1. Sepsis Mortality

- Reduce MHSC sepsis mortality rate by 25% by September 2016
- Reduce mortality rate among patient transfers to U of U by 25% by September 2016
- Increase sepsis bundle adherence (3 hour bundle), to 80% adherence by September 2016
- Increase sepsis early recognition through increase in ability among nurses and providers to identify sepsis

2. Bundle Adherence – 3 hour

- Baseline- 64 charts reviewed from baseline period
- Severe Sepsis
  - Baseline: 55.26%
  - Goal: 60%
- Sepsis Shock
  - Baseline: 63.64%
  - Goal: 72.73%
- Culture
  - Baseline: 71.05%
  - Goal: 100.00%
- Antibiotic
  - Baseline: 68.42%
  - Goal: 74.95%
- Fluids
  - Baseline: N/A
  - Goal: 72.73%
- Overall
  - Baseline: 64.91%
  - Goal: 72.73%

3. Sepsis Early Recognition

Patient transfers to U of U: 47

- Sepsis identified at MHSC prior to transfer: 51.1%
- Sepsis identified & early interventions initiated prior to transfer: 34%

**Impact**

1. Reduce MHSC sepsis mortality rate by 25% by September 2016
2. Reduce mortality rate among patient transfers to U of U by 25% by September 2016
3. Increase sepsis bundle adherence (3 hour bundle), to 80% adherence by September 2016
4. Increase sepsis early recognition through increase in ability among nurses and providers to identify sepsis

**Analysis and Investigation**

- Analysis of data to determine focus areas: decrease sepsis mortality rate (MHSC and transfers to U of U), improve adherence with sepsis 3 hour bundle guidelines, improve ability for early recognition of sepsis by nurses and providers
- Internal MHSC sepsis management team initiated 6/17/2015
- Baseline data reviewed, areas for opportunity identified, goals set

**Improvement Design and Implementation**

- Sepsis management team – start 6/17/15
- Initiation of sepsis screening tools into electronic medical record to assist with early recognition strategies- start 6/17/2015, utilized in EHR 10/6/2015
- Revised sepsis protocol to include nurse driven initiation of NICOM- start 7/29/2015, approved MEC 8/15, initiated on units, workflow of process changed per feedback from units
- Order sets for 3 hour and 6 hour bundle into electronic medical record- start: 10/6/2015, modified per feedback
- Begin screening all patients for sepsis upon arrival to ED- start: 7/29/2015
1. Problem: Sepsis Management

Sepsis is the leading cause of death among hospitalized patients nationwide
- Between 28% and 50% of people who get sepsis die
- The number of sepsis cases in the United States continues to rise each year

At MHSC:
- 15.75% of our patients diagnosed with sepsis died between April 2014 and June 2015
- 14.89% of our patients of which we transferred to U of U with sepsis between April 2014 and June 2015 died
- 68.82% of our patients diagnosed with sepsis had all elements of the recommended best practice 3 hour bundle initiated
- Early recognition remains an opportunity for improvement to identify sepsis early, improve outcomes of our patients, and reduce complications that may arise when sepsis has gone unnoticed

2. Analysis and Investigation-Electronic medical record integration-Order Sets

- Screening tools changed/tweaked per workflow recommendations from frontline users
- Order sets and workflow added to hospital policy stat for reference
- Screening tools used on pediatrics- education and changing of screening tools to reflect for adult population only
- Adjustment of protocol to patient condition necessary
  - Fluid challenge, bolus for patients in fluid overload

3. Improvement Design- Electronic medical record integration- Screening Tools

4. Improvement Design- Education program

- Providers and clinical personnel required to complete sepsis education program, available to all employees if interested, education encouraged
- Providers providing education on different stages of sepsis
- Hands-on NICOM review, improved NICOM familiarity

<table>
<thead>
<tr>
<th>Pre-assessment - Clinical and Physician</th>
<th>Perform</th>
<th>Infection only</th>
<th>SIRS</th>
<th>Sepsis</th>
<th>Severe Sepsis</th>
<th>Septic Shock</th>
<th>NICOM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Providers, Nurses, and Essential Services ability to recognize:</td>
<td>58.54%</td>
<td>57.72%</td>
<td>34.96%</td>
<td>29.27%</td>
<td>40.65%</td>
<td>52.03%</td>
<td></td>
</tr>
<tr>
<td>Overall 44% n=122</td>
<td>Attempts: 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Post-assessment - Clinical and Physician (completed Dec 2015)</th>
<th>Perform</th>
<th>Infection only</th>
<th>SIRS</th>
<th>Sepsis</th>
<th>Severe Sepsis</th>
<th>Septic Shock</th>
<th>NICOM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Providers, Nurses, and Essential Services ability to recognize:</td>
<td>84.26%</td>
<td>77.16%</td>
<td>67.01%</td>
<td>64.98%</td>
<td>72.59%</td>
<td>80.39%</td>
<td></td>
</tr>
<tr>
<td>Overall 77% n=116</td>
<td>Average attempts: 1.7</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Plan: Continue with ongoing education and re-assess understanding in June 2016
### Sepsis Bundle Adherence - 3 hr

<table>
<thead>
<tr>
<th>Item</th>
<th>Q3 2015</th>
<th>Q4 2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lactate</td>
<td>37%</td>
<td>50%</td>
</tr>
<tr>
<td>Culture</td>
<td>68.45%</td>
<td>100.00%</td>
</tr>
<tr>
<td>Antibiotic</td>
<td>37%</td>
<td>50%</td>
</tr>
<tr>
<td>Fluids</td>
<td>N/A</td>
<td>50%</td>
</tr>
<tr>
<td>Average</td>
<td>47.5%</td>
<td>62.5%</td>
</tr>
</tbody>
</table>

| Lactate       | 74%     | N/A     |
| Culture       | 87%     | N/A     |
| Antibiotic    | 82%     | N/A     |
| Fluids        | N/A     | 38%     |
| Average       | 81%     | 38%     |

* Q4 Data for Sepsis Bundle Adherence – 3 hr changed in methodology of data collection as the standardized SEP-1 measure was initiated in October 2015. Utilizing data from SEP-1 measure starting with Q4 2015 data.

### Sepsis Early Recognition

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>51.5%</td>
<td>66.7%</td>
<td>33.3%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Sepsis, any form, identified and documented as an clinical impression prior to transfer to U of U (among transfers in which sepsis, any form, was present on admission to U of U)

### Sepsis Average Length of Stay

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>4.991</td>
<td>5.962</td>
<td>3.556</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Sepsis, any diagnosis, acute inpatient encounters, excludes inpatient deliveries, newborns, and behavioral health

### Sepsis 30-day Readmissions

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>4.43%</td>
<td>10%</td>
<td>14.7%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Sepsis readmissions/total 30-day readmissions- acute care inpatient encounters, excludes inpatient deliveries, newborns, and behavioral health