PATIENT FLOW ANALYSIS AT MAGEE-WOMENS HOSPITAL OF UPMC

by

James Cable

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This essay is submitted

by

James Cable

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and approved by

Essay Advisor:
Barry T. Ross, MBA, MS, BS _____
Adjunct Faculty
Department Health Policy & Management
Graduate School of Public Health
University of Pittsburgh

Essay Reader:
Bryan A. Norman, PhD, MS, BS _____
Associate Professor
Department of Industrial Engineering
Swanson School of Engineering
University of Pittsburgh

Barry Ross, MBA, MS, BS

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ABSTRACT

As the number of hospital visits increases, patients across the U.S. are experiencing longer wait times before being transferred to an inpatient unit. Hold hours in emergency rooms (ED) and post-operative care units (PACU) are defined as the period of time where patients are prepared to be transferred but cannot because the receiving unit is at capacity. Magee-Womens Hospital of UPMC has seen an increase in hold hours in both their PACU and ED because inpatient units are usually at 95% of capacity. Total hold hours over a two-week period typically range from 70 to 130 hours, with the all-time high reaching 250 hours.

Accrediting agencies, such as the Joint Commission and the Institute of Medicine have identified hold hours as a public health problem, because hold hours lead to poorer patient outcomes as well as lower patient satisfaction scores. After consideration, Magee executives and staff identified ineffective discharge processes, with patient transportation being a primary factor, as the cause of the bottlenecks being created in both the PACU and ED. This report analyzes ways to increase transport efficiencies so that wait times that patients are currently experiencing once they have been cleared for discharge can be reduced.

Observations and data were collected to review the discharge process and understand where problems may be occurring. The use of patient transport communication system

(Teletracking) reports were used to analyze the discharge process and proved vital in determining where processes were broken. Data logged by transporters into Teletracking was used to create a Pareto chart that shows categories of delays that include delays broken down into nursing, patient, equipment, physician and paperwork as well as miscellaneous delays.

Results of the study indicate that an inefficient discharge process is causing the hold hours. Recommendations are made based on the problems noted in the analysis with an emphasis on increasing efficiency in the transport department to make the discharge process more efficient. These recommendations include increased communication between departments, implementation of a discharge unit, so patients have a place to wait after they have been discharged, and an inventory analysis to reduce time spent looking for equipment.

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PREFACE

The author would like to thank Barry T. Ross, Dr. Bryan A. Norman and Dr. Wesley M. Rohrer for editing and reviewing this paper and providing feedback. The author would also like to thank Paul Caliari for his assistance in arranging observation times with EVS and transport and verifying Teletracking reports that were used in this paper.

1.0 INTRODUCTION

1.1 MAGEE-WOMENS HOSPITAL OF UPMC

Magee-Womens Hospital of UPMC is one of over twenty hospitals in the University of Pittsburgh Medical Center (UPMC) hospital system. U.S. News & World Report ranks Magee as the twelfth best hospital in the country for gynecological care and is also a high performer in orthopedics and cancer care. Originally built as a women's hospital in the early twentieth century, it has since expanded services beyond women's and infant health. Being part of a world-renowned health system and being a reputable hospital itself, patients from all over the region come to Magee to be seen by some of the best physicians in the area. Magee is almost always close to capacity often resulting in a bed shortage both for obstetric services and surgery.

Magee currently has sixteen operating rooms (ORs) assigned to general surgery, orthopedics, gynecological oncology as well as outpatient procedures. Surgical patients will either be discharged that day or will be assigned an inpatient bed in a medical-surgical unit, the orthopedic unit, or the oncology unit. These ORs are generally not used for obstetric surgeries because Magee has five ORs for Obstetric surgeries. These Obstetric surgeries could include any surgery related to childbirth; the most common surgery performed in these rooms are C-sections. Hold hours, when the OR becomes backed up from patients waiting to be transferred to the inpatient units, were identified as a problem during the summer of 2016. The charge nurse

calculates hold hours manually. The hold clock begins once a patient is eligible for transfer to an inpatient unit but cannot be transferred because there are no inpatient beds available. The time stops when the patient has been transferred to the inpatient floor. Over the past year, these hold hours have resulted in misused resources and dissatisfied patients and staff.

Excessive hold times not only lead to bottlenecks, but they also impact full time equivalents (FTEs) in the PACU and ED. When hold hours occur and patients have to wait to be admitted as an inpatient, the nursing staff in the ED and PACU take on dual responsibilities. Not only must they treat their patients, but they must also treat patients that should be on an inpatient floor, which can sometimes lead to an increased workload for nursing staff in the ED and PACU. These hold hours can range up to 250 hours over a two-week period for the PACU, but the average ranges from 70 hours to 130 hours per two-week period.

The objective of this essay is to investigate why hold hours are occurring. The importance of identifying hold hours in both the PACU and the ED is important, because a majority of the patients that are transferred from these locations are assigned beds on the same inpatient units. After investigating different causes, patient transport's role in the discharge process was determined to be a primary cause of the hold hours and was chosen to be analyzed further. Transporters perform any type of transport job, so if they are being used inefficiently it can lead to patients waiting for transport to arrive to be escorted out of the building when a discharge occurs. This report discusses the negative outcomes hold hours have on patients and staff, inputs that contribute to the discharge process, data and tools used in this project, and results and recommendations to potentially alleviate the hold hours, which could increase patient and staff satisfaction and reduce misused staff in the PACU and ED.

