Work Flow Analysis of Admitted Patients

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Abstract

The Dartmouth General hospital (DGH) is a community hospital in urban Nova Scotia that provides services to approximately 120,000 people in Dartmouth and surrounding areas. The hospital has 131 inpatient beds, consisting of 95 acute, 28 transitional care and 8 intensive care beds. In 2005, 75% of all hospital admissions came through the Emergency Department (ED).

The work of the ED nurse requires a high degree of flexibility. Being able to adapt to the ever changing patient demographics and health status is an essential characteristic for staff who work in the ED setting. Traditionally this care has been marked by short-stays and a quick turn-around time between patients. In recent years, adaptive measures have expanded to include the care of the admitted patient.

To determine the issues around the flow of the admitted patient to an inpatient bed from the ED a working group was formed. The multidisciplinary group was led by Mr. John Kim of Lean Advisors Inc (LEAD®).   Lean Advisors Inc. (LEAD®) is a consulting company that teaches the concept of "lean management" or "lean thinking" through analyzing flow processes. This analysis included stakeholders at the administrative level, as well as nurses and ward clerks from both the ED and inpatient units. The analysis involved data collection, emergency department information system (EDIS) queries, and work flow analysis using the concepts of LEAD®.

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Introduction

The Institute of Medicine (2005), recommended a system approach to improve the delivery of health-care. Work flow analysis is one tool that can assist administration to identify root-causes of system defects. Lean Advisors Inc. (LEAD®) is a consulting company that teaches the concept of "lean management" or "lean thinking" through analyzing flow processes. The core idea of "lean" involves determining the value of any given process by distinguishing value-added steps from non-value-added steps, and eliminating waste so that ultimately every step adds value to the process.(Womack, Byrne, Flume, Kaplan, and Toussaint, 2005). Increasing value in a process may naturally rid a system of some of its deficiencies.

Based on this premise a working group was formed to expedite patient admissions from the Emergency Department (ED) at the Dartmouth General hospital (DGH). The multidisciplinary group was led by Mr. John Kim of LEAD®. Each member contributed to their area of expertise, and all participated in mapping the process, gathering data, identifying possible efficiencies, and developing and testing possible solutions.

The "lean concepts" are most commonly associated with Japanese manufacturing (Womack et al, 2005). The key difference in the application of these concepts to health-care is the product. Analyzing the work flow in the manufacturing industry may involve following the flow of a nut or bolt. In the health-care industry the "product" is the patient or patient information.

Miro, Sanchez, Espinosa, Coll-Vincent, Bragulat, and Milla (2003), used measurements of patient flow to detect factors associated with ED effectiveness and overcrowding. They

asserted that these factors are not only determined by external pressure, but also by internal factors. They also found that measurement of patient flow was a useful tool to detect these factors and to assist with the development of plans for reorganization.

Background of ED Overcrowding Problem

Much attention has been given in current literature to ED overcrowding. Sedlak and Roberts (2004) reported that ED crowding has become a major barrier to receiving timely emergency care. They identified that the consequences of crowding were widespread and included diversion of ambulances, prolonged waits, dissatisfied clients, potential for poor outcomes, and unnecessary costs. Howard (2005) noted that overcrowding was not just an ED issue but rather a systems issue. As well, he found that many persons use the term "hospital overcrowding," which is more reflective of what is truly occurring within the organization.

The work of the ED nurse requires a high degree of flexibility. As an ED nurse being able to adapt to the ever changing patient demographics and health status is an essential characteristic to have.. Traditionally this care has been marked by short-stays and a quick turn-around time between patients. In recent years, adaptive measures have expanded to include the care of the admitted patient. It has become the norm for patients to be admitted and discharged from the ED over the span of 2-3 days. Another trend is the provision of intensive care in the ED to avoid a hospital admission.

One indicator of overcrowding that is akin to the dissatisfied client, are those who self triage themselves and leave without being seen (LWBS) (Polevoi, James, & Kramer, 2005; Weiss, Ernst, Derlet, King, Bair, & Nick, 2005; McMullan, & Veser, 2004; Derlet, 2002).

