USING REAL TIME ANALYTICS TO IMPROVE TURNAROUND TIME, STREAMLINE STAFF SCHEDULING, AND IDENTIFY VARIOUS SOURCES OF ERROR, BOTH IN THE LAB AND IN THE ED

What one lab has learned about using
Real Time Analytics: A case study

ST. JOSEPH'S HOSPITAL AND MEDICAL CENTER DIGNITY HEALTH

- Founded in 1895 by the Sisters of Mercy

- First hospital in the Phoenix area

- 586 beds, not for profit

- Includes:

    - Barrow Neurological Institute

    - Norton Thoracic Center

    - University of Arizona Cancer Center

    - Level 1 Trauma Center

- Part of Dignity Health, with more than 40 hospitals in Arizona, California and Nevada

SJHMC Laboratory

Full service Laboratory, which includes Chemistry, Hematology, Blood Bank, Microbiology, Anatomic Pathology, Molecular Testing and Cytogenetics, and Point of Care testing

Performs over 4 million tests/year

Centralized testing site for Microbiology

Very little automation

AGENDA

- What are real time analytics?

- Why did we choose to use them?

- How did we initiate this process?

- How did we implement Performance Insight?

- Case studies and sample reports.

- What we learned, what we did well, what we could have done better.

WHAT ARE REAL TIME ANALYTICS?

- Access to and use of data and related resources as soon as data enters the system.

- Real time analytics can provide up to the minute information, and present it so that better and quicker business decisions can be made.

- Both recurring reports and unpredictable, ad hoc inquiries can provide valuable information.

- "Real time business intelligence"

WHY DID WE CHOOSE TO USE REAL TIME ANALYTICS?

- LIS system was not giving us the clean, actionable data required to make real time decisions.

- Report generation was slow, cumbersome, and the outcome was uncertain.

- Greater flexibility in the types of reports we could generate was required—both overview and "drill down" report capability.

- Support of LEAN process improvement projects.

- The potential to optimize staffing.

- Identifying performance problems, and not allowing them to go unchecked.

- Improving management team's effectiveness!

HOW DID WE INITIATE THIS PROCESS?
(OR: HOW DID WE GET FROM THE EXECUTIVE WAR COLLEGE TO HERE?)

- Starting point: The Executive War College

- Intermediate stops: Supply Chains, Finance, and IT

- Challenges unique to St. Joseph's Hospital and Dignity Health

- Final approval and timeline

HOW DID WE IMPLEMENT PERFORMANCE INSIGHT?

- The 3 "buy-ins"
  - System
  - Facility
  - Department
- Actual implementation
- Post-implementation hiccups
- Where we are now

CASE STUDIES AND SAMPLE REPORTS

ED TURNAROUND TIME AND QUALITY OF SERVICE

ED CHALLENGES

- Emphasis on faster throughput in the ED to decrease patient wait times, increase patient satisfaction and ensure better patient outcomes

- Complaints from physicians—"Why can't we have the Stat Lab back?"

- Turnaround times were too long

- Specimen quality issues ► More phlebotomists needed

- Perception among lab staff that the ED staff "just likes to complain"

- Poor communication between ED and Lab, and also among Lab departments

ED TURNAROUND TIME DASHBOARD

Dignity Health

Report Type: 04

Performance Summary

Performance Insight®

Set #1: ED TAT-Daily	-	Wednesday, September 27, 2017

Summary Criteria (not exhaustive)					Target			Count		
Pat Type/Loc	Test/Priority	Test Loc/Other	Statistic	Other Info	(<=)	% Achv	Actual	Pass	Fail	Status
EMERGENCY;SJHI	Hemogram;stat		Pct <= Target	Order to Verify	70 min	80%	100.0%	5	-	Pass
EMERGENCY;SJHI	CBC w/Diff;stat		Pct <= Target	Order to Verify	70 min	80%	85.8%	121	20	Pass
EMERGENCY;SJHI	Basic;stat		Pct <= Target	Order to Verify	70 min	80%	64.0%	16	9	Fail
EMERGENCY;SJHI	Lactic Acid;stat		Pct <= Target	Order to Verify	70 min	80%	82.8%	48	10	Pass
EMERGENCY;SJHI	CMP;stat		Pct <= Target	Order to Verify	80 min	80%	85.1%	103	18	Pass
EMERGENCY;SJHI	All UA tests;stat		Pct <= Target	Collect to Verify	70 min	80%	84.4%	103	19	Pass
EMERGENCY;SJHI	U hCG Qual;stat		Pct <= Target	Collect to Verify	70 min	80%	80.0%	12	3	Pass
EMERGENCY;SJHI	Arterial Blood Gas (pH, l		Pct <= Target	Collect to Verify	30 min	80%	100.0%	2	-	Pass
EMERGENCY;SJHI	TropED;stat		Pct <= Target	Order to Verify	70 min	80%	100.0%	48	-	Pass

