The Implementation of Lean Healthcare in a Public Hospital in Oman

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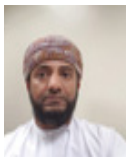

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ABSTRACT: A tertiary care hospital in Oman introduced Lean Healthcare which had a valuable impact on improving its processes and hospital operations. It provided healthcare professionals with tools that helped empower them to improve the process of operations beyond daily clinical activities. Lean implementation in healthcare in the Middle East Region is quite new. The examples described here show how policy makers and healthcare managers can equip care providers with Lean tools that empower them to define and resolve their operational challenges.

Introduction

Oman has a population of 4.6 million.[1] The Royal Hospital has a strong commitment to patient care and over 3,500 talented healthcare professionals with 1056 beds. The hospital served 68,000 admissions, 70,000 emergency visits, and 300,000 outpatient visits in 2019.[2] It is challenged by increased demands, an overflowing emergency department and long waiting lists as a result of the growing population. There is shortage of beds and health care providers which may affect patient care. How will care providers handle this expanding population of patients? The answer is not by being overstretched, nor by spending more, but by leveraging current services.[3] Healthcare systems are full of waste and experience an enormous amount of variation and many preventable mistakes.[4] Lean applications help define problems and eliminate waste. In healthcare, they have been most popular in UK and the USA hospitals for more than a decade now, with focus on the elimination of waste and process improvement rather than cost cutting.[5]

As a result, the Royal hospital launched the Lean program in September 2017, through an external Lean Sensei from the USA. The contracted Sensei visited the hospital on a monthly basis for 7 months. Each visit lasted 2-4 days on average. He trained 32 care providers who became certified lean champions. During those visits, the external Sensei engaged champions in multiple Lean methods. There were a couple of hundred of improvements over two years (2018-2019), which were small to medium in size. These were the result of regular training established for all departments and follow-up by the Lean champions, including senior leadership departmental visits and meetings. However, for the interest of a deeper insight into implementation operations, three examples of improvement projects are described here.

Exposition

Example 1

Improving Patient Flow in Daycare Through Lean Implementation

The daycare ward at the Royal hospital serves to provide services for patients not requiring overnight stay at the hospital. It has 30 beds and 4 single rooms which are

shared by many medical and surgical subspecialties, both adult and pediatric. There was a constant shortage of beds as only a maximum of 50 patients could be served per day. This resulted in long waiting times for available beds, long waiting lists for receiving treatment or surgery. The number of patients requiring daycare increased every month leading, to admissions in regular wards to overcome the shortage, in turn creating a bed crisis on the wards. It was very difficult to accept an extra patient, even for an urgent blood transfusion. There was an urgent need to improve patient flow in daycare in order to serve more patients with the same number of beds and staffing. Our interest focused Lean implementation which began in March 2017. Root cause analysis revealed that patient service was linked to bed availability, even if the procedure does not require a bed. Already at the start of the day, all 34 beds would be occupied by patients which meant that no more patients could be served until one was discharged. Therefore the aim was to improve the use of daycare beds, increase bed capacity by 30%, reduce patient service time by at least 30%, cut registration waiting times by 50% and improve staff and patient satisfaction.

Representatives from all subspecialties (doctors and nurses) and other stakeholders including discharge planners, the financial and information technology departments, medical records, pharmacy, medical laboratories, radiology and the blood transfusion laboratory were all involved in this project involving multiple meetings to explain Leanness, and the challenges faced in daycare. Everyone participated by providing specialty related procedures along with estimated "length of time per procedure". In this way procedures were filtered into those not requiring daycare, those requiring daycare but not beds and those requiring a daycare bed. A visual stream map was prepared for all specialties to identify the areas of waste and identify ways for improvement. Patients were then filtered according to those requiring the procedure to be done after laboratory results and those for whom this was not necessary. After obtaining the number of patients per specialty per year, beds were allocated according to specialty for a smoother flow of patient services, focusing on non-clinic days to enable physicians to attend their patients in a timely manner. Admission type was changed to enable the provision of services to patients without them having to wait for a bed. Patients are now triaged; blood is collected and clerked by the doctors by using single daycare rooms. Procedures that do not require blood tests are admitted directly (for example; drug infusion, surgery) and by the time they finish, blood tests results for the next patients are ready, at which point beds are ready.

