TRANSFORMING MICROBIOLOGY:

Using Kaizen Events to Produce Short Bursts of Improvement that is Easily Sustained

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FLORIDA HOSPITAL
The skill to heal. The spirit to care.
Florida Hospital Celebration Health
Florida Hospital Altamonte
GINSBURG
Florida Hospital Winter Park
Florida Hospital Orlando
Florida Hospital East Orlando
Florida Hospital Apopka
Florida Hospital Kissimmee

Objectives

- Implementing Lean Six Sigma in the Clinical Microbiology Laboratory for improved cost savings with increased clinical delivery demands
- Implementing change quickly and with minimal costs, using a Kaizen model
- Centralizing of key processes without reduction in service
- Survival in 'ACO mandated cut' environment

Common Denominator

- How do hospital and lab administration manage with decreasing budgets and revenue?
  - Employ Lean Six Sigma
  - Focus on cost savings with improved efficiencies
  - Make changes quickly with minimal costs
- Strategy at Florida Hospital withACO Mandated Cuts
  - Ratchet down costs
  - Insurance companies going to a DRG model
  - Decreased utilization (cost avoidance)
  - Avoid penalties through HCAAPS

Florida Hospital Background

- Centralized Microbiology from 7 campuses to 1 core lab:
  - ***Before***: campuses streaked plates and sent plates and specimens to Orlando Microbiology
  - ***Now***: campuses send specimens *only* to Orlando Micro
    - Only rapid tests and stat gram stains are done at the campuses
  - Campuses pre-sort when sending batches by eswabs/urines/blood cultures
  - Implemented boric acid tubes for all Urine C&Ss

Why Change?

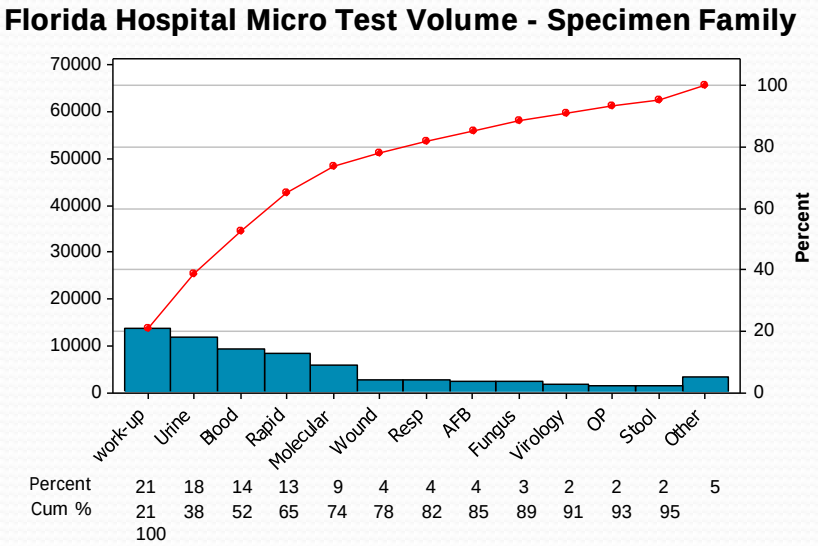
- Staffing
  - It take 1 year to begin to understand Micro
  - It takes 5 years to have an understanding of Micro
  - “Seasoned” staff is heading towards retirement
- Timely Resulting
  - Infectious Disease Physicians to act on results
  - The hospital wants to move patients out of rooms; Reduce LOS, thus reduce costs to the hospital

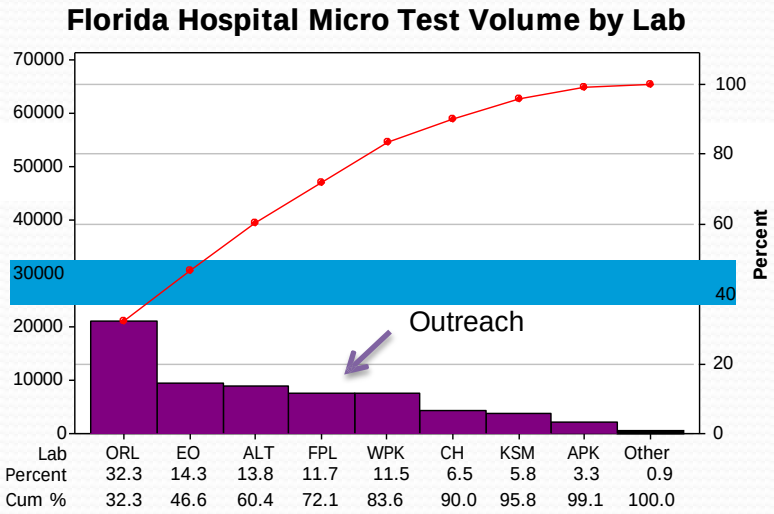
Base Line

2010 - 2012

CURRENT STATE

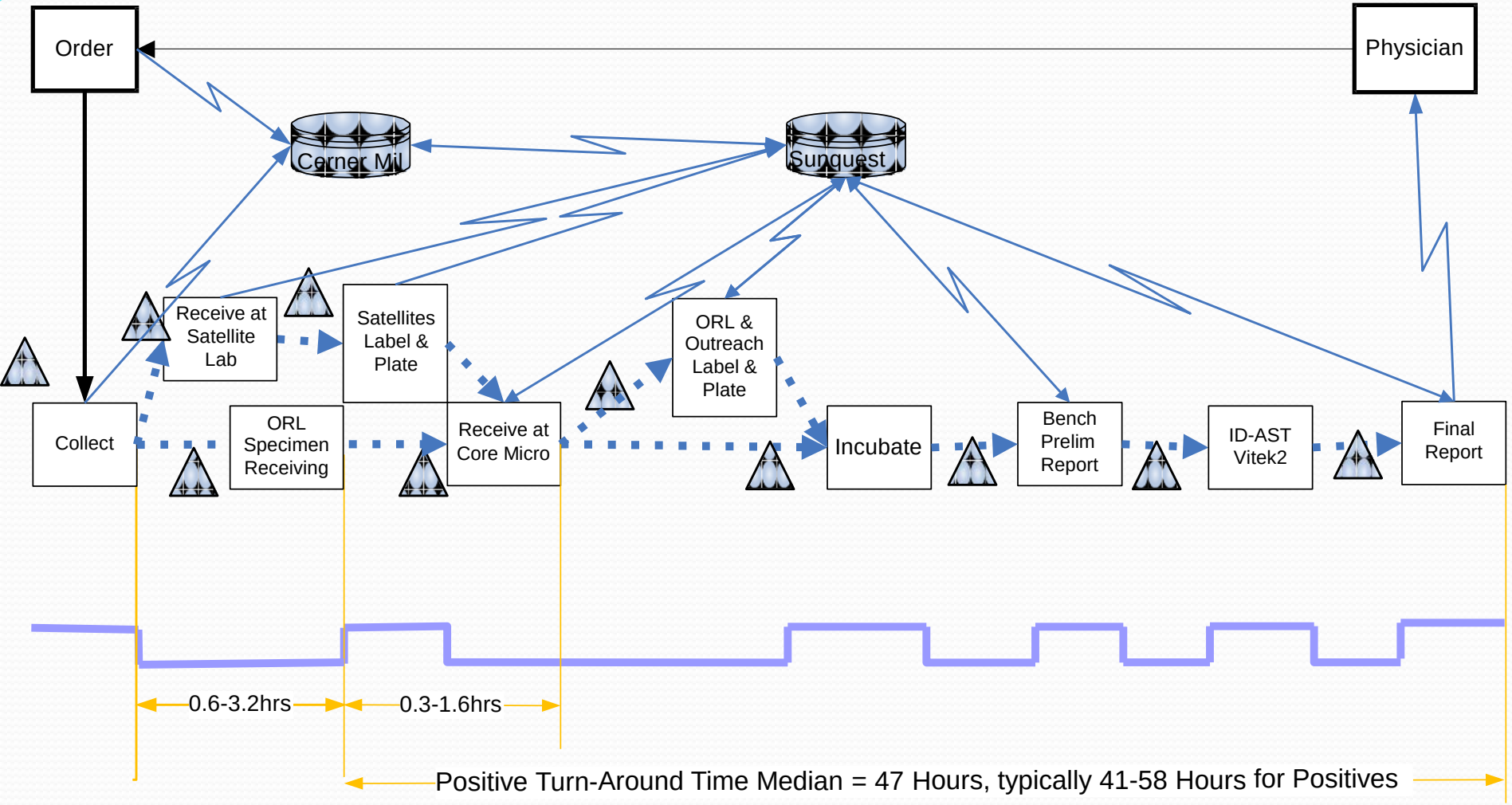
Test Volume





Understand what to address 1st

Florida Hosp Micro - Urine Value Stream



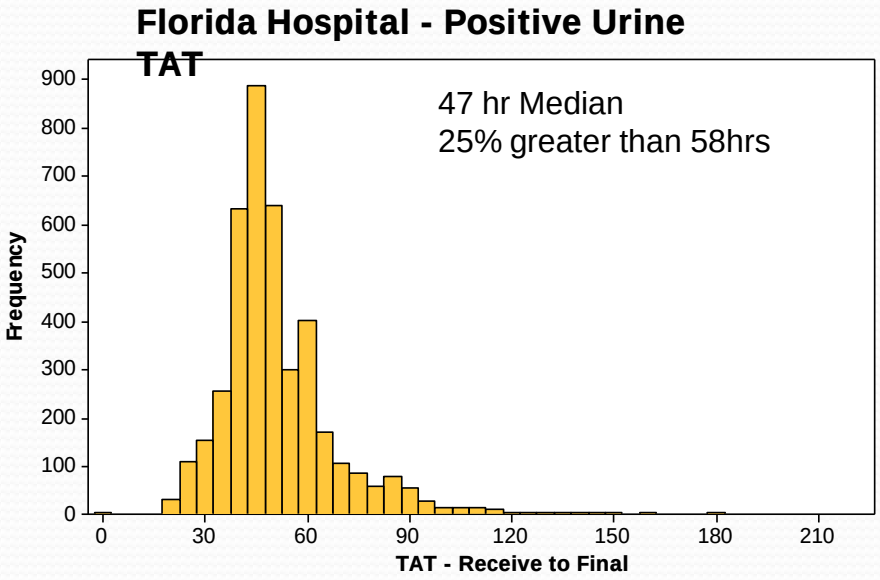
- Understand the Value Stream
- Identify where the "waste" is and where the opportunities are

