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Achieving Lean and Sustaining Lean Improvements in Phlebotomy and Pre-analytical

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Allina Health Laboratory
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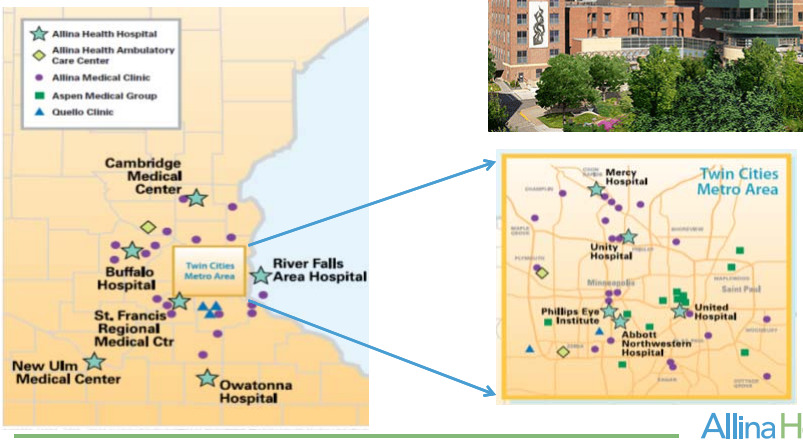
Purpose

To present the benefits of Lean implementation by illustrating an improvement project in the phlebotomy department of a large urban hospital. Overview of Lean concepts to achieve Five S, create a Lean layout and staff to workload.

- **Key Learning Objectives**
  - Understand how Lean process improvement can improve workflow, remove waste and optimize performance in phlebotomy
  - Learn application of basic Lean concepts of Five S, Lean layout and staff to workload
  - Understand how to achieve cost benefits by reducing waste of inventory, waste of motion, waste of non-utilized talents

Allina Health System

- 11 Hospitals (Metro/Regional)
- 82 Clinic Locations



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Allina Health Laboratory

- Employ 700 laboratory professionals system-wide
- Perform routine and esoteric testing:
  - Andrology
  - Cytogenetics
  - Flow Cytometry
  - Cytopathology
- 9.2 million lab tests performed in 2011

4

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Construction of New Central Lab Facility

- Adjacent to Abbott-Northwestern Hospital campus in Minneapolis
- $29 million facility opened March 2012
- Consolidated 12 lab sites
- Occupies 75,000 sq ft
- 400 employees

5

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Beginning of a Lean Journey!

- Strategic Plan: to gain efficiencies by implementing Lean workflows at design phase
- Hired a Lean Consultant in 2010
- Project timeline
  - August 2010: Lean design phase begins
  - March 2011: construction begins
  - December 2011: Initial occupancy
  - March 2012: Core lab move; full occupancy
- Key projects identified for improvement

  → Phlebotomy

6

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Lean in Healthcare

Lean is derived from the Toyota Production System. The key focus is to increase the *value-added* work by eliminating waste and reducing extra work to improve profitability, customer satisfaction, quality and employee morale.

Allina Health Laboratory's commitment to increase <u>value</u> to the patient by improving quality and reducing cost

(ValuMetrix, 2010)

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Lean World Class Mission
To Seek Out and Eliminate Waste

8 WASTES OF LEAN

Defects
Overproduction
Waiting
Transportation
Inventory
Motion
Extra Processing
Non-Utilized Talents

WASTE Raises cost, produces no benefit and threatens our jobs!

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Phlebotomy Project Team

Phlebotomy Team
Izzy Soeun, Evening Shift
Melissa Globensky, Day Shift
Leadership
Julie Singewald, Supervisor
Marcia Bell, Manager
Quality Improvement Specialists
Karen Chatt
Julie Simons
Champion
Jan Skoog, Laboratory Director
Phlebotomy Staff
Lean Consultant
Mike Hogan, ValuMetrix

A dedicated team is crucial to the success of Lean projects!

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Project Scope

- Five S: The cornerstone of Lean
- Workflows and Layouts: Improving efficiency of the workspace
- Staffing to Workload: Driven by Demand
- Sustain Improvements: Standard Work and Pre-analytic Metrics

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Five S

The cornerstone of Lean

Safety

Quality


Efficiency

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Five S

Create and maintain an organized, efficient, clean and safe high performance workplace

- Sort → keep only what is needed
- Set in order → arrange & identify for ease of use
- Shine → clean daily; everything has a place
- Standardize → make standards obvious
- Sustain → discipline; set an expectation

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Five S = Sort
Expired Tubes

Total 3049 expired tubes found throughout hospital
Oldest tube found from 1997!