Though it has been determined that there is a positive correlation between ED overcrowding and those who leave without treatment, there is no current benchmark to compare the per cent of LWBS between EDs. McMullen & Veser (2004) conducted a study which showed a positive correlation between the number of LWBS and ED volume and acuity. They found that the percentage of LWBS ranged from 2.3% to 4.7%. This is approximately one-half of the 2005 figure of 6.05% for the Dartmouth General Hospital ED patients who LWBS.

Setting and Population

The DGH is a community hospital in urban Nova Scotia that provides services to approximately 120,000 people in Dartmouth and surrounding areas. The hospital has 131 inpatient beds, consisting of 95 acute, 28 transitional care and 8 intensive care beds. In May 2002 the hospital ED expanded from 15 to 23 beds. The increase in ED bed capacity did not coincide with an increase in inpatient bed capacity. Therefore the larger ED has compounded the overcrowding situation, creating a larger holding area for admissions and impeding throughput. In 2005, 10% of all ED visits required hospital admission and 75% of all hospital admissions came through the ED.

The 23 beds in the new ED consist of 12 core monitored beds that circle the department and 11 specialty beds. In the 12 core beds patients are placed according to their acuity. The remaining 11 specialty beds include a resuscitation room with 2 monitored beds; a fracture room, a pediatric room with 2 monitored beds, two ears, nose and throat (ENT) rooms, monitored gynecology rooms, a monitored isolation room, and an interview room. A minor treatment area with 6 non-monitored beds is juxtaposed to the main ED and is referred to as the

MET. This area serves a dual purpose, functioning as a "fast-track" area during high acuity (1100 to1800 hours) and as a holding area for admitted patients when necessary.

Further evidence of overcrowding in the DGH ED is noted during occurrences when both the clinical leader and the emergency room physician (ERP) agree that the department is in a state of crisis. During these episodes measures are taken to control the situation. These measures may include: attempt to divert ambulances to another facility, initiating "internal divert" (a guideline alerting all inpatient units and ancillary departments of the need to adjust their workload to prioritize ED admissions or orders for diagnostic tests), or calling staff in on overtime.

Analysis of ED Admitted Patient Processes

To understand how the ED admitted patient process further compounds overcrowding and discover potential solutions an analysis of the problem was conducted. This analysis included stakeholders at the administrative level and involved (a) data collection, (b) emergency department information system (EDIS) queries, and © work flow analysis using the concepts of LEAD®

I. Data collection: A survey completed on all patients admitted through the ED by nurses and clerks was performed from 6 February to 20 March 2006. The survey captured times from when the ERP decided to admit a patient until they were transferred to an inpatient bed. The processes can be divided into 3 main categories: (1) ward clerk and admitting staff interactions, (2) consultant interactions and (3) inpatient and emergency nurse interactions when a bed is assigned. There was opportunity for subjective causes of delay to be offered. The questions for each category included:

(1) Ward clerk and admitting staff interactions:

a. Date and time of decision to admit.

b. Time ward clerk entered patient into EDIS

c. Time admission sheet was sent to registration clerk to put into ADT

d. Was there a delay in putting admission into the system? If yes, please explain.

e. Bed type requested

f. Floor and bed number assigned, date and time assigned in EDIS

(2) Consultant interactions:

a. Was there a specialist consultation in the ED? If yes, what service?

b. Time specialist contacted and time actually seen.

c. Was there a delay in the patient being seen by the specialist? If yes, please give reason.

(3) ED and inpatient nurse interactions:

a.   Date and time information faxed to inpatient unit

b.   Date and time floor called and response.

c.   Time floor is ready to accept patient.

d.   Time patient is transferred to floor.

e.   Please give reason if there is a delay in time floor is ready and time patient is

transferred.

II. Queries were posed of the emergency department information system (EDIS) over the

same 6-week time period.

III. Work-flow analysis of the process that occurs from the time a physician decides to admit

an ED patient until the ED patient is transferred to an inpatient bed and the time from a

discharge on the inpatient unit until the ED patient is transferred to a bed. This analysis

will be referred to as the "lean project" for the remainder of this paper. The project was

governed by two key themes; the continuous elimination of waste and respect for people.

The multidisciplinary team consisted of nurses and clerks from the ED and inpatient units,

the bed manager, an inpatient Health Services manager, chief of staff and engineers. All

members were employees of Capital Health Authority in Nova Scotia.

IV. Nova Scotia. The analysis consisted of three phases, (a) map the current state, (b) map

the future state, and (c) develop a plan.

