Advisory Board | Physician Executive Council

Reduce Care Variation to Improve Sepsis Outcomes: Lessons from Emory Healthcare

Sarah Evans
Practice Manager
Physician Executive Council

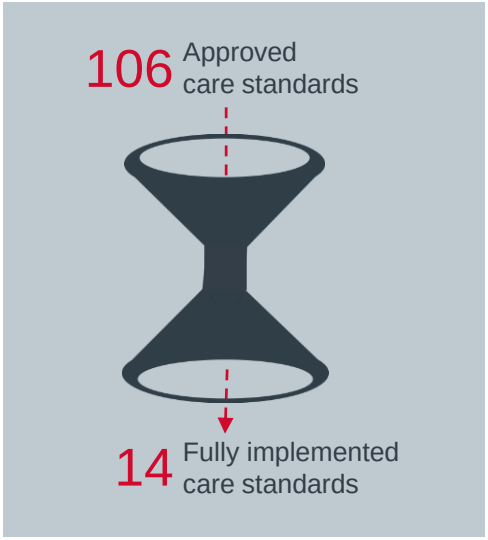
Evanssa@advisory.com

1 Advisory Board's Framework for Reducing Care Variation at Scale

2 How Emory Healthcare Reduced Sepsis Care Variation

An All Too Familiar Story

Hill Valley Health System's[1] Care Standard Bottleneck

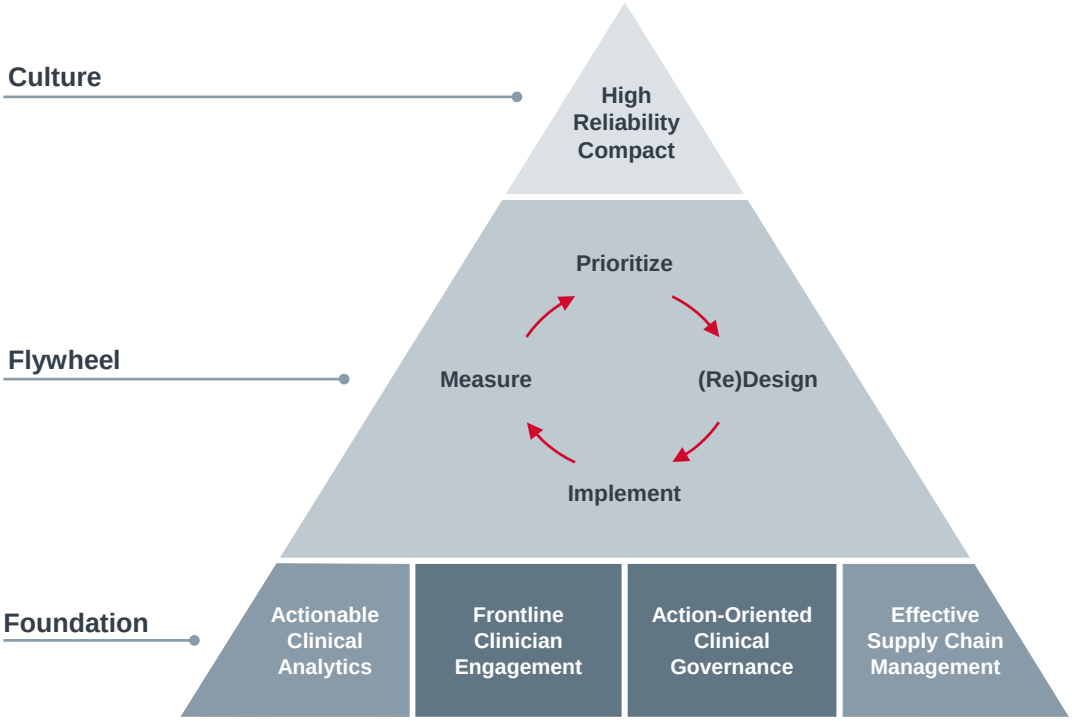


> It's not about the guidelines at all. There are tons of guidelines, with new ones coming out all the time. We've spent so much time understanding what guidelines to put in place that we never get around to implementing or sustaining them."
>
> *Chief Clinical Officer, Health System in Midwest*

1) Pseudonym.

