blood Glucose		
Glucose Lvl	151	3/23/15 0920
APTT POC		
No results in last 48hrs		

Vital signs (within last 24 hours)

Temperature		
Temp (Oral) DegF	H 100	03/23/15 1014
Temp (Oral) DegF	H 104.5	03/23/15 1012
Temp (Axillary) DegF	H 99	03/23/15 1012
Temp (Core) DegC	37	03/23/15 1012
Temp (Rectal) DegF	100	03/23/15 1012
Heart Rate		
HR (Monitored) bpm	60	03/23/15 1014

A. SIRS (Systemic Inflammatory Response Syndrome)

Does the patient meet any of the following SIRS criteria?

If TWO or MORE boxes are checked in this section, you will be required to continue to section B

- ☐ Does not meet any of the listed criteria
- ☐ Temp greater than 100.4F (38C) or less than 96.8F (36C)
- ☐ Heart rate greater than 96
- ☐ Respiratory rate greater than 22 or PaCO2 less than 32
- ☐ WBC less than 4000, greater than 12000 or greater 10% bands
- ☐ Acute change in level of consciousness
- ☐ Glucose greater than 140 and non-diabetic

B. Infection/Potential Infection Criteria

Are any of the following conditions present?

If ONE or MORE conditions are present, the patient may have sepsis, notify charge RN to verify. If validated, call Dr. for the following orders to assess for severe sepsis (lactic acid level, HMGPD, CMP, PT/INR, blood cultures) and proceed to section C

DOCUMENTED, SUSPECTED, OR NEW:
Examples can include but not limted to: pneumonia, UTI, meningitis, endocarditis, immunosuppressed (chemo, post transplant), recent surgery/procedure, abdominal pain/infection, implantable device or infection (blood stream catheter, skin, bone, wound)

ANTI-INFECTIVE THERAPY:
Receiving antibiotics, antifungal or other anti-infective therapy (non-prophylaxis)

- ○ No at risk condition or anti-infective therapies identified
- ○ Yes, at risk condition or anti-infective therapy identified

C. Acute Organ Dysfunction Criteria

Are any of the following criteria indicating possible, new or advancing organ dysfunction present?

Only document NEW or CHANGE from baseline - not expected values, chronic conditions, or condition related i.e. Coumadin therapy, Chemo, Hepatic or Renal disease

If the patient screens POSITIVE for SEVERE SEPSIS and NOT in ICU, notify Rapid Response Team and/or Physician

- ☐ Does NOT meet any of the listed criteria - Negative Screen
- ☐ INR greater than 1.5
- ☐ APTT greater than 60 seconds
- ☐ SBP decrease greater than 40mmHg from baseline
- ☐ SBP less than 90 or MAP less than 65
- ☐ SPO2 less than 90% with new or increased oxygen needs
- ☐ Platelets less than 100,000
- ☐ Bilirubin greater than 2mg/dL
- ☐ AST greater than 90
- ☐ ALT greater than 90
- ☐ Lactate greater than 2mmol/L
- ☐ Creatinine greater than 2mg/dL
- ☐ Creatinine increase greater than 0.5 mg/dL from baseline
- ☐ Urine output less than 30 mL x 2 hours

Rapid Response Team Contacted?

- ☐ Yes - Called or paged rapid response team
- ☐ No - Currently in ICU
- ☐ No - Provider at bedside (Physician, PA, or ARNP)
- ☐ No - Positive sepsis in ED, treatment begun w/in last 8 hrs

Provider Contacted?