Verify Date: **Wednesday, September 27, 2017**

Criteria

Test:	CBC w/Diff CBC w/Diff* (man diff if indicated)	Count: 141
Priority:	stat	
Patient Type:	EMERGENCY	Activity Being Counted: Tests
Ord Hospital:	SJHMC	(Addon tests being ignored)
Pat Loc Group:	3 ED	
Lab ID:	sjh 10 lab	

Measurement: **Order to Verify**

Performance Summary — **Turnaround Time (minutes)**

	Average		Median		90% Completion		Outliers (above target)	
		Current vs:		Current vs:		Current vs:	n % of Total	
Target	70.0	76%	70.0	75%	70.0	107%		Current vs:
Baseline (N/A)								
Wednesday, September 27, 2	53.0		52.3		75.2		20 14.2%	

Average Turnaround Time and Volume by Hour

Turnaround Time Histogram

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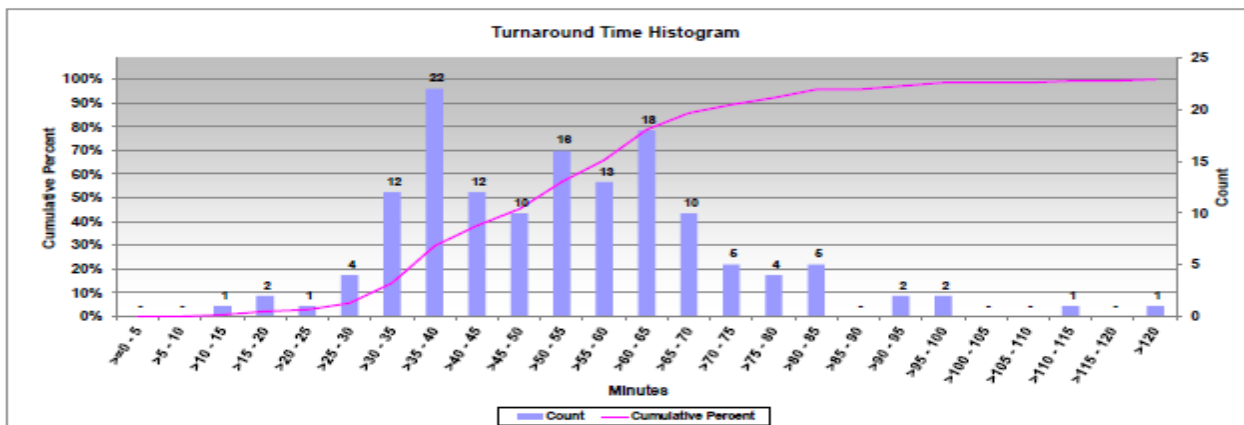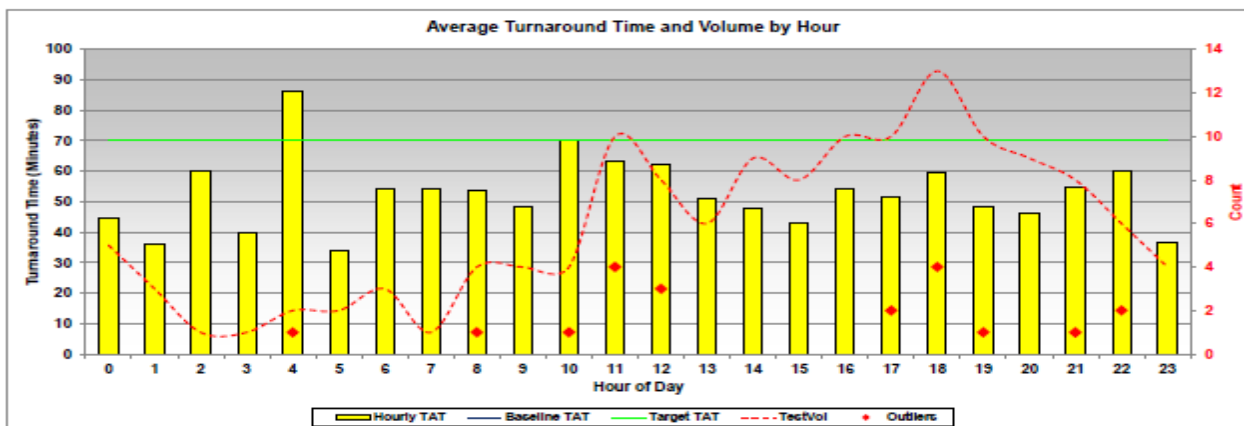
Weekly CMP Composite Turnaround Time Report