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Five S = Sort
Speckled Red Top Tubes

- Replaced by gold top tubes in 2005
- 6700 tubes in inventory
- Total savings @ $0.15 per tube = $1005
- Lean project suggested discontinuing product
  - Inventory maintained by Materials Management: as tubes expired, the par level was being replaced!
  - Added benefit: reducing inventory space in Materials Management

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Five S = Sort *Overstock*

- OP reception area
- Inventory = 3536 tubes
- Max. tubes used per day = 107
- 33 days worth of stock!
- Implemented 2-bin kanban system: one pack in use, one pack back-up
- Reduced inventory by 65%

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Five S

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Five S = Set in Order
ED Layout

Before

After

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Five S
Create and maintain an organized, efficient, clean and safe high performance workplace

- Sort → keep only what is needed
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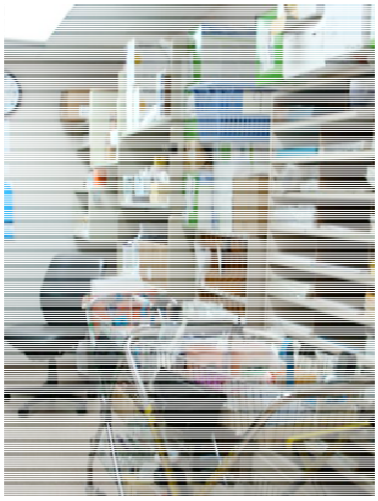
Five S = Shine
ED Layout

Before



Unlabeled shelves gather junk!

After

Label, label, label!

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Five S

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Five S = Standardize
Phlebotomy Carts

Before

After

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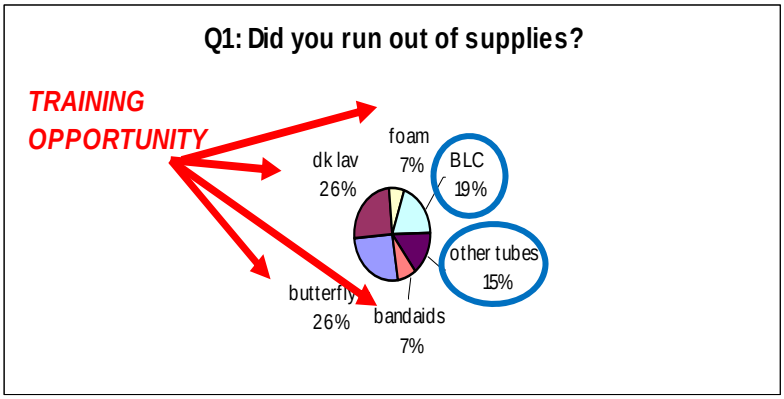
Five S = Standardize
Standard supplies drive standard practice



Survey results during pilot for standardized phlebotomy cart

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Five S = Standardize

Further training for standard practice

- **Quick Care Hand Foam**
  - Protocol to foam in patient room

- **Minimum volume tubes**
  - Supports Blood Management initiatives
  - Carts stocked with lav and blue min. volume tubes

- **Butterfly needle**
  - Significant cost difference: $1.25 vs $0.21
  - Current usage at 47%; encourage staff to reduce

- **Band aids**
  - Discourage usage due to skin deterioration
  - Tape and Coban available on carts

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Five S = Standardize

Items removed from each cart x 14 carts = $955

Cost savings

Speckled red	$1,005
Carts x 14	$955
OP Reception	$288
Stock area	$2,807
ED and POCC	$154
TOTAL INVENTORY SAVINGS	**$5,209**

Overall savings from inventory reduction = $5209

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Five S

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Five S = Sustain

- Daily audit of carts
- Visual aids
  - Color code racks
  - Label, label, label
- Monthly audit for expired tubes
- Weekly cleaning schedule

26

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Five S = Sustain
Audit

Process Improvement Audit - ANW Phlebotomy

Auditor:	**Date: from 5/15/2012**
Person(s) Audited:	**Shift:**

Process Inputs:	Yes	No	Action Taken (if "No")
Is one-piece flow being followed? (one label at a time at bedside?)	x		
Are phlebotomists following Standard Work for performing venipuncture? (observation)	x		Based on Direct Observation Checklist: standard work followed except time held for bandage. Leadership will discuss with staff.
Are visual controls in place for prioritized draws?	x		
Is 5-S being followed? (carts, ED, POCC, reception, MOB and coordinator desk)?	x		
Are regular audits conducted for expired tubes?		x	Not documented
Are phlebotomy carts re-stocked and parked at the end of each shift?	x		
Does scheduling reflect new Lean staffing goals of staggered start times and cross-training?	x		New guidelines for cross-training expectations of start times; will review at next audit for improvement.

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Workflows and Layouts

Improving efficiency of the workspace

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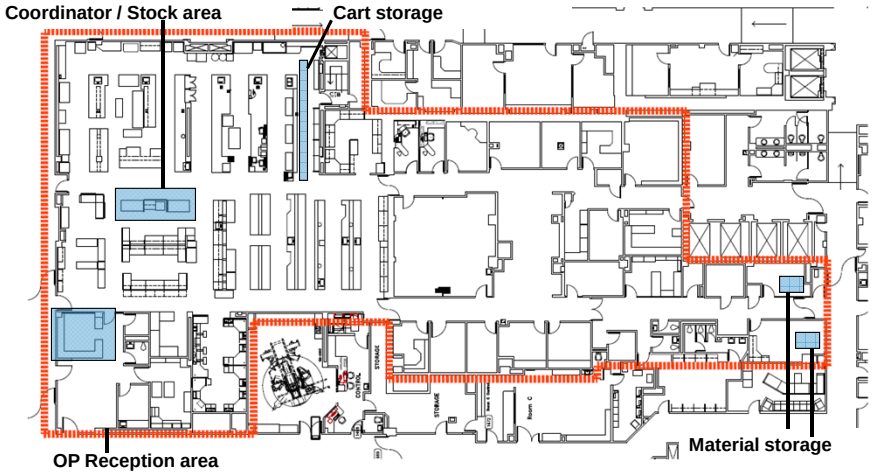
Phlebotomy Original Layout