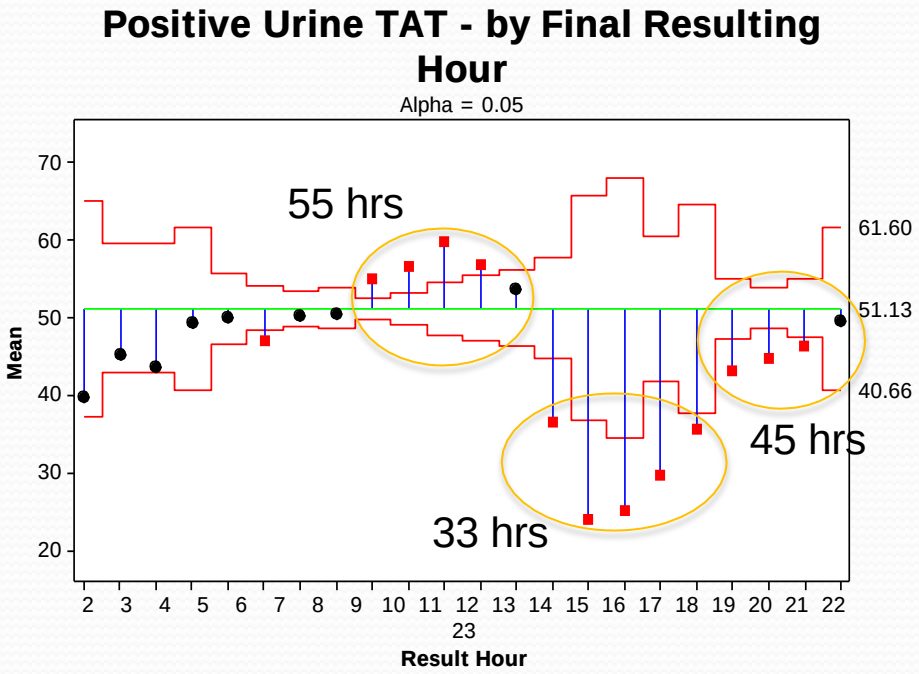
History of Performance

Turn Around Time – Receive to Final

TAT (Hours)	2010	Jan-Feb 2013
Positives		
Median	47	39
Q3	58	48
Negatives		
Median		23
Q3		25

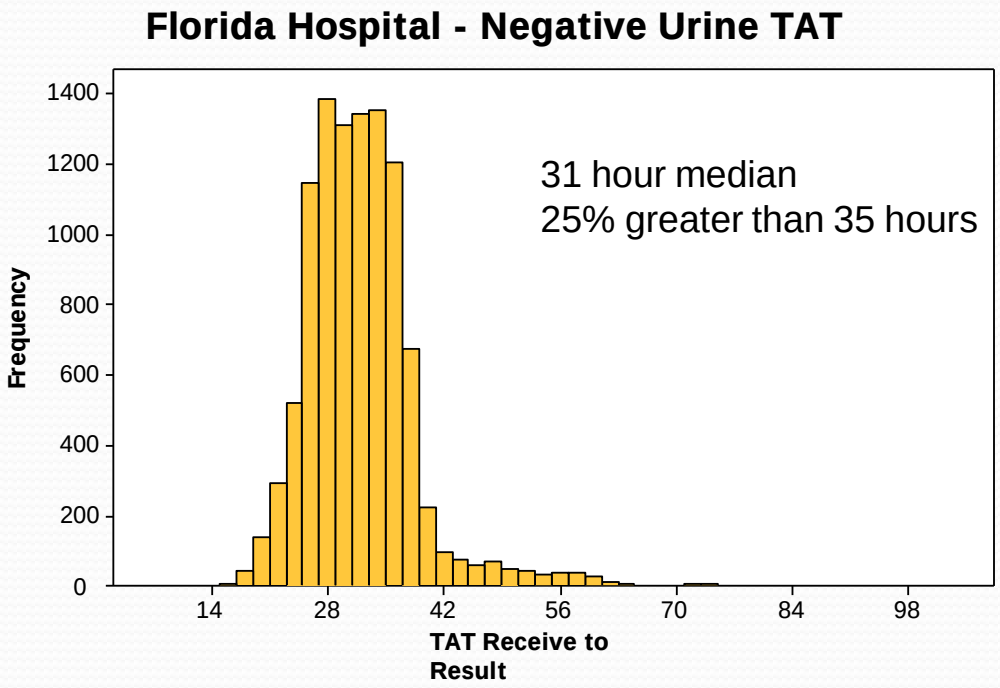
Positive Urine – Turn Around Time (Hours)





1St Opportunity: 10-15 hour difference between peaks seems to be driven by the 9 to 9 MST cut-off for plate reading schedule.

Negative Urine – Turn Around Time (Hours)



2nd Opportunity: Although we had a 24 hour protocol for negative urine only 7% were actually reported at 24 hours

Other Waste Opportunities

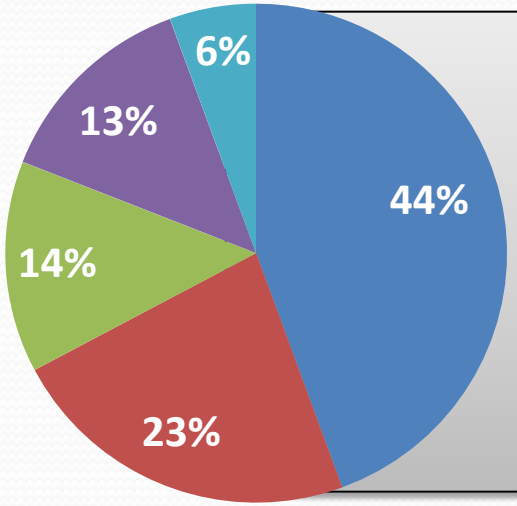
As much as 3 hours *delay* in getting plates to the incubator

Negative cultures *wait* to be resulted until positives completed

Vitek 2 *batched* and *wait* for available resource

Account for all specimens on inactivity list and overdue log (avoids 40 hrs/month)

Technical/Processor Capacity Utilization



- Technical
- Administration
- Transport
- Motion
- Other

Administration:
- Data keying
- Paper work
- Labeling
- Calls
- Log books
- Validating WIP

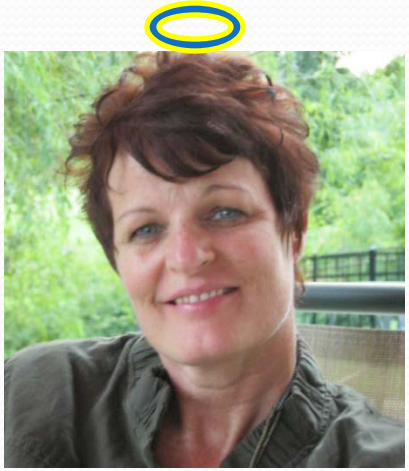
Other Activity
- QC
- Transportation
- Receive/Unpack
- Waiting
- Searching

45-50% of time in micro lab is on technical task, 27% transport/motion, 23% admin

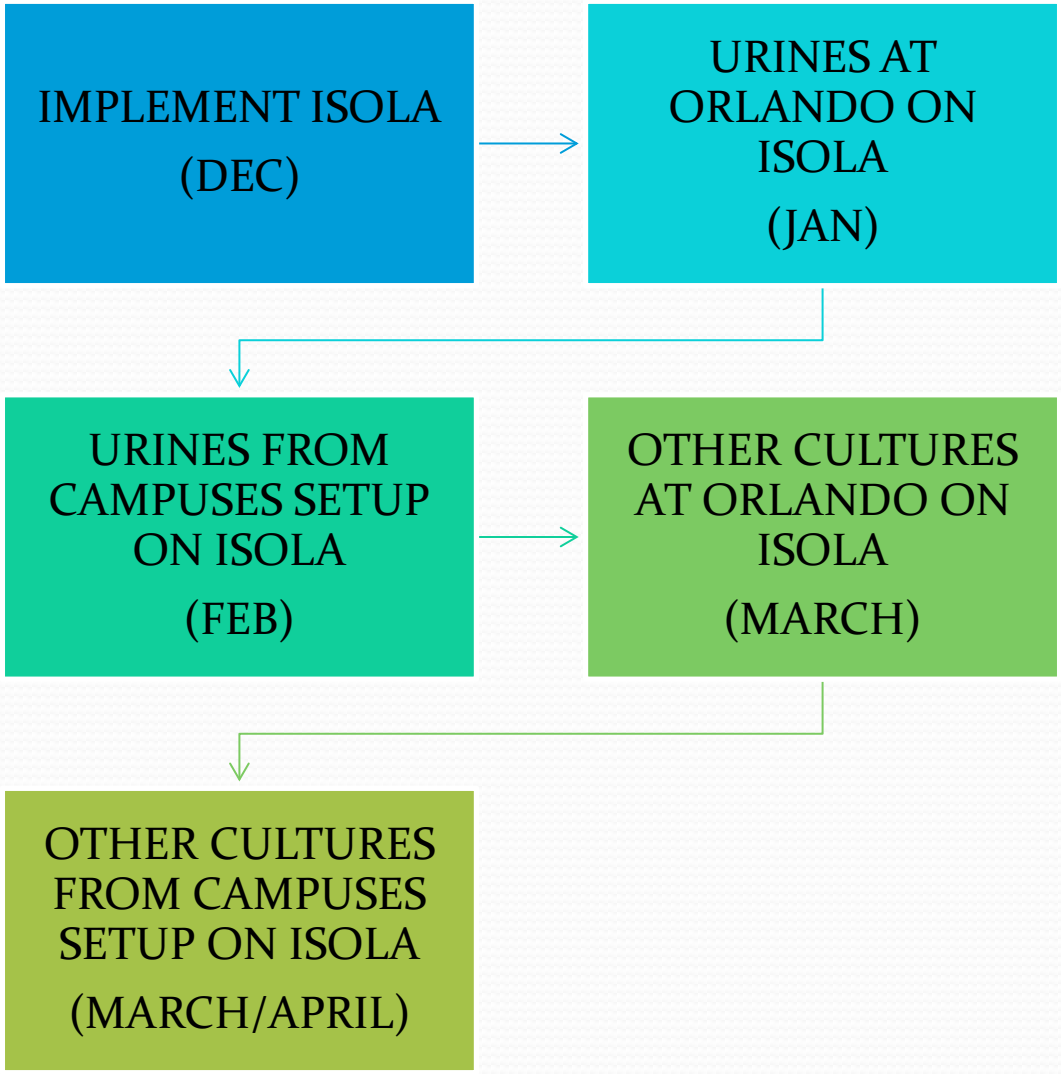
Opportunity to leverage cellular processing, new layout, daily management, and schedule changes to improve the Ratio

