



Clinical Safety & Effectiveness

Cohort # 21 Team 5

Ordering Body Fluids for Laboratory Testing



Educating for Quality Improvement & Patient Safety

THE UNIVERSITY OF TEXAS
MD ANDERSON
CANCER CENTER
Making Cancer History

The Team



- Division

- Ashley Schutz , *MLS (ASCP)^{CM}*
- Joy Wortham, MD, Hospitalist
- Stephanie Knight, MSN, RN,CCTN,CVRN

Ancillary Team members

- Jennifer Reed RN
- Norma Pena, MT (ASCP)
- Hazel Lee, RN, EMR
- Michael Shoffeit, MD, Internal Medicine
- Michelle Ogunwole, MD, VA Chief Resident
- Edna Cruz, M.Sc., RN, CPHQ, CPPS

- Sponsor Department

- Stephanie Whitehead
- Dr. Emily Volk

BACKGROUND

Body Fluid specimens are sent for laboratory testing to be used as part of the diagnostic process for patients.

Body fluids that are missing or have incorrect orders risk laboratory testing not being performed and/or being delayed and affecting the accuracy of results.

Body fluids often are considered “irretrievable specimens” and are difficult to recollect. Correct ordering is imperative for proper patient care.

What do these errors cost?

Background:

- Hospital-based errors are 8th leading cause of death in US
 - 1 million injuries
 - 11% patients – received potentially harmful care
 - 46% patients – didn't receive recommended care
 - 1.5 million preventable adverse drug events
 - 2.4 million extra days of hospitalization
 - Increased hospital costs of \$17 billion
- 75% of clinical lab errors are part of the pre-analytical process

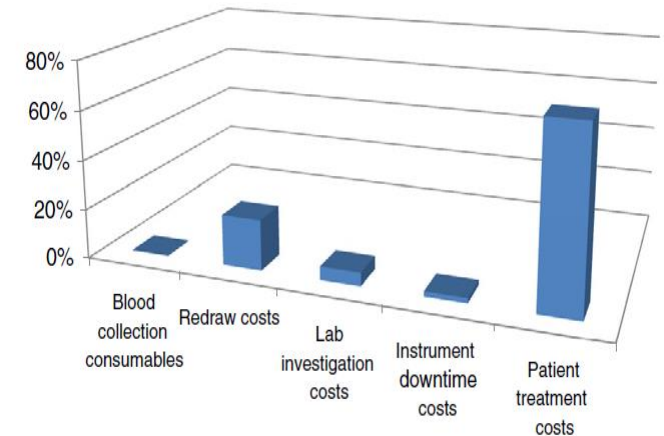


Fig. 2. The total cost of specimen rejection can be quantified by cost category.

