



**Research Article**

**IMPROVING BED UTILIZATION USING A PEDIATRIC DISCHARGE LOUNGE**

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**ABSTRACT**

This article examines the establishment of the first pediatric discharge lounge in King Abdullah Specialist and Children’s Hospital(KASCH), a military university hospital located in Riyadh, Saudi Arabia. This played a major role in a revised patient flow methodology. Using a Plan Do Study Act (PDSA) method to design, develop, test and implement this new concept, the discharge lounge was introduced. Following an initial pilot program, it has successfully achieved its second year of sustainability. It has been effective in reducing length of stay of 546.15 bed days through the introduction of a cost neutral strategy that has saved the organization a modestly estimated one million Saudi Arabian Riyal (SAR) equivalent to 364,096 United States Dollars (USD) using a sample size of (n=10,119). Patient and parent satisfaction was measured using a five (5) point Likert Scale (sample size n=150) with a positive experience/satisfaction score of 78%.

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**INTRODUCTION**

The King Abdulla Specialized Children’s Hospital, located in Riyadh, Saudi Arabia, shared similar challenges along with their international counterparts with Emergency Department (ED) overcrowding, delayed discharges, increased length of inpatient stay. In spite of the introduction of a robust revised patient flow methodology from the ED and bed management teams, the hospital continued to experienced continued challenges related to flow and bed availability. In spite of early rounding an decisions to discharge. A series of reasons for delays included transportaion , medication, education of parents/patients as part of discharge preperation and housekeeping delays in preparing rooms. Delays resulted in bottlenecks in the ED with further delays for elective admissions.

Patient flow presented a major organizational challenge in terms of (ED) increased length of boarding times and delays in admission for elective patients. Increased length of stay for patients within the mememrgncy department was examined internationally and equalted to an overall increased length of hopsital stay and assocaited morbidity <sup>1</sup>.

Delays in discharging patients resulted in a bottleneck in patient flow that impacted ultimately upon patient safety, satisfaction and overall organizational efficiency. A decision was made to examine the obstacles that enabled early and timely discharge. A core team was established between inpatient and emergency staff.

One of the major causes of delays and bottlenecks to flow had been delayed decisions to discharge, delays in transport and medication dispensing. An average delay for pediatric patients following a decision to discharge was 8 hours. Main reasons were related to waiting transportation and medication.

A comparable study undertaken by Brown *et al*, 1998<sup>2</sup> produced similar trends related to delays citing medication, transportation and review by physician as the main reasons. They did however suggest that further studies would be prudent in relation to the incidence of respiratory admissions. These cases have however been noted to comprise 25% of the annual 8,000 admissions.

Hernandez *et al* <sup>3</sup> identified the importance of advanced discharge preperation, education , whilst Weiss *et al* <sup>4</sup> emphasized the value of carefully planning and preparing patient and family needs to expedite the safe and timely stage of the patient’s journey.

International literature examined pediatric hospitals of similar size and throughput as (KASCH) and indeed described similar patient flow methodologies related to the expidition of timely, safe discharge<sup>5,6</sup>. All describe the application of lean methods to improve patient flow and discharge. There has however been little research related to pediatric - specific discharge lounges and is therefore an area identified for further research.

**METHODOLOGY**

Daily bed management meetings were introduced, attended by key stakeholders such as clinical, nursing and bed management case workers. On call Directors of Nursing would also chair the meetings to effectively support any challenges identified and work on a plan of escalation at the end of the week going into weekends. It was agreed that any challenges to patient

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flow would have a strategic plan in place prior to senior personell leaving at the end of each day.

The pull/push method of patient flow was introduced pre-empting triggers that might occur within the ED (delays of more than 6 hours); late admissions for elective patients and delays in urgent, unplanned admissions from clinics<sup>7,8</sup>).

A strategy was developed whereby a series of (PDSA) Plan-Do- Study- Act cycles were undertaken to test and refine the revised patient flow methodology within the hospital at predetermined time frames during the course of 2 years. The PDSA cycle is shorthand for testing a change by developing a plan to test the change (Plan), carrying out the test (Do), observing and learning from the consequences (Study), and determining what modifications should be made to the test (Act).

A strategy was developed following a cause and effect analysis. The quality improvement strategy was taken through a series of 5 rapid phases.

Phase (1) January 2016, one month, examined cause and effect, ranking of highest challenges with interventions and outcome(s) analysis (Figure1). This included a strategy to identify a suitable location that would be cost neutral to commission and examine available manpower resources along with skill mix to optimize existing resources. Table (2) illustrates the timeframe using a Gaant Chart.

Phase (2) February 2016, one month, developed a clear inclusion/exclusion criteria to be used when selecting patients for transfer to the discharge lounge. Develop a Departmental Policy and Procedure, Unit Profile, staff training needs analysis, patient and parent brochure. Through the development of the unique policy, staff could easily make a desion related to exclusion criteria, therefore selecting suitable patients to be transferred to the Discharge Lounge. Development of inclusion and exclusion criteria for patients accomodated in the area. All immunocompromised and infected patients along with complex care needs such as chronic ventilated patients were excluded. Inclusion and exclusion criteria clearly detailed in the policy guidelines. During year (1) 548 out of 2,720 patients met the criteria.