1.2 LITERATURE REVIEW

Accrediting agencies such as the Joint Commission are placing more and more emphasis on reducing hold hours as it becomes an increasing problem. The Institute of Medicine identified hold hours as a public health problem in 2006. Increased hold hours in hospitals could be a result from increased utilization of hospitals. A study conducted by Forster et al. showed that once a hospital exceeded a threshold of 90% capacity, ED length of stay increased significantly for patients being admitted from the ED. Waiting in the ED is a widespread problem, with hospitals across the country attempting to reduce inefficient time spent in the ED. One study found that patients spend 15% of their time in the ED waiting for an inpatient room to become available (Hollander and Pines, 2007).

Numerous risks have been associated with hold times in hospitals which can range from increased wait times, length of stay, or medical errors. All these problems factor into an increase in mortality risk for patients that are being held in the PACU or ED (Calloway, 2012). As patients are held in an ED, their chances for mortality increases as time increases. After two hours of being held in the ED, there is a 2.5% increase in mortality and after a patient is held over 12 hours, mortality increases to 4.5%. (Singer et al., 2011). Hold hours are also associated with additional length of inpatient stay compared to patients that do not experience hold hours. Patients that were held in the ED for two hours or less had a mean length of stay of 5.6 days versus 8.7 days for patients who were held in the ED for over 24 hours. (Singer et al., 2011).

Holding patients in the ED and PACU is also associated with negative Press-Ganey surveys. These wait times can negatively impact patients perception of their care. A study found that holding patients in the ED was associated with those patients being less likely to recommend the hospital in the surveys (Pines et al., 2008). This information could be critical for a hospital's

success, since people review these surveys and by word of mouth determine what hospital the patient choses to go to when they need ED services.

1.3 DISCHARGE PROCESS

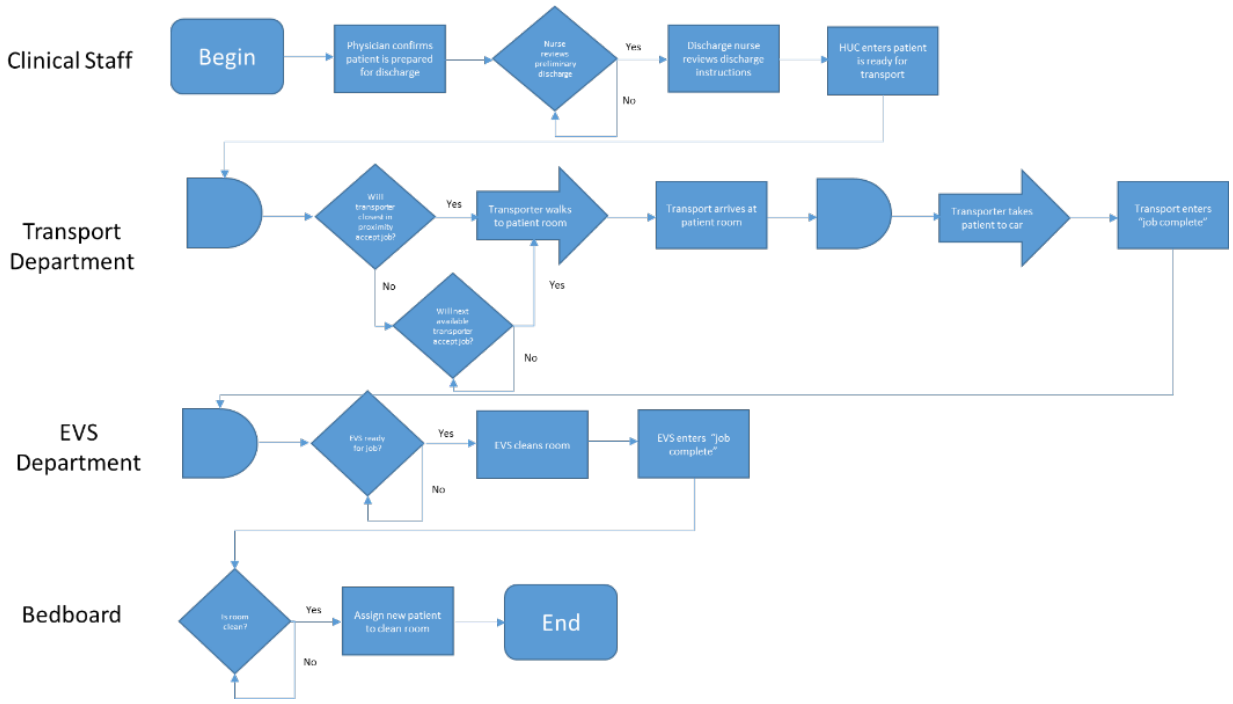

Figure 1. Flow Chart of the Discharge Process

As discussed earlier, hold hours are believed to be a symptom of an inefficient discharge process. The discharge process has been mapped and Figure 1 represents the process as a flow diagram. There are four portions in the med-surg discharge process. The clinical piece of the process is initiated when the physician reviews the patient's medical record and determines that the patient has met all requirements to be discharged from the hospital. The physician then passes the medical record to the Health Unit Coordinator (HUC). The information is input into Teletracking to indicate that the patient is confirmed as a pending discharge patient and is then entered under

“physician depart order”. From that point, a nurse, specifically dedicated to reviewing discharge instructions visits the patient and reviews post-discharge instructions and answers any questions the patient may have. Once this is completed, the patient is officially ready for discharge.

Following proper discharge preparation, the patient is entered into the system as having completed discharge preparation. The HUC then enters that the patient is ready for transport to arrive. At this point, a timestamp is automatically entered into Teletracking and the clock begins for tracking transport's response time. Transport’s target times to complete the “pending” to “job complete” patient transportation process have been computed to be: 15 minutes or less 60% of the time, 16-25 minutes 30% of the time, 26-45 minutes 10% of the time and to have no response to complete time over 45 minutes.

