ISUDT Toxicology Screening

CCHCS LEAN SIX SIGMA PROGRAM

GREEN BELT | [redacted] AGPA, Ironwood State Prison

Lean Six Sigma Methodology

The Lean Six Sigma DMAIC methodology is a proven improvement approach used to address problems in existing processes where the root causes of those problems are unknown. The approach focuses on understanding the process, analyzing factors that contribute to the problems, identifying root causes, designing and implementing interventions, and establishing a structure to sustain high performance.

Define Phase

Define and scope the problem, identify the key metric and the team that will work the project, and create the project charter.

Project Background

The Integrated Substance Use Disorder Treatment Program **(ISUDT)** - is committed to improving the overall health of the population, specifically those who are seeking to overcome the disease of addiction.

Toxicology Screenings (UTOX or Urine Samples) are a key component Medicated Assisted Treatment (MAT). These screenings are used to guide treatment plans, manage and monitor the Patients Medication and aid in determining compliance and success within of the program.

Ironwood State Prison's Toxicology Screening metric has been inconsistent with compliance percentage since initiation of the program. Work arounds have been created throughout the process and sustainability has been hard to reach. Noncompliance with Toxicology Screenings can hinder Patient care and interrupt treatment plans.

Project Charter

- **Problem Statement:** ISP's 6-month average defect rate is currently at 12% for Toxicology for MAT Patients. A portion of these defects could represent valuable spots in the MAT program that can be used by patients that want to overcome addiction. We do not have unlimited PCP resources for MAT patients, therefore, UTOX screenings is crucial in being able to monitor and assess their compliance and engagement in the program.

- **Project Objective:** Less than 2% of toxicology orders will be completed outside of the 45-day timeframe.

- **Primary Metric:** The percentage of Patients actively on MAT with a completed Toxicology test in the past 45 days or as ordered, whichever comes first.

Team Members

- Champion: [redacted] Resource SRN II
- Executive Sponsor: [redacted], CSE
- Team Members:
  - [redacted], NP
  - [redacted] Resource SRN II
  - [redacted], Lab Technician
  - [redacted], Lab Scheduling SME
  - [redacted], QMSU OT
  - [redacted] Clinic Officer

Gather the process inputs, set up and validate the measurement system, and determine the baseline for the primary metric.

Baseline Capability/Performance

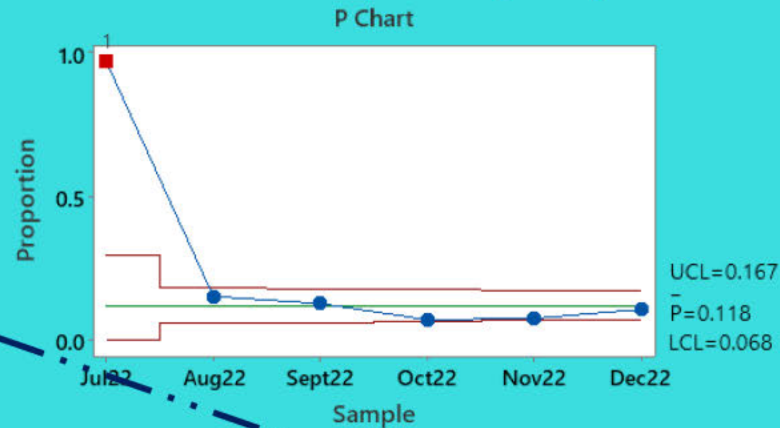
Months Used:
July- December 2022

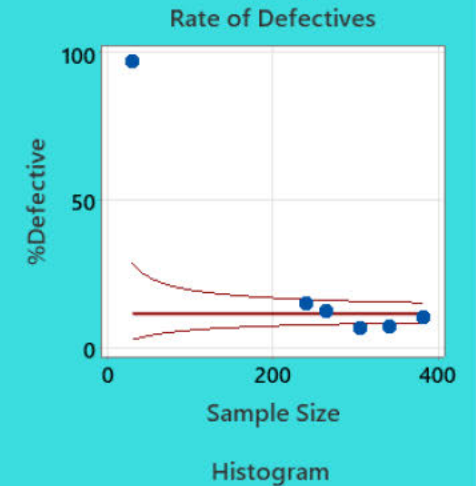
Current Defect Rate:
12%

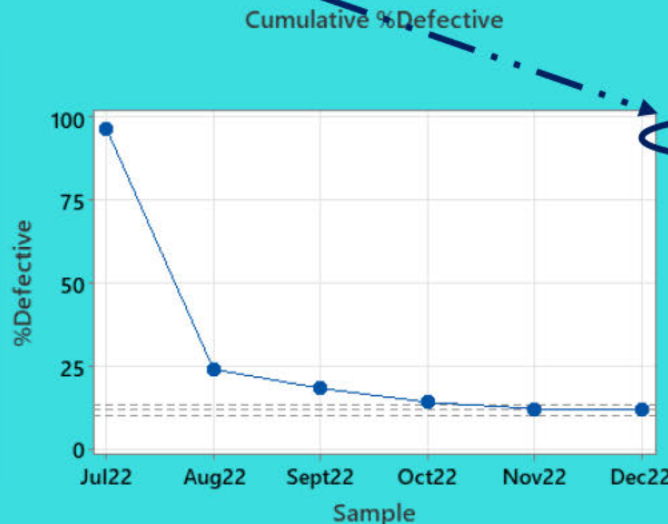
Baseline Compliance
88%

According to this analysis, the chart tells us that during the 6 months baseline period, we are at 12% defects (88% compliance). With this sample size I can confidently say that if I were to add another 6 months of data the defect rate would still be within 10% - 13% at best.

Binomial Capability Report for Defects Prior to Change

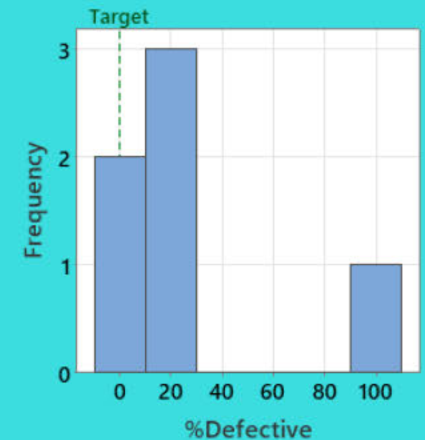






Summary Stats
(95.0% confidence)

%Defective:	11.77
Lower CI:	10.22
Upper CI:	13.47
Target:	0.00
PPM Def:	117722
Lower CI:	102155
Upper CI:	134742
Process Z:	1.1864
Lower CI:	1.1043
Upper CI:	1.2694



Measurement System Analysis

Attribute Agreement Analysis for Sara 1, Sara 2, Amy 1, Amy 2

Within Appraisers

Assessment Agreement

Appraiser	# Inspected	# Matched	Percent	95% CI
[illegible]	30	29	96.67	(82.78, 99.92)
[illegible]	30	30	100.00	(90.50, 100.00)

 # Matched: Appraiser agrees with him/herself across trials.

Each Appraiser vs Standard

Assessment Agreement

Appraiser	# Inspected	# Matched	Percent	95% CI
[illegible]	30	29	96.67	(82.78, 99.92)
[illegible]	30	29	96.67	(82.78, 99.92)

 # Matched: Appraiser's assessment across trials agrees with the known standard.

Assessment Disagreement

Appraiser	# Yes / No	Percent	# No / Yes	Percent	# Mixed
[illegible]	0	0.00	0	0.00	1
[illegible]	1	6.67	0	0.00	0

 # Yes / No: Assessments across trials = Yes / standard = No.
 # No / Yes: Assessments across trials = No / standard = Yes.
 # Mixed: Assessments across trials are not identical.