Dignity Health

Report Type: 3

Composite Turnaround Time

Performance Insight

Sun, Sep 24, 2017 to Sat, Sep 30, 2017

Criteria

Test:	CMP	**Comprehensive Metabolic Panel**		**Count:**	775
Pat Loc Group:	3 ED				
Lab ID:	sjh 10 lab		**Activity Being Counted:**	**Tests**	

	1st Time Segment:	**Order to Collect**
	2nd Time Segment:	**Collect to Receive**
	3rd Time Segment:	**Receive to Verify**

Performance Summary — **Turnaround Time (minutes)**

	Average	Current vs:	Median	Current vs:	90% Completion	Current vs:	Outliers (above target) n	% of Total
Overall Target	60.0	102%	60.0	96%	60.0	149%		
Total	61.3		57.5		89.3		351	45.3%
Order to Collect	22.1		17.6		40.5			
Collect to Receive	14.9		10.0		29.0			
Receive to Verify	30.0		27.3		45.0			

Hourly Turnaround Times Per Segment

Dignity Health

Report Type: 54

Workflow and Productivity Assessment

Performance Insight®
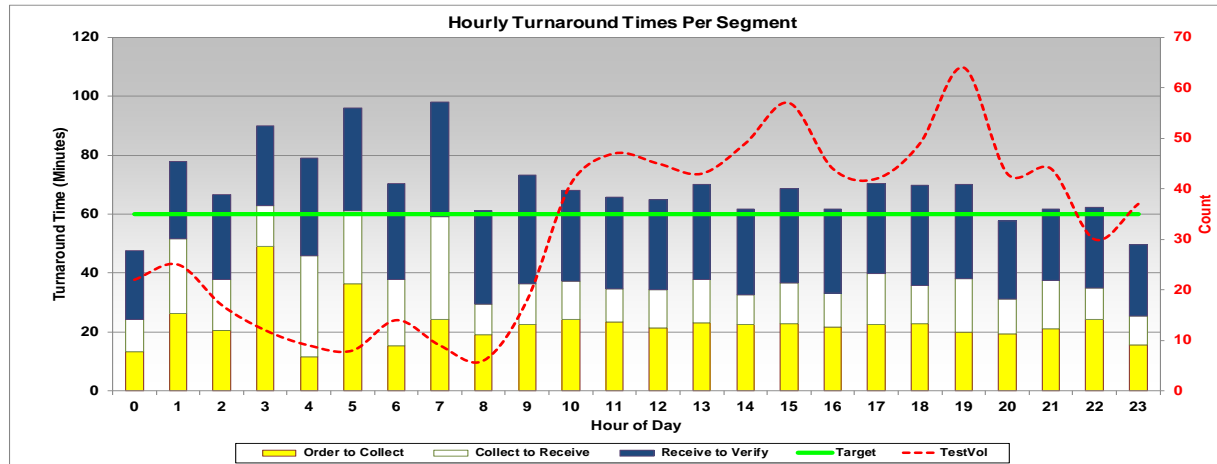
Collect Date:	Thursday, September 28, 2017

Criteria:

