GETTING PATIENTS FROM HERE TO THERE:

A COLLABORATION OF PATIENT TRANSPORTATION AND RADIOLOGY DEPARTMENTS TO MAXIMIZE EFFICIENCY

by

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ABSTRACT

Background: The patient transportation system within a large hospital is a very large and complex operation. Although this is an operational issue, there can be a significant impact on public health. In order to ensure patient satisfaction and minimize associated costs, efficiency is key.

Public Health Relevance: The impact on public health is significant in two major ways. First, and most importantly, the health and well-being of the patient should always come first. Waiting for a long period of time can be a major dissatisfier for patients. In addition, delays in transportation not only delay the radiology scan or procedure, but they can also delay other important exams, procedures, or tests. The second major impact on public health is the rising cost of health care. Inefficiency, in any state, drives cost and should be continually improved upon.

Methods: A prospective quality improvement initiative was developed to decrease extended patient transport times. Using predefined transportation time goals, outliers were assessed on a monthly basis. Several initiatives were implemented to help reduce the number of transports outside of these goals. Data was analyzed on a monthly basis and discussed at collaborative, interdepartmental work group meetings.

Discussion: Approximately two-thirds of patient transports to the radiology department exceeded the goal transport time. These trips were further analyzed. Trips originating from Montefiore Hospital were longer than other trips. There were no specific trends to time of day. Specific, targeted interventions were implemented based on need. Overall, trips within goal have increased over the study period.

Conclusion: Data analysis, interdepartmental collaboration, and work process improvement tools can be utilized to decrease the time it takes to transport a patient to the radiology department. Further analysis and continued outlier management will be crucial to continue this trend.

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1. Background

The University of Pittsburgh Medical Center (UPMC) Presbyterian Hospital (PUH) is an urban, academic, level 1 trauma center, located in southwestern Pennsylvania. The hospital, founded in 1893, is the region's largest inpatient acute care hospital, and staffs 792 beds. PUH is the flagship institution for the UPMC Health-System and has a significant global presence. It is the primary provider for the region and is the home to multiple specialties, including, but not limited to: cardiology, cardiothoracic surgery, critical care medicine, trauma services, neurosurgery, and transplant services. It is also one of 41 nationally certified Comprehensive Stroke Centers. The campus also includes Montefiore Hospital (MUH). These two towers are connected by a pedestrian bridge that crosses above two city blocks.[1]

The patient transportation department consists of 80 full-time equivalents (FTE). Emplyees work a variety of shifts, staggered to ensure that there is 24-hour coverage for the needs of the patient. On average, the department makes between 800 and 900 trips daily, which includes the movement of patients and equipment.

The radiology department encompasses unique modalities, including: nuclear medicine, computed tomography (CT), ultrasound, diagnostics (i.e. X-ray), magnetic resonance imaging (MRI), and interventional radiology. At PUH and MUH, the radiology department volume exceeds 300,000 cases per year. The department staffs 227 FTE.

Radiology leadership identified issues with in-patient arrivals and departures from the unit. After engaging the patient transportation department, both parties recognized the need for more efficient use within the system.

There are a variety of work process improvement techniques that could be useful in finding solutions to these problems, such as the Toyota Production System (TPS), Lean, and Six Sigma principles. TPS is very focused on reducing waste to optimize efficiency. Success with the TPS can be tied to four rules: (1) highly specified work, (2) direct, unambiguous customer-supplier relationships, (3) simple and direct pathways for products and services, and (4) improvements should be made in small experiments, as close to the actual work as possible.[3]

Dr. John Kenagy, a vascular surgeon, spent significant periods of time studying TPS and worked to utilize these principles in the health care setting. Adaptive Design™ was created to give health care professionals tools to applying system-level thinking to this complex environment. Similar to Toyota's goal of producing defect-free products, the goal of Adaptive Design is to provide ideal patient care. Similar to Toyota's evaluation of problems, there is a heavy emphasis on pictures and diagrams. When a problem is identified, it is crucial that no assumptions are made and direct observations of those close to the problem are made. This is in-line with the TPS philosophy that the workers doing the work know the work the best. This principle requires a significant change in management culture, avoiding the "top down" approach and allowing change to occur from the grassroots of the organization.[4]

Lean processes focus on elimination of waste, which negatively impacts an organization's use of valuable resources. There are eight major types of waste: overproduction, inventory, defects and correction, over-processing, waiting, people, motion, and transportation.[5] People, and the associated time they have available to work, are arguably the most valuable resource an organization has. To eliminate waste of these resources, tools, such as standardizing work, streamlining layouts, quick turnovers, and work flow, can be utilized in daily work. Although these recommendations were originally based in the manufacturing-based industries, they have been applied to other systems, including health care.

Because this project has the opportunity to analyze a large amount of data, Six Sigma principles were also discussed. The practice of Six Sigma focuses on causes of variation within a process. Common cause variation is the day-to-day changes that happen naturally. Special variation is a change triggered by an external force. By identifying different sources of variation, successes can be repeated and unsatisfactory failures can be assessed and improved upon. The Six Sigma process also focuses on different visual displays of data, which are helpful to identify trends in variation.[6]

A major barrier to many improvements to the work process is organizational culture. Edgar H. Schein, an expert in organizational culture, defined it as:

> *"A pattern of shared basic assumptions that the group learned as it solved its problems…that have worked well enough to be considered valid and, therefore, to be taught to new members as the correct way to perceive, think, and feel in relation to those problems.[7]"*

Organizational culture includes what the organization considers to be the "right decision," the speed and efficiency with which things get done, how individuals and work groups deal with work assigned to them, and the attitudes of outside stakeholders to the organization. This culture can support (or hinder) implementation of initiatives or achievement of organizational goals. Conners and Smith (2011) introduce a results pyramid approach to culture. Employees' experiences make the foundation for which they base their beliefs. Beliefs influence their actions, which produce the organization's results. In order to change results, efforts must be made to change beliefs and experiences before changes in action can be observed.[8]

Initial discussions about the patient transportation problem recognized that a combination of these principles would be beneficial in analyzing and improving the patient transport process. It was the work group's goal to identify potential solutions and create improvements that aligned with the scientific method – small experiments that would be followed through with quantitative and qualitative data. The work group was mostly comprised of transport and radiology supervisors, who were very close to the improvements being made. It was clear that there were rich sources of very detailed data, so analysis tools used in Six Sigma were chosen to identify areas of waste.

1.1 Public Health Significance

The impact on public health is significant in two major ways. First, and most importantly, the health and well-being of the patient should always come first. Waiting for a long period of time can be a huge dissatisfier for patients. In addition, delays in transportation not only delay the radiology scan or procedure, but they can also delay other important exams, procedures, or tests.

The second major impact on public health is the rising cost of health care. Inefficiency, in any state, drives cost and should be continually improved upon. If patients aren't ready when a transporter arrives, the transporter can wait or pick up another transport – either of which wastes staff time. If a patient is not ready for a scan when the radiology department is ready, the imaging machine may be left unused for a period of time. This radiology department is the home to state-of-the-art and very costly equipment, so wasted table time is significant to the bottom line. If a patient's exams, procedures, or scans cause the patient to require a longer hospital stay, it will increase their associated health care costs and put the patient at risk for various hospital-acquired complications. Patient satisfaction is now tied to hospital reimbursement, so it is twice as impactful to hospital operations.

1.2 Baseline Work Flow

Spectrum Teletrak® Services[2] is used in the hospital to request transporters to move patients and/or equipment. Access is given to hospital staff, including nurses, health unit coordinators (HUC), and radiology staff. It provides a platform to collect pertinent details relating to the requested transport.

The process is initiated by a staff member entering a request for a transport. They have the option to request a future timed transport, though most staff request the transport as it is needed. Upon entering the request, the transport is assigned a job number and filed into a queue. The job at this phase is deemed as “pending.” If the requestor enters a future time for the transport, the job will not be pending until 20 minutes prior to the requested time.

Transporters carry smart phones that are used to access the Teletrak® system. When they are available for a transport, they utilize the smart phones to get a job assigned to them. The prioritization of jobs is based on a complex algorthim, based on location (i.e. the emergency department), destination, and other transport details. Once the transporter has been assigned a job, the request is “dispatched.” At this time, a page is sent to the unit, usually to the HUC, stating that a transporter is en route to pick-up the patient.

Once the transporter arrives, they may need to wait for the patient to be ready to leave the unit. If the patient is not ready once the transporter arrives on the unit, the transporter can utilize their smart phones to enter a delay code. Delays may be due to a variety of reasons, including a change of status or a health care provider speaking to or examining the patient. Once the transporter has the patient and is leaving the unit, the status of the job changes to “in-progress.” After the patient has arrived at his/her final destination, the job status is changed to “complete.” This work flow is outlined in Figure 1.