Resources

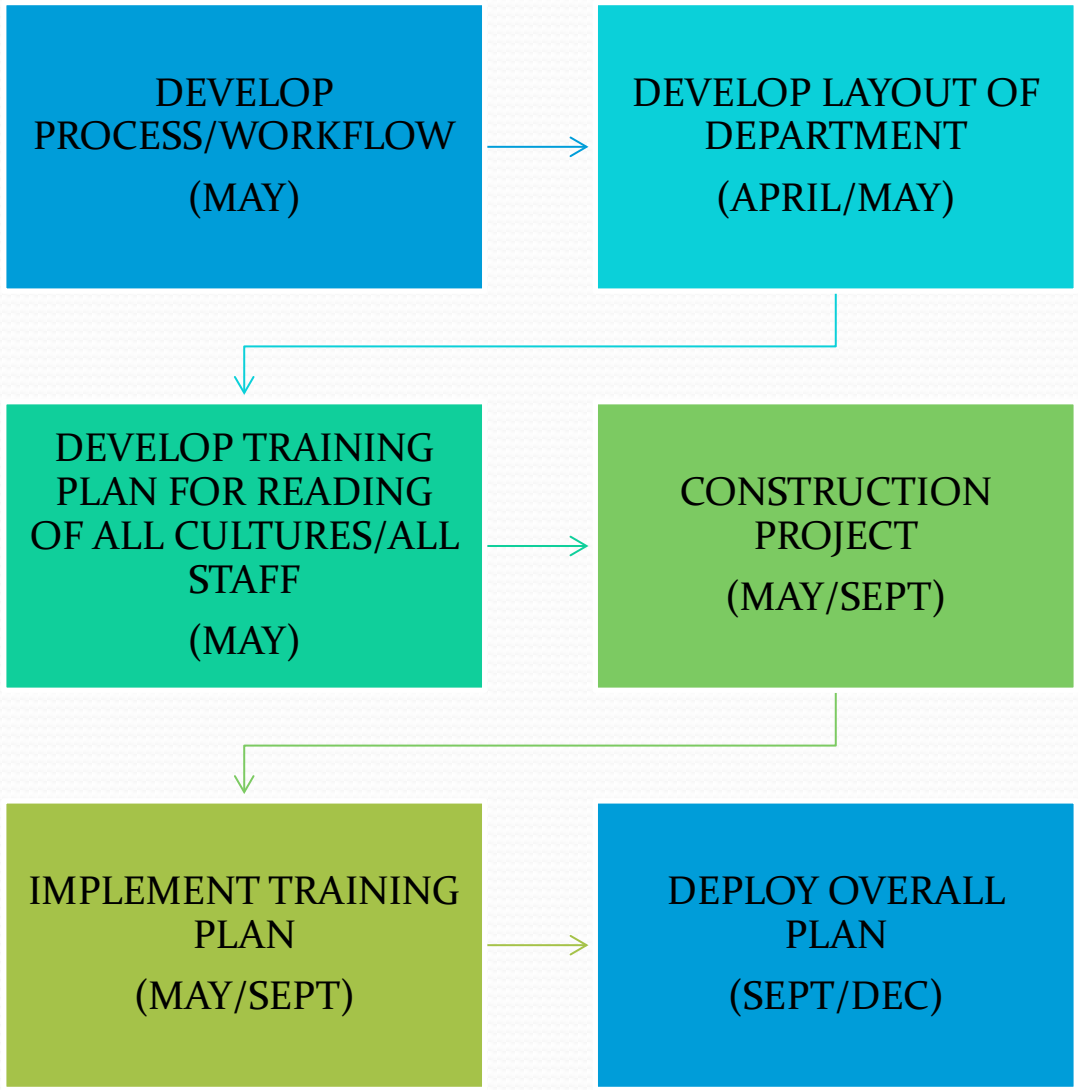
- External Consultants
  - “Fresh eyes” approach
  - Bring experiences from other facilities
- Internal Consultants
  - Formal DMAIC project on blood
  - Microbiology Workflow PI Project
    - Laboratory Process Improvement Manager



ALL CAMPUSES PHASE I: ISOLA IMPLEMENTATION WITH ALL CULTURES (2013)



ORLANDO MICRO PHASE II: NEW PROCESS IMPLEMENTATION (2013)



Microbiology: How it Looks Today

Challenges in Micro - Orlando

- Cross train all staff to “read” plates on all shifts
- Reading on one shift is no longer sufficient
- Low employee satisfaction
- Shortage of qualified technologists, high turnover
- Retirement of “seasoned” techs in the next 5 years
- Limited space, crowded, 35+ years old
- Staffing mismatched with incoming workload

Solutions

- Brought in outside consultants to assist with Kaizen process improvement projects
  - Assessment: 10/12
- Review current process; Kaizen event (05/13), ongoing continuous improvement
- Implement new technology with process change, 03/13
- Plan a space redesign, 5/13
- Scheduling to match staff to workflow -ongoing

Transformation – Urine Kaizen

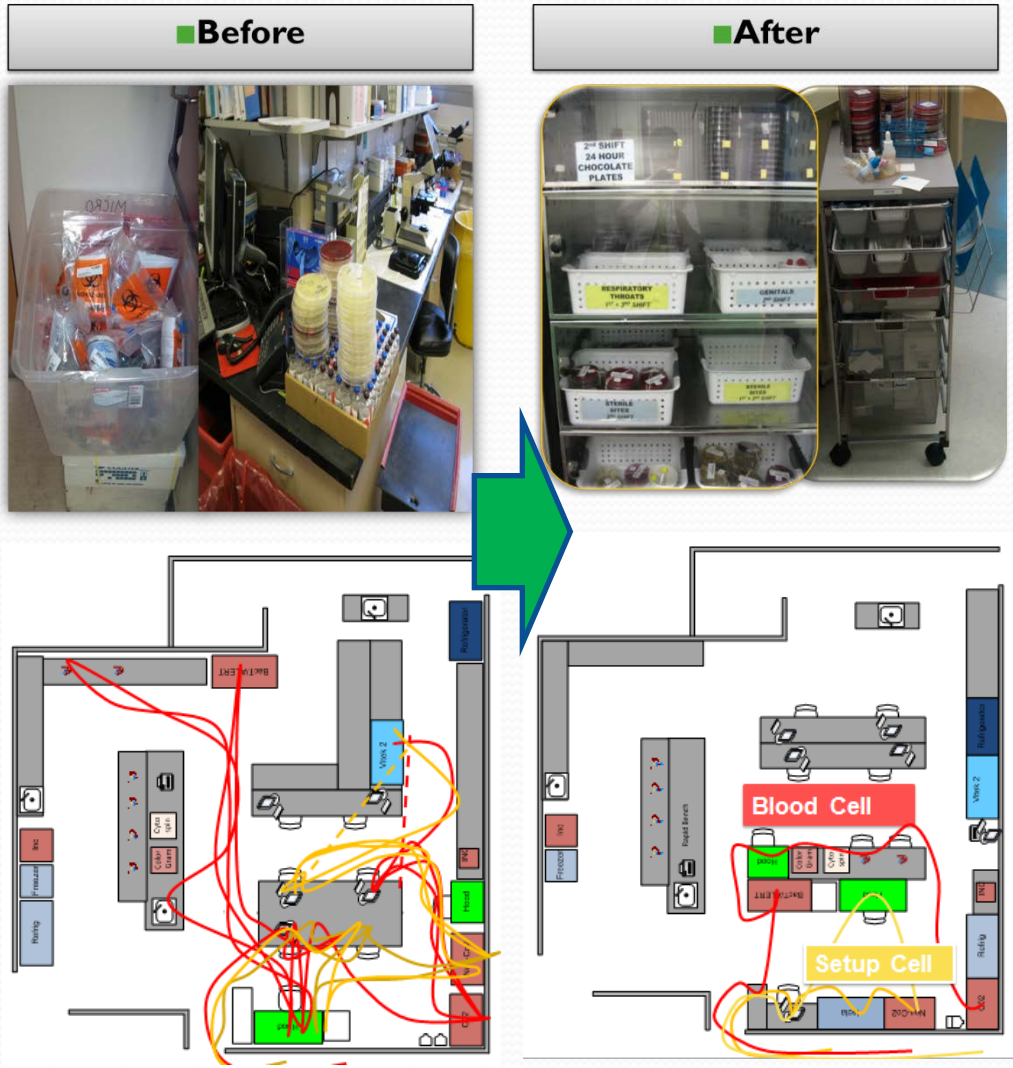
May 2013

Implementing Technology

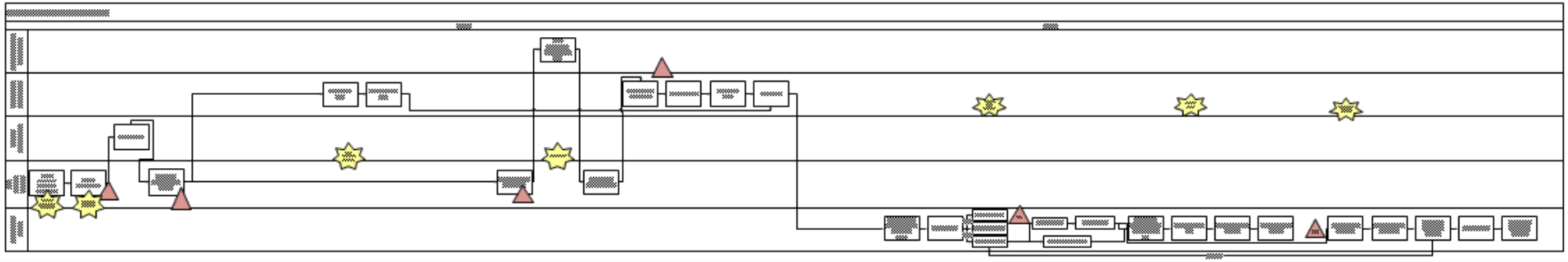
- Previ – Isola
- 40% reduction in time to plate
- Consistency in plating
- 2nd Isola installed 06/13 (Plan B)

Kaizen – Rapid Improvement

- Select Target Process
- Create a Team
- Set Objectives & Goal
- Observe the Process
- Analyze the Process
- Create Improvement Plan
- Implementation
- Presentation
- Standardize & Monitor



