QATAR UNIVERSITY

COLLEGE OF HEALTH SCIENCE

IMPROVING WAITING TIMES IN HAND SURGERY CLINIC AT RUMAILAH HOSPITAL, QATAR

BY

SAMAH A. ABD AL HADI

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COMMITTEE PAGE

The members of the Committee approve the Project of SAMAH A.ABDALHADI defended on 05/12/2019.

DR. Mujahed M A Shraim
Thesis/Dissertation Supervisor

Dr. Amal Shaaban Abousaad
Committee Member

Approved:

Asma Al-Thani, Dean, College of Health Science

ABSTRACT

ABD ALHADI SAMAH AHMAD, Masters of Science: January [2020:], Public Health

Title: Improving Waiting Times in Hand Surgery Clinic at Rumailah Hospital, Qatar.

Supervisor of Project: Mujaed, Mahmoud, Shraim.

Amal, Shabaan, Abousaad.

Background: The quality and efficiency of healthcare delivery are key drivers that influence hospital quality as well as patient satisfaction. The patient waiting time is the period of time that passes between patients first seeking medical treatment from the healthcare system and their admittance for consultation and diagnosis. The hand surgery clinic at Rumailah Hospital (RH) in Qatar has seen that only 12% of new patients who had been referred for urgent treatment from the accident and emergency department had received an appointment within 14 days.

Aim: To increase the percentage of patients with new, urgent referrals to the hand surgery clinic at Rumailah Hospital from the accident and emergency department to be seen within 14 days from the current 12% to 20% by the end of October 2019 and from 20% to 60% by the end of April 2020.

Methodology: This is a Quality improvement Project used the Institute for Healthcare Improvement model for improvement, the team used the root cause analysis to identify the bottleneck in the process, the Plan- Do - Study - Act (PDSA) cycles facilitates

testing the selected changes: increase capacity, triage acciedent and emergency referrals, and clear the back log.

Results: After implementing the changes, we observed increase in the proportion of patients who received appointments within 14 days of the referral, from 22% in July to 26% in August and 40% in September and October, 2019.

Conclusion: The project team did extensive research in understanding the complex process of OPD appointment and clinic consultation. The project team tested three change ideas that yielded to manage the percentage of patients who received appointments within 14 days. The team is planning to test the next change idea to improve the triaging process by implementing electronic triaging, which is expected to reduce the waiting time for an appointment in the clinic.

DEDICATION

This research project is dedicated to myself, my parents, and my friend Ahmed Saad who offered me constant support throughout my journey as a Masters student.

ACKNOWLEDGEMENTS

This research project has been completed after much hard work. However, it would not have been possible without the support and help provided by a number of people.

I would like to thank my two supervisors, Dr. Mujahed, Associate Professor of Public Health, and Dr. Amal, Assistant Executive Director of Quality and Patient Safety at Rumailah Hospital, for their guidance in this project.

I offer my appreciation to the project team for their cooperation during the project planning and implementation right through to the completion of this project.

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I would like also to thank all my friends for their constant support and encouragement.

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ABBREVIATIONS

RH Rumailah Hospital

HMC Hamad Medical Corporation

QI Quality Improvement

EMR Electronic Medical Record

IHI Institute for Healthcare Improvement

MFI Model For Improvement

HIM Health Information Management

PDSA Plan Do Study Act

RBMS Registration Booking and Management System

PCC Patient Contact Center

DNA Do Not Arrive

TNAA Third Next Available Appointment.

LIST OF FIGURES

CHAPTER 1: INTRODUCTION

The quality and efficiency of healthcare delivery are key drivers that influence hospital quality as well as patient satisfaction (Atnafu, Haile Mariam, Wong, Awoke, & Wondimeneh, 2015).

The patient waiting time is the period of time that passes between patients first seeking medical treatment from the healthcare system and their admittance for consultation and diagnosis (Harper & Gamlin, 2003). The degree to which health customers are pleased with the care they receive is strongly linked to the quality of the waiting experience (Preyde, Crawford, & Mullins, 2012). Healthcare organizations that aim to deliver outstanding services must manage their waiting times effectively. Inability to integrate consumer-driven features into the design of waiting experiences can lead to dissatisfaction for both the patient and the health-care provider (Chen, Lou, & Feng, 2015). Globally, it is recognized that a well-designed health service management system should not allow patients to wait for a long time for appointments and consultations (Sun et al., 2017).

Clients of outpatient services have been reported to be the least satisfied with long wait times for consultations (Michael, Schaffer, Egan, Little, & Pritchard, 2013). A Patient Experience Survey conducted among Rumailah hospital (RH) patients in 2017 highlighted patients' dissatisfaction with outpatient services, as 36% of respondents complained regarding their inability to obtain timely appointments, care and information. The key reason for this is that demand for outpatient services is increasing faster than the supply of

appointments (Sun et al., 2017). As a result, rapidly increasing demand and limited health-care resources force health-service suppliers to focus on improved flow control and capacity distribution, and to alter processes that involve demand-driven scheduling through purposeful preparation to reduce the negative impact of long waiting times for patients (Pandit, Pandit, & Reynard, 2010).

The hand surgery clinic at RH in Qatar has seen an increase in the number of new referrals from 2154 in 2017 with an average of 180 referrals per month, to 5146 in 2018 with an average of 428 referrals per month. The rise has continued this year, as the average number of new referrals per month for the three months at the start of 2019 (January to March) was 450. This high demand is due to the fact that the clinic at RH is the only hand surgery clinic in Qatar.

The baseline data obtained from the electronic medical record (EMR) of the RH hand surgery clinic for January to March 2019 show that only 12% of new patients who had been referred for urgent treatment from the accident and emergency department had received an appointment within 14 days. This was despite the referral process policy across RH management company Hamad Medical Corporation, which stated that urgent referrals must have been addressed within this time frame.

Statement of the Aim of this Project

To increase the percentage of patients with new, urgent referrals to the hand surgery clinic at Rumailah Hospital from the accident and emergency department to be seen within 14 days from the current 12% to 20% by the end of October 2019 and from 20% to 60% by end of April 2020.

CHAPTER 2: LITERATURE REVIEW

The aim of this chapter is to present a brief review of some key factors that are associated with patient waiting times, and the impact of waiting time in the outpatient hand-surgery clinic on health outcomes, costs, and patient satisfaction. This review includes data that show variations in waiting times between regions and offers some possible solutions to shorten similar prolonged waiting-time cases.

2.1 The Link Between Waiting Time and Health Outcome

Waiting time is defined as the entire period during which the patient waits to receive medical attention at the hospital. Bakar, Fahrni & Khan in 2016 stated that it was the length of time "that patients must wait for a specific procedure, admission, diagnostic tests, medication, and to be seen by a doctor". A long waiting time has a great impact on the patient's health outcome. For instance, it can lead to worsening of the treatment outcome since signs and symptoms deteriorate over time. For example, a waiting time of three months has shown significant association with deterioration in health outcome for psychosis patients who were waiting for early intervention services (Reichert & Jacobs, 2018). Failure to meet patients' needs can also lead to patients disengaging from the treatment process, which promotes negative health outcomes as it increases the burden on patients' emotional and physical health (Ansell, Crispo, Simard, & Bjerre, 2017). Long waiting times have been shown to reduce the outcome quality of knee and hip replacements through surgery (Lizaur-Utrilla, Martinez-Mendez, Miralles-Munoz, Marco-Gomez, & Lopez-Prats, 2016). When wounds require surgical procedures, elongated waiting times might lead to difficulties in conducting the operations as the wound conditions worsen

(Lizaur-Utrilla et al., 2016). Similarly, rapid declines occur in health outcomes for mental health patients when they do not receive effective treatment in a timely manner (Pomerantz, Cole, Watts, & Weeks, 2008).

Other research has shown that increased waiting times are associated with higher morbidity and mortality rates for bladder-cancer patients due to delayed treatment (Fahmy et al., 2009). Moreover, prolonged waiting time is associated with decreased remission rates, which therefore hinder the patients' opportunity to obtain the best treatment. When there is a delay in provision of medical attention by the relevant health-care personnel, signs of disease may disappear, which may lead to a wrong diagnosis such as has been observed in HIV patients. For example, one Ethiopian study reported that longer waiting times are associated with higher mortality rates (Walter et al., 2015).

On the other hand, correct assessment of symptoms followed by short waiting times help to improve patients' wellbeing as they are able to receive treatment and prescriptions for medication at the optimum time (Bietenbeck, Junker, & Luppa, 2015).

2.2 The Link Between Waiting Time and Patient Satisfaction

Waiting time for appointments has a great influence on patient satisfaction (Lizaur-Utrilla et al., 2016; Sun et al., 2017). Several studies on this subject acknowledge that long waiting times are a reason for patient dissatisfaction with services offered (Murray & Berwick, 2003). How well a patient is satisfied with the service received is a vital factor in assessing the quality of the services offered. This is because the practice is patient-centered, so the

health-care quality is determined by the patient's sense of its efficiency and timely functioning (Bakar, Fahrni, & Khan, 2016). Most studies on this matter have established at least an indirect relationship between service satisfaction with health care and waiting time (Michael, Schaffer, Egan, Little, & Pritchard, 2013; Preyde, Crawford, & Mullins, 2012; Xie & Or, 2017). Jennings et al. (2015) have reported a negative relationship between prolonged waiting time and patient satisfaction, and this can lead to low patient satisfaction scores. Waiting time also impacts negatively on the utilization of health services by the patient, since it influences their willingness to return to the facility, which eventually affects continuity of care (Ansell et al., 2017). As such, reduction of waiting times may result in improved patient satisfaction and greater readiness of patients to continue receiving care at the same clinic (Xie, & Or, 2017).

It has been found that even when patients have arrived for appointments, waiting times before they are attended by physicians and other professionals within the health-care setting are increasing (Oche & Adamu, 2013). This waiting time also influences their satisfaction with the services they are accorded (Lizaur-Utrilla, Martinez-Mendez, Miralles-Munoz, Marco-Gomez, & Lopez-Prats, 2016). Therefore, health-care facilities that wish to provide high-quality care services must address all patient waiting times (Rondeau, 1998). Patient and provider satisfaction can only be guaranteed by incorporating consumer-driven features into the wait experience. Long waiting time is perceived as a barrier to obtaining services (Ansell, Crispo, Simard, & Bjerre, 2017). Too much waiting time can trigger stress for both health-care providers and patients. Patients judge health personnel based on the waiting time more than on their perceived skills and knowledge.

Most patients who report dissatisfaction with care do so because of lengthy waiting periods in the clinic (Sun et al., 2017). The health-care sector is becoming more personalized and consumer-driven, and therefore, provision to patients of overall satisfaction is necessary (Bleustein et al., 2014). According to a research study conducted in 136 tertiary hospitals in China and published by the China National Patient Survey in 2015, patients in the ambulatory services reported that they were dissatisfied with long waiting times for consultation (Sun et al., 2017).

Waiting times are increasing because there is a higher demand for health-care services than there are available resources to meet that demand (Ugarte, 2015). The increase in the number of patients seeking services in public health-care facilities may have a serious impact on the quality of care due to increased tension between doctors and patients and insufficient ability to safeguard patient safety (Bovier & Perneger, 2003).