Predefined goals have been set by patient transport leadership, and these were used in data analysis throughout the project. The goals are defined in Table 1. To assess trips that were near goal, a five-minute buffer was added to the total trip time.

Table 1. Transport Travel Time Goals

PHASE INTERVALS	GOAL	BUFFERED GOAL
Pending-Dispatch	10 minutes	---
Dispatch-In-Progress	10 minutes	---
In-Progress-Complete	9 minutes	---
Pending-Complete (Entire Trip)	29 minutes	34 minutes

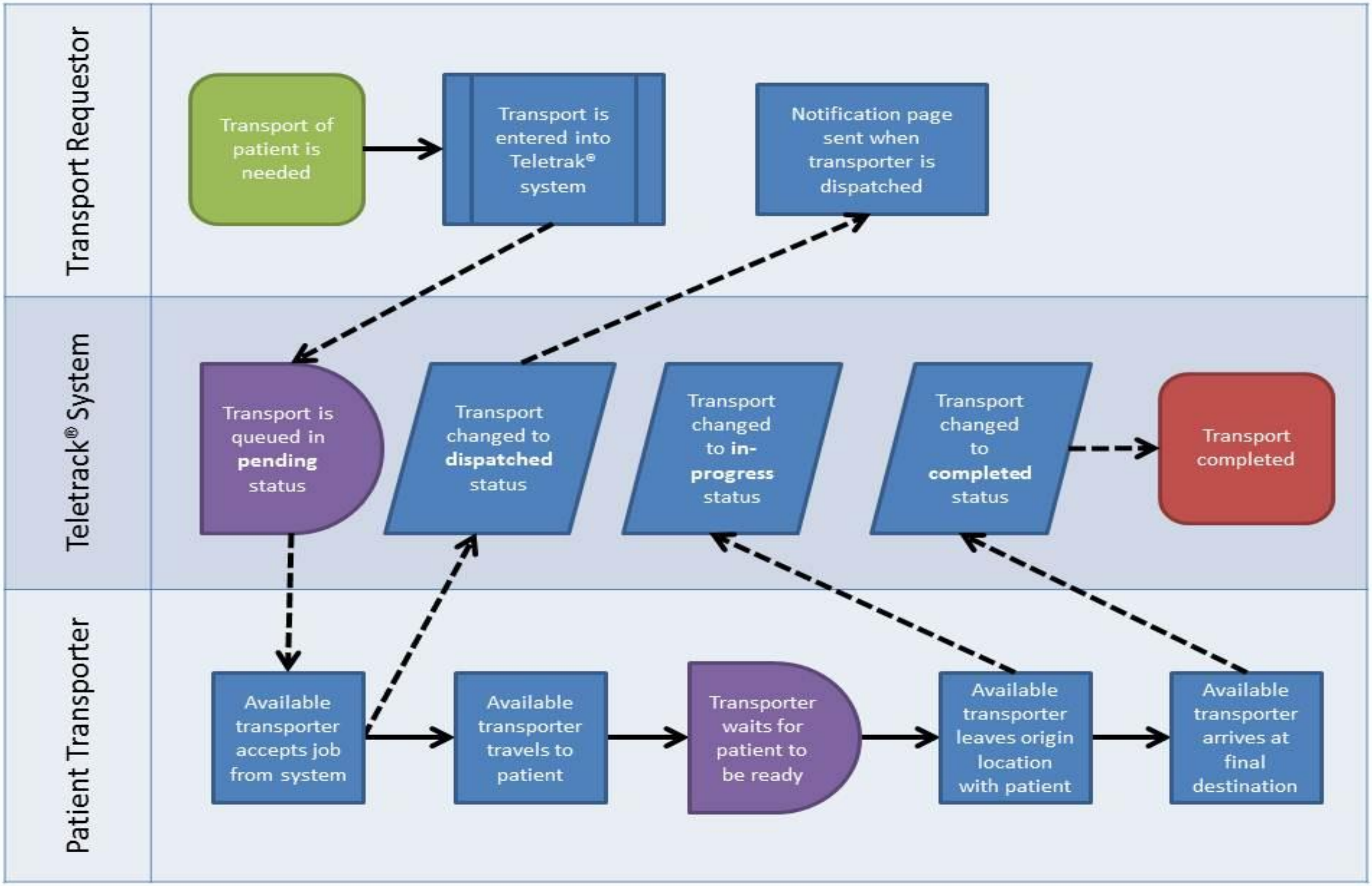


Figure 1. Work Flow Chart of Transport Request Process.

2. Data Analysis

At the end of every calendar month, all radiology transports were exported from the Teletrak® system. Data exported included: job identification number; transport requestor; date and time in pending, dispatch, in-progress, and completed status; and patient's origin and location destination. Microsoft® Excel was used for data analysis.

2.1 Baseline Data

A three-month baseline period was established from May to July 2014. For the first month, transports both to and from the radiology department were analyzed. Because of the higher number of extreme outliers and longer mean transport time, further analysis focused only on trips with radiology as the destination. For trips with radiology as the origin, approximately 82% of trips were within goal, while only approximately 66% were within goal when radiology was the destination. It was deemed that the trips with radiology as a destination were those with the greater opportunity for improvement. A summary of the total time for transports in the first month can be found in Figure 2 and Figure 3.

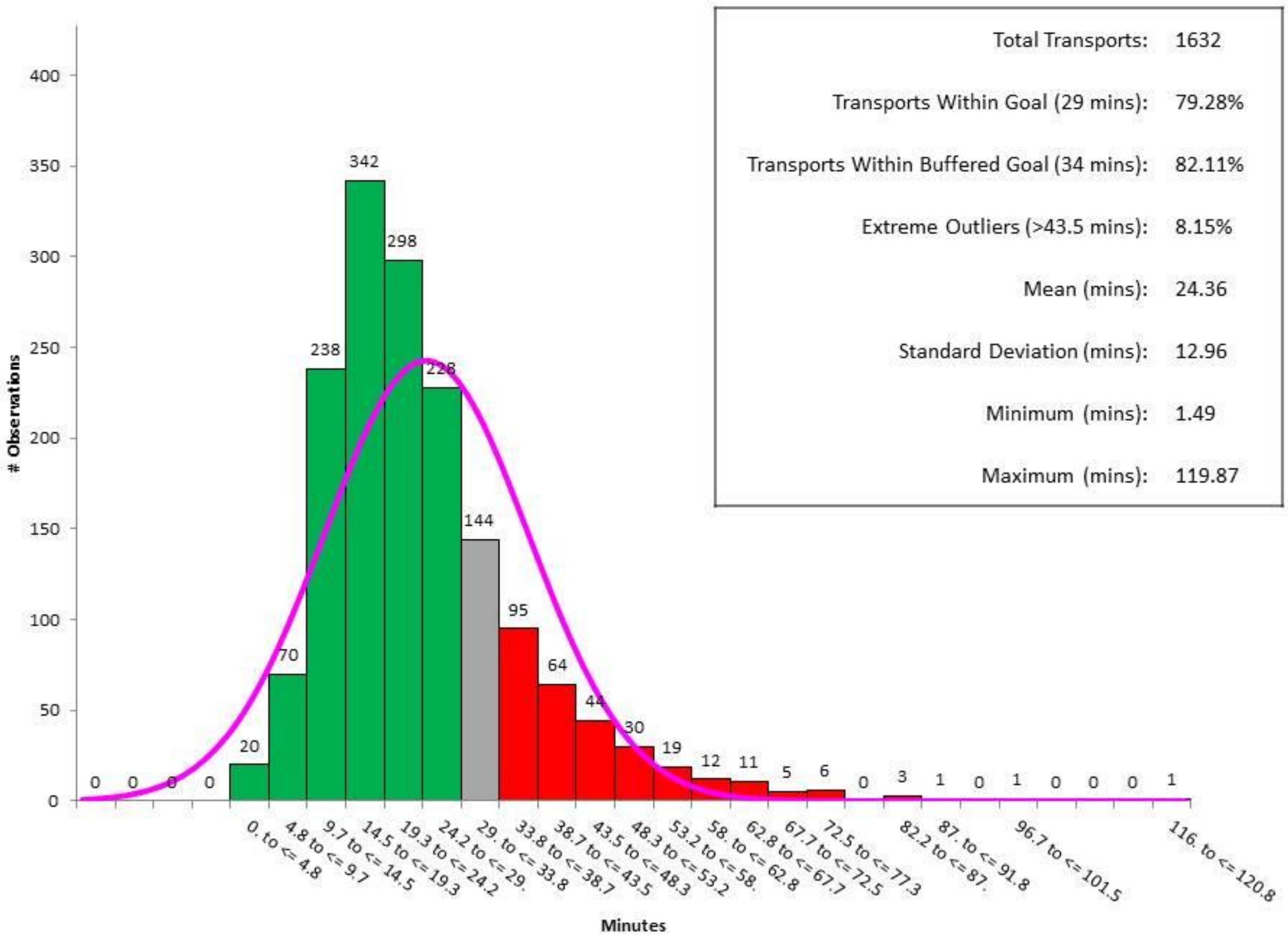


Figure 2. Total Transport Times with Radiology as the Origin, May 2014.

