Clinical Safety & Effectiveness
Cohort 18 Team #7

Increasing Early Detection of Sepsis

The Team

- Division
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  - CS&E Participant: Alexandra Castro, MD
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  - CS&E Participant: Helena Quezon, RN
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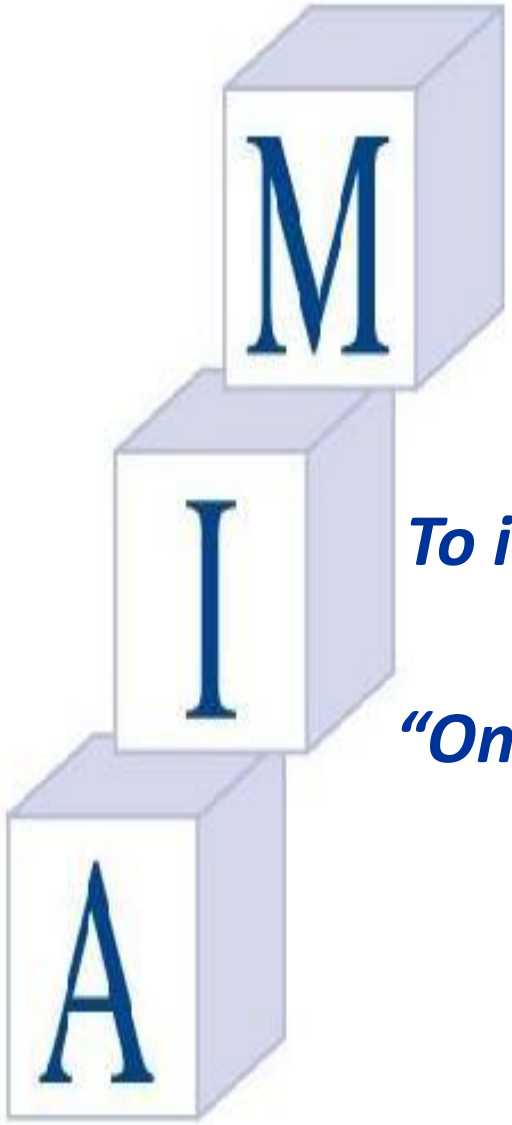
  - Facilitator: Edna Cruz, M.Sc., RN, CPHQ, CPPS

- Sponsoring Departments
  - Dr. James Barker, UHS VP for Clinical Services CMO Office
  - Dr. Luci Leykum, Division Chief of General and Hospital Medicine
  - Ronald Estrella, RN, Executive Director of Nursing on 5th floor
  - Dr. Daniel Dent, Program Director of General Surgery Residency Program
  - Dr. Jan Patterson, Associate Dean for Quality and Lifelong Learning



STATEMENT

To increase early detection of sepsis on the fifth floor Acute Care Unit at UHS hospital by reducing

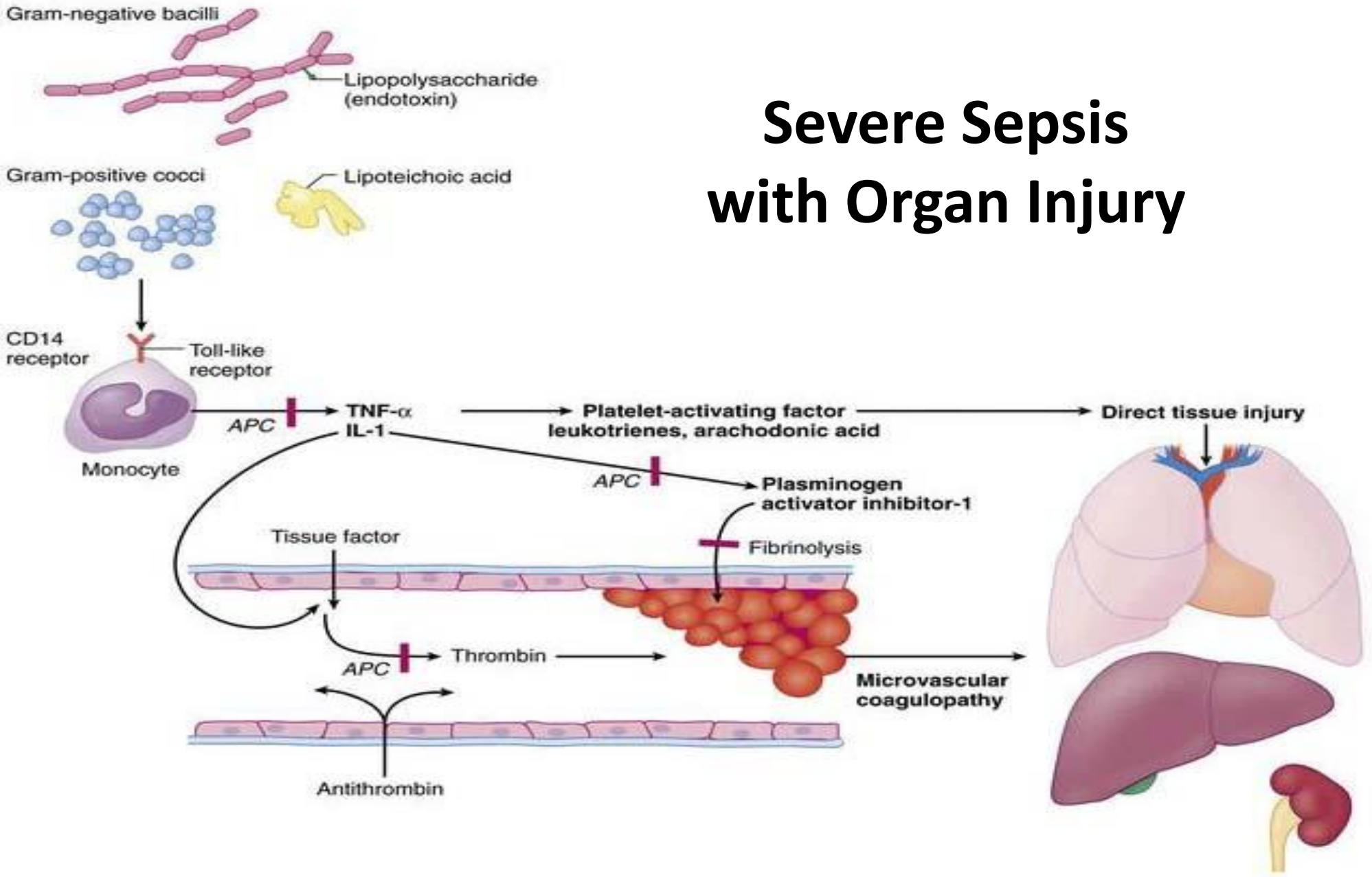
"Onset of sepsis to MD antibiotic order" cycle time by 50% from 9:28 to 4:44 hours

by May of 2016.

Project Milestones

- Team Created — Jan 2016
- AIM statement created — Feb 2016
- Weekly Team Meetings — Jan-April 2016
- Background Data, Brainstorm Session, Workflow and Fishbone Analyses — Jan-Feb 2016
- Interventions Implemented — Mar-April 2016
- Data Analysis — May 2016
- CS&E Presentation — Jun 3rd, 2016

Severe Sepsis with Organ Injury



Background

- Sepsis is a common problem with a major global impact on healthcare resources and expenditure.
- Developed countries sepsis incidence : 300 cases per 100,000 population and rising.
- Mortality for patients with severe sepsis or septic shock ranges between 20% and 50%.
- The Surviving Sepsis Campaigns promoted internationally recognized pathways to improve the management of sepsis.
- To translate recommendations into the daily practice is challenging and requires a multi-disciplinary approach.

Background

- Severe sepsis: sepsis + sepsis-induced organ dysfunction or tissue hypo perfusion.
- Septic shock : severe sepsis criteria + hypotension despite IV fluid resuscitation.
- Fundamental approach: early recognition, appropriate, timely delivery of antibiotics, source control.
- Mortality increases by 7.6% for every hour delay in starting antibiotic therapy.
- Early goal-directed therapy (EGDT) has previously been associated with a 34% relative risk reduction in mortality.