Between Appraisers

Assessment Agreement

# Inspected	# Matched	Percent	95% CI
30	29	96.67	(82.78, 99.92)

 # Matched: All appraisers' assessments agree with each other.

All Appraisers vs Standard

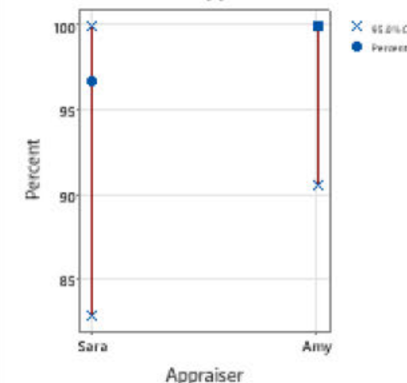
Assessment Agreement

# Inspected	# Matched	Percent	95% CI
30	[illegible]	96.67	([illegible].78, 99.92)

 # Matched: All appraisers' assessments agree with the known standard.

Assessment Agreement

Date of study:
Reported by:
Name of product:
Misc:



Project: ISUDT Toxicology Screening - GB.mpx; Worksheet: Worksheet 4; 3/27/2023;

Dashboard Measurement System Analysis

Does the denominator for this metric correctly capture all the actual process opportunitie	YES
Number of "NO" errors:	0
Number of "YES" errors:	0
MSA Results and Actions:	PASS: no action required—dashboard data can be used with confidence

The MSA proved that the measure was accurate per the glossary definition. However, during the analyze phase, we found that the automated metric was not measuring the true performance at each institution.

MSA:
30/30 = 100%
The MSA proved the measure to be reliable but not valid.

Attribute Agreement Analysis:
Appraisers: 2
Assessment Agreement: 96.67%

Change to statewide measurement on Power BI

CQ

Thank you for bringing this issue to our attention. This email serves as a confirmation that QM has completed working on your request and the below fix should resolve the issue.

ISUDT Dashboard

- Renamed Naltrexone (IM) treatment type to Naltrexone (Injectable).
- Added a new "Institution Arrival Date" column that displays the patient's date of arrival to the current institution.
- Fixed an issue where toxicology orders that were active at the end of the reporting period were affecting the compliance date even when there was a collected lab result in EHRS. The measure was updated to exclude orders with a lab result completed before the end of the reporting period from affecting the compliance date. This measure was refreshed from May 2022 to April 2023 and the statewide score increased 3% on average.
- "Medical LCSW Release Planning 60," "Medical Pre-Release Screening LCSW," and "Telemedicine Medical Pre-Release Screening LCSW" orders were excluded from placing patients into the

"Assessment Needed" measure's denominator and excluded them from the "LCSW Assessment Order Status" column.

Thank you again for your help in ensuring the quality of our tools. We appreciate any opportunity to improve our logic and measures. Please let us know if you notice any further issues.

Sent: Thursday, June 1, 2023 4:12 PM

Subject: RE: Question about QM_ISUDT_Dashboard_Clinical in Power BI

This email serves as a confirmation that QM has completed working on your request and the below fix completes your request.

ISUDT DASHBOARD - *VERSION HISTORY*

Click To Return to Previous Page

#	Date	Change To	Change Description
1	5/31/2023	Toxicology Screening Per Guidelines - Performance Measure	Fixed an issue where toxicology orders that were active at the end of the reporting period were affecting the compliance date even when there was a collected lab result in EHRS. The measure was updated to exclude orders with a lab result completed before the end of the reporting period from affecting the compliance date. This measure was refreshed from May 2022 to April 2023 and the statewide score Increased on average 3%.

Thank you again for your help in ensuring the quality of our tools. We appreciate any opportunity to improve our logic and measures. Please let us know if you notice any further issues.

Effective Date: 5/31/2022

Retroactive:
May 2022 – April 2023

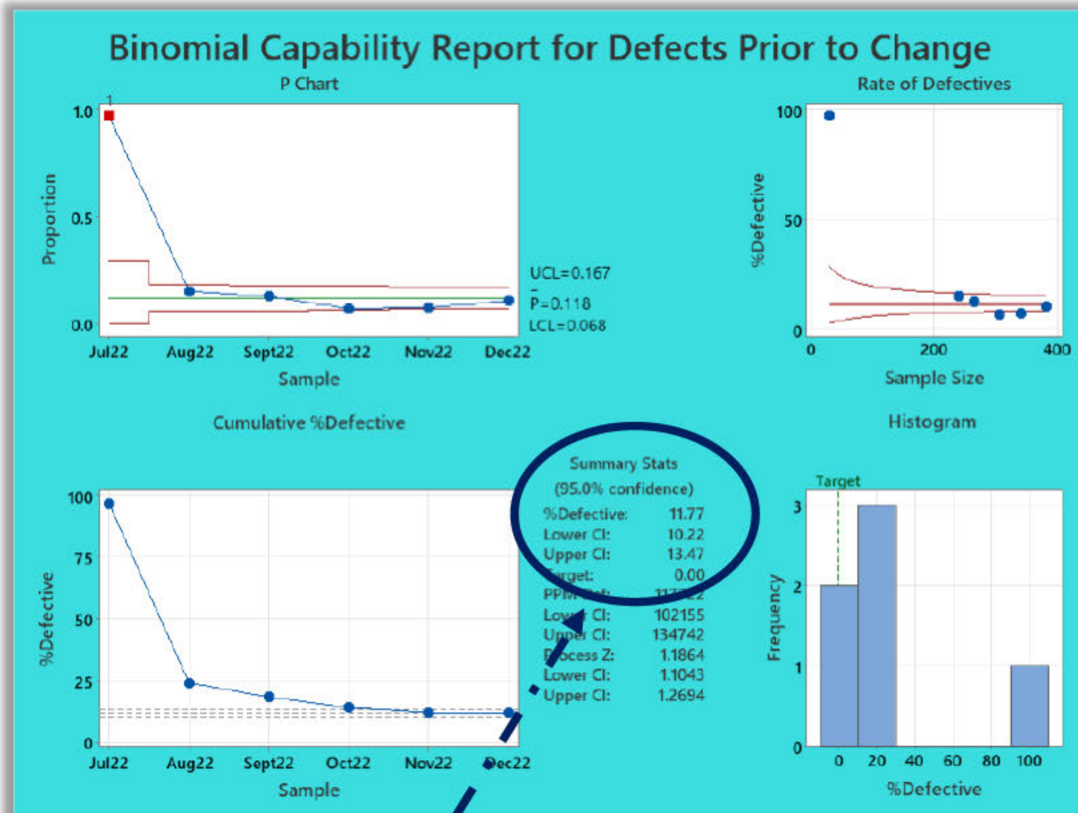
ISP's Impact:
Increase by 8% for baseline

Statewide Impact:
Increase 3% on Average

An email was sent to QM Staff with explanation of hypothesis findings along with HCDOM Policy, verbiage from the institution dashboard on lab compliance as a suggestion of change to the measurement. QM reviewed and approved. A change in the measurement was completed on 5/31/2023.