192 feet travel distance from door to material storage area



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Original Layout

Carts in walkway

30

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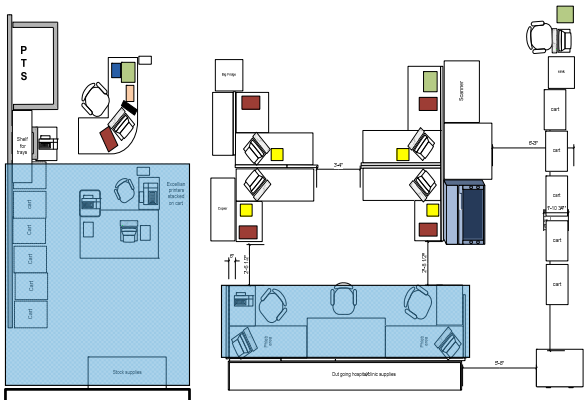
Phlebotomy Lean Layout
Phase 1



Workflow will transfer to new design of ANW lab space

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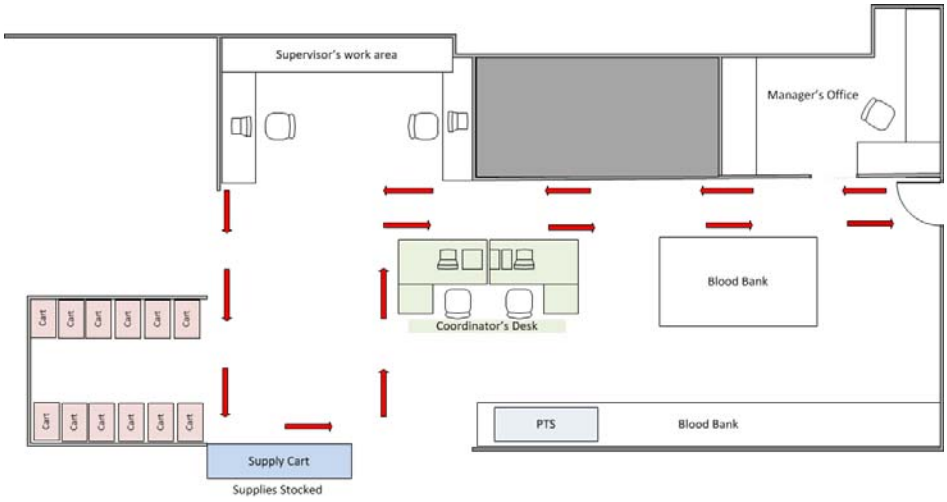
Phlebotomy Lean Layout
Phase 2 Redesign



32

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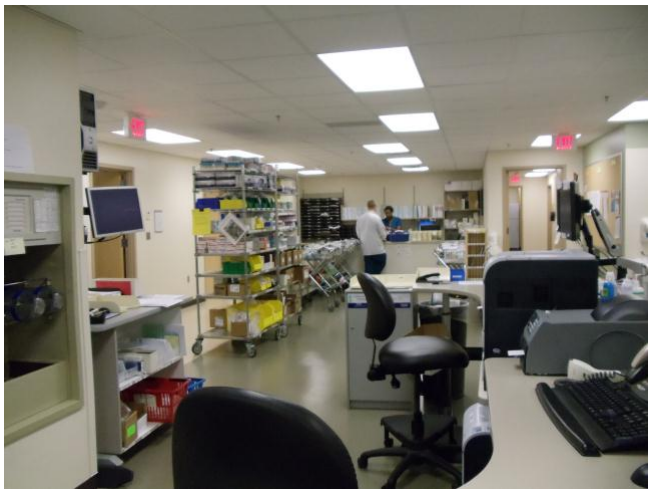
Phlebotomy Lean Layout
Phase 2 Redesign



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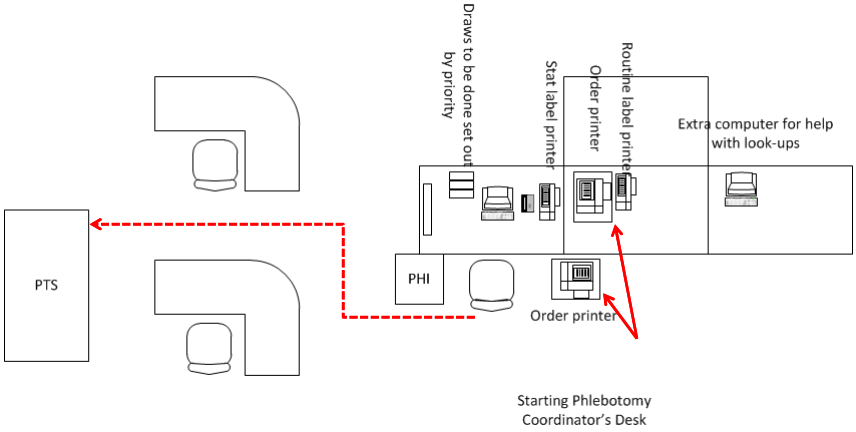
Coordinator Desk
Original Layout