Background

- The Surviving Sepsis Campaign
  - Joint collaboration of the Society of Critical Care Medicine and the European Society of Intensive Care Medicine committed to reducing mortality from sepsis worldwide.
  - Implementation of a core set of evidence-based interventions, otherwise known as ‘resuscitation bundles’
- Sepsis Six:
  - three diagnostic and monitoring steps and three therapeutic interventions:

Background- Sepsis six

1. Deliver high-flow oxygen
2. Take blood cultures prior to antibiotics but do not delay treatment
3. Administer empirical intravenous antibiotics
4. Measure serum lactate
5. Start intravenous fluid resuscitation with crystalloids
6. Commence urine output monitoring via either a catheter or chart

Bibliography

1. Kumar, P., Jordan, M., Caesar, J., & Miller, S. (2015). Improving the management of sepsis in a district general hospital by implementing the “Sepsis Six” recommendations. BMJ Quality Improvement Reports, 4(1), u207871.w4032. http://doi.org/10.1136/bmjquality.u207871.w4032

2. Dellinger RP, Levy MM, Rhodes A et al. Surviving sepsis campaign: International guidelines for the management of severe sepsis and septic shock: 2012. Crit Care Med 2013;41(2):580–637 [PubMed]

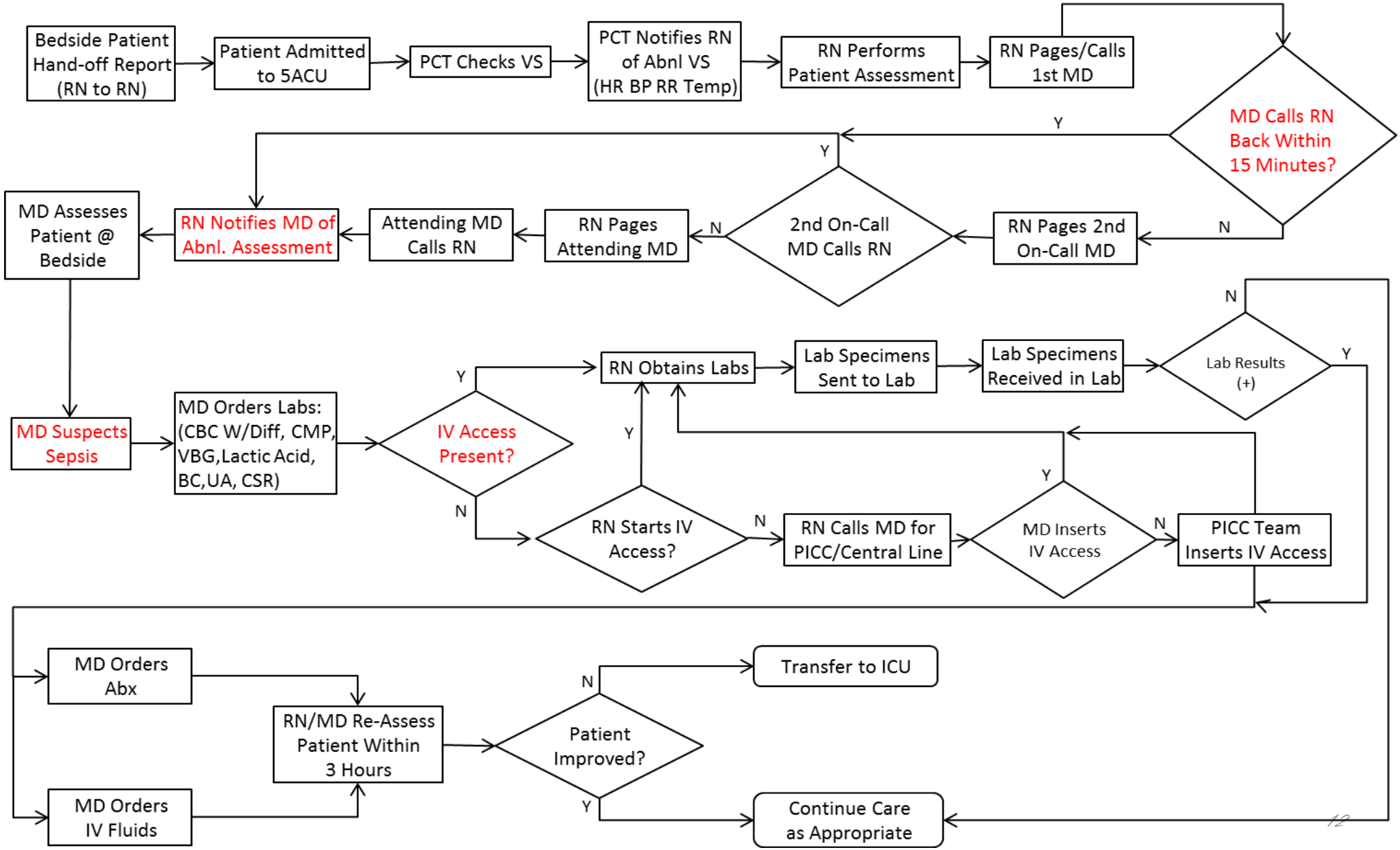
3. Rivers E, Nguyen B, Havstad S et al. Early goal-directed therapy in the treatment of severe sepsis and septic shock. N Engl J Med 2001;345:1368–77. [PubMed]

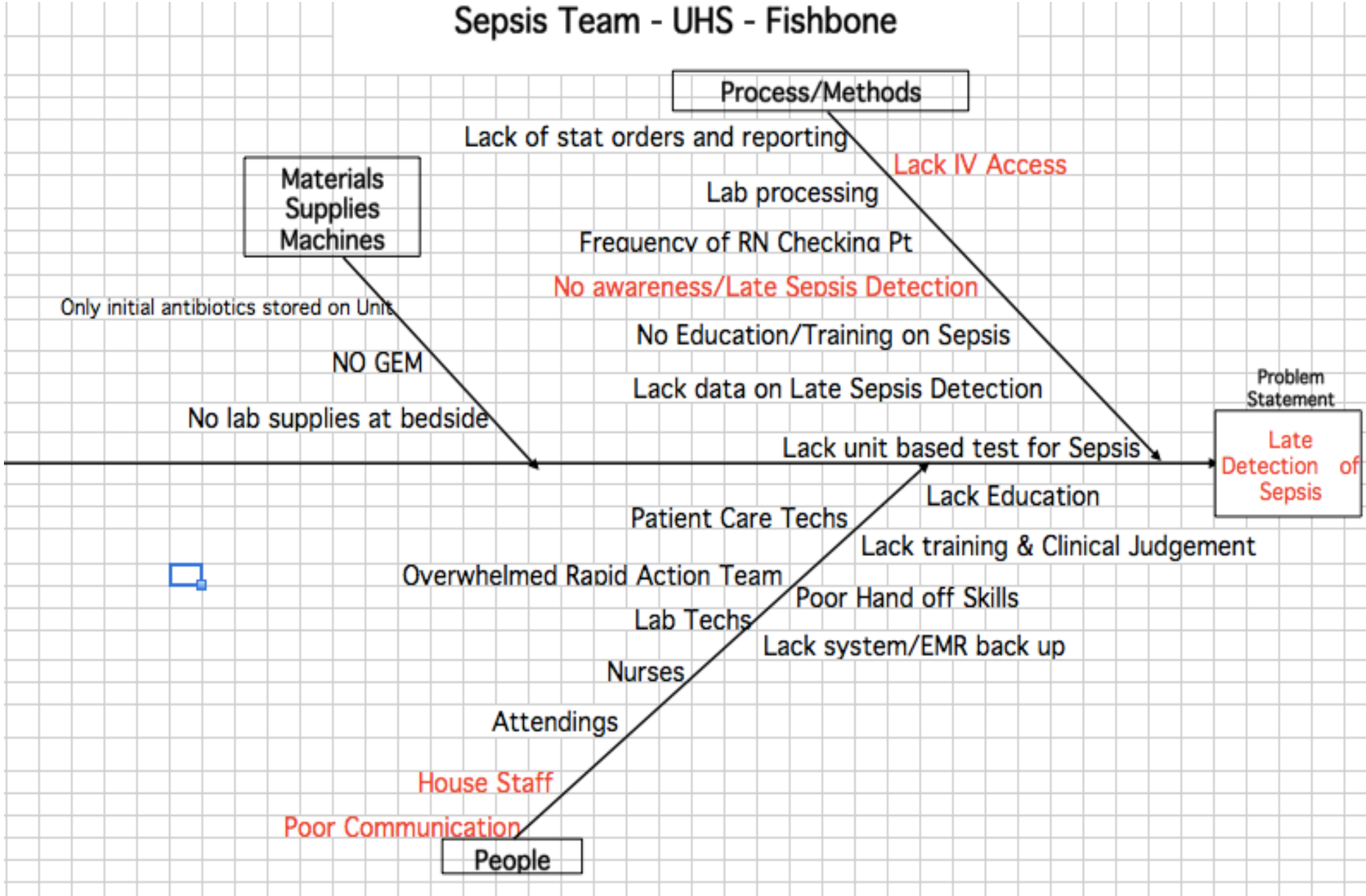
4. Robson WP, & Daniels R The Sepsis Six: helping patients to survive sepsis. Br J Nurs 2008;17:16–21 [PubMed]