New Baseline Capability/Performance

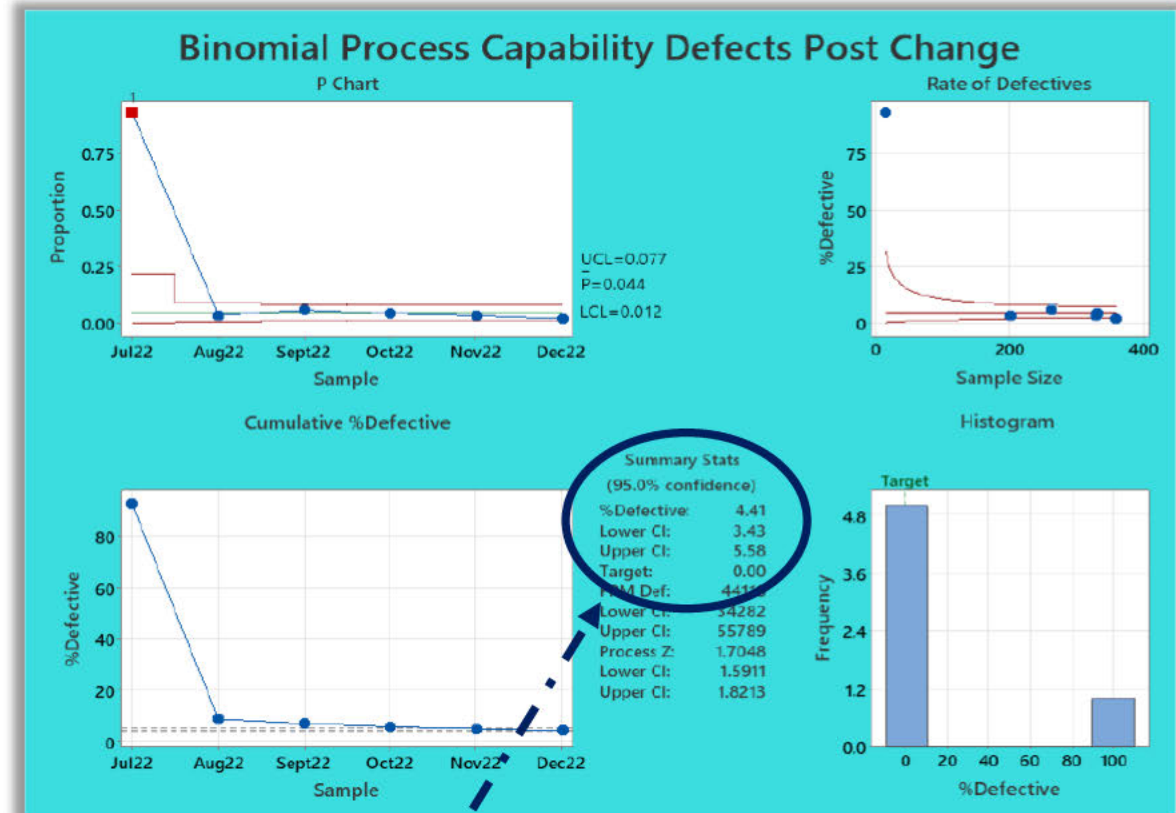
Original Baseline



Defect Rate Prior to Measurement Change: 12%

Baseline Compliance Prior to Measurement Change: 88%

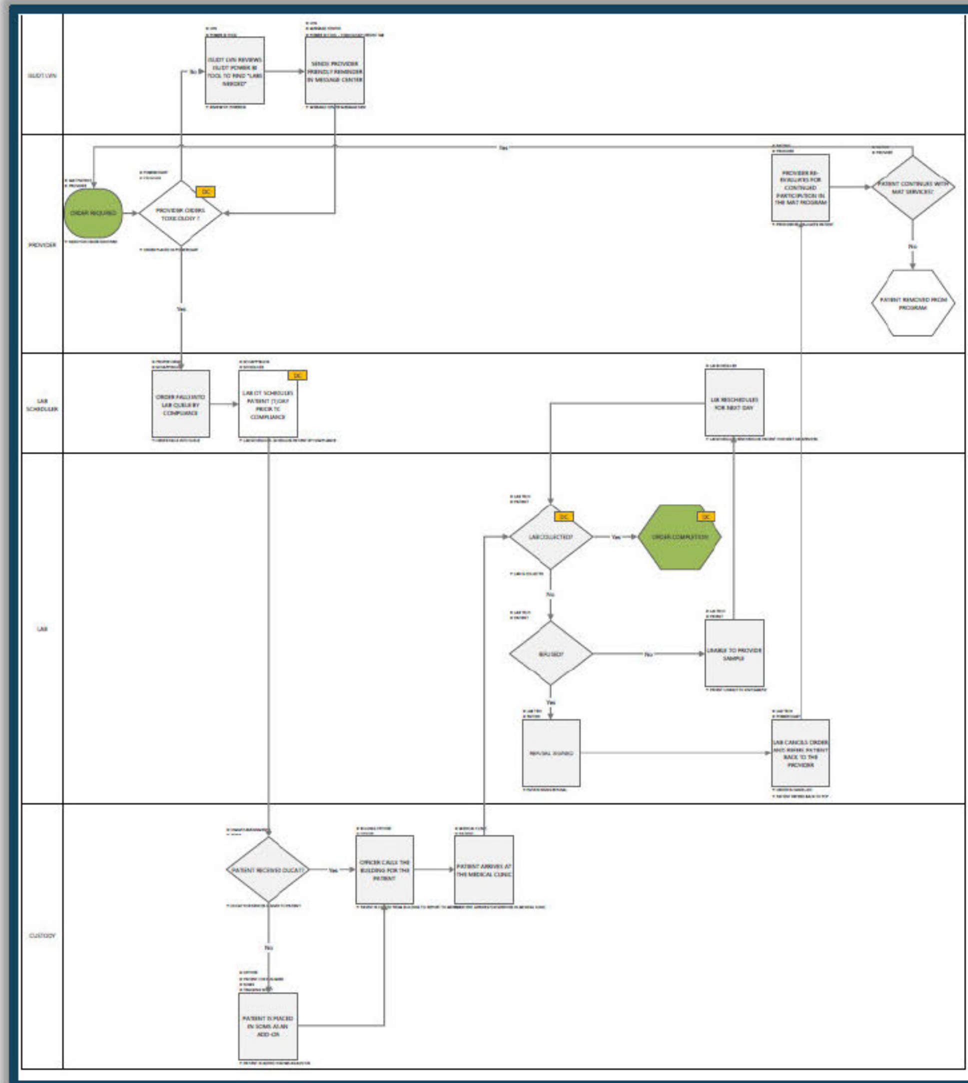
Accurate Baseline



Defect Rate Post Measurement Change: 4%

Baseline Compliance Post Measurement Change: 96%

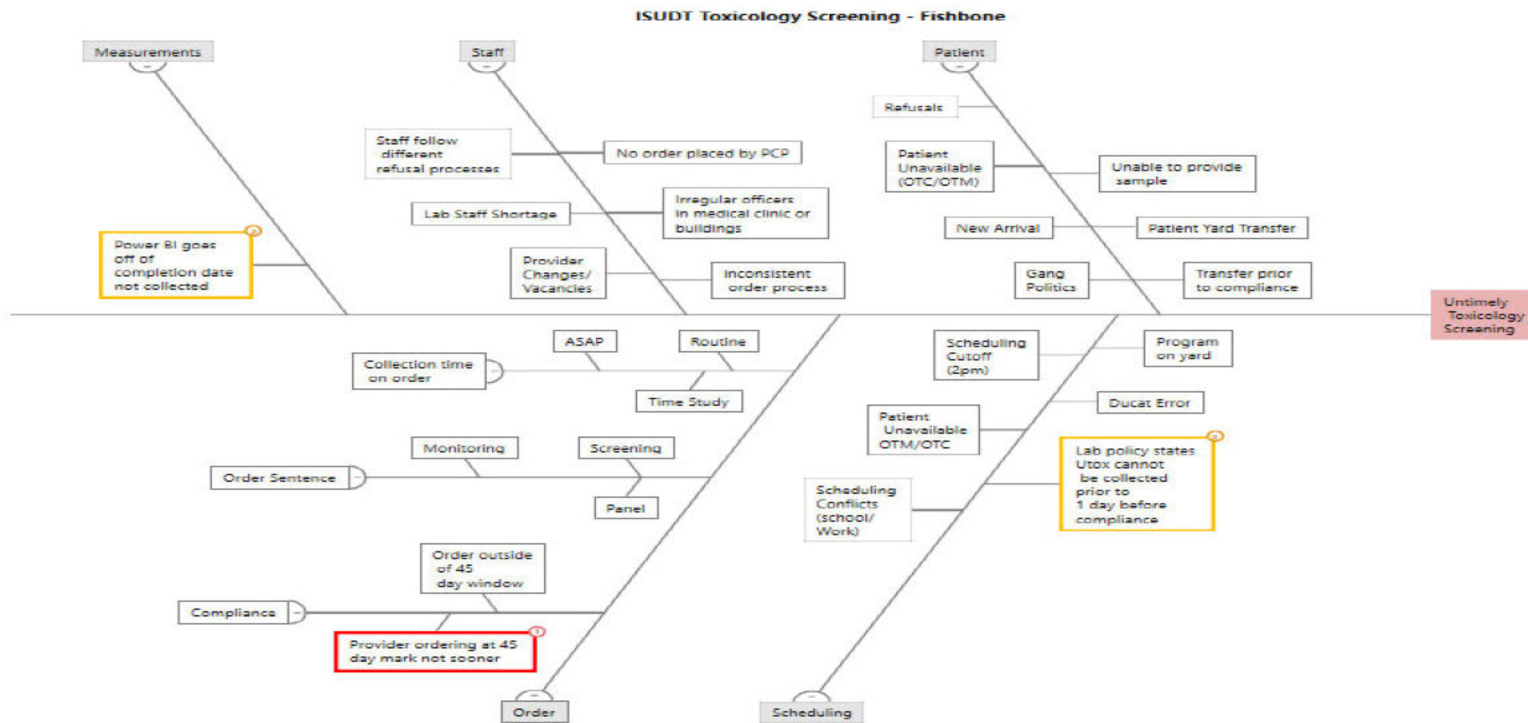
Initial Process Map

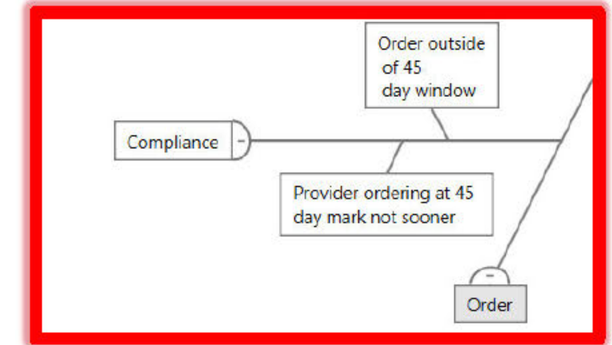


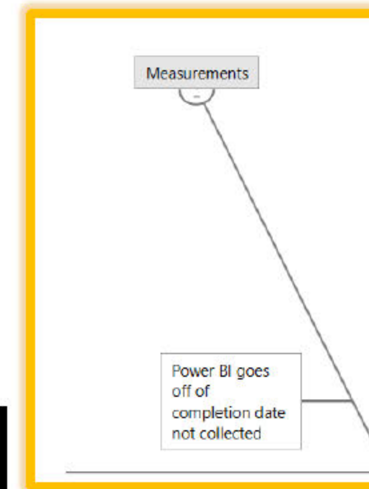
Significant Findings

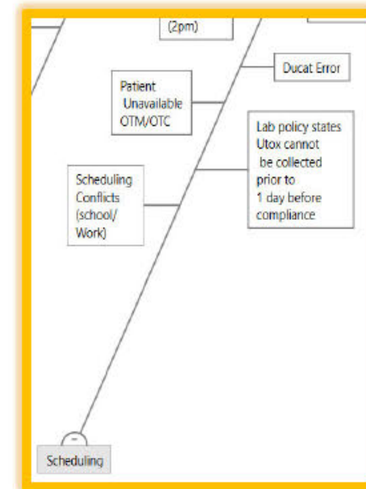
- 20 identified steps
- 2 Value Added Steps
- 4 Data Collection Points
- Disciplines involved in the process - (Swim Lanes) :
    - ISUDT LVN
    - Provider
    - Lab Scheduler
    - Lab Technician
    - Custody

Brainstorming Using Fishbone









Top 3 issues identified Utilizing the Fishbone Diagram:

- Compliance - Providers are ordering toxicology screenings with a compliance of 45 days
- Power BI Tool – Measurement off completion not collection date
- Scheduling – Lab Policy states toxicology cannot be collected prior to 1 day before compliance.

Analyze Phase

Analyze data to determine the critical inputs affecting the primary metric.

Failure Modes and Effects Analysis (FMEA) Findings

