

# Reducing Daily Phlebotomy Improves High Value Care In A Community-based Internal Medicine Residency Program

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## Background

- Health care costs in the US are increasing (**3.2 trillion** in 2015).
- 30% of costs are wasted.
- Physicians are responsible for 87% of wasteful spending.
- Admission order sets (daily CBC, BMP/CMP) usually ordered by least experienced physicians.
- No established guidelines exist to distinguish appropriate vs. inappropriate lab orders.
- Morning internal round data suggests 60% of tests yield normal results.

Using a PDSA (plan-do-study-act) framework, we addressed one root cause of excessive lab use.

## Methods

Plan

- Track scheduled labs on each patient admitted to medicine teaching service during hospital stay via Epic EMR work bench report
- Root cause analysis

Do

- Experiment: stop scheduled phlebotomy on one inpatient medicine teaching team (Team 4)
- Period of time: 1 month; Volume: 1 resident, max 16 patients
- Communicate, educate, inform all staff about plan

Study

- Run chart, comparison to other teams
- Approximate cost saved per lab avoided
- Assess balancing measures

Act

- Project feedback
- Address sustainability (people, training)
- Next experiment: One team to formally address the need for daily labs on each patient during AM rounds

## Results

Elimination of recurrent orders on one team prevented a ~120 lab draws over one month.

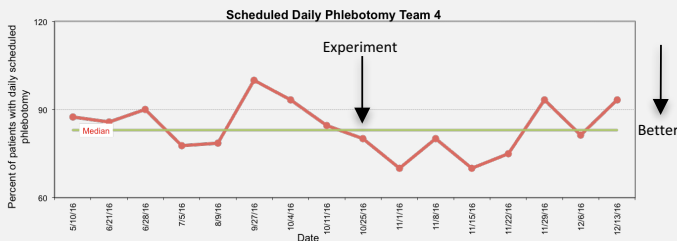


Fig. 3: Percent of patients with scheduled daily labs on Team 4. Black arrow shows start of intervention.

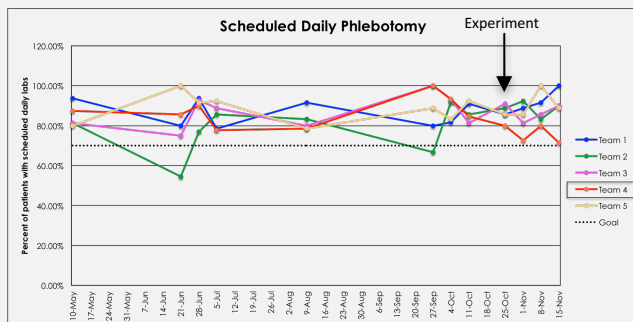


Fig. 4: Percent of patients with scheduled daily labs amongst five inpatient medicine teaching teams.

## Current Conditions

On 5/10/2016, **83% of all inpatient medicine teaching patients** at our hospital had at least one scheduled *daily* lab (CBC, BMP/CMP, PT/INR).  
The average number of phlebotomy sticks/patient/day = 1.73.

Component	1/1/2017	1/2/2017	1/3/2017	1/3/2017	1/4/2017	1/5/2017	1/6/2017	1/7/2017	1/8/2017	1/9/2017	1/10/2017
WBC	7.0	7.1	6.8	5.6	5.1	5.1	5.4	5.5	6.6	6.2	6.0
RBC	3.98 (L)	3.72 (L)	3.43 (L)	3.46 (L)	3.40 (L)	3.54 (L)	3.72 (L)	3.73 (L)	3.78 (L)	3.68 (L)	3.75 (L)
Hemoglobin	12.1 (L)	11.2 (L)	10.3 (L)	10.5 (L)	10.3 (L)	10.6 (L)	11.4 (L)	11.1 (L)	11.4 (L)	11.3 (L)	11.1 (L)
Hematocrit	37.4 (L)	34.8 (L)	32.8 (L)	32.1 (L)	31.6 (L)	32.5 (L)	33.3 (L)	33.4 (L)	33.7 (L)	33.2 (L)	34.1 (L)
MCV	94	94	93	93	93	92	90	90	89	90	91
MCH	30.4	30.1	30.0	30.3	30.3	29.9	30.6	29.8	30.2	30.6	29.6
MCHC	32.4	32.2	32.2	32.7	32.7	32.6	34.2	33.2	33.8	34.0	32.9
RDW	13.7	13.1	13.3	13.3	13.1	12.8	12.7	12.8	12.8	12.9	12.6
Platelet Count	125 (L)	131 (L)	127 (L)	128 (L)	142 (L)	165	186	195	243	245	263

Fig. 1: Daily CBC results on a patient admitted for hip fracture.

## Cost Savings

Lab Test	Estimated Charge/Cost	Projected Savings
CBC	\$155/\$12	For patients: \$24,160 For hospital: \$1440 (per month per team)
CMP	\$338/\$12	
PT/INR	\$111/\$12	

Fig. 5: Estimated charges/costs from CPMC Pathology Department

## Target Condition

Reduce daily labs from 83% to <70% within one month.

## Root Cause Analysis

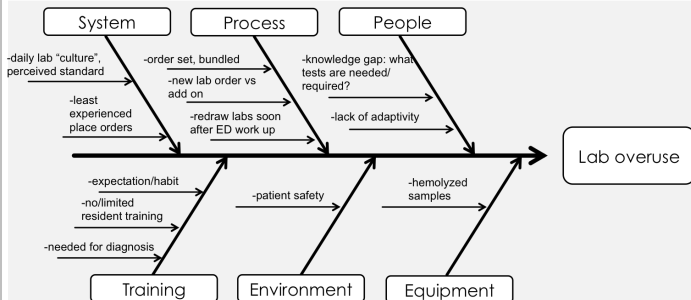


Fig. 2: Ishikawa Fishbone Diagram

## Conclusions and Reflection

- Automated bundled order sets contribute to excessive lab use.
- Experiment was resident dependent and not sustainable.
- Limitations to sustainable reduction included lab culture/habit, re-ordered bundles, and necessity for daily labs on certain patients.

Appropriate	Inappropriate
Within 48h of admission (days 0, 1, 2) or vitals	Stable labs and vitals for >48h (day 3+, or after 3 days of lab instability)
Leukocytosis or leukopenia present	Leukocytosis/leukopenia resolved on prior day
Hemoglobin below baseline	Hemoglobin normal or at baseline for 2 days
Thrombocytopenia/thrombocytosis beyond baseline	Platelets normal or trending towards normal for 2 days
Day following procedure	Full CBC after blood transfusion (Hgb only)
If confirming potential lab error	Full CBC after platelet transfusion (Plt only)

Fig. 6: Internal guidelines created by University of Michigan for appropriate CBC ordering.

## Future Experiments

Additional PDSA cycles are planned to target

- resident training and
- establishing appropriate lab criteria.

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