Results of Analysis

Data collection

Surveys were completed on 345 patients, revealing that patients who are admitted to

family medicine, telemetry and internal medicine are the 3 services that wait longest for

inpatient beds. Table 1 identifies the admission totals and the average wait times by service.

Results revealed that patients who were admitted to family medicine, telemetry and internal

medicine were the 3 services that waited longest for inpatient beds. Family medicine was also

the bed service most requested (56%). The median ED length of stay (EDLOS) was 12 hours

and 24 minutes for patients requiring this service. This was more than double the 5 hour and 54

minute median of EDLOS in a 2003 study by Forster, Stiell, Well, & van Wallraven. This

information was used to map an implementation plan. Focusing on the highest contributor to

the EDLOS would ensure the greatest gain.

The most frequent reason stated by nurses and clerks for delay was "no bed available".

(Table 2) Inpatient staff also stated that delays were related to the differing times for shift

change between the ED and the inpatient nurses and hospital list rounding process. Shift change

in the ED is at 0700 and 1900 hours, whereas on the inpatient unit the hours were 08:00 and

20:00. Aligning shift change times within the organization would ensure staff are performing

change of shift tasks at the same time. This would reduce delays in transferring a patient to a

bed due to staff giving report and makes sense from a system perspective. The second potential

source of delay is the methodical practice of the hospitalist when doing rounds. Rounds are -

started on one floor and proceed to the next. If practice were altered to target potential

discharges first, these beds may become available sooner to receive admissions.

Review of the consultant times for notification and seeing a patient did not reveal any

major delays. Four surveys reported a delay caused by the practice of one internal medicine

consultant to hold patients overnight. Staff cited indecision as to whether the patient required a

telemetry bed or ICU admission as the predominant reason for this practice.

EDIS Queries

EDIS could not be used as the exclusive means of exploring all of the survey questions

as subjective data could not be captured. Specifically, EDIS does not capture the following

parameters (a) decision to admit by the ERP as well as some of the times and interactions once a

bed is assigned, (b) the time when the ED report was faxed to the inpatient unit, (c) when the

floor was called and (d) the times to call the porter to transfer. EDIS has fields for capturing

three times relating to consultants: time referred, time contacted and time attended to the patient.

These fields are not consistently completed by end-users (nurses and physicians), thus could not

be analyzed without capturing these times on the paper survey.

One example of inconsistency in times between the surveys and the EDIS queries is shown in Table 3. This table describes the time from when an inpatient bed is assigned to an ED patient until the patient is transferred to a bed. The discrepancy is most likely due to delays by system end users in entering the information. Due to the inconsistent results of the 2 methods, the time measurements quoted are survey times, unless otherwise stated.

The potential for EDIS to support ED practice has yet to be fully realized beyond the current use as a "tracking screen". One opportunity in relation to staffing and a standard definition for overcrowding will be discussed later. Other opportunities may exist in the standardized discharge diagnosis field that is confined to ICD-10 coded entries.

Workflow Analysis

Two metrics for improvement were identified: average wait time for an inpatient bed and percent patients arriving with all necessary information. During the data collection phase it was identified that the highest contributors to the average wait time were those waiting for telemetry, family medicine and internal medicine beds (Table 1). A closer look at these three bed assignments revealed that 56% of all admitted patients in the ED required a family medicine bed (Table 2).

The lean team calculated baseline numbers on the two chosen metrics. These baseline figures will be compared to their 6-month measurement to determine effectiveness. The first metric addressed was to reduce the wait for the ED admitted patient awaiting a family medicine bed. In the current state this takes 12 hours and 24 minutes. The second metric addressed was to increase the percentage for admitted patients who arrived with all the required information. To determine the baseline for the second metric another survey was conducted over 10 days.

The survey involved 1 question posed to the inpatient nurse at the time of the faxed report. The question determined whether further information was required and asked, "Did you have to call the ED nurse for more information?" Sixty-nine surveys were completed that revealed more information was required by the nurses 37% of the time.