Printers on multiple levels. Ergonomically difficult to reach.
Walking around printers to get labels.
Walking around PHI and through specimen management to use PTS

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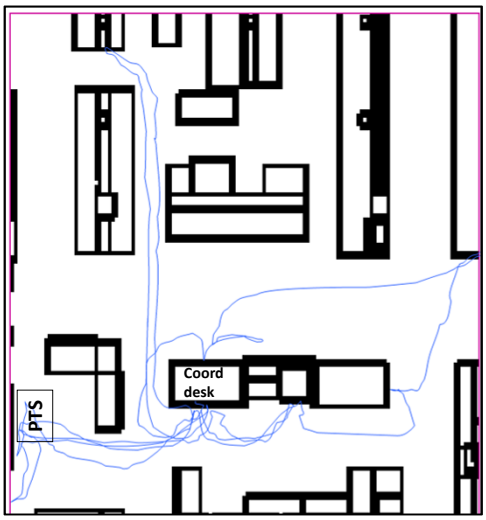
OPA of Evening Coordinator



35 *Total distance traveled in 7 minutes = 194 feet*

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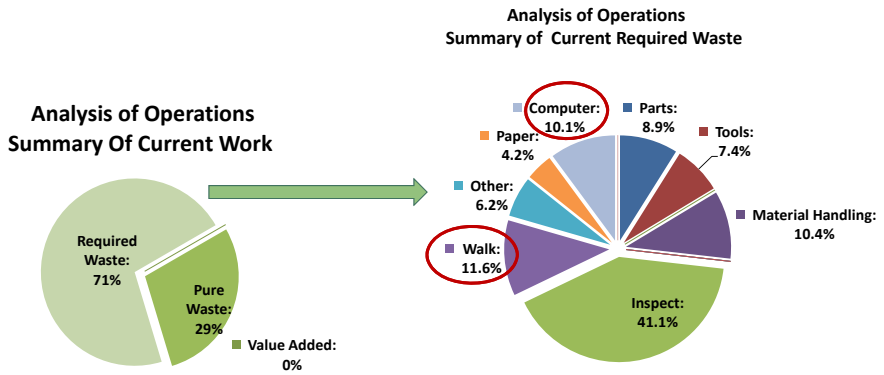
OPA Evening Coordinator



36 **5:36 of 7:51 is Required Waste**

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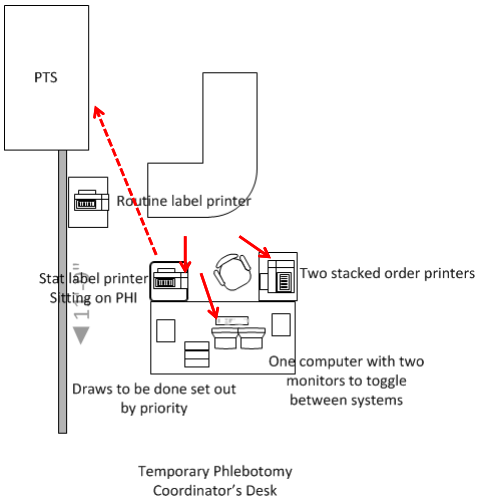
Coordinator Desk
Phase 1

- Work space is tighter
- Add second computer monitor
- Printers and labels are ergonomic
- Improved accessibility to PTS



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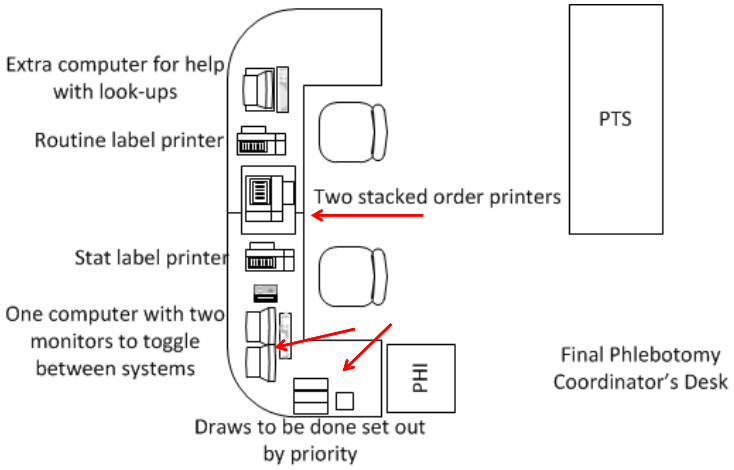
Coordinator Desk
Phase 2 – New Construction



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Coordinator Desk
Phase 2

- Phase 1 design concepts incorporated into new space
- Ergonomic
- 2 computer screens
- Access to PTS
- Communication changes due to Central Lab location off-site