By implementing LEAN, bed capacity was increased by 50% (from a maximum of 50 patients per day to 75). The total annual increase in the number of patients served in daycare from 2017 till 2020 was 11% (from 10106 in 2017, 10529 in 2018 to 11163 in 2019). Figures 1, 2 and 3 illustrate the number of patients served in daycare from 2017-2019. Service time was reduced by 30% and the waiting time for a bed was reduced by almost 100%. Afternoon cases could be accommodated during the morning shift and many urgent cases were accommodated on the same day, saving around 6 ward beds per week. The general surgical waiting list was reduced from 6 months to 2 weeks; the waiting list for sweat tests was reduced from 2 months to 2 weeks. All rheumatology patients received their monthly infusions on time. Staff satisfaction was improved in many ways. Specialty doctors had certain days to attend in daycare instead of patients coming throughout the week, thus minimizing interruptions to other clinical duties and increased focus on patients, who were attended to faster, with less errors, making for better patient care overall. Nurse phone calls to doctors were reduced. The pharmacy team suffered much less interruptions as medications were dispatched early morning to daycare, depending on the type of patients scheduled each day, so they could focus on other duties such as the inpatient medication. Satisfaction surveys were distributed to patients from all specialties. Over 80% of patients preferred the new system because of significant reductions in service time. The remaining 20% wanted a bed to sleep on while waiting rather than having to sit on a bench, mainly chronic patients, accustomed to the old system for many years, in which a bed was given upon patient arrival. Patients could have their blood tests done earlier at their local General Practitioner's surgery a few days prior to their appointment in order to minimize their waiting time and a good number preferred this option. The Lean project also helped to create Leanness in other departments, thus avoiding the need for ward admission, such as for chronic patients on ventilators requiring regular ventilator setting checks. 90% of all pediatric thalassemia patients requiring regular blood transfusions are served in daycare compared to 50% ward admission as was previously the case. Even pediatric oncology patients requiring Brain MRIs are now being admitted in daycare to avoid ward admission. As Lean implementation is a continuous improvement process, more is being done to further facilitate patient flows, such as the creation of a special daycare admissions template that is user friendly for doctors and nurses, to speed up patient admission and discharge.

Example 2

5S Management Method in the Pediatric Intensive Care Unit (PICU) to Improve Environmental Efficiency, Safety and Quality

Background:

The physical environment is an important component in the critical care setting and can directly impact patient safety as well as contribute to staff satisfaction, stress and burnout, resulting in medication errors, equipment damage and waste of items due to expiry. Various attempts have been made to reduce medication errors, however errors continued to persist.

What is the challenge?

In the current state, there are many challenges affecting environmental efficiency, quality, and safety which is highlighted in Figure 4 below.