Average cost of a preanalytical error: \$208.00

***Up to 1.2% of total hospital operating costs**

***Average hospital of 650 beds = approximately \$1,199,122 per year**

The most important cost is to the patient

☹️ Delayed or Incomplete testing

☹️ Misdiagnosis

☹️ Improper treatment

☹️ Repeat procedures

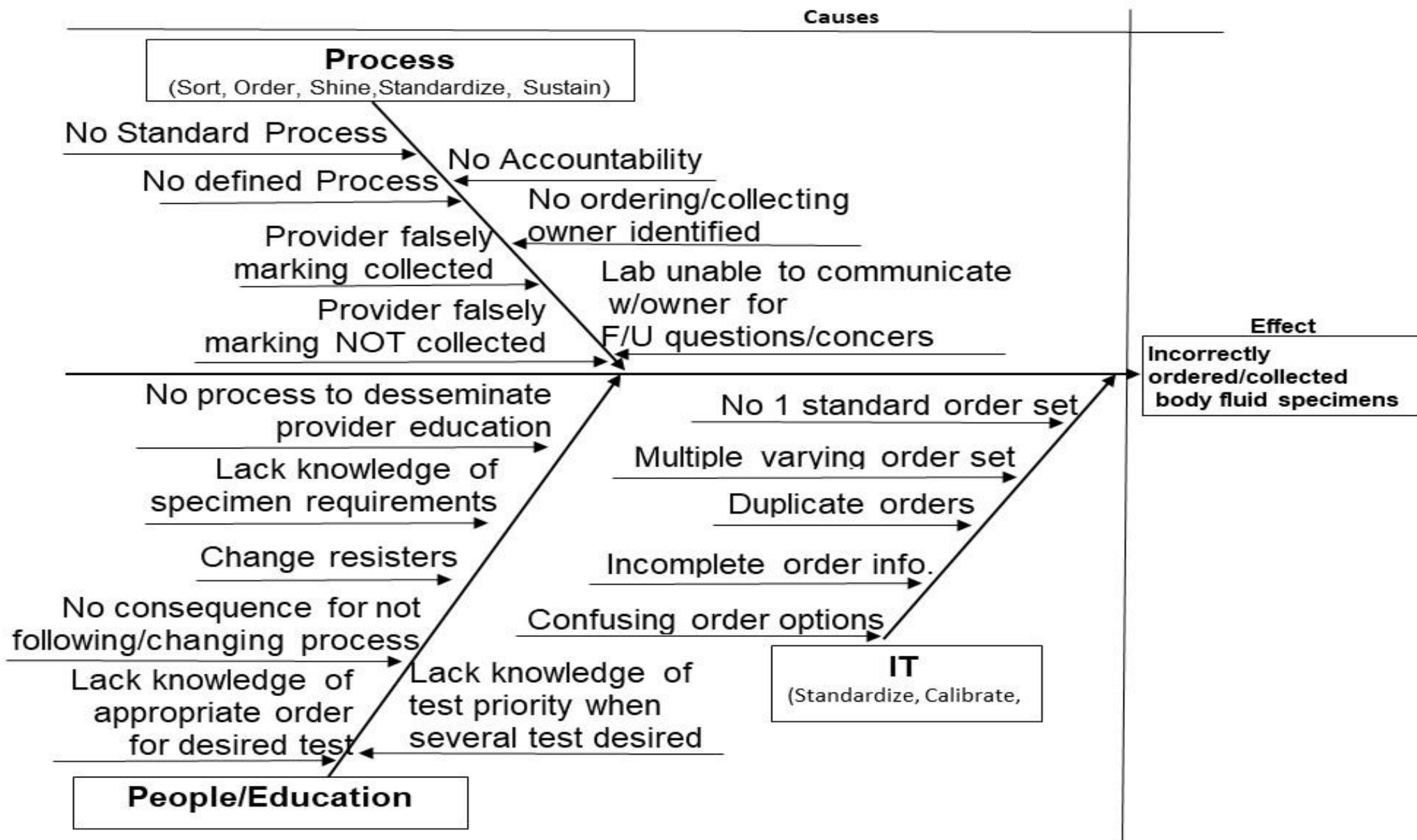


Our Aim Statement

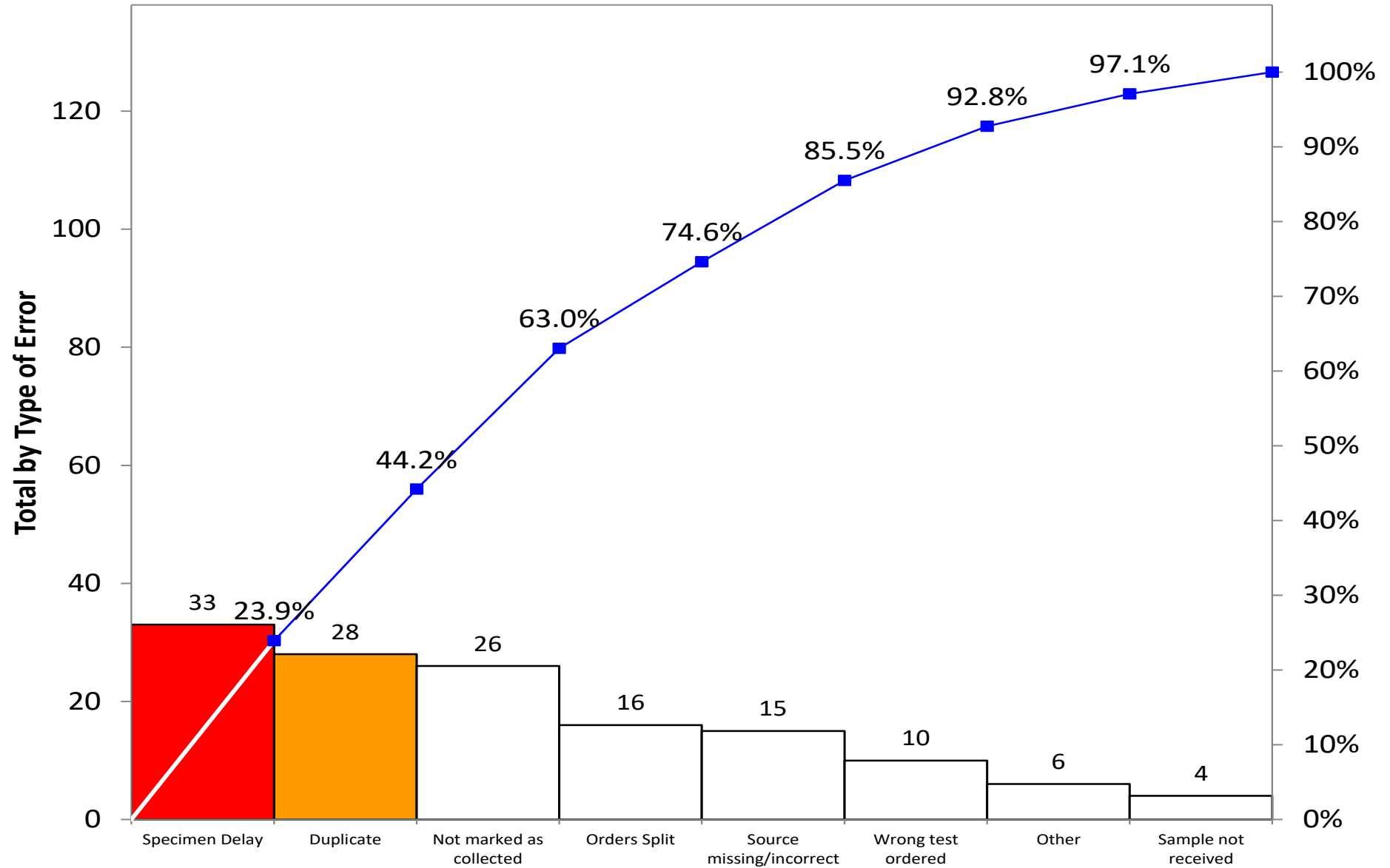
To Decrease the amount of incorrectly ordered and collected body fluid specimens from 75% to 30% by January 5, 2018.



