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Improving Outpatient Clinic Operations: A Case Study at Lady Ridgeway Children's Hospital, Sri Lanka in 2019

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ABSTRACT

This study focuses on improving outpatient clinic operations in an existing largest public free of charge pediatric hospital in the world, Lady Ridgeway Children's Hospital, Sri Lanka. According to our preliminary investigation, the outpatient clinic of this hospital is currently suffering from inefficient operations which lead to a significant patient's waiting time to receive the doctor care and other services. This eventually leads to a decline in patient's satisfaction in overall hospital services. The primary objective is to reduce the patient waiting time in each stage of operation. On-site data collection and exploratory study are carried out in order to fully understand the current operations and to identify the root causes of the problems. Process analysis is performed to identify the process bottleneck. Integrating areas of queuing theory, and facility layout, a set of improvement guidelines is proposed. Discrete-vent simulation results show that, with the proposed guidelines and operation settings, the overall patient's waiting time can be significantly reduced.

Keywords: Inefficient operations, Patient's satisfaction, Patient's waiting time

INTRODUCTION

Lady Ridgeway Hospital for Children is the largest public free of charge pediatric hospital in the world. It serves as the national referral center for pediatric care for Sri Lanka. It also serves as a local hospital for the population in and around Colombo city for minor ailments. This hospital has 1000 beds and it treats children below 14 years of age from all over the country. It has all supportive services required to provide quality patient care. The total number of staff is over 2000. The medical staff consists of nearly 70 consultants and nearly 300 medical officers. They are organized as medical teams headed by permanent senior consultants who have international experience in that particular specialty. Nursing staff consists of nearly 700 nursing officers and are organized as teams in line of the organization of doctors.

The outpatients department (OPD) and the accident services department of this hospital are open for 24 h a day, for 365 days. Out patients clinics conducted by the relevant consultants of inpatient units and visiting consultants of the OPD maintain a continuous link with patients discharged from their units. There is also an emergency treatment unit, diarrhea unit and immunization clinic which operate in the OPD to improve the quality of care.

This study explores current operations in an outpatient clinic department in Lady Ridgeway Hospital for Children, Sri Lanka. The participating hospital is the largest children's hospitals in Sri Lanka and one of the largest in Asia, which is currently facing patient's long waiting time to receive the hospital services. Unlike any other major public hospitals, this hospital is subsidized by the government and totally free of charge to the patients. Therefore, public hospitals appear to be the only place affordable by the low income groups of patients. On the other hand, with high quality of professional and medical services, the hospital also serves middle to high income groups of patients as well. Besides the free of charge and the quality of health care, responding time to patients is another aspect of overall service quality that highly affects the patient's satisfaction.

The outpatient clinic department of the participating hospital is currently facing patients' dissatisfaction in unrealistically

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long waiting time to receive the medical care as well as other services within the outpatient clinic department. Based on preliminary evidence, patients are likely to experience significantly less waiting time to receive medical and other care in the private hospitals. This is why majority of patients could be willing to pay more in order to reduce queue time [1].

The primary objective of this exploratory study is therefore to investigate the current operations and to identify the causes of extensive waiting time in each stage of operations. The operations in the participating hospital are approached and investigated by defining resource and the effectiveness of the use of resource. A set of quantitative and qualitative studies are carried out. This study proposes the guidelines for improving the patient's overall waiting time without affecting the quality of professional and medical quality. A set of recommendations is proposed after the case study.

ASSESSING CURRENT SCENARIO

To understand the overall processes and to identify the causes of problems, the study is initially carried out by observing the current operations and common procedures in outpatient clinic departments. The outpatient clinic department (OPD) of this hospital consists of seven clinics as follows: General Practice Clinic, Pathology Clinic, Pediatrics Clinic, Ear Nose Throat Clinic, Surgery-Orthopedics Clinic and Eye Clinic. Once one enters the hospital, patient has to report to the registration department **(Figure 1)**. Then the registration department will retrieve the patient record and send it in a hard copy to the appropriate clinic. In the meantime, patient can go directly to one of seven outpatient clinics as appropriate or as suggested by the registration department staff. Patient that has appointment does not need to report at the registration department as his/her record is already transferred to the appointed clinic at the beginning of the day. Some patients may attend more than one clinic in one visit depending on the complication of their case. Once the treatment is completed, patient receives prescription and goes to the medicine/cashier department. As prescribed, medicine is received and transaction is completed, patient may exit the hospital **(Figure 2)**.