FIGURE 1: NUMBER OF ADULT PATIENTS SERVED IN DAYCARE PER SPECIALTY FROM 2017 TILL 2019

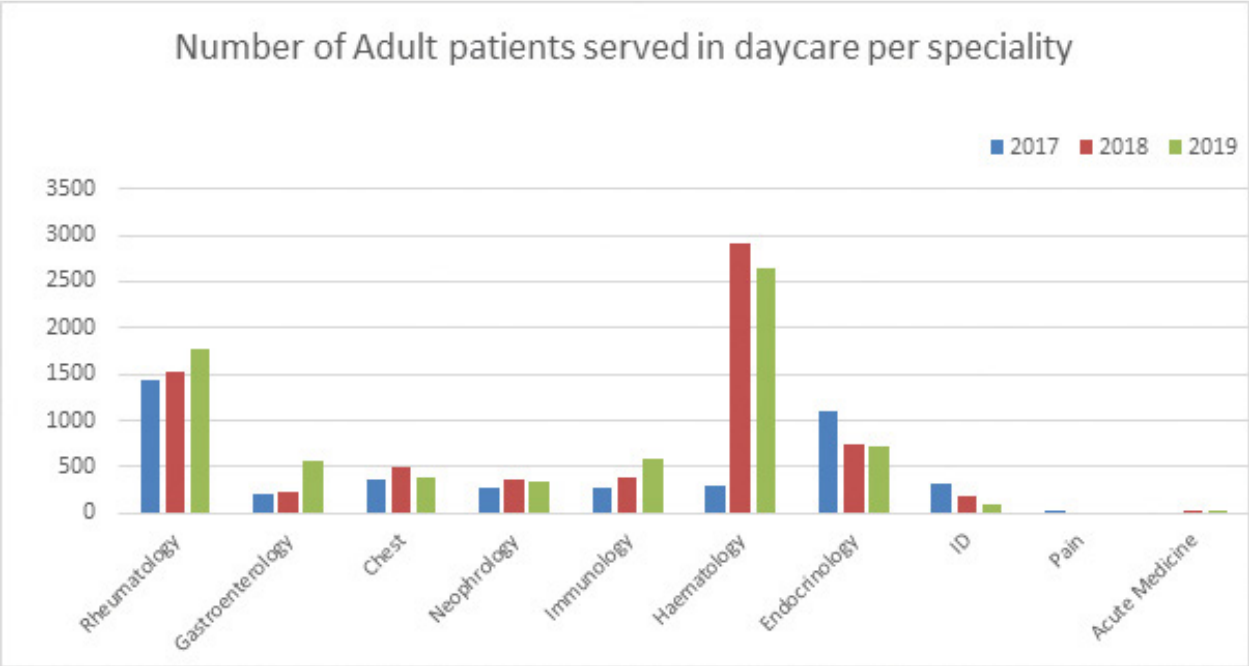


FIGURE 2: NUMBER OF PEDIATRIC PATIENTS SERVED IN DAYCARE FROM 2017-2019