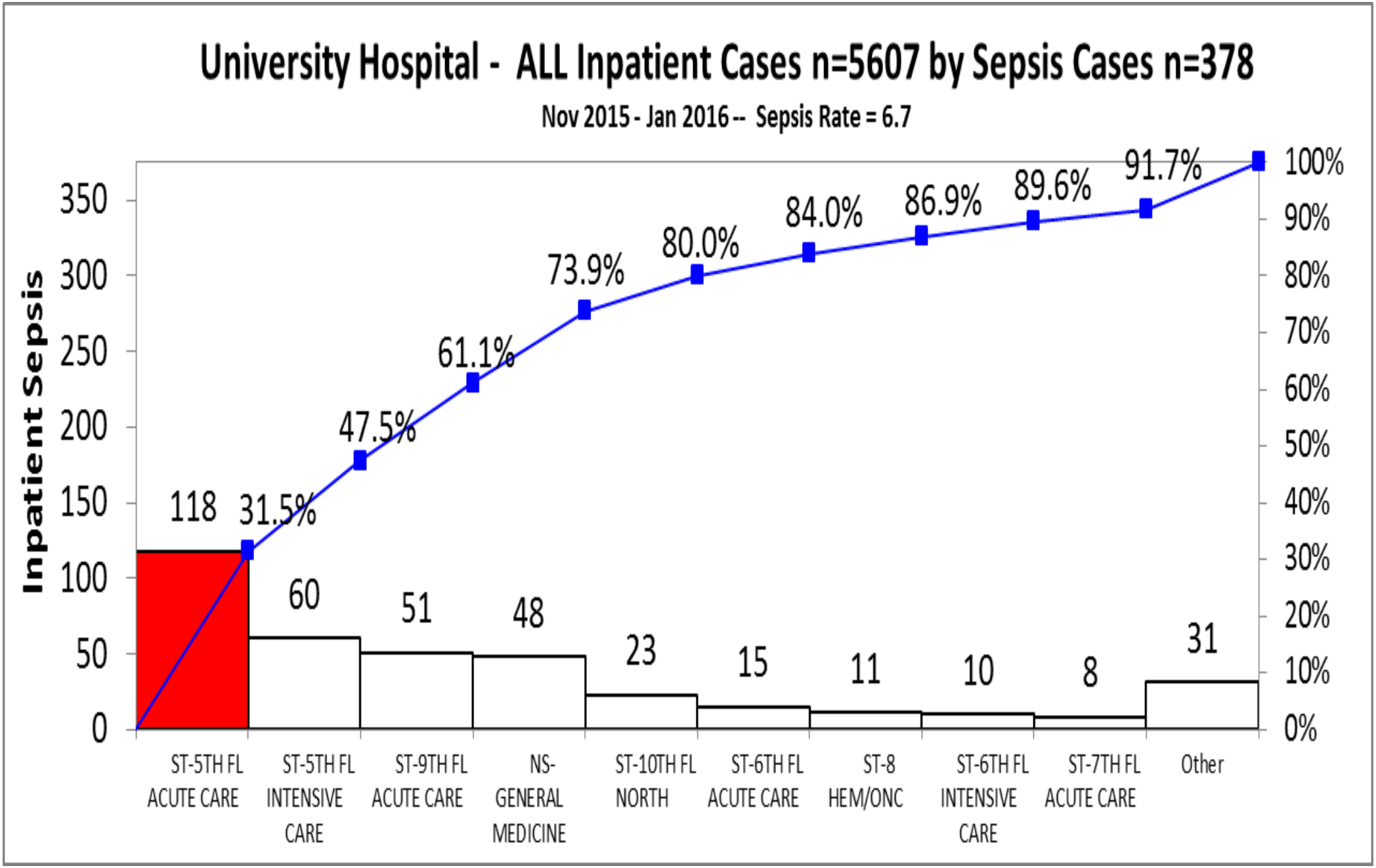
Plan - Determine the Baseline Performance

- Flow to determine bottle neck issues for lack of performance
- Cause and Effect Diagram to determine the root cause for non-performance
- Pareto chart to narrow to a focus
- Process control chart to determine stability of the process and present performance