Mapping the Current State

It was recognized that in order to fully understand the causes of delay to assigning a bed from a system perspective two processes needed to be mapped and analyzed. To do this the team was divided into two working groups to map both processes. One group mapped the current process for ED admitted patients. This included the time from the decision to admit by the ERP until the patient was transferred to an inpatient bed. The second group mapped the process for inpatient discharges, including the time the physician wrote the order for discharge until the bed was cleaned and ready to accept an admission. The current state map for the ED admitted patient included 14 tasks and the map for the discharged patients involved 8 (Table 4).

Mapping the Future State

The twenty-two steps in the two processes mapped occur simultaneously and were merged into one process in the future state map. Critical steps for both processes were identified and the final process was pared down to four tasks:

1. Physician writes the discharge order.

2. Patient is moved to discharge lounge if appropriate

3. Bed is cleaned and entered in the admission, discharge and transfer (ADT) information system. Admission is entered into EDIS and ADT. Bed is assigned.

4. Patient is transferred to an inpatient unit.

There was consensus among team members that the future state map was the preferred map. Any efforts to bring the organization closer to this state were viewed as worthwhile.

Developing a Plan

The solutions in the proposed implementation plan incorporated strategies that focused on the metrics identified at the outset. The actions were assigned two characteristics: easy or hard and those that added value and those of no value. Those that were both easy and added value were automatically included in the plan. Those identified as hard and of no value, were excluded. The tasks were then further categorized into "do-its", "projects" and "lean events" (Table 5). "Do-its" can be done by 1 person in 8 hours. "Projects" may require 2 persons and 1-2 days. "Lean events" require 4-6 people.

An admitted patient in the ED changes the traditional work content for the ED nurse. Care is fragmented and less organized for the admitted patient in the ED than the care they would receive on the inpatient unit. The increase demand in the workload for a new admission fosters a view of the admitted patient as more of a "penalty" than a "reward" by both the ED and inpatient nurse. Adopting changes that will bring organization to the flow of information from the ED to the inpatient unit will move the view of the admitted patient closer to the "reward" end of the spectrum.

The first step following bed assignment in the current state (Table 4) step 10 of the ED admitted patient) is for the ED nurse to fax a report sheet to the inpatient unit. This sheet contained information that is redundant to that on the inpatient care plan and nursing assessment forms. Once the information was transferred to the inpatient forms, the ED report sheet is placed at the back of the chart, reinforcing the temporary need for the form. Providing a verbal

report to augment the faxed report further duplicated the information. This is different than clarifying orders or information written on the faxed report sheets. Redundant information generates waste and adds to the workload of the health-care providers. It also negatively influences potential efficiency gains and the flow of communication.

The primary solution identified to address this waste and improve the flow of information was to create a common cover sheet for inpatient care plan forms. This would serve as both the ED report sheet and continue to be part of the inpatient care plan. Measures to further bring organization to the admitted patient in the ED include: (1) placing the ED chart in the maroon binders used on the inpatient units, (2) in-service ED nurses on the policy for completing the medication administration record (MAR), and (4) send medications with patients during hours when pharmacy is not open as medications are easier to access in the ED through PYXIS (automated pharmacy dispensary).

As stated earlier, one premise underlying solutions to address the flow of information and enhancing organization is, to change the perception of an admitted patient from a "penalty to a reward". Perceiving the patient as more "like a transfer" by receiving staff fosters a receptive attitude toward admissions. Likewise, the transfer of admitted patient information into the format used for all admissions will bring system wide uniformity to the patient chart. This enables ED health care providers to transfer care using a more organized approach.

The second step of the future state map is to move the patient to a discharge lounge if appropriate. This measure was trialed at the DGH for approximately one year (2004-2005). It was staffed by a licensed practical nurse (LPN). The strategy was terminated, as patients were not delegated to the lounge frequently. This resulted in the LPN being reassigned to inpatient

units where the workload was heaviest. The physical space is still available for the discharge lounge and the lean team conceded that this strategy might still have value. Therefore an analysis of the issues around the discharge holding area is needed and became one of the "do-its" in the implementation plan.