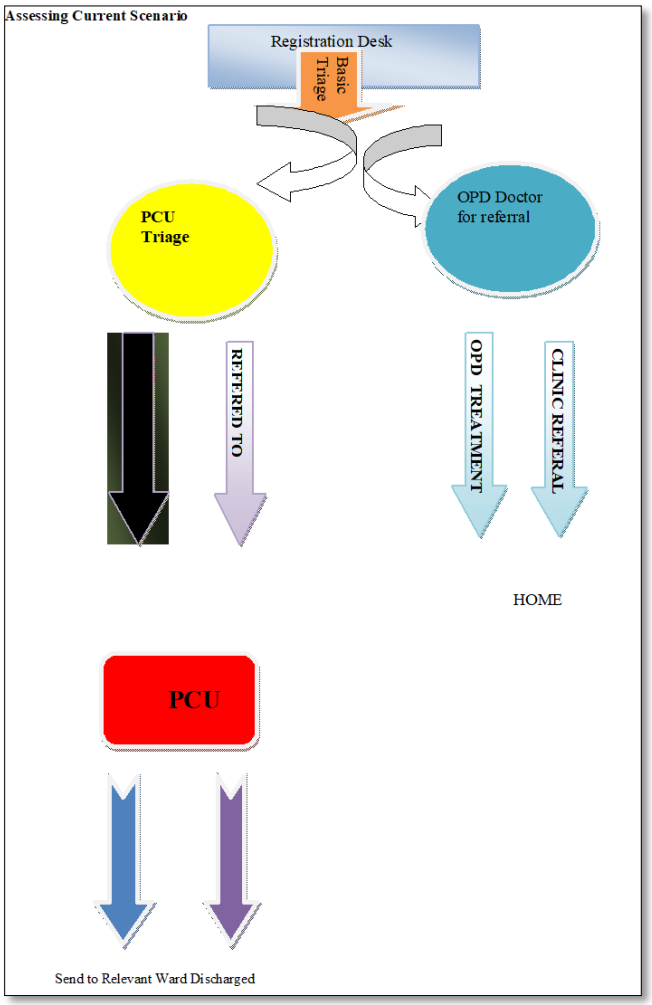

Figure 1. OPD admission pathway at LRH.

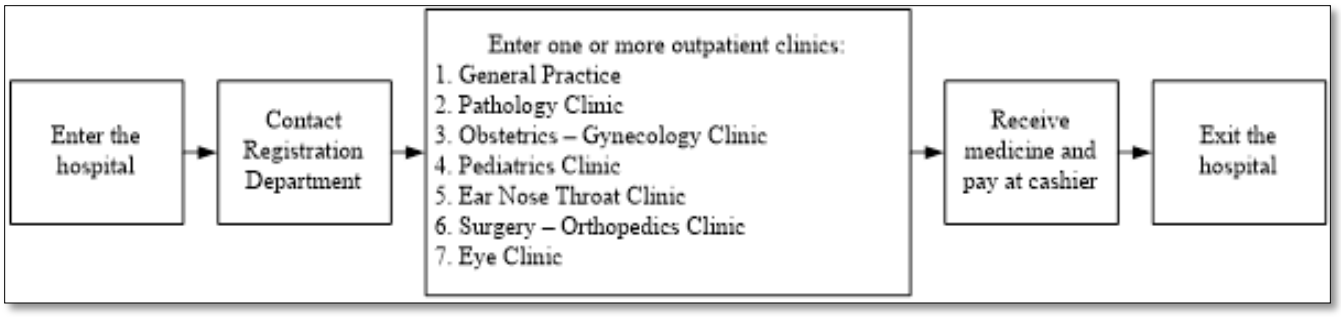

Figure 2. Common processes for outpatients in a public hospital.