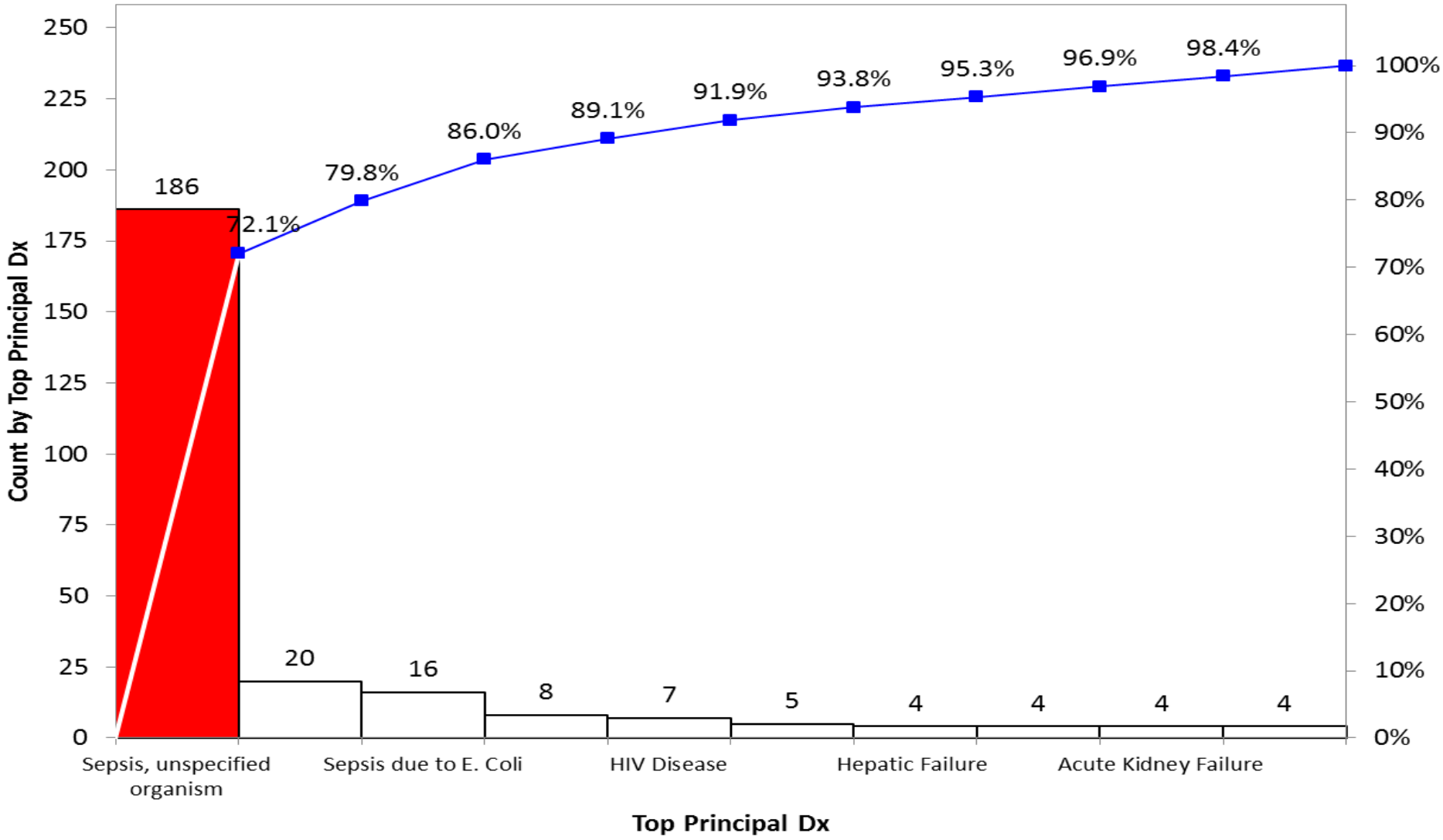
Sepsis Team - UHS 5ACU - Flow Diagram

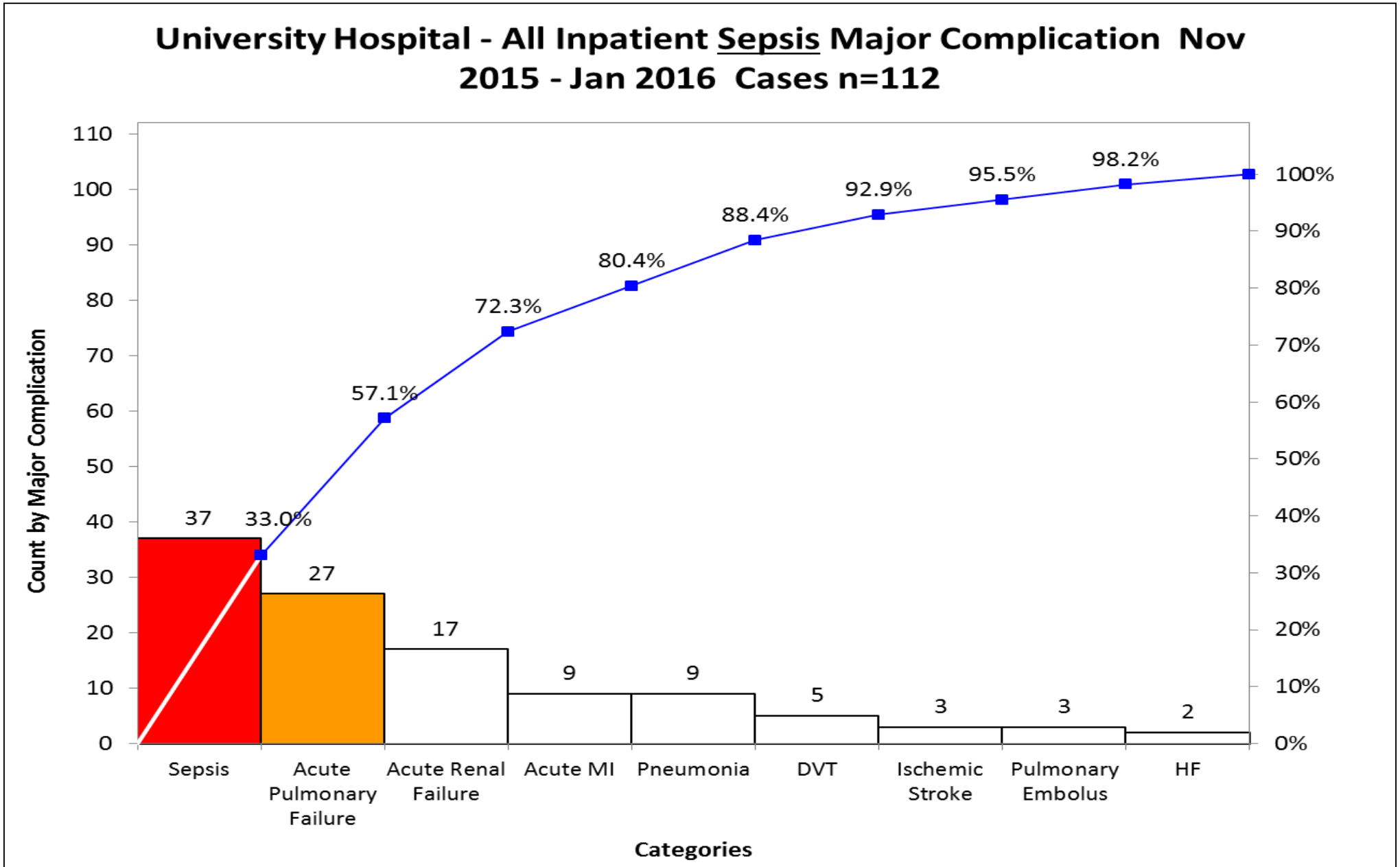


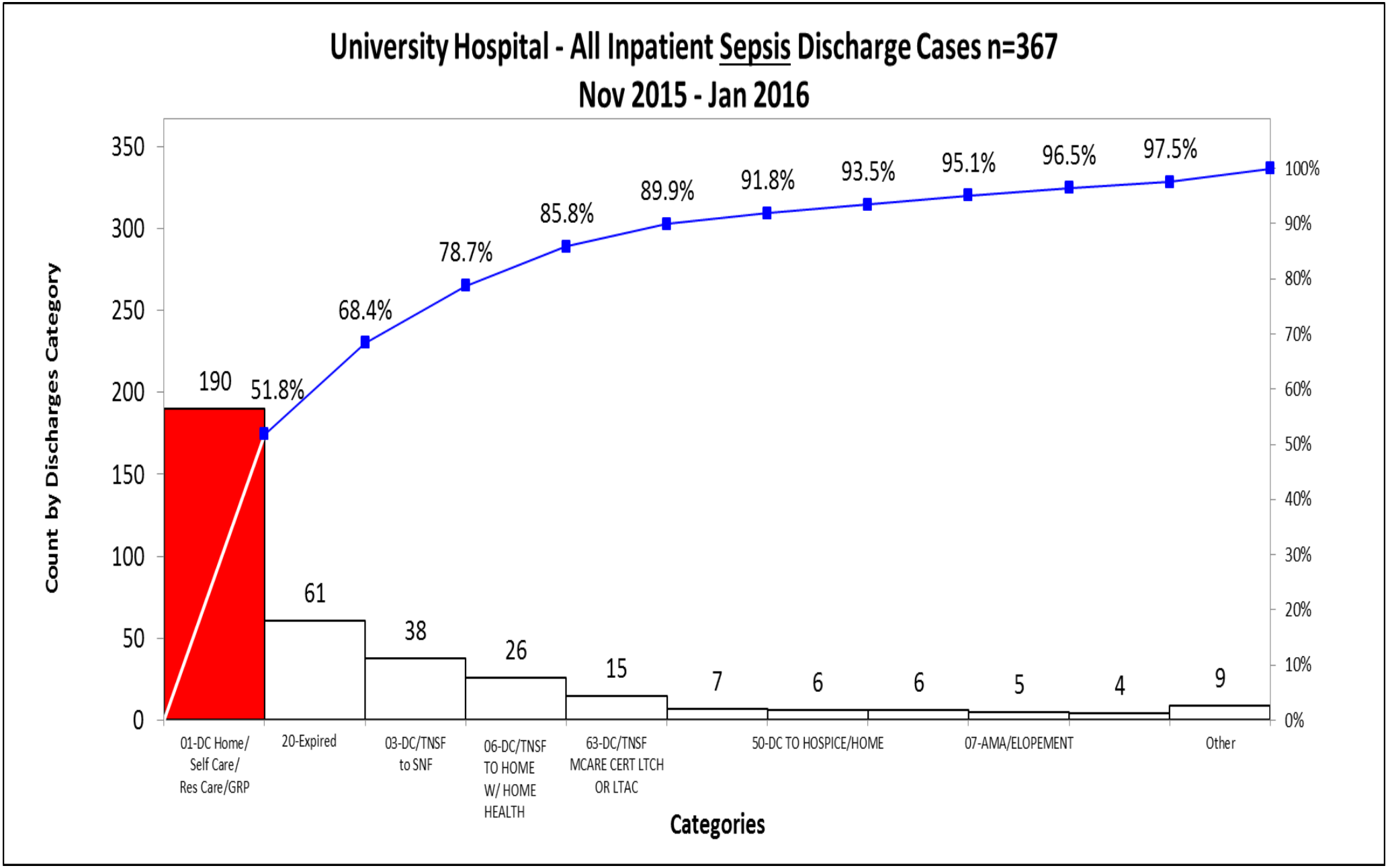

Sepsis Team - UHS - Fishbone
Process/Methods
Lack of stat orders and reporting
Lack IV Access
Lab processing
Frequency of RN Checking Pt
No awareness/Late Sepsis Detection
No Education/Training on Sepsis
Lack data on Late Sepsis Detection
Lack unit based test for Sepsis
Lack Education
Lack training & Clinical Judgement
Poor Hand off Skills
Lack system/EMR back up
Materials
Supplies
Machines
Only initial antibiotics stored on Unit
NO GEM
No lab supplies at bedside
Problem Statement
Late Detection of Sepsis
Patient Care Techs
Overwhelmed Rapid Action Team
Lab Techs
Nurses
Attendings
House Staff
Poor Communication
People

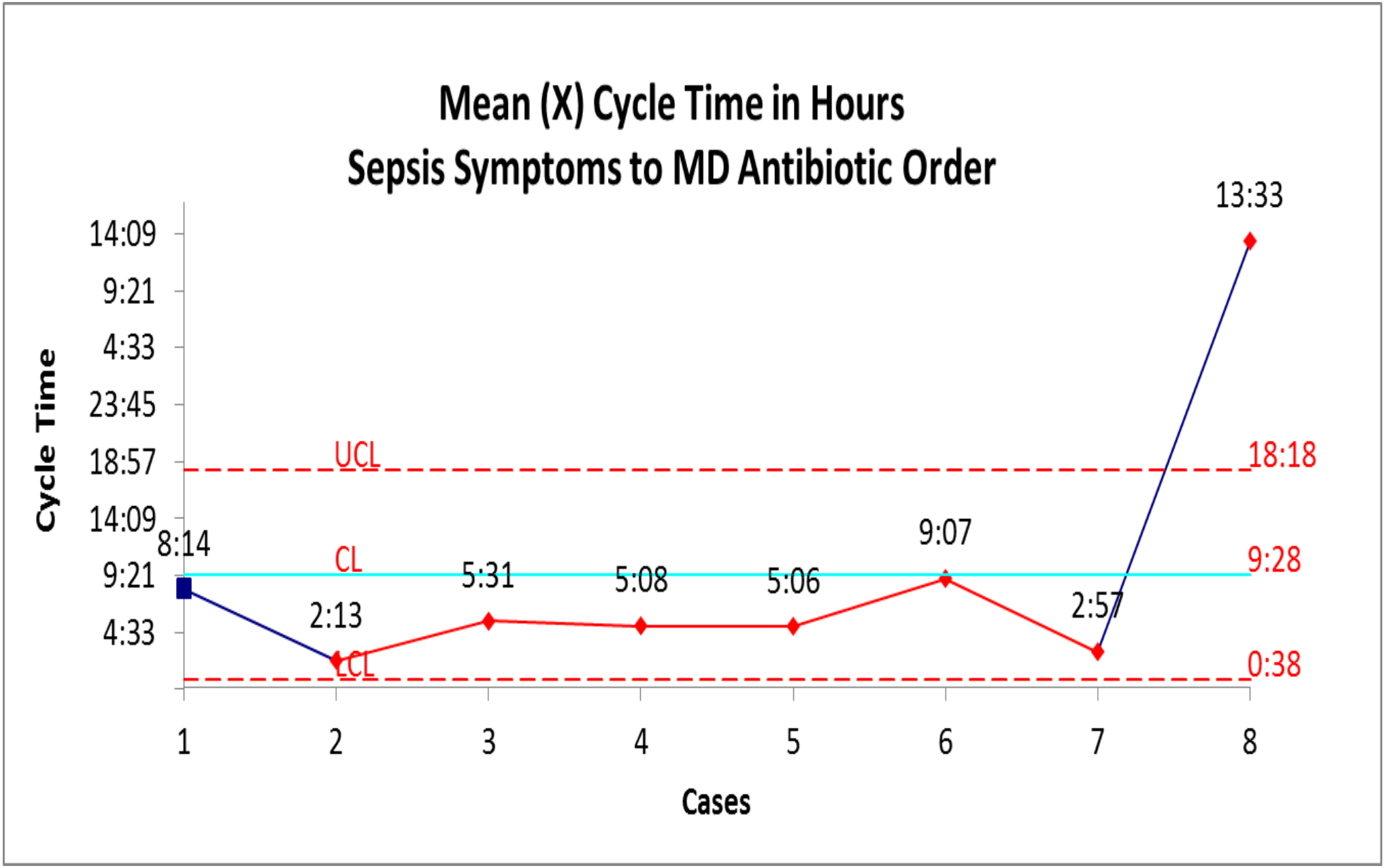

University Hospital - ALL Inpatient Cases n=5607 by Sepsis Cases n=378
Nov 2015 - Jan 2016 -- Sepsis Rate = 6.7
Inpatient Sepsis
350
300
250
200
150
100
50
0
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
118
60
51
48
23
15
11
10
8
31
31.5%
47.5%
61.1%
73.9%
80.0%
84.0%
86.9%
89.6%
91.7%
ST-5TH FL ACUTE CARE