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Staffing to Workload

Driven by demand

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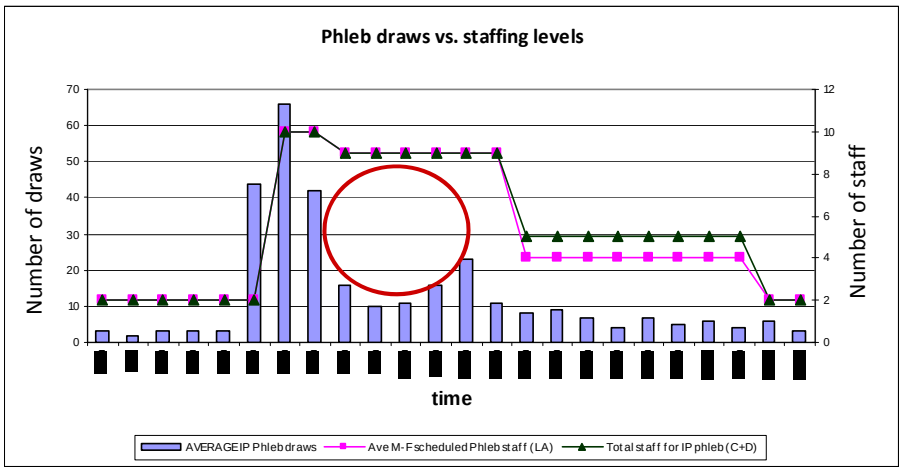
Staffing to Workload Model



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Staffing to Workload Model

IP PHLEB STAFFING LEVELS

Current Daily Coverage	time of day	IP Sched	# pt draws (ave)	Takt Time (sec)	TLT	Staffing per TLT	Staffing variance +/-
	0:00	2	3	1200	480	0.40	1.6
	1:00	2	2	1800	480	0.27	1.7
	2:00	2	3	1200	480	0.40	1.6
	3:00	2	3	1200	480	0.40	1.6
	4:00	2	3	1200	480	0.40	1.6
	5:00	2	44	82	480	5.87	-3.9
M	6:00	10	66	55	480	8.80	1.2
M	7:00	10	42	86	480	5.60	4.4
	8:00	9	16	225	480	2.13	6.9
	9:00	9	10	360	480	1.33	7.7
	10:00	9	11	327	480	1.47	7.5
	11:00	9	16	225	480	2.13	6.9
	12:00	9	23	157	480	3.07	5.9
	13:00	9	11	327	480	1.47	7.5
	14:00	5	8	450	480	1.07	3.9
	15:00	5	9	400	480	1.20	3.8
	16:00	5	7	514	480	0.93	4.1
	17:00	5	4	900	480	0.53	4.5
	18:00	5	7	514	480	0.93	4.1
	19:00	5	5	720	480	0.67	4.3
	20:00	5	6	600	480	0.80	4.2
	21:00	5	4	900	480	0.53	4.5
	22:00	2	6	600	480	0.80	1.2
	23:00	2	3	1200	480	0.40	1.6

Opportunity to level load staffing to meet hourly workload

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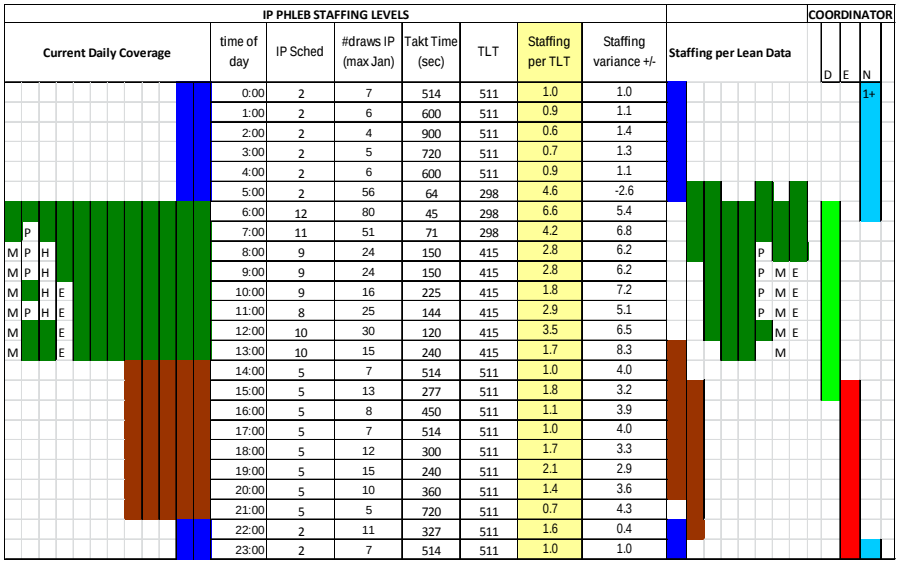