1\.
- Policy Vs. Power BI Collection /Completed Dates

2\.
- End of Week Collection

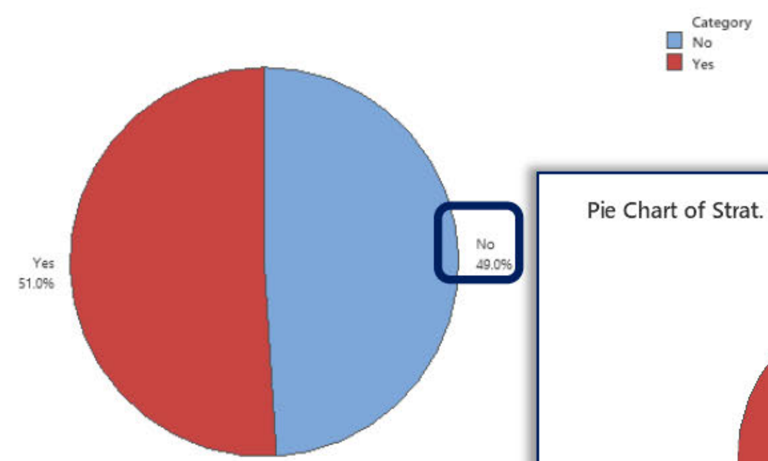
3\.
- End of Month Collection

FMEA

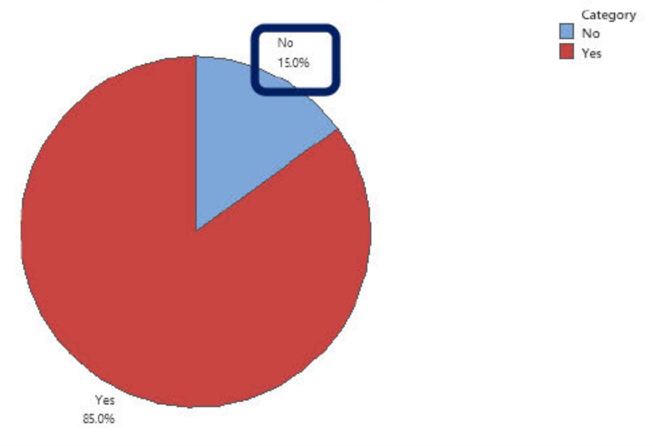
Step #	Process Map - Activity	Key Process Input	Potential Failure Mode	Potential Failure Effects	SEV	Potential Causes	OCC	Current Controls	DET	RPN
1	Detailed Process Map - PROVIDER ORDERS TOXICOLOGY ?	PROVIDER	Orders for 45 days	Lab falls out of the 45 day metric	7	Lab collects on 44th day with no time for completion before 45th	8	No detection to monitor once order is entered	9	504
2	Detailed Process Map - LAB OT SCHEDULES PATIENT (1) DAY PRIOR TO COMPLIANCE	LAB SCHEDULER	Completed outside of timeframe	Lab falls out of 45 metric	7	End of week collection - results received over weekend	8		9	504
3	Detailed Process Map - LAB OT SCHEDULES PATIENT (1) DAY PRIOR TO COMPLIANCE	LAB SCHEDULER	Completed outside of timeframe	Lab falls out of 45 day metric	7	End of month collection - results received beginning of following month	8	[illegible] queue	9	504

Key Findings

Does the Power BI measuring off completion date conflict with Lab policy stating lab can only be pulled 1 day prior to compliance, causing defects?



