

# Reducing Length of Stay by Enhancing Patients' Discharge: A Practical Approach to Improve Hospital Efficiency

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**Abstract.** For years, hospitals have responded to inefficiencies by adding more resources, whereas research suggests that it is a flow problem. King Faisal Specialist Hospital and Research Center decided to improve efficiency and enhance patient flow through improving patient discharge and reducing length of stay. Eight interventions were implemented; dedicating slots in diagnostic services for discharges, improving communication, eliminating pending exams, identifying discharges the day before, prioritizing laboratory tests, coordinating discharge medication processing and utilizing case management. 14.1% of discharges after improvement, compared to 21.7% before, experienced delays. Discharge cycle duration was reduced from 17.9 to 9.2 hours. 4.1% of discharges after improvement, compared to 14.8% before, experienced procedure delays. Procedure turnaround time was reduced from 46.9 to 15.3 hours. Average length of stay (ALOS) was reduced from 12 days to less than 10. Improving hospital efficiency is an integrated process and the responsibility of all hospital staff.

**Keywords.** Length of Stay, Discharge, Patient Flow, Performance Improvement, Efficiency, Hospitals.

## Introduction

The burden of health care expenditure on national budgets has increased worldwide over the past two decades. Recent studies provided explanations; among these is the weakness of efficiency improvement measures [1]. Efficiency is defined as the ability of a system or a process to avoid wasting materials, energy, efforts, money, time or other resources in achieving the intended outcomes or producing the desired results. It is concerned with the relationship between resource inputs and either the intermediate outputs, such as the numbers of patients treated or the eventual healthcare outcomes, such as number of lives saved, life years gained, or quality adjusted life years. Inefficiency can be identified if resources could be reallocated in a better way to increase quantitative or qualitative value of healthcare outcomes [2]. One of the effective tools to improve efficiency is to enhance patient flow and to optimize discharge processes [3]. Because waits, delays, and cancellations are very common, they are assumed inevitable in the health care process. For years, hospitals responded to inefficiencies and delays by adding more resources; beds and buildings or more staff, few

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organizations today can afford this. Recent research on assessing the reasons for delays suggests that adding resources is not the answer. In many cases, delays are a flow not a resource problem [4]. The average length of stay (ALOS) in hospitals is often regarded as the most important indicator of efficiency. All other things being equal, a shorter stay will reduce the cost per discharge and shift care from inpatient to less expensive post-acute settings. However, shorter stays tend to be more service intensive and more costly per day. Too short a length of stay could also cause adverse effects on health outcomes or patient recovery. The international benchmark for ALOS has fallen from 10 days in 2000 to only 8 days in 2013 [5]. At King Faisal Specialist Hospital and Research Center, Saudi Arabia, a performance improvement project was launched to enhance patient flow by improving patient discharge processes in order to reduce the ALOS of patients and improve the hospital efficiency.

## **1. Methods**

The aim of the study was to identify and manage reasons of delay in discharging inpatients. A root cause analysis was conducted, showing that delays in discharges were relevant to all patients and are related mainly to three components; 1) Discharge process, starting with writing discharge orders by consultant physicians, then placing orders on hospital information system and finally physically preparing patients to be discharged, 2) Pre-discharge required procedures which are necessary for discharge; lab tests and imaging and 3) Preparing beds for next patients. A delay was considered when the turnaround time of any process exceeded two hours, as per hospital policy. A specially designed database tool was developed and nurses were trained to use it to collect data about discharges and delays at three different medical units; General Medicine, Nephrology and Gastroenterology. Nurses registered four check points; 1) Date and time of decision to discharge, 2) Date and time of placing the order on the system, 3) Date and time when the patient physically left the room and 4) Date and time when the bed is ready for the next patient. Three phases are now identified in between these four check points and the tool allowed nurses to register reasons of delays in each phase. The tool allowed nurses as well to register delays of required pre-discharge procedures and the reason of delays, including operative, imaging procedures and lab investigations. The improvement project was conducted in three phases; 1) Data collection and analysis for delay frequencies, magnitudes and reasons over the first two quarters of 2016, 2) Launching a group of improvement interventions, based on the analysis, in June 2016. 3) Recollection and analysis of data for the post-improvement, from July to September 2016. Improvement included eight interventions; 1) Dedicating slots in radiology department for discharging patients, 2) Establishing clear line of communication between radiology and head nurses to coordinate procedures, 3) Reviewing all the radiology exams pending from previous days and addressing the reason for delays by supervisors, 4) Identifying all actual and potential discharges the day before by rounding consultants, 5) Labeling laboratory samples for morning discharge patients with a different color and handling these in priority in collection, transportation and in lab, 6) Requesting pharmacy team to coordinate with head nurses to improve response and expedite the discharge medications, 7) Establishing clear line of communication between head nurses and housekeeping to improve on the turnaround time of cleaning patient rooms after discharge, and 8) Assigning case managers to coordinate with different departments and family to facilitate discharge.