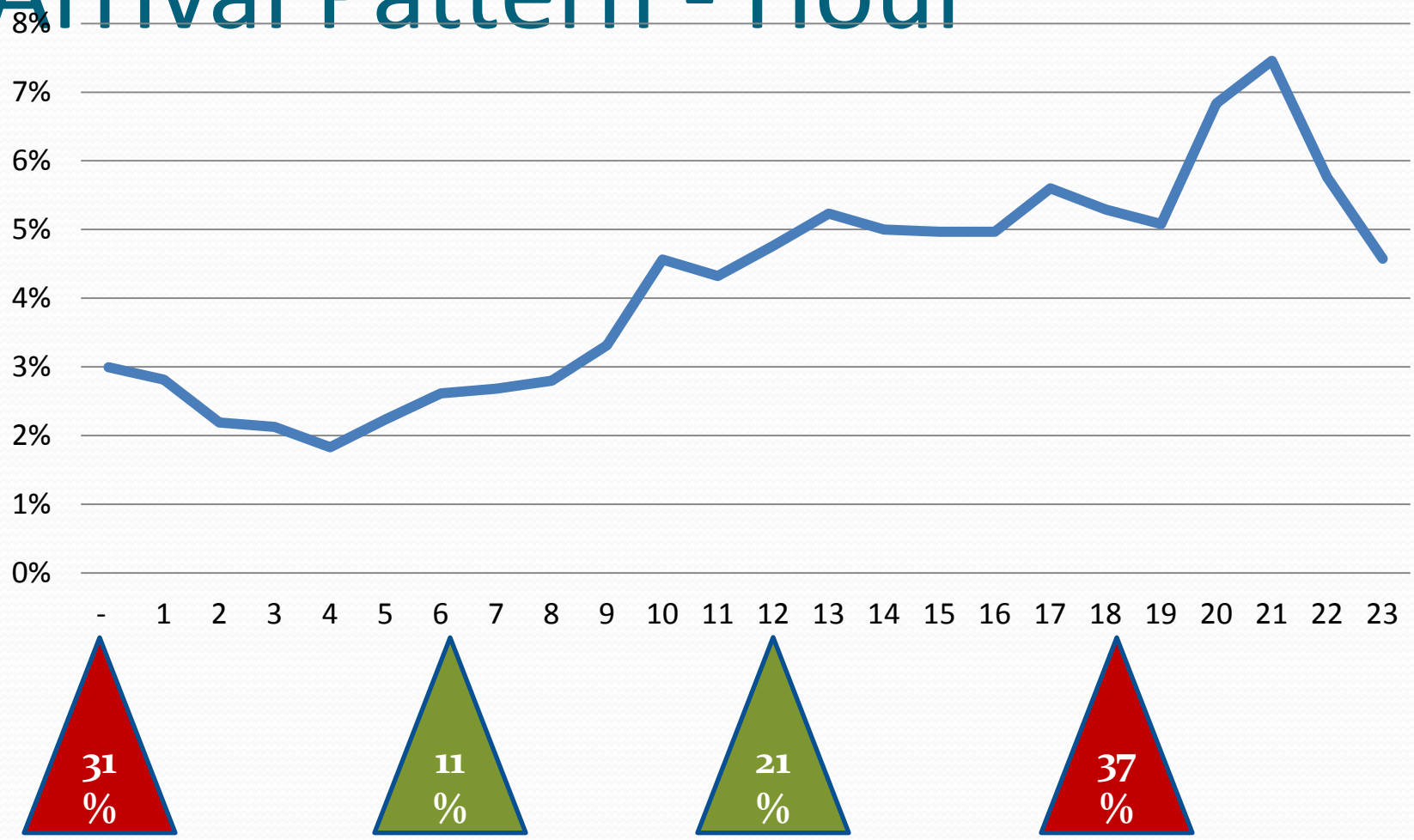
Pre-Kaizen Urine Process Map



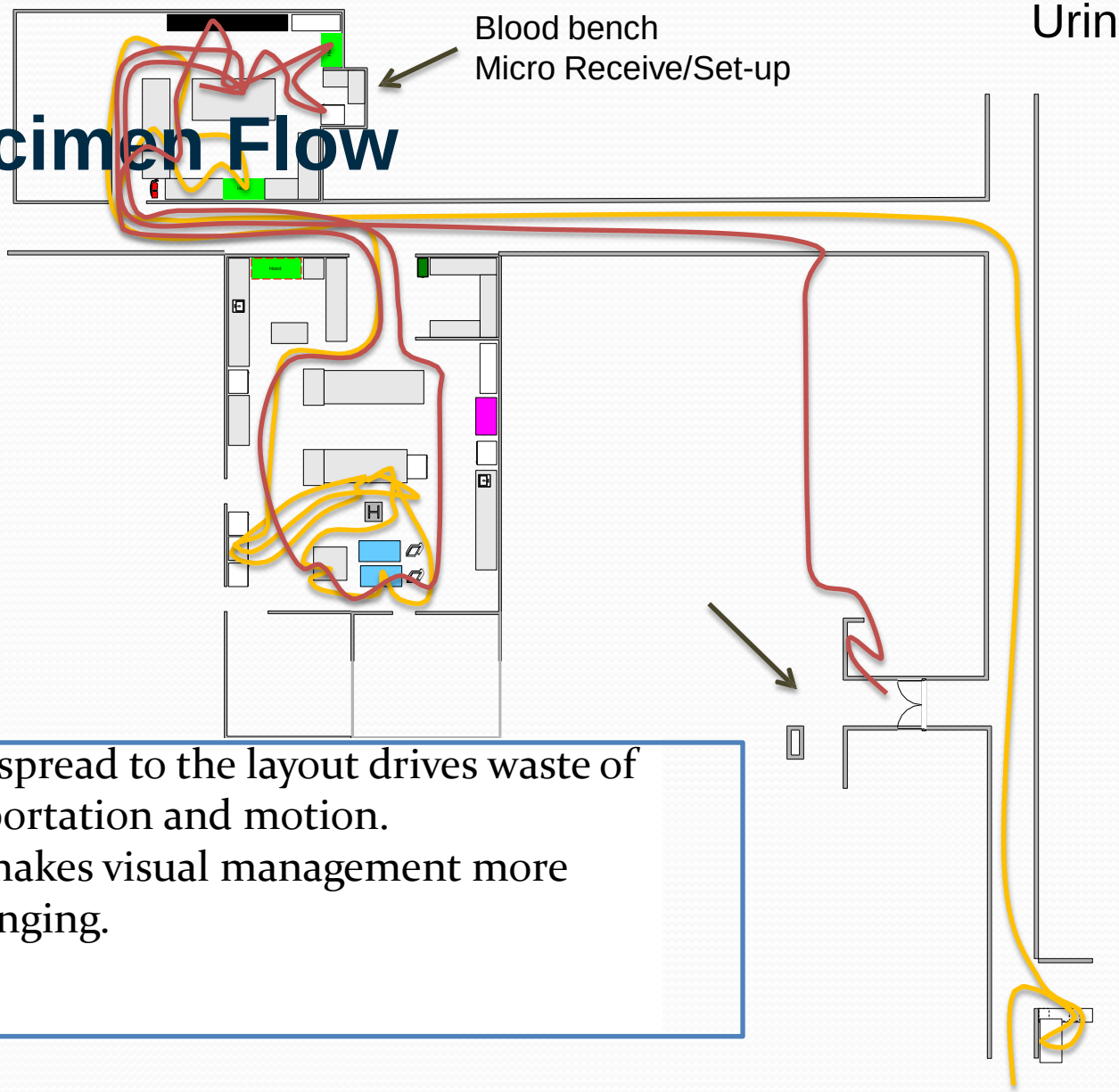
Total Number of Steps:	56

Enlisting Help – Robotic Delivery

Arrival Pattern - Hour

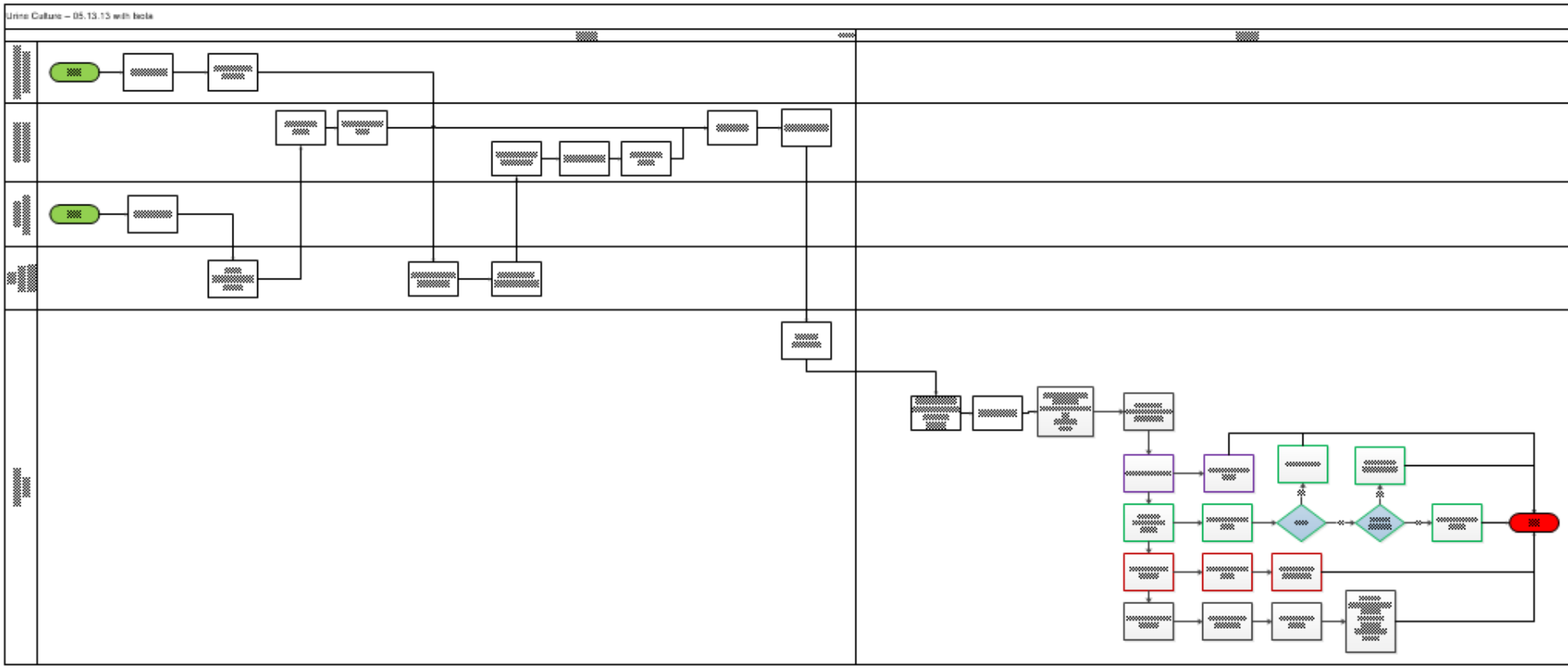


Specimen Flow



Large spread to the layout drives waste of transportation and motion.
Also makes visual management more challenging.