Source: Physician Executive Council interviews and analysis.

Advisory Board's Framework for Reducing Care Variation at Scale



Source: Physician Executive Council interviews and analysis.

The Care Variation Short List

Benchmarking Average Hospital Costs Against Top-Quality Performers by APR-DRGs

Top 30 CVR Savings Opportunities Nationally	Average Savings Opportunity per Hospital[1]	Cost Gap Per Patient
1. Septicemia & Disseminated Infections	$1,868K	$3,057
2. Percutaneous Cardiovascular Procedures without AMI	$697K	$6,079
3. Heart Failure	$610K	$1,634
4. Major Small and Large Bowel Procedures	$592K	$4,364
5. Dorsal and Lumbar Fusion Except for Curvature of Back	$587K	$4,926
6. Cesarean Delivery	$608K	$949
7. Vaginal Delivery	$594K	$516
8. Craniotomy Except for Trauma	$641K	$10,385
9. CVA and Precerebral Occlusion with Infarct	$504K	$2,519
10. Neonate, Normal Newborn or Neonate with other Problem	$560K	$340
11. Knee Joint Replacement	$418K	$1,495
12. Respiratory System Diagnosis with Ventilator Support +96 hours	$332K	$13,445
13. Other Pneumonia	$316K	$1,226
14. Schizophrenia	$340K	$2,600
15. Chronic Obstructive Pulmonary Disease	$312K	$1,181

1) For a single facility, based on The Advisory Board Company's proprietary analysis of 468 hospitals.

Source: Physician Executive Council interviews and analysis.

Potential Options for Answering Six CVR Questions

	Question	Sample Answers	
Design	1. How much of the care pathway can we address with available resources?	• Emergency department • ICU • Med/Surg units	• Post-acute care • Specific phase of condition
Design	2. Which specific components of care do we want to standardize?	• Widely accepted guidelines • Antibiotic stewardship • Diagnostic testing • Medications and supplies	• Patient placement • Patient rounding • ICU mobility • Post-acute follow-up
Implement	3. What enablers do we need to translate clinical specifications into practice?	• Physician order sets • Nurse order sets • Surveillance triggers • Pop-up alerts • Documentation forms • Data aggregation tool	• Embedded risk calculator • Diagnostic and decision aids • Additional FTEs • APRN[1] support • Scripting • Supply chain experts
Implement	4. How should we roll out and communicate new standards?	• System-wide rollout • Phased rollout • In-person communication	• Virtual communication • Targeted upskilling • Care standard documents
Measure	5. How do we reinforce adherence over time?	• Top-down conversations • Alerts • Peer pressure • Visibility campaigns	• Financial incentives • Continuing education • Clinician backstops • Email outreach
Measure	6. How do we know what's working (and not working)?	• Condition-specific dashboards • System-wide CVR dashboards	• Chart review

1) Advanced practice registered nurse.

Source: Physician Executive Council interviews and analysis.