ST-5TH FL INTENSIVE CARE
ST-9TH FL ACUTE CARE
NS-GENERAL MEDICINE
ST-10TH FL NORTH
ST-6TH FL ACUTE CARE
ST-8 HEM/ONC
ST-6TH FL INTENSIVE CARE
ST-7TH FL ACUTE CARE
Other

University Hospital - All Inpatient Top Principal Dx
Nov 2015 - Jan 2016 Cases n=112




University Hospital - All Inpatient Sepsis Major Complication Nov 2015 - Jan 2016 Cases n=112
Count by Major Complication
110
100
90
80
70
60
50
40
30
20
10
0
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
37
27
17
9
9
5
3
3
2
33.0%
57.1%
72.3%
80.4%
88.4%
92.9%
95.5%
98.2%
Sepsis
Acute Pulmonary Failure
Acute Renal Failure
Acute MI
Pneumonia
DVT
Ischemic Stroke
Pulmonary Embolus
HF
Categories


University Hospital - All Inpatient Sepsis Discharge Cases n=367
Nov 2015 - Jan 2016
Count by Discharges Category
350
300
250
200
150
100
50
0
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
190
61
38
26
15
7
6
6
5
4
9
51.8%
68.4%
78.7%
85.8%
89.9%
91.8%
93.5%
95.1%
96.5%
97.5%
01-DC Home/ Self Care/ Res Care/GRP
20-Expired
03-DC/TNSF to SNF
06-DC/TNSF TO HOME W/ HOME HEALTH
63-DC/TNSF MCARE CERT LTCH OR LTAC
50-DC TO HOSPICE/HOME
07-AMA/ELOPEMENT
Other
Categories