This problem of increasing demand that cannot be met by limited resources means that there must be an improvement in allocation of resources to overcome the negative impact of the lengthy waiting period. There is a need to introduce organization and structural changes alongside careful planning of outpatient care.

2.3 The Link Between Waiting Time and Cost

Patient costs take the form of an underlying fee that is incurred as a result of a decrease in the rate of productive work by the patients, since the individual involved in the process is sick. It also originates from the patient's income reduction and reduced spending which reduces their economic activity due to lack of work participation (Ansell, Crispo et al. 2017). As the waiting time is increased, the patient wastes much time seeking medical attention, which reduces their productive life. The outcome is reduced productivity and increased costs spent on medical attention (Bakar, Fahrni, & Khan, 2016). To determine general economic costs, three costs are taken into account: medical system costs, patient costs, and caregiver costs (Walter et al., 2015).

2.4 Other Factors Related to Patient Waiting Time

The type of service that the patient needs is a factor in the waiting time they must endure (Bietenbeck, Junker, & Luppa, 2015). For instance, the arrangement of treatment that involves surgery or guidance and counseling takes a long time compared with treatments that do not involve these provisions. Some diseases also attract more attention than others. For instance, in the case of HIV/AIDS, patients need a lot of attention and guidance to learn how to survive with the disease (Yarmohammadian, Rezaei, Haghshenas, & Tavakoli, 2017). Also it has been shown that, for the same procedures, waiting time depends on the clinical threshold, or the indication that a procedure must be performed; for example, one patient who requires cataract surgery may wait longer than other patients if the waiting list threshold is higher (Viberg, Forsberg, Borowitz, & Molin, 2013). Also the frequency of

performance of surgeries affects the speed at which patients are removed from waiting lists (Taylor, 2000).

Another factor is the availability of doctors in a particular health-care system. The number of health-care workers employed in a given health-care center has a major effect on patient waiting times, and this is called the imbalance between supply and demand (Ward et al., 2017). When there are numerous doctors, work delivery is enhanced and, in turn, patient waiting time is reduced; when the number of sick people is greater than the number that can be handled by health-care providers, the patients' waiting time increases. Hence, to reduce waiting times, there is a need to increase the number of medical specialists in the healthcare facility (Messina et al., 2015).

Another reason for long waiting times is the rate of no-shows for appointments, which is increasing (DuMontier, Rindfleisch, Pruszynski, & Frey III, 2013). The reasons for no shows include logistical issues such as lack of transport, appointment scheduling, late arrival at the appointment and poor communication. Patients who do not show are then rescheduled, which increases the length of the waiting list (Mohamed, Mustafa, Tahtamouni, Taha, & Hassan, 2016).

Additionally, waiting time varies for inpatients and outpatients depending on the location and specialty of treatment. For instance, treatments that involve surgeries have longer waiting times than those for other related illnesses (Eggertson, 2005).

2.5 Variation of Patient Waiting Time by Region and Health-care System

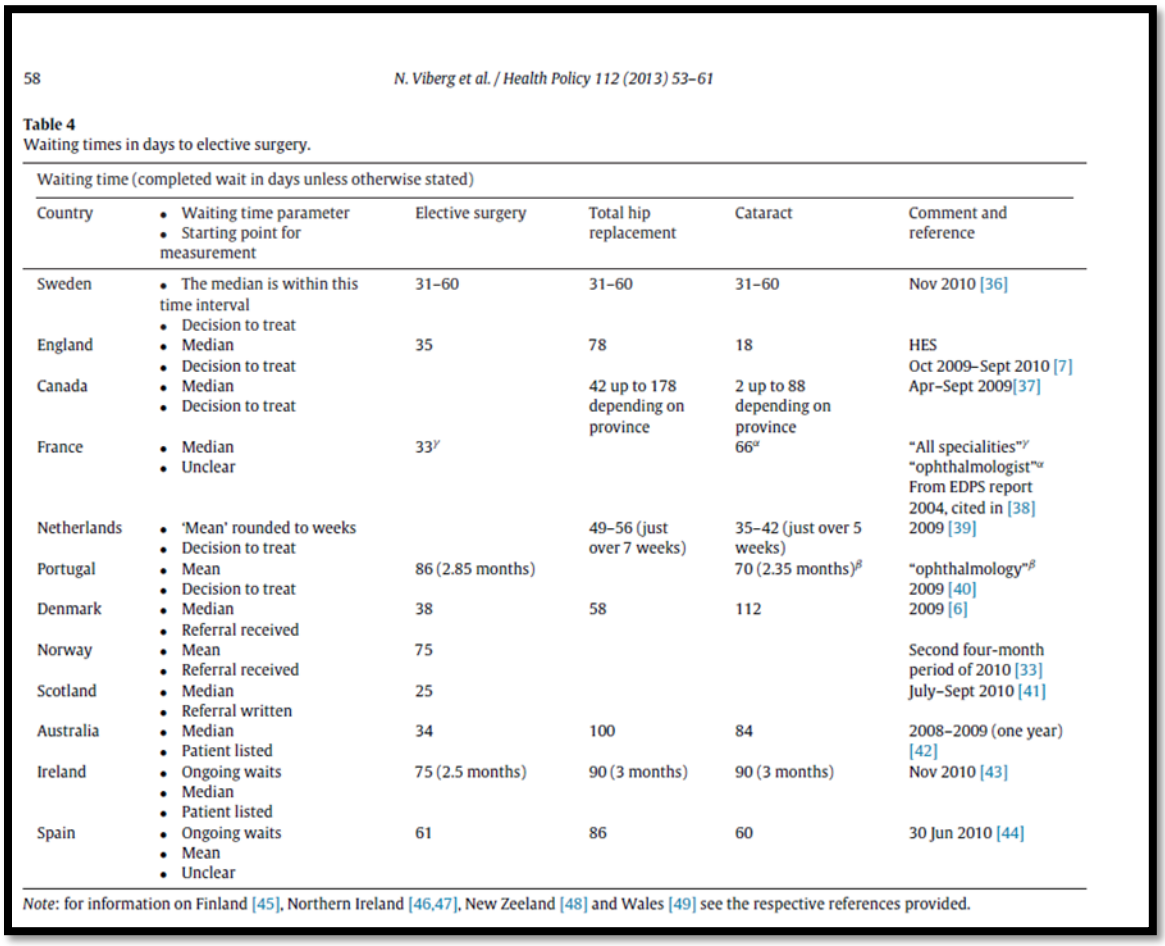
Once patients have arrived in the clinic for their appointments, the United States (US) Institute of Medicine (IOM) suggests that at least 90 per cent of patients should meet the doctor within 30 minutes (O'Malley, Fletcher, Fletcher, & Earp, 1983). However, in most developing countries, this is not the case. Several studies on this subject regarding developing countries show that patients may spend two to four hours in the waiting room before consultation with doctors (Anderson, Barbara, & Feldman, 2007; Ofili & Ofovwe, 2005; Ward et al., 2017).

The patient waiting time in health-care facilities varies from one country to another, and within countries, from one hospital to another. This is because in some countries, patients seek doctors who are regarded as experts in their fields, and because some hospitals employ improved technologies to facilitate the waiting process. However, increased waiting times have been reported in both developing and developed countries (Long et al., 2016); even the US, a highly developed nation, has been found to have the same problem. In Atlanta, patients' waiting time is about 60 minutes, while in Michigan the average wait time is 188 minutes, which is longer than the wait time in Nigeria, a developing country in Africa; there the average time has been reported to be 173 minutes in Benin, and 73 minutes at Ibadan University College Hospital (Oche & Adamu, 2013).

Regarding waiting times for appointments, huge variations have been reported. in 1990, according to Murray and Tantu's (2000) study, the average waiting time for a general appointment in a primary-care department in Kaiser Permanente, in California, US, was 155 days. Merritt Hawkins, a physician search and consulting firm in the US, performed a

study in 2014 which analyzed the average time that Americans spent waiting for appointments in 15 different health-care facilities across the country. This study found that it took roughly 66 days to see a family doctor in Boston. However, to see specialists in the state of Washington, the study showed that Americans waited 29 days to see a dermatologist and about 32 days to get a consultation with a cardiologist.

There are many differences between countries in the ways they use to measure waiting time. For example, in England, waiting times are measured from when a referral is written; Norway starts from the time at which a referral is received; Sweden measures it from when treatment is decided; and Australia starts the clock from when the patient joins the waiting list (Viberg et al., 2013). The parameters used to measure waiting times also vary between the mean, the median, the number of patients waiting, and the time interval. The best way is to measure the median since this figure is less affected by the outliers (Viberg et al., 2013). Waiting times vary between countries, and this variation is shown in (Figure 2.1). According to the data used in this figure, the longest waiting time for elective surgeries was seen in Spain with a mean of 61 days, the longest waiting time for hip replacements was 100 days in Australia, and the longest for cataract surgery was observed in Denmark with a median of 112 days, while it was the lowest in the UK at 18 days median.



58 N. Viberg et al. / Health Policy 112 (2013) 53–61

Table 4
Waiting times in days to elective surgery.

Country	• Waiting time parameter • Starting point for measurement	Elective surgery	Total hip replacement	Cataract	Comment and reference
	Waiting time (completed wait in days unless otherwise stated)				
Sweden	• The median is within this time interval • Decision to treat	31–60	31–60	31–60	Nov 2010 [36]
England	• Median • Decision to treat	35	78	18	HES Oct 2009–Sept 2010 [7]
Canada	• Median • Decision to treat		42 up to 178 depending on province	2 up to 88 depending on province	Apr–Sept 2009[37]
France	• Median • Unclear	33[γ]		66[α]	"All specialities"[γ] "ophthalmologist"[α] From EDPS report 2004, cited in [38]
Netherlands	• 'Mean' rounded to weeks • Decision to treat		49–56 (just over 7 weeks)	35–42 (just over 5 weeks)	2009 [39]
Portugal	• Mean • Decision to treat	86 (2.85 months)		70 (2.35 months)[β]	"ophthalmology"[β] 2009 [40]
Denmark	• Median • Referral received	38	58	112	2009 [6]
Norway	• Mean • Referral received	75			Second four-month period of 2010 [33]
Scotland	• Median • Referral written	25			July–Sept 2010 [41]
Australia	• Median • Patient listed	34	100	84	2008–2009 (one year) [42]
Ireland	• Ongoing waits • Median • Patient listed	75 (2.5 months)	90 (3 months)	90 (3 months)	Nov 2010 [43]
Spain	• Ongoing waits • Mean • Unclear	61	86	60	30 Jun 2010 [44]

Note: for information on Finland [45], Northern Ireland [46,47], New Zeeland [48] and Wales [49] see the respective references provided.

Figure 2.1: Waiting times in days for elective surgeries in various Organisation for Economic Cooperation and Development countries.

2.6 Strategies to Minimize Waiting Time

Various methods can be put into practice to reduce waiting times, such as speeding up referrals and minimizing errors through use of computerized systems and improving the training of appointment agents. These have been shown to help to improve efficiency of the management of patient waiting times (Liddy et al., 2015).

Other mitigation plans can be used to manage waiting lists, such as to create a balance between supply and demand, improve efficiency of or introduce triage time, and reduce the accumulated backlog (Murray & Berwick, 2003).