- ○ Yes - Called or paged provider
- ○ No

Reason Provider Not Contacted

Sepsis Monitoring Tool

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Sepsis Monitoring
Other Communica

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ANTI-INFECTIVE THERAPY:
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Sepsis Monitoring
Other Communica

Sepsis Monitoring Tool

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Only document NEW or CHANGE from baseline - not expected values, chronic conditions, or condition related i.e. Coumadin therapy, Chemo, Hepatic or Renal disease

If the patient screens POSITIVE for SEVERE SEPSIS and NOT in ICU, notify Rapid Response Team and/or Physician

- ☐ Does NOT meet any of the listed criteria - Negative Screen
- ☐ INR greater than 1.5
- ☐ APTT greater than 60 seconds
- ☐ SBP decrease greater than 40mmHg from baseline
- ☐ SBP less than 90 or MAP less than 65
- ☐ SPO2 less than 90% with new or increased oxygen needs
- ☐ Platelets less than 100,000
- ☐ Bilirubin greater than 2mg/dL
- ☐ AST greater than 90
- ☐ ALT greater than 90
- ☐ Lactate greater than 2mmol/L
- ☐ Creatinine greater than 2mg/dL
- ☐ Creatinine increase greater than 0.5 mg/dL from baseline
- ☐ Urine output less than 30 mL x 2 hours

Rapid Response Team Contacted?

- ☐ Yes - Called or paged rapid response team
- ☐ No - Currently in ICU
- ☐ No - Provider at bedside (Physician, PA, or ARNP)
- ☐ No - Positive sepsis in ED, treatment begun w/in last 8 hrs

Provider Contacted?

- ○ Yes - Called or paged provider
- ○ No

Reason Provider Not Contacted

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Provider Contacted?

- ○ Yes - Called or paged provider
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Reason Provider Not Contacted

Sepsis Monitoring Tool Quality Audit Report

		Alert	SIRS Criteria Met	At risk medical Conditions	Organ Dysfunction Criteria	Provider Contacted
07/08/2016 01:30:00 AM	Patient #1	Yes	Heart rate greater than 90, WBC less than 4000, greater than 12000 or greater 10% bands	No at risk condition or anti-infective therapies identified		
07/07/2016 07:00:00 PM	Patient #2	Yes	Heart rate greater than 90, Respiratory rate greater than 20 or PaCO2 less than 32, Glucose greater than 140 and non-diabetic	Yes, at risk condition or anti-infective therapy identified	Does not meet criteria for severe sepsis-Negative Screen	
07/08/2016 06:43:00 AM	Patient #3	Yes	Temp greater than 101F (38.3C) or less than 96.8F (36C), WBC less than 4000, greater than 12000 or greater 10% bands	Yes, at risk condition or anti-infective therapy identified	**Section C incomplete**	
07/08/2016 07:04:00 AM	Patient #4	No	Only one SIRS Criteria Chosen	**Section B incomplete**		
07/07/2016 06:19:00 PM	Patient #5	Yes	Heart rate greater than 90, Respiratory rate greater than 20 or PaCO2 less than 32, WBC less than 4000, greater than 12000 or greater 10% bands	Yes, at risk condition or anti-infective therapy identified	SPO2 less than 90% with new or increased oxygen needs	Yes - Called or paged provider

