Surviving Sepsis:
University of South Florida Graduate Medical Education and
Tampa General Hospital’s Quality Improvement Journey

September 10, 2018

What works?

• Early recognition
  – It is important that we educate our communities
    • As many as 87% of sepsis cases originate in the patient’s community
    • EMS - First responder training and sepsis alert protocols
    • In-hospital - Frequent assessment using established criteria

• The Surviving Sepsis Campaign Bundle: 2018 Update
  – The 3-h and 6-h bundles have been combined into a single “hour-1 bundle” with the explicit intention of beginning resuscitation and management immediately.
    • Measure lactate level.
      – Remeasure if initial level is >2mmol/L
    • Obtain blood cultures prior to administration of antibiotics
    • Administer broad-spectrum antibiotics
    • Begin rapid administration of 30ml/kg crystalloid for hypotension or lactate >4mmol/L
    • Apply vasopressors if patient in hypotensive during or after fluid resuscitation
Sepsis Post-op Rate

Source: Comprehensive Data System, September 9, 2018
**Overall Sepsis Mortality**

Source: Comprehensive Data System, September 9, 2018

**Hospital-Onset Sepsis Mortality Rate**

Source: Comprehensive Data System, September 9, 2018
### MTC HIIN Resources

- Change Packages and Top 10 Checklists
- Date of Last Septic Event Poster
- Post-op Prevention Process Improvement Discovery Tool
- Sepsis Podcast
- LISTSERVs

HRET HIIN Website: [www.hret-hiin.org](http://www.hret-hiin.org)

#### MTC HIIN Resources

- Webinars and Coaching Calls
- National Experts
- Quality Improvement Fellowships
- Patient and Family Engagement Learning Collaborative
- Chasing Zero Infections Series
- Safety Culture Survey
- UP Campaign – SOAP UP, GET UP, WAKE UP, SCRIPT UP

FHA MTC HIIN Website: [www.fha.org](http://www.fha.org)

HRET HIIN Website: [www.hret-hiin.org](http://www.hret-hiin.org)
HRET HIIN Quality Award Winner

Congratulations, Florida Hospitals!

Outstanding performance in driving quality care, safety and value across its network of hospitals

AHA Leadership Summit
HIIN Reception, July 25, 2018

MTC HIIN Upcoming Events

- Sep. 12 - QI Fellowship Office Hours #10
- Sep. 13 - Patient & Family Engagement Convening [Orlando, FL]
- Sep. 14 - CDI Sprint Summary
- Sep. 18 - Reduce Readmissions: Florida Rx Card
- **Sep. 18 - Sepsis Alliance: Pearls and Pitfalls in the Recognition & Treatment of Pediatric Sepsis**
- Sep. 20 - Surviving Sepsis: Learn How Florida Hospital New Smyrna Reduced Sepsis Mortality
- Sep. 21 - Fall Injury Prevention Strategies
- Oct. 16 - TeamSTEPPS Check-in Webinar

Check the [MTC HIIN Upcoming Events Calendar](#) for details and registration
We are here to help!

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Surviving sepsis:
USF GME & TGH's
quality improvement journey

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Joint Associate Professor, USF COPH
Director of Quality and Safety, USF GME
Associate Director, FPQC

FHA webinar
9/10/18

Disclosure statement
• I have no relevant financial relationships with manufacturers of any commercial products or providers of commercial services discussed in this activity.
• I do not intend to discuss an unapproved or investigatory use of a commercial product or device in my presentation.

Engaging interprofessional teams in quality improvement can decrease sepsis-related mortality

1. Discuss opportunities for promoting interprofessional teamwork & QI at TGH & USF
2. Apply the Model for Improvement to address sepsis

Empower health professionals to advocate for safe, quality patient care.

USF GME  TGH

• Promote meaningful engagement in QI activities
• Focus on improving communication
• Working in interprofessional teams

Our problem...
USF Morsani College of Medicine
USF College of Nursing
USF College of Public Health

Limited clinical opportunities to apply QI learning

Patient outcomes can be improved by the implementation of QI initiatives
Our problem...

USF Morsani College of Medicine
USF College of Nursing
USF College of Public Health

Limited clinical opportunities to apply QI learning

TGH is the major academic affiliate for USF physicians

Patient outcomes can be improved by the implementation of QI initiatives

Our problem...