Mean (X) Cycle Time in Hours
Sepsis Symptoms to MD Antibiotic Order
Cycle Time
14:09
9:21
4:33
23:45
18:57
14:09
9:21
4:33
UCL
CL
LCL
18:18
9:28
0:38
8:14
2:13
5:31
5:08
5:06
9:07
2:57
13:33
1
2
3
4
5
6
7
8
Cases

DO – Plan & Test the Actions

- *After analysis of UH statistics in preliminary data analysis and noticed that the majority of sepsis occurred on 5ACU and not in 6ACU, teaching and implementation of screening tool was done in 5ACU (Feb 2016, completed)*

- *The primary and secondary outcome analysis will be based on the data collected from screening tool and chart review (May 2016, completed)*

PLAN: Intervention

- Initial analysis of pre-intervention data
- Screening tool implementation
- Post-Intervention data to be collected until May
- Final analysis of post-intervention data

PLAN: Intervention

Dynamic changes in statement, population, and primary and secondary outcomes:

- **Population:** Change the focus from 6ACU to 5ACU
- **Primary outcome:** Cycle time from time of sepsis onset to initiation of antibiotics for patients located on 5ACU
- **Secondary outcomes:** ICU transfers and mortality

Action Plan

Aim Statement: To increase early detection of sepsis on the fifth floor ACU in UHS hospital by 20% by May of 2016.

Action Strength	Action Driver (Taken from Flow or Cause & Effect Diagram)	Action	Who?	Why? (Choose one)	Start Date
Strong	**Lack od data on late sepsis detection**	Sepsis Screening Tool	Maria Salak, RN Helena Quezon, RN	**1) Standardize 2) Simplify 3) Reduce Wasted Time 4) Redesign the process**	**March 1st-ongoing**
Strong	No awereness/ late sepsis detection	Teaching Material for the Sepsis Screening Tool	Maria Salak, RN Helena Quezon, RN	**1) Standardize 2) Simplify**	**Feb 22nd-29th**
Strong	No education/training in sepsis	Educate and Train the nurses & MDs	Maria Salak, RN Helena Quezon, RN Ha Lam, MD Alexandra Castro MD	**1) Standardize 2) Simplify**	**Feb 22nd-29th**
Strong	Lack systems/ EMR back up	Automate the Screening Tool	Mohammed Al Fayyadh, MD	**1) Software Modification & Enhancement**	**Feb 22th-march 5th**

Intervention 1

Date: ____/____/____
Time: ____: ____ (24 hr. clock)

Patient label

SEPSIS SCREENING TOOL

Instructions: Use this tool to screen patients for sepsis upon admission or inpatients if infection is suspected.

Location: _____

1. Underlying Diagnosis : _____

2. Source of infection suspected? ☐YES ☐NO

3. Is this patient have lines/drains/Foley?

☐PICC/midline ☐TLC/DL ☐MEDIPORT

☐PERMACATH/temporary catheter (Quinton) ☐FOLEY/suprapubic

☐OPEN WOUND/PRESSURE ULCER

4. Does this patient meet (SIRS) criteria?

☐Hyperthermia >100.4°F (38 °C) ☐Hypothermia <97 °F (36 °C)

☐Tachycardia HR > 90 bpm ☐Tachypnea RR >22bpm

☐WBC (leukocytosis) >12,000µ-1/Bands >10% ☐WBC (Leukopenia) <4,000µ-1

☐PaCO2 <32mmhg ☐ SBP <100mm Hg

☐Altered mental status from baseline (GCS <13)

If you check 2 or more boxes on question 4, suspect presence of infection.

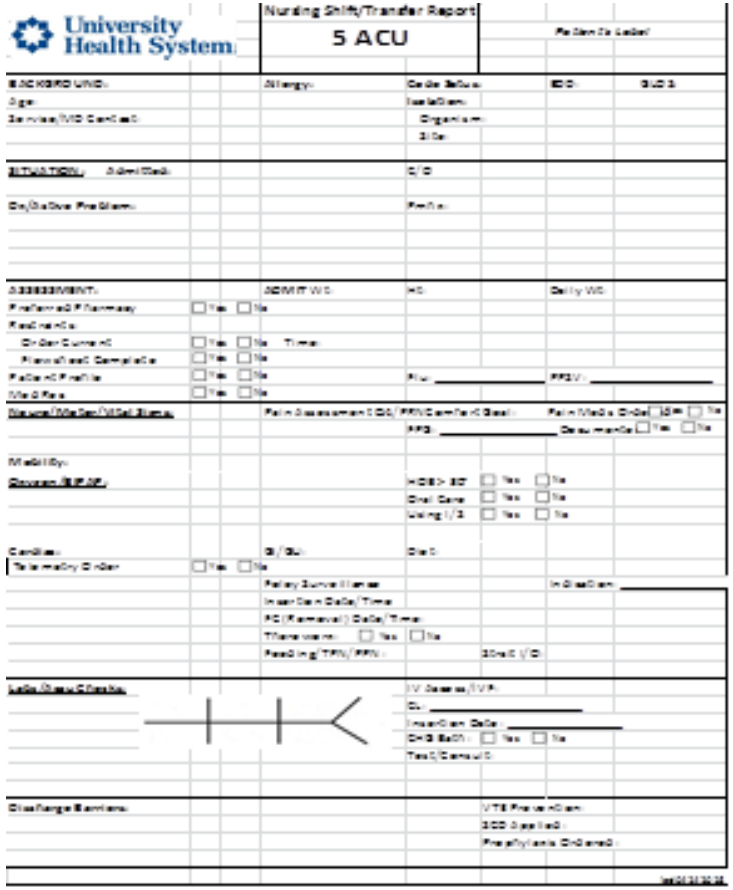
5. Code Sepsis activated? **(RRT 30975 /ACT on the floor)** ☐Yes ☐No