2.6.1 Correct Electronic Referrals and Efficient Triage Time

Correct electronic referrals (E-referrals) facilitate easy and multiple access to referral order. Electronic transmission saves time since it provides the fastest access to information (Almomani & AlSarheed, 2016). Information can also be transferred appropriately to numerous departments. The process is fast and enhances the workflow, so patient's waiting time is reduced as unnecessary time wastage is minimized. This method enhances speed of referral through information integration and improvements in functionality, while one referral can contain vast information and the system is convenient to use (Mamtani & Lowenfels, 2018).

Triage time is the amount of time taken to sort outpatients according to illness urgency (Harding & Bottrell, 2016). Efficient use of triage time increases the percentage of patients with urgent new referrals who can be given an appointment within the recommended time.

E-referrals enable the physician to access the information easily and therefore to sort patient referrals quickly by treatment priority. Efficient use of triage time has the capacity to create a smooth flow of patients in accident and emergency (A&E) departments by dispersion code referrals. Combination of these two time-saving systems in A&E leads to implementation of the electronic triage system.

2.6.2 Management of Capacity and Demand

Capacity and demand management is a technique applied to maximize production output; therefore, it ensures an effective patient service flow and outcome (Liang, Turkcan, Ceyhan & Stuart, 2015). It leads to an increase in the percentage of patients who can be allocated treatment quickly within the setting. Capacity and demand management can be developed through use of one data source, which contains accurate and up-to-date information about the patient's health care, to allocate the patient to the most current and accurate waiting queue. The best management can be obtained by development of staff to assist in queue management and clearance. Also, management of capacity to balance demand requires understanding of differences in referral rates by educating relevant personnel (Taneja, 2017).

2.6.3 Re-designing the Scheduling Process

This process ensures effective and efficient utilization of slots. Changes in a hospital's operational time tend to regulate patients' reporting and leaving times (Pacheco-Vergara & Cartes-Velásquez, 2016). Such regulation means that numerous ill individuals can be attended to by the reledvant personnel and are thus treated appropriately without any delay. It also enhances effective caseload management for physicians and advances patients' experiences of their medical conditions (Barghash & Saleet, 2018). A re-design of the scheduling process may improve the effective passage of information between the referral booking and management system (RBMS) and the patient contact center (PCC) to cancel unnecessary future appointments for walk-in patients. With electronic referrals and efficient communication, both the physicians and the clients receive data in a timely

manner, which enhances psychological, physical, and mental preparedness for both parties (McCormick et al., 2019).

The exclusion of the physician's name in the triage decision is also an indicator of a re-designed scheduling process (Waters, Edmondston, Yates & Gucciardi, 2016). This aids movement and attendance by the physicians in handling urgent, emergent, and non-urgent cases. It ensures that medical personnel act in accordance with need and not as scheduled by a particular physician. The exclusion also assists in the calculation of each physician's average triage time. Through this action, measures can be taken to increase the percentage of patients with the most urgent and new referrals who are able to access appointments within a recommended time. Consequently, this move balances the waiting list of referrals awaiting routine appointments and the pending list (Xie & Or, 2017).

Regarding patients who missed appointments, a study was performed by Kumar et al. (2014) which showed that, after a detailed analysis of factors such as the patient's financial arrangements to pay for appointments, patient's attendance history and age, lead time was the major predictive factor for cancellations and no-shows (Kumar et al., 2014). Most of the research studies on managing waiting lists have utilized mathematical models to help care organizations to manage resources. The most common methodology that has been applied is queuing theory, which takes into account the possibility of missed appointments (Cayirli, Yang & Quek, 2012; Green, 2010; Green & Yankovic, 2011; Liu, 2016).

CHAPTER 3: METHODOLOGY

3.1 Introduction

This chapter provides an overview of the setting where the chosen intervention was applied. It discusses the rationale for selection of the Model For Improvement (MFI) intervention. This entails provision of details regarding the tools used to identify the problem and the proposed changes to reduce patient waiting times. The study was conducted in the hand surgery clinic at Rumailah Hospital.

3.2 Setting

This quality improvement project was conducted in Rumailah Hospital (RH). RH is a continuing care hospital under Hamad Medical Corporation (HMC) with multi-specialty departments that provide medical, surgical and long-term care to the population of Qatar. The hospital operates across three different sites, with 364 beds and 2,848 multi-national employees.

3.3 Population

The scope of this quality improvement project included all new patients over the age of 14 years that had been urgently referred for hand surgery in 2019. HMC defines urgent referrals as those in which an appointment is required within 14 days (HMC Referral Process Policy, 2018).

3.4 Ethical Approval

This project did not involve the study of human subjects, and it did not put patients at risk or apply a new treatment or therapy. Therefore, ethical approval from the Institutional Review Board was not required (Jennings, 2007).

3.5 Project Design

3.5.1 Institute for Healthcare Improvement Model for Improvement

Quality improvement (QI) is a methodical approach that is used to examine and enhance system performance by implementation of changes (Jennings, 2007). Many different approaches are used for QI in health care, depending on the structure and the systems in use at the particular site where the QI is required. The methods for improvement vary from studies of possible variations to current systems, others aim to improve the flow and some use both techniques (Jennings, 2007).

Model for Improvement is a scientific method employed by the Institute for Healthcare Improvement (IHI) in the US as a guide to improvement that enhances work efficiency, healthcare safety and supply of equal, timely and patient-centred services (Taylor et al., 2014). It comprises three basic questions: “What does the process aim to accomplish?” “How will the change be discernible?” and “What changes need to be made to ensure improvement?” It also includes completion of the Plan-Do-Study-Act (PDSA) cycle (see Figure 3.1).

The use of PDSA cycles facilitates tests of implemented changes on a small pilot scale. The test cycles offer a structured way to learn from the changes before they are

implemented across the board. It is a powerful tool to learn from ideas so that stakeholders have the opportunity to see if the proposed changes will succeed (Taylor et al., 2014).

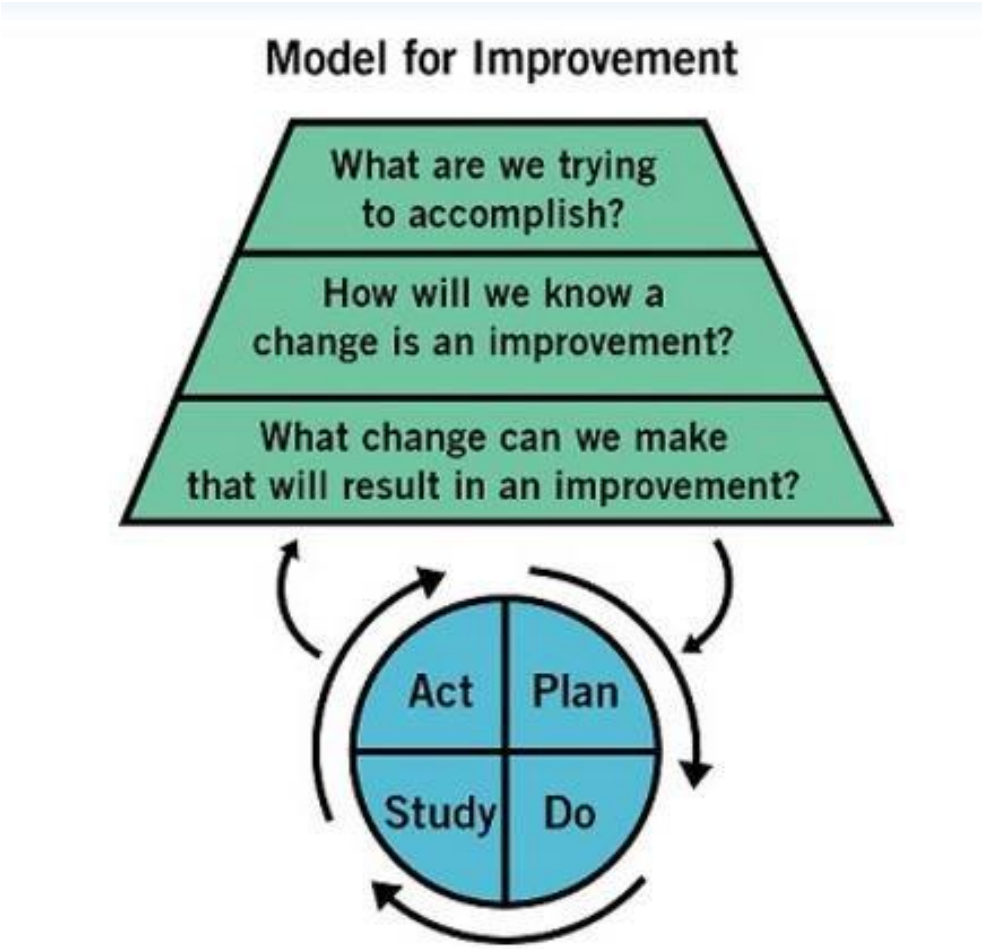


Figure 3.1: Model For Improvement. © 2019 Institute for Healthcare Improvement

3.5.2 Forming the Team

Individuals were selected to form an effective team to enhance the improvement effort (Almomani & AlSarheed, 2016). Members of the team were selected who had the necessary skills to enable the group to define various measurements, provide effective

measurement tools, display and interpret data, and suggest changes. In daily activities, a leader was selected who acted as the project driver, overseeing data collection and implementation. The project sponsor was added to the selected officials to review the group's daily activities and handle any issues of accountability on behalf of team members (Eubank et. al., 2016).

The selected members for this quality improvement project were:

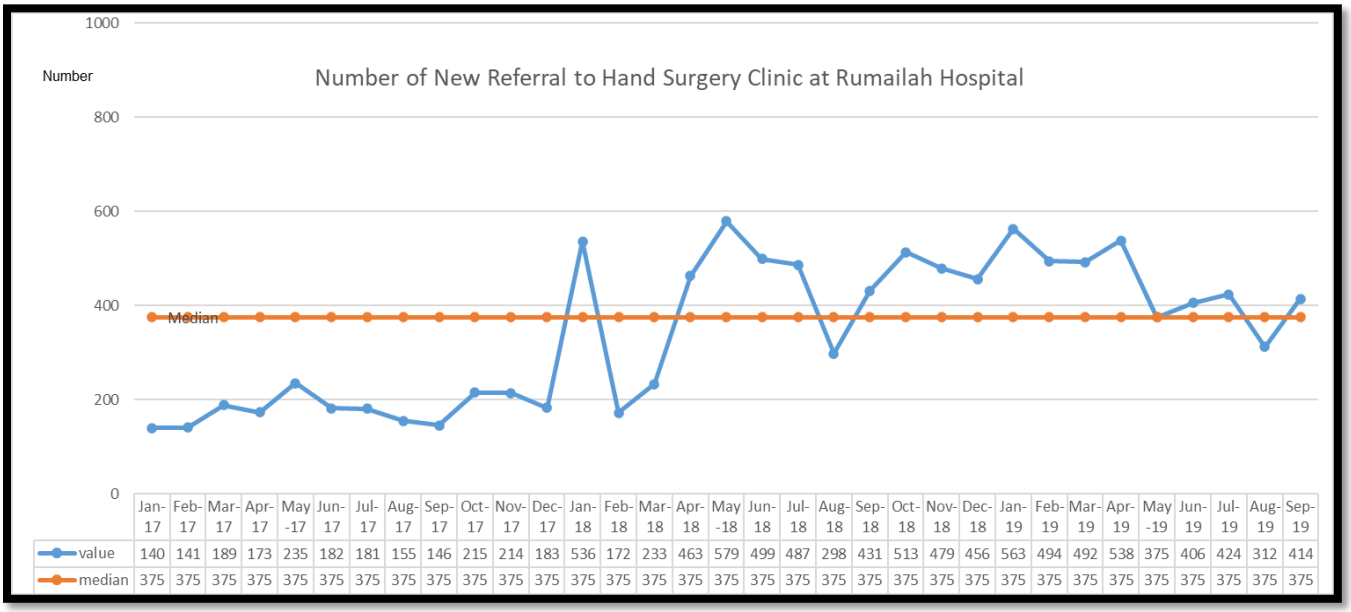
- Project sponsor: RH medical director;
- Project lead: consultant from plastic surgery outpatient department ;
- Quality expert: assistant executive director of quality and patient safety;
- QI project facilitator: clinical manager and CIS lead;
- Local experts: hand surgery specialist, head nurse of the plastic surgery outpatient unit, director of nursing in outpatient unit, RBMS staff; Clerk, Health Information Management (HIM).