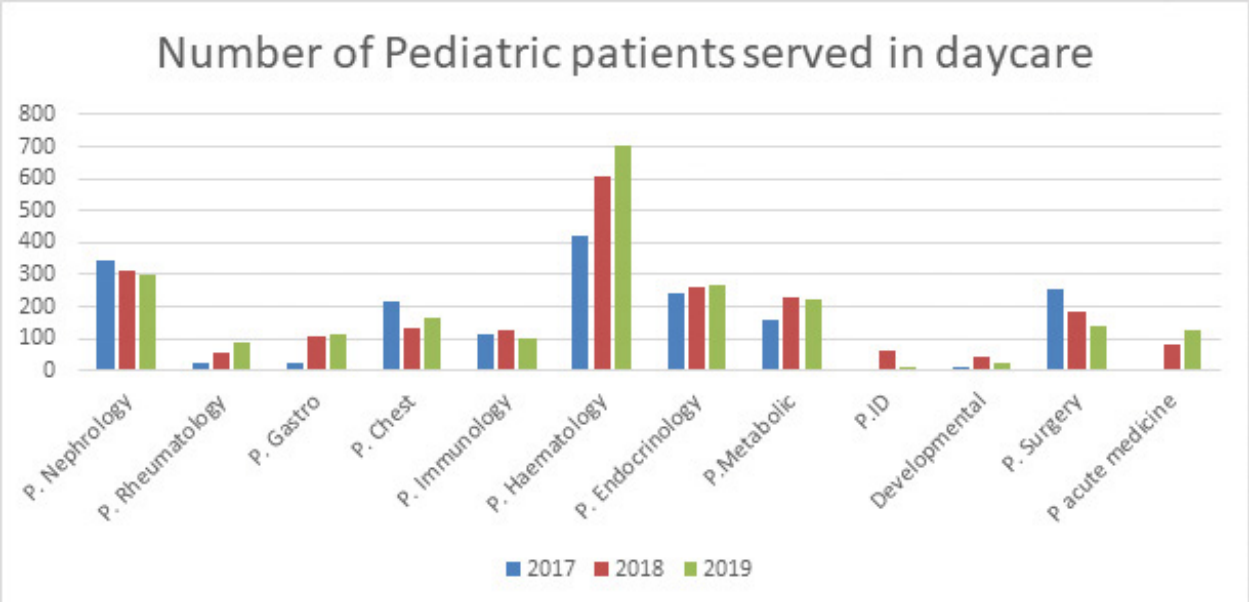


FIGURE 3: NUMBER OF PATIENTS IN SURGICAL SPECIALTIES ADMITTED TO DAYCARE FROM 2017-2019

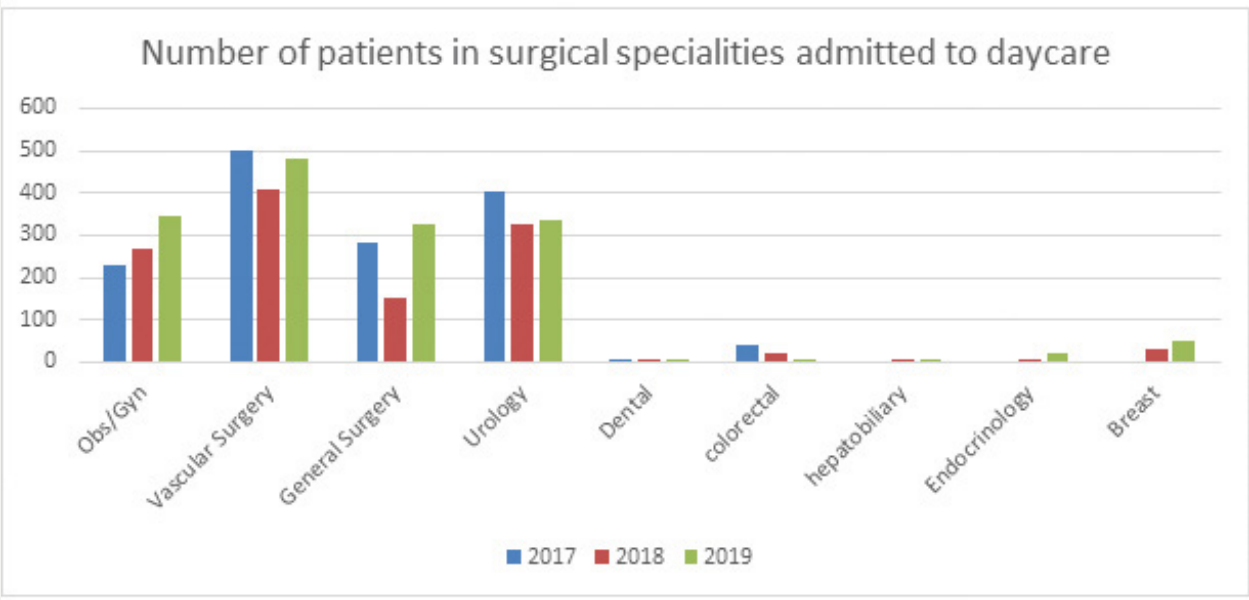
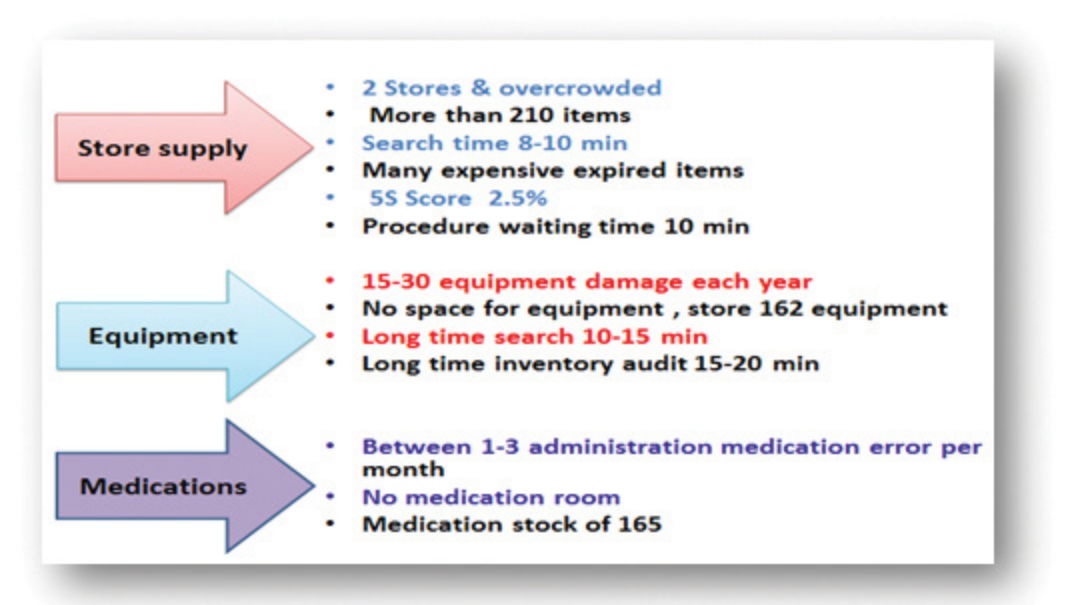