6. Name of MD notified? _____ Time: _____

7. Did MD order Sepsis Protocol within 3hours?

☐Lactic acid ☐Blood cultures ☐Initiate antibiotics ☐IVFluids

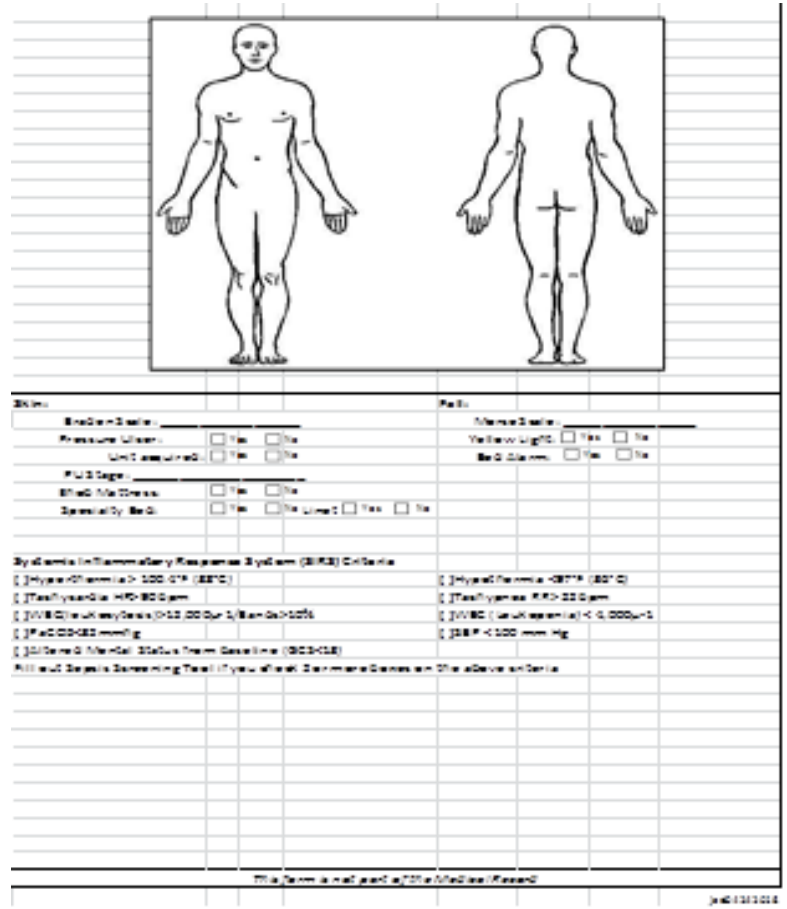
Intervention 1: SIRS criteria



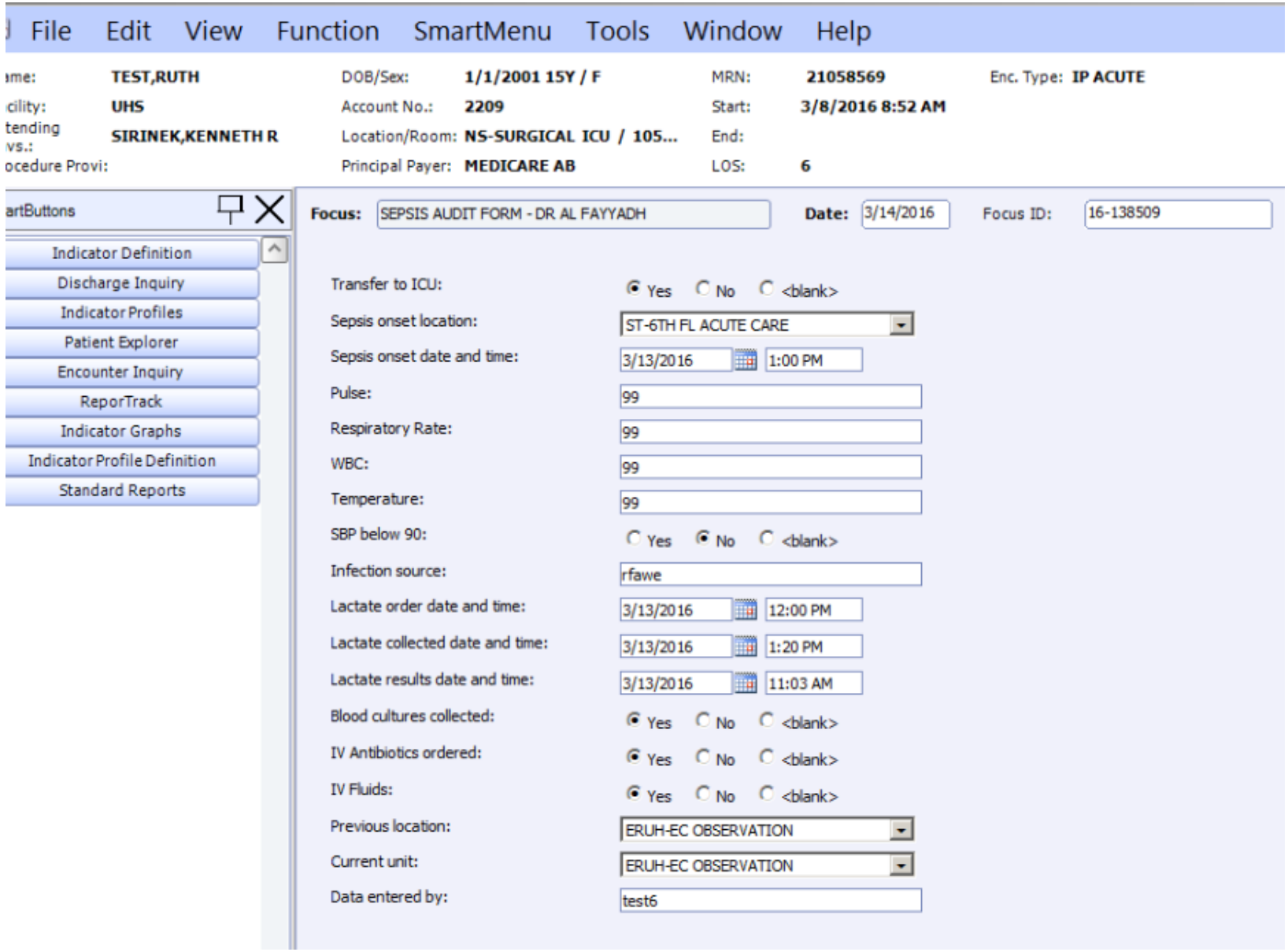
University Health System

Nursing Shift/Transfer Report

5 ACU

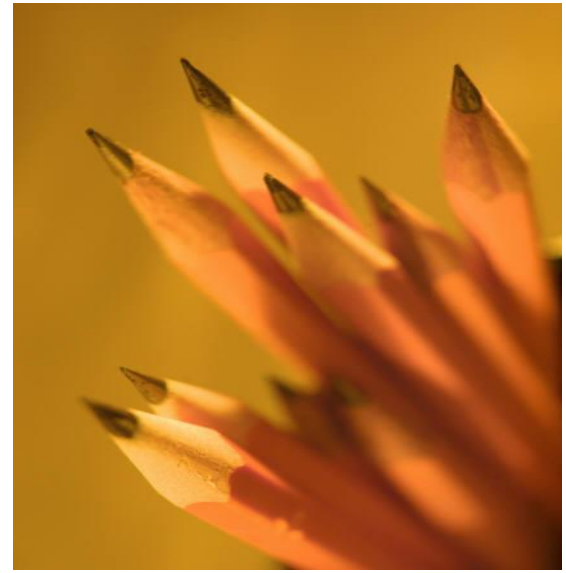


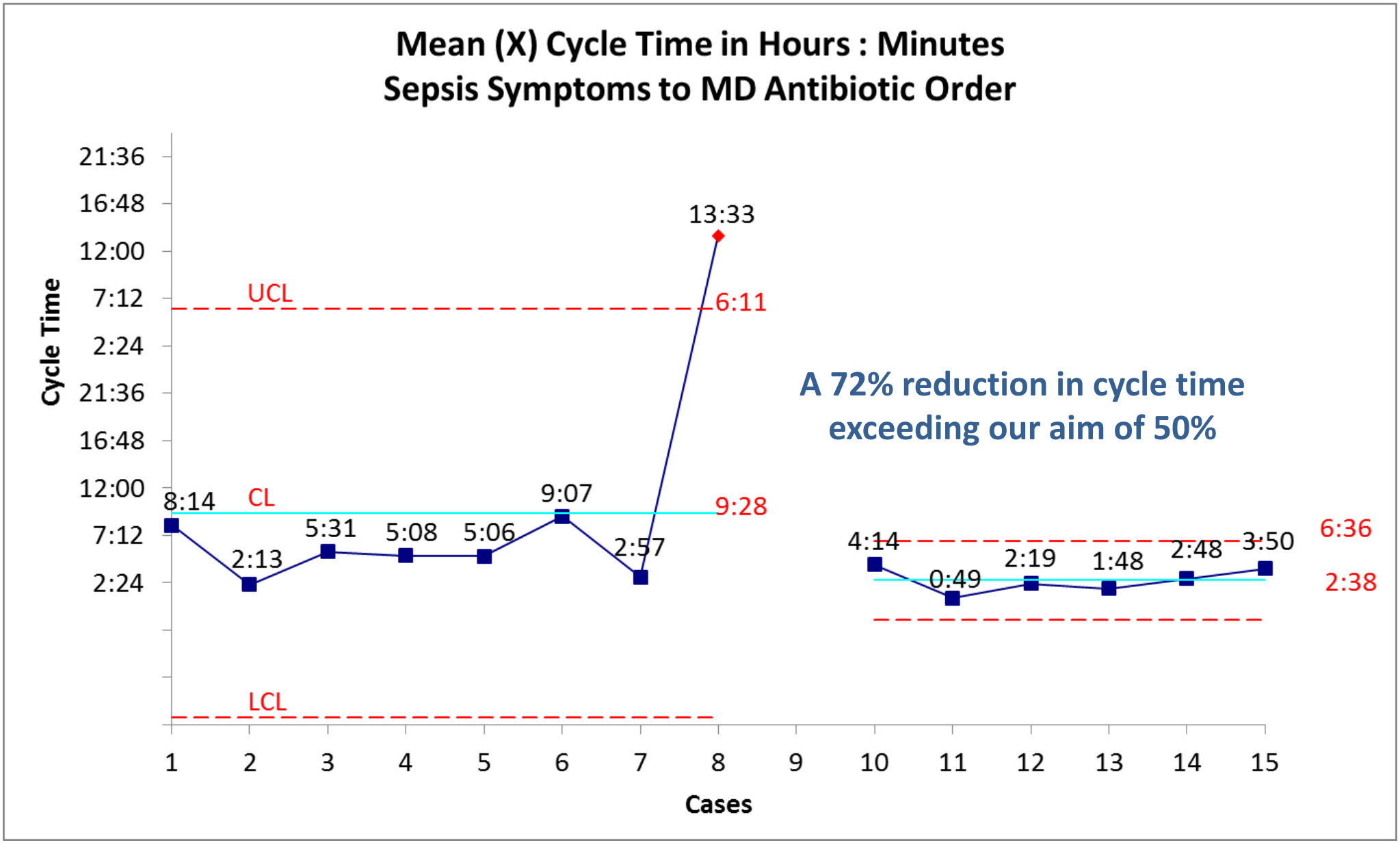
Intervention 2



CHECK/STUDY THE PROGRESS…

- Compare the results to the plan




Mean (X) Cycle Time in Hours : Minutes
Sepsis Symptoms to MD Antibiotic Order
Cycle Time
21:36
16:48
12:00
7:12
2:24
21:36
16:48
12:00
7:12
2:24
UCL
6:11
CL
9:28
LCL
8:14
2:13
5:31
5:08
5:06
9:07
2:57
13:33
A 72% reduction in cycle time
exceeding our aim of 50%
4:14
0:49
2:19
1:48
2:48
3:50
6:36
2:38
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
Cases

Nursing Survey

- 4 question survey using a 5 point Likert scale given to 5ACU RNs
- 42% of RNs felt confident diagnosing or recognizing sepsis PRIOR to the use of the Sepsis Screening Tool
- 64% of RNs felt confident diagnosing or recognizing sepsis AFTER the use of the Sepsis Screening Tool
- 48% of RNs felt that the tool changed the way they managed patients
- Neutral response in terms of time management

Act - Modify Plan for Next Test of Change

- ✓ Use the tool as part of shift change protocol for the nursing staff
- ✓ Incorporate an automated version of the tool into Sunrise
- ✓ If proven helpful this tool must be part of the new Employee or Unit Orientation, Graduate Medical Education and Continuing Education courses
- ✓ More data analysis and reporting to come.

Act - Modify Plan for Next Test of Change

- Continue to monitor and report the data to the staffs.