Although each outpatient clinic has different number of doctors, nurses, and staff and different clinic detailed layout, it is found that all seven outpatient clinics have similar flow of operations as shown in **Figure 3**. As patient enters the clinic, he/she must first contact the front desk (counter 1). Nurses will check whether the patient's medical record has arrived from registration department. Patient stays in queue waiting for their medical record and the availability of pre-diagnose nurses (counter 2). It is found that the waiting time at this stage is not significant. As pre-diagnosis are completed, patient transfers to a large queue waiting to be treated by one of the doctors. According to on-site data collection, it is found that patient spend a significant time in this queue. In some clinic during peak time, some patient may have to wait as long as three hours or more to receive the doctor care in this queue. After receiving medical treatment, patient contacts counter 4 to give the medical record to nurses and wait in queue. Nurses will print out the prescription and release to patient at counter 5. Patient exits the clinic with prescription and transfers to the medicine/cashier department. In this department, it is observed that each patient also spends significant time waiting to complete the procedure.

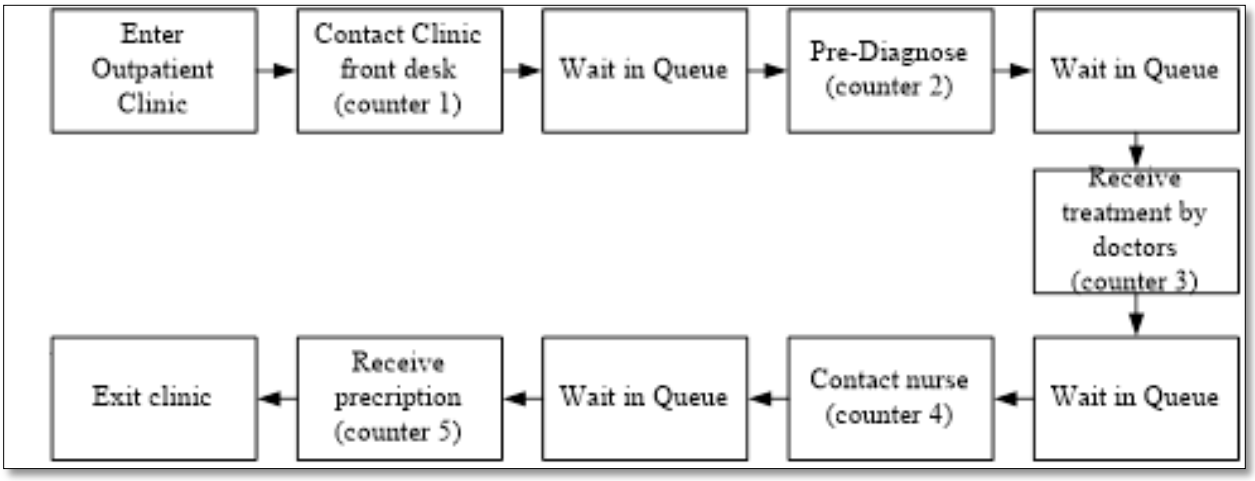

Figure 3. Overall patient flow within the clinic.

After observing the existing patients' flow and common procedures in all outpatient clinics, the data collection sheet is designed and distributed. The primary elements required in data sheet are the average waiting time and service times in each stage of operation, the average time patient spends in the outpatient clinic department and the number of patients entering each outpatient clinic in each time period during the day. These information are then further analyzed to identify the process bottleneck and to calculate the patient inter arrival time, patient arrival rate and service rate in each operations which will be used in simulation models. The data was collected for 1 month period. It is found that patients spend more than 3 h on average in the patient clinics waiting for doctor cares and other hospital services. Although most internal operations in each clinic are similar, some clinics are suffering from extensive patient waiting time than the others **(Tables 1 and 2 and Figures 4 and 5)**.

Table 1. Performance of outpatients department 2018.