Meaningful engagement in QI activities
(education, support, communication)

Patient outcomes can be improved by the implementation of QI initiatives

Our problem...

Efficient & effective use of existing resources
(Interprofessional teamwork)

Patient outcomes can be improved by the implementation of QI initiatives

Our problem...

Choosing QI initiatives aligned with organizational goals

Patient outcomes can be improved by the implementation of QI initiatives

Think big

Meaningful engagement in QI activities
(education, support, communication)

Efficient & effective use of existing resources
(Interprofessional teamwork)

Choosing QI initiatives aligned with organizational goals

Patient outcomes can be improved by the implementation of QI initiatives

Preventing severe sepsis can save lives

Mortality increases by 7% for every hour that sepsis treatment is delayed

403 adults died (2016)

Hospital mortality ~30-50%

>50% develop severe sepsis

~25% develop septic shock

#1 Cause of inpatient death nationally

403 adults at TGH died (2016)
Preventing sepsis can avoid hospital days

Sepsis is the most expensive condition treated in US hospitals, costing more than $20 billion.


Sepsis is a healthcare problem

morbidity
mortality
length of hospital stay
costs (direct, indirect, quality of life)

Compliance with evidence-based Surviving Sepsis Campaign recommendations for acute management of sepsis & septic shock resulted in significant decrease in hospital mortality & length of hospital & ICU stay.

• Surviving Sepsis Campaign launched in 2002 with goal of reducing sepsis by 25% in the following 5 years.

• Demonstrated decrease in unadjusted odds ration for hospital mortality from 37% to 30.8% over 2 years (p<0.001)1

QI in healthcare

Quality is defined...1,2
What & how well something is done
AND
Doing the right thing ➔ delivering needed healthcare services
At the right time ➔ when patients need them
In the right way ➔ using appropriate tests/procedures

Variation is everywhere

Goals
• Understand variation
• Control degree of variation
• Minimize its impact

Decrease variation ➔ deliver service in a predictable manner ➔ produce a predictable & reliable result

2 www.survivingsepsis.org

Variation is everywhere

Goals
• Understand variation
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Decrease variation ➔ deliver service in a predictable manner ➔ produce a predictable & reliable result

2 www.survivingsepsis.org
Does variation in sepsis rates make it a suitable problem to address using QI methods?

IHI’s Model for Improvement

**What are we trying to accomplish?**

**How will we know that a change is an improvement?**

**What changes can we make that will result in improvement?**

Knowledge systems for QI

- **Generalizable scientific evidence**
  - From empirical studies that try to eliminate effects of context

- **Particular Context**
  - Characteristics of the local setting or environment

- **Measured Performance Improvement**
  - Measurement over time
  - Balanced measures

Knowledge about applying, adapting evidence to context

Knowledge needed for execution, change


Slide adapted & used with permission from Dr. Gautham Suresh

**Plan**

- **Do**
  - Study
  - Act

**What are we trying to accomplish?**

- Understand the problem
- Determine the aim
- Form interprofessional team

**How will we know that a change is an improvement?**

**What changes can we make that will result in improvement?**
Our sepsis problem statement

Compliance with sepsis-related guidelines at TGH is suboptimal leading to increased patient mortality & cost.

The Vizient database comparison of academic medical centers reports TGH's compliance with the SEP-1 bundle was below average in performance & sepsis mortality index was in the lowest quartile (AY 2016).

Our sepsis aim statement

By 6/2019, we will improve our compliance with the TGH sepsis bundle to the current average academic medical center performance of 35%.

Core team members include: Attending project lead, Resident project lead, Data lead, Administrative lead, & identified TGH inter-professional partner.

<table>
<thead>
<tr>
<th>QI project topic</th>
<th>Inter-professional teams</th>
</tr>
</thead>
<tbody>
<tr>
<td>SEPSIS</td>
<td>1) Emergency Medicine</td>
</tr>
<tr>
<td></td>
<td>2) Internal Medicine &amp; Pulmonary Critical Care</td>
</tr>
<tr>
<td></td>
<td>3) Pediatrics</td>
</tr>
<tr>
<td></td>
<td>4) Radiology</td>
</tr>
<tr>
<td>CLABSI</td>
<td>5) Infectious Disease</td>
</tr>
</tbody>
</table>

*Core team members include: Attending project lead, Resident project lead, Data lead, Administrative lead, & identified TGH inter-professional partner.