1 Advisory Board's Framework for Reducing Care Variation at Scale

2 How Emory Healthcare Reduced Sepsis Care Variation

Introducing Emory Healthcare

EMORY
HEALTHCARE

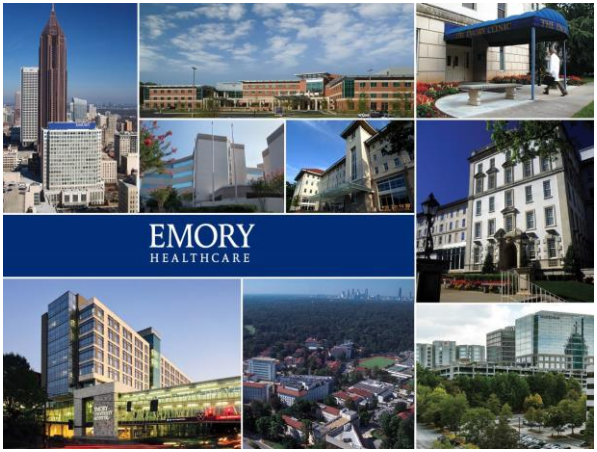


IMAGE CREDIT: EMORY HEALTHCARE

Emory Healthcare

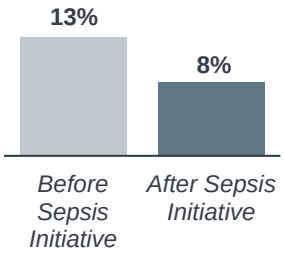
- 7-hospital AMC based in Atlanta, Georgia with three university hospitals
- Healthcare arm of the Woodruff Health Sciences Center at Emory University
- Largest CIN in Georgia with 2,000+ providers
- Launched Value Acceleration Program in 2014 as part of system-wide $200M margin improvement initiative
- Met $200M goal by 2017, including cumulative $30M cost reduction through CVR
- Started sepsis CVR initiative in 2014
- System-wide sepsis protocol led to decreased mortality, lower length of stay, and $1.8M in annual savings
- Sepsis CVR Team Lead Awarded 2017 Magnet Nurse of the Year for Transformation

Source: Emory Healthcare, Atlanta, GA; Physician Executive Council interviews and analysis.

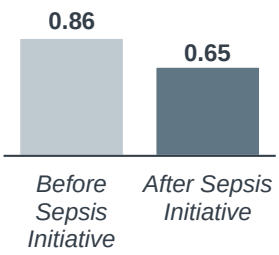
Emory's Sepsis Outcomes After CVR Initiative

Emory Healthcare Sepsis Mortality

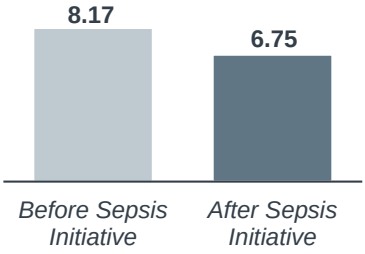
Sepsis Mortality Rate[1]



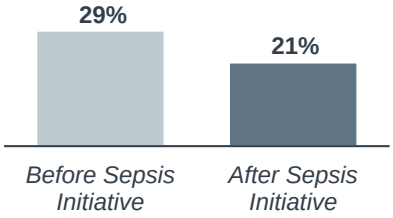
Observed/Expected Mortality[2]



Sepsis Average LOS (Days)



ICU Days as Percent of Total LOS



$1.8M

Annual savings from sepsis CVR work

1) Industry average mortality rate is 17%.
2) Based on Vizient AMC benchmarks.

Source: Emory Healthcare, Atlanta, GA; Physician Executive Council interviews and analysis.

How Emory Answered the Six Questions

Overview of Emory's CVR Approach for Sepsis

	Question	Emory's Decisions
Design	How much of the care pathway can we address with available resources?	• Emergency department • Inpatient setting
Design	Which specific components of care do we want to standardize?	• SCCM guidelines • Use ICU mobility guidelines to reduce length of stay • Reduce use of unnecessary antibiotics when possible
Implement	What enablers do we need to translate clinical specifications into practice?	• Suspected sepsis trigger • Diagnostic tool • Code sepsis • Nurse-initiated PowerPlan • Provider-initiated PowerPlans • Hired physical therapists • Limited antibiotic access • Dosing reminders • Pharmacy oversight
Implement	How should we roll out and communicate new standards?	• Phased rollout • Care standard document • In-person communication • Grand rounds • Nursing modules
Implement	How do we reinforce adherence over time?	• Top-down conversations with non-adherent providers • Visibility campaigns • Continuing education
Measure	How do we know what's working (and not working)?	• System-wide CVR dashboard • Process defect analysis scorecard

Source: Emory Healthcare, Atlanta, GA; Physician Executive Council interviews and analysis.

Question 1: How Much of the Sepsis Care Pathway Can We Address with Available Resources?

