



**Critical Access Hospital
Nebraska Hospitals Quality Improvement
“Quest for Excellence” Award
Application**

Topic:

Process Improvement – Outpatient Injection/Infusion Services

Category of Criteria:

Process Management/Organizational Performance Results

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President & CEO Community Hospital:

James P. Ulrich, Jr. FHFMA, MHA, CPA

1301 East H. Street

P.O Box 1328

McCook, NE 69001

308-345-8333

julrich@chmccook.org

Process Improvement – Outpatient Injection/Infusion Services

Introduction – Voice of the Customer

It is a primary focus at Community Hospital to manage the services we provide to patients as processes. Improving a broken process is the objective of process improvement in general with the focus being on the customer. Our journey to improving one of the most fragmented processes at Community Hospital began with listening to what our internal and external customers had to say. The process improvement effort focuses on our Outpatient Injection/Infusion services, where patients receive medications that range from simple injections and port flushes to complex infusions for chemotherapy. The medications are usually very expensive and carry significant risk factors that require increased levels of monitoring. Also, the patients that receive this service are usually on a series, where they may require the service as often as twice a day.

The Outpatient Injection/Infusion patient volumes were projected to continue to increase over the next few years from the average volumes of approximately 132 visits per month. Due to excessive amounts of waste in the current process and the risk factors associated with the medications, patient safety and the ability to safely handle the volume increases were the primary reasons to charter this process for improvement. Other factors the team aimed to improve were patient and employee satisfaction, and the time for the patient to complete their service. The process improvement methodology selected to improve the Outpatient Injection/Infusion process was PDCA (Plan, Do, Check, Act), which is our underlying strategy for continuous improvement with a focus on the customer. Table 1 shows some of the items identified as Critical to Quality (CTQ) for our customers, which helped begin the planning process.

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Sample Comments	Key Output Characteristic Important to the Customer (CTQ)
Patients show up, and they don't know where to go, it's a different location every time.	Consistent Location.
The Outpatient is worked into the Inpatient Nurse's day, with a different Nurse every time. When the floor is busy, the Outpatients wait. Also, many of the Nurses are not familiar with the medications being administered requiring Pharmacy to provide 'just in time' education.	Consistent Staff. Allocated time for the Outpatient. Knowledge of the Medications.
Outpatients are being sent to the inpatient floor, putting immuno-compromised patients at higher risk for infection.	Infection Controlled area for treatment.
Scheduling does not schedule appropriate times for all required treatments.	Schedule to treatment requirements.
There are not enough waiting areas for the patient/family to await test results and drug preparation. Currently being placed in ER/Surgery waiting; ER consult room (security issue), or sent to the inpatient floor to wait in the sun room.	Allocated space for patient/family.
Some patients have received medications the physician intended to discontinue. The order often has to be clarified, thus taking additional time.	Safety- Accurate orders and discontinuation of orders.
Patients do not show up at their scheduled time. Some may come hours early.	Timeliness of patient presentation
Medication Reconciliation is terrible. Sometimes done, sometimes not. May be in the computer or written out. Takes a lot of time. Who reviews it? What is the benefit?	Simple and beneficial medication reconciliation process.
Documentation on the chart is questionable. Times that should match often don't.	Accurate nursing documentation.
There is no sense of "welcomeness" for the Outpatients, they have to wait and be worked in by whoever can get to them.	Welcome. Sense of preparation for the patient and family. Respect for their time.

Table 1: Getting the Voice of the Customer

Plan – Current State of the Process & Improvement Plan

In January 2010, an Outpatient Injection/Infusion team was developed to include members from all the departments identified as being within the scope of the project, that being Nursing Service, Scheduling, Pharmacy, Laboratory, Registration, an Administrative Sponsor, and Process Improvement Facilitators.

The first step was to map the current state of the process in order to identify the breakdowns that were occurring, as well as beginning the initial data collection. Figure 1, which is located in the supporting documentation section, shows the process map for

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the current state. Also, patients were categorized based on the type of treatment they might receive. The categorization of the patients for the Outpatient Injection/Infusion services was critical to improve the process and help the team to understand the underlying variability in the service times and requirements. All patients are grouped into one of five categories as listed below, where approximately 50% of the patient volumes are Level 1, and 90% of the patient volumes fall into Levels 1, 2 or 3.

- Level 1 – Injection/Flush – No Lab
- Level 2 – Injection/Flush – With Lab
- Level 3 – Infusion – No Lab
- Level 4 – Infusion – With Lab
- Level 5 – Chemotherapy/Other

Data collection began as a manual process through random sampling over three months to establish a baseline to determine the time required for the patients to receive their initial injection/infusion and total time spent from admit to discharge. The baseline data is shown in Table 2, where the variation from one visit to the next quickly verifies the existence of breakdowns, delays, and inconsistencies within the current process.