The next phase of the process is when the job has been placed into Teletracking and it is put into the cue of current jobs to be completed by a transporter. Once the job has been assigned to the closest available transporter by Teletracking, the transporter will either accept or reject the job on his/her cell phone. Transporters are only allowed to reject a job if they are going to lunch, or are fifteen minutes from the end of their shift. Transporters are only permitted to reject so many jobs in a one week period, if rejected jobs hit a threshold of more than two rejects a day, the system flags the director for review. At the discretion of the director, transporters may have more than two rejects a day if there are issues with the phones that the transporter uses to accept the jobs. However, rejected jobs are tracked and if a pattern of additional rejections occurs, the director will hold the transporter accountable. If the transporter closest in proximity to the next transport job rejects it, the job is assigned to the next available transporter to accept or reject.

The status changes in Teletracking from “pending” to “dispatched” at this point. A timestamp is also recorded from when a transporter is assigned the job to when the transporter

manually enters that they have arrived at the patient's room. Once the ticket to ride, which has patient-specific identifiers on it to ensure transport is grabbing the correct patient, is reviewed and proper patient checks are made to ensure the transporter has the right patient, the transporter indicates "job in progress." The patient is taken to either the main lobby or the garage to be picked up depending on where is most convenient for the patient. After the patient has been helped into the car, the transporter marks "job completed" in Teletracking and the job number is uploaded to the Teletracking's Standard Report feature in order to track transport statistics.

Teletracking is able to identify when a patient is marked as "job in progress" and notes that the patient is no longer in the room. At this point Teletracking automatically marks the patient's room as a dirty room and the environmental services (EVS) job automatically is placed in the cue for rooms to be cleaned. Each EVS employee carries a cell phone that alerts him/her when a room is ready to be cleaned. Once notified, the EVS room discharge cleaner calls the Teletracking number and indicates that he/she is accepting the job and the room is currently being cleaned. Unlike transport, EVS is not able to reject jobs and any rejection is automatically sent to the director for review. EVS response time benchmarks are similar to transport response time benchmarks which are based on percentages.

EVS holds itself to very high standards when it comes to thoroughly cleaning in between a patient leaving and a new patient arriving in the room. Each EVS employee is expected to spend 45 minutes cleaning a contact precaution patient's room and 30 minutes for a non-isolated patient. In this amount of time, EVS cleaning expectations are to wipe down all surfaces, change the sheets and wipe down the bed, clean the patient's bathroom and finally remove all garbage from the patient's room. Once the job is completed, the Teletracking number is called again to indicate that the room is clean. After the number is called, it is automatically uploaded to the

electronic bedboard, a program that Magee uses to track clean and dirty inpatient rooms. The final steps to a room being prepared for a new patient is done in the electronic bedboard.

As soon as the room has been entered as clean, a Patient Placement Coordinator assigns a new patient to that room. This coordinator is responsible for all coordination and assignment of patients that are entering from other facilities, the emergency room, the operating room or any other route a patient that would need an inpatient stay would enter into the system. The coordinator is also responsible for deciding what rooms need to be cleaned next by EVS. The Patient Placement Coordinator does this by establishing a room cleaning priority to accommodate patients who have waited the longest, by making an entry into Teletracking.

1.4 TELETRACKING

The patient management application, which UPMC utilizes for their patient discharge tracking is Teletracking. This application offers a variety of services that health systems can use. Relative to this project, the primary component of Teletracking that UPMC uses is the Capacity Management Suite, which consists of the PatientTracking Portal™, PreAdmitTracking® with the electronic Bedboard®, TransportTracking™ and BedTracking as well as Mobile Solutions. These applications are all used for the discharge process and allow all departments involved (EVS, transport and clinical staff) to view the status of each bed within the hospital within one system.

The most useful tool for clinical and support staff is the PatientTracking Portal application. The primary function of the PatientTracking Portal is to give a general overview of

the patients in each room of the hospital, including patient information as well as various aspects of care that the patient is receiving. The most relevant information to this project includes the room number in which the patient is located; the status of the room which is categorized as clean, dirty, clean next, or clean stat; and a patient's hospital status which is categorized as inhouse patient, pending discharge, confirmed discharge or additional pre-admit categories. The milestone column is used following a confirmed discharge. Milestones show where in the discharge process a patient currently is. Once a confirmed discharge is put in Teletracking, it is automatically entered as a Physician Depart Order. The next step is Patient Disposition, Discharge Prep and finally when transportation has been dispatched.

Additional applications that UPMC uses are Bedtracking, which gives a high level overview of beds and their status cleaning status in terms of which are dirty, cleaning in progress, and to be cleaned. It also shows how many beds are currently occupied and also how many beds are intentionally blocked, usually for pre-assigned patients. The transport tracking function shows a high level overview of current transport jobs, so departments can view how many jobs are currently in the queue. Not only does it show pending jobs, but dispatched jobs, delays, in progress transports, jobs that need assistance, completed jobs and canceled jobs. Finally, UPMC is able to analyze all the times of all of the previous information mentioned under Standard Reports. This allows them to review their performance and also to benchmark their procedures between hospitals within UPMC.

2.0 DESIGN, METHODOLOGY AND DATA

Observations were a key source of information for this project. While reviewing reports and analyzing data are important portions of any project, following the flow of work by the people involved in the project can be valuable to the resolution of the problem. A sample of recorded data while shadowing transport is available in Figure 2.