The Evolution of Sepsis Work at Emory

Process Improvement Team

Primary Focus: To improve the quality of sepsis care delivery

Resources: Clinical nurse specialist with ICU expertise, two physician champions

Value Acceleration Team

Primary Focus: To address the high cost of sepsis care delivery

Resources: Dedicated analyst, external consultants, informatics

Sepsis Core Team

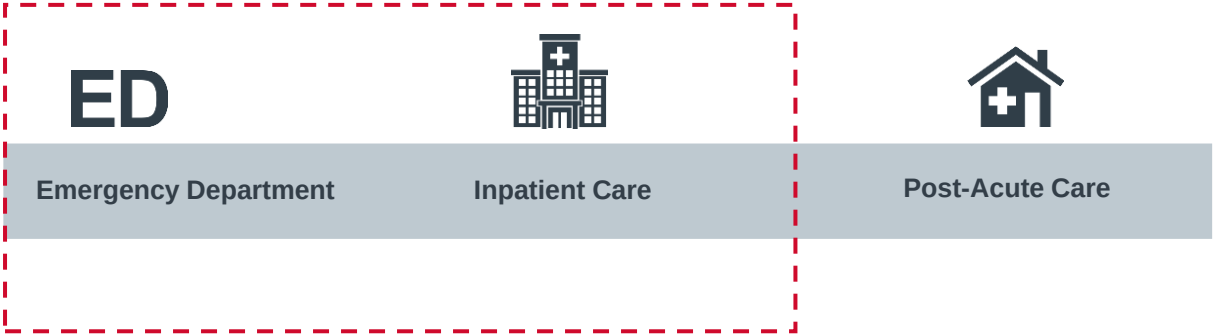
Primary Focus: To improve quality while reducing cost for sepsis care delivery

Resources: Army of volunteers, provider leaders, dedicated analyst, consultant, informatics

Source: Emory Healthcare, Atlanta, GA; Physician Executive Council interviews and analysis.

Emory Sets Aside Post-Acute Care

Care Settings Tackled in CVR Initiative



Source: Emory Healthcare, Atlanta, GA; Physician Executive Council interviews and analysis.

Question 2: Which Specific Components of Care Does Emory Choose to Standardize?

Society of Critical Care Medicine (SCCM) Guidelines

Society of Critical Care Medicine

The Intensive Care Professionals

Emory's Specific Sepsis Goals

- Increase speed and accuracy of identification
- Increase execution speed of resuscitation bundle

Additional Components of Care

1. Use **ICU mobility guidelines** to reduce length of stay
2. Reduce **use of unnecessary antibiotics** when possible

Source: Surviving Sepsis Campaign Guidelines Committee, Surviving Sepsis Campaign: International Guidelines for Management of Sepsis and Septic Shock: 2016; Emory Healthcare, Atlanta, GA; Physician Executive Council interviews and analysis.

Standardizing to Widely Accepted SCCM Guidelines

Key Components of the 2016 Surviving Sepsis Campaign Guidelines

Source Control

- Determine whether infection requires emergent source control
- Intervene as soon as medically and logistically possible

Initial Resuscitation

- Administer at least 30ml/kg of intravenous crystalloid fluid within the 3 hours, supplement fluids as needed
- Albumin can be added when large amounts of crystalloids needed

Antibiotics

- Administer IV antibiotics within 1 hour for both sepsis and septic shock
- Use broad-spectrum therapy with one or more antimicrobials to cover all likely pathogens

Vasoactive Therapy

- Aim for initial target mean arterial pressure (MAP) of 65 mmHg in patients with septic shock requiring vasopressors
- Norepinephrine is first choice vasopressor

Source: Surviving Sepsis Campaign Guidelines Committee, Surviving Sepsis Campaign: International Guidelines for Management of Sepsis and Septic Shock: 2016; Physician Executive Council interviews and analysis.