time of day	IP Sched	#draws IP (max Jan)	Takt Time (sec)	TLT	Staffing per TLT	Staffing variance +/-
0:00	2	7	514	511	1.0	1.0
1:00	2	6	600	511	0.9	1.1
2:00	2	4	900	511	0.6	1.4
3:00	2	5	720	511	0.7	1.3
4:00	2	6	600	511	0.9	1.1
5:00	2	56	64	298	4.6	-2.6
6:00	12	80	45	298	6.6	5.4
7:00	11	51	71	298	4.2	6.8
8:00	9	24	150	415	2.8	6.2
9:00	9	24	150	415	2.8	6.2
10:00	9	16	225	415	1.8	7.2
11:00	8	25	144	415	2.9	5.1
12:00	10	30	120	415	3.5	6.5
13:00	10	15	240	415	1.7	8.3
14:00	5	7	514	511	1.0	4.0
15:00	5	13	277	511	1.8	3.2
16:00	5	8	450	511	1.1	3.9
17:00	5	7	514	511	1.0	4.0
18:00	5	12	300	511	1.7	3.3
19:00	5	15	240	511	2.1	2.9
20:00	5	10	360	511	1.4	3.6
21:00	5	5	720	511	0.7	4.3
22:00	2	11	327	511	1.6	0.4
23:00	2	7	514	511	1.0	1.0

- Recommendation: stagger phlebotomy staff start times
- Absorbed 3 FTE from patient service areas without increase of budgeted FTE
- Reduced technical staff scheduled for phlebotomy

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Staffing to Workload Model

Daily Cov.	time of day	2800 Staff Sched	Ave # of pt draws	Takt Time (sec)	TLT	Staffing per TLT	Staffing variance +/-	Staffing per Lean Data
	0:00							
	1:00							
	2:00							
	3:00							
	4:00							
	5:00							
	6:00							
	7:00	1	1	3000	640	0.21	0.79	X
	8:00	1	1	3000	640	0.21	0.79	
	9:00	1	3	1333	640	0.48	0.52	
	10:00	1	5	766	640	0.84	0.16	
	11:00	1	2	1500	640	0.43	0.57	
	12:00	0	1	4000	640	0.16	-0.16	
	13:00	1	1	2571	640	0.25	0.75	
	14:00	1	3	1200	640	0.53	0.47	
	15:00	1	2	1565	640	0.41	0.59	
	16:00	1	1	3000	640	0.21	0.79	X
	17:00							
	18:00							
	19:00							

- PATIENT SERVICE AREA: 2800 Medical Building
- Phlebotomists trained to flex
- Originally staffed 7:00-5:00 (1.25 FTE)
- Hours adjusted for staffing to workload: 8:00 – 4:30 (1 FTE)
- **Saves 0.25 FTE and productivity**

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Staffing to Workload Model

REC PHLEB STAFFING LEVELS

Daily Cov.	time of day	REC Staff Sched	# of pt draws	Takt Time (sec)	TLT	Staffing per TLT	Staffing variance +/-	Staffing per Lean Data
	0:00							
	1:00							
	2:00							
	3:00							
	4:00							
	5:00							
	6:00	1	2	2204	641	0.29	0.71	
	7:00	2	3	1350	641	0.47	1.53	
	8:00	2	4	959	641	0.67	1.33	
	9:00	3	6	564	641	1.14	1.86	
	10:00	3	6	609	641	1.05	1.95	
	11:00	3	8	478	641	1.34	1.66	
	12:00	3	6	640	641	1.00	2.00	
	13:00	3	5	757	641	0.85	2.15	
	14:00	2	4	850	641	0.75	1.25	
	15:00	1	4	810	641	0.79	0.21	
	16:00	1	3	1350	641	0.47	0.53	
	17:00	1	2	2234	641	0.29	0.71	
	18:00							

- PATIENT SERVICE AREA: Outpatient Reception
- Phlebotomists trained to flex
- Originally staffed 3 FTE daily
- LEAN RECOMMEND: Staff 2 FTE daily; flex if needed
- **Reduction of 1.0 FTE**

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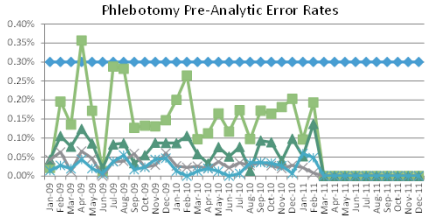
Sustain Improvements

Standard Work and Pre-analytic Metrics



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Standard Work

Standard Work is

- knowing **WHAT** to do
- knowing **WHEN** to perform the activity
- knowing **WHY** it needs to be done
- knowing **WHO** should do it
- knowing **WHERE** the activity should take place
- knowing **HOW** to perform the activity

… with the same effort and quality every time.