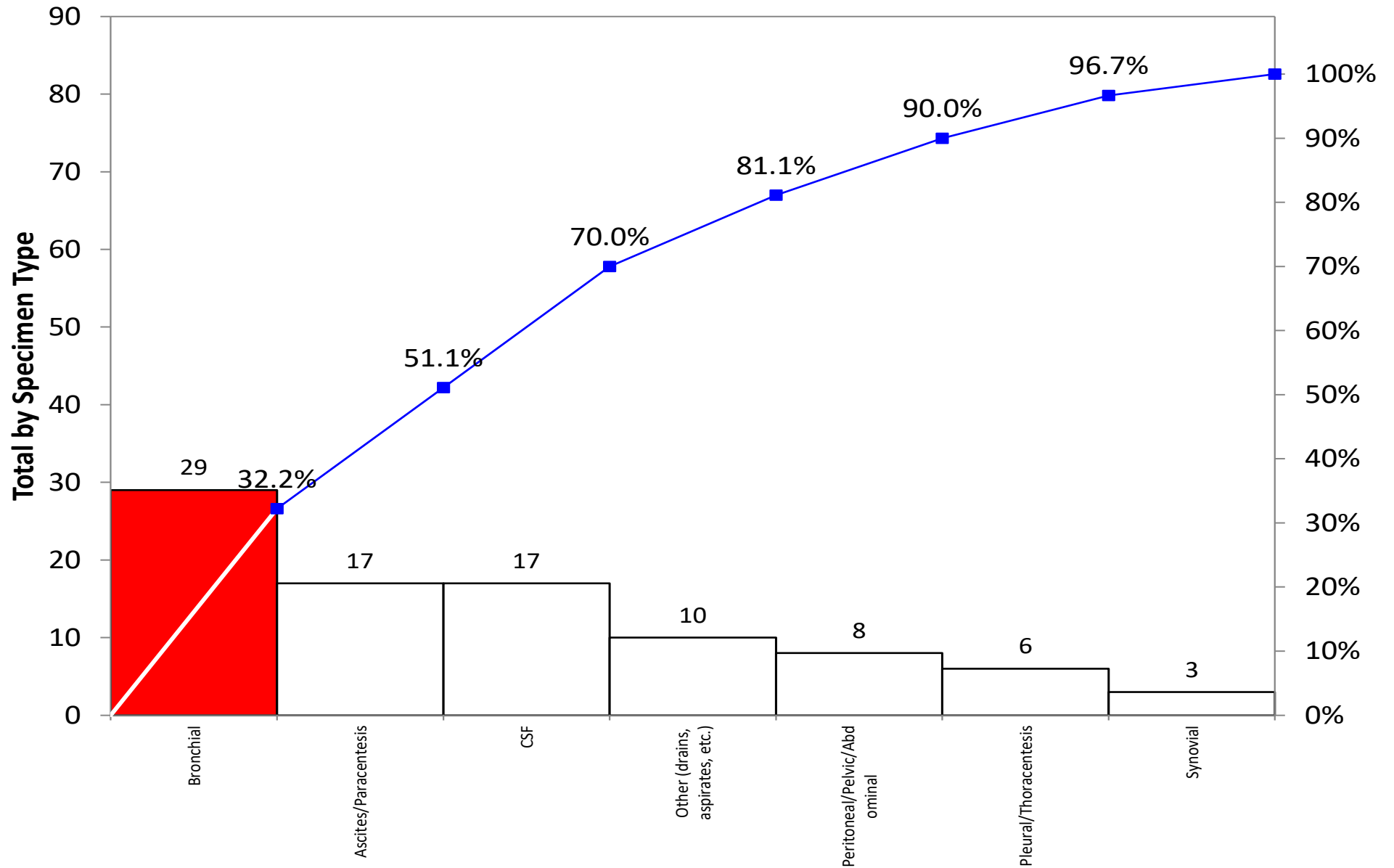
CAUSE & EFFECT



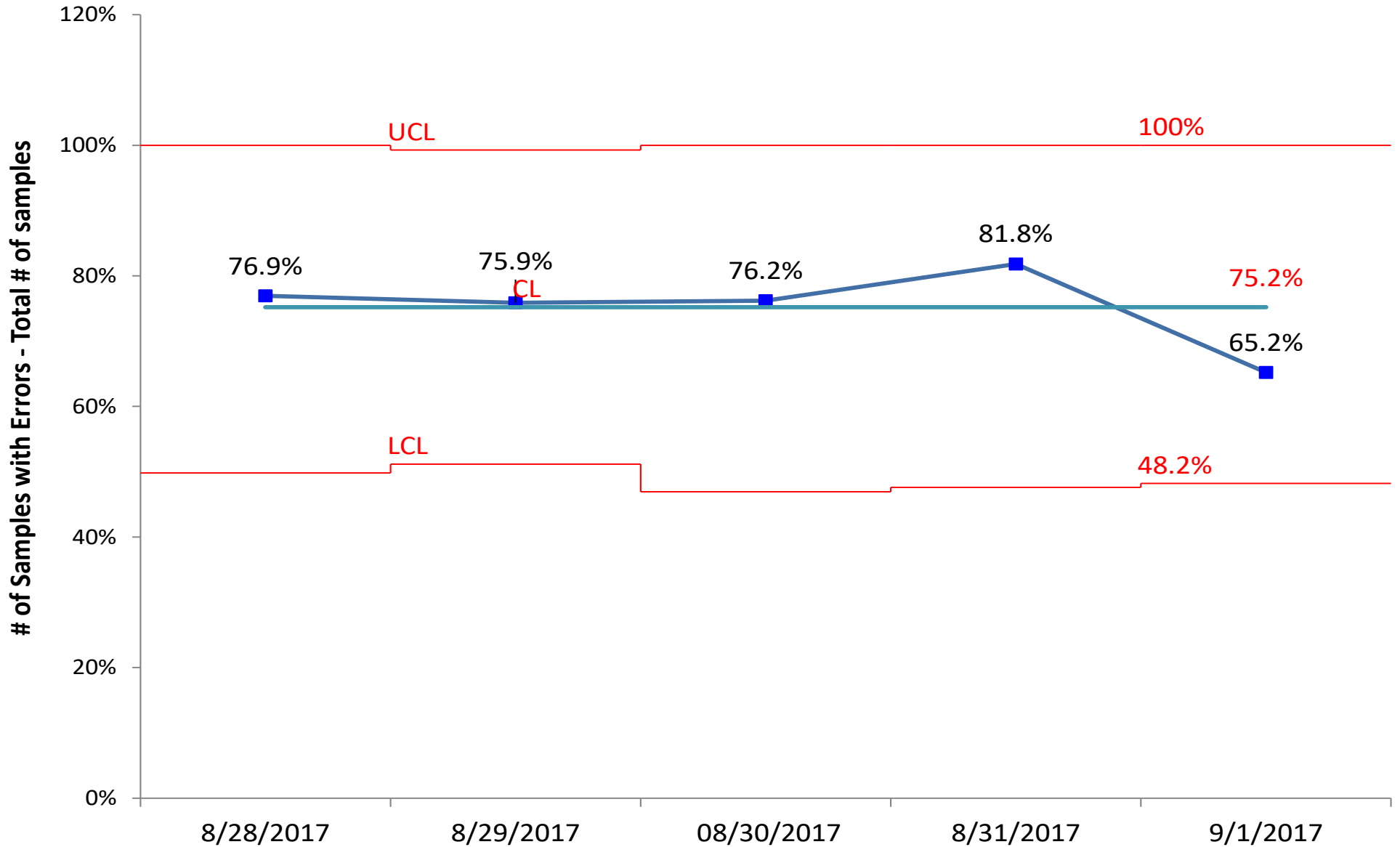
Pareto -- Total by Type of Error



Pareto -- Total by Specimen Type



p-Chart -- # of Samples with Errors / Total # of Samples



Action Plan

Action Strength	Action Driver (Taken from Flow, Fishbone or Pareto)	Action	Who?	Why? (Choose one)	Start Date
Strong	Pareto by Error & Specimen type	Gather pre-implementation data to categorize error types	Ashley Schutz	Standardize, Correct, Simplify	8/25/2017
Strong	Standardize the Process	Assess current order sets available in Sunrise	Team & Norma Pena	Standardize	9/17/2017
Strong	Standardize the Process	Meet with Internal Medicine (owner of order sets) to update sets according to their needs	Team & Dr. Michael Shoffeit	Standardize	10/30/2017
Strong	Process fails to proceed next step	Reorganize "flow" of ordersets	Team & Norma Pena	Correct & Simplify Flow	10/31/2017
Strong	Reduce multiple, varying, duplicative, incomplete, confusing order sets	Determine best format to create user-friendly ordering processes	Team & Norma Pena	Correct & Simplify Flow	10/31/2017
Strong	Reduce multiple, varying, duplicative, incomplete, confusing order sets	Submit changes to IT via footprints	Norma Pena / IT	Correct & Simplify Flow	11/7/2017
Strong	Create Accountability of order sets	Review changes in test-system to adjust accordingly	Team & Internal Medicine	Correct & Simplify Flow	Not Started
Strong	Change Resisters	Go-Live with new order sets	IT	Standardize	Not Started
Strong	Create Accountability of order sets Address change resisters	Follow-up with general medicine after Go-Live	Team & Internal Medicine	Standardize Correct & Simplify Flow	Not Started
Strong	Reduce error types on Pareto	Gather post-implementation data and take next steps	Ashley Schutz	Standardize Correct & Simplify Flow	Not Started