Double-Clicking on Antibiotic Specifications

Standardized Elements	Emory's Answer
Standard first course of antibiotics for all patients	Zosyn within 30 minutes and Vancomycin within 60 minutes
Standard second course of antibiotics based on source	Defined crosswalk linking antibiotics to source infections based on local antibiogram
Standard dosage	Fixed dosage and schedule
Standard duration	Abbreviated antibiotic regimen length and frequent reassessment to ensure antibiotics are needed

Source: Emory Healthcare, Atlanta, GA; Physician Executive Council interviews and analysis.

Question 3: What Enablers Does Emory Need to Translate Clinical Specifications into Practice?

Care Components	Enablers
SCCM guidelines – identification	• Suspected sepsis trigger • Suspected sepsis diagnostic tool
SCCM guidelines – resuscitation	• Code sepsis • Nurse-initiated PowerPlan • Physician-initiated PowerPlans
Use ICU mobility guidelines to reduce length of stay	• Hired physical therapists
Reduce use of unnecessary antibiotics when possible	• Limited antibiotic access • Dosing reminders • Pharmacy oversight

Source: Emory Healthcare, Atlanta, GA; Physician Executive Council interviews and analysis.

Automatically Flagging Cases of Suspected Sepsis

Trigger Criteria for Suspected Sepsis Infection

Indicator	SIRS Standard	Emory's Refined Standard
Elevated temperature	38º F	38º F
Hypothermic temperature	36º F	**35º F**
Heart rate	>90 / minute	**>110 / minute**
Respiratory rate	>20 / minute	**>22 / minute**
White blood cell count	<4.0 x 10^6 /L >12.0 x 10^6 /L	<4.0 x 10^6 /L >12.0 x 10^6 /L
Mean arterial pressure (MAP)		**<65 mmHG**
Systolic blood pressure		**<90 mmHG**

Refined criteria reduce false positives in high-acuity environment

Meeting two criteria results in alert firing to nurse

After firing, alert snoozes:

- 2 hours in ED if screen completed
- 12 hours in other units if screen completed
- 48 hours if sepsis screen positive and initial PowerPlan initiated

Source: Emory Healthcare, Atlanta, GA; Physician Executive Council interviews and analysis.

Diagnostic Tool Enables RN Suspected Sepsis Identification

Emory's Sepsis Screening Tool for Nursing

Sepsis Screening	
1. Do you suspect a new or worsening infection within the last 48 hours?	2. Are signs and symptoms of infection both present and new?
☑ YES ☐ NO	☑ YES ☐ NO

Suspected Sepsis Alert

Your patient has screened positively for suspected sepsis. Take the following immediate actions:

1. Call "Code Sepsis"
2. Notify physician of the positive screen
3. Activate initial PowerPlan for suspected sepsis

Source: Emory Healthcare, Atlanta, GA; Physician Executive Council interviews and analysis.

Automated Steps Speed Sepsis Care

Actions Automatically Trigged by Suspected Sepsis Alert

Launch of Nurse-Initiated Plan

Nurse PowerPlan immediately launched after positive suspected sepsis alert

Notify Code Sepsis Response Team

Phlebotomy, pharmacist, nurse, and physician receive automatic alerts

Launch of Physician PowerPlan

Physician PowerPlan is automatically launched after nurse initiates initial PowerPlan

Order Second Lactate

Second lactate test automatically ordered if the first test result is >2 mmol/L

Source: Emory Healthcare, Atlanta, GA; Physician Executive Council interviews and analysis.

Nurse-Initiated PowerPlan Removes Waiting Time

Emory's Nurse-initiated PowerPlan[1]

Nurse-Initiated Suspected Sepsis PowerPlan → **Physician-Initiated Sepsis Antibiotic PowerPlan** → **Physician-Initiated Severe Sepsis PowerPlan**

	Component	Details
Medications		
☑	NS, LR bolus	500 mL, infuse over 1 hour
Diagnostic Tests		
☑	Urinalysis	Stat, urine
☑	Blood culture	Stat, nurse collect, blood peripheral
☑	XR Chest 1 View Portable	Stat, reason for exam: suspected sepsis
☑	Electrocardiogram	Stat, reason for exam: suspected sepsis
☑	Suspected Sepsis Plan Initiated	

Fluid bolus "orderable" by nurses

Nurse orders labs and imaging, but not medication

1) Illustration simplifies PowerPlan layout for teaching purposes.