Post Kaizen Urine Process Map



Total Number of Steps: 34

- 40%

Future State - Concept

Daily cycles

Hour	Total	Avg / Day Received	%	+18 hrs	New Batches	Racks
0	539	12	3%	12		
1	505	11	3%	13		
2	429	10	3%	10		
3	400	9	2%	12	52	2.0
4	388	9	2%	17		
5	401	9	2%	16		
6	520	12	3%	16	46	1.8
7	578	13	4%	19		
8	452	10	3%	19		
9	556	12	3%	17	55	2.1
10	761	17	5%	18		
11	732	16	4%	20		
12	741	16	4%	20	56	2.1
13	866	19	5%	20		
14	850	19	5%	21		
15	784	17	5%	25	61	2.4
16	820	18	5%	17		
17	894	20	5%	14		
18	901	20	5%	12	55	2.1
19	915	20	6%	11		
20	951	21	6%	10		
21	1,106	25	7%	9		
22	751	17	5%	9	42	1.6
23	636	14	4%	9		
Grand Total	16,476	366			366	

3rd Shift Technologist

1st Shift Technologist

2nd Shift Technologist

New Batch Process

New Urine Culture Processing	
Day 0	
Set-Up Time	Plate Rack Color
04:00-08:59	
09:00-11:59	
12:00-14:59	
13:00-17:59	
18:00-20:59	
21:00-23:59	
0:00-03:49	

Day 1 Urine Culture Pull from Incubator				
Read				
Read Time	Plate Rack Color	Too Young/Further Workup	Final ID/Sens Ready	Cath Urine 48 hold
3:00		3:00	3:00	3:00
6:00		6:00	6:00	6:00
9:00		9:00	9:00	9:00
12:00		12:00	12:00	12:00
15:00		15:00	15:00	15:00
18:00		18:00	18:00	18:00
22:00		22:00	22:00	22:00

Day 1+ Urine Culture Placement for Incubation			
Place in Labeled Containers (Empty)			
Set-Up Time	Too Young/Further Workup	Final ID/Sens Ready	Cath Urine 48 hold
3:00	12:00	18:00	3:00
6:00	15:00	22:00	6:00
9:00	18:00	3:00	9:00
12:00	22:00	6:00	12:00
15:00	3:00	9:00	15:00
18:00	6:00	12:00	18:00
22:00	9:00	15:00	22:00

Daily Workflow

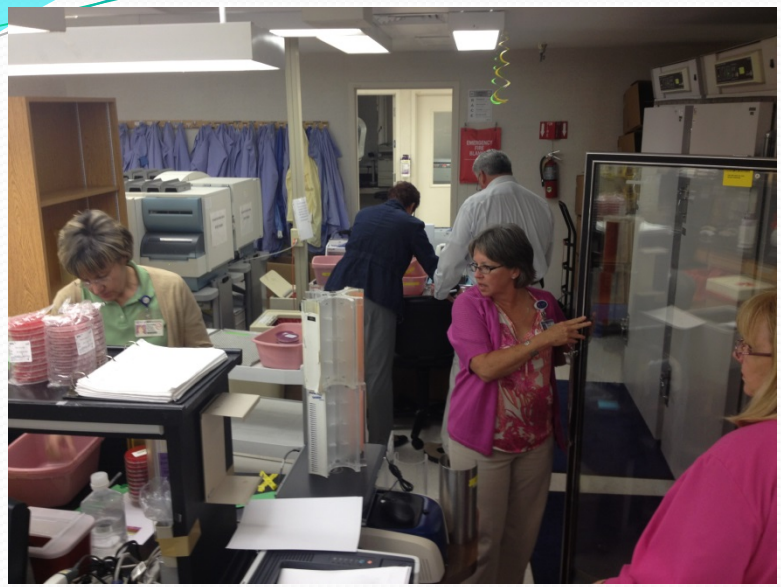
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
0:00
1:00
2:00
3:00
4:00
5:00

Task

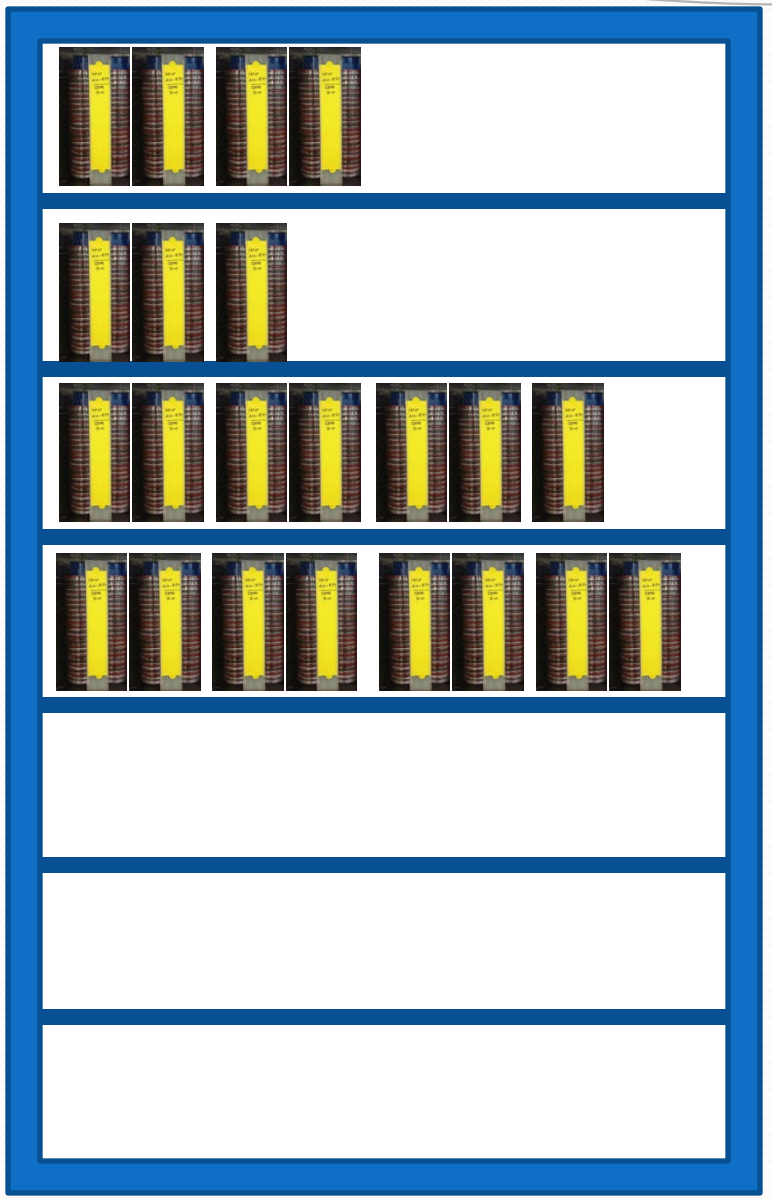
1 Pull Plates from Incubators
   a. Correct color / time
   b. TY
   c. AST
   d. Cath
2 Pull empty buckets from shelf
3 Cath
   Empty bucket on shelf
4 AST Final Prelim Report
   Save
   Rework ->AST in time bucket

5 TY
   Empty bucket on shelf
   AST in time bucket
6 New color read
   Triage -> trash
   Mixed -> save
   Positives -> AST in time bucket
   - TY
   - Cath

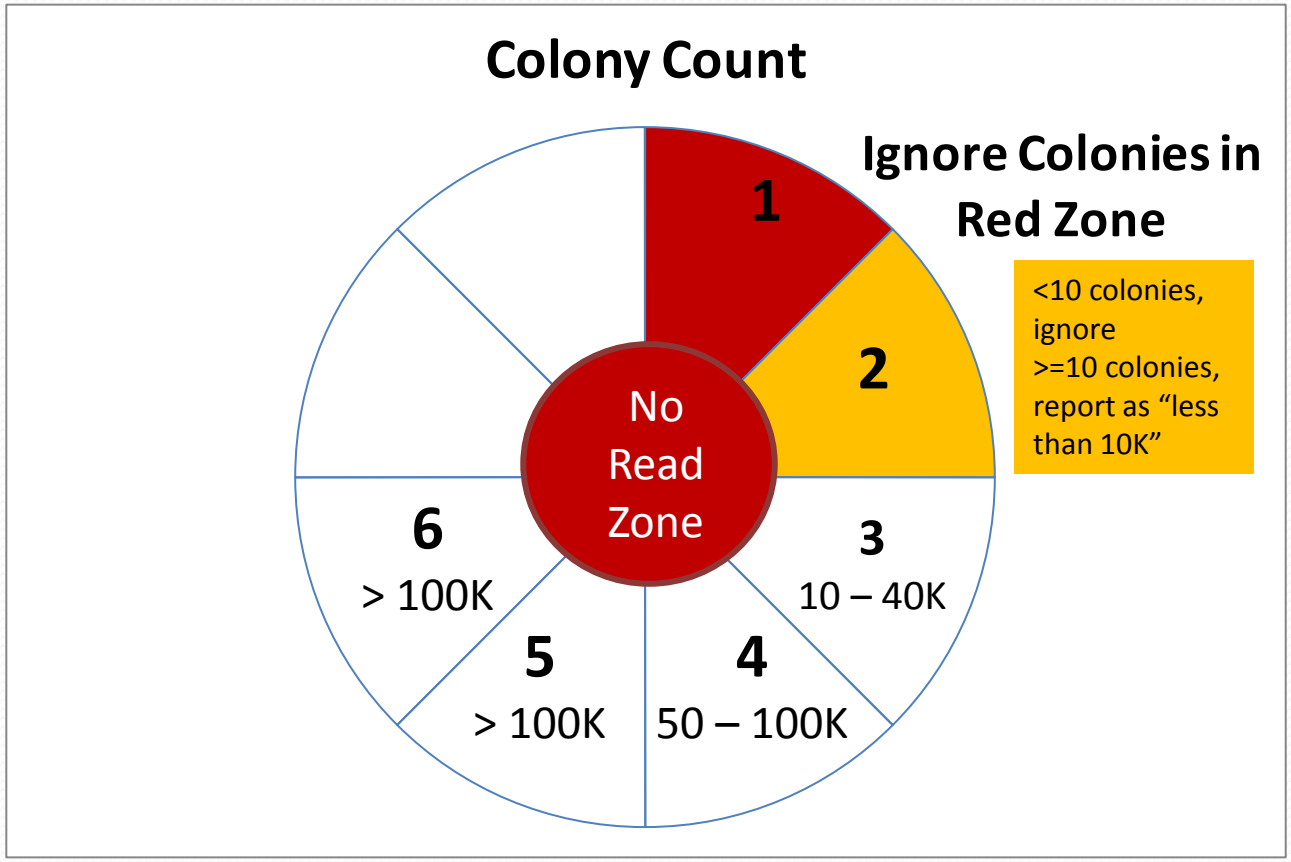
Implementation! In 3 days!