Phase (3) March 2016, examined 3 month's of activity as the pilot phase of operation during end of first quarter. Introduction of additional services such as patient education, final dose of antibiotic regiment and expidition of take home supplies.

Phase (4) June 2016, one month, parent and patient satisfaction questionnaire survey was conducted using a 5 point Likert scale .Feedback from wards and departments. Discuss challenges and benefits of the unit. Figure (3) illustrates the child and family-friendly environment of the unit.

Phase (5&6) finally, the sustainability phase at end of year's 1 and reviewed again at end of year 2 respectively.

Phase (7) completion of study and presentation of results and recommendations.

#### **Ethical Approval/Consent**

All patients were anonymized, retrospective data examined and therefore ethical consent was not required.

## **RESULTS**

The results from 2016 to August 2018 were examined and illustrated the following:

An increase from 36.3% to 44% of patients being sent to the discharge lounge during the morning period was related to improving trends in early morning discharges. Afternoon discharges appeared to reduce from 55.4% to 50% and appeared to be related to the inroduction of the Pediatric Acute Unit (PAU) as a pilot program that reduced the demands upon the discharge lounge by optimizing the PAU unit for low acuity cases requiring brief management less than 72 hours. This population of patients had been discharged directly from the aforementioned unit.

The Average Length of Stay (ALOS) had reduced from 1.22 hours to 1.10 hours and was attributed to the fact that the Discharge lounge system was well established and resulted in a more streamlined process along with understanding and awareness of parents. Overnight Conversions from the unit had remaned between 12-13 annually. All cases were analyzed and it was noted that 75% of the re-admissions were related to failure of parental transportation (collection) . Whilst 20% of the cases were related to an unexpected change in the patient's condition and the remaining 5% were delayed slightly over the hours of operation but were discharged home (Table 4).

An overall summary of the results achieved following the introduction of the Pediatric Discharge Lounge reflected as an average during the three years. Average admission in this unit since operation was 3,000 per annum. Average length of stay 1.15 hours. Bed days saved were 59 per annum equating to an overall cost saving of 455,119.30 SAR/121,365.15 USD.

#### **Patient/Parent Satisfaction Survey Results**

Parental as well as age-specific satisfaction and feedback questionnaires were distributed approximately 3 months following the implementation of the Pediatric Discharge Lounge project. The return rate was 86% with evidence of pediatric patient group engegement.

Using a five point Likert scale, 78% were very happy with the service and overall experience in the Discharge lounge. 14% satisfied with the experience and 8% thought the area required toys and entertainment for the children. It is however worthy to note, that two areas were converted to play zones with toys, tables, chairs, play station centres, videos and books.

#### **Discharge Trends**

Discharge trends were examined and showed that, 09:00- 12:00 yielded 36.3%. Whilst the peak time of discharge activity occurred between 13:00-16:00 = 55.4%. With the fewest of discharges occuring during the evening 17:00-19:00, 8.3%

#### **Sustainability Results**

During years 2 and 3 only 12 patients (0.3%) returned to ward from the Discharge Lounge due to sudden and unexpected symptoms and failure of transportation and were deducted from the overall cost saving for the year.

## **DISCUSSION**

The Kingdom's first succesfully implemented Pediatric Discharge Lounge has been pivotal to the success of a revised patient flow methodology within the hopsital. It has resulted in

almost zero delays for inpatient beds in the ED, has achieved zero cancellation of elective procedures due to unavailability of inpatient beds. This was a cost-neutral project implemented by using existing resources of location, equipment and manpower. Training needs of front line staff were addressed through internal upskilling programs. The efficiency and effectiveness was evaluated through a series of monthly analysis of key performance indicators. End user satisfaction questionnaires were distributed among parents and patients .

An overall cost saving during the three year program has equated to **1.5 million SAR ( 400,00.00 USD) and almost 400** in patient bed days were rendered available for utilization for emergency and elective patients that would otherwise have been delayed or cancelled (**Table 2**).The results provided evidence of efficiency and improved patient flow methods among the pediatric population. Limitations to the study were identified when attempting a comparison with similar pediatric units presented a major challenge. Literature yielded a scarce selection against which to compare. The model for adult discharge lounge units appeared to be more established internationally, but not nationally<sup>9</sup>.