Green = within goal; Grey = within buffered goal; **Red** = outliers

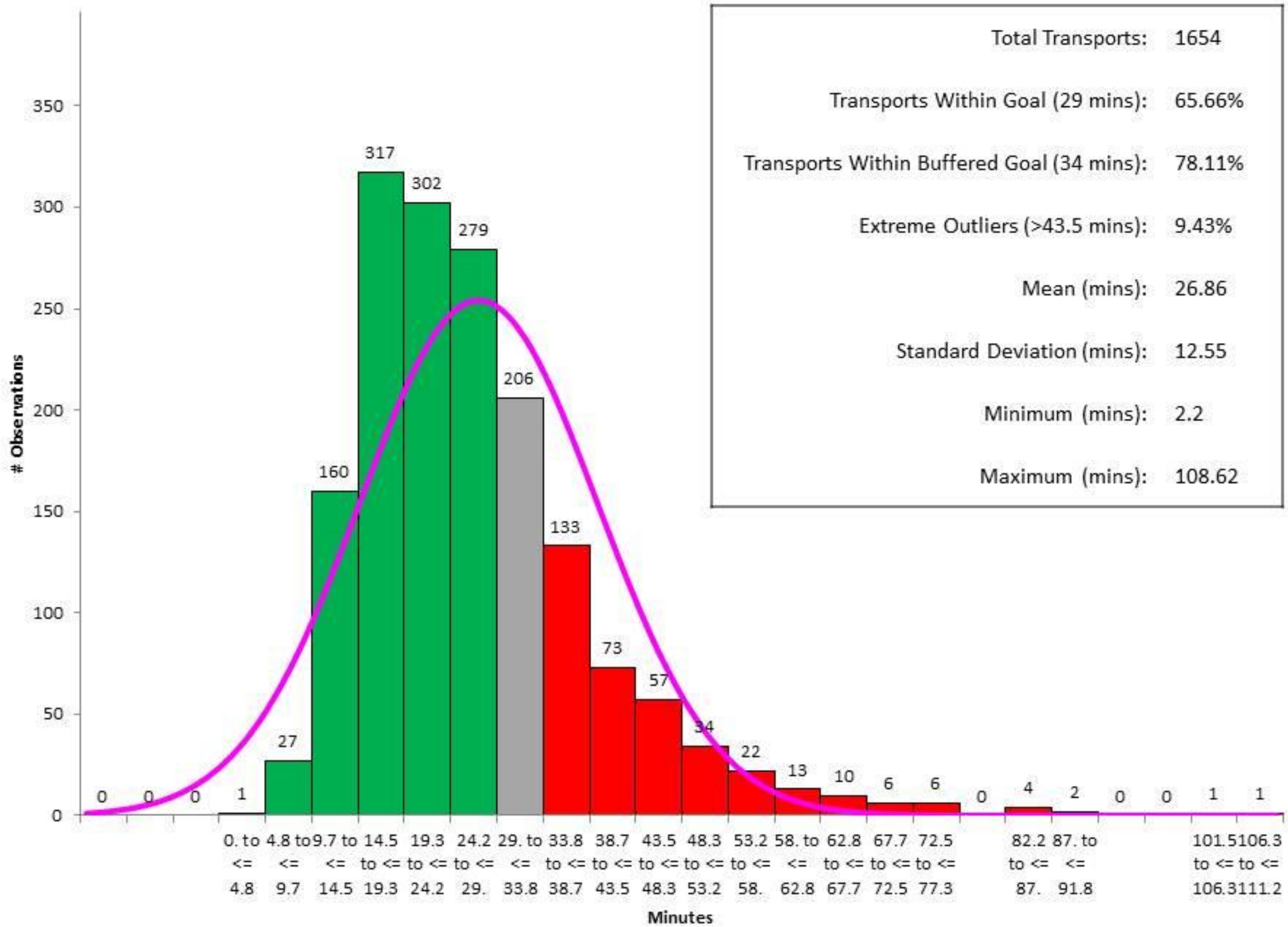


Figure 3. Total Transport Times with Radiology as the Destination, May 2014.

Green = within goal; Grey = within buffered goal; Red = outliers

After deciding in the firth month that the project would focus on trips to radiology only, data were further analyzed for other outlier trends over a baseline period of three months. The greatest number of outliers occurred during the daylight shift. However, despite fluctuations in volume, the outlier percentage rate remained relatively consistent throughout the daylight and evening shifts (Figure 4).

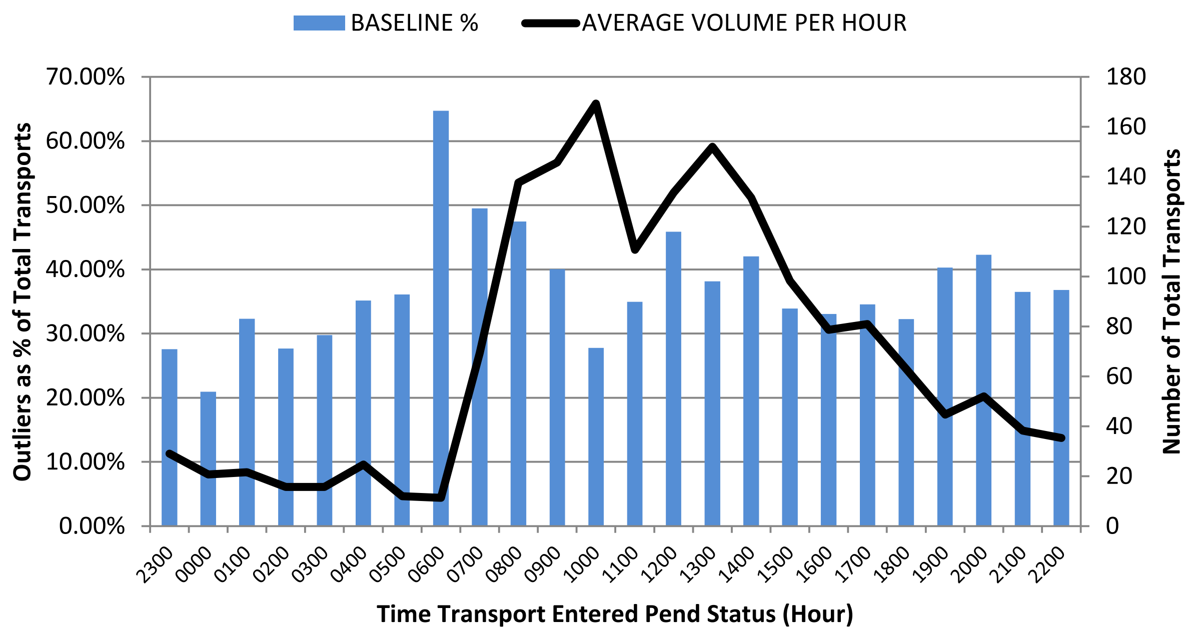


Figure 4. Outliers (transports >29 minutes) by Hour, May-July 2014. (n=5076)

Because of the unique layout of the hospital, outliers were also analyzed for trends related to origin location. Locations were categorized into originating from 5 places: Presbyterian (PUH), Montefiore (MUH), Emergency Department (ED), 7 South Tower (7ST), and various others (OTHER). 7 South Tower was previously used for two nursing units and was separated due to its physical location. The beds on these units were closed and relocated to Presbyterian Hospital two months into the baseline period; further segregation of these beds was no longer needed. Not surprisingly, the majority of outliers were trips originating from MUH (Table 2).

Table 2. Baseline Outliers Separated by Origin Location.

	MAY	JUNE	JULY	TOTAL	%
PUH	204	323	209	**736**	38.00%
MUH	234	202	373	**809**	41.77%
ED	57	56	30	**143**	7.38%
7ST	14	26	0	**40**	2.07%
OTHER	59	56	82	**197**	10.17%
TOTAL OUTLIERS	**694**	**663**	**580**	**1937**	

2.1.1 Radiology Staff Impact

Radiology technologists have the ability to enter transport requests into the software, though this was not standard practice. Success rates for transports entered by radiology staff members were calculated based on baseline data. Transports were deemed a "success" if the time fit within the pre-defined goals. During the baseline period, transport requests that were entered by radiology staff were more likely to meet time standards, when compared to other trips requested by other staff. This was consistent throughout each stage of the process. However, only 17.9% of transport requests were entered by the radiology staff during the baseline period.