Discussion

Review of current literature and discussions with members of the lean project provided opportunity to explore solutions not covered in the immediate implementation plan. These solutions include matching bed supply with facility demand, facilitation of self-triaging to the community, a district wide policy and standardization of a quantitative definition of ED overcrowding, and a second triage nurse or nurse practitioner (NP)

Matching Bed Supply With Facility Demand

Proudlove, Gordon, Boaden (2003) presented a bed management tactic that involves organizing surgical procedures to match the supply and demand of facility beds. Figure 1 depicts the weekly trend for admissions and discharges at the DGH. The demand for beds was greater in early week when admissions outnumber discharges. The peak leveled off midweek and towards the end of the week the supply was greater than the demand. Scheduling surgical procedures to facility bed availability may include planning day surgeries earlier in the week and assigning procedures that require admission after Tuesday. This would clear the way for an increase in the internal bed capacity and reduce the need to cancel surgical procedures during times of ED overcrowding. It is expected that this will result in an increase in satisfaction for both the patient and surgical staff.

Facilitation of Self-Triaging to Community

Patients who present to triage with a lower acuity level may be given the option to triage themselves to a walk in clinic or their family doctor. Self-triaging is not refusal of care, which is taboo in the healthcare realm. Self-triaging is the facilitation of an informed decision to seek care in the community based on the wait times and the availability of an appropriate alternative care option. The discharge planning nurses at the DGH prepared a list of walk-in-clinics in the community. The list includes, contact numbers, addresses, hours of operation, as well as details relating to the population serviced and whether it is necessary to call ahead for a same day appointment. This list is kept at the triage desk and is available for patients who are considering leaving or self-triaging themselves away from the ED. A second list of community physicians accepting new patients is offered to patients without a physician or those who request this information.

District Wide Policy for ED Overcrowding and Standardizing a Qualitative Definition

The facilitation of self-triaging, is a community strategy that may reduce the number of patients waiting in the ED but it is not a solution for patients of higher acuity. Diverting ambulances to other district EDs is one current practice for this subset of patients. Ambulance diversion from one hospital to another simply shifts the overcrowding problem from one hospital to its neighbor. (Derlet, 2002)   A district wide policy for ED overcrowding or situations of bed crisis is required to standardize the process. This policy would begin with a qualitative definition of ED overcrowding, such as the National Emergency Department Overcrowding Score (NEDOCS). (Weiss, Derlet, Arndahl, Ernst, Richards, Fernandez-Frankelton, Schwab, Stair, Vicellio, Levy, Brautigan, Johnson, Nick, 2004) NEDOCS affords

uniformity through a common metric of the degree of overcrowding. The policy would include system wide intra and interdepartmental measures. The priority would be to expedite the transfer of admitted patients that are being boarded in the ED into the first available bed in the district. This practice would involve the collaboration of bed managers from both the sending and the receiving facility to assess bed availability and match patients to an appropriate bed. Standardization of the process will improve communication amongst district facilities and foster organizational decisions that enhance the flow of the patient through the ED system. The impact would translate into decreased wait times for patients waiting for a bed as well as those patients who are waiting to be seen. This solution would also result in an increase in satisfaction for both groups of patients and ED staff.

Nursing Staff Ratio Based on Known Times of ED Overcrowding

EDIS offers real-time data to the state of affairs in the ED. A glance at the screen, for example, can reveal available bed capacity, how many persons waiting in the waiting room, the number of persons waiting for admission and the acuity level for all registered patients. This data can be quickly transformed into a NEDOCS score at any time of the day or week. The collection of scores over time can assist administration to determine patterns of overcrowding occurrence. This knowledge can be useful to staff the ED responsively versus the current static and at times reactive manner.

Matching staffing needs to known patterns of overcrowding may assist management in addressing nursing workforce issues. Robinson et. al, explores the current nursing shortage issue and its affect on the ED. They report that by the year 2020, there will be at least 400,000 fewer nurses available to provide care than is needed. (Robinson, Jagin, Ray, 2004) This

combined with the increased demand for services by the elderly population (65 years or older) will further compound ED overcrowding.

Second Triage Nurse or Nurse Practitioner (NP)

During times of ED overcrowding, the triage nurse is in the most pivotal position for carrying the burden, as the input flow continues without regard for the state of the ED. Consequently the ED waiting room becomes congested and the triage nurse's responsibility increases tremendously. A second nurse at triage would ensure that reassessments of patients in the waiting room are timely.