Pie Chart #1 shows defect percentage reported on the Power BI per my 100 random sample = 49%



Pie Chart #2 shows the adjusted defects with the labs that were collected in compliance as per HCDOM Chapter 1 Article 1 – Appendix I = 15%

Two Proportions - Po

Method

p_1: proportion where Sample 1
p_2: proportion where Sample 2
Difference: $p_1 - p_2$

Descriptive Statistics

Sample	N	Event	S
Sample 1	100	49	0.490000
Sample 2	100	15	0.150000

Estimation for Difference

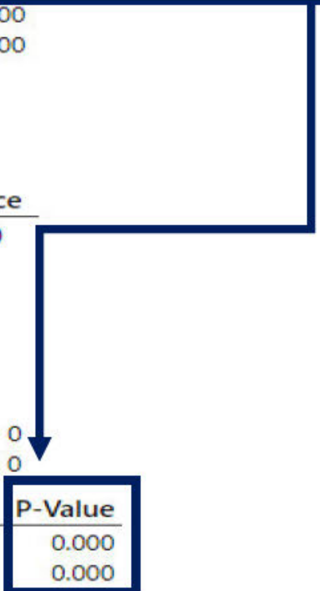
Difference	95% CI for Difference
0.34	(0.219594, 0.460406)

CI based on normal approximation

Test

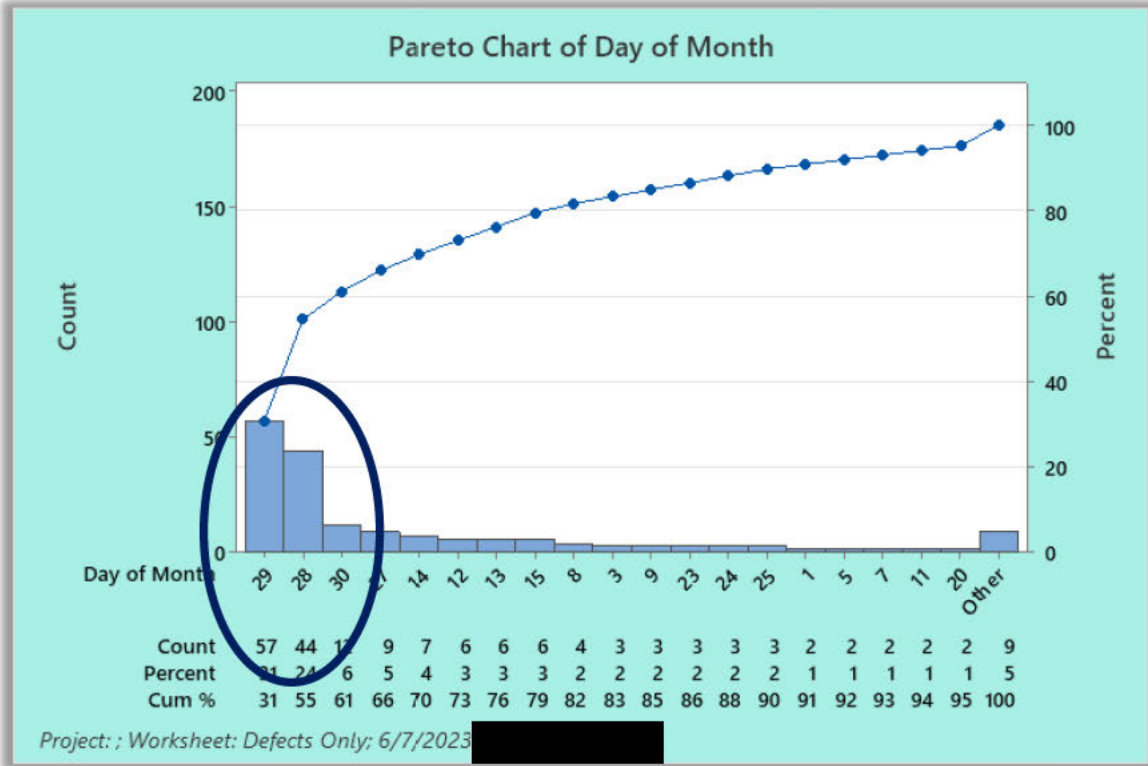
Null hypothesis $H_0: p_1 - p_2 = 0$
Alternative hypothesis $H_1: p_1 - p_2 \neq 0$

Method	Z-Value	P-Value
Normal approximation	5.53	0.000
Fisher's exact		0.000



A Two Proportions test was done to show if there is a difference between those that are defects by the Power BI and those that were collected Per HCDOM policy. With a P-Value of <0.001 , we can say there is a difference between the two.

Key Findings 1:
Is there a difference in the lab collection day of the month?



Labs collected on the 28th, 29th and 30th account for 113 (61%) of the defects.

Two Proportions Before/After 28th Day

Method

p_1: proportion where Sample 1 = Event
p_2: proportion where Sample 2 = Event
Difference: $p_1 - p_2$

*Sample 1 – Before the 28th Day
Sample 2 – After the 28th Day

Descriptive Statistics

Sample	N	Event	Sample p
Sample 1	1528	71	0.046466
Sample 2	369	114	0.308943

Estimation for Difference

Difference	95% CI for Difference
-0.262477	(-0.310789, -0.214166)

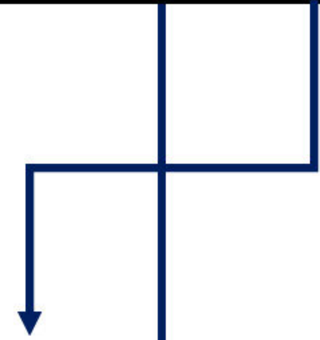
CI based on normal approximation

Test

Null hypothesis $H_0: p_1 - p_2 = 0$
Alternative hypothesis $H_1: p_1 - p_2 \neq 0$