DATE	CALL RECEIVED	ARRIVE AT PT ROOM TIME	ORIGIN	DESTINATION	TRANSPORT TYPE	PATIENT READY	DELAY TYPE	DELAY END	TOTAL WAIT TIME	FINISH TIME
1/18/2017	1356	1400	ULTRASOUND	ED	PATIENT	YES	N/A	N/A	0	1408
1/18/2017	1410	1416	5800	RAD ONC	PATIENT	NO	PROVIDER DELAY	1433	17	1438
1/18/2017	1439	1446	3231	ULTRASOUND	PATIENT	NO	PROVIDER DELAY	1451	5	1454
1/18/2017	1456	1502	ED	X-RAY	PATIENT	YES	N/A	N/A	0	1510
1/19/2017	1254	N/A	GARAGE	5800	EQUIPMENT	N/A	N/A	N/A	0	1300
1/19/2017	1300	1305	5307	HEART CENTER	PATIENT	NO	PROVIDER DELAY	1319	14	1323
1/19/2017	1323	1329	WCBC	3800	PAPERWORK		PROVIDER DELAY	1335	6	1338
1/19/2017	1339	1343	5849	LOBBY	PATIENT	N/A	PATIENT DELAY	1349	6	1353
1/19/2017	1356	1404	5840	RAD ONC	PATIENT	YES	N/A	N/A	0	1411
1/19/2017	1412	N/A	3191	LOBBY	PATIENT	N/A	N/A	N/A	0	CANCELED
1/19/2017	1414	1419	3816	LOBBY	PATIENT	NO	PATIENT DELAY	1427	8	1439
									42	

Figure 2. Transport Observation Data

Results of the observations were used to validate the recorded data in Teletracking as to what types of delays were occurring most often and to identify any non-value added time. Observations included following transport and EVS personnel and sitting at the nursing station to follow the complete process from patients being entered into Teletracking for discharge, to transport removing the patient from their room, to EVS arriving and cleaning the room, to the room being assigned to the next patient. Transport observations were conducted on 1/18/17 and 1/19/17, EVS observations were conducted on 1/25/17 and 1/26/17, and shadowing on the

nursing floors occurred on 2/8/17, 2/16/17. In addition, the validity of Teletracking standard reports have been questioned by executives at Magee. Therefore, real time data from shadowing transport was used to compare to Teletracking reports in order to validate data. Reports and real time data were compared and validated by the director of transport and EVS.

During observations with transport, it was determined that an inventory analysis needed to be conducted in order to evaluate current equipment inventory to determine if there was an adequate amount of equipment. The stretcher inventory was provided by the director of transport. Magee's transport department only had one at the time of inventory. When more than one stretcher is needed at a time, other departments in the hospital will allow transport to use their stretcher to transport the patient. In general, patients will either stay in their bed to be transported, or they will take a wheelchair. From 1/1/17 to 2/28/17 a request for a transporter to bring a stretcher was zero.

The wheelchair analysis was a much more complex inventory analysis. From the investigation, neither facilities nor the transport department keeps a spreadsheet of the wheelchairs that need to be repaired, disposed of or are currently in circulation in the hospital. In order to get as accurate a number as possible, Sunday at four o'clock pm was selected as the best time to do an equipment inventory because most discharges do not occur on Sundays and not many transports are requested at this time. The analysis began on the zero floor level and entailed checking all departments and manually counting each wheelchair. Following the zero level, the process was repeated on levels one, two, three, four and finally ended on floor five, with a final count of 83 wheelchairs. Teletracking Standard Reports are reports that, through the efforts of the Capacity Management Team and Teletracking, are available to each hospital to utilize. Reports that were used all involved the discharge process. For example, the Transporter

Delays report was used to analyze the types and frequency of delays that transporters would enter when there was a delay with transporting the patient.

Transport and EVS Response Times are calculated weekly by EVS and transport supervisors to determine the response times and the amount of time that each employee takes on average per job. This is evaluated by the director of transport and EVS to quantify staff performance. This report was also used to analyze the likelihood of delays that contributed to EVS and transport not meeting their targets.

3.0 FINDINGS AND RESULTS

3.1 TRANSPORT DELAYS

As mentioned earlier, the Transport Delays report accessed from the Teletracking Standard Reports was used as a reference to show how many delays are occurring and for what reason. These reasons were classified by category and a Pareto analysis was conducted to determine the largest contributor to delays encountered by transport. In Figure 3 below, from left to right, the red bars in Figure 3 indicate the hours associated with that delay and the blue line indicates the cumulative percentage associated with delays. The data represent delays from 1/1/17 to 2/28/17. Overall, there were a total of 261 hours of delay for both months.

The graph indicates the highest amount of delays was related to the nursing staff as can be seen by the blue line which shows roughly 20% of all delays are associated with nursing. Delays that are associated with nursing could involve the nurse administering medication, or any other duties that the nurse has to perform in order to have the patient prepared for transport.

Any patient delay is entered when the patient is not ready to leave for a test or is ready to be discharged. Common reasons for this could be that they need to use the restroom, need medication before he/she leaves, or is still eating their lunch. All were noted through observations based on following transport.

Equipment delay is any delay involving the lack of equipment. The most common equipment delay is when a transporter is looking for a wheelchair and is traveling to multiple floors before one is found. Also, this delay can also include getting IV poles or oxygen tanks for patients that need oxygen during their transport.

Discharge waiting for car/ride refers to a patient still in a room even though he/she has met criteria to be discharged, however, the patient's ride has not arrived yet. Round trip delays must be included because they cause the transporter to wait for the patient test to be finished before returning the patient to his/her room. This is only done for testing that can be done quickly and is used to prevent another transport job being entered and making the patient wait to be transported back to their room.