Research Improvement

<table>
<thead>
<tr>
<th>Aim</th>
<th>Improvement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test</td>
<td>Blinded or controlled test</td>
</tr>
<tr>
<td>Bias</td>
<td>Design to eliminate bias</td>
</tr>
<tr>
<td>Sample size</td>
<td>Just in case data</td>
</tr>
<tr>
<td>Hypothesis flexibility</td>
<td>Fixed hypothesis</td>
</tr>
<tr>
<td>Testing strategy</td>
<td>One large test</td>
</tr>
<tr>
<td>Determining if a change is an improvement</td>
<td>Hypothesis tests, statistical tests, p-values</td>
</tr>
<tr>
<td>Data confidentiality</td>
<td>Research subject identities are protected</td>
</tr>
</tbody>
</table>

What are we trying to accomplish?

Develop clear measures

How will we know that a change is an improvement?

What changes can we make that will result in improvement?

Act

Plan

Study

Do

Data type

Outcome

Process

Balancing

QI tries to evaluate efficiency & effectiveness of interventions using measures

Balanced set of 5-8 measures usually enough

Data type Definition

Outcome

Aim: 2-3

Achieve what we set out to do?

• Measures effectiveness
  • How does the system impact the values of patients, their health, & wellbeing?
  • What are impacts on other stakeholders (i.e., payers, employees, community)?

Process

Aim: 1-2

How the change happens?

• Measures internal to the process
  • Are parts or steps in the system performing as planned?
  • Are we on track in our efforts to improve the system?

Balancing

Aim: 1-2

Cause harm inadvertently?

• Are improvements designed to improve 1 part of the system causing new problems in other parts of the system?
**Key driver diagram**

- Systematic method to outline a QI initiative
- Shared team view on theory of change
  - Predicts system changes that help progress towards aim
  - Shows cause & effect ("causality")
  - Helps others understand what you need to be successful
- Define key leverage points (drivers) in a system
- Increase your chances for project success

**Key drivers identify project measures**

Helps ensure the team is collecting relevant measures to affect your aim

- Process measures
  - Improve prevention of sepsis
  - Improve readiness to address sepsis
  - Improve recognition of sepsis
  - Improve response to sepsis
  - Improve reporting of sepsis

- Outcome measures
  - Use infection prevention strategies
  - Assess invasive device necessity daily
  - Appropriately supporting & de-escalating care
  - Standardize & consistently use a sepsis algorithm, orders, & guideline
  - Use a trigger tool
  - Document the exam, diagnosis, & response to interventions
  - Use appropriate sepsis definitions
  - Compliance with the sepsis bundle
  - Perform safe & effective transitions of care
  - Communicate expectations with patients & family

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**Table 5. Process, outcome, and balancing measures for sustained engagement and sepsis initiative.**

<table>
<thead>
<tr>
<th>Process measures</th>
<th>Outcome measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prevention:</td>
<td></td>
</tr>
</tbody>
</table>
| - Assessing daily central line necessity | - Compliance with daily central line necessity 
| - Compliance with central line maintenance bundle | - Compliance with infection prevention strategies 
| - Appropriate blood culture collection | - Assess invasive device necessity daily 
| Realtime: | 
| - Evaluation of trigger tool accuracy and completeness | - Compliance with infection prevention strategies 
| - Compliance with placing sepsis alert order | - Assess invasive device necessity daily 
| Recognition: | 
| - Compliance with each team goal for sepsis | - Compliance with daily central line necessity 
| - Education of healthcare providers | - Compliance with central line maintenance bundle 
| Response: | 
| - Usage of standardized orders | - Compliance with infection prevention strategies 
| - Appropriateness of imaging using ACR compliance | - Assess invasive device necessity daily 
| Reporting: | 
| - Compliance with standardized documentation | - Compliance with infection prevention strategies 
| - Compliance with appropriate physician handoffs | - Assess invasive device necessity daily 

**Aim**

Desired outcome SMART AIM

**Primary Drivers**

"Big Changes" or concepts

Most likely to achieve aim

"Small changes" that are testable & measurable

**Secondary Drivers** (AKA interventions)

Specific actions

Support primary drivers

**Direction of causality**


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**By 6/2019, we will improve our compliance with the TGH sepsis bundle to the current average academic medical center performance of 35%**

Based on FY 2017 Vizient data

V1. 9/2017
Value of standardized processes

*Processes should be standardized before improvement can begin*

- Baseline for QI activities
- Where is a process?
- Where is the process going?
- How is the process getting there?