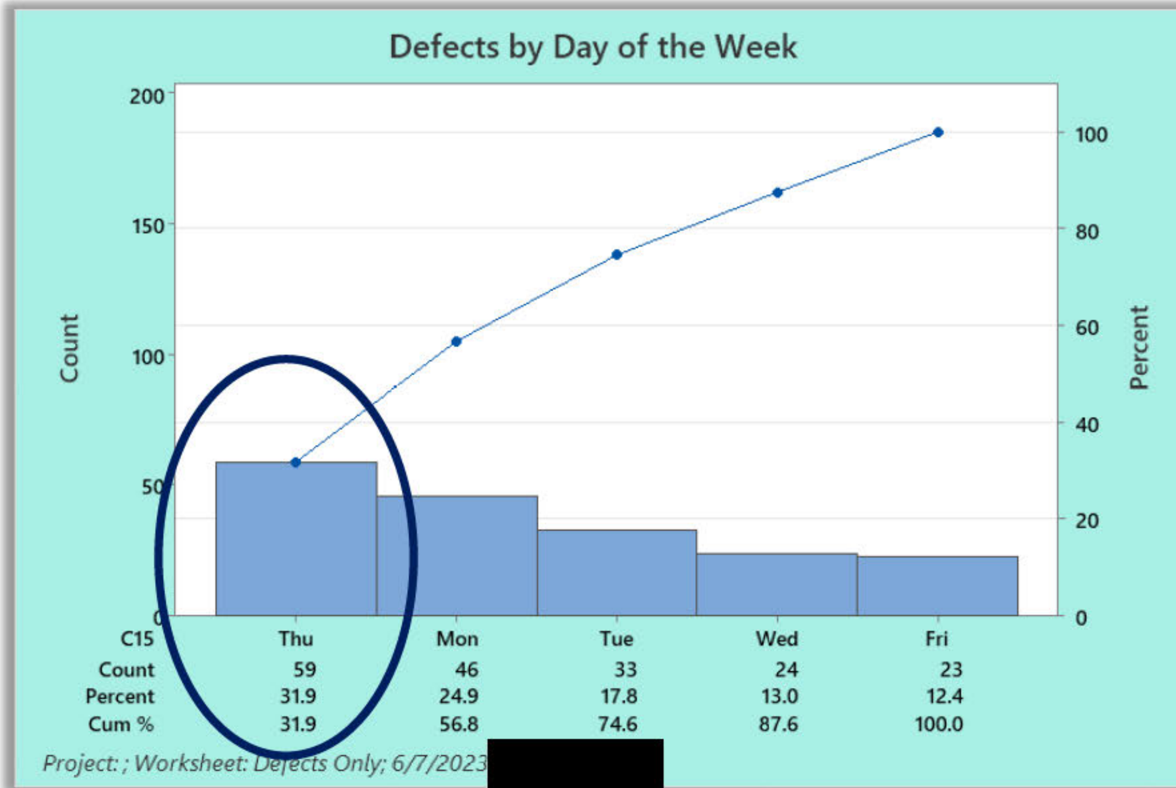
Method	Z-Value	P-Value
Normal approximation	-10.65	0.000
Fisher's exact		0.000

P Value = <.001 - There is a statistically significant difference between those that are collected before the 28th of the month and those that are collected after.



Key Findings 2

Is there a difference in the Day of the Week that the lab is drawn?



59 of the 185 (31%) of defects were collected on a Thursday.

Chi-Square % Defective Test for Day Of The W by Day

Summary Report

Do the % defectives differ?

0 0.05 0.1 > 0.5

Yes No

P < 0.001

Differences among the % defectives are significant (p < 0.05).

Which % defectives differ?

#	Day	Differs from
1	Tuesday	4 5
2	Wednesday	4 5
3	Monday	4
4	Thursday	1 2 3
5	Friday	1 2

% Defectives Comparison Chart

Red intervals that do not overlap differ.

Tuesday
Wednesday
Monday
Thursday
Friday

5 10 15 20 25

Defect %

M:8.78

T:6.31

W:6.88

Th: 16.34

F: 16.43

A Chi Square % Defective proved that there is a statistically significant difference between the day of the week in which the lab is drawn.

Critical Xs

Measurement Variance

- Power BI measurement

Solution

Change to Power BI Measurement

Process Variance

- Labs completed after the 28th of the month
- Day of the week that the lab is drawn

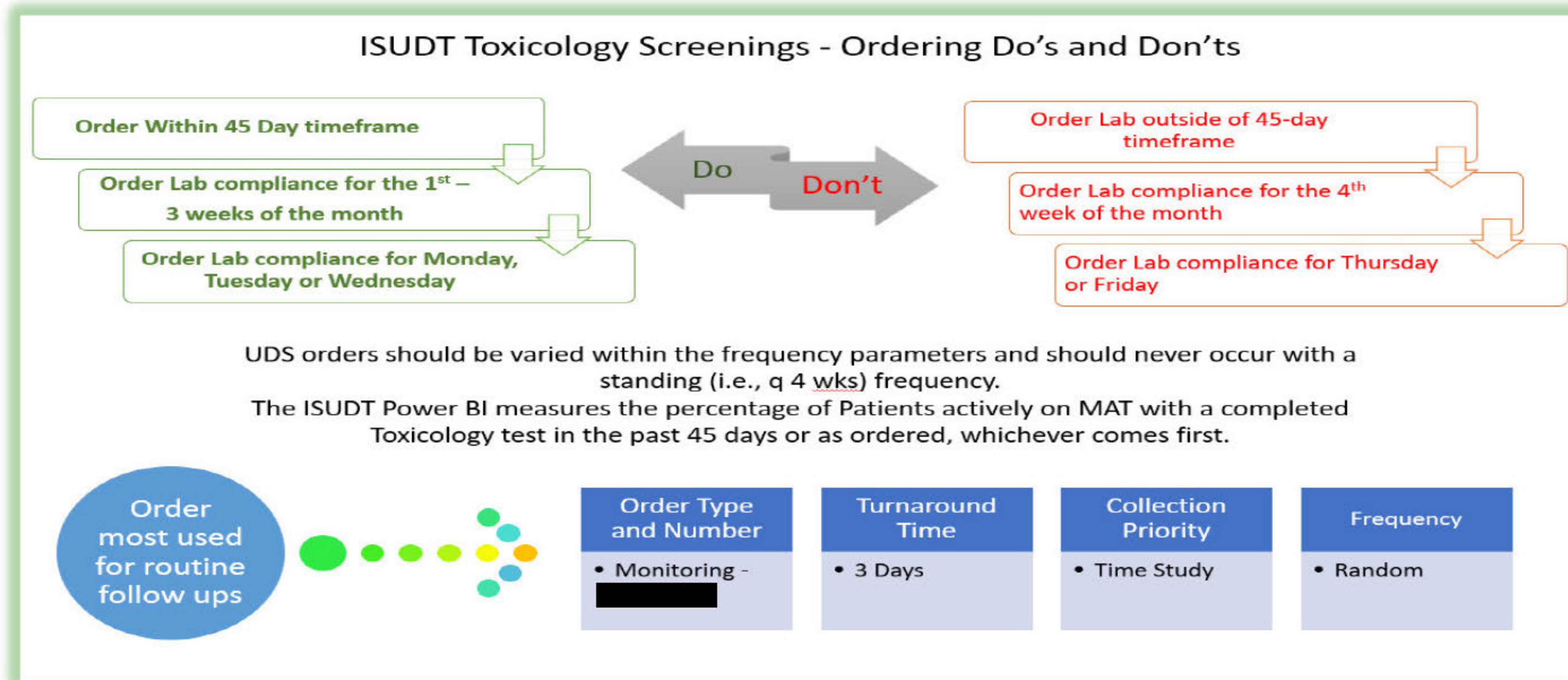
Solution

Do's and Don'ts Visual Aid

Identify and implement fixes for the problem and analyze new data to validate the improvement.

Improvements

- A Visual Aid was created for the Providers, training was provided to help standardize the ordering process.



Improvements

- An order sentence request was submitted for: UTOX Monitoring 30 days via a Service Now ticket.
  - Incident Ticket [redacted] has been reviewed and approved. Not only will ISP providers benefit from the improvement, but it was agreed upon to have the order sentence available statewide.