No.	Description	No. of patients
1	No of first visits	435616
2	No of subsequent visits	19728
3	No of emergency patients (ward admissions)	81587
4	Emergency Room (PCU)	50830
5	OPD visits (accident service)	49311
6	No. of patients treated for injuries in the dressing room	5273
7	Rheumatic clinic	1328
8	Lactation management unit	3194
9	Nutrition clinic	6581
10	Total no. of patients encounters	653448

Source: AHB LRH 2018

Table 2. Laboratory investigations in OPD.

Description	No. of patients
No. of specimen taken	89966
Monteux test	579

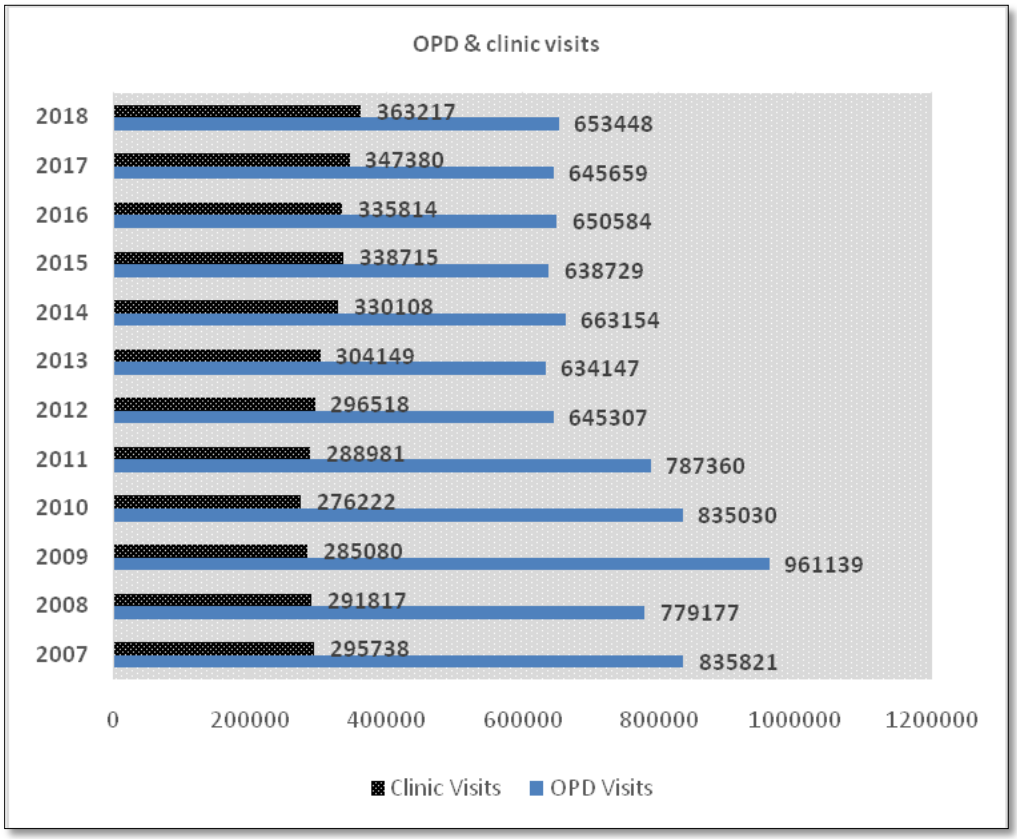

Figure 4. OPD and clinic visits 2006-2017.