		Sample Size	Mean (Minutes)	Standard Deviation
Level 1 – Injection – No Lab	Check-in to Initial Injection	46	20.8	15.3
	Total Time	46	39.4	17.7
Level 2 – Injection – w/Lab	Check-in to Initial Injection	16	51.0	21.1
	Total Time	16	76.4	21.1
Level 3 – Infusion – No Lab	Check-in to Initial Infusion	13	40.5	23.6
	Total Time	13	142.8	65.6
Level 4 – Infusion – w/Lab	Check-in to Initial Infusion	11	41.3	18.6
	Total Time	11	132.4	78.6
Level 5 – Chemotherapy/Other	Check-in to Initial Injection	3	37.7	12.4
	Total Time	3	111.0	18.7

Table 2: Current State of the Process – Baseline Data

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Once the data had been collected, the team began investigating options to improve the Outpatient Injection/Infusion process. The team looked at the following criteria for improvement:

- Designated Location on the Inpatient Floor
- Room Set up/Requirements
- Supplies Needed/Availability
- Electronic Documentation/Requirements
- Having the patient go to one location and all the services (i.e. Lab) would come to the patient.
- Patient Education and Medication Reconciliation
- Feasibility of having designated Staff/Requirements

After a month of investigation, the team got back together to discuss the feasibility of the changes, what they felt would work, and to stress their concerns. Demonstrations were shown for a solution to document electronically the information of the Outpatient visit. Although, not a true EMR system, the current database is capable of allowing for electronic review of medications, documentation of vital signs, and providing time stamps for ongoing data collection of the process. The scheduling component was discussed, where the patients would be scheduled based on the Level of service they required, allowing for more accurate capacity planning. The primary concern that arose was the designated locations on the Inpatient Floor. At the time, Community Hospital was undergoing major construction, building an entirely new Inpatient wing and removing the current; the designated location would be gone in less

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than 18 months. The construction plans also included a designated location for the Outpatient Injection/Infusion services that would not be near the new Inpatient wing. Once the new facility was finished, the service would no longer be able to be worked into an Inpatient Nurse's day, which would result in additional staff designated for the area. But how much additional labor would be needed to provide the Outpatient Injection/Infusion service?

After long discussions and brainstorming, the team decided to completely redesign the process, with an effort to simulate the dynamics and changes the service would see in about two years. The team was able to relocate the service to three overflow rooms that were rarely used near the Emergency Department. Data collection and analysis were started to determine staffing requirements in order to gain approval from Administration for the changes. Adding labor was originally considered not an option for improving the service, but with the team's long term views, the changes would eventually need to take place.

One of the more difficult elements of the project was determining the staffing requirements for the designated location since the service was basically a side job for a Nurse clocked into the Inpatient Floor. The team decided to look at the current staffing from a different angle, by asking, "If we remove the Nurse that does the Outpatient Injections/Infusions, what impact will that be to the Inpatient Floor?" Data was then collected on daily Nursing hours, Inpatient floor tasks, and Outpatient volumes by Level. By looking at the Outpatient volumes and applying a weighted average time per visit based on frequencies and average times for each Level of Outpatient; the following results were taken to Administration:

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- Approximately 33.71 hours are spent providing the Outpatient Injection/Infusion service Monday – Friday.
- The Inpatient Floor is receiving approximately 42.85 hours Monday – Friday from the Outpatient Nurse.
- If the Outpatient Nurse is not available to help on the Inpatient Floor, the impact would be 42.85 hours they would need to cover with additional staff.
- The Outpatients that require the service on the weekends will be tended to by Emergency Department staff. Generally, the weekend volumes are very low.

With Administrative approval in hand, the Nursing Service worked through the dynamics of scheduling staff for the designated Outpatient Injection/Infusion area. One question needing answered was to have either a set of designated Nurses scheduled in the area, or to schedule any available Nurse each day. Through discussions and by reviewing the projects CTQ's, the team decided to have a group of designated Nurses available to staff the Outpatient Injection/Infusion area. The driving criteria became Patient Safety, Knowledge of Medications, Education, and in depth training for the designated staff. By reducing the amount of changes in the staff from one day to the next, relationships can be built with the patients, thus potentially increasing Patient Satisfaction scores.

Do – Implement the New Process

With the designated rooms set up, supplies organized, the electronic documentation system ready to go, and the staff identified and trained, the team was ready to pilot the new process. Two days were scheduled where the Outpatients

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requiring the service were contacted, told about the changes in the service, and asked to enter the facility through the Emergency Department entrance. The redesigned process map is shown in Figure 2, which is located in the supporting documentation section.

With a successful pilot, the team met once again to discuss any changes in the process prior to going live. Policies were finalized and training for the electronic documentation was extended to secondary staff in case a designated staff member was not available. Parking was revised to allow for the increased patient volume through the Emergency Department, and the team scheduled a go live date of July 15th, 2010. Data would be taken out of the database used for the electronic documentation and analyzed for ongoing sustainability and continuous improvement.

Check – Analyze the Results of the Redesigned Process

The data was collected after the first month of implementation, and the results were incredible. The team met once again to discuss the results and make any additional adjustments to the process. There were 195 visits analyzed from the initial period, where patients from Levels 1, 2 and 3 accounted for 93% of the volume, and Level 1 accounting for 66% of the volume. In Table 3, it is very easy to see the impact of the changes, especially for the Level 1 patients, where the highest percent of our volumes saw the greatest improvement in service times and variations. A few of the results show that the variations actually got worse, the team felt this was a result of low patient volumes in the baseline and first month data, where ongoing analysis continues in order to reduce the variations.