Source: Emory Healthcare, Atlanta, GA; Physician Executive Council interviews and analysis.

Antibiotic PowerPlan Ensures Timely, Appropriate Delivery

Emory's Antibiotics PowerPlan[1]

Nurse-Initiated Suspected Sepsis PowerPlan → **Physician-Initiated Sepsis Antibiotic PowerPlan** → **Physician-Initiated Severe Sepsis PowerPlan**

Medications	
Unknown Source (First Course)	
☐	Antibiotics – Source unknown, Community Acquired Sepsis
☐	Antibiotics – Source unknown, Hospital Acquired Sepsis
Known Source (Targeted Therapy)	
☑	**Antibiotics UTI with Sepsis**
☐	Antibiotics CAP with Sepsis
☐	Antibiotics Skin/Soft Tissue with Sepsis
☐	Antibiotics Intra-abdominal with sepsis

First course STAT order standard for all new sepsis cases

Once source infection identified, PowerPlan defaults to most appropriate antibiotic

Medications		
Antibiotics – UTI, Community Acquired with Sepsis		
☑	Ceftriaxone	1 gm, IVPB, injection, q24Hr, STAT, Pharmacy adjust dose
☐	Tobramycin	5 mg/kg, IVPB, injection, once, STAT
☑	Pharmacotherapy Consult	Sepsis Antibiotics

1) Illustration simplifies PowerPlan layout for teaching purposes.

Source: Emory Healthcare, Atlanta, GA; Physician Executive Council interviews and analysis.

Hiring Physical Therapists Dedicated to the ICU

Four New Physical Therapist FTEs

Care Enabled by Hiring of ICU Physical Therapists

- Physical therapy consult included in the PowerPlan for each ICU patient
- Therapists work with all ICU sepsis patients as soon as the patient is deemed clinically ready
- Goal is for 50 percent of ICU sepsis patients to receive physical therapy

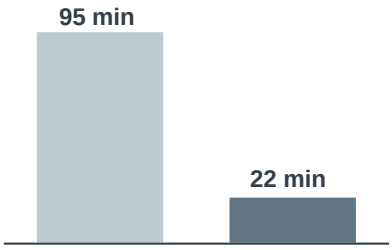
1 day

Average length of stay reduction resulting from early mobility

Source: Emory Healthcare, Atlanta, GA; Physician Executive Council interviews and analysis.

Only Standard First-Course Antibiotics Kept in ED and ICU

Time to First Course Antibiotics



Before providers selected first course antibiotics from unlimited formulary and ordered through pharmacy

Currently, standard first course antibiotics are stocked in ICU and ED Omnicell cabinets for rapid access