Test:	-	All		Total Activity:	205
Pat Loc Group:	3	ED			
Lab ID:	sjh 10 lab			Average Daily Activity:	205
Phleb Grp:	1	Phleb			

Activity Measure: Pat. Collections
Time Stamp: Collect
Tech Type: Phlebotomist

Summary

	All TechIDs		Per TechID
Average Daily Total Activity	205		
Average per Hour	8.5		
		Maximum (per Hour)	7
		90th Percentile (per Hour)	4.0
		Median (per Hour)	2.0
		Average (per Hour per Tech)	2.1

Average Activity by Hour
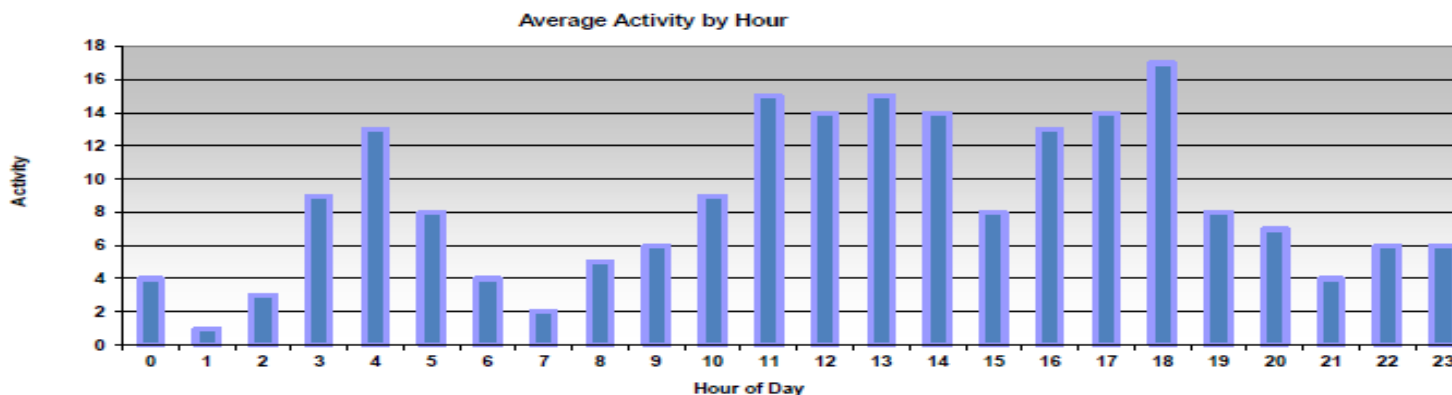
Tech ID	Name	Period Total	per Hour Max	per Hour 90th Pctle	per Hour Average	Pct Total
DPORRAS	23603219	25	7	4.9	3.1	12.2%
MHTET	33551319	30	6	5.3	3.8	14.6%
AQUIBAN	23603188	5	5	5.0	5.0	2.4%
BGADISA	23604519	7	5	4.2	2.3	3.4%
ABLISSIT001	30843185	10	4	2.2	1.4	4.9%
AROSSI002	33155622	28	4	3.9	2.3	13.7%
CGUTIERREZ	26696827	10	4	3.6	2.0	4.9%
RDUNLAP004	28956862	25	4	4.0	2.8	12.2%
SFRANKLIN00	31509931	8	4	3.4	2.0	3.9%
CTURMO	23604478	7	3	2.2	1.4	3.4%
MHOLMES005	23603210	15	3	3.0	1.9	7.3%
SVALLE001	0	4	3	2.8	2.0	2.0%
BSTERN	30872673	5	2	1.7	1.3	2.4%
JDOMINGUEZ	23604478	6	2	1.6	1.2	2.9%
MMONTOYA	23603129	4	2	1.8	1.3	2.0%
NTEFERA	25189200	5	2	1.7	1.3	2.4%
SBITTER	23604478	5	2	1.7	1.3	2.4%
TMYERS005	32649814	4	2	1.8	1.3	2.0%
NGONZALES0	33086844	1	1	1.0	1.0	0.5%
SMEZA	23603019	1	1	1.0	1.0	0.5%
						0.0%
						0.0%

Tech ID	Name	Period Total	per Hour Max	per Hour 90th Pctle	per Hour Average	Pct Total
						0.0%
						0.0%
						0.0%
						0.0%
						0.0%
						0.0%
						0.0%
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						0.0%
						0.0%