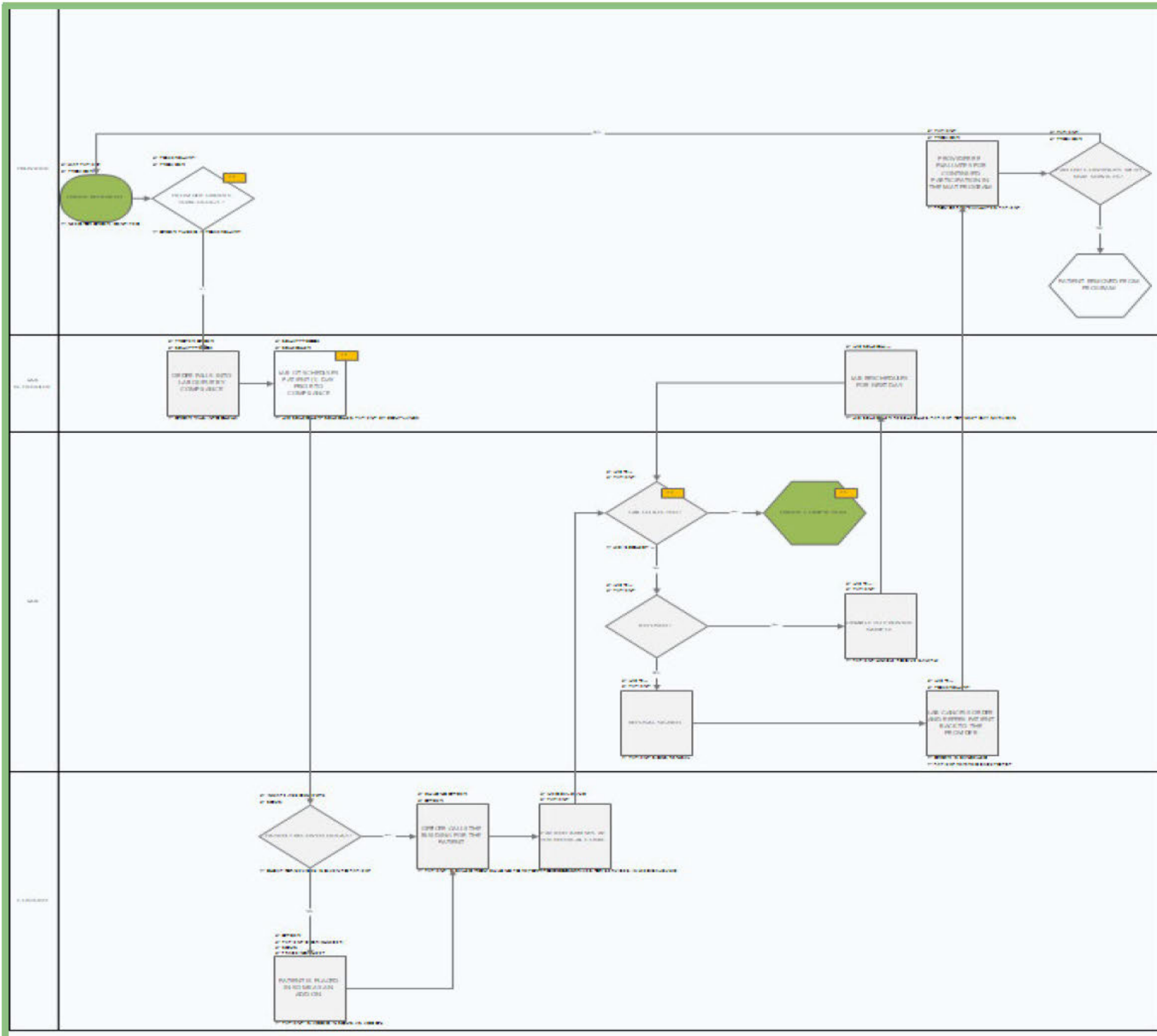
Implement controls to assure that the improvement remains permanent, and create a control plan with a sustaining and continuous improvement strategy.

Updated Process Map

Updates & Changes

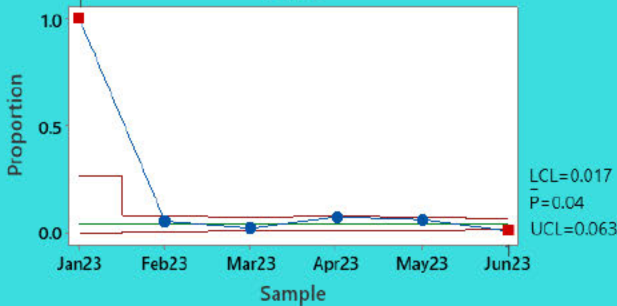
(Should the process work as intended the 1st time)

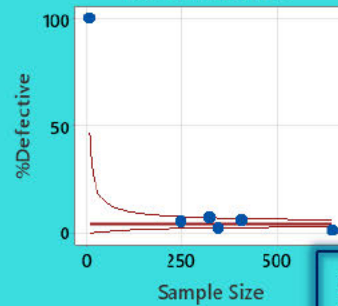
- The Provider will place the order for 25-35 days.
- Lab will continue to schedule 1 day prior
- Lab results would be received 3.5 days after collection resulting with completion prior to the 45 days
- Power BI update will alleviate the need for LVN rework and review of dashboard defects (swim lane deleted)



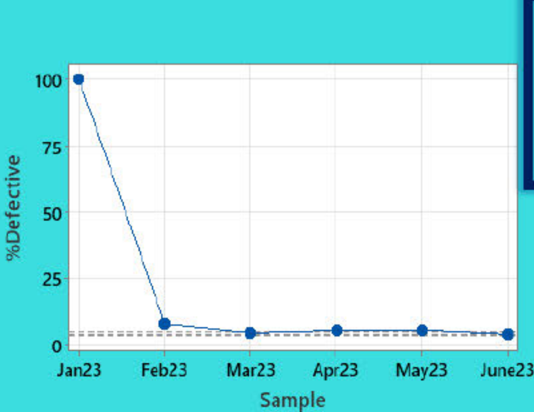
Updated Capability/Performance Analysis

Binomial Capability Report Defects (Jan23-June23)



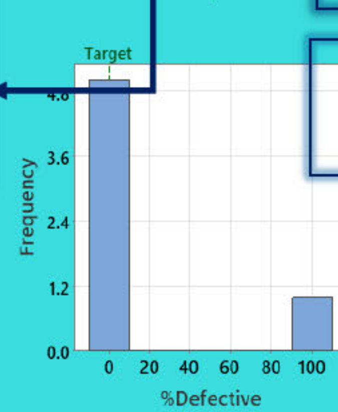


Tests are performed with unequal sample sizes.



Summary Stats
(95.0% confidence)

%Defective:	4.00
Lower CI:	3.18
Upper CI:	4.96
Target:	0.00
PPM Def:	40000
Lower CI:	31794
Upper CI:	49605
Process Z:	1.7507
Lower CI:	1.6487
Upper CI:	1.8551



% Defective: 4%

P. Value <.001

Two Proportions Before/After Improvements

Method

p_1: proportion where Sample 1 = Event
p_2: proportion where Sample 2 = Event
Difference: $p_1 - p_2$

Descriptive Statistics

Sample	N	Event	Sample p
Sample 1	1342	185	0.137854
Sample 2	2308	79	0.034229

*Sample 1 – Before
Sample 2 – After

Estimation for Difference

Difference	95% CI for Difference
0.103625	(0.083745, 0.123506)

CI based on normal approximation

Test

Null hypothesis $H_0: p_1 - p_2 = 0$
Alternative hypothesis $H_1: p_1 - p_2 \neq 0$