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- Level 1: Injections/Flush – No Lab (Sample size of 129)
 - Admit to Initial Injection
 - Average time decreased from 20.8 min. to 10.9 min. (48% improvement)
 - Standard Deviation decreased from 15.3 min. to 7.5 min. (51% improvement)
 - Total Time
 - Average time decreased from 39.4 min. to 33.1 min. (16% improvement)
 - Standard Deviation decreased from 17.7 min. to 11.2 min. (37% improvement)
- Level 2: Injections/Flush – w/Lab (Sample size of 34)
 - Admit to Initial Injection
 - Average time decreased from 51 min. to 27.5 min. (46% improvement)
 - Standard Deviation increased from 21.1 min. to 26 min. (23% worse)
 - Total Time
 - Average time decreased from 76.4 min. to 53 min. (31% improvement)
 - Standard Deviation increased from 21.1 min. to 37 min. (75% worse)
- Level 3: Infusions – No Lab (Sample size of 18)
 - Admit to Initial Injection
 - Average time decreased from 40.5 min. to 23.6 min. (42% improvement)
 - Standard Deviation decreased from 23.6 min. to 19.7 min. (17% improvement)
 - Total Time
 - Average time decreased from 142.8 min. to 124 min. (13% improvement)
 - Standard Deviation increased from 65.6 min. to 86.3 min. (32% worse)
- Level 4: Infusions – w/Lab – Amount of data too small for accurate results.
- Level 5: Chemotherapy/Other – Amount of data too small for accurate results.

Table 3: Initial Results of the Redesigned Process

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Act – Sustaining the Gains and Validating the Growth

The redesigned process for providing our Outpatient Injection/Infusion services has now been functioning for more than a year. Data is analyzed on a quarterly basis and the team meets occasionally in order to discuss how the process continues to perform and additional opportunities for improvement.

The patient volumes have shown a steady increase over the past eleven months, and are starting to become more consistent, with increases higher than forecasted 18 months ago. Table 4 shows the volumes by day of week over the past several months.

Volumes											
	Aug. 2010	Sept. 2010	Oct. 2010	Nov. 2010	Dec. 2010	Jan. 2011	Feb. 2011	Mar. 2011	Apr. 2011	May 2011	Jun. 2011
Sunday	12	7	17	7	10	15	4	13	13	18	15
Monday	16	20	28	23	20	19	12	16	24	25	23
Tuesday	27	32	40	38	33	43	21	31	30	26	24
Wednesday	18	26	38	31	36	27	14	33	33	34	40
Thursday	33	37	37	20	39	26	21	26	30	36	45
Friday	17	20	38	16	33	27	15	20	39	31	24
Saturday	16	9	18	3	11	16	4	15	25	16	21
Total	139	151	216	138	182	173	91	154	194	186	192
% Increase (from 2009 Avg. of 132/mo)	5.3%	14.4%	63.6%	4.5%	37.9%	31.1%	31.1%	16.7%	47.0%	40.9%	45.5%

Table 4: Volumes over the past 11 months

The data collected for the service over the past several months continue to show how the new process has sustained the gains initially reached, and in some cases continue to improve. Figures 3 through 7 in the supporting documentation section show how the process has performed over the past eleven months for each Level of patient with thresholds marked for where the prior process was performing.

The improvements have been incredible, and the team is really beginning to understand how to control variation. One example of this occurred when the new Inpatient wing opened at the end of January 2011. The service times for Level 1

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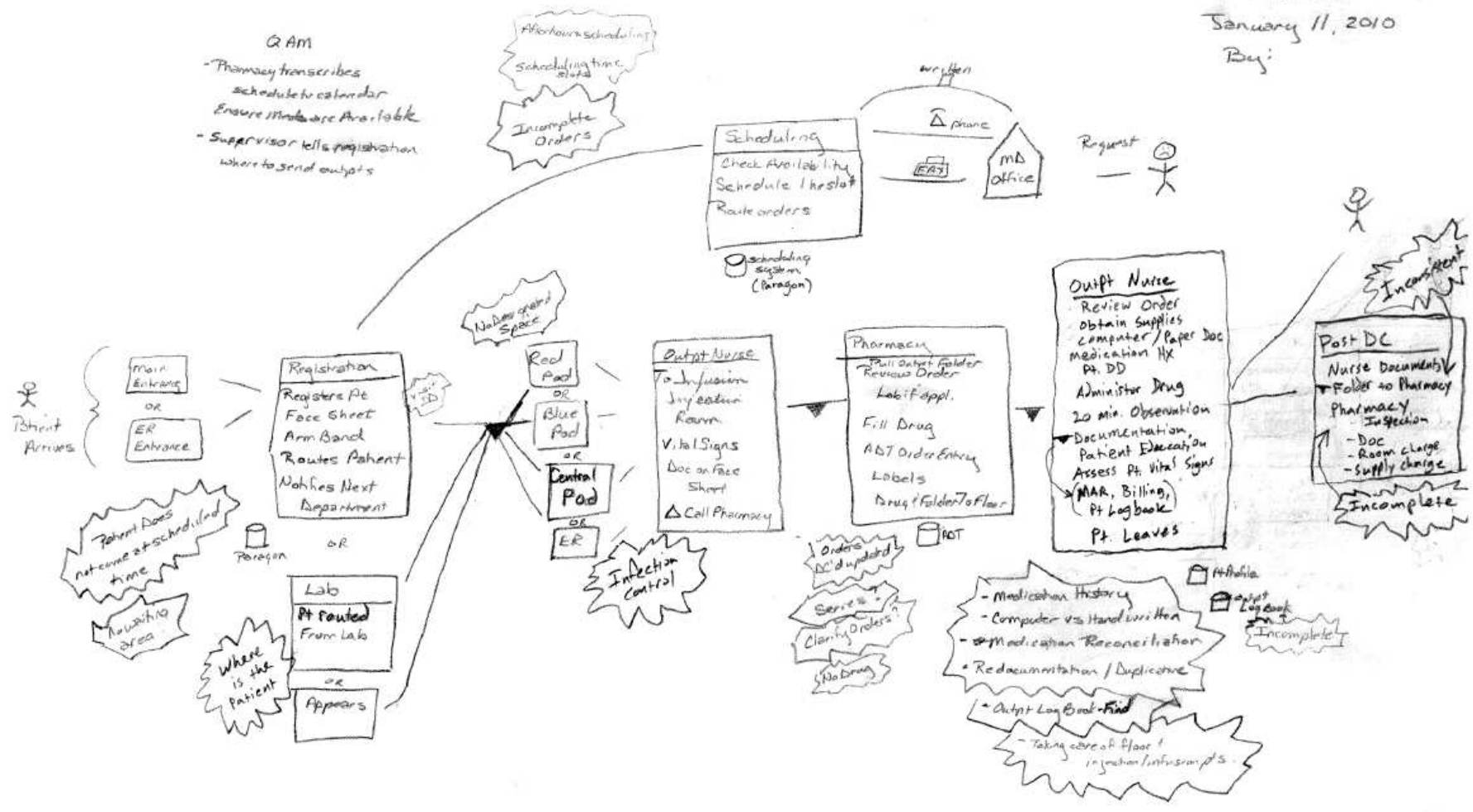
patients (our highest volume Level) slowly started moving back towards prior system performance levels. The Pharmacy Department had moved a considerable distance away from the service location and a number changes occurred with their internal processes. Because the team was familiar with the data and able to understand what was happening, they were able to meet and come up with solutions for improved communication to hold on to the gains they had made.