Restricted Access to First Course Antibiotics

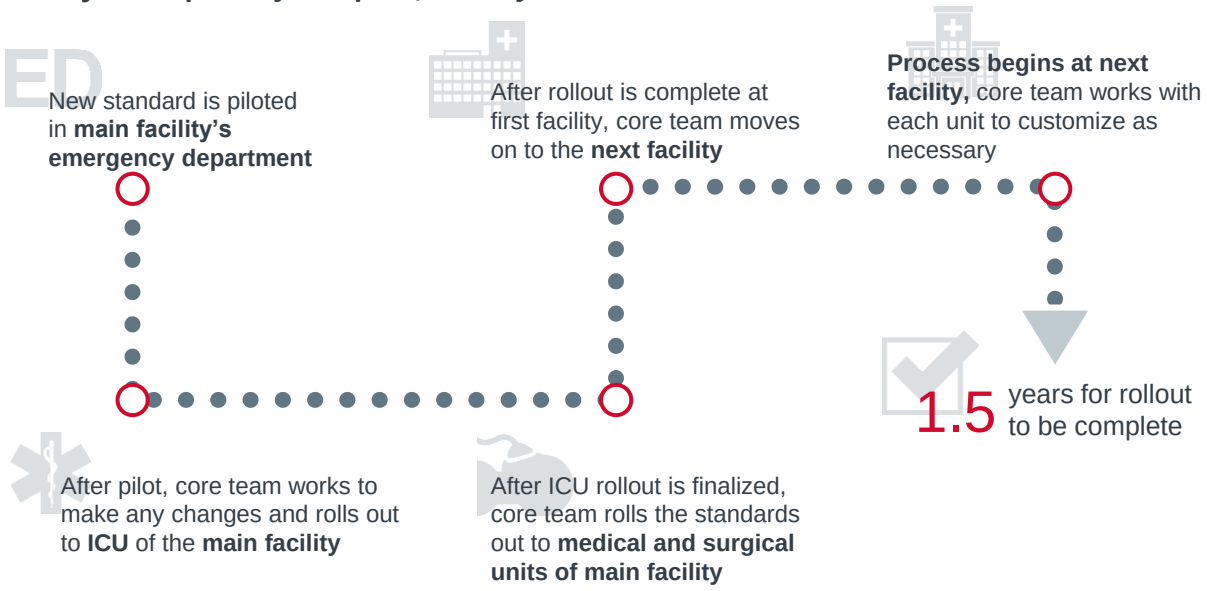
- Only Zosyn and Vancomysin available in Omnicell for quick access
- All other antibiotics available through pharmacy

Source: Emory Healthcare, Atlanta, GA; Physician Executive Council interviews and analysis.

Question 4: How Should We Roll Out and Communicate New Standards?

Emory Takes Advantage of Time to Get Sepsis Rollout Right

Emory's Hospital-by-Hospital, Unit-by-Unit Rollout



Source: Emory Healthcare, Atlanta, GA; Physician Executive Council interviews and analysis.

Core Design Team Members Lead Rollout at Their Facilities

Design Strategy

Emory Healthcare Sepsis "Core Team"

- Designs standards for each component of care
- Collectively adapts rollout for each local facility
- Core Team comprised of over 30 members including ED, ICU, and medical/surgery representatives from each hospital

Rollout Strategy

Emory University Hospital

Core team ED representative leads rollout at home facility

Emory University Midtown Hospital

Core team ED representative leads rollout at home facility

Saint Joseph's Hospital

Core team ED representative leads rollout at home facility

Johns Creek Hospital

Core team ED representative leads rollout at home facility

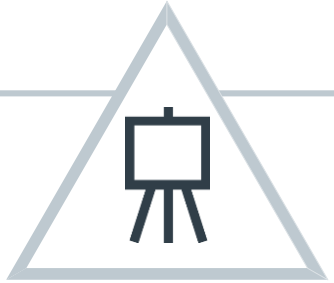
Source: Emory Healthcare, Atlanta, GA; Physician Executive Council interviews and analysis.

Question 5: How Does Emory Reinforce Adherence Over Time?

Two Types of Ongoing Training

Regular (Re)Education

- 1-2 sessions per year
- Focus on sepsis protocol and PowerPlan updates
- Review performance, new recommendations, definitions



New Hire Training

- All new clinicians must complete sepsis education during orientation
- Content includes: PowerPlans, standard protocols, screening tools, bundle compliance

Source: Emory Healthcare, Atlanta, GA; Physician Executive Council interviews and analysis.

Focusing on Hot Spots for Non-Compliance

Emory's Sepsis Initiative Requires Ongoing Vigilance

- Clinical leads **updated weekly on provider PowerPlan adherence** rates
- Facility leaders review **LOS outliers and bundle compliance defects** monthly
- **Local core team members reeducate** staff that neglect the protocol

Source: Emory Healthcare, Atlanta, GA; Physician Executive Council interviews and analysis.