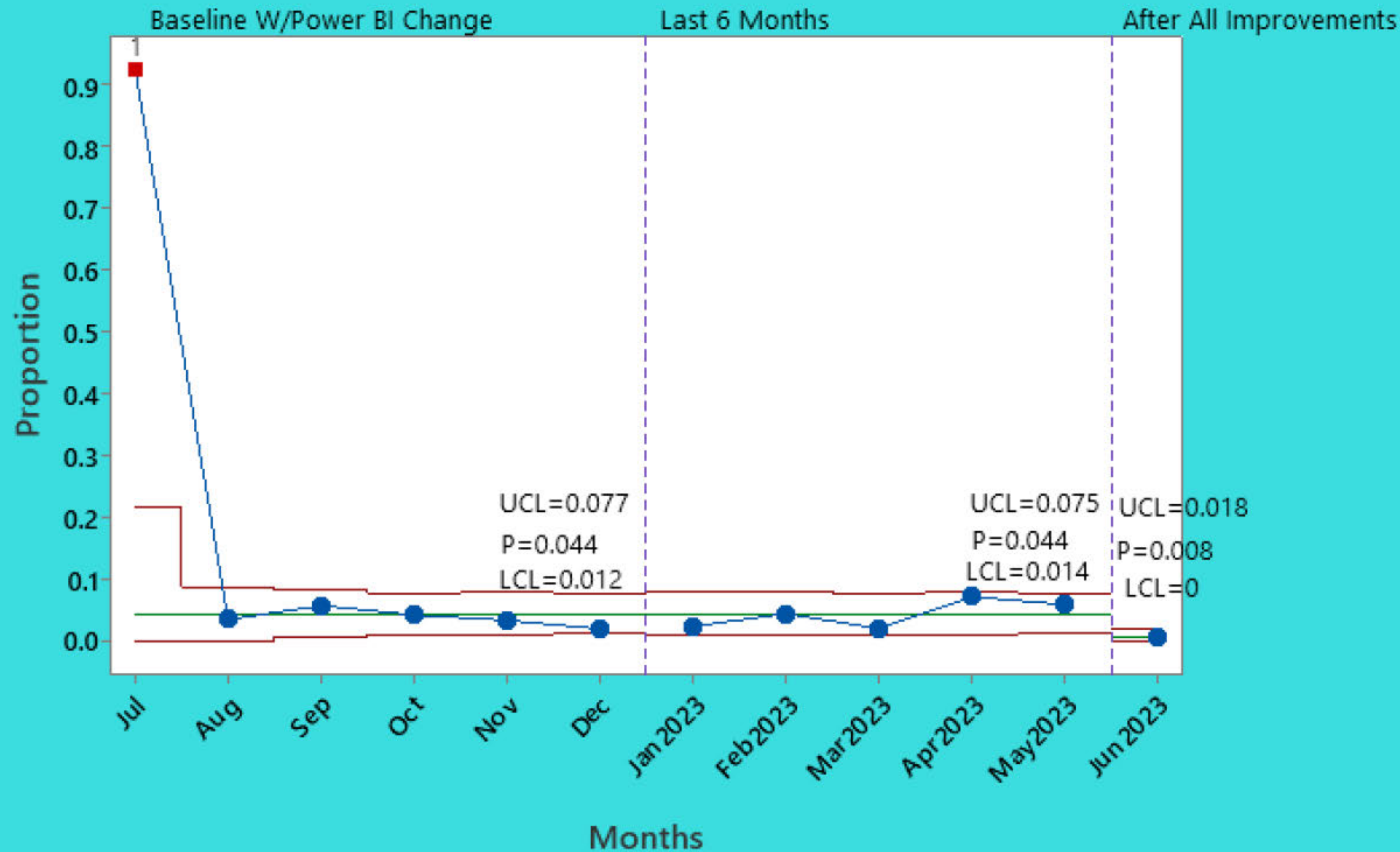
Method	Z-Value	P-Value
Normal approximation	[illegible]	0.000
Fisher's exact		0.000

Although not at our goal of 98%, this Two Proportions test proves that the improvements made so far are statistically significant. Since there is a difference between baseline and improvement, improved scores could not have happened by random chance.

Control Plan

- Resource Analyst will continue to monitor compliance on the Power BI
- Providers will order labs as needed by the Patient AND within the Power BI parameters.
- Lab will continue to schedule patients 1 day prior to compliance as per HCDOM Policy

P Chart



- Baseline with the change Power BI measure from July 2022 to December 2022
- Improvement performance from January 2023 to May 2023
- Control Phase – June 2023

QUALITY MANAGEMENT
LEAN SIX SIGMA

A3 PERFORMANCE TRACKER

General Information:

Project Title: ISUDT Toxicology Screening
Agency/Department: California Correctional Healthcare Services
Division/District/Office: Medical – Ironwood State Prison
Champion/Process Owner: [redacted]
Green Belt: [redacted]
Executive Sponsor: [redacted]
Date: July 13, 2023

Problem Statement:

ISP's 6-month average defect rate is currently at 12% for Toxicology for MAT Patients. A portion of these defects could represent valuable spots in the MAT program that can be used by patients that want to overcome addiction. We do not have unlimited PCP resources for MAT patients, therefore, UTOX screenings is crucial in being able to monitor and assess their compliance and engagement in the program.

Primary Metric:

The percentage of Patients actively on MAT with a completed Toxicology test in the past 45 days or as ordered, whichever comes first. Will also look number of days late for those that are completed late.

Goal:

Less than 2% of toxicology orders will be completed outside of the 45-day timeframe.

Root Causes (Critical X's):

- Power BI measurement:
  - As of May 31, 2023 – QM fixed the issue found during this project and retroactively changed the Power BI measurement. This change took our baseline defect rate from 12% to 4%
- Labs completed after the 28th day of the month
- Day of the week that the lab is drawn

Solution Implementation Tracking:

Item	Status
QM – Measurement tool revision	Complete
Visual Aid – Do's / Don'ts of ordering UTOX	Complete
Q30 drop down/ Order Sentence in Power Chart	Approved

Updated Control Chart:

Control Chart (% Defective) - Improvement Phases

Baseline W/Power BI Change
Last 6 Months
After All Improvements
Proportion
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
UCL=0.077
P=0.044
LCL=0.012
UCL=0.075
P=0.044
LCL=0.014
UCL=0.018
P=0.008
LCL=0
Jul
Aug
Sep
Oct
Nov
Dec
Jan2023
Feb2023
Mar2023
Apr2023
May2023
Jun2023
Months

Corrected Baseline Average: 4% defects (96% compliance)
Current Average: Less than 1% defects (99% compliance)

Financial Savings

Annual Soft Savings
(efficiency gains that do not impact the budget)

- **Eliminating the need for the Resource AGPA to drilldown on each defect monthly (2 hr. monthly)**

$840 savings per year

Total Annual Savings

$840

* Savings does not include the elimination of any future unnecessary PIWP's, Green/Black Belt, or Special Projects on ISUDT Toxicology at all 33 institutions.

Project Impacts

- Improvements with Power BI Toxicology Screening metric accuracy and compliance statewide.

- Standardization of the way Toxicology Screenings are ordered.

Project Summary and Lessons Learned

Summary:

Toxicology Screenings are a key component of the MAT program. ALL patients receiving Medicated Assisted Treatment require a Toxicology Screening to be done every 45 days or as the provider orders; whichever comes first. An issue with the Power BI measurement was identified and sent to QM for review. Upon review and completion, the Power BI measurement was fixed to ensure accuracy. Improvements to the measure increased the statewide scores by 3% on average. After all improvements, ISP's defect rate decreased drastically. We will continue to monitor the measurement tools in order to reach and sustain the goal of 98%.

Lessons Learned:

Averages don't tell the whole story!

Lean Six Sigma tools not only identify issues but statistically proves areas for improvement.

Green Belt Contact Information