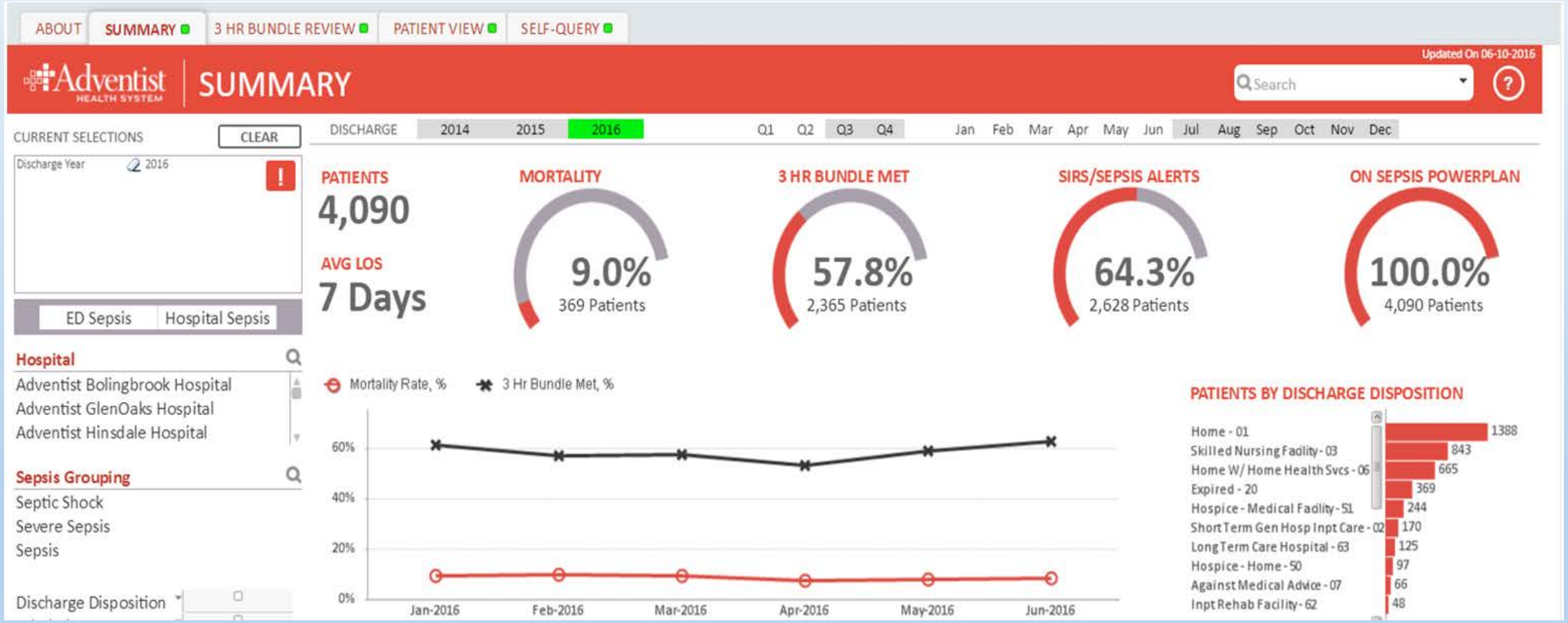
Sepsis Alert Spread Plan Adoption Report

	Patients w/Alert Count	Total Patients w/Sepsis Coding	% of Patients w/Alerts & Sepsis Coding	Septic shock - R65.21	Severe Sepsis - R65.20	Sepsis	Overall Expired	Expired w/Sepsis Dx	Total Patients w/form	% of Patients w/Alerts & Form	Expired Pts w/form	Patients w/PP	Expired pts w/PP	Median LOS	Discharge Month
Hospital A	133	43	32.33%	15	1	27	14	8	32	24.06%	6	39	5	4.44	Jan 2016
Hospital B	190	52	27.37%	7	6	39	12	3	100	52.63%	2	47	5	4.95	Jan 2016
Hospital C	162	46	28.40%	7	1	38	7	3	78	48.15%	1	26	0	5.44	Jan 2016
Hospital D	185	56	30.27%	13	13	30	17	7	133	71.89%	6	59	5	4.70	Jan 2016
Hospital E	107	31	28.97%	7	5	19	3	2	1	0.93%	0	40	1	3.64	Jan 2016
Hospital F	342	92	26.90%	27	25	40	37	23	312	91.23%	23	42	3	6.09	Jan 2016
Hospital G	239	83	34.73%	22	12	49	14	12	0	0.00%	0	65	8	5.22	Jan 2016
Hospital H	263	58	22.05%	18	3	37	17	11	107	40.68%	4	64	4	4.92	Jan 2016
Hospital I	211	83	39.34%	18	15	50	21	16	81	38.39%	5	49	10	4.35	Jan 2016
Hospital J	239	80	33.47%	10	18	52	12	6	115	48.12%	8	64	3	4.78	Jan 2016
Hospital K	146	32	21.92%	8	4	20	12	6	93	63.70%	6	30	2	4.93	Jan 2016
Hospital A	144	33	22.92%	9	6	18	14	8	142	98.61%	13	49	6	4.52	Feb 2016
Hospital B	182	52	28.57%	3	11	38	10	6	100	54.95%	3	48	6	4.66	Feb 2016
Hospital C	163	53	32.52%	12	4	37	9	5	153	93.87%	6	39	0	5.80	Feb 2016
Hospital D	161	38	23.60%	9	3	26	16	5	159	98.76%	16	42	2	5.09	Feb 2016
Hospital E	106	36	33.96%	9	2	25	8	7	94	88.68%	7	46	6	4.07	Feb 2016
Hospital F	359	101	28.13%	27	21	53	30	22	332	92.48%	17	61	8	5.27	Feb 2016
Hospital G	271	81	29.89%	26	7	48	17	9	6	2.21%	1	67	3	5.65	Feb 2016
Hospital H	266	71	26.69%	15	3	53	20	7	131	49.25%	9	73	6	5.21	Feb 2016
Hospital I	226	93	41.15%	12	12	69	15	8	67	29.65%	2	56	5	4.78	Feb 2016
Hospital J	263	95	36.12%	18	19	58	19	17	101	38.40%	5	73	12	4.93	Feb 2016
Hospital K	128	32	25.00%	13	2	17	6	3	85	66.41%	4	24	3	4.24	Feb 2016