The next is the ticket to ride/paperwork delay. This delay was created, because UPMC uses transport documentation called a ticket to ride that must accompany the patient while transport is escorting them to the patient's destination. UPMC implemented the ticket to ride to reduce common errors and has a checklist that must be completed before the patient can be transported. In some instances, nurses do not have the correct ticket to ride paperwork completed.

The doctor related delays are anything related to delays associated with physicians. Physician related delays are not common among the total transport delays, but if there is a physician related delay it is usually because the physician is consulting with the patient. Finally, the no reason code provided delay is a miscellaneous delay that does not fall under any other category. Analysis of no reason code is not required, because of its small contribution to the delays.

As mentioned earlier, the Transport Delays report accessed from the Teletracking Standard Reports was used as a reference to show how many delays are occurring and for what reason. These reasons were separated out by category and a Pareto analysis was conducted to determine largest contributor to delays encountered by transport. Going from left to right, the red bars indicate the hours associated to that delay, while the blue line indicates the cumulative percentage associated with delays. The data represents delays from 1/1/17 to 2/28/17 at Magee. Overall, there were a total of 261 hours of delay for both months.

The graph indicates the highest amount of delays was related to the nursing staff as can be seen by the blue line which shows roughly 20% of all delays are associated with nursing. Delays that are associated with nursing could involve the nurse administering medication, or any other duties that the nurse has to perform in order to have the patient prepared for transport. In order to get a more in-depth view of what a nursing delays consisted of, the transport department recorded specifically what nursing delay they encountered. This was conducted by all transporters from 4/10/17 to 4/14/17.

Any patient delay is entered when the patient is not ready to leave for a test or is ready to be discharged. Common reasons for this could be that they need to use the restroom, need medication before he/she leaves, or is still eating their lunch.

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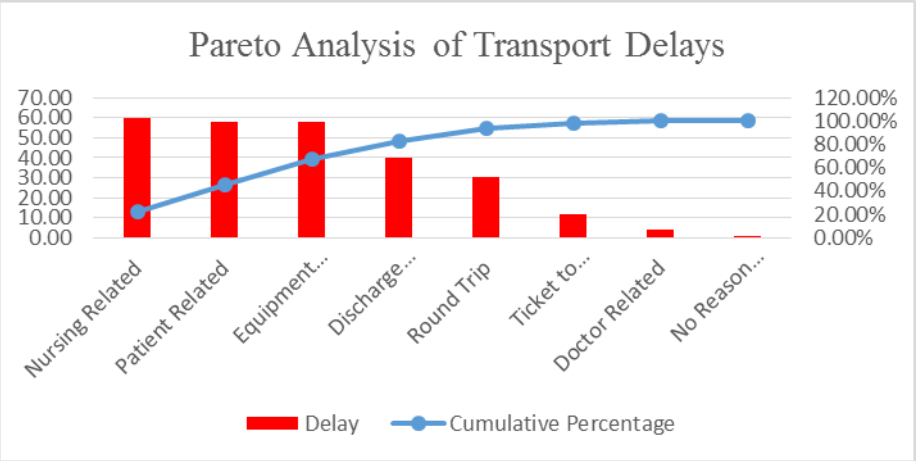

Figure 3. Pareto Analysis of Transport Delays

3.2 DISCHARGES BY TIME OF DAY

In order to get an understanding of how many patients were being discharged within certain times blocks, discharges were reviewed and a graph was created to represent the time of day that patients were discharged (refer to Figure 4). The highest amount of discharges occurred between 12:01-14:00 followed by 14:01-16:00. The highest discharge times occur in the middle of the day, which creates a problem when a patient will not be able to be picked up by a family member until they are done with work. The improper use of an inpatient room that another patient is waiting for is an inefficient use of time. Patients need a space that they can wait for their family members, such as a discharge unit.