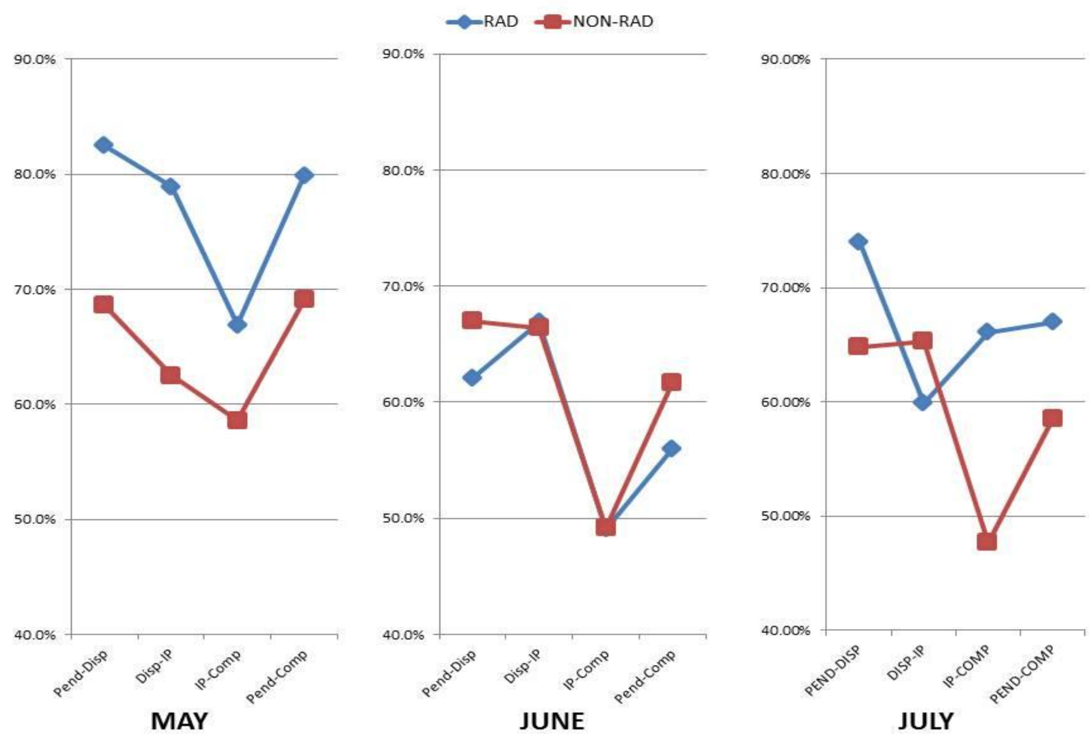


Figure 5. Comparison of "Success Rates" of Trips Entered by Radiology vs. Non-Radiology Staff.

2.1.2 Transport Staff Impact

Of note, outliers were also stratified by the transport staff member who accepted the job. However, this data was deemed unfair by the transport staff, as the list was comprised of the department's top performers. The theory is that the more productive staff members are, the more transports they will complete, therefore, there are more opportunities to be identified on the transport list.

2.2 Further Data Analysis

Data was analyzed monthly and presented for discussion at the monthly collaboration meetings. Improvements were made in the overall transport time from the baseline period through January 2015. During the baseline period, 62.1% of total transports were within goal, and by January, this number had increased to 65.8%. In an attempt to understand the volume of transports that were just outside of the goal, a buffer goal of 34 minutes (5 minutes added to the goal of 29 minutes) was also assessed. This buffer was included to highlight trips that were close to goal, in order to improve staff morale and engagement for improvement. The changes in the transports meeting the buffered goal mirrored the changes seen in the strict goal group. The number of extreme outliers, defined as trips lasting equal to or more than 43.5 minutes also decreased from 12.1% to 8.9% (Figure 6).

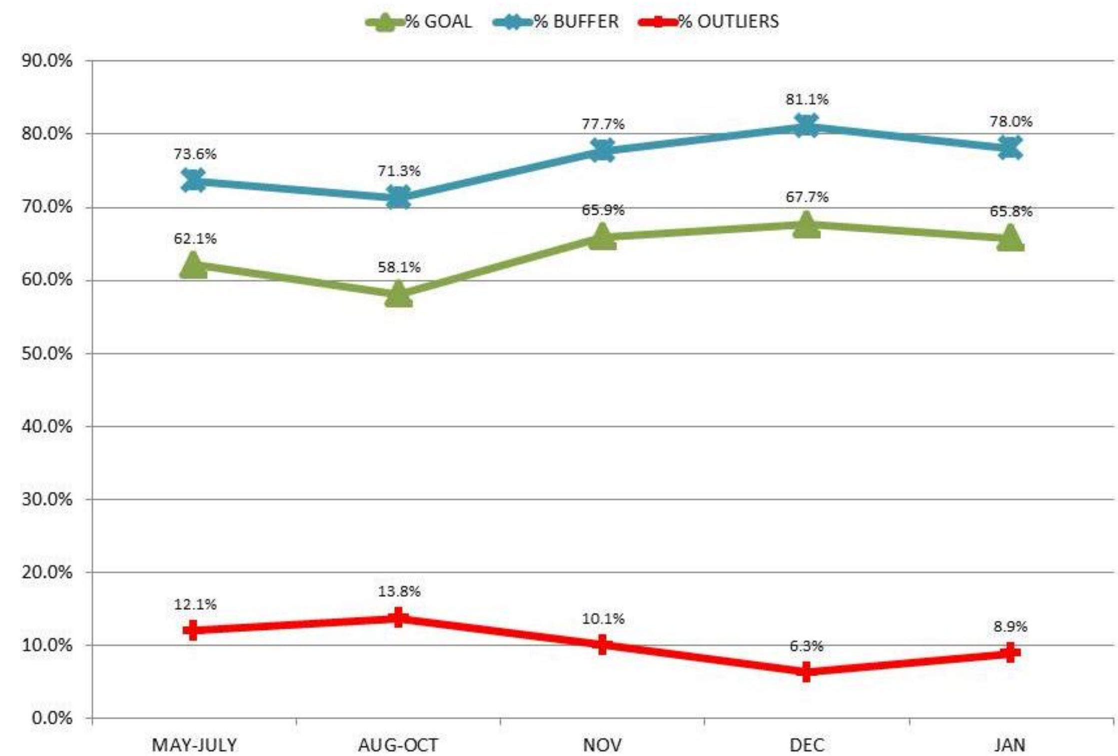


Figure 6. Trend of Total Transport Time, May 2014-January 2015.

Starting in January 2015, delays in patient transports are being more closely analyzed. Transporters have the ability to enter delay codes during their transports. The reasons for delays reported in December 2014 are shown in Table 3. The “Patient not Ready” delay code counts for the vast majority of entered codes. Although this code is used most frequently, it is a very broad explanation for delays. The patient may not be ready for a variety of reasons. It is also theorized that this code is the “go to” code for any type of delay. Further analysis is required to further narrow down reasons why the patient is not ready. Upon identification of these reasons, targeted interventions can be developed to avoid this delay, as this may be a critical way to increase efficiency. Delay codes are also able to be broken down by nursing unit. These are displayed in Figure 7. This graph indicates that the ten nursing units with the highest incidence of delays make up for nearly two-thirds of all delays. These frequencies do not correlate directly to non-compliance with the process; many of these units house critically ill patients, where their status may change quickly, a higher volume of patients, and a lower nurse-to-patient staffing ratio. All of these factors may play into reasons for a delay in transport. Further analysis is required, but these nursing units may be good pilot units for targeted interventions, as the greatest opportunity to decrease use of delay codes are associated with these areas.

Table 3. Reasons for Delay in Patient Transport, December 2014.