**Goal of standardization in Industry**

*Consistently produce good service(s) or product(s) that meet agreed-upon requirements*

**Goal of standardization in Healthcare**

*Consistently produce good health outcomes that meet agreed-upon goals*

A process by which healthcare products or services are chosen by a committee of key stakeholders, taking into account evidence-based results, to ensure quality patient care while adhering to fiscal responsibility.

**How standardization has been applied**

**INDUSTRY**
- Electrical plugs & sockets
- Computer connections
- Diesel vs. gasoline nozzles
- Standard operating procedures in aviation
- Computer coding

**HEALTHCARE**
- WHO High 5’s project
- CLABSI reduction
- Neonatal Resuscitation Program
- Newborn screening
- GBS (intrapartum prophylaxis & neonatal management)
- Neonatal HIV management

Make it easier to do the right thing

Standardization should not be applied to everything.

Everything should not be standardized.
Standardizing a process

1. Find a suitable process to standardize
   • Supported by high-quality evidence
   • Repeatedly done in the same way every time
   • Affects a homogenous population of patients
   • Engages a large population of practitioners performing high-stakes tasks
   • Agreed upon by stakeholders

2. Develop a guideline
   ....& have compliance with the guideline

3. Know when to customize

Understand limitations to guidelines

• Not understanding the local environment
• Inability to adapt systems to work in setting created for
• Using low-quality evidence
• Lack of guideline consensus or compliance
• Behaviors
• Medico-legal considerations

4. Use measurement

Our theory of change

1. Providing resources & a structured interprofessional approach to QI may promote sustained QI engagement amongst GME faculty, GME trainees & TGH health professionals

2. Promote sepsis bundle compliance along the continuum of care for adult & pediatric patients may improve overall TGH sepsis bundle compliance
Plan
Do
Study
Act

What are we trying to accomplish?

How will we know that a change is an improvement?

What changes can we make that will result in improvement?

Test interventions

Interventions our teams have addressed

STANDARDIZE
- Sepsis guideline
- Sepsis checklist
- Method of “Time Zero” identification (i.e., sepsis alert)
- EMR order set
- EMR note template
- Education

IMPROVE COMPLIANCE
- Document response to interventions performed
- IV fluid administration (dose, type)
- Shared patient handoff

USE TOOLS
- EMR trigger tool (predictive analytics)
- EMR report

Currently being developed and implemented

What is a PDSA cycle?

- Useful tool for developing & documenting tests of change to **improve**
- AKA PDCA, Deming Cycle, Shewart Cycle

P – Plan a test
D – Do a test
S – Study & learn from test results
A – Act on results

Reasons to test changes

Learn whether change will result in improvement

Predict the amount of improvement possible

Evaluate the proposed change work in a practice environment

Minimize resistance at implementation

What are we trying to accomplish?

Have an objective
- Concisely state what you plan to do
- I plan to... Introduce a standardized physician EMR note for sepsis patients in the Pulmonary Critical Care Unit

Make a prediction

Execute the plan

Plan-Do-Study-Act
Plan-Do-Study-Act

- Have an objective
- Make a prediction of what will happen
  - I hope this produces... improvement in reporting of sepsis
- Execute the plan

Plan-Do-Study-Act

- Have an objective
- Make a prediction
- Execute the plan

Who? Pulmonary Critical Care Unit residents & fellows will use note with any sepsis patient

What? EMR note template (EPIC “dot phrase”)

When? 2 weeks

Where? Pulmonary Critical Care unit

How data will be collected? Sepsis patients identified by existing trigger tool; EMR review of identified sepsis patients

Plan-Do-Study-Act

- Have an objective
- Make a prediction
- Execute the plan

How will we know that a change is an improvement?

Plan-Do-Study-Act

- Have an objective
- Make a prediction
- Execute the plan

What changes can we make that will result in improvement?

Tasks needed to implement these changes (how will we make this change happen?)