Simple step-by-step instructions for bench work (job aid)
Procedures are detailed instructions for process

(ValuMetrix, 2010)

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Standard Work
Direct Observation

Phlebotomy – Direct Observation – Competency
Name: Audit **Date Started:** 5/15/12 **Date Completed:** 5/16/12

Venipuncture Collection Observation (observe 1-5, as applicable to job duties)

Date	Introduce Self. Verbal consent of patient	Identify patient (wristband and verbally)	Select proper equipment (straight or butterfly)	Venipuncture success	Dispose of sharps and other items properly	Properly label specimens at bedside	Check for bleeding and bandage	"Anything else I can do?"/Hand hygiene	Return the room to initial stat (in-pt)	Initials of observer
1 ED 5/15	√	√	√	√	√	√	√	√	√	√
2 ED 5/15	√	√	√	√	√	√	√	√	√	√
3 Station 64 Day 5/15	√	√	√	√	√	√	√	√	√	√
4 Sta 8000 Eve 5/16	√	√	√	√	√	√	√	√	√	√
5 Sta 7000 Eve 5/16	√	√	√	√	√	√	√	√	√	√

48

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Standard Work
Audit

Process Improvement Audit - ANW Phlebotomy

Auditor:	**Date: from 5/15/2012**
Person(s) Audited:	**Shift:**

Process Inputs:	Yes	No	Action Taken (if "No")
Is one-piece flow being followed? (one label at a time at bedside?)	x		
Are phlebotomists following Standard Work for performing venipuncture? (observation)	x		Based on Direct Observation Checklist: standard work followed except time held for bandage. Leadership will discuss with staff.
Are visual controls in place for prioritized draws?	x		
Is 5-S being followed? (carts, ED, POCC, reception, MOB and coordinator desk)?	x		
Are regular audits conducted for expired tubes?		x	Not documented
Are phlebotomy carts re-stocked and parked at the end of each shift?	x		
Does scheduling reflect new Lean staffing goals of staggered start times and cross-training?	x		New guidelines for cross-training expectations of start times; will review at next audit for improvement.

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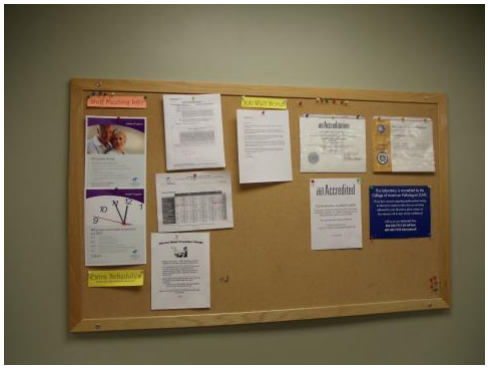
Metrics
Visual Display Board

- Use metrics that show a meaningful improvement: quality, TAT, safety, cost
- Don't make the data collection too complicated
- Display where staff can be active participants
- Celebrate achievements



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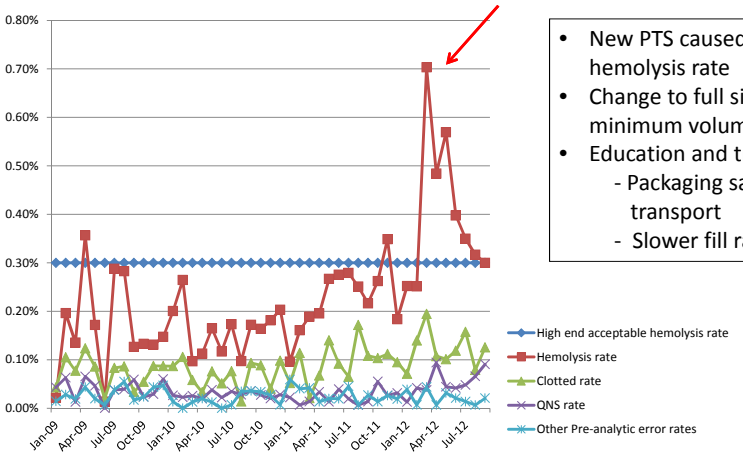
Metric
Pre-Analytic Error Rates



- New PTS caused spike in hemolysis rate
- Change to full size, minimum volume tubes
- Education and training
  - Packaging samples for transport
  - Slower fill rate of tube

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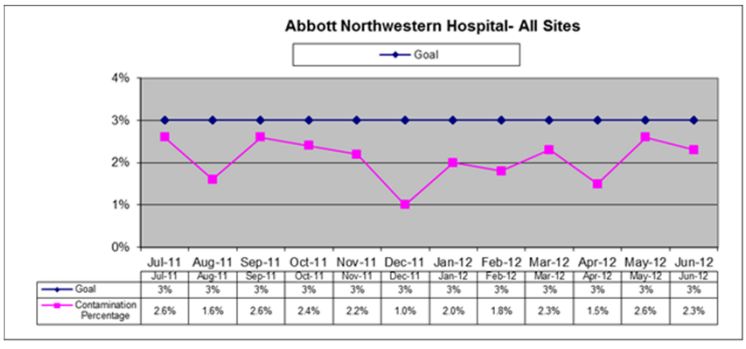
Metric
Blood Culture Contamination