Keeping Sepsis Top of Mind

Balancing Hearts and Minds

Emory's Regular Sepsis Visibility Campaigns

IMAGE CREDIT: SHUTTERSTOCK.

Month-long Sepsis Campaign

"Sock it to Sepsis" campaign brings visibility and education to staff during sepsis awareness month

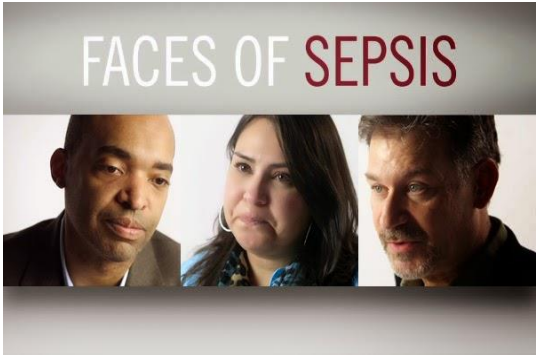


IMAGE CREDIT: SEPSIS ALLIANCE.

Posted Patient Stories

"Faces of Sepsis" campaign highlights stories of celebrities who have suffered from sepsis

Source: Emory Healthcare, Atlanta, GA; Physician Executive Council interviews and analysis.

Question 6: How Does Emory Know What's Working?

Tracking Sepsis Pathway Adherence and Outcomes Monthly

Primary Monthly Reports

Sepsis Core Team

Process Metric Scorecard

Designed by sepsis core team leadership

Sepsis Identification Timing

- Sepsis screening and pathway use
- Blood culture collection and turnaround

Resuscitation Timing

- Initial antibiotics and IV fluid delivery
- Initial and repeat lactate

Recovery and Antibiotic Stewardship

- Progressive ICU mobility
- Antibiotic optimization and overuse

Comprehensive static report highlights sepsis-specific performance by facility to help meet rapid bundle compliance and other goals

Medical Leadership and CVR Team

Outcome Metric Dashboard

Designed by medical leaders and finance to ensure ease of data capture

Sepsis Clinical and Financial Outcomes

- Mortality rate
- Case mix index
- Variable cost per case
  - Length of stay
  - ICU length of stay
  - Blood, pharmacy and lab utilization

Dynamic tool crosses CVR initiatives, highlights clinical and financial outcomes, and includes drill through capability by facility and provider

Source: Emory Healthcare, Atlanta, GA; Physician Executive Council interviews and analysis.

How Emory Answered the Six Questions

Overview of Emory's CVR Approach for Sepsis

	Question	Emory's Decisions
Design	How much of the care pathway can we address with available resources?	• Emergency department • Inpatient setting
Design	Which specific components of care do we want to standardize?	• SCCM guidelines • Use ICU mobility guidelines to reduce length of stay • Reduce use of unnecessary antibiotics when possible
Implement	What enablers do we need to translate clinical specifications into practice?	• Suspected sepsis trigger • Diagnostic tool • Code sepsis • Nurse-initiated PowerPlan • Provider-initiated PowerPlans • Hired physical therapists • Limited antibiotic access • Dosing reminders • Pharmacy oversight
Implement	How should we roll out and communicate new standards?	• Phased rollout • Care standard document • In-person communication • Grand rounds • Nursing modules
Measure	How do we reinforce adherence over time?	• Top-down conversations with non-adherent providers • Visibility campaigns • Continuing education
Measure	How do we know what's working (and not working)?	• System-wide CVR dashboard • Process defect analysis scorecard

Source: Emory Healthcare, Atlanta, GA; Physician Executive Council interviews and analysis.

Emory's Sepsis CVR Starter Kit

Toolkit Contents

Care Standard Materials

Sample Dashboard(s)

Enabler Materials

Clinical Governance Structure and Governance Tools

Patient and Staff Education Materials

CVR Project Management Resources

Emory's Sepsis CVR Starter Kit

The Advisory Board Company's 10 Imperatives to Reduce Sepsis Mortality

Source: Emory Healthcare, Atlanta, GA; Physician Executive Council interviews and analysis.