DELAY CODE	FREQUENCY	% OF TOTAL
Patient not Ready	426	79.5%
Monitoring Patient	45	8.4%
Dr or Nurse w/ Patient	35	6.5%
Change in Status	19	3.5%
Waiting for Ride	6	1.1%
Equipment not Available	5	0.9%
GRAND TOTAL	**536**	

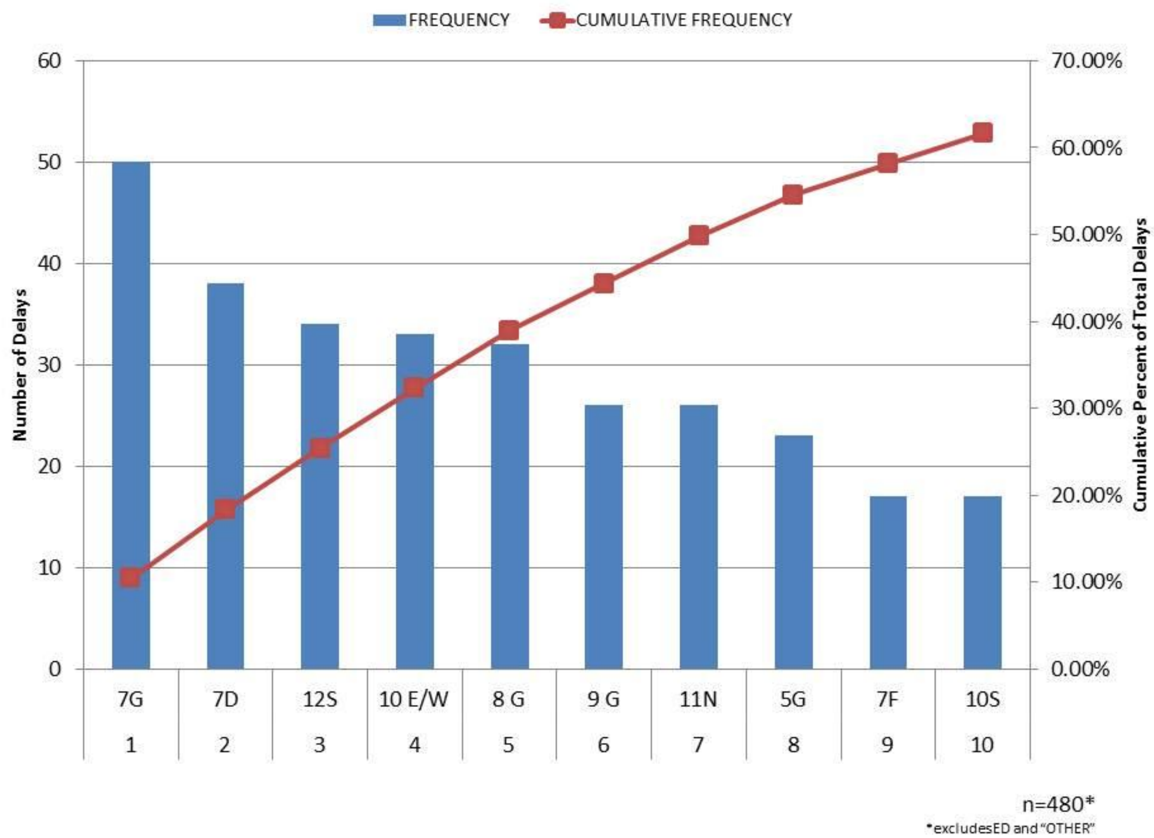


Figure 7. Delays in Patient Transport by Nursing Unit, December 2014.

3. Transport-Radiology Work Group Collaboration

During the baseline period, a transport-radiology work group was established. Attendees included directors, managers, and supervisors from both the transport and radiology departments. Monthly meetings were scheduled to review data and discuss outlier management.

During this process, several work process changes were identified. A summary of each change is listed below. Monthly data analysis continued throughout the study period.

3.1 Transport Self-Dispatching

Inefficiencies were noted upon some transitions between a transporter dropping a patient off and picking another patient up for transport. For example, a transporter may be delivering patient X to the radiology department. Upon completing this transport, patient Y has just finished their scan and is ready to be transported back to their nursing unit. Before the implementation of self-dispatching, the transport request for patient Y would need to be entered into the Teletrak® system, and there was no way to ensure the transporter already present would get assigned to patient Y's transport.

Self-dispatching allows for a radiology associate to ask the transporter to self-dispatch to another job. The radiology staff member will enter the request into the software but will immediately give the job number to the patient transporter. The transporter utilizes the numeric code to self-assign him/herself to the job. This helps reduce resources waste and ensures efficiency; the transporter closest to the job gets the assignment.

3.2 Quick-Scans

Similar to the issues identified with before self-dispatching, there are some X-ray and CT scans that are quick (less than 5 minutes). In these cases, transporters can enter a delay code into the Teletrak® software. This enables the transporter to stay with the patient until the scan is over, complete the job, and self-dispatch him/herself to the patient's return trip.

Of note, we have seen significant improvement in work flow with the development of this process change. However, it often skews the data – transports are delayed for up to five minutes before being completed, which often causes them to become outliers. Although they are objective outliers, their value is recognized in subjective reports. Continued data collection and analysis process changes are being implemented to help adjust for these "beneficial" outliers.

3.3 Radiology Staff Engagement

Upon recognizing during the baseline period that when a radiology staff member enters the request, there is a higher chance of the trip being within goal, it was a high priority of radiology leadership to engage their staff in the process. On a quarterly basis, each of six radiology modalities was given a targeted goal for staff "ownership" of transport requests. It is hypothesized that by having the radiology technologists enter the request, there will be more accurate information (i.e. where the patient is to be transported to within the department). The radiology associate is also responsible for working with the patient's nurse to find a time where the patient will be ready for transport and the radiology department will be prepared for their procedure or scan. The percentage of transports requested by radiology staff is displayed in Figure 8. Overall, there has been a significant increase in this category, which is promising for the engagement of staff in these process changes.

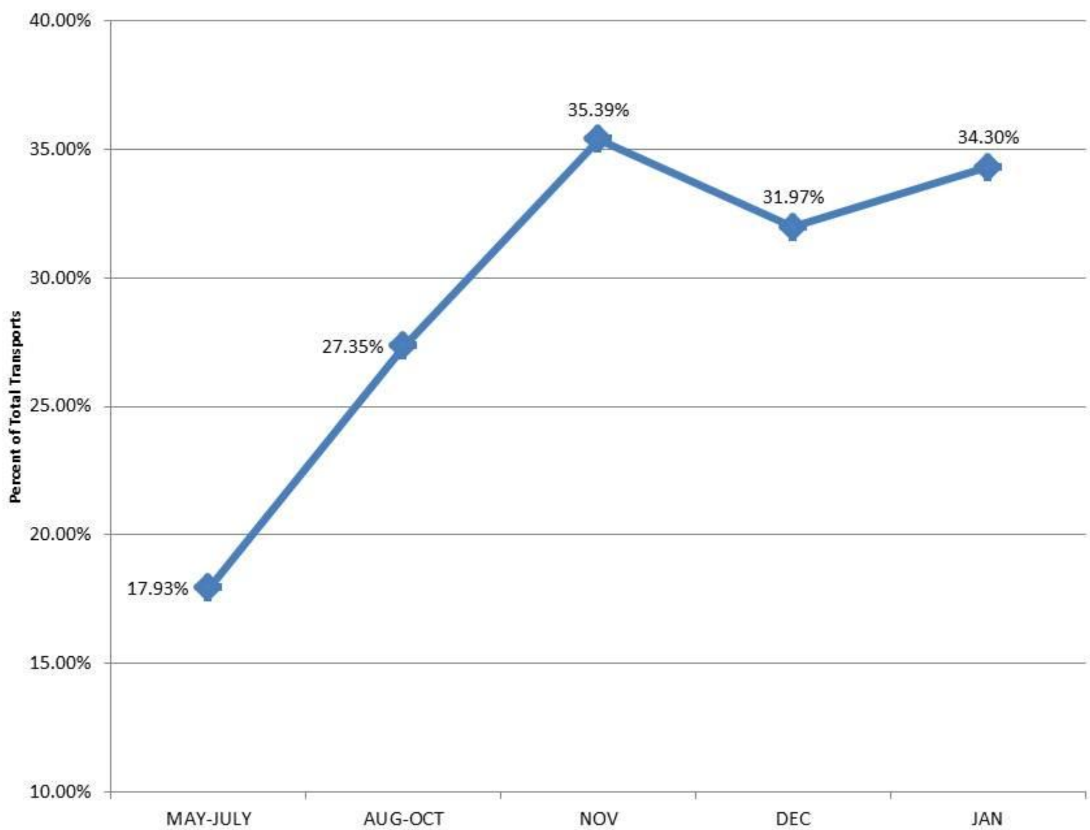


Figure 8. Percentage of Total Transports Requested by Radiology Staff

Table 4. Modality-Specific Goals for Radiology Associates Requesting Patient Transports.

	NM	CT	IR	US	MRI	XR
Goal	40%	25%	25%	15%	20%	75%

3.4 System Surge Plan

As the project continued, the collaborative group recognized a need for communication for times when the transport system was stressed. Starting in late December, the transport supervisor on-duty set out a system surge page to radiology leadership when there were more than 15 patients pending in the Teletrak® system, which targets patients waiting to be assigned a transporter. During a surge, radiology staff is expected to help transport patients and delay non-urgent scans, as able. Each modality developed their own plan to respond to surge notifications. The surge will end 30 minutes after the page is sent. If the system still falls within the defined parameters of a surge, the transport supervisor must send out a repeat page. This would continue until the surge has resolved.