The variation in the process continues to differ depending on the Level of patient, but are still reduced considerably overall. The volumes are slowly starting to increase for the Level 5 patients, due to an opportunity to expand our Chemotherapy services at Community Hospital. As we are heading into our final year of construction, focus will remain on the process to assure the gains are sustained.

In conclusion, the process improvement team was very successful at enhancing our Outpatient Injection/Infusion services. They met all of their goals for improving the process, providing increased patient safety, developing consistent documentation and medication education, and providing our patients with a service that is more consistent and easier to use. The team recently implemented a survey to continue to collect the Voice of the Customer. The changes in the process have added a significant amount of capacity to the service, but with the volume increases and as our new facility nears completion, we find ourselves continuing to look for ways to improve the service and exceed our patient's expectations.

Supporting Documentation

Outpt Injection/Infusion
 - No Lab
 January 11, 2010
 Ray



90min Registration to Injection

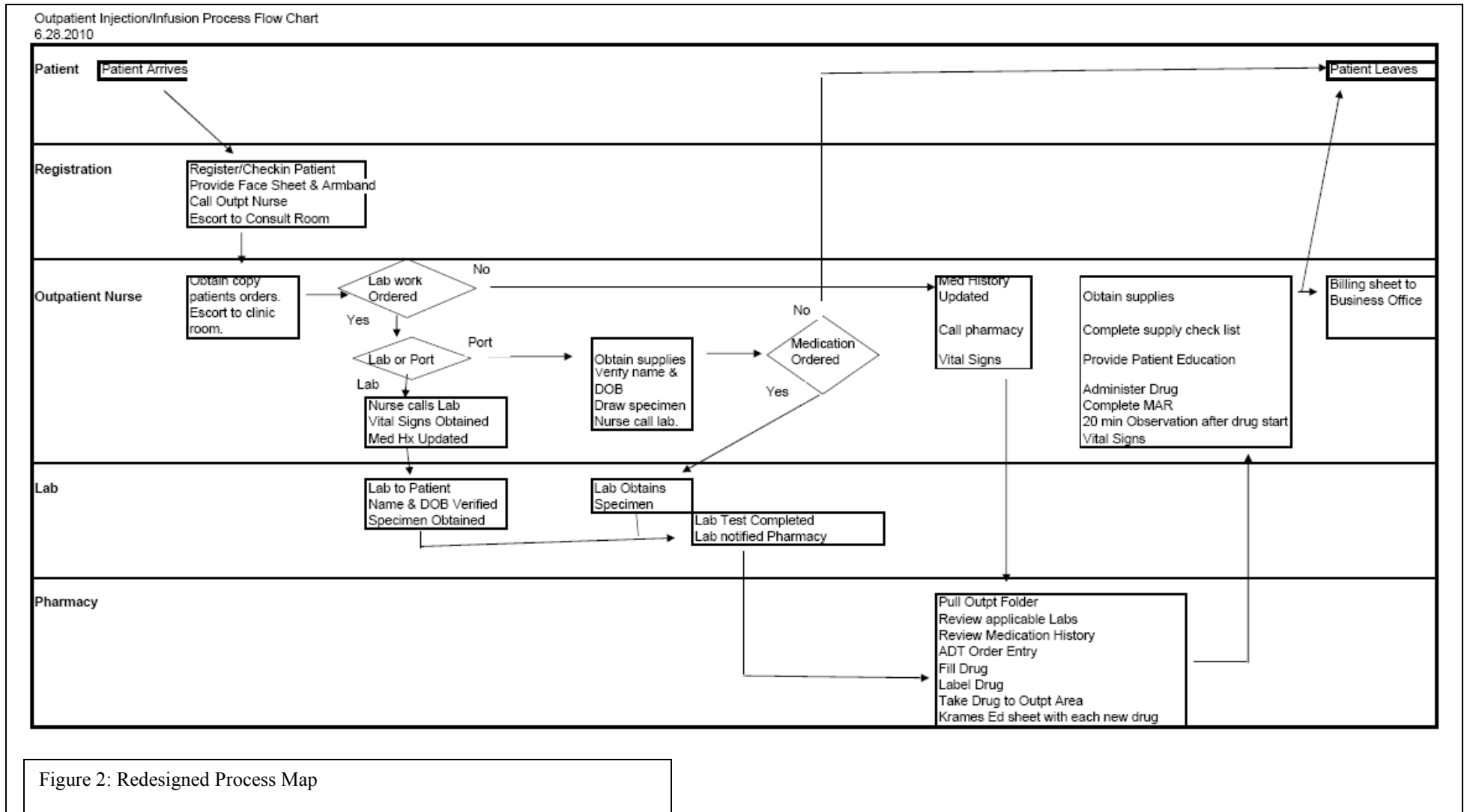
Injection		Infusion	
Avg	62	Avg	131
Low	4	Low	14
High	73	High	102