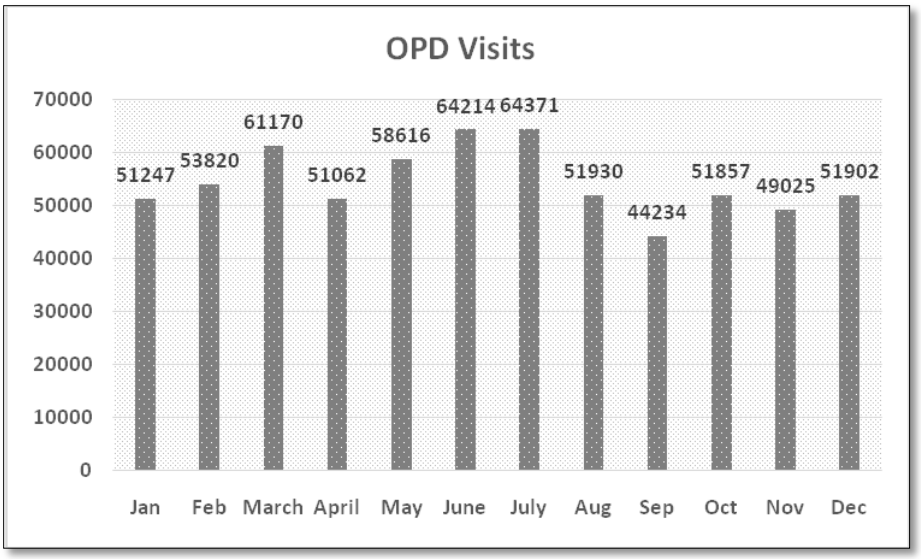

Figure 5. OPD visits 2018 (by month).

The problem statement and the scope for improvement can be stated into three main categories as follows:

1. **Insufficient number of doctors:** According to on-site observation and data collection, it is found that there are a significant large number of patients waiting in front of the doctor rooms. Comparing the service times of all operations, it can be concluded that this is the bottleneck of the process. This is mainly due to insufficient number of doctors to serve as compared to the number of patients arriving at the clinic. This problem seems to be common for all seven outpatient clinics. Reducing the treatment time will significantly reduce the medical service quality. The simulation model is then developed to investigate the appropriate number of doctors with respect to average patient arrival rate that leads to a satisfied waiting time.
2. **Inappropriate appointment system:** Currently, appointment patient has no priority over non-appointment patient. Two types of patients follow the same process. Therefore, appointment patients are likely to ignore their appointment time and tend to arrive at the clinic very early. This causes congestion in the clinic during the beginning of the day. Moreover, there is no formal appointment system in place. There is no time slot information to guarantee the availability of doctors on the appointment day. Based on simulation results, appointment guideline is developed. The simulation model is tested with various ratios between appointment and non-appointment patients. The experiment is based on an assumption such that appointment patients will have higher priority to receive the services in all stages. The aim of this experiment is to propose the appropriate proportion of appointment patients in each time in order to reach the most satisfied overall waiting time.
3. **Long waiting time at clinic rooms:** After patients receive the prescription from the clinic counter 4, patients are directed to medicine room to pay for the fee and receive the medicines. According to our observation, patients currently spend significant amount of time at the medicine room counter. Most of which is waiting for medicine. After carefully observing the operations within the medicine room, it is found that the medicine shelf within the medicine room can be rearranged in order to reduce the operation time of preparing medicine according to the prescription.
4. **Appointment system:** Currently, both appointment and non-appointment patients have the same priority after entering the clinic. Psychologically, patients may feel that they should have higher priority to receive doctor care when they have an appointment. Further, no formal appointment system is currently in place in outpatient clinic department. The simulation models are therefore developed in order to provide the appointment guideline that leads to a satisfied overall patient waiting time. The simulation models assume that appointment patient will have higher priority in all stages of operations. Based on empirical data from general practice clinic, the experiment is conducted by varying the proportion of appointment patients entering the clinic while other system parameters (i.e., patient arrival rate and service times) remain unchanged. This experiment aims to understand how sensitive the average patient's time in clinic to the proportions of appointment and non-appointment patients.
5. **Infrastructure issues:** Currently Lady Ridgeway Hospital's OPD department is running at old building complex and is very much unable to supply enough space for more than 2000 patients and their parents.

SUMMARY OF PROBLEMS

Patient factors

1. Pediatrics patients from all over the country walk-in to the OPD without any filtration or restriction
2. Higher preference of patients from any region of the country to get treated by OPD of the LRH
3. Patient's choice of the OPD as national policy of free health and respecting patient's choice
4. Preference to get treated at the hospital where their consultant treated at private sector is working at
5. Demanding and stress of the patients

Service provider factors

1. Heavy peak hours making them stress and tired
2. Negligence and ignorance due to dominant organizational culture

Process factors

1. Inadequate application of system and techniques on Patient Appointment Systems
2. Deficiency in scientific waiting line management techniques
3. Lack of interventions to modeling patient flow through the healthcare system as the national referral center