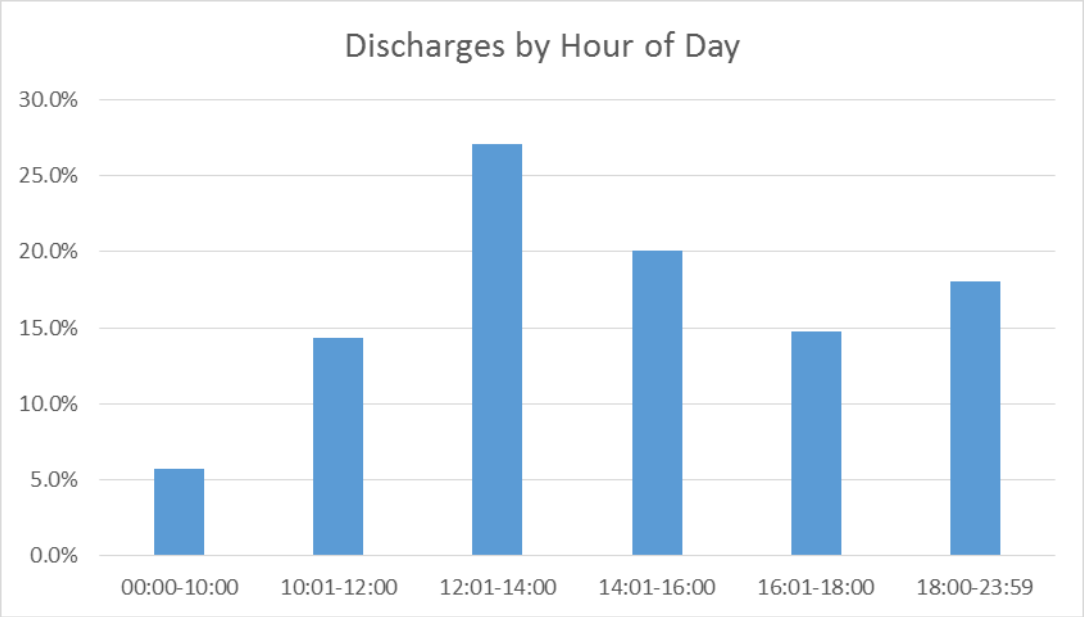

Figure 4. Discharges by Hour of Day

3.3 AVERAGE DISCHARGE WAIT TIMES FOR TRANSPORT

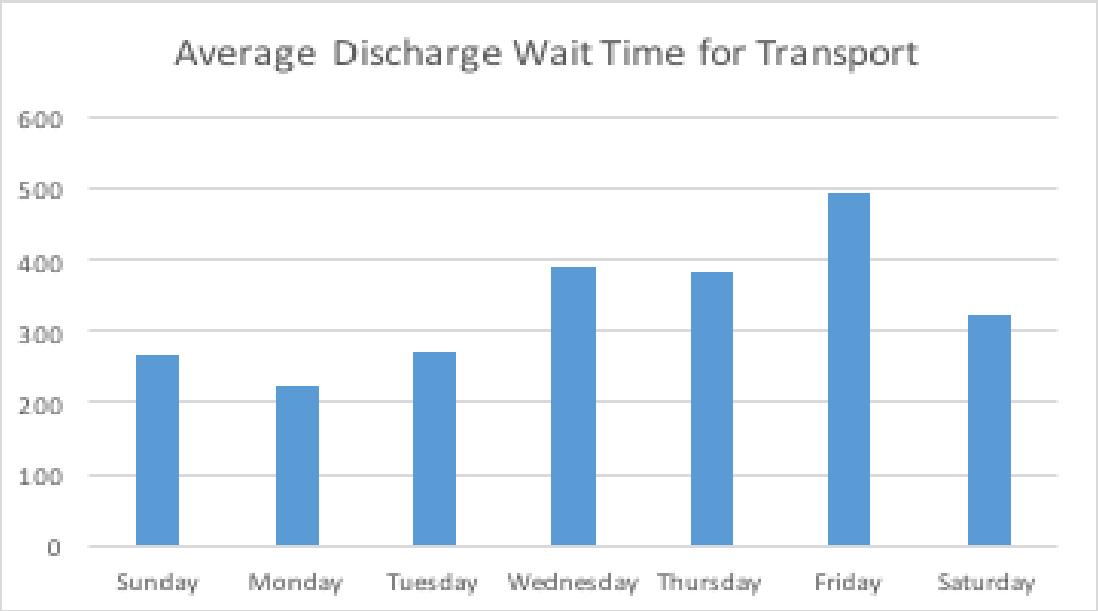

Figure 5. Average Transport Discharge Wait Time by Day

A teletracking report was ran to show how inefficiencies in transport response time can affect the discharge process. This graph indicates on average the number of minutes that are wasted each day of the week for a transport to arrive at a patient's room who is being discharged. The graph was created by separating all days of the week and dividing by totally number of each day that occurred between 1/1/17 to 2/28/17. For example, there were 8 Fridays in January and February of 2017. The total wait time that patients had to wait for transport was divided by 8 to get the average amount of time spent waiting per day for transport to arrive. In January and February on any given Friday roughly 500 minutes or over 8 hours patients as a whole waited for transport to escort them out of the hospital, leading to wasted time that backed up EVS from arriving and another patient from being placed into an inpatient bed. This data is representative of what executives at Magee expected – that discharge patients are waiting the longest amount of time

for transport to arrive at their room Wednesday, Thursday and Friday, which are the highest discharge times.

3.4 TRANSPORT STAFFING ANALYSIS

MAGEE	Date Range					1/1/2017				To		1/31/2017					
Goal Dispatch to Complete 15 minutes or less at least 60% of the time	Total # Dispatches	Dispatches (excluding return trips) - what the percentages are based off of	Rejects	Average Dispatches - Complete (not including Equip Return)	# Return Equip Trips	0	5	6	15	16	25	26	30	31	45	45	+
All Employees	3331	3272	667	0:16:29	59	138	4%	1679	52%	1065	33%	183	6%	177	5%	0	0%
1	431	425	49	0:15:26	6	11	3%	237	56%	148	35%	18	4%	10	2%	0	0%
2	87	85	14	0:17:36	2	4	5%	42	51%	29	35%	3	4%	5	6%	0	0%
3	156	148	13	0:16:14	8	7	5%	78	53%	53	36%	1	1%	8	5%	0	0%
4	387	383	113	0:16:38	4	7	2%	190	50%	146	38%	30	8%	8	2%	0	0%
5	199	199	80	0:19:40	0	7	4%	67	34%	82	42%	21	11%	19	10%	0	0%

Figure 6. Transport Response Times

A review of transport response times was completed to determine if a lack of transport staff could be a cause for increased discharge wait time. On a monthly basis the Director of EVS and transport reviews Transport staffing. An example is provided in Figure 5. As mentioned earlier, staff are expected to meet target time requirements for transport jobs. In the left most column is each individual transport employee. Next is the total number of jobs that an employee has performed. The third column is jobs excluding return trips from procedures, which is when a transport staff waits with the patient while they have their procedure and returns them back to their room. The fourth column shows how many jobs have been rejected by each employee. The fifth indicates their average dispatch to complete jobs, or how long their median trip length was from receiving the call to delivering the patient to their destination. The last column indicates how many return equipment jobs each employee completed for the month. The final columns are

associated with the percent each employee met the target times of 60% having a job less than 15 minutes in green, 30% of jobs being 16-25 minutes in yellow and finally 10% of jobs that took 26-45 minutes in red are recorded in the columns to indicate how the staff compare to each other and how they are performing based on the target times set by the director. Based on the target times, transport staff is meeting their target times and staffing levels were not analyzed further.