The second nurse at triage could initiate current departmental protocols for preordering x-rays according to the Ottawa ankle rules (OAR) (Steill, McKnight, Greenberg, McDowell, Nair, Wells, Johns & Worthington, 1994) or provide analgesic for patients experiencing pain based on the DGH pain pathway protocol. These patient centered protocols support the flow of the ED patient through the department. Furthermore, if the second nurse was a NP, she/he could provide advanced assessment and diagnostic services, in collaboration with the ERP. The recent posting for a nurse practitioner in the ED at the Dr. Everett Chalmers hospital in Fredericton, New Brunswick provides evidence that the role of the NP is beginning to receive recognition.

Conclusion

The solutions to address ED overcrowding at the hospital and community levels presented here are not all-inclusive. They offer a starting point to springboard action for all levels of CHA staff. Organizational change is difficult. To adopt policies that will improve the throughput of ED patients to an inpatient bed, change management issues must involve providers, consumers, administration, community and political organizations.

First, there must be a motivation to change and interfacility partnerships to prevail over embedded, traditional constraints. While it is intuitive that the solutions offered in this paper will be effective in reducing ED wait times, better objective evidence of efficiency and effectiveness of these solutions may be required before regulators and policy makers will adopt some of these solutions.

Adoption of policies at the national level is also needed to address ED overcrowding. On April 04, 2006, the Canadian Prime Minister, Stephen Harper gave his throne speech which put health care wait times on the agenda. Mr. Harper stated "Canadians have paid their taxes to support our system of public health insurance. But all too often, they find themselves waiting too long for critical procedures. That is not good enough. It is time Canadians received the health care they have paid for" (Harper, 2006).

In closing, one has to ponder whether Canadians will realize the benefit of Mr. Harper's throne speech and if any of the efforts to reduce wait time will be translated into a reduction in the long waits in our nation's safety net, the ED.

Table 1: Admission totals per service and average wait times (minutes):

345 Admissions: 06 February -20 March 06						
Service	**FM**	**Tel**	**IM**	**S**	**ICU**	**Totals**
Total	194	46	16	54	35	**345**
% of all admissions per service						
	56%	13%	5%	16%	10%	
Wait from decision to admit until goes to floor						
Min	0:43	0:50	1:35	0:00	0:00	
Max	23:51	48:10	50:19	27:22	26:40	
Average	**12:24**	**13:19**	**10:28**	4:58	3:01	
Wait from bed allotted until goes to floor						
Min	0:00	0:00	0:27	0:00	0:00	
Max	9:31	6:44	3:36	14:46	3:33	
Average	1:24	1:14	1:21	1:31	0:52	

(FM = Family Medicine, Tel = Telemetry, S = Surgery, IM = Internal Medicine and ICU = Intensive Care Unit)

Table 2: Perceived delays by clerk and ED RN

Perceived Delays by Clerk and ED RN			
RN: Stated causes of delay		*Clerk: Stated causes of delay*	
No bed available	15	No Bed available	137
Bed not ready	6	Clerk on break	8
Awaiting consult	6	Relieving for break	6
Pt unstable	5	Waiting for stat sheet	5
RN/Floor to busy	4	Busy	3
Change in Pt condition	3	Shift Change	3
Waiting for porter	3	Acuity of Patient	1
Inpatient RN at lunch	2	Computer down	1
ERP req. pt kept in ED	2	Consultant using chart	1
1st fax not received	2	Issue with diagnosis in STAR	1
Needed med prior to transfer	2		
RN in report	2		
Need Dr's orders	1		
RN in ED busy	1		
Shift change in ED	1		
Clarification of orders	1		
Physician assessing pt.	1		

Table 3: Surveys versus EDIS queries

| Time* Bed Assigned Until Transferred to an Inpatient Bed		
Bed Service	*Survey Data*	*EDIS*
Surgery	1:31	2:30
Family Medicine	1:24	2:06
Internal Medicine	1:21	1:30
Telemetry	1:14	1:25
ICU	0:52	0:46