Overall rate of contamination is within established guidelines

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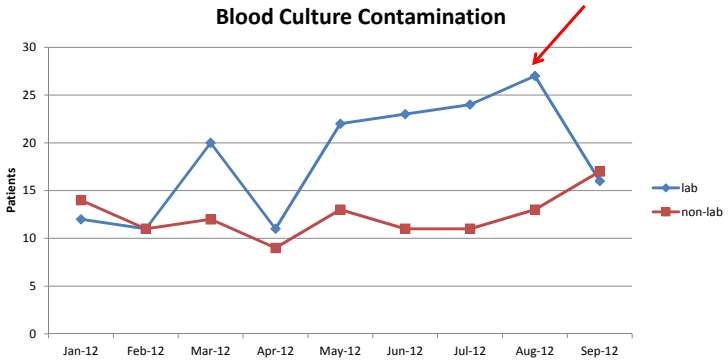
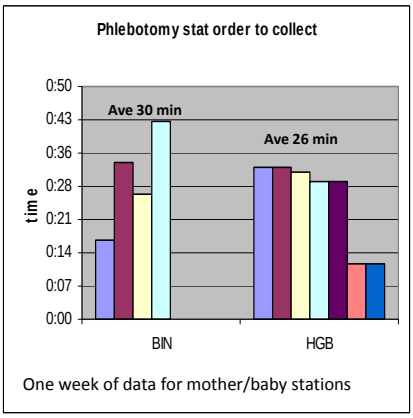
Metric
Blood Culture Contamination



- Lab initiated direct observations for phlebotomists identified as repeat offenders
- Found non-standard practice used for cleansing site
- Re-training resulted in 37% reduction of contaminated cultures collected by lab!
- Metric shows trends for non-lab staff; initiates re-training events

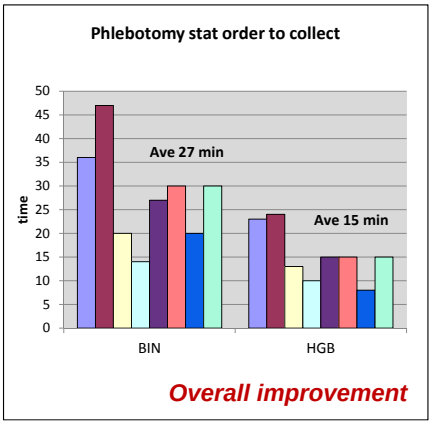
New Metric
Stat Response Time

May 2011



One week of data for mother/baby stations

August 2012



Overall improvement

- Goal: Improve quality by reducing stat response time

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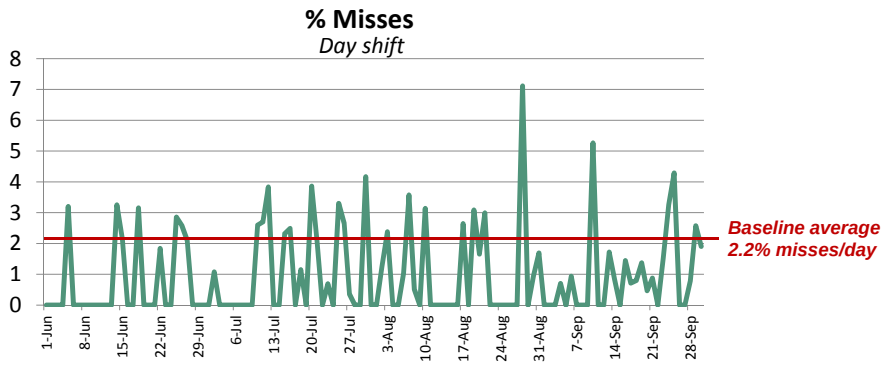
New Metric
Missed Draw Rate



- Goal: increase patient satisfaction by reducing multiple sticks
  - Opportunity for training

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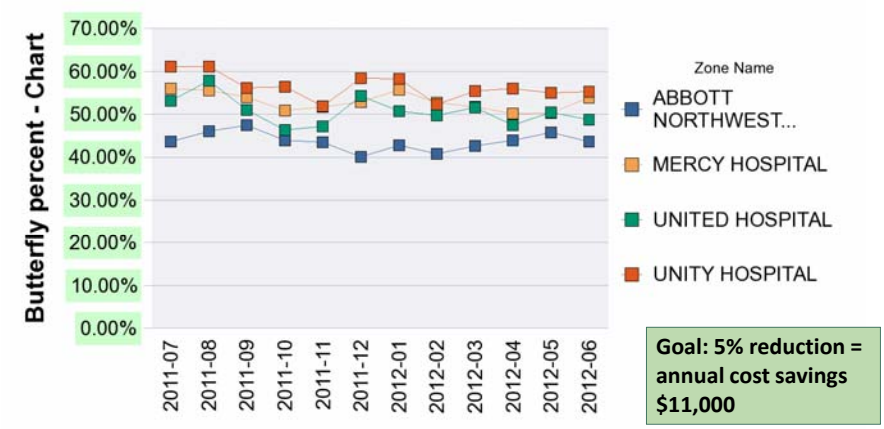
Butterfly Use – Metro Hospitals 2012
Goals not achieved



Goal: 5% reduction = annual cost savings $11,000

Ave = 44%; Range 40-48%

Trans Year-Month

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Lessons Learned

- Make friends with LIS and learn their language
- Face time with staff is essential; personal communication is better than emails
- Importance of project scoping: this initial project was quite broad; future projects are more focused and shorter duration
- Central lab move and disconnect from phlebotomy location has large communication impact
- Sustaining: First annual audit showed 60% compliance overall; primary area to improve was implementing metrics (missed draws, stat draw response time) and visual displays of metrics
- Butterfly usage reduction: goals not reached, suggestions welcome!

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