4.0 DISCUSSION

Teletracking's discharge by time report was used to determine when patients were being discharged. However, it does not indicate why patients are being discharged so late. When a patient is delayed from being discharged because of waiting for a ride, it does not appear in the system. In Teletracking, there is a comment section where staff record that the patient has met criteria for discharge but is waiting for a ride. However, there is no way to capture this information unless it is manually recorded. Therefore, the true impact of patients waiting in their inpatient rooms cannot be determined until manual data collection is performed. While no quantitative data is available to support this, observations while shadowing indicated that it is a major problem at Magee.

Teletracking's reports were helpful in the analysis of the patient flow problem. However, data validity was a concern from the beginning because a majority of the data that are entered is done by transporters. Therefore, if the data are not being entered appropriately and delays are not being recorded, this could result in unreliable data. To ensure that data were being entered appropriately, real-time data were collected. However, the real-time data were limited and additional time should be spent reviewing transporters and assessing if they are entering information appropriately. The Capacity Management Team periodically presents to transporters at Magee to explain how to accurately enter information into Teletracking but chances of errors are always possible.

The Pareto chart that records the transport delays has limited categories and no options to free text additional information into the system. This limitation only allows the data to be broken down to a certain level. A breakdown of the data into subcategories of each should be performed in order to assess what percentage constitutes each delay. For example, when a nursing delay is entered, there needs to be additional information explaining why it is a nursing delay and why the patient was not prepared. Attempts to collect these data were discussed, but unfortunately never occurred, because the transport director did not ask his staff to record specifically what type of nursing delay it was.

5.0 CONCLUSIONS

From the Pareto chart, it was determined that nursing has the highest amount of delays. From the time spent shadowing, communication between units within the hospital was noted as a potential bottleneck. When transport arrives to pick up a patient to transfer him/her to a test, at times nursing staff are not aware of this and do not have the patient prepared for transport. Since the nurse is unaware of the transport that also means that the patient is unaware, which potentially leads to a large proportion of patients being unaware of their transport.

Equipment delays are also a large portion of the delays for transport. A majority of the equipment delays are from an inadequate inventory of wheelchairs and stretchers. The lack of equipment management leads to delays, because transporters are searching for the equipment.

Transports time spent waiting for patients in the lobby or to be picked up by a cab leads to an inefficient use of their time. Transporters have to wait for every patient that is taking a cab home from the hospital. Also, any patient that is waiting for a ride home can wait in his/her inpatient room. This inefficient use of an inpatient room contributes to an increase in hold hours. Magee does not currently have a location to send patients while they wait for a ride, so either transport waits with them or the patient waits in their room.

6.0 RECOMMENDATIONS

6.1 DISCHARGE UNIT

Discharge units could be an effective way to give discharged patients a place to wait for either their family members or for a taxi to arrive. Discharge units have been proven to increase efficiency and patient throughput in hospitals and it also gives patients a comfortable place to wait while they wait for their ride; examples are presented below. It would also increase patient satisfaction because hold hours in the ED and PACU should decrease thereby reducing patients' wait times for their rooms would decrease.

The unit could be housed in a portion of the vacant 4200 unit that is used as an overflow unit currently. Patients would need to meet a set criterion in order to qualify to use the discharge unit. The unit could also be used for any patient waiting for a taxi or a family member, or a patient being transferred to a nursing home or assisted care facility. When a patient is ready for discharge, the staff will identify then if the patient is suitable to be sent to the discharge lounge. Magee would follow the same guidelines for all patients that will be discharged to the discharge unit. The physician would put the order in, the discharge nurse would speak with the patient and then transport would transfer them to the discharge unit. Once the taxi or the family member has arrived transport can then be called from the discharge unit and the patient can then be transported to their vehicle. (Discharge Lounge Operation Guidelines, 2012).

One instance of a discharge unit being successfully implemented occurred at Syracuse Veterans Affairs Medical Center. Their case was similar to Magee in that they were experiencing excessive amounts of hold time. Roughly 25% of their patients were waiting longer than 6 hours to be admitted into an inpatient unit. They also identified only 33% of patients were being discharged before noon. From implementing a discharge unit they were able to reduce the number of patients waiting over 6 hours in the ED from 25% to 16%. They also were able to increase the amount of patients discharged from their inpatient room before noon from 33% to 42% (Hernandez et. al, 2014)., Strong Memorial Hospital also implemented a discharge lounge and found that patients actually enjoy the space while they were waiting for their ride. Not only did it effect patient's perceptions of a better flowing system, it also freed up 214 hours of inpatient bed time, which reduced patients waiting for an inpatient room (Patient Discharge Lounge Sparks Connections, Frees up Beds, 2015). Magee's discharge times are similar in that a majority of patients are discharged after 12 noon. This delayed discharge time begins to form a bottleneck in the ED and PACU as it did at Syracuse and the Strong Memorial Hospital.