## 2. Results

Considering that workload and staff to patients' ratio were the same, comparing the first two quarters of 2016 with the third, we find that before improvement, 21.7% of discharges (257 out of 1,187) compared to only 14.1% (72 out of 511) after improvement experienced delays. As shown in Table 1; there has been a significant improvement over the total discharge cycle duration, with an improvement in the mean from 17.9 to 9.2 hours (48%), on the median from 6.5 to 5.4 hours (17%) and on the 90<sup>th</sup> percentile from 30.1 to 15.2 hours (49%). There also have been variable improvements over all of the three phases of the process. Delay reasons, of the three phases were analyzed and sorted descending by their frequency of occurrence to develop improvement procedures. In the pre-discharge procedures delay analysis, shown in Table 2, there has been a significant improvement of turnaround time, the mean improved from 46.9 to 15.3 hours (67%), the median from 25.3 to 5.4 hours (79%) and the 90<sup>th</sup> percentile from 94.3 to 43.1 hours (54%). Before improvement, 14.8% of the discharges (176 out of 1,187) experienced delays in procedures, while only 4.1% of the discharges (21 out of 511) after the improvement experienced delays. As a result of this improvement in both discharge processes and the pre-discharge procedures; the ALOS for the three medical units could be reduced, for the first time in 2 years from almost 12 days to less than 10 days.

**Table 1.** Mean and 90<sup>th</sup> percentile of the 3 phases and total discharge process cycle measured in hours comparing before and after the improvement.

| Phase  | Phase 1 |                      | Phase 2 |                      | Phase 3 |                      | Total |                      |
|--------|---------|----------------------|---------|----------------------|---------|----------------------|-------|----------------------|
|        | Mean    | 90 <sup>th</sup> Per | Mean    | 90 <sup>th</sup> Per | Mean    | 90 <sup>th</sup> Per | Mean  | 90 <sup>th</sup> Per |
| Before | 4.8     | 4.0                  | 8.7     | 11.2                 | 4.5     | 4.3                  | 17.9  | 30.1                 |
| After  | 1.5     | 3.2                  | 5.3     | 8.7                  | 2.4     | 4.0                  | 9.2   | 15.2                 |

**Table 2.** Mean, median and 90<sup>th</sup> Percentile of pre-discharge procedure process measured in hours comparing before and after the improvement. Count is the incidents of reported delays in discharged patients.

| Procedure Cycle | Count | Mean | Median | 90 <sup>th</sup> Percentile |
|-----------------|-------|------|--------|-----------------------------|
| Before          | 176   | 46.9 | 25.3   | 94.3                        |
| After           | 21    | 15.3 | 5.4    | 43.1                        |

## 3. Discussion and Conclusion

Since all the delays in discharges were relevant to all patients and to improve the discharge process, it is very essential to dedicate slots in the radiology schedule and utilize after hours for patients that are under discharge process. Research discusses the positive influence of prioritizing discharge patients on streamlining patient flow and improving discharge efficiency [6]. Improving direct communication between radiology department staff and head nurses, to coordinate discharge patients' procedures, can improve patient flow and minimize delays [7]. Better communication, as well, between nurses and housekeeping can spare a lot of wasted time though avoiding occasional slow response of making beds ready for next patients [8]. To avoid simple and routinely encountered delays, discharges have to be planned in advance. Patients on discharge list need to be identified early the day before, whether these are

actual or potential discharges. This can be achieved through prioritizing physicians' rounds, improving discharge planning efficiency [9]. Laboratory samples for morning discharge patients should be labeled with a different color and handed in higher priority for collection, transportation and processing. It is the pre analytical phase improvement that can significantly enhance patient flow and discharge by reducing turnaround time of lab results needed for discharge [10]. Since discharge medication preparation and reconciliation is an essential component of the patient flow improvement, it is very important to requesting perfect coordination between the pharmacy team and the head nurses, responsible for discharge, to improve response and expedite the discharge process [11]. Add to all these interventions, utilizing case management to coordinate work throughout different services proved to improve patient flow significantly and improve post hospital transitions of patients to other settings [12]. The improvement of discharge process and reduction of inpatients' length of stay remain among the most effective interventions to improve enhance patient flow inside hospitals and improve their efficiency [13]. It might also be beneficial to monitor and then improve an extra new phase; the interval from the time inpatient bed is made ready for the next patient until the bed is physically occupied by the newly admitted patient. This new phase is not related to the discharge of the patient but related mainly to the efficiency of admission and boarding processes and is an influential factor on the hospital efficiency and the patient flow [14]. As a matter of fact, improving hospital efficiency and optimizing patient flow is an integrated and highly connected process, it is not a department specific or a specialty task; rather it is the responsibility of all hospital staff members.

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