FIGURE 4: CHALLENGES THAT AFFECT ENVIRONMENTAL EFFICIENCY.



What is the aim to be achieved?

The aim is to highlight the impact of environmental constraints on medication errors, nurse efficiency and the quality of patient care in critical care units. to the aims is also to explore the effect of Lean tool usage in preventing medication errors and improving environmental efficiency by implementing 5S tool in PICU.

What was done to identify the problems?

A root cause analysis (RCA) and 5 whys tools were used to identify the problems, followed by the implementation of Lean tools including A3 and Value Stream Mapping (VSM).

What was the proposed solution for this problem?

The application of the A3 lean method and root cause analysis, to identify environmental constraints. For example, no medication room, lots of medication in stores, and distractions during preparation, equipment damage, the expiry of items due to limited storage and the hoarding of various unneeded equipment and supply. PDCA and 5S lean tools were implemented in PICU. An inventory management system and 5S was implemented in the store to control the expiry of items and improve efficiency. Color-coded medication infusion labels were implemented to facilitate infusion identification for visual management. 5S was implemented for equipment, with visual and label management. Unused equipment was distributed to other units in need, thus reducing the cost of buying new equipment for other units. This improved equipment store organization and stocking with utilized equipment only. The environment was reorganized with 5S and the application of the PDCA cycle for sustainability. This was supported with nurse awareness and empowerment, to ensure staff engagement and standardization support. The project was implemented in all critical care units with similar methodology process.

What was the impact of implementation?

After one year of implementation, the achievement is highlighted in Figure 6 below.

Summary:

5S approved to be a successful achievement in an ICU environment which impacts staff performance, quality and efficiency. Motivation and engagement play a unique role in the sustainable application of 5S and other lean tools. 5S can be used as a strategic tool for policymakers to develop quality improvement initiatives and enhance quality and safety.

Example 3

Generating Leanness in Pediatric Clinical Rounds

Background

The Child health Department at the Royal hospital is the main tertiary care center for sick children in the country. The department consists of different subspecialties which serve as tertiary care level for complicated medical cases from across the country.

What is the current challenge?

A growing population, increased number and complexity of referred medical cases. Limited bed availability in the department, limited tertiary care facilities in other regions in addition to serving as a secondary care facility for Muscat Region. Bed management is very critical to accommodate increasing demand, especially during bed crisis season, usually from September to March each year.

Goal

To improve bed management with the following strategies:

1. To improve clinical round dynamics on admitted

FIGURE 5 EXPLAINS THE 5S IMPLEMENTATION PROCESS.