Proposed New Orders

- All order sets standardized to be organized by performing laboratory department with most commonly ordered tests pre-checked and appearing in bold at the top of the category they belong to.
- Body Fluid Cell Count & Body Fluid Path Review merged into 1 order to avoid confusion of ordering the path review instead of cytology.
- Procedural Order sets now will have auto-populated sources.

Current Paracentesis Order Set	Updated Paracentesis Order Set
<u>Routine</u> <input checked="" type="checkbox"/> Body fluid cell count <input checked="" type="checkbox"/> Albumin Miscellaneous fluid	<u>Hematology</u> <input checked="" type="checkbox"/> Body Fluid Cell Count with Reflex to Path Review
<u>Other</u> <input type="checkbox"/> Body fluid pathology review <input type="checkbox"/> Protein Total Misc fluid <input type="checkbox"/> AFB Stain <input type="checkbox"/> AFB Culture with Stain	<u>Cytology</u> <input type="checkbox"/> Cytology, Non Gynecologic
<u>Associated Serum</u> <input type="checkbox"/> Amylase Misc fluid <input type="checkbox"/> Bilirubin Total Misc Fluid <input type="checkbox"/> Cytology <input type="checkbox"/> Albumin Serum	<u>Chemistry</u> <input checked="" type="checkbox"/> Albumin Miscellaneous fluid <input type="checkbox"/> Protein Total Misc Fluid <input type="checkbox"/> Amylase Miscellaneous fluid <input type="checkbox"/> Bilirubin Total Misc Fluid <input type="checkbox"/> Triglyceride Misc Fluid <input type="checkbox"/> CEA Miscellaneous Fluid
	<u>Microbiology</u> <input checked="" type="checkbox"/> Aerobic Culture <input checked="" type="checkbox"/> Anaerobic Culture <input type="checkbox"/> Fungal Culture with Stain <input type="checkbox"/> AFB Culture with Stain
	<u>Other</u> <input type="checkbox"/> Albumin Serum