While the previously mentioned hospitals have seen great success with discharge units, hospitals in the area have seen new problems arise with the addition of these units. An interview was held with a unit director from a local hospital that has a similar concept at their facility. The largest problems that potentially could occur are disjointed continuity of care, increased liability and staff buy-in of the new unit. While the discharge unit concept would free inpatient beds sooner, there is an additional step added to the discharge process resulting in more opportunity for breakdown in communication between units and could result in patient care being negatively affected. There is also liability associated with running a discharge unit. A rigorous protocol for eligible patients is important to ensure no patients are injured or receive inadequate care in a

discharge unit. These units should only be used for patients without dementia and patients who do not need assistance to use the restroom or walk. Finally, culture change among the staff must occur so the discharge unit is utilized appropriately. Staff must be well informed about the unit and support the unit to make it successful or eligible patients will not be screened and sent to the discharge unit once they meet criteria to be discharged from their inpatient room. Further study is required to determine the true impact of patients waiting in their room post-discharge.

6.2 EQUIPMENT INVENTORY

The third largest delay was the inability to locate equipment needed to transport the patients. Eighty-three wheelchairs that were identified in the inventory analysis is not a shortage and is an adequate supply according to the director of transport. While there is an adequate_supply of wheelchairs, ineffective monitoring of the wheelchairs resulted in the nursing staff perceiving there is a shortage. This perceived shortage comes from the limited storage space for transport equipment on the nursing units. Currently, there is enough space for five wheelchairs in the lobby, storage for three wheelchairs and 1 stretcher on 2800 and the transitional care unit, four wheelchairs and one stretcher on 4100 and four wheelchairs in the physical therapy department, three wheelchairs on 5400 and finally three wheelchairs and two stretchers on 5800. Since space on each unit is scarce at Magee, allotment to add additional space is not an option.

	Unit		
Time	4100	5300	5800
5	0.00	0.05	0.00
6	0.00	0.05	0.31
7	1.05	0.63	0.68
8	1.46	1.41	1.31
9	2.04	2.35	1.88
10	2.51	2.82	2.56
11	3.08	3.55	2.93
12	3.76	4.23	3.76
13	5.07	4.81	5.02
14	6.48	5.23	5.80
15	7.52	6.22	6.64
16	8.20	7.05	7.11
17	8.57	7.68	7.68
18	8.88	8.10	7.89
19	9.09	8.62	7.99
20	9.25	8.78	8.05

Figure 7. Average Wheelchair Use by Unit and Time of Day

Therefore, standards must be implemented to ensure that units are always stocked fully with equipment. An inventory analysis was created based on average utilization of wheelchairs (Figure 6). This was done by taking the total number of jobs that each unit requested from January 2017 to February 2017 and separated by hour of day. Then each cell was divided by the total number of days that occurred in January 2017 and February 2017, which was 59 days to get average wheelchair use per unit by hour of day. Each highlighted cell shows by hour of day when a restock should occur on each unit based on the average amount of wheelchairs used by hour of day. For example, 4100 uses ten wheelchairs a day and can store four wheelchairs, so at twelve noon on an average day 3.76 wheelchairs are used and a restock is likely needed as well as at sixteen hundred another restock is likely needed. The same process occurred for 5300 and 5800, where only 3 wheelchairs can be stored and highlighted cells indicate when a restock would be needed.

6.3 NURSING AND PATIENT DELAYS

The largest delay category that transporters encounter is nursing delays. These could be anything that would involve additional nursing care that patients need before the patient is prepared for transport. The first step in resolving the process inefficiencies was to relay this information back to nursing so everyone is aware of how large the problem is. A presentation was created to explain the problem to nursing leadership so they could disseminate the information to their floor nurses. Following the presentation, discussions surrounding patient preparation and nursing staffs were held. It was determined that at times nursing staff are not aware when patients are being transported to radiology. When patients are scheduled for radiology tests, the radiology technologists enter the transport information as an “appointment” into Teletracking. From the meeting, nursing leadership indicated that the radiology technologists do not always inform inpatient nursing that they have scheduled a transport for a patient. It appears in Teletracking, but nursing staff do not regularly look at Teletracking.

Upon discovering this information, a conversation was held with the manager of radiology to discuss radiology staff improving communication with nursing staff. The manager informed his staff and they are adding a step to creating an appointment. Anytime a radiology technologist creates a transport for the patient they will now call the HUC on the inpatient unit so nursing staff can be aware and have the patient prepared for their transport. In addition, they can write it on the patient’s white board, so the patient can be aware as well. Implementing the phone call after an appointment has been set will give patients and nurses the time required to be prepared for the patient to be transported as soon as the transporter arrives.

Final recommendations may offer solutions to reducing these hold hours. An option for people prepared for discharge, but who are waiting for a ride home could utilize a discharge unit.

This would help reduce the amount of patients waiting in their rooms for a ride home. While this is well-known by inpatient clinical staff, further quantification is required to truly determine how many hours a month are “lost” due to patients using rooms while they wait for a ride.

Thus far, Magee has not implemented any equipment management to ensure wheelchairs are always stocked in each unit within the hospital. Upon review of various Teletracking reports, predetermined times that each unit should be checked and stocked are listed above in Figure 6. Further analysis should be conducted to determine the proposed restock times versus when the units actually run out of wheelchairs.

Finally, nursing and patient delays can be reduced from increased communication; the communication must begin with radiology when they schedule patients for tests. Once the test is scheduled, the radiology technologist must call the HUC, so the nurse and patient can be informed. Lack of communication is a common problem within hospital units. Buy-in from senior-level staff is essential to ensure all staff in radiology are promptly informing nursing units that a test has been scheduled.

Magee has a patient-centric culture and any implementation to improve the patient experience will likely be well received. The inefficient use of patient rooms and inefficient use of staff’s time are barriers to an efficient discharge process. This inefficient discharge process leads to excessive hold hours that negatively impact the patients by increasing the likelihood of medical errors and the delay of appropriate care. These hold hours affect the physicians, nurses and ultimately the patient’s perception of their care.

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