Administration factors

1. Punctuality and been presence of medical staff is not tracked well
2. Lack of governance and regulatory framework
3. Inadequate periodical progress reviews

Health system factors

1. National policy of free health and respecting patient's choice
2. Mal functioning of peripheral Primary Health Care services
3. Not having a proper system of referring and back referring

RECOMMENDATIONS

1. Appoint an audit team to analyze the gravity of congestion, peak hours and peak days.
2. Formulate working groups to introduce new interventions related to waiting line management techniques, modeling patient flow through the healthcare system.
3. Create a database of nearest back referral center for OPD patients.
4. Improve facilities of OPD for staff and patients
5. Need of help desk establishment: Help desk will be of a great help for catering the people, who are helpless and confused about the exact direction of different counters.
6. More efficient use of signage: As there are new additions and deletions of services in hospital, new and better signage will definitely help new patients. This will reduce congestion like situation in corridor.
7. Space management: Shifting of registration counter. Space in front of registration counter is very small. Due to this small space, there is heavy congestion in morning time.
8. Display system: Token display system is used for queue management in OPD. But, sometimes there are few electrical problems creating mismanagement like situation in OPD. Early trouble shooting from electrical department may avoid it. A large size plasma TV in central waiting area may be used to display all OPDs status. Display system of availability of doctors and medicines should be there in reception area. In case of leave or some other condition, display status of that particular situation will be highly helpful. This will help them to choose the specific time to visit hospital.
9. Proper time slot for VIP/staff patients: There should be a proper slot for such patients. This timing should be fixed by doctor and patient mutually.
10. Proper time slot for entertaining medical representatives: Time slot should be declared and displayed for this purpose.
11. Arrangement of proper facility for examination: Examination facility should be present inside the OPD itself and one attendant may be used to assist doctor. This will reduce the unnecessary absence of doctor from OPD.
12. Sitting arrangement & arrangement of tea, coffee, newspaper, magazine, television, etc., in OPD waiting area. Sitting arrangement in OPD waiting area is very less as compared to the rush present in OPD. Proper arrangement for patients will definitely delight them.
13. Specialist OPD and evening OPD: Arrangement of specialist OPDs will reduce OPD congestion by diverting specific types of patients toward a particular area at a particular time.
14. Screening OPDs: There should be an arrangement of screening OPD in each department to scrutinize the patients.
15. Intra-departmental referral system: Intra-departmental referral system in this hospital is very poor [2]. All doctors are getting here similar treatment. There should be clear cut strata differentiation in each department.

This will not only reduce idle time of doctors but also improve waiting time of patients.

16. Proper infrastructure development.

CONCLUSION

Using outpatient clinic department in an existing public hospital as a case study, this paper presents preliminary investigation of extensive patient waiting time to receive doctor care and other services. The study is initially carried out by observing the clinic floor and collecting necessary time-related information, such as patients inter arrival time and service times at each stage of operations. From preliminary analysis, three major sources of extensive patient waiting time are identified: (1) an insufficient number of doctors as compared to patient arrival rate, (2) a lack of appropriate appointment system, and (3) a poor design of medicine storage in medicine room.

Firstly, simulation models are constructed and tested for an appropriate number of doctors that should be available according to average patient arrival rate. Results based on simulation and Little's law calculation can assist the hospital staff in planning the doctor schedules (i.e., how many doctors should be available) according to average patient arrival rate in each operation hour. Secondly, due to a lack of appointment system in most outpatient clinics, a set of appointment and non-appointment patient ratios are examined. Based on empirical data from an existing clinic, a range of ratios that leads to a satisfied overall patient's time are suggested. Lastly, it is found that patients spend significant time waiting for medicine at the medicine room. It can be observed that the pharmacists spend significant time retrieving different kinds of medicines from the shelves. The concept of dedicated storage location and ABC analysis are applied to form a recommendation to the medicine room staff, which is expected to significantly reduce medicine retrieving time and as a consequence, to reduce patient's waiting time at the medicine room.

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