Registration to DC

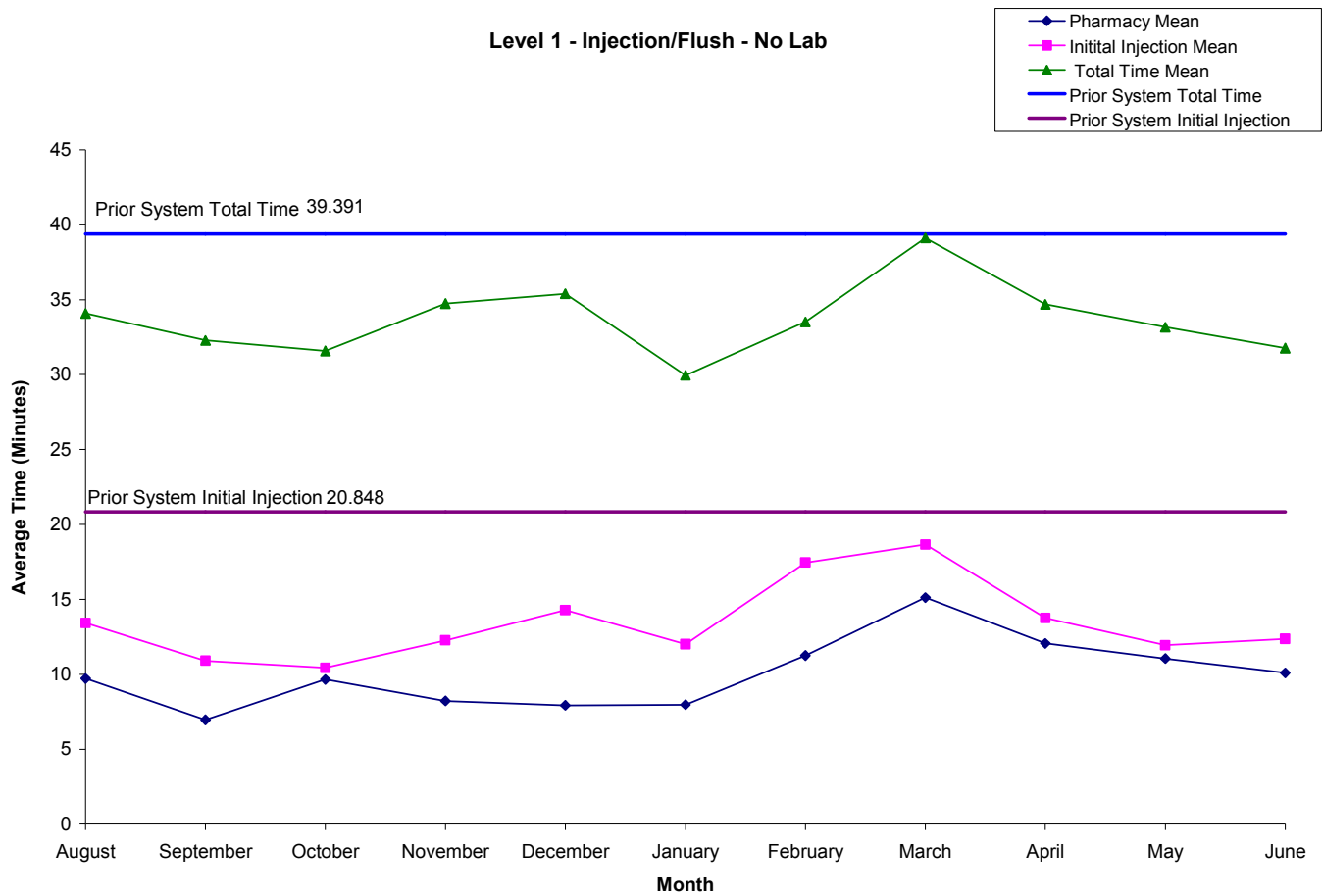
Injection		Infusion	
Avg	90	Avg	130
Low	9	Low	62
High	85	High	259