- Spread best practice to the ED and other units as appropriate.
- Focus education and training on proper tool use, its benefits and patient selection.

Benefits

- Standardizing and facilitating the right care via use of a protocol reduces both transfers to the ICU and mortality.

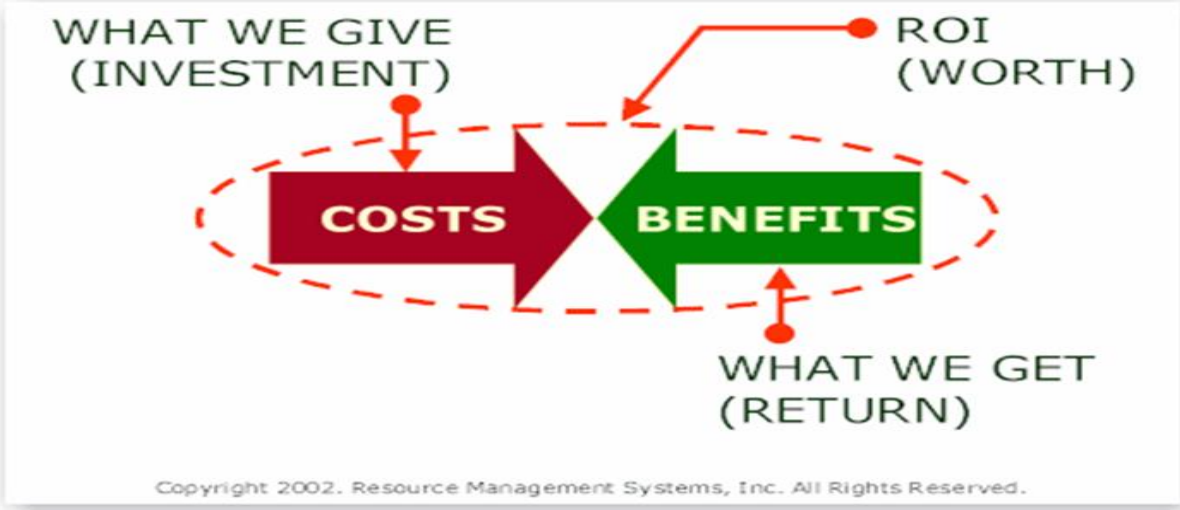
Barriers

– Bedside nurse may view screening tool as added workload and extra paperwork to be filled out.

– Additional unit activities on the wards may affect the timing and implementation of the screening tool.

Return on Investment

- Improved care represents fewer patients died with subsequent with a lower hospital ALOS and costs.
- % Mortality dropped from 4 of 8 or 50% to 0 of 6 or 0%

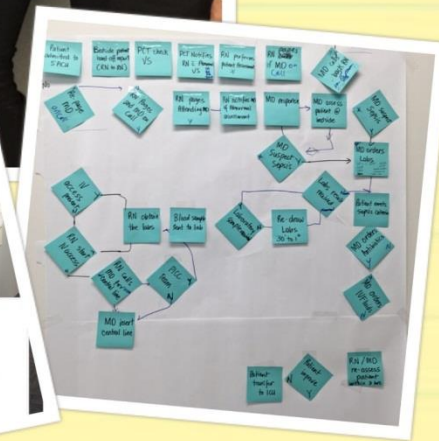


- Fewer transfers to the ICU represents a reduction in use of a highly skilled ICU and subsequent ALOS.
- % ICU transfers dropped from 8 of 8 or 100% to 4 of 6 or 66%

Return on Investment

ROI on Sepsis Cases						
	Pre-Intervention			Post-Intervention		
% Mortality	4/8 or 50%			0/6 or 100%		
	LIVED n=4	DIED n=4	TOTAL POPULATION	LIVED n=6	DIED n=0	TOTAL POPULATION
Hospital ALOS	31.3	16.5	23.9	10.7	0	10.7
Hospital Average Cost	$41,264	$26,317	$33,790	$15,355	$0	$15,355
Total Hospital Days	125	66	191	64	0	64
Total Hospital Cost	$165,058	$105,266	$270,324	$92,127	$0	$92,127
% ICU Transfers	8/8 or 100%			4 of 6 or 66%		
	ICU Days	Non-ICU Days	TOTAL POPULATION	ICU Days	Non-ICU Days	TOTAL POPULATION
ALOS	11.4	12.5	23.9	3.3	7.3	10.7
Total Days	91	100	191	20	44	64


Clinical Safety & Effectiveness
Cohort 18 Team #7
Increasing Early Detection of Sepsis
CENTER FOR PATIENT SAFETY & HEALTH POLICY
UT HEALTH SCIENCE CENTER
SAN ANTONIO



THANK YOU!