*All tests sources will default to **Ascites Fluid**

Current Thoracentesis Order Set	Updated Thoracentesis Order Set
<u>Routine</u> <input checked="" type="checkbox"/> Body fluid cell count <input checked="" type="checkbox"/> Aerobic Culture <input checked="" type="checkbox"/> Protein Total Misc fluid <input checked="" type="checkbox"/> LDH Misc Fluid <input type="checkbox"/> Glucose Misc Fluid	<u>Hematology</u> <input checked="" type="checkbox"/> Body Fluid Cell Count with Reflex to Path Review <input type="checkbox"/> Hematocrit Misc Fluid
<u>Other</u> <input type="checkbox"/> Body fluid pathology review <input type="checkbox"/> Cytology <input type="checkbox"/> Amylase Misc fluid <input type="checkbox"/> Blood Gas Arterial <input type="checkbox"/> Triglyceride Misc Fluid <input type="checkbox"/> Adenosine Deaminase, Pleural Fl <input type="checkbox"/> Anti-Nuclear Antibody <input type="checkbox"/> Hematocrit Misc Fluid	<u>Cytology</u> <input type="checkbox"/> Cytology, Non Gynecologic
<u>Associated Serum Studies</u> <input type="checkbox"/> Protein Total Misc fluid <input type="checkbox"/> LDH Misc Fluid	<u>Chemistry</u> <input checked="" type="checkbox"/> Protein Total Misc fluid <input checked="" type="checkbox"/> LDH Misc Fluid <input checked="" type="checkbox"/> Glucose Misc Fluid <input type="checkbox"/> Albumin Miscellaneous fluid <input type="checkbox"/> Amylase Miscellaneous fluid <input type="checkbox"/> Triglyceride Misc Fluid <input type="checkbox"/> Cholesterol Miscellaneous Fluid
	<u>Microbiology</u> <input checked="" type="checkbox"/> Aerobic Culture <input checked="" type="checkbox"/> Anaerobic Culture <input type="checkbox"/> Fungal Culture with Stain <input type="checkbox"/> AFB Culture with Stain
	<u>Other</u> <input type="checkbox"/> Anti-Nuclear Antibody <input type="checkbox"/> Adenosine Deaminase, Pleural Fluid <input type="checkbox"/> pH by Meter Misc Fluid Panel <input type="checkbox"/> Protein Total Serum <input type="checkbox"/> LDH Serum

*All tests sources will default to **Pleural Fluid**

- Missing tests added: based on procedural needs
- Alternate tests used: example: pH misc fluid instead of blood gas arterial

Proposed New Orders

Current Arthrocentesis Order Set

Laboratory

- ☒ Body fluid cell count
- ☒ Aerobic Culture
- ☒ Anaerobic Culture
- ☐ Glucose Misc Fluid
- ☐ Generic Lab Order Request

Updated Arthrocentesis Order Set

Hematology

- ☒ Body Fluid Cell Count with Reflex to Path Review
- ☒ Body fluid crystals

Microbiology

- ☒ Aerobic Culture
- ☒ Anaerobic Culture
- ☐ Fungal Culture with Stain
- ☐ AFB Culture with Stain
- ☐ Gonorrhoeae (Gonococcal) Culture

*All tests sources will default to **Synovial Fluid**

Current Body Fluid Order Set

Laboratory

- ☐ Aerobic Culture
- ☐ Anaerobic Culture
- ☐ AFB Culture with Stain
- ☐ Fungal Culture with Stain
- ☐ Body fluid cell count
- ☐ Body fluid crystals
- ☐ Body fluid pathology review
- ☐ Albumin Miscellaneous fluid

Updated Body Fluid Order Set

Hematology

- ☒ Body Fluid Cell Count with Reflex to Path Review
- ☐ Body fluid crystals

Cytology

- ☐ Cytology, Non Gynecologic

Chemistry

- ☐ Protein Total Misc fluid
- ☐ Glucose Misc Fluid
- ☐ Amylase Miscellaneous fluid
- ☐ Lipase Miscellaneous fluid

Microbiology

- ☒ Aerobic Culture
- ☒ Anaerobic Culture
- ☐ Fungal Culture with Stain
- ☐ AFB Culture with Stain

*Tests will **NOT** have a default source.

- New tests updated to be available to order: Gonorrhoeae
- Generic BF order set updated to include more options and organized

- Current order sets all have different formatting
- All will be updated to “grid” format
- No more pop-up windows to fill out individual orders

STANDARDIZATION

UHSTEST, BOSTON

UHS - Floor 13

Allergies: ABILIFY, DILAUDID

1. Each order would have to be selected and opened individually to edit sources/sites
2. Nothing is pre-checked to aide in consistent ordering
3. Missing essential tests such as glucose and total protein.