Figure 1: Current State Process Map

Supporting Documentation



Supporting Documentation



	Level 1					
	Pharmacy Time		Time to Initial Injection		Total Time	
	Pharm Mean	St. Dev.	Initial Injection Mean	St. Dev.	Total Mean	St. Dev.
Aug. 2010	9.714	6.265	13.422	9.309	34.077	12.846
Sept. 2010	6.966	6.406	10.895	8.468	32.279	9.883
Oct. 2010	9.659	8.594	10.422	8.508	31.576	11.764
Nov. 2010	8.222	5.019	12.267	6.777	34.733	7.583
Dec. 2010	7.923	3.662	14.286	9.804	35.381	10.979
Jan. 2011	7.969	6.458	12.000	7.177	29.952	11.485
Feb. 2011	11.250	6.201	17.457	9.303	33.514	11.299
Mar. 2011	15.118	11.224	18.657	12.029	39.114	16.231
Apr. 2011	12.059	9.208	13.754	9.121	34.692	11.691
May 2011	11.040	8.658	11.934	10.027	33.158	12.649
Jun. 2011	10.087	9.483	12.361	9.483	31.770	9.470
Total	10.491	7.959	12.878	9.352	33.122	11.843
1st Month	8.537	5.192	10.943	7.528	33.142	11.205
Prior System			20.848	15.333	39.391	17.744