*Time in hh:mm

Table 4: Current State Map Tasks

ED Admitted Patients: Decision to Bed (14 tasks)	Discharged Patients: Decision to Bed Ready (8 tasks)
Physician decides to admit	Physician writes discharge order or patient dies
Physician tells RN	RN initiates discharge
RN gives stat sheet to the ward clerk (WC)	Patient leaves
WC enters admission into EDIS and gives the stat sheet to registration clerk (RC)	WC notified and chart is dismantled. Bed entered in bed book for cleaning or housekeeping paged if "STAT"
RC has patient sign admission forms	Bed is cleaned and recorded in bed book
RC or admitting clerk enters the information into STAR (admission, transfer, discharge information system)	Discharge is entered in STAR this triggers "empty bed"
Bed assigned or if no bed available patient placed in a virtual bed in STAR.	Notice prints in registration and ED
Bed entered in EDIS by RC or admitting clerk.	Bed assigned by: RC or bed manager on days, on evenings the inpatient clerk calls nurse manager, and on night's bed is assigned by the ED clerk and clinical leader
RC calls unit with admit information and available bed displayed in EDIS	
ED RN prepares patient for transfer (medications, chart, and old chart).	
5-10 mins after faxing ED RN calls floor to clarify information.	
ED RN prepares patient for transfer (medications, chart, and old chart).	
30 mins later porter called to transfer patient	
Patient transferred to inpatient unit.	

Table 5: Implementation Plan

	April	May	June	July & Beyond
Implementation Plan				
L e a n		• Mimic discharge process in family medicine • Develop discharge/admit process for inpatient nurse		ED lean activity 6am-2am
P r o j e c t s		Use Maroon Folders in ED • In-service ED RNs on MAR sheets • Reallocate resources: • Nurse for admissions and discharges • Adjust porter and housekeeping hours to increase coverage between 11am-7pm.	- Begin discharge process at admission - Disease specific teaching, use check list Common care plans and nursing assessment forms - Flag system for readily communicating bed "dirty" and "clean".	
- D o - I t s	ED RN to send meds after hours from PYXIS Advance planning with homecare. Meet with Finance to begin invoicing patients for extra days.	• Advance communication of daily schedule of discharges to housekeeping • Understand issues of discharge lounge. • Adjust ED hours of work to align with the rest of the hospital (07-19 instead of 08-20)	- Complete metrics for decision to admit from ED	

Figure 1: Average admissions and discharges by day of week (January - February 2006)

January 1-February 28 2006
Average Admissions and Discharges by Day of Week
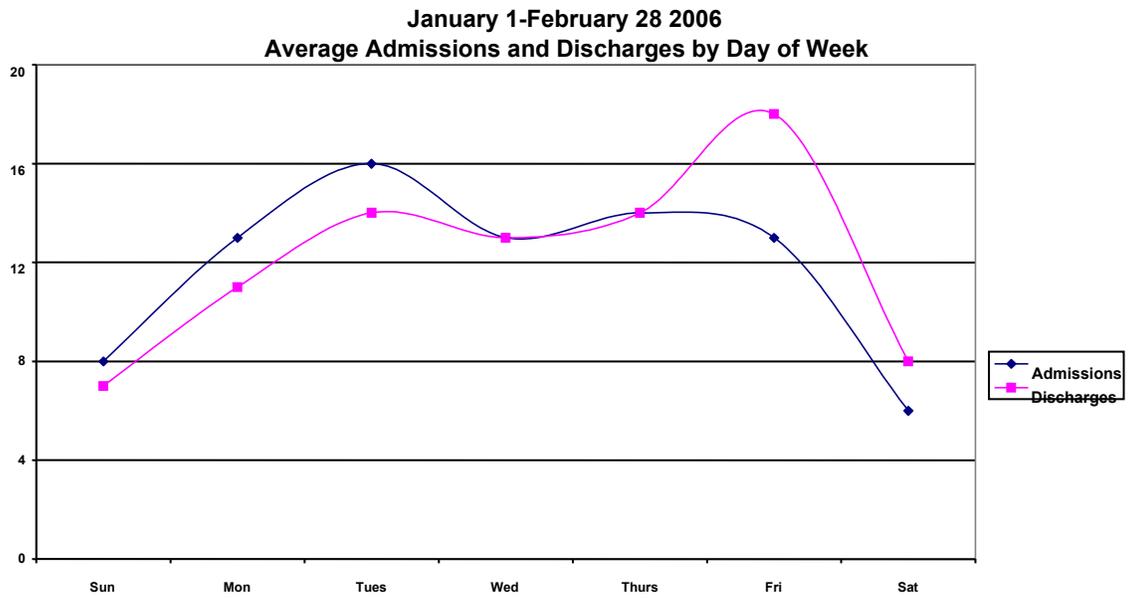
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