Incubator #13 – Batch Visual Control



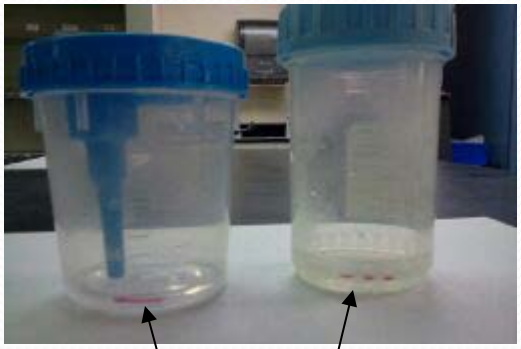
Urine Reading Template



It was discovered that we were over-reporting on urines!

Visual Aids and Standards

URINE POUR OFF'S FOR MICROBIOLOGY
GUIDE FOR VOLUME



Only 3 ml's are needed to pour off in to gray top tubes for Micro.
This red line indicates where 3 ml's are located on the cups; very low, barely covering the bottom of the cup.

Isola Poka Yoke, to reduce errors and facilitate identification
Later, added "arrows" to limit batch size between the 5 & 6 slots!

Pre-Kaizen History of Performance

TAT (Hours)	2010	Jan-Feb 2013	Goal	Improvement
Positives				
Median	47	39	30	23%
Q3	58	48	33	31%
Negatives				
Median		23	21	9%
Q3		25	24	4%

Current Performance

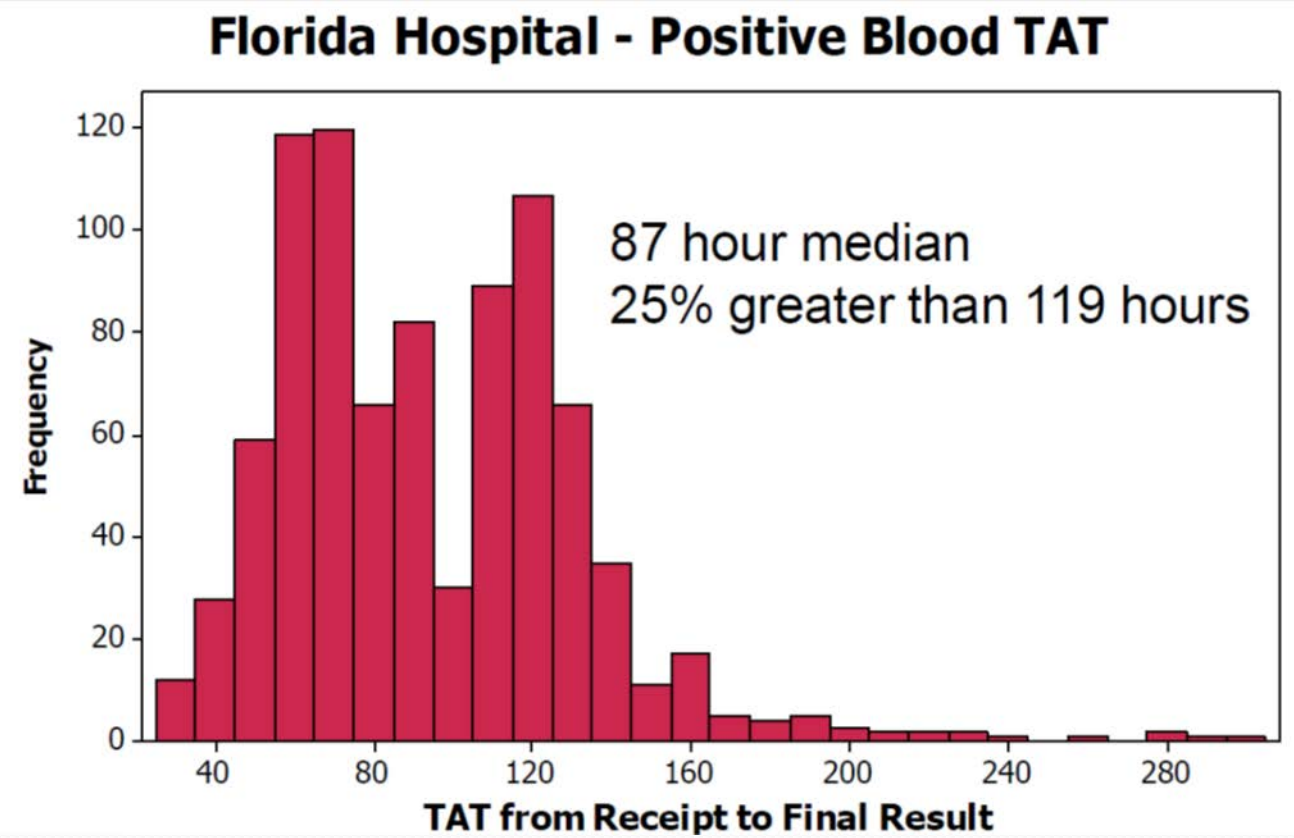
URINE CULTURE TURN-AROUND-TIME					
TAT(Hours)	**2010**	**Feb, 2013**	**June**	**Sept**	**Goal**
Positives					
Median	47	39	37	33	30
Q3	58	48	41	38	33
Negatives					
Median	31	23	20:44	20:31	21
Q3	47	25	21:56	21:49	24

Transformation – Blood Cultures

Fall 2013

Findings – Blood Culture TAT

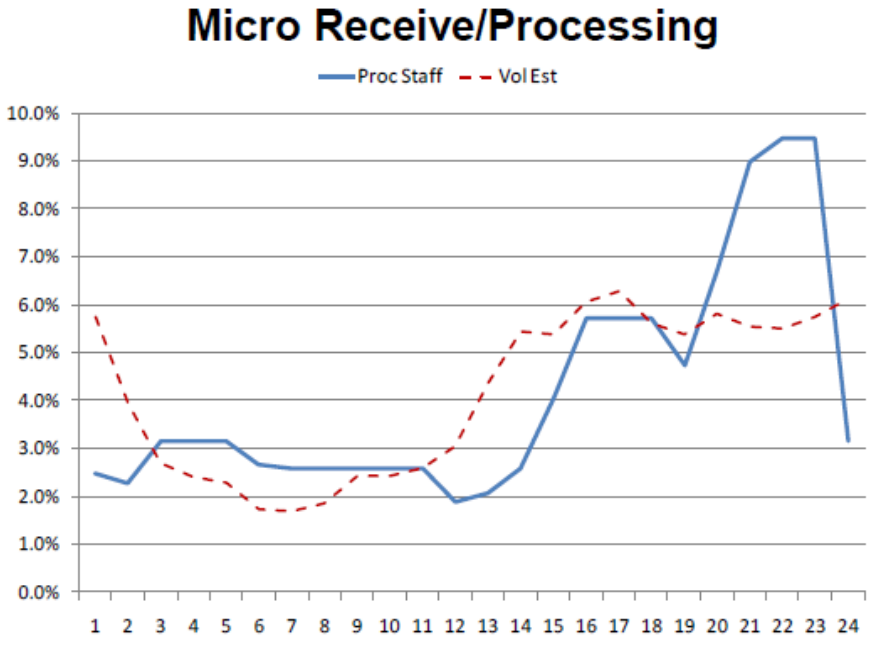
- Pre 2011 DMAIC Project Data

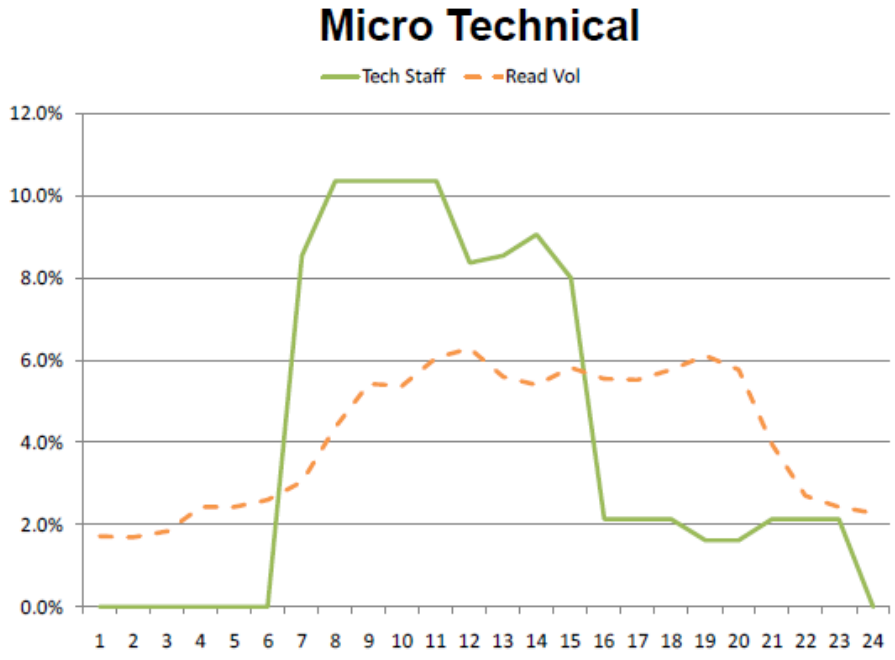


Findings – Blood Culture TAT

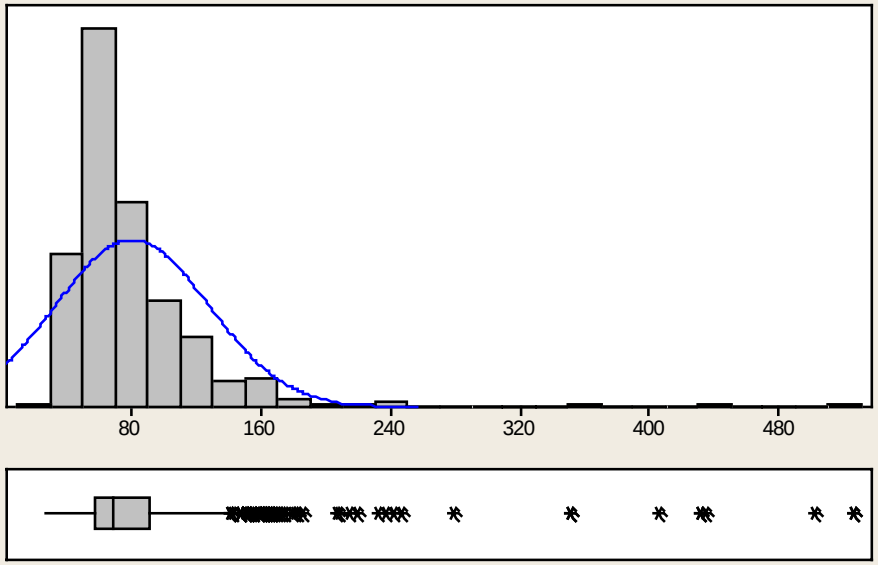
- Staffing Variation
  - Processing
  - Technical