Dignity Health

Report Type: 82

Hemolysis and QNS Audit

Performance Insight©

Receive Date:	Monday, October 2, 2017

Filter Criteria:		
Test:	-	All
Pat Loc Group:	3	ED
Lab ID:	sjh 10 lab	

Report Summary:		
		Pct of Total
Total Hemolyzed	9	16.4%
Total QNS	-	0.0%
Total Hemolyzed and QNS	9	16.4%
Overall Total	55	
Analysis Period	Day	
Counting	Containers	

By Patient Loction

Top Hemol and QNS by Count

Pat Loc	Name	Hemol	QNS	H+QNS	Ttl Events	Pct Ttl
SJH ED		4	-	4	23	17.4%
SJH EDIP		3	-	3	28	10.7%
SJH Trauma EDIP		2	-	2	4	50.0%
				-		0.0%
				-		0.0%
				-		0.0%

By Phlebotomist

Top Hemol and QNS by Count

Phleb ID	Name	Hemol	QNS	H+QNS	Ttl Events	Pct Ttl
		3	-	3	3	100.0%
SJHNL	####	2	-	2	3	66.7%
MHTET	####	1	-	1	2	50.0%
MSIY	####	1	-	1	2	50.0%
SFRANKl	####	1	-	1	2	50.0%
PCHAVEʒ	####	1	-	1	1	100.0%
				-		0.0%

Export Data for Off-line Analysis

TestID	PriID	Accn	ContID	OrdHospID	PatType	PatLocID	PerfHospID	LabID	LabDeptID
CMP	Stat	000102017		SJHMC	Emergency	SJH ED	St. Joseph Hospi	SJH 10 Lat	10 SJH Chemistr
Hemolysis I	Stat	000102017		SJHMC	Emergency	SJH ED	St. Joseph Hospi	SJH 10 Lat	10 SJH Chemistr
CMP	Stat	000102017		SJHMC	Emergency	SJH ED	St. Joseph Hospi	SJH 10 Lat	10 SJH Chemistr
Hemolysis I	Stat	000102017		SJHMC	Emergency	SJH ED	St. Joseph Hospi	SJH 10 Lat	10 SJH Chemistr
TropED	Stat	000102017		SJHMC	Emergency	SJH ED	St. Joseph Hospi	SJH 10 Lat	10 SJH Lab - Cler
CMP	Stat	000102017		SJHMC	Emergency	SJH ED	St. Joseph Hospi	SJH 10 Lat	10 SJH Chemistr
CRP High Se	Stat	000102017		SJHMC	Emergency	SJH ED	St. Joseph Hospi	SJH 10 Lat	10 SJH Chemistr
Hemolysis I	Stat	000102017		SJHMC	Emergency	SJH ED	St. Joseph Hospi	SJH 10 Lat	10 SJH Chemistr
ABORH Autc	Stat	000102017		SJHMC	Observation	SJH TOW5	St. Joseph Hospi	SJH 10 Lat	10 SJH Blood Ba
ABSC AutoS	Stat	000102017		SJHMC	Observation	SJH TOW5	St. Joseph Hospi	SJH 10 Lat	10 SJH Blood Ba
U hCG Qual	Routine	000102017		SJHMC	Emergency	SJH ED	St. Joseph Hospi	SJH 10 Lat	10 SJH Chemistr
R ABORH	Stat	000102017		SJHMC	Observation	SJH TOW5	St. Joseph Hospi	SJH 10 Lat	10 SJH Blood Ba
InhaIntIgE A	ASAP	000102017		SJHMC	Outpatient	SJH OP Lab	St. Joseph Hospi	SJH 10 Lat	10 SJH Sendouts

Performance Comparison: March 2017 to September 2017
Turnaround Time and Percentage of Outliers