16594931 / 100077643
TEST, DSMD20

68y (Jan-30-1949)

Body Fluid Order Set [0 or

AttendingPhysician

Laboratory

- ☐ Aerobic Culture with Gram Stain
☐ Anaerobic Culture

- ☐ Fungal Culture with Stain
☐ AFB Culture with Stain

- ☐ Body Fluid Cell Count
☐ Body Fluid Crystals

- ☐ Body Fluid Pathology Review
☐ Cytology (Non-Gynecologic)

Body Fluid Order Set - UHSTEST, CARDINAL

UHSTEST, CARDINAL

01

Briggs, Heather

16595088 / 000005236

57y (Jan-01-1960)

Allergies: ATENOLOL, Bananas, CHOCOLATE, EGGS, HorsesIntolerances: LACTOSE

WARNING CHART RESTRICTED TO ONLY DIRECT PT CARE

Test Thoracentesis Order Set [7 orders of 19 are selected]

Request Date

Request Time

Attending Physician

Hematology

Order	Attending Physician	Specimen Type	Specimen Source	Specimen Site	Indication for Test
<input checked="" type="checkbox"/> Body Fluid Cell Count	Briggs, Heather	Body Fluid	Pleural		
<input type="checkbox"/> Hematocrit Misc. Fluid		Body Fluid			

Cytology

Order	Attending Physician	Specimen Type	Specimen Source	Specimen Site	Indication for Test
<input type="checkbox"/> Cytology Request (Non-Gynecologic)		Cells	Pleural Fluid		

Chemistry

Order	Attending Physician	Specimen Type	Specimen Source	Indication for Test
<input checked="" type="checkbox"/> Protein Total Misc Fluid	Briggs, Heather	Body Fluid	Pleural Fluid	
<input checked="" type="checkbox"/> pH Miscellaneous Fluid	Briggs, Heather	Body Fluid	Pleural Fluid	
<input checked="" type="checkbox"/> Glucose Miscellaneous Fluid	Briggs, Heather	Body Fluid	Pleural Fluid	
<input checked="" type="checkbox"/> Albumin Miscellaneous Fluid	Briggs, Heather	Body Fluid	Pleural Fluid	
<input type="checkbox"/> Amylase Misc		Body Fluid	Pleural Fluid	
<input type="checkbox"/> Triglyceride Misc		Body Fluid	Pleural Fluid	
<input type="checkbox"/> Cholesterol Misc		Body Fluid	Pleural Fluid	