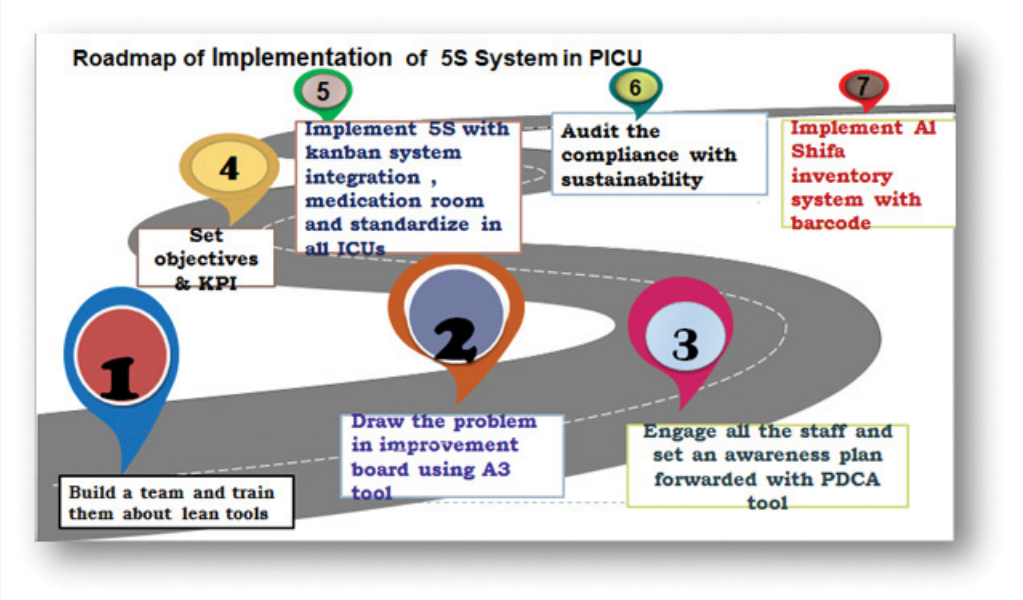
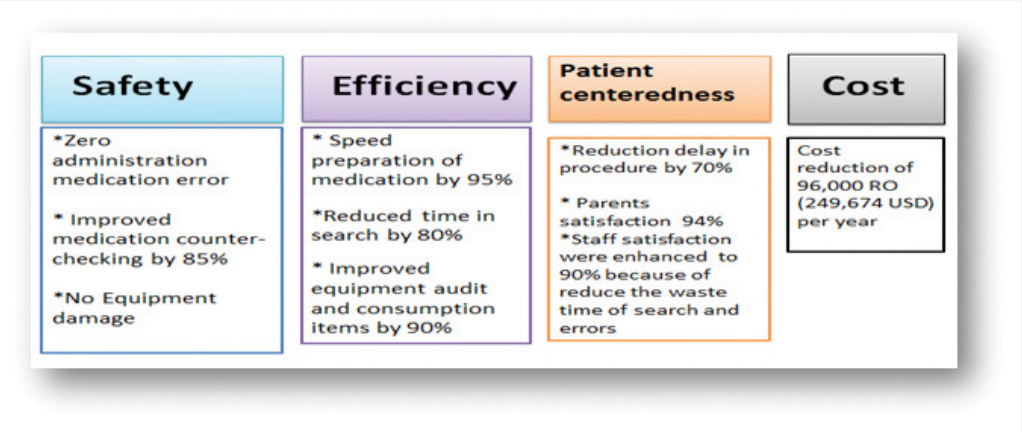


FIGURE 6: THE IMPACT OF 5S IMPLEMENTATION IN IMPROVING ENVIRONMENTAL EFFICIENCY.



patients

2. To increase the number of early discharges
3. To improve the quality of patient management.
4. To improve inter- and intra- team relationships and communication
5. To better utilize the time and available resources

Methods

Implementing Lean principles by using VSM helps to identify the bottlenecks where most of the delay in the clinical round takes place. Applying active clinical rounds with multi-level handovers and active time monitoring of the round. Including and clearly distributing responsibilities among team members helps to improve round dynamics.

Results:

Making the clinical round lean with multidisciplinary management of the discharge process resulted in significant improvements in discharge times, with increased numbers of early discharges and better bed utilization, as shown in Figure 7.

Summary

Applying Lean tools such as VSM for the clinical rounds process improved clinical rounds dynamics, bed utilization within the child health department, early discharges and resulted in the following advantages:

- Improved communication among health care providers involved in patient care.
- Improved efficiency of the clinical round.

FIGURE 7: VISUAL STREAM MAPPING OF THE CLINICAL ROUND.