Report Details		Baseline Period (Wed, Mar 1, 2017 - Fri, Mar 31, 2017)						Current Period (Fri, Sep 1, 2017 - Mon, Sep 25, 2017)						Percent Change (from Baseline to Current)						Volume	Absolute Change (Current - Baseline)				
ReportID	ReportName	Average	Median	90th Percentile	95th Percentile	98th Percentile	% Outliers	Average	Median	90th Percentile	95th Percentile	98th Percentile	% Outliers	Average	Median	90th Percentile	95th Percentile	98th Percentile	% Outliers	(Tests / Day)	Average	Median	90th Percentile	95th Percentile	98th Percentile
1	Hemogram Order-Verify	48.97	44.28	83.65	103.24	133.41	18.8%	42.57	38.23	67.37	83.07	104.97	8.6%	-13.1%	-13.7%	-19.5%	-19.5%	-21.3%	-54.2%	13	(6.40)	(6.05)	(16.28)	(20.17)	(28.43)
2	CBC wDiff Order-Verify	59.50	53.86	93.81	112.40	133.74	26.5%	50.39	46.42	77.95	90.51	106.55	15.5%	-15.3%	-13.8%	-16.9%	-19.5%	-20.3%	-41.3%	120	(9.11)	(7.44)	(15.86)	(21.89)	(27.18)
3	Basic Order-Verify	67.11	61.78	104.01	122.61	143.95	36.6%	57.47	54.58	82.94	94.68	117.64	22.1%	-14.4%	-11.6%	-20.3%	-22.8%	-18.3%	-39.6%	32	(9.64)	(7.19)	(21.07)	(27.93)	(26.31)
5	Lactic Acid Order-Verify	63.80	59.32	97.83	116.99	137.37	33.5%	60.19	55.55	92.10	109.45	131.88	25.6%	-5.7%	-6.4%	-5.9%	-6.4%	-4.0%	-23.5%	34	(3.61)	(3.77)	(5.73)	(7.54)	(5.49)
8	CMP Order-Verify	73.66	68.70	108.75	124.19	143.15	32.5%	63.92	60.10	91.77	106.05	121.66	18.4%	-13.2%	-12.5%	-15.6%	-14.6%	-15.0%	-43.5%	100	(9.73)	(8.60)	(16.98)	(18.14)	(21.48)
9	UA Collect-Verify	55.90	49.33	93.50	118.09	148.07	23.4%	47.72	41.13	81.50	102.16	125.92	15.9%	-14.6%	-16.6%	-12.8%	-13.5%	-15.0%	-32.1%	108	(8.17)	(8.19)	(12.00)	(15.93)	(22.14)
10	U hCG Qual Collect-Verify	42.14	37.88	69.51	89.84	114.23	10.0%	39.23	31.44	67.13	92.49	141.11	8.1%	-6.9%	-17.0%	-3.4%	2.9%	23.5%	-18.4%	13	(2.91)	(6.44)	(2.38)	2.64	26.87
12	ABG Collect-Verify	10.08	7.57	18.27	20.44	30.27	2.8%	12.03	8.07	18.19	31.42	72.43	6.4%	19.4%	6.6%	-0.4%	53.7%	139.2%	126.6%	2	1.95	0.50	(0.07)	10.98	42.15
80	TropED Order-Verify	42.65	39.07	66.41	77.84	95.75	8.3%	39.68	36.42	60.94	72.20	89.84	5.9%	-7.0%	-6.8%	-8.2%	-7.2%	-6.2%	-28.9%	45	(2.98)	(2.65)	(5.46)	(5.64)	(5.90)

IMPROVED PERFORMANCE!

	Percent Change (from Baseline to Current)						Volume
	Average	Median	90th Percentile	95th Percentile	98th Percentile	% Outliers	(Tests / Day)
Hemogram Order-Verify	-12.6%	-12.4%	-18.5%	-19.0%	-21.1%	-54.1%	13
CBC wDiff Order-Verify	-15.1%	-13.4%	-17.2%	-19.5%	-19.9%	-41.7%	122
Basic Order-Verify	-13.0%	-11.1%	-18.4%	-21.1%	-16.7%	-37.3%	32
Lactic Acid Order-Verify	-6.9%	-8.3%	-8.1%	-8.5%	-6.3%	-27.5%	35
CMP Order-Verify	-13.3%	-12.7%	-15.4%	-16.0%	-15.1%	-43.5%	103
UA Collect-Verify	-13.2%	-15.2%	-11.6%	-13.3%	-12.8%	-30.5%	110
U hCG Qual Collect-Verify	-6.5%	-14.0%	-2.0%	6.6%	16.2%	-10.9%	14
ABG Collect-Verify	12.7%	6.3%	-7.6%	23.0%	126.8%	85.5%	2
TropED Order-Verify	-7.2%	-7.4%	-8.2%	-6.5%	-7.9%	-26.6%	46