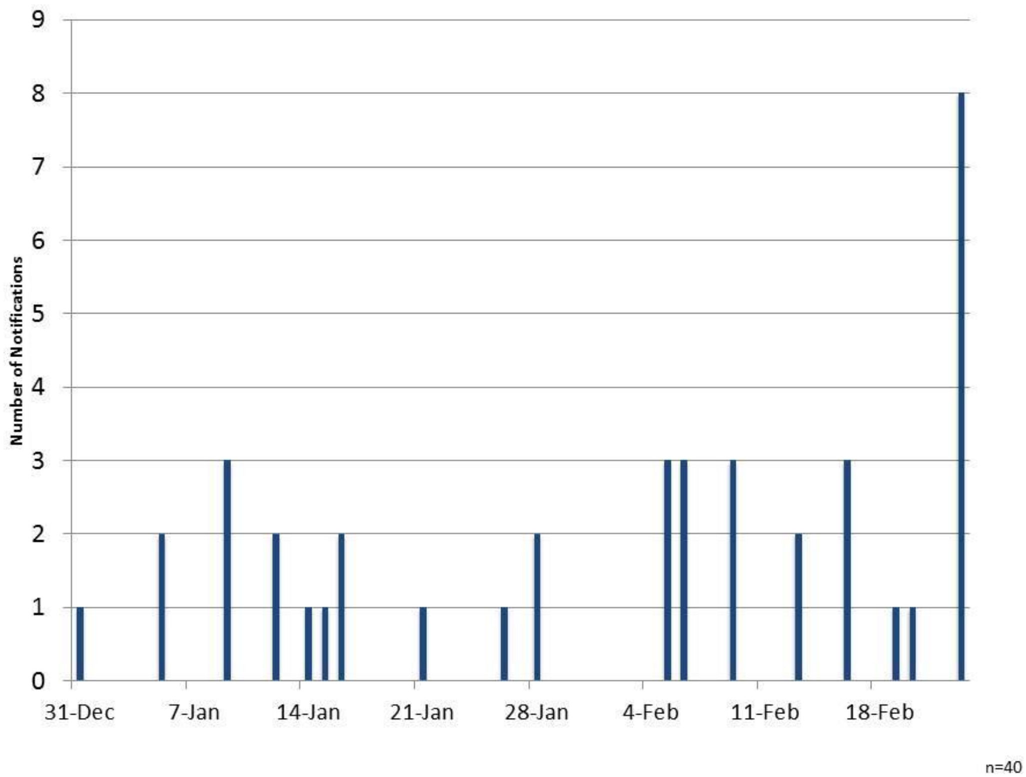


Figure 9. Number of Surge Alerts Received by Date, 12/31/14-2/23/15.

The surge plan is only utilized on weekdays from 7am-5pm for the beginning of the pilot. This ensures that radiology and transport leadership are on-site to address critical issues. From December 31, 2014 to February 23, 2015, surges were called on 18 of 39 eligible days (46.2%). The distribution across dates is shown in Figure 9. On February 23, 8 surge notifications were sent. Repeat notifications, loosely defined in data analysis as a repeat surge notification within one hour of the original page, represented 12 of 40 notifications. Of note, six of these repeated pages were on February 23. Analysis of these surge alerts can help identify areas for enhanced efficiency, as trends in surges can be utilized to assess staffing needs. For example, analysis of surge notifications by day of the week (Figure 10) showed that the majority of system surges occurred on Monday and Friday. This has triggered the patient transportation department to modify their staffing schedules to provide additional coverage on these days.

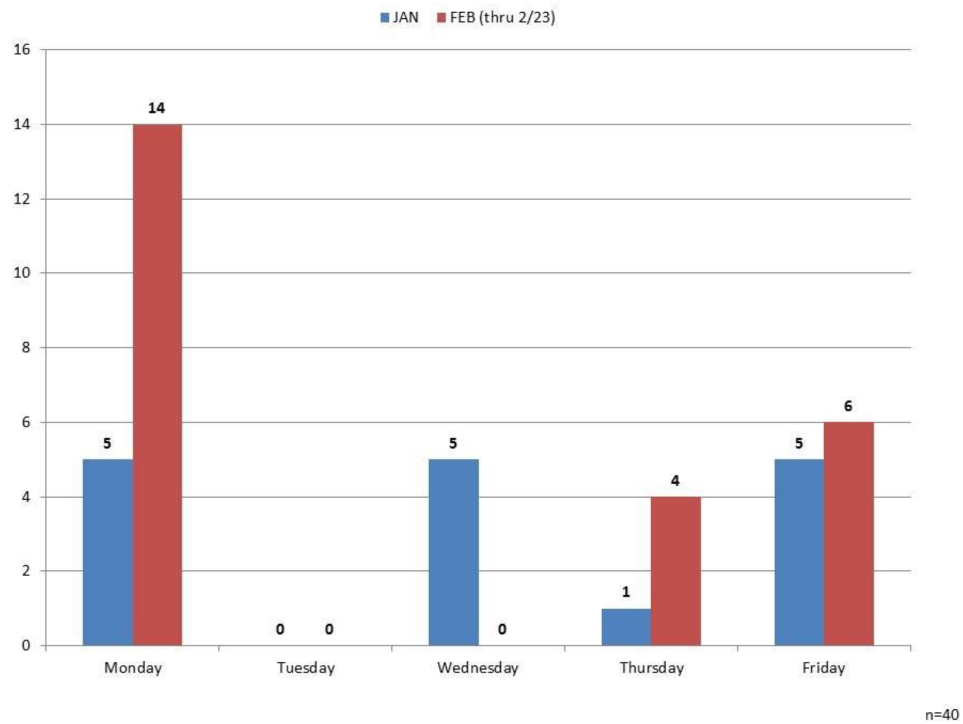


Figure 10. Number Surge Alerts Received by Day of the Week, 12/31/14-2/23/15.

To ensure that radiology staff members are appropriately responding to the alerts, snapshots of days on which a surge notification was sent were analyzed. Figure 11 represents January 5, on which two separate surges were reported. In both instances, pending radiology transports decreased from eight to three, indicating that radiology staff members implemented their modality-specific plan and assisted in the transport of patients.

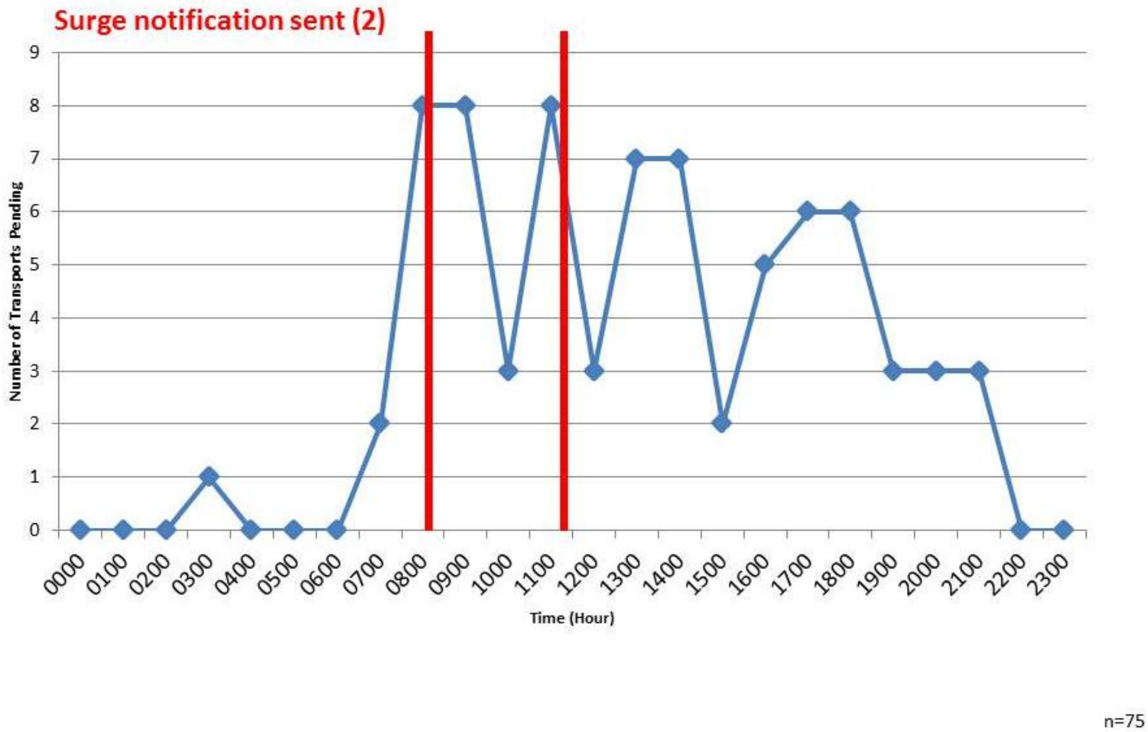


Figure 11. Impact of Surge Alerts on Transport Volume to the Radiology Department, 1/5/15.