<table>
<thead>
<tr>
<th>Task</th>
<th>Who is responsible</th>
<th>Due date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Design EMR note template (draft, solicit feedback from frontline stakeholders, finalize draft)</td>
<td>Ravi, Jaime</td>
<td>2/1/18</td>
</tr>
<tr>
<td>Implemented EMR note template</td>
<td>Jaime, Andy</td>
<td>2/20/18</td>
</tr>
<tr>
<td>Design post-use survey for PCC residents &amp; fellows</td>
<td>Chris, Andy</td>
<td>2/1/18</td>
</tr>
<tr>
<td>Complete post-use survey with PCC residents &amp; fellows</td>
<td>Jaime</td>
<td>2/25/18</td>
</tr>
<tr>
<td>Analyze results of post-use survey</td>
<td>Jaime</td>
<td>2/25/18</td>
</tr>
</tbody>
</table>

Other measures: qualitative feedback on EMR note template

Plan-Do-Study-Act

- Do the test
- Take notes on problems & observations
  - Access to the EMR note template?
  - Was it easy to use?
  - What did stakeholders like & dislike about the EMR note template?
- Know when to stop the test
  - Can terminate before designated time frame if the test clearly doesn’t work

Plan-Do-Study-Act

<table>
<thead>
<tr>
<th>DO OR IMPROVE</th>
<th>What happened when the test was conducted?</th>
<th>Was the cycle carried out as planned? (yes, no)?</th>
<th>Yes</th>
</tr>
</thead>
<tbody>
<tr>
<td>What did you observe? (i.e., qualitative feedback from the team?)</td>
<td>30% usage of EMR note template</td>
<td>40% sepsis bundle compliance</td>
<td>Qualitative feedback:</td>
</tr>
<tr>
<td>Reported as easy to use and access the note.</td>
<td>Recommended additions of lab results to auto-populate into the note.</td>
<td>Some providers were concerned about increased documentation requirements in an already documentation heavy rotation.</td>
<td></td>
</tr>
</tbody>
</table>

What did you observe that was not part of the plan? |
- There were fewer than anticipated sepsis patients diagnosed and admitted to the Pulmonary Critical Care unit during the testing period
- Needed to develop an educational PowerPoint to help education physicians about our initiative, rationale for the note, and how to access the note template.
Plan-Do-Study-Act

**STUDY OR CONTROL**
Did the measured results and observations meet your objective?
Was your goal achieved (yes, no)? No. We did not achieve goal sepsis note usage or sepsis bundle compliance.

**How do results of this test compare to previous performance?**... noted difference in performance, likely related to small number of sepsis patients and limited scope for this test (i.e., PCC unit).

Yes
- Do you plan to expand the test (yes, no)? Yes. Yes. We plan to test in PCC for a longer period of time (1 month).
- Will you expand the scope (i.e., keep the same conditions, just test more)? Yes. We plan to test in PCC for a longer period of time (1 month).
- Will you expand the scope (i.e., change the conditions)? Yes. We plan to test in PCC for a longer period of time (1 month).

**END**

- What data do you have to distinguish if your method of testing the change failed or if the designed change was not effective? NA

Were there any barriers to the change: implementation (yes, no)? Yes. There was some resistance among a few residents who felt this was documentation burden. Also, there were fewer than expected patients diagnosed with sepsis in the PCC unit during the testing period.

What else did you learn? It is important to address change management issues, including obtaining buy-in, explaining rationale of the test, and make frequent efforts to obtain feedback from stakeholders.

---

**Keep in mind**

- Scale down scope of tests
- Pick willing volunteers
- Choose changes that don’t require long process for approval initially
- Don’t reinvent the wheel

---

**Keep in mind**

- Pick easy changes with good yield
- Avoid technical slow downs
- Reflect on results of EVERY change – even failures
- End the test if there is no improvement

---

**Cycle** | **Date** | **Intervention**
--- | --- | ---
1 | 11/2017 | Completed QI boot camp sessions 1 & 2
2 | 1/2018 | Team’s 1st PDSA cycles, QI coaching offered at request
3 | 4/2018 | Predictive analytics used
4 | 6/2018 | Release of most EPIC EMR tools
Engaging interprofessional teams in quality improvement can decrease sepsis-related mortality

Using a structured approach is key to facilitating continuous quality improvement