Microbiology

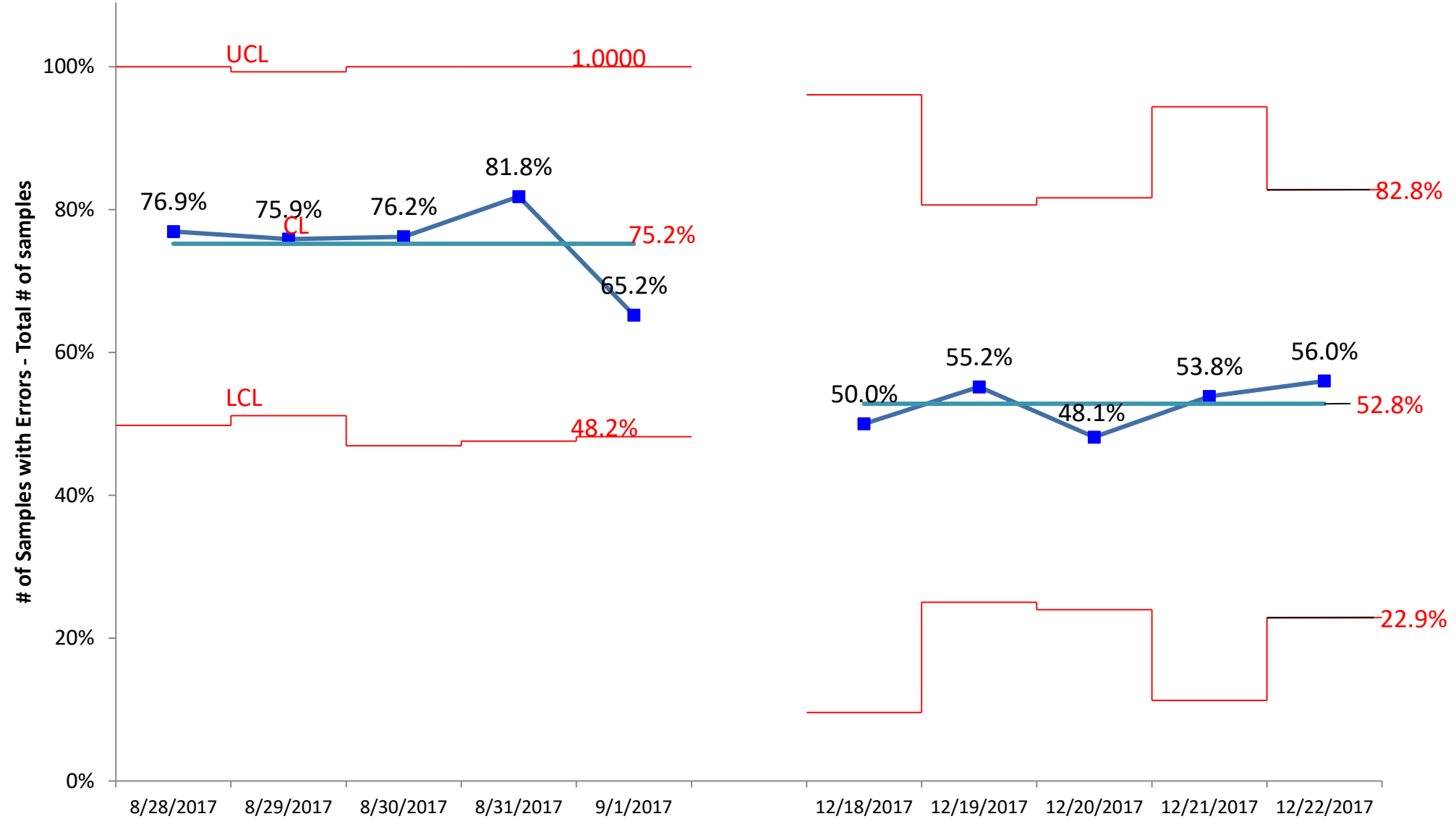
Order	Attending Physician	Specimen Source	Specimen Site	Specimen Side	Indication for Test
<input checked="" type="checkbox"/> Aerobic Culture with Gram Stain	Briggs, Heather	Fluid Pleural			
<input checked="" type="checkbox"/> Anaerobic Culture	Briggs, Heather	Fluid Pleural			
<input type="checkbox"/> Fungal Culture with Stain		Fluid Pleural			
<input type="checkbox"/> AFB Culture with Stain		Fluid Pleural			

Other

Order	Attending Physician	Specimen Type	Specimen Source	Indication for Test
<input type="checkbox"/> Anti-Nuclear Antibody		Fluid Pleural	Pleural Fluid	
<input type="checkbox"/> Adenosine Deaminase, Pleural Fluid		Fluid Pleural	Pleural Fluid	
<input type="checkbox"/> pH by Meter Misc Fluid Panel		Fluid Pleural	Pleural Fluid	
<input type="checkbox"/> Protein Total Serum		Blood	Blood	
<input type="checkbox"/> LDH Serum		Blood	Blood	

New grid
format with
organization
by lab
departmentPre-checked
orders for most
commonly
requested testsSources are
auto-filled for
procedure
based order
sets**New & Improved**

Pre/Post Intervention
p-Chart -- # of Samples with Errors / Total # of Samples



Return on Investment (cont.)

Pre-Implementation: University Health System

Average of 18.2 body fluid samples with errors per day

18.2 errors x \$208.00 = **\$3785.60 per day**

\$3785.60 x 365 days per year = **\$1,381,744 per year**

Post-Implementation: University Health System

Average of 10.8 body fluid samples with errors per day

10.8 errors x \$208.00 = **\$2,246.40 per day**

\$2,246.40 x 365 days per year = **\$819,936 per year**

By reducing our errors from 75% to 53% we were able to see a ROI

\$561,808

Maintaining the Gains

- Continue to monitor number of errors
 - Monthly for the next 6 months
 - Every 3 months for the next year
- Reconvene with internal medicine team to gather feedback on the usefulness of the new order sets and adjust as needed
- Follow up with other errors that are still occurring
 - Delays in Transport
 - Not marking specimens as collected



Next Steps



- 1. Create “dummy order” for cytology orders**
- 2. Work with Endoscopy (Pulmonary) to reduce the amount of errors related to bronchial specimens**
- 3. Focus on collection and transport errors that were not resolved with the order sets**
- 4. Begin evaluating other non-body fluid order sets and processes**



UT Health

San Antonio

Center for Patient Safety
& Health Policy

Thank you