Figure 3: Level 1 Results – Injection/Flush – No Lab

Supporting Documentation

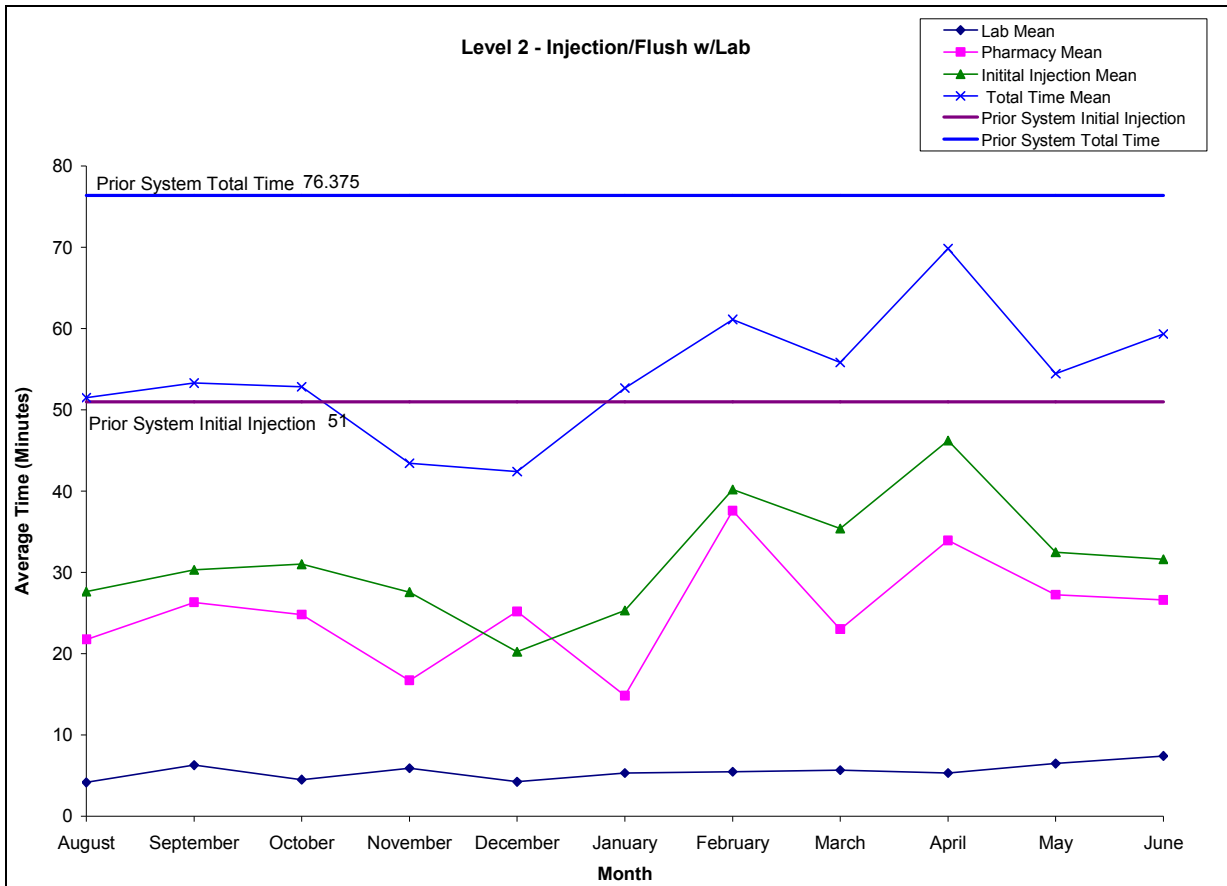


Figure 4: Level 2 Results – Injection/Flush w/Lab

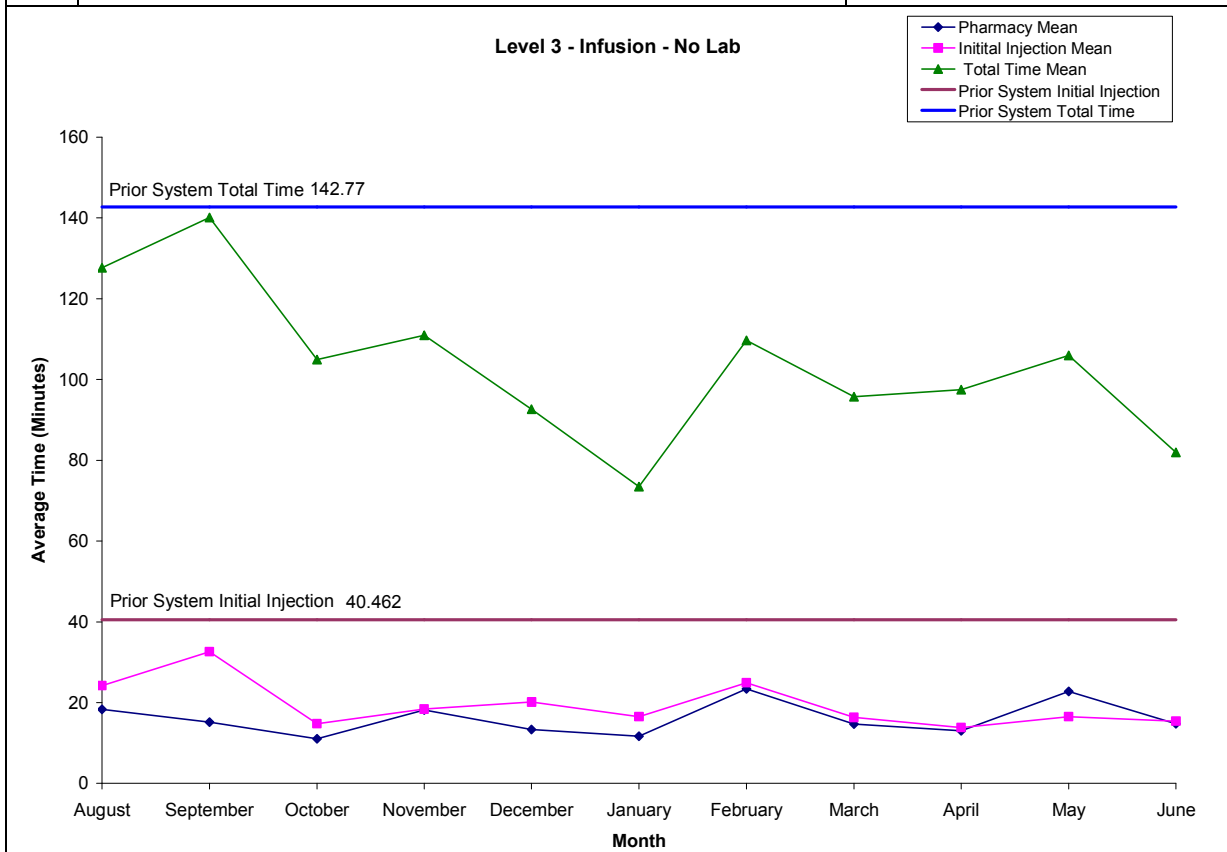