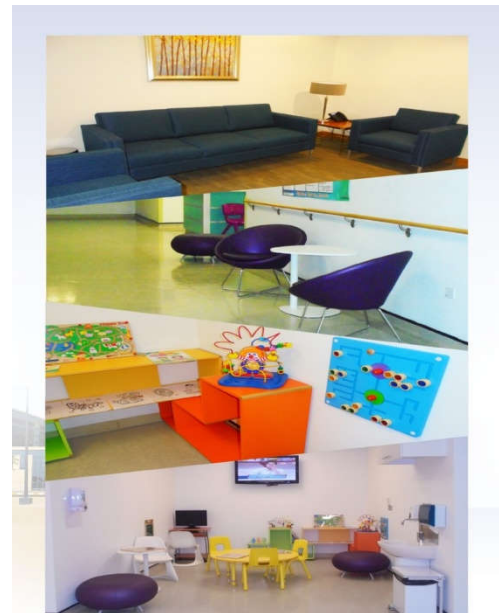
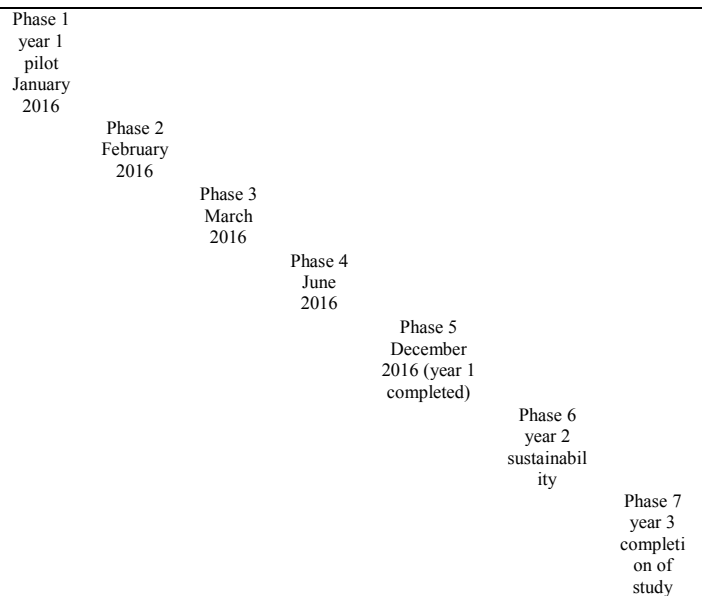
The study spanned a period of more than two years which clearly demonstrated its sustainability and effectiveness on patient flow, reduced length of stay, all supported with timely discharge planning. Patient and parent satisfaction survey results of an overall 78% positive experience at the end of the patient journey and provided a reliable indicator of patient safety and involvement as part of a partnership model.The recommendations are for the continued use of the unit with consideration to extend the hours of operation to exceed 19:00 in line with local cultural trends associated with evening activities. Seasonal weekend opening should also be considered to support patient flow as part of winter pressure planning initiatives. The organizational vision, based upon the success of this unit is to invest in the creation of a larger twenty four (24) bed pediatric unit operating 24/7.

**Disclosures**

The authors wish to confirm that there has been no conflict of interest in the creation of this article.

importance. This illustrates the bars contributing to the most problems.

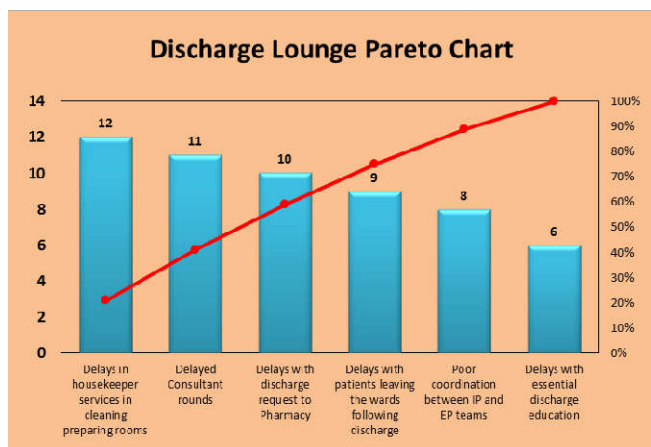
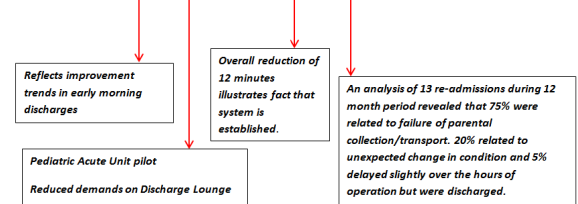
**Table 2 Gaant Chart**



**Figure (3)** Patient and parent satisfaction 78% Image of child-friendly environment

**Table 4 Three Year Results**

YEAR	No. of Patients	Time of Transfer (%)			Average Length of Stay	Overnight Conversions	Total Utilization (Hours)	Total Bed Days Saved	Cost Saving
		Morning	Afternoon	Evening					
2016	3,072	36.30%	55.40%	8.30%	1 hr. & 22 mins.	12	4,218.53	175.77	439,425 SAR/ 117,180 USD
2017	3,689	42.00%	53.00%	5.00%	1 hr. & 23 mins.	12	5,077.00	211.54	528,850 SAR/ 141,027 USD
2018	3,358	42.00%	52.00%	6.00%	1 hr. & 10 mins.	13	3,812.00	158.20	397,883 SAR/ 105,889 USD



**Figure 1** Pareto Chart

**Legend:** IP refers to an inpatient. EP refers to an emergency admission.

The right vertical axis has percentage demarcations. The cumulative line (red) is used to add the percentages from each bar, starting from left indicating the highest ranking of

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