As radiology is only one small portion of all of the transports made in one day, it is not likely to have a major impact on overall, house-wide transport data. The surge plan has now been extended to surgical services. This service line now receives the notification and implements an interdepartmental procedure until the surge ends. The long-term plan is to implement this across the hospital, so that all departments can aid in transportation until the transport system's surge is resolved.

3.5 Out-patient Kidney Ultrasound Scans

Through the collaborative work group, the ultrasound supervisor expressed concern with transportation for specific kidney ultrasounds completed on weekday mornings. These are outpatients that utilize in-patient resources for scanning purposes, and all patients go to the same area before going for imaging. Due to doctor availability, all scans must be completed between the hours of 8 and 9am. The scans are relatively quick, so the nursing unit was entering multiple transports to happen at once, which overwhelmed the system.

It was decided that a dedicated transporter would be appropriate for these scans when there were three or more patients to be scanned. This would allow one transporter to continuously deliver and return patients to and from the ultrasound department. The detailed process can be found in Appendix C.

3.6 Staff Recognition

In an attempt to familiarize departments with each other and publically recognize an individual's dedication to their work, a staff recognition program was developed. Two individuals are awarded a prize if they have perfect attendance and a dispatch to in-progress interval of <10 minutes in a quarter. In addition, department-wide stretch goals have been established. The transport department is aiming for a goal of < 5% extreme outliers for the entire transport process. The radiology department has specific goals for each modality to have radiology associates enter transport requests (Table 4). These goals were set by the radiology executive director, based on patient volume and past performance.

Table 4. Modality-Specific Goals for Radiology Associates Requesting Patient Transports.

	NM	CT	IR	US	MRI	XR
Goal	40%	25%	25%	15%	20%	75%

4. Discussion

There have been several challenges related to the successful collaboration between the two groups. Regular monthly meetings of the work group have afforded the opportunity for group discussion on outlier management. There has also been a change in culture; the departments have developed a "blame-free" approach to problem solving. Data analysis is time-consuming, but absolutely necessary to the project. It has been a challenge to determine the most meaningful data on which to focus. We are very fortunate that the Teletrak® system tracks so many different things. It has also been a challenge to present the data in a way that makes sense to the front-line staff. Finding the right balance of being true to the objective information, while making it easy-to-understand has been a fine-line to walk. To this point, objective data has only been able to be reviewed retrospectively; there are limitations to evaluating outliers in real time. This is a limitation to the software, and we are working to help recognize outliers sooner and identify root causes to address.

Organizational culture is often a barrier to changes in work process improvement. This initiative was born out of need identified by front-line staff, and the leadership team has really focused on maintaining open communication by all parties. The regular meeting of the collaborative group has fostered great relationships between the two groups. It helps each department to better understand the other's work flow, which makes it a more supportive environment in which to problem-solve.

There are also obstacles in working with nursing staff. They are used to entering transports themselves, so when a radiology staff member enters a transport, the nurses often cancel and re-enter the transport. To help avert this issue, radiology associates have been asked to speak directly to the bedside nurse before entering a transport request. This will help ensure the patient is ready for transport when the transporter arrives.

Despite our deep collaboration, there are some things that just cannot be done. At this time, the nursing department is an uninvolved party that participates in the transport process regularly. As we continue to have success improving transports within goal to the radiology department, we hope to share these examples to engage nursing staff. This will be a much larger initiative and may need to happen on a unit-by-unit basis over a period of time. In the case of the outpatient kidney scans, the ultrasound department wanted a dedicated transporter every day. This would cause larger problems extending beyond the radiology department, as it would remove one transporter from the system to focus on a smaller number of patients, whether or not it was extremely necessary. Instead, we met with the transport group and had a realistic conversation about what is possible and what is not. For example, the trigger of more than three patients scheduled for scans was negotiated between front-line staff.

5. Conclusion and Future Considerations

A great focus of future data analysis will be on reasons for delay in transport. Transporters have been educated to enter a delay code as soon as they get to the unit and the patient is not ready. Historically, they have waited 5-10 minutes before entering a delay code, which makes it difficult to analyze the data. By entering a delay code and leaving after five minutes if the patient is not ready, the delay code data will be more accurate, allowing for meaningful changes to be made in work flow.

The group is also working on a manual for transports to the radiology department. This would include all of the interventions that have been made. This will help train new staff members and hold all staff members accountable for following the guidelines set forth by the collaborative work group.

As we develop a sustainable process, we hope to expand this to other units in the hospital. This will make a larger impact on the work of the transport group. The manual will be a key piece in expanding the initiatives. As mentioned previously, the nursing employees are a much larger group than the radiology staff, and it will be much harder to disseminate the new guidelines. One approach that is being considered is targeting specific pilot units that have a greater opportunity for improvement in transportation times. The collaborative work group has engaged senior nursing leadership, which is a significant first step to getting the nursing staff members involved in these process improvements.

Finally, transitioning another individual to analyze data will be an obstacle. Previous data analysis has been done by the administrative resident (A. Korenoski), who will be finishing her residency in June 2015. The plan is to identify a staff member who is eager to help and relatively capable of utilizing the software. Multiple sessions will be needed to transition the work flow to a new employee.

The collaboration of two departments has been very successful in identifying new interventions to improve efficiency with patient transportation. Data analysis has been crucial to monitor both opportunities to change and the impact of our interventions, and it will be critical that the data is continued to be monitored in real-time.

Appendix A.

Summary of Interventions

Table 5. Timeline/Summary of Interventions, May 2014-March 2015

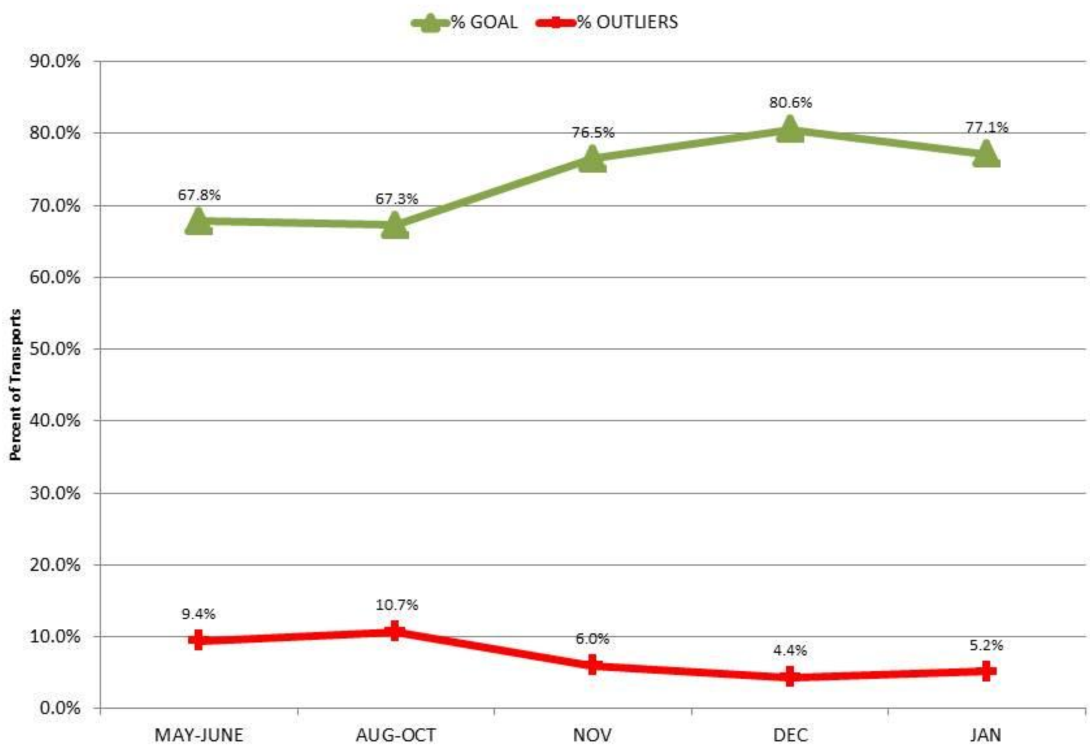
IMPLEMENTATION DATE	INTERVENTION	DESCRIPTION
April 2014	Quick Scans	• X-ray and CT scans that are less than 5 minutes in duration are designated as quick scans. • Transporters will remain in the radiology department until the patient is ready to return to the nursing unit.
June 2014	Data Analysis	• Detailed and thorough data analysis is completed and presented to the collaborative work group monthly.
June 2014	Transport Self-Dispatching	• Transporters are able to dispatch themselves if a patient is ready to leave the radiology department and the transporter has just completed a patient transport to one of the radiology departments nearby.
June 2014	Radiology Staff Engagement	• Radiology staff members are to enter all transport requests to ensure there is proper communication between the bedside nurse and radiology associate.
August 2014	Outpatient Kidney Ultrasounds	• If more than three outpatients are scheduled for specific scans the dedicated transporter process is triggered. • One transporter will be responsible for taking all patients to/from the radiology department.
September 2014	Staff Recognition	• Two transport staff members are recognized quarterly for their attendance and performance in transports to the radiology department.
December 2014	System Surge Plan	• When there are more than 15 pending transports in the queue, a surge notification is sent out. • Radiology associates are asked to help transport patients and/or delay non-urgent scans.