RESULTS AND CONCLUSIONS FROM ED IMPROVEMENT PROJECT

- Depending on the test, average turnaround time has decreased by 15.1-6.5%

- Depending on the test, % outliers have decreased by 53-11%

- Physician complaints have dropped from average of 15 per week at the start of the project to an average of 2 per week (most recent week)

- More flexibility in staffing phlebotomy in the ED and in house

- Positive return on investment due to changes in lab staffing matrix

- Inspired more flexible thinking—Use of Hotline phone to field questions from physicians, assist Lab Services, and enhance communication in the Core Lab

CASE STUDIES AND SAMPLE REPORTS
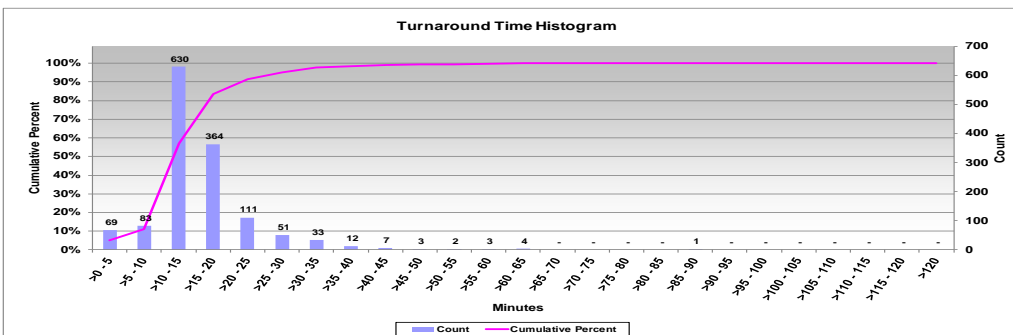
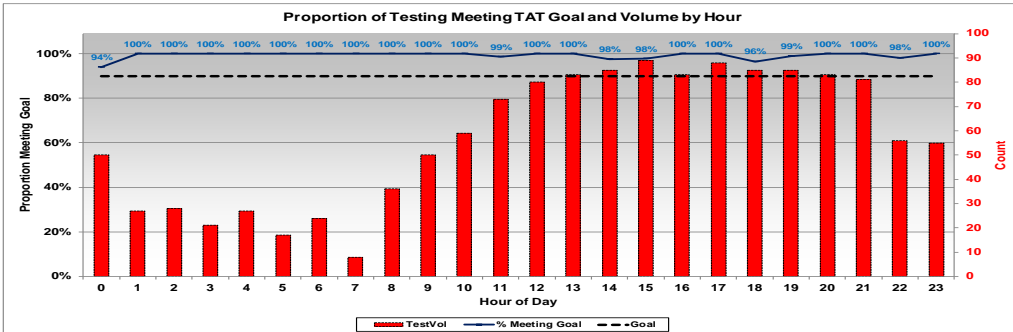ED Troponin and Chest Pain Certification

ED TROPONIN CHALLENGES

- Chest pain accreditation required specific performance measures

- Challenge required generating data, analyzing that data, and compiling the data into a concise report for the Cardiac Care Committee

- Data analysis over time (trending) is required

Dignity Health

Report Type: 05

Testing Meeting TAT Goal and Volume by Hour

Performance Insight

Criteria

Test:	TropED	Troponin (ED only)	**Count:**	1,373
Pat Loc Group:	3	ED		
Lab ID:	sjh 10 lab			

Activity Being Counted: **Tests**

Measurement: **Receive to Verify**

Performance Summary

	Turnaround Time (minutes)						
	Average		**Median**		**Pct Meeting Goal**	**Outliers (above target)**	
		Current vs:		Current vs:	Current vs:	n	% of Total
Target	45.0	35%	45.0	32%	90.0% 110%		
September 2017	15.7		14.4		99.1%	13	0.9%

Proportion of Testing Meeting TAT Goal and Volume by Hour

Turnaround Time Histogram

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Dignity Health.