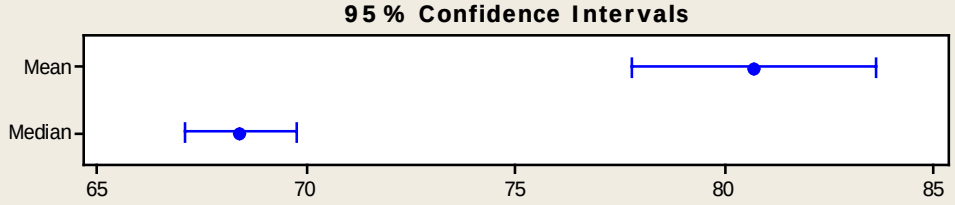
Hourly Staff and Volume Distribution





Summary for + Blood Culture TAT (June/July)





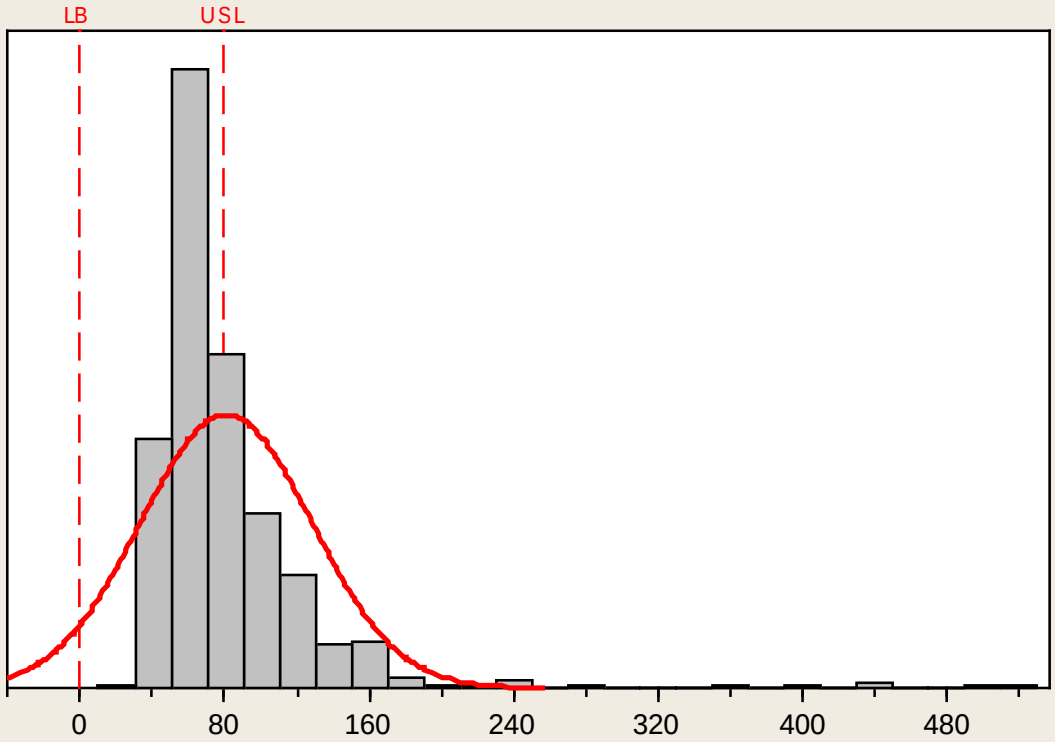
Anderson-Darling Normality Test	
A-Squared	72.16
P-Value <	0.005
Mean	80.691
StDev	47.364
Variance	2243.391
Skewness	4.7395
Kurtosis	33.8349
N	1006
Minimum	27.183
1st Quartile	58.196
Median	68.417
3rd Quartile	91.383
Maximum	525.467
95% Confidence Interval for Mean	
77.761	83.621
95% Confidence Interval for Median	
67.110	69.745
95% Confidence Interval for StDev	
45.381	49.530

Process Capability of Blood Culture Process (June / July)

Process Data	
LB	0
Target	*
USL	80
Sample Mean	80.6911
Sample N	1006
StDev(Overall)	47.3644

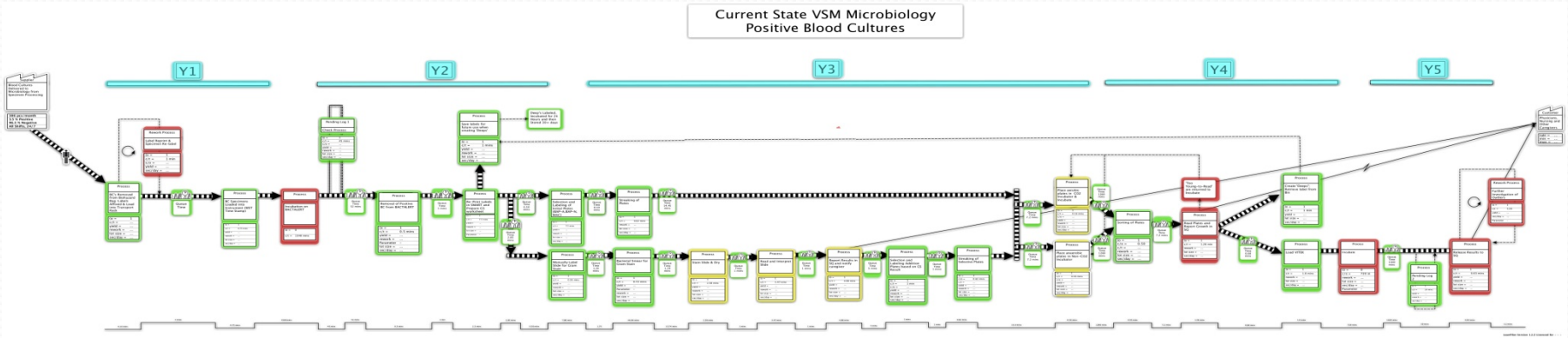
Observed Performance	
PPM < LB	0.00
PPM > USL	365805.17
PPM Total	365805.17

Exp. Overall Performance	
PPM < LB	*
PPM > USL	505820.42
PPM Total	505820.42



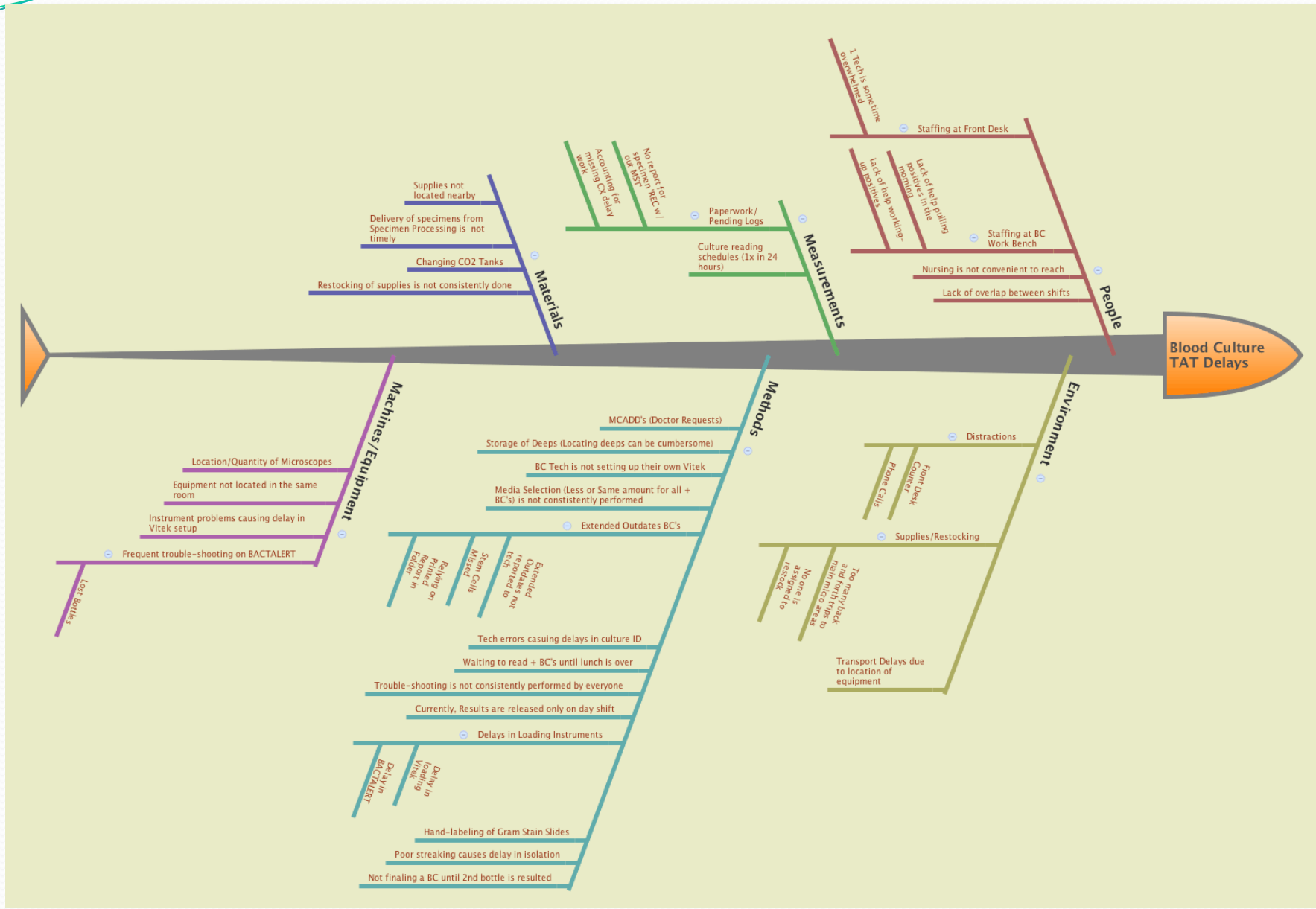
DPMO = 365,805 Sigma Score / Z (ST) = 1.95

BLOOD CULTURE VALUE STREAM MAP



Significant X: not releasing results from Vitek timely!