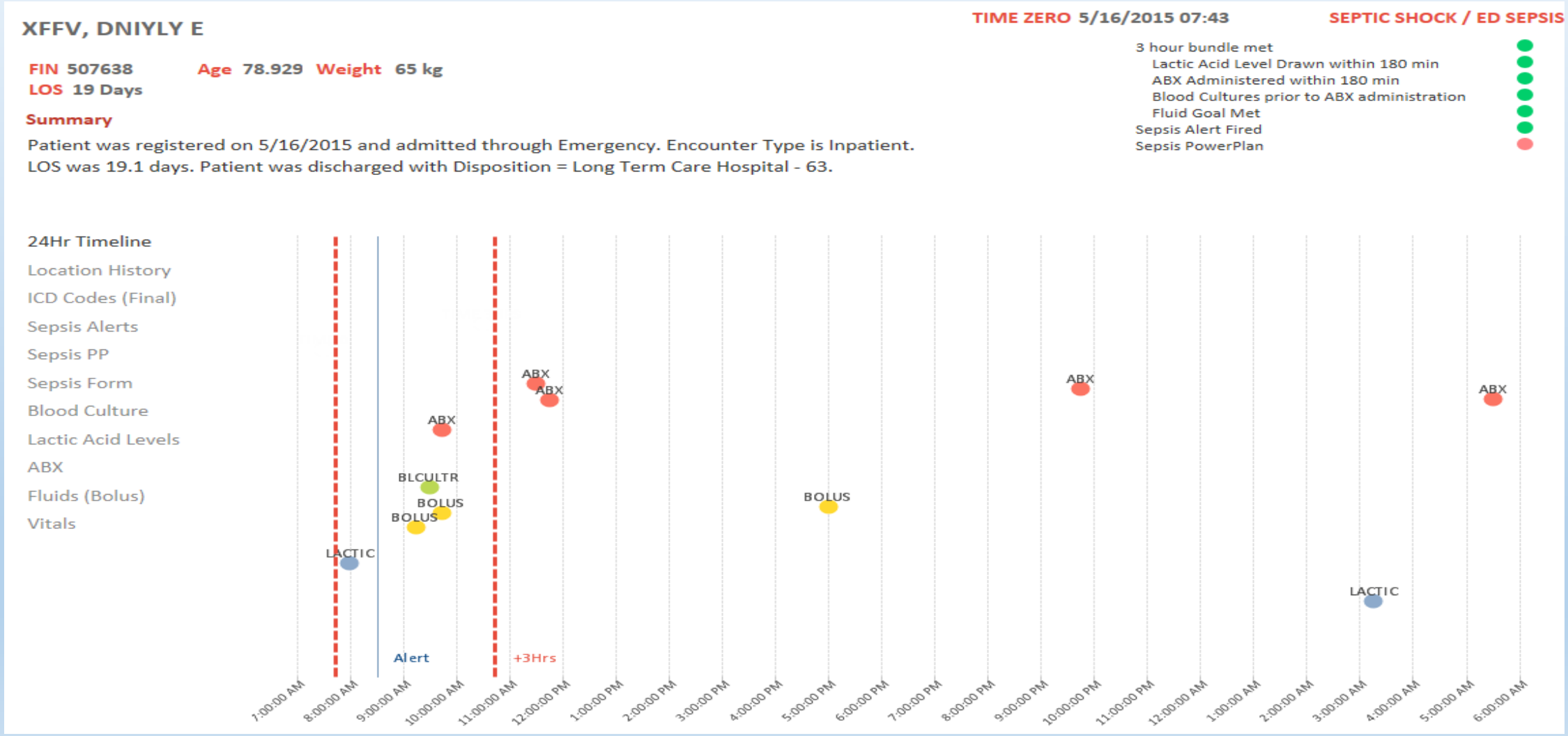
Sepsis Alert Report Summary

	Patients w/Alert Count	Total Patients w/Sepsis Coding	% of Patients w/Alerts & Sepsis Coding	Septic shock - R65.21	Severe Sepsis - R65.20	Sepsis	Overall Expired	Expired w/Sepsis Dx	Total Patients w/form	% of Patients w/Alerts & Form	Expired Pts w/form	Patients w/PP	Expired pts w/PP	Median LOS
Hospital A														
Oct 2015	162	37	22.84%	12	3	22	7	4	1	0.62%	0	26	1	
Nov 2015	165	44	26.67%	14	1	29	10	6	0	0.00%	0	33	2	
Dec 2015	164	41	25.00%	11	5	25	3	2	0	0.00%	0	21	0	
Jan 2016	162	46	28.40%	7	1	38	7	3	78	48.15%	1	26	0	5.44
Feb 2016	163	53	32.52%	12	4	37	9	5	153	93.87%	6	39	0	5.8
Mar 2016	162	40	24.69%	13	1	26	10	6	155	95.68%	6	30	3	4.94
April 2016	176	41	23.30%	5	7	29	6	3	164	93.18%	4	36	2	5.14
May 2016	135	39	28.89%	13	1	25	9	6	123	91.11%	4	27	3	5.11
Hospital B														
Oct 2015	333	81	24.32%	21	17	43	23	14	294	88.29%	10	59	4	
Nov 2015	272	85	31.25%	25	17	43	17	10	241	88.60%	7	41	3	
Dec 2015	312	71	22.76%	14	20	37	18	6	277	88.78%	11	41	5	
Jan 2016	342	92	26.90%	27	25	40	37	23	312	91.23%	23	42	3	6.09
Feb 2016	358	100	27.93%	27	21	52	30	21	332	92.74%	17	61	8	5.28
Mar 2016	400	106	26.50%	35	16	55	51	30	365	91.25%	33	56	4	5.67
April 2016	334	88	26.35%	26	16	46	32	16	311	93.11%	20	46	8	5.59
May 2016	331	105	31.72%	25	17	63	25	13	307	92.75%	15	49	3	5.47

Automated Sepsis Performance Feedback:



Patient Timeline of Treatment for Sepsis:



A Call to Action: System Wide Spread

- 2016 initiative is to spread and standardize best practices, screening and early recognition and treatment to the other units in the hospital.
- Export recognition and early treatment in outpatient areas.
- Create processes to screen that support unique needs of each individual unit.
- Measurable Outcomes:
  - Mortality
  - Components of the bundle administered
  - Rate that second lactate was drawn

Corporate Spread: Barriers and Challenges

- Educational deficit of clinical staff
- RN turn over - bedside nurses
- RN time commitment to screen patients
- Paper screening tool was cumbersome
- Physician reluctance to administer fluid bolus
- Small numbers of positive screens (high risk/low volume condition)
- Geographically distant facilities across 10 states
- Variation in state laws regarding nursing practice
- Competing initiatives in the field

Corporate Spread: Advantages

- Advantages:
  - One computer platform-Ability to mine data at unit level
  - Corporate Office of Clinical Effectiveness
  - Senior operational and clinical leader support
  - Alignment with major initiative in hospitalist medicine

Going forward

- County EMS involvement in fluid resuscitation of suspected severe sepsis patient prior to arrival at the ED
- More intention around handoffs/transitions
- Sepsis screening information to go straight to physician summary page
- Link electronic alert to the electronic screening tool so the screen will immediately display when alert fires