Performance Insight®

Report Looks Back from:	Monday, October 2, 2017

Criteria

Test:	TropED	Troponin (ED only)	Period of Time Being Analyzed:	Weeks
Lab ID:	sjh 10 lab			

Measurement: Order to Verify

Performance Summary

	Average		Turnaround Time (minutes) Median (approx)		90% Completion (approx)	
		Current vs:		Current vs:		Current vs:
Target	45.0	92%	45.0	83%	45.0	142%
Values for Entire Report	41.3		37.5		63.8	

Turnaround Time Trend

Legend: Average — Median — 90th Percentile — Target

Test Volume

Legend: Test Volume — 3 Period Moving Avg

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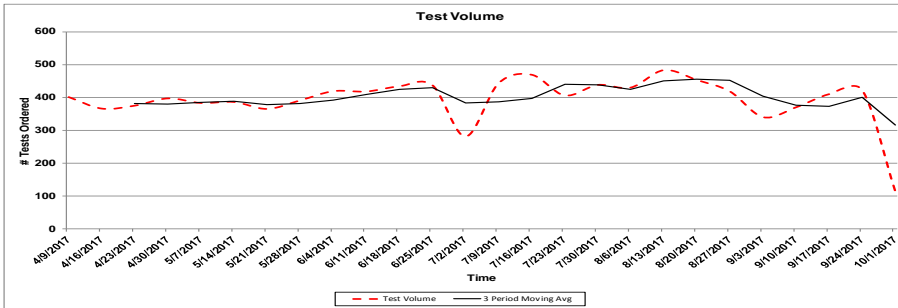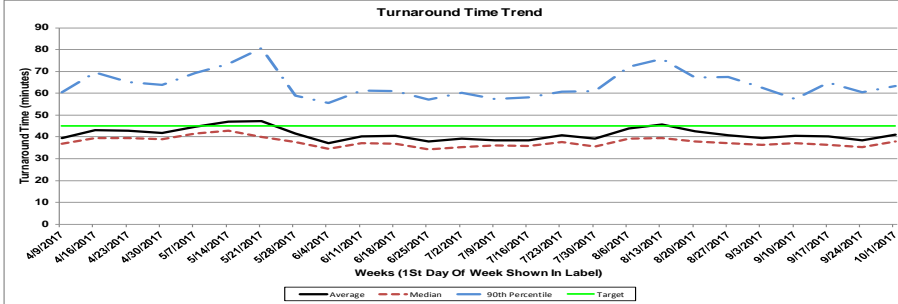
RESULTS AND CONCLUSIONS FROM ED TROPONIN PROJECT

- Analytics required for Certified Chest Pain Center accreditation are readily available

- Cardiac Care Committee members appreciate the graphics used to display the data and analytic measures

- Outlier data is readily available for analysis to further improve performance

- Trending over time can be analyzed by time period of weeks or months

WHAT WE LEARNED

- Improvements from Cerner reports:

    - Ease of setting up software (once we finally got to that point)

    - Flexibility to get the big picture, or to drill down to exact data needed

    - Continual improvements and updates from the manufacturer

    - Speed of pulling up reports

    - Auto-email !!!!!!!!

    - Excellent customer service

- Ongoing:

    - User guide could be more user friendly

    - Cerner is still useful for some data collection and reporting

WHAT WE DID RIGHT

- We chose a really good company and a really good product.

- We thoughtfully chose which modules to purchase.

- We paved the way for other Dignity Health facilities to purchase and implement Performance Insight.

- We worked closely with the Performance Insight technical staff, and relied on their expertise.

WHAT WE COULD HAVE DONE BETTER

- Worked more closely with Dignity Health IT.

- Recognized that the process would proceed slowly due to continuing Cerner Millennium implementation at the 42 Dignity Health facilities.

We're still learning!

RETURN ON INVESTMENT

- By better planning and use of our phlebotomists, we were able to eliminate 12 Lab Services FTEs while providing a better level of service to our ED customers.

- Total savings = approximately $499,000 per year

- Simple return on investment: **467%**

- Must also consider additional benefits, including less frustration and lost productivity for time spent trying to pull necessary information out of LIS

QUESTIONS?