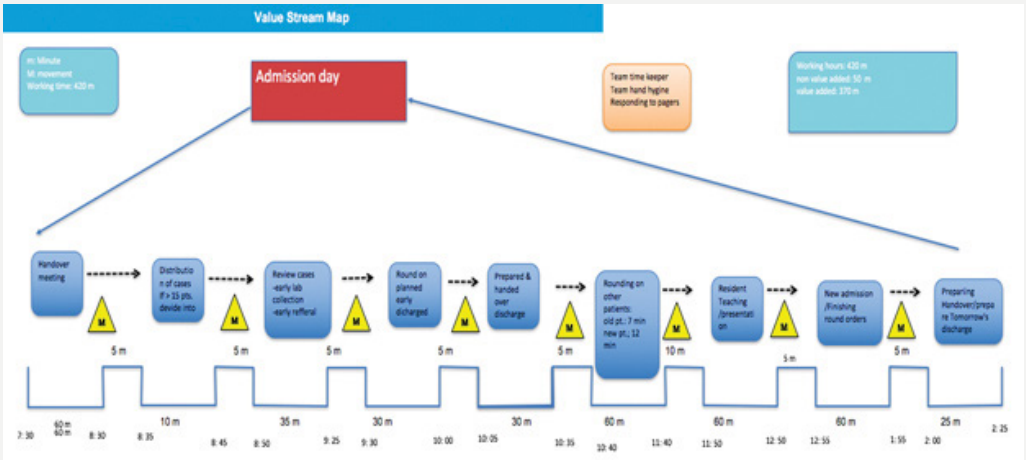
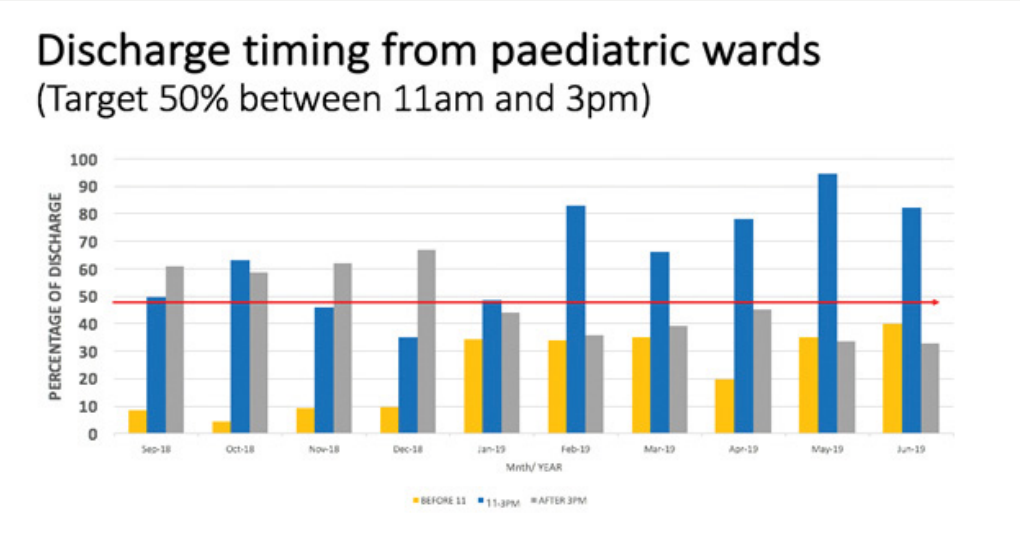


FIGURE 8: DISCHARGE TIMING FROM PEDIATRIC WARDS



- Better bed utilization on medical wards
- Eliminated Motion and over-processing in patient care for patients admitted to the child health department

Follow up

- Monitoring discharge timing on monthly basis in the child health department as one of the pediatric wards key performance indicators (KPI)
- Improved awareness of this project among staff and residents in the department and enhanced implementation of this project to improve clinical rounds and bed utilization in the department
- Addressed and solved obstacles that may arise during the implementation of this project

Conclusion

The three examples illustrated the impact of Lean implementation on hospital operations. Progress was dependent on training and leadership support through visits to different departments. The improvements created an environment of "how can we do our job better today than yesterday". Therefore Lean improvement tools are a good platform for involving healthcare providers in operations and process improvement. However, the journey towards engaging different stakeholders to continuously improve and sustain improvements has only just begun.

Conflict of Interest

The authors have no conflict of interest to disclose.

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