Appendix B.

Trends in Patient Transport by Phase of Transport Process

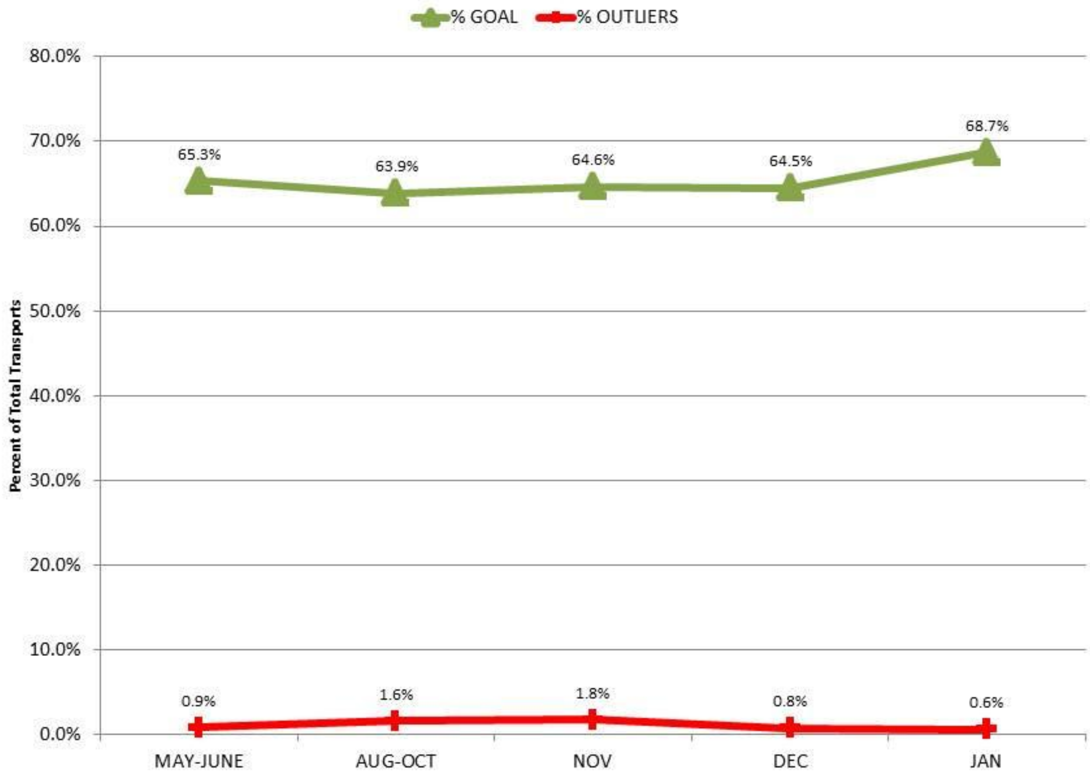
Table 6. Phases of Patient Transport.

PHASE	DESCRIPTION
Pending	Request for transport entered
Dispatched	Job assigned to transporter
In-Progress	Transporter has picked up patient and is on the way to the destination
Complete	Patient has arrived at the final destination



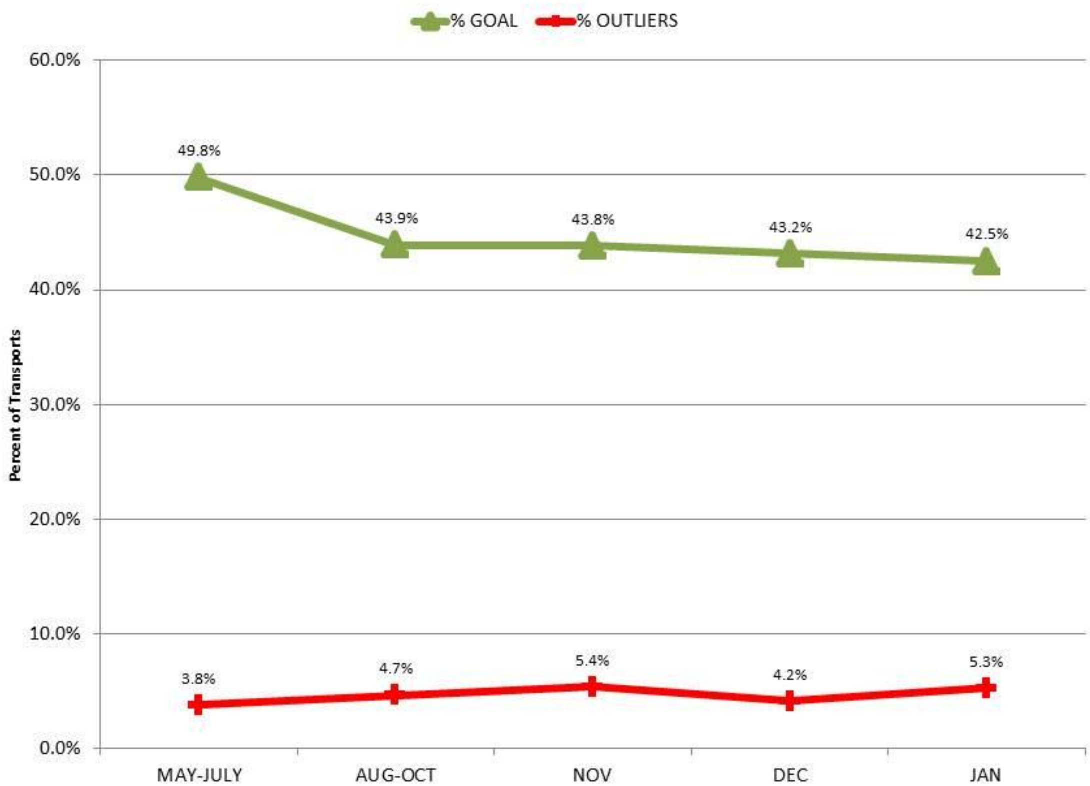
Note: Goal <10 minutes; Extreme Outliers >25 minutes

Figure 12. Trend of Transports from Pending to Dispatch Phases, May 2014-January 2015.



Note: Goal <10 minutes; Extreme Outliers >25 minutes

Figure 13. Trend of Transports from Dispatch to In-Progress Phases, May 2014-January 2015.



Note: Goal ≤9 minutes; Extreme Outliers ≥22.5 minutes

Figure 16. Trend of Transports from In-Progress to Complete Phases, May 2014-January 2015.

Appendix C.

Kidney Ultrasound Scans – Dedicated Transporter Process

Radiology/Transport Collaboration
7 West Ultrasound CRT Transports

Problem: Transport system stressed when all patients requiring CRT US are requested to be transported at the same time.

Goal: Ensure that all patients arrive in a timely fashion while utilizing transport resources most efficiently.

Go-live date: Monday, August 11, 2014

Process:

- At least 15 minutes before the first patient is scheduled for the scan, the US technologist is to determine the number of patients on the schedule.
    - If there are <u>0-2 patients</u>: Radiology staff will enter transport requests into the Teletrak system, staggered 10 minutes apart.
    - If there are <u>3 or more patients</u>: Radiology staff will follow **dedicated transporter process (see below).**

- Dedicated transporter process
    - Radiology staff to contact 7 West **charge nurse** to check both number and status of CRT patients and how this may impact transports.
    - Radiology staff to page PUH Transport Supervisor Pager (pager number 6227).
        - Message should state "DEDICATED TRANSPORTER REQUIRED FOR 7 WEST AT [INSERT TIME TRANSPORTER SHOULD ARRIVE ON UNIT]"
        - Include return call information.
    - Transport supervisor will call radiology staff to confirm a dedicated transporter will be deployed.
    - Dedicated transporter will report to 7 West and coordinate the sequence of patients to be transported.
    - Transporter will bring first patient to MUH US.
    - Continuous patient transport will occur until tests completed.
    - Dedicated transporter process <u>should not</u> last longer than 1 hour.

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