Figure 5: Level 3 Results – Infusion – No Lab

Supporting Documentation

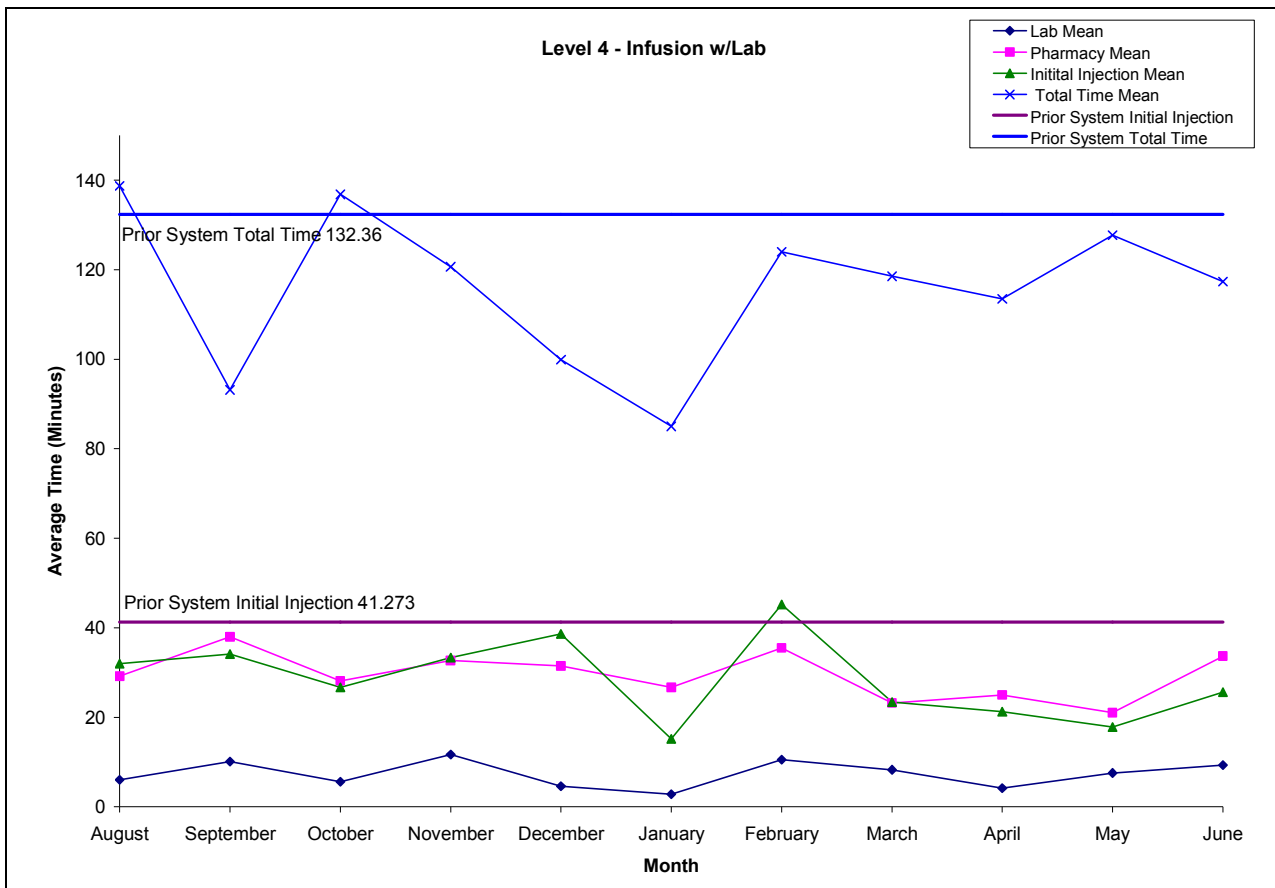


Figure 6: Level 4 Results – Infusion w/Lab

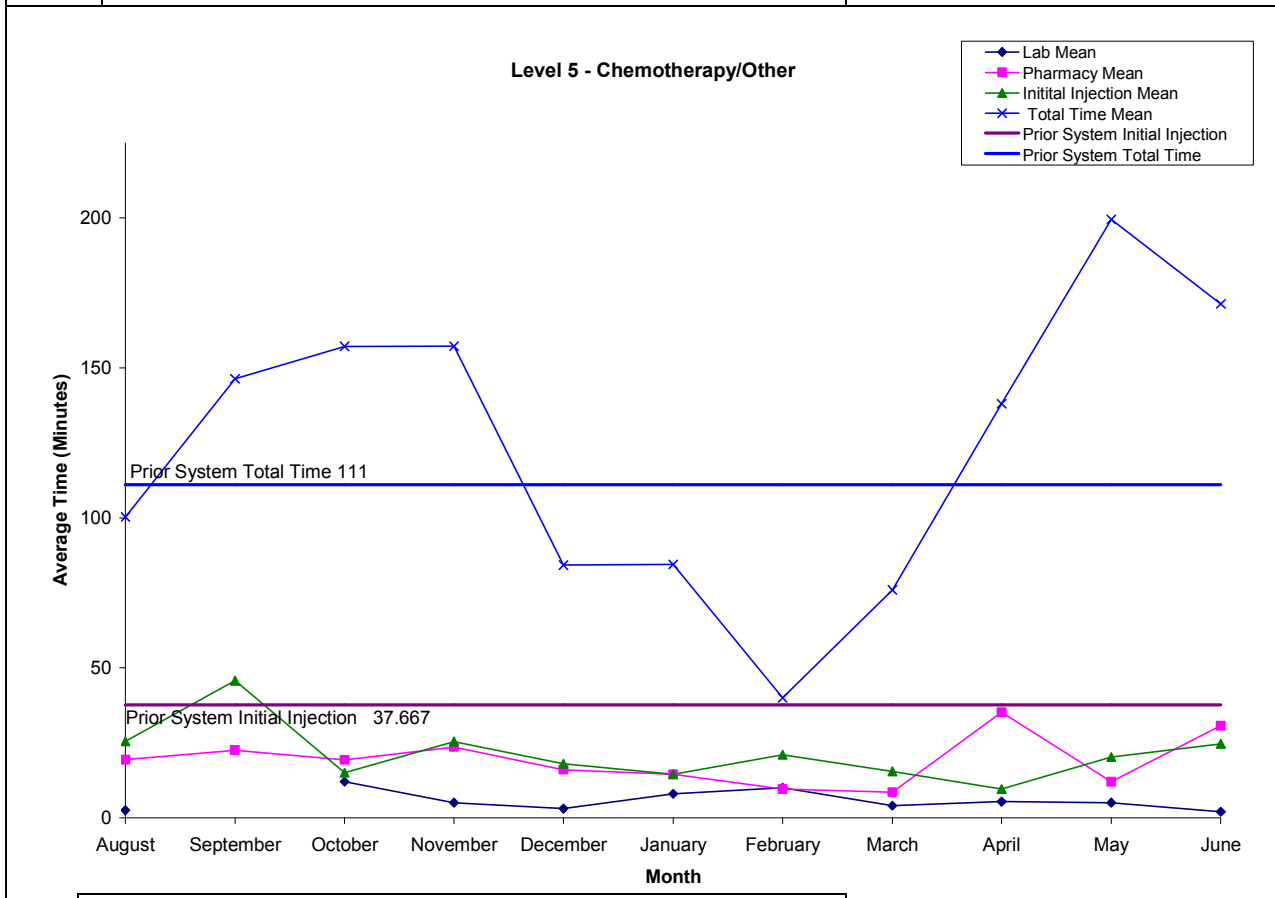


Figure 7: Level 5 Results – Chemotherapy/Other