3.5.3 Problem Identification

The hand-surgery clinic at RH has seen an increase in the number of new referrals from 2154 in 2017, an average of 180 referrals per month, to 5146 in 2018, an average of 428 referrals per month. This year, the average number of new referrals for each of the three months from January to March was 450 referrals. This high demand is because the RH offers the only hand surgery clinic in Qatar (see Figure 3.2).

The Ministry of Public Health (MOPH) has developed a standardized survey tool in collaboration with stakeholders to measure patients' perspectives of health care as part

of the Health Services Performance Agreement (HSPA) to promote safe, high-quality care through continuous improvement. The Patient Experience Survey for Rumailah Hospital in 2017 highlighted the dissatisfaction of 36% of outpatients regarding the difficulties of getting timely appointments, care and information. This is shown in Figure 3.3. The result, of this survey of 482 outpatients raised concern among hospital managers regarding the standard of outpatient services. The hospital leadership requested that waiting times for new patients to obtain appointments in Rumailah Hospital outpatient clinics be closely monitored.



	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Sep-17	Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18	Oct-18	Nov-18	Dec-18	Jan-19	Feb-19	Mar-19	Apr-19	May-19	Jun-19	Jul-19	Aug-19	Sep-19
value	140	141	189	173	235	182	181	155	146	215	214	183	536	172	233	463	579	499	487	298	431	513	479	456	563	494	492	538	375	406	424	312	414
median	375	375	375	375	375	375	375	375	375	375	375	375	375	375	375	375	375	375	375	375	375	375	375	375	375	375	375	375	375	375	375	375	375

Figure 3.2: Number of referrals to the hand surgery clinic at Rumailah hospital per month.

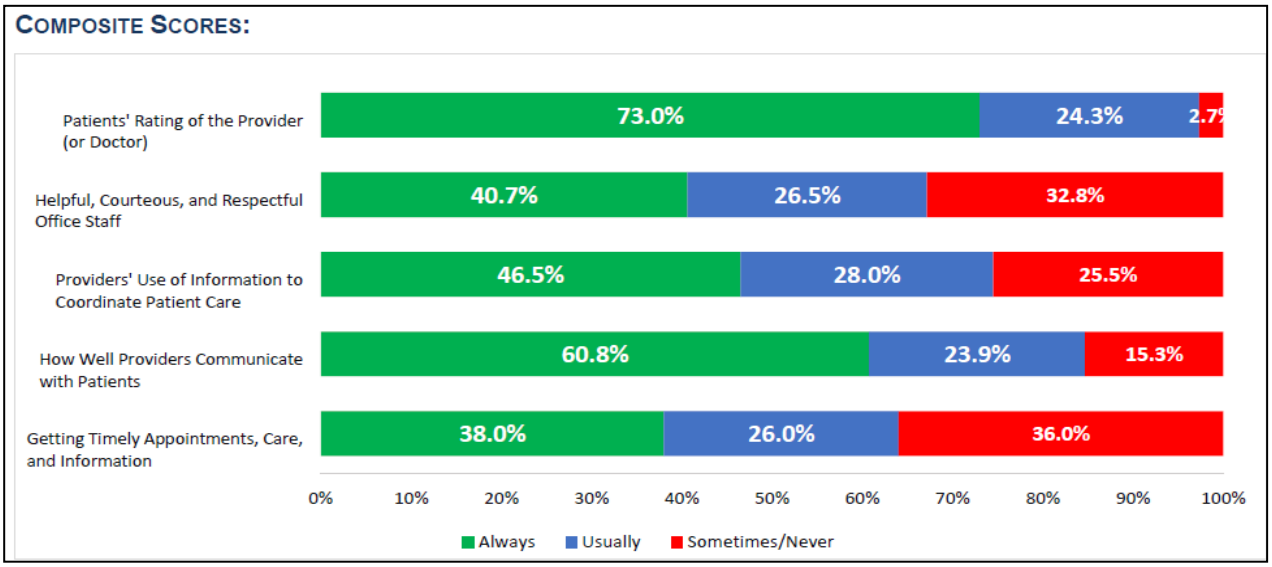


Figure 3.3: Data from Patient Experience Survey, outpatient services at RH, 2017.

3.5.4 Baseline measurement

The project team focused on the baseline data from the electronic medical record for the months between January and March 2019 (Figure 3.4). This data indicates that 12% of new, urgent referral patients during this period received appointments that were within 14 days of the referral. These appointments therefore met the HMC guidelines that required urgent referrals to be seen within 14 days. However, 17% were seen within a time interval of 14 to 42 days, and the majority of them (65%) received their appointments between 42 and 70 days after the referral.

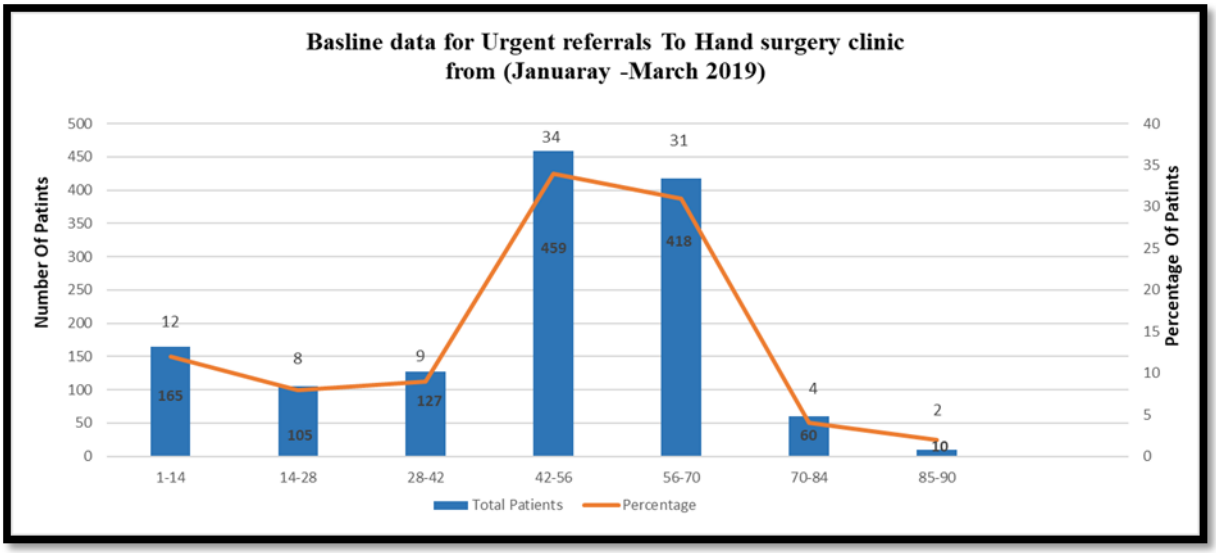


Figure 3.4: Baseline data showing the percentages of patients with new urgent referrals that were seen at the RH hand surgery clinic within certain periods after the referrals were made.

It was also reported that 70% of urgent referrals were not triaged by a physician. After investigation we found that the source of untriaged referrals was A&E centres across Qatar. Figure 3.5 shows the percentage of cases that were not triaged by a physician between January 2019 and August 2019.

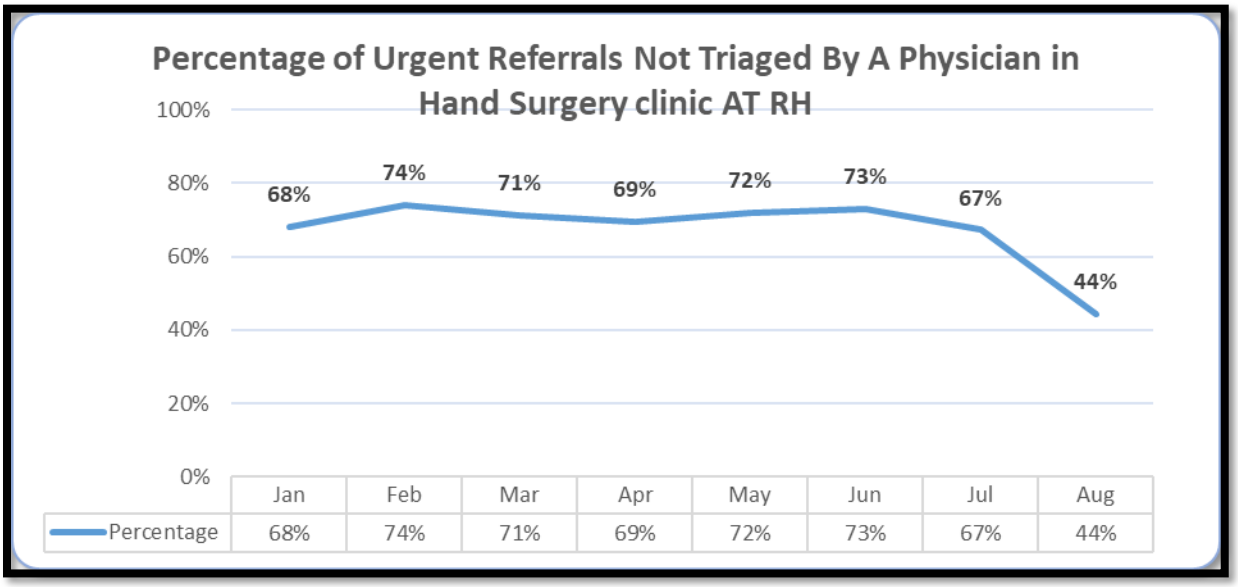


Figure 3.5: Percentage of referrals to the hand surgery clinic at RH which had not been triaged by a physician.

Another cause for concern was the number of no-shows, which resulted in a waste of clinic slots and underutilization of resources. Some patients attended the clinic as walk-ins and missed their scheduled appointments. The baseline data showed an average no-show rate each month of around 30% and a 34% walk-in rate, while the international benchmark for patients who did not arrive was 10% and the benchmark for walk-ins was 15% (Mohamed, Mustafa, Tahtamouni, Taha, & Hassan, 2016). The aggregate effect of these issues was affecting the effective running of the clinic.