BLOOD CULTURE FISHBONE ANALYSIS



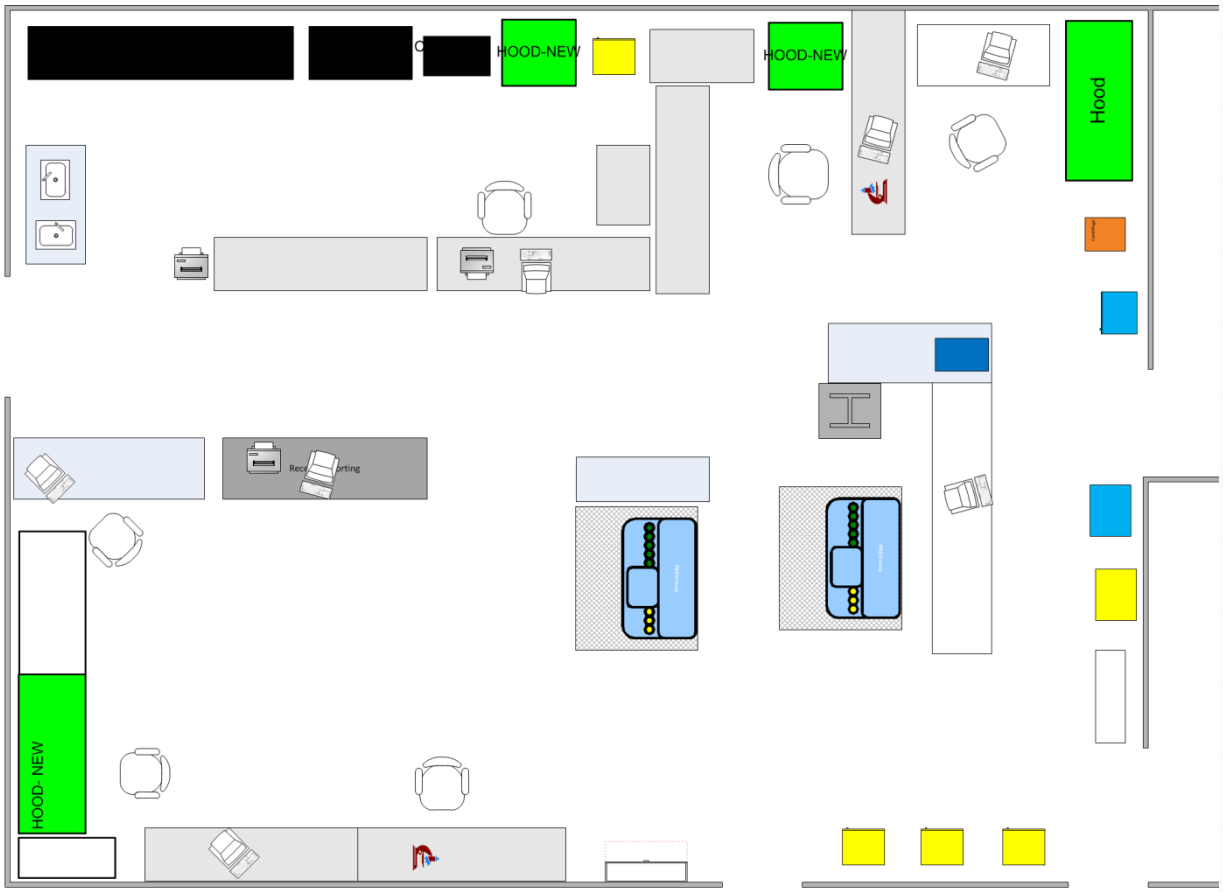
Blood Culture – Current Performance (2013)

BLOOD CULTURE TURN-AROUND-TIME		
June 2010	**June 2013**	**Goal**
36.5% final <80 hours	86.2% final <100 hours	90% final < 100 hours

QUICK WINS - 2013

- Changed GOAL
  - Never going to get to 80% in <100 hours, because of the 120 hr incubation for negatives
  - Goal made more meaningful
    - 90% reported at 48 hours from ***received/result***
- Increased frequency of MNG from 1-2x/day to 6 times per day
- Increased frequency of releasing results from Vitek from 1-2x/day to 4 times per day
- Reduced or eliminated paperwork

Micro Setup – Future State

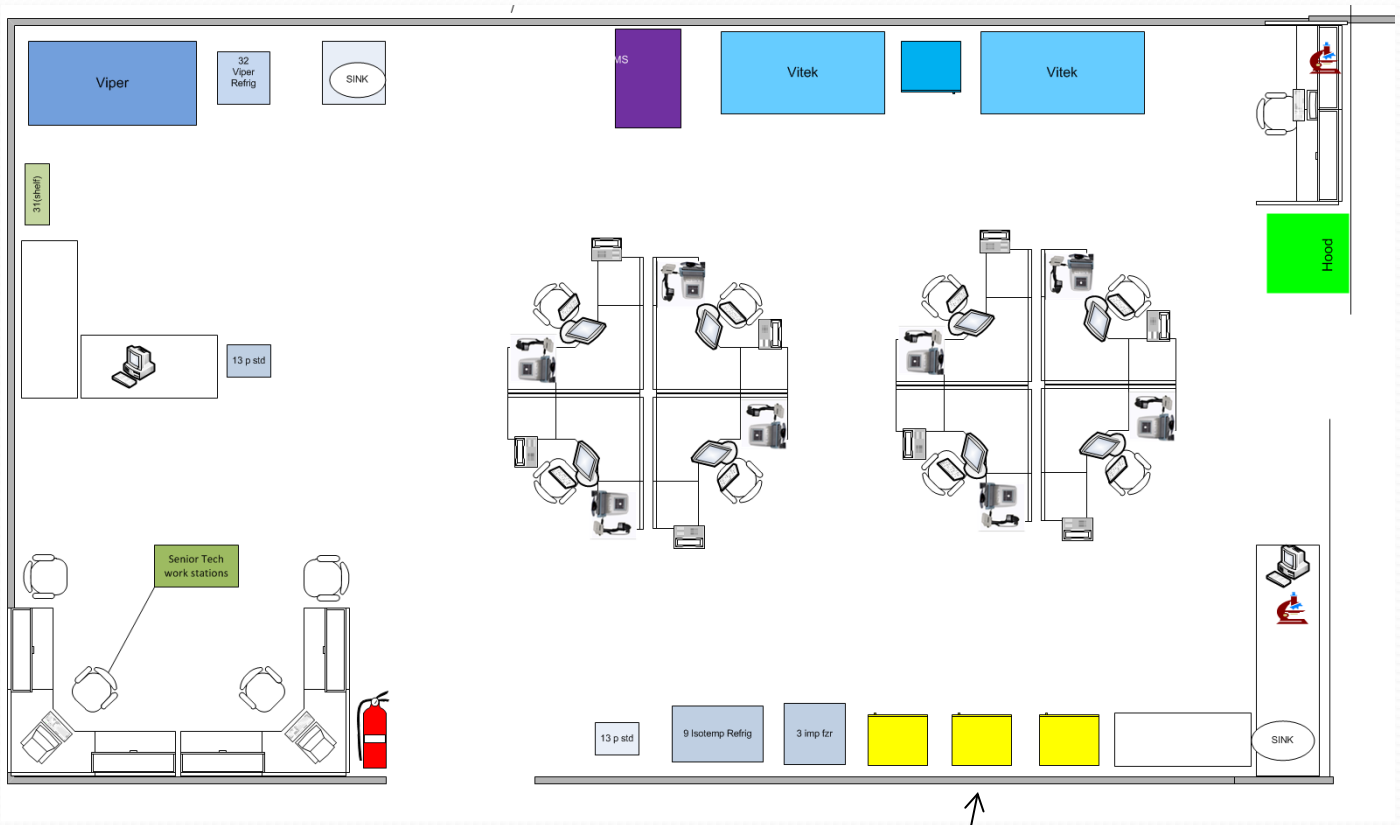


Benches have V2 Smart Carriers

Direct access to V2 (small batches)

Design Bench Layout and Workflow to Reduce Rework, Motion, and Unnecessary Processing

Micro Reading – Future State



Day 1+ Incubators

Benches have V2 Smart Carriers

Direct access to V2 (small batches)

Design Bench Layout and Workflow to Reduce Rework, Motion, and Unnecessary Processing

Lessons We Learned from our Kaizen Events: Must Do's for Success

- Before the Kaizen event:
  - Pick out an “engaged” team; you want the best & brightest
  - Lay out the “expectations” for the team members
  - If you have metrics, crunch numbers and share with the team
- During the Kaizen event:
  - Make for a comfortable environment
  - Share in the “positivity” with the team and expanded team
- Post Kaizen event:
  - Communicate results to the expanded team
  - Celebrate success! (don’t under estimate the importance here)
  - Continue with improvement efforts &
  - Communicate, communicate communicate!!!

Lessons We Learned from our Kaizen Events: Must Don‘ts for Success”

- Fail to record metrics or dilute reporting
- Set unrealistically low or high targets

- Pick team members based on seniority or position
- Allow process owner to discontinue sustainability
- Allow “Executive Sponsor” to ignore process change post Kaizen and beyond (leading to zero sustainability)

Benefits to the People

- Physicians/Patients:
  - Faster TAT, physicians can act quicker on results
  - Reduce false positive Urine C&S with boric acid tubes
- Microbiology:
  - Alignment of staff with workload; smooths out the processes and reduces stress
  - Cross-training of all staff on “reading” enhances job satisfaction
  - Reduces errors due to “over work” conditions
  - Creates “teamwork” environment through shared work

Questions?

30 days Plan

	Action	Who	When	Completion
1	Reflex order UA short term improvement	Sany	14-May	100%
2	Create guideline for rack / batch standard size	Team	14-May	100%
3	Wrong plates loadeed on Previ Isola - how to fix it	Angela	14-May	100%
4	Record today's work flow 3 shifts	Angela	15-May	100%
5	Create incoming Urine Cultures profile	Manuel	15-May	100%
6	Create and communicate Std operating procedure	Maryanne	23-May	50%
7	Specimen batching process	Manuel	14-May	100%
8	Observe specimen waiting receiving and micro specimen receiving	Maryanne	14-May	100%
9	Ask Technologiest why they wait in front of Previ Isola	Manuel	14-May	100%
10	Turning off workcards (automatic print)	Mary Ann	20-May	100%
11	Establish new colony count template	Angela/Maryanne /Anne	15-May	100%
12	Traning for all shift on changes	Angela / Sandy / Maryanne	31-May	25%
13	Result ORDRCS batch result entry	Maryanne / Patrick	15-Aug	25%
14	Training Matrix	Maryanne	31-May	100%
15	Metrics to track (TAT & Volumes)	Team	15-May	100%

30 days plan

	Action	Who	When	Completion
16	Look for smaller containers / racks	Team / Mary Ann	15-May	75%
17	Engineer the incubator spaces (Draw)	Mary Ann	16-May	50%
18	Resulting of reflex order			100%
19	Create a visual control for Urine level for Isola	Mary Ann	16-May	100%
20	Update process map	Team	15-May	100%
21	Autoverification Vytek	Mary Ann		25%
22	Purchase acrilic plate holders	Mary Ann	17-May	100%
23	Data collection plan	Manuel	16-May	100%
24	Schedule for following weeks	Team / Sandy	16-May	0%
25	Purchase a shelf for the incubator	Mary Ann	16-May	100%
26	Maintain daily operation volume by batch and record time to read - create a standard	Maryanne	31-May	25%
27	Request a new crystal report that full fill Micro Lab requirements	Mary Ann	15-Jun	0%