The above analysis of baseline data led to the conclusion that the nature of this QI project was multifactorial. The triage process, arrangement of clinic slots, capacity and demand were major contributors to these undesirable outcomes. To understand the process further, and the problem faced in the hand-surgery clinic, the team drew a process map to

attempt to find the bottleneck that was causing the waiting-time problem (see Figure 3.6). From this figure we identified two points of interest: the first was that referrals from A&E were not being triaged; the other was the triaging process.

In order to define the area in which the quality improvement plan was needed, all the factors that influenced the long patient wait times needed to be explored. The team listed all factors that might have affected patient waiting times. This was displayed on a fishbone diagram, so that everybody could visualise the problem areas (see Figure 3.7).

A number of root causes of the difficulties were identified: ineffective triage process for A&E referrals; lack of resources such as physicians; limited clinic slots to match demand; inefficient use of a model to predict future trends; and suboptimal clinic utilization due to no-shows and the arrival of patients who came for a walk-in appointment despite having a scheduled appointment. The team was able to identify process areas that generated the longest waiting times. Of these, triage had the greatest effect on the efficient running of the clinic.

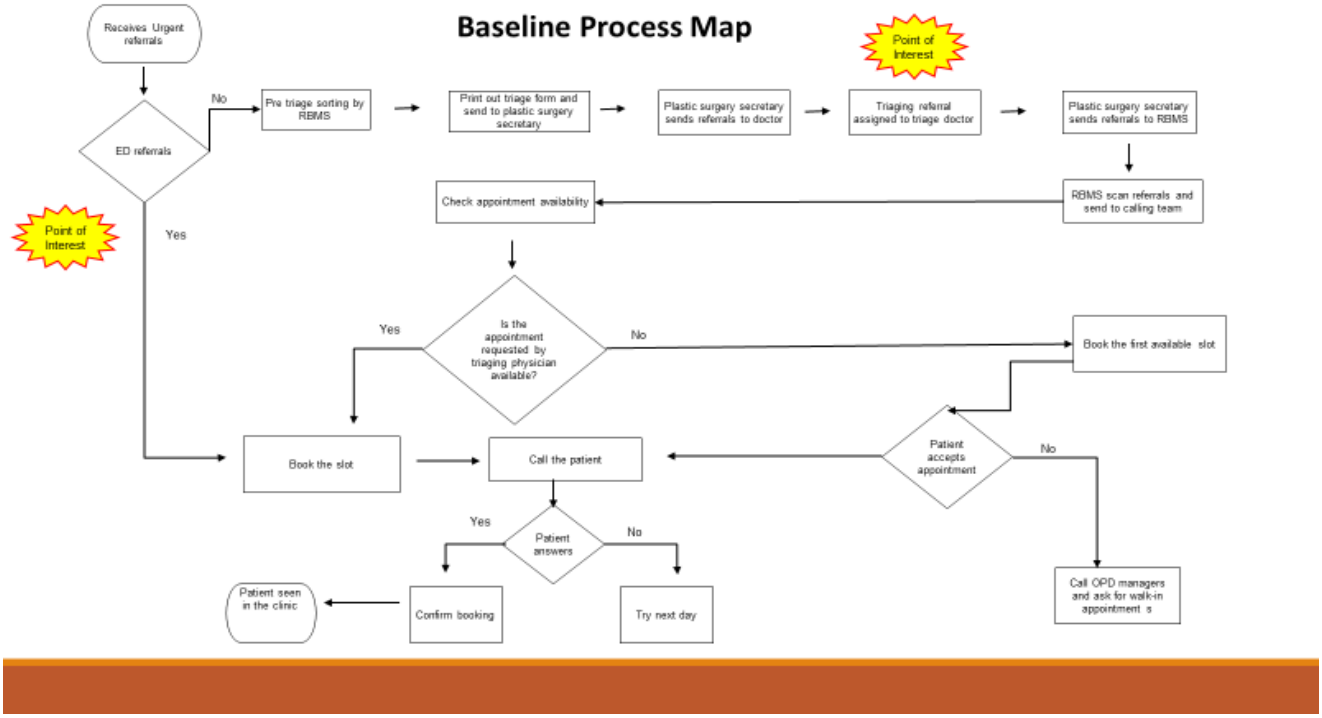


Figure 3.6: Process map for referral and booking appointments.

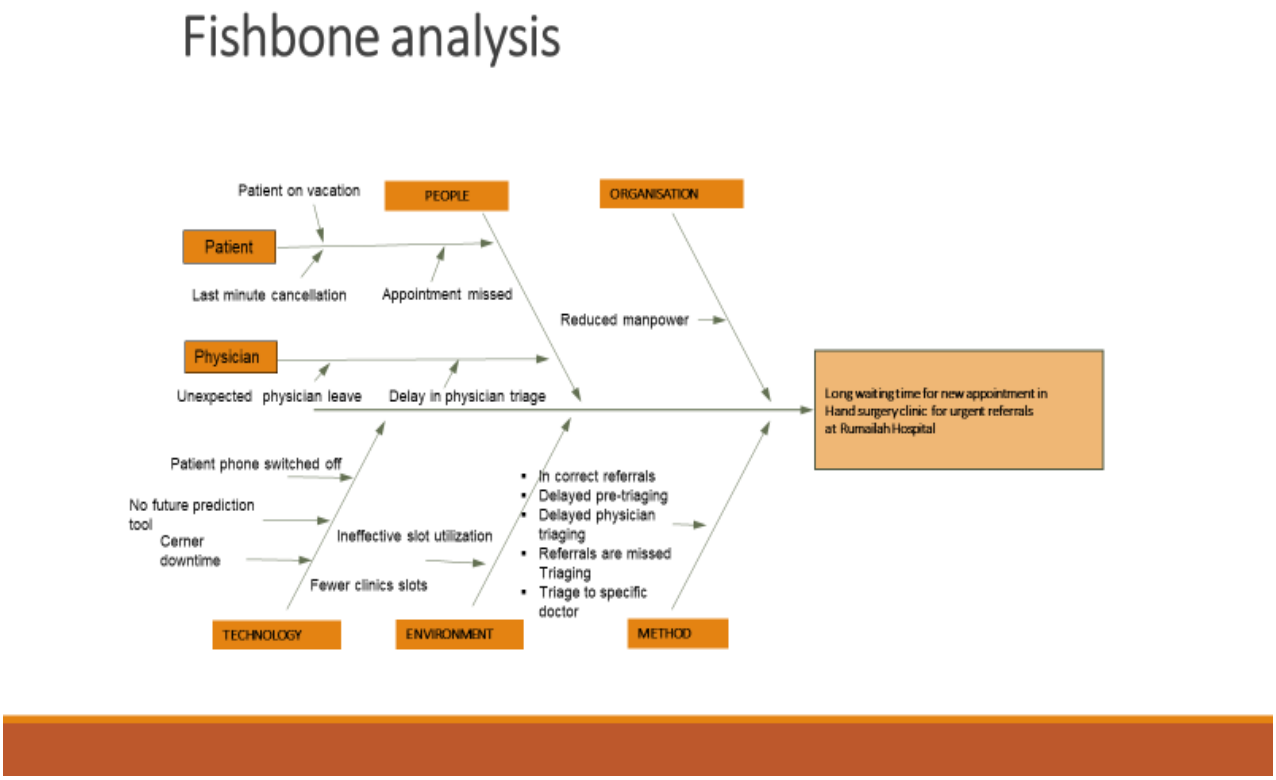


Figure3.7: Fishbone Analysis of the Problems that cause Long Wait Times in the hand surgery clinic at Rumailah Hospital

3.5.5 Defining the Aim: What We Are Trying To Accomplish?

- To increase the percentage of patients that have new urgent referrals from A&E that is seen within 14 days from the current 12% to 20% by the end of October,2019 and from 20% to 60 by the end of Aprile, 2019 in the hand surgery clinic at Rumailah Hospital.

3.5.6 Identification of Useful Measures: how will we know whether a Change is an Improvement?

The following are the project performance measures that were used in our improvement project:

Outcome measure:

- the percentage of patients who obtain new appointments that falls within 14 days of their urgent referral to the RH hand surgery clinic.

Process measures:

- the timing of the third next available appointment;
- the number of new patients seen in the hand surgery clinic after the addition of new slots; and
- the percentage of triaged referrals.

Balancing measure:

- the waiting list of pending referrals for follow-up appointments.

3.5.7 Definition of Changes: What Changes Can Be Made That Will Result in Improvement?

This initial preparatory work provided the team with a crucial understanding of the system and the reasons for the accumulation of long waiting times. The next step for the team was

to develop a driver diagram (Figure 3.8) to display the team's theory on what would drive, or contribute to, the success of the project.

The driver diagram includes:

• the primary drivers, which are the critical, big areas that have the most significant impact on the aim;

• the secondary drivers, which are those that positively affect the primary drivers; and

• the change ideas, that affect the secondary drivers and which need to be tested to help to achieve the aim.

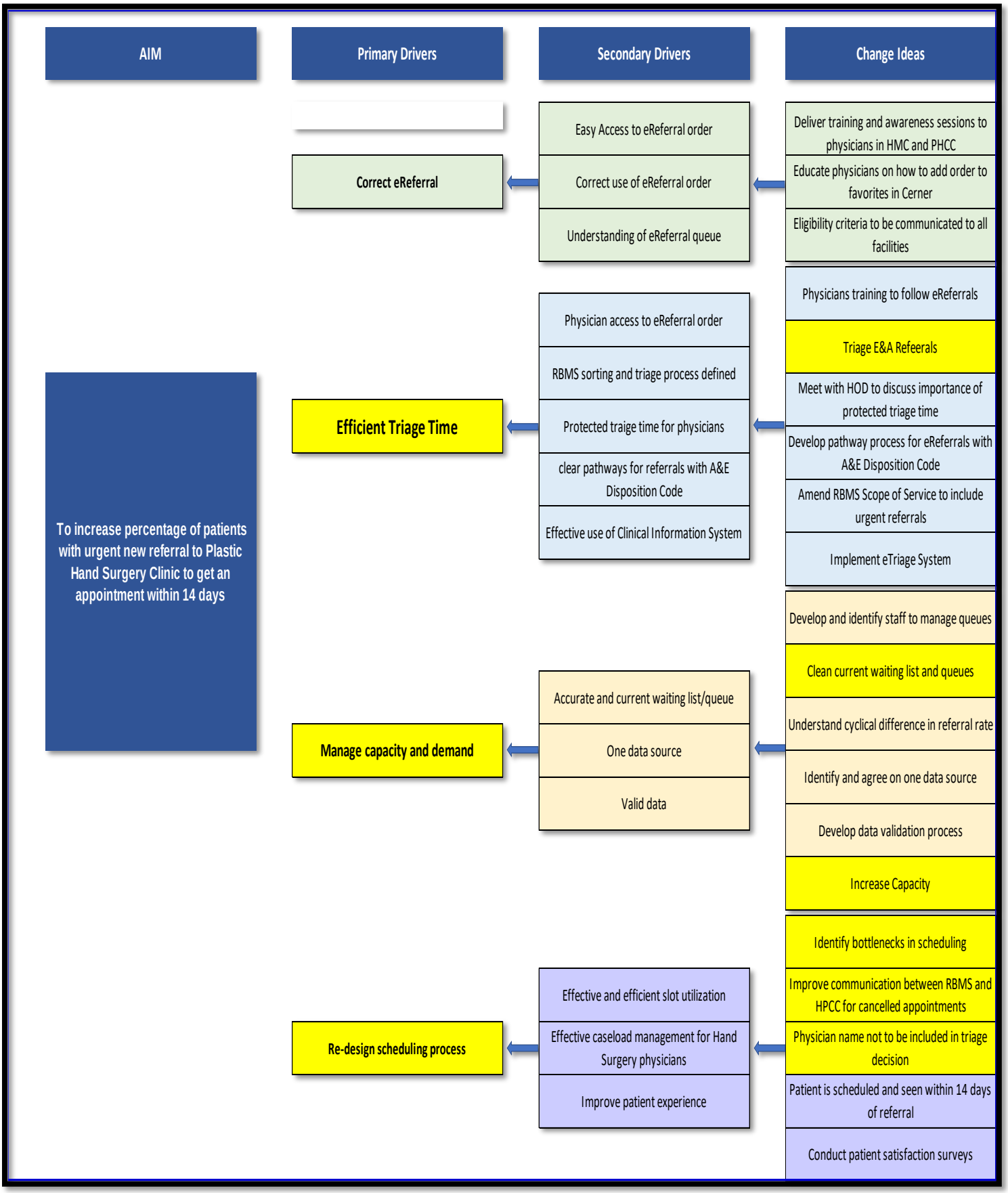


Figure 3.8: Driver diagram

3.6. Implementation of Rapid Cycle (PDSA) cycles

After identifying the root causes of the problem, we prioritized them for action based on the probability of an event, the ease of execution of a change, and the effect such a change would cause. Then the interventions were chosen and tested and others were suggested for implementation later in the project.

The following PDSA cycle ramps were proposed to test the changes suggested by the QI team.

3.6.1 PDSA Cycle Ramp 1

The aim of PDSA cycle ramp 1 was to plan to match capacity to demand through the **maximization of capacity of the RH Hand Surgery Clinic**. It was proposed to achieve this through implementation of the following change ideas (See attached Appendix A) :

- Validate the clinic waiting list.
- Add one specialist clinic and one resident clinic, and open two extra specialist evening clinics.
- Clear the backlog.

3.6.2 PDSA Cycle Ramp 2

The aim of PDSA Cycle Ramp 2 was to **streamline the triaging process** through its redesign by implementation of the following change ideas (see attached Appendix B):

- Triage new patients from A&E to physician clinics.

- Eliminate triaging to a specific specialist's clinic.

3.6.3 PDSA Cycle Ramp 3

The aim of PDSA Cycle Ramp 3 was **to optimize utilization of the clinic's appointment slots** through implementation of the following change idea (see attached Appendix C).

- Cancel/ reschedule next scheduled appointment as walk-in as per patient needs.

3.6.4 Description of Work to instigate PDSA Cycle Ramp 1

1.1 Validate the clinic waiting list.

The validation of a waiting list is the process whereby the accuracy of the list is checked by inquiring of patients whether they still require their appointment in the hand surgery clinic. To improve data accuracy we aimed to understand exactly how many patients were waiting in order to utilize the slots based on true demand and to reduce the no-show rate. Validation was challenging because some data were missing from the waiting list. The team was able to validate the list during the period between January and April 2019with the HIM, outpatients and Health Information and Communications Technology (HICT) departments to obtain the correct waiting time for new appointments. Undated appointments were cleared from the system in coordination with HIM, outpatient department clinical teams, HICT and patients. This was performed after ensuring that patient safety would not be affected. All patients involved were called to ask whether they still needed their appointments.

1.2 Addition of extra clinics (May 2019)

Based on our observation and analysis of the baseline data, we noticed that demand was expanding continuously, and the current capacity would not be enough to manage the increasing demand. Accordingly, the team suggested to the head of the plastic surgery department that the number of hand surgery clinics be increased in order to add more slots for new patients. In May, 2019, the head of the department added one specialist clinic, one resident clinic and two specialist evening clinics. This created 24 additional appointment slots for patients weekly. The slots were utilized from May 2019 onwards. Continuing observation is required to guarantee a reliable process.

1.3 Clear the backlog (May 2019)

The backlog comprised all appointments that did not comply with the hospital policy that urgent new referrals should be seen within 14 days. In April 2019, there were almost 300 appointments with waiting time of $\geqslant$ 14 days. The first step required to clear the backlog was to gain instant supply of new appointments. This was achieved by the creation of two evening specialist clinics to manage appointments with waiting time $\geqslant$ 14 days. RBMS was able to reschedule 160 appointments with a waiting time that exceeded 14 days to the nearest appointment date. Through clearance of this backlog, the team expected to reduce the period to the third next available appointment, and would increase the availability of slots on schedule and reduce the waiting time for patients. These changes were implemented in May 2019 and more time is required to see consistent improvement.

3.6.5 Description of work to instigate PDSA Cycle Ramp 2

1.1 Triage new patients from A&E to physician clinics

The team noticed that referrals from A&E were not been triaged by a physician as the referral emails were sent from the head of the A&E department to the RBMS team. The team proposed that all A&E referrals should be sent for triage to assess the severity of the cases and to determine whether the patients required a fast-track appointment. This step was intended to enable differentiation between truly urgent and non-urgent referrals that came from the A&E department (Figure 3.8). The change showed significant improvement over time after ramps of PDSA cycles. This step resulted in modification of the outcome measure for the project it instilled recognition that few referrals made by the A&E department were truly urgent (see Figure 3.9).

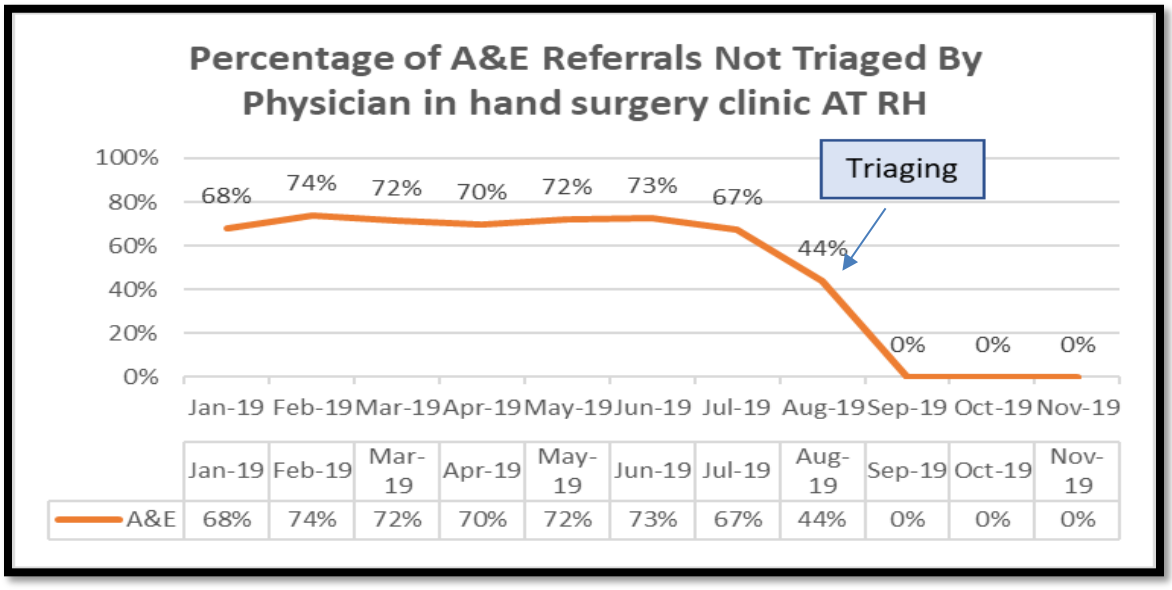


Figure 3.9: Percentage of A&E Referrals Not Triaged during 2019 with addition of Triage

Step

1.2 Eliminate Triaging to Specific Specialist's Clinic.

The RBMS team raised the concern that during triage, a specific physician was often named on the triage form for subsequent treatment. This naming of a specific physician increased the period to the third next available appointment for that physician and affected slot utilization. It was suggested that new referrals should be triaged for treatment from a specialist based on their own health condition and not based on a physician's name. The immediate positive impact was to increase the slot utilization and reduce the period to the third next available appointments.

3.6.6 Description of work to instigate PDSA Cycle Ramp 3

1.1 Cancel next scheduled walk-in appointment as per patient needs (August 2019).

The QI team decided to check the walk-in slots for patients who had already been seen by physicians. The change was tested in August 2019. The clerks were trained to check the walk-in appointments. The appointments for patients who had already visited and therefore did not need a future appointment were cancelled, and these slots were retargeted to other patients. As a result, 20% of future appointments held by walk-in patients were cancelled. Continuation of this change will have an impact on the average waiting time for new appointments.

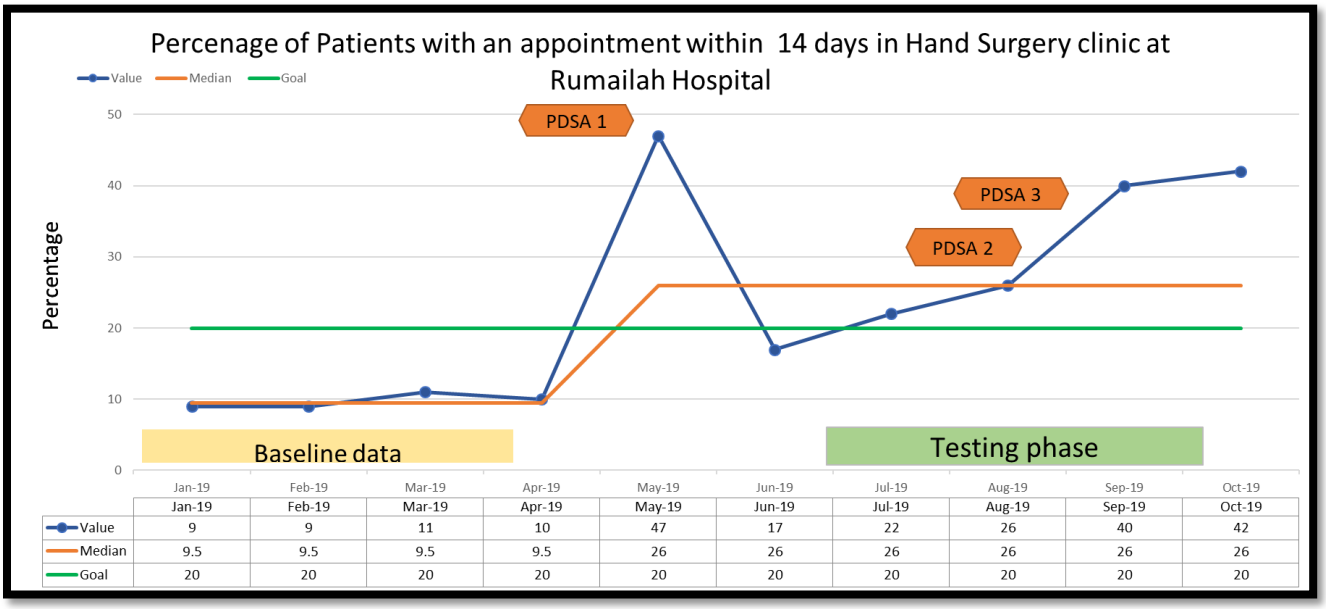
CHAPTER 4: RESULTS

This chapter presents and explains the findings of the journey to improve waiting times for appointments at the Hand Surgery Clinic at Rumailah Hospital. The researcher details the data variance in outcome measure, process measures and balancing measure that was caused by the tested and implemented process changes. Several PDSA cycles were run, and four changes were implemented between May 2019 and October 2019. They are still ongoing.

4.1 Outcome measure

The outcome measure for this improvement project was the percentage of patients who obtained new appointments within 14 days of urgent referrals to the RH Hand Surgery Clinic.

The chart presented in Figure 4.1 shows significant improvement in the percentage of patients who obtained new appointments within the required time frame at the clinic over time. The baseline data during the pre-implementation phase, from January to April 2019, show that the percentage of patients who obtained the required appointments was an average of 12% per month.



	Jan-19	Feb-19	Mar-19	Apr-19	May-19	Jun-19	Jul-19	Aug-19	Sep-19	Oct-19
Value	9	9	11	10	47	17	22	26	40	42
Median	9.5	9.5	9.5	9.5	26	26	26	26	26	26
Goal	20	20	20	20	20	20	20	20	20	20

Figure4.1: Percentage of patients who obtained appointments within 14 days of urgent referral to the Hand Surgery Clinic at Rumailah Hospital during 2019.

Initially, after intervention through PDSA ramp cycle 1, a dramatic improvement was seen in the percentage of the patients who received appointments within 14 days of referral. This figure reached 47 % in May 2019. However, this improvement was not sustained, and the following month this percentage of patients dropped to 17%.

Based on that, the team decided to test other change ideas. The second PDSA cycle ramp test involved the triaging of A&E referrals from the end of July. All referrals made from the A&E department were referred as urgent. However, triaging physicians who specialised in hand surgery made the clinical decision that 95 % of these referrals were not urgent (see Figure 4.2).

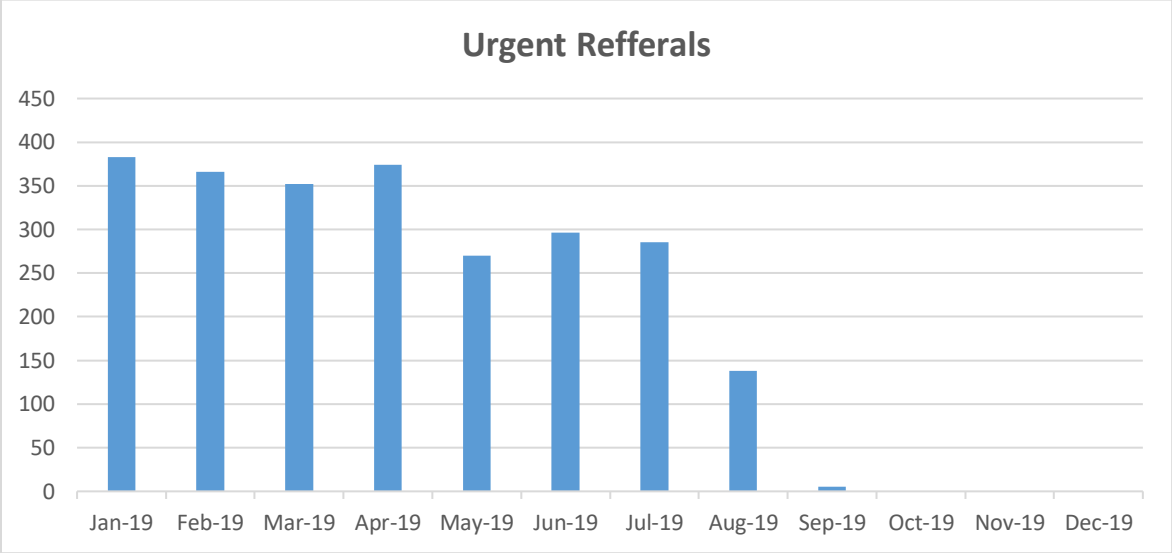


Figure 4.2: Number of referrals designated as urgent. A triage step by physicians with hand surgery expertise was implemented in August.

After implementation of the new process of triaging referrals from A&E, an increase was observed in the proportion of patients who received appointments within 14 days of the referral, from 22% in July to 26% in August and 40% in September. This trend continued in October. Monitoring is ongoing to ensure that a sustainable situation is reached.

4.2 Process measure

The process measures for this improvement project were: the number of new patients seen in the RH Hand Surgery Clinic after the addition of new appointment slots; the percentage of triaged referrals; and clearing the backlog of appointments, which was measured by monitoring the period to the Third Next Available Appointment (TNAA) for the clinic.

Two PDSA cycle ramps were tested and were then implemented successfully. The first PDSA cycle ramp tested an attempt to match capacity to demand by opening two extra evening specialist clinics, one resident clinic, and one specialist clinic.

The clinic capacity increased to 234 appointment slots per month after the addition of 96 overbooking slots to the 138 existing monthly slots by the end of May 2019. This led to an increase in the number of new patients seen in the RH Hand Surgery Clinic. The figures are presented in Figure 4.3. The average number of patients seen in the clinic per month increased from 505 between January and March 2019 to 582 in October 2019. The number of patients seen in June and August were 414 and 421, respectively. This dip was due to Eid vacations. Therefore, we expect more reductions in the number of patients on the waiting list in the next few months. As more patients are seen in the clinic, the number of patients on the waiting list will reduce. Further monitoring is needed to ensure sustainability.

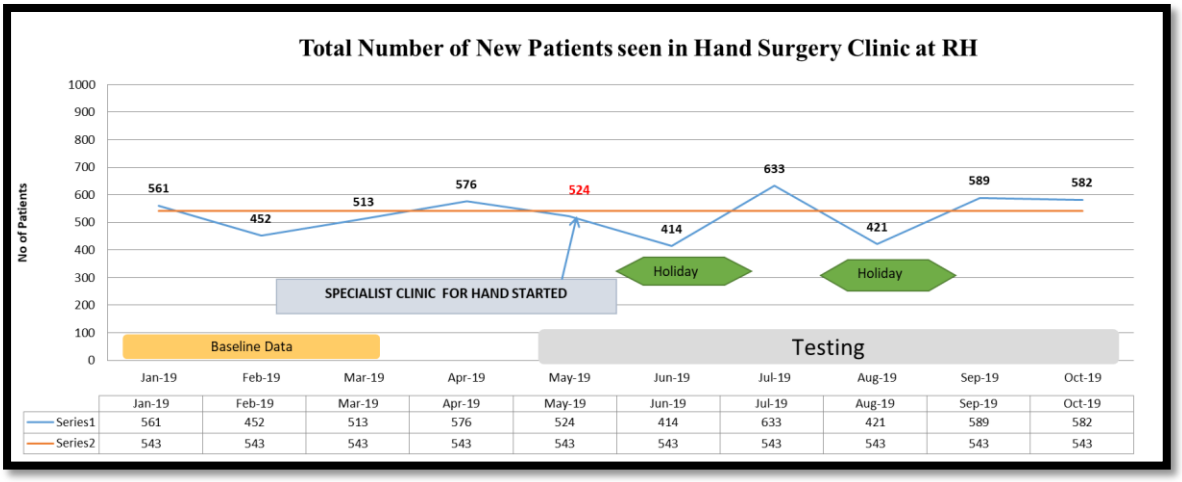


Figure 4.3: Total number of new patients seen in Hand Surgery Clinic at RH with addition of new appointment slots from May onwards.

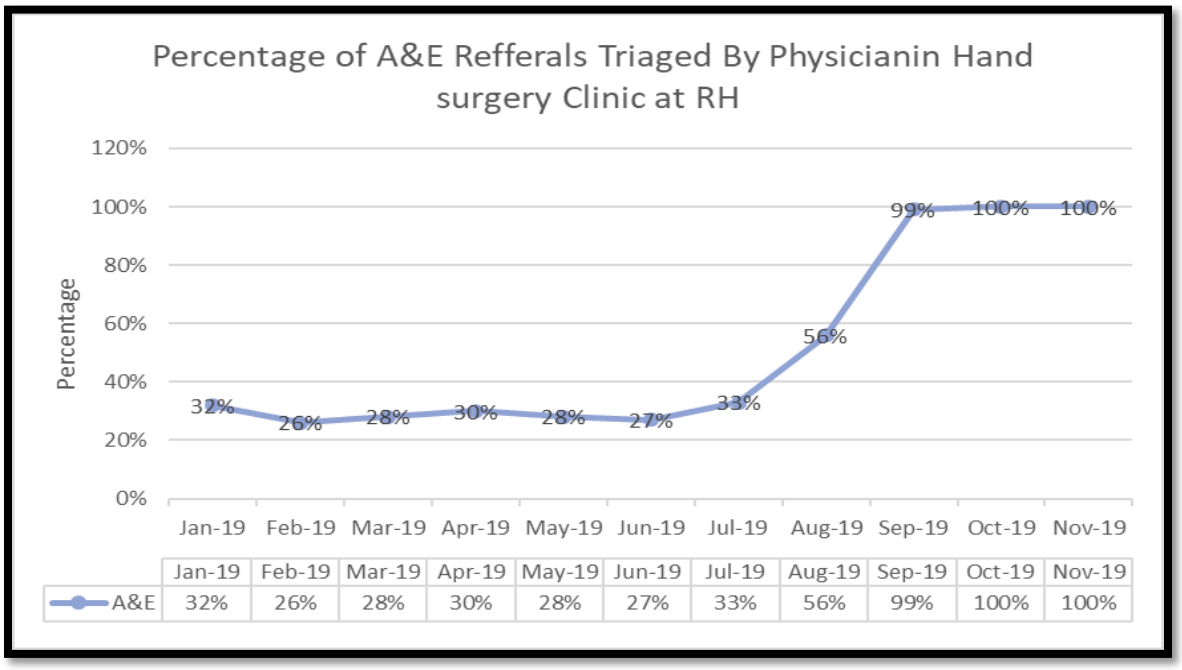


Figure 4.4: Percentage of A&E Referrals Triaged by Physician during 2019 in the Hand Surgery Clinic.

The third change idea, to clear the backlog, was measured by monitoring the availability of the TNAA. Figure 4.5 shows the figures for the TNAA for surgeons in hand surgery clinics. It can be seen that the availability of the TNAA decreased from June, and this data did not show significant improvement. More data points are required to track this process measure and further work would be required to investigate the reasons for this finding.

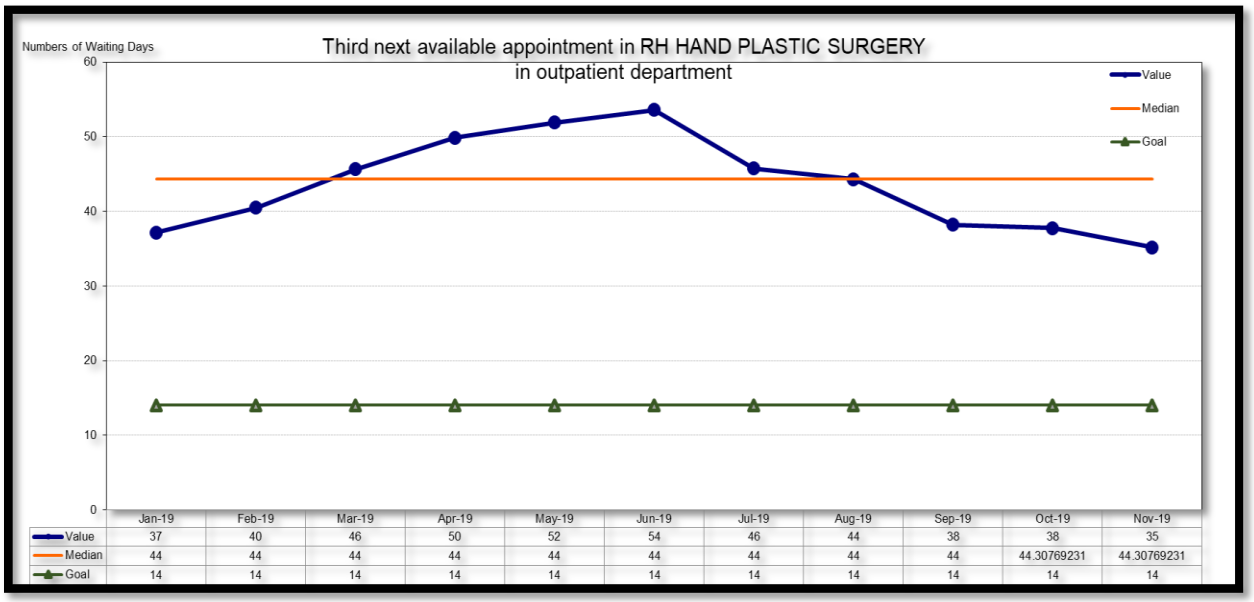


Figure 4.5: Data regarding the third next available appointment for the Hand Surgery Clinic at Rumailah Hospital.

4.3 Balance measure

The balance measure for this quality improvement project was the number of patients seen for follow-up appointments. The choice of this measure enabled the team to monitor any changes caused by the interventions to the referrals method that may have happened in other parts of the system. These effects could be positive or negative.

We observed no variation in the number of patients seen for follow-up appointments caused by the interventions. The decreases in the numbers of patients seen in June and August could be explained by the presence of the Eid holidays. The increase in the capacity for new patients did not affect the number of slots for follow-up patients, as shown in Figure 4.6. The average number of follow-up patients seen between January and March 2019 was

412; after implementation of the change ideas, the average number of follow-up patients seen was 409. This is considered as a sign of success, as the functioning of this other part of the system was maintained without negative effect while the improvement project was implemented.

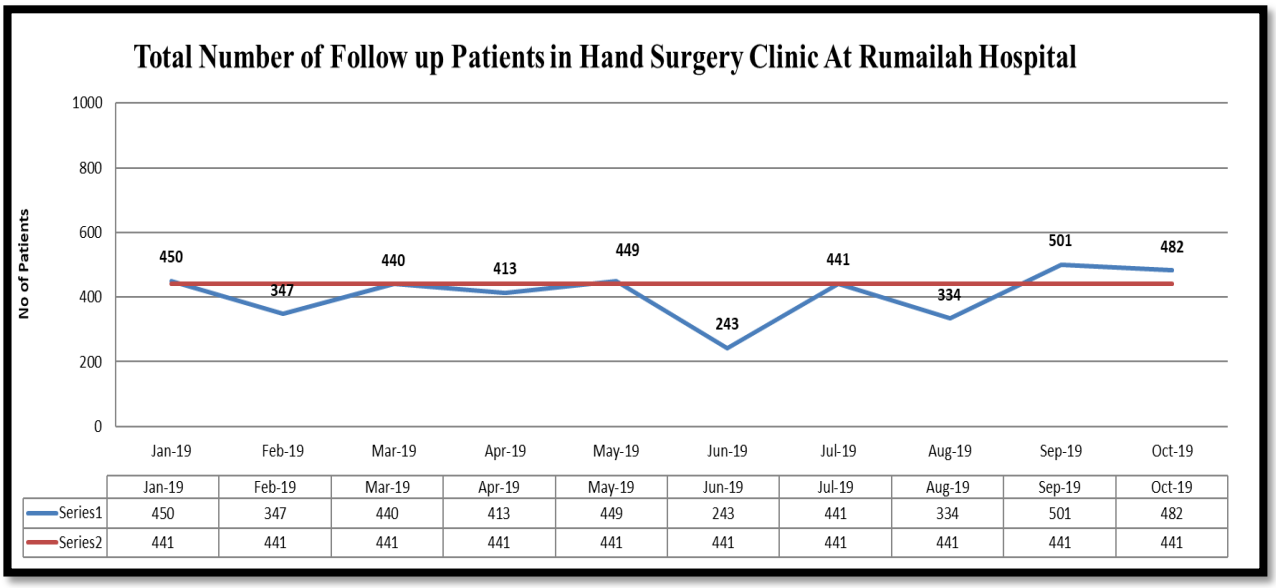


Figure 4.6: The numbers of follow-up patients seen in the Hand Surgery Clinic at Rumailah Hospital.

CHAPTER 5: DISCUSSION

As with any improvement project that involves large-scale change in a complex environment, several events occurred during the period of work, and therefore it was very difficult to be sure those changes observed were due to the QI project that had been introduced. However, measurements can be made to ascertain the relationship between changes we tested and the overall context, to identify any pattern which could indicate how the mechanisms were likely to have produced the results.

For this QI project, the referral and appointment booking system that was in place for the Hand Surgery Clinic at Rumailah Hospital was investigated and improved by redesigning the triaging process and working to match capacity to increase in demand for the clinic.

Before testing the change ideas, it was very important to review the baseline data in a systematic and structured way. This was performed through analysis of the waiting list. This step was very important as we intended to test multiple change ideas concurrently. Furthermore, this step enabled clarification of the changes that would have most impact on the outcome, which would then enable us to drop those that did not.

The waiting list analysis consumed a lot of time due to issues such as the discovery of invalid data and the need to access multiple resources (the Cerner data and the RBMS) to extract data. This analysis required resources in terms of time and staff. However, the analysis was critical as it enabled the QI team to recognize many problems that might have

been responsible for the production of the long waiting list. One such problem was the discovery of undated patients, which proved to be an issue that required immediate solution before the testing phase of our change ideas for this improvement project could begin.

The reason for the existence of these undated referrals was that the calling team were unable to contact patients due to the holding of incorrect phone numbers in the system. This issue had been mentioned previously in other studies, such as an improvement project that had been conducted in the Paediatric Neurology Clinic to reduce the no-show rate. In that study, the root cause of 49% of no-shows was found to be the appointment scheduling system, which involved difficulties such as the inability of staff to contact patients (Mohamed et al., 2016).

During the study of the waiting list, many deficits were identified among the referrals such as duplicate, incomplete or incorrect referrals. Another issue was the attendance to the walk-in section of many patients whose referrals remained active on the waiting list. This was found to be due to lack of communication between registration staff in the clinic and the RBMS team. In the previous study of the Paediatric Neurology Clinic, solving this issue helped to improve the waiting list by 18% (Mohamed et al., 2016).

In this QI project we succeeded to validate the waiting list, clear the backlog and streamline the pre-clinic process. The main result we observed was the reduction in the number of unnecessary urgent referrals by triaging all referrals sent from the A&E department, which consequently increased the percentage of patients who received an appointment within the policy time frame. The improvement in the percentage of patients seen within 14 days of referral reached 40% in October. More time is required to check

further results. Due to the short time frame for this QI project, we had only four months in which to test change ideas, whereas in a study published by Rushton et al. in 2017, it was observed that the time frame needed to achieve sustainable results using similar change ideas was six months (Rushton, Robertson, Taylor, Taylor, & Alfred, 2017).

Triaging is one of the most effective solutions to the problems of long waiting times and poor patient flow as it shows a strong relationship to these two issues, according to a systematic review that studied triage-related interventions to improve patient flow and waiting times (Oredsson et al., 2011). Another improvement project at a physiotherapy department in Australia, which implemented a timely appointment triage model, achieved a reduction in the waiting list by 22% (Harding & Bottrell, 2016).

The outcome measure chosen for our improvement project, to increase the percentage of new patients who obtained appointments within 14 days of referral, reached 48 % after increasing capacity and altering the triage process. This result was in parallel with that of another study, in which an intervention was made to reduce waiting time by more than 10% through the addition of capacity to reduce the no-show rate (Molfenter, 2013). Furthermore, our result was supported by another systematic review, which discovered that the most effective solutions to reduce waiting times in outpatient specialist clinics were the alignment of resources and planning for efficient use of capacity using existing resources (Naiker, FitzGerald, Dulhunty, & Rosemann, 2018).

In our project, we also saw a reduction in the percentage of patients seen in June. This was because the addition of appointment supply without consequent changes in the

process of service had only a temporary effect on the waiting list, and the queue rebuilt because other issues were not addressed (Harding & Bottrell, 2016).

The mean of the TNAA was used to measure efficacy for the clinic. Figure 4.5 shows that the TNAA for our improvement project increased over the period of intervention. The reason for this result is that the TNAA measure was affected by a high no-show rate, since the rescheduling of patients who did not attend their appointment contributed to increased waiting time (Mohamed et al., 2016). The no show rate for the Hand Surgery Clinic did not show enough improvement; the baseline data was 34% and it reduced only to 30%. Moreover, when studying the mean of TNAA, it was unclear whether the variation between different days or the presence of different physicians in the clinic might have affected the TNAA.

Accordingly, the TNAA did not improve and further monitoring would be needed to accumulate more data. The recommendation is to continue testing of other change ideas in the clinic to achieve a waiting time reduction, such as use of an overbooking approach to reduce the no-show rate and the period to the TNAA (Molfenter, 2013).

On the other hand, the availability of appointments in practices such as the walk-in clinic affects appointment schedules in the booked clinics. It is unknown whether the number of walk-in patients affects availability of appointments. However, it is known that the number of walk-in patients increases pressure on staff as they must be seen by a physician, and this affects the timing for routine appointments booked through the Cerner system, because the clerks must modify these appointments to register the walk-in patients.

Attempts not to book walk-in patients can cause difficulties (Eggleton, Penney, & Moore, 2017).

CHAPTER 6: LESSONS AND LIMITATIONS

This improvement project involved many processes on which many diverse levels of staff depended, so it was overwhelming at first to discover the source of the problem and to decide which changes ought to take priority. A multidisciplinary team that comprised a physician, nurses, allied health, information system clinic clerks and cashier staff, permitted a genuine process overview.

This high level of involvement from all staff, with a strong patient-centered approach, helped to engage the cooperation that was necessary to make the project successful.

A systematic and structured review of baseline data and tracking of many small indicators along the way enabled us to understand and evaluate the interventions. This was important as we had carried out multiple interventions concurrently. These indicators enabled us to refine the interventions that showed most impact and drop those that did not.

There were some limitations in this QI project. The data employed were based on data from the EMR. Due to the extensive process of validation required by the RBMS team, the EMR report is released only six weeks after the month-end. For example, the data released in the middle of November 2019 covers the period to the end of September 2019, which leads to a timelag between any changes implemented and observation of the effect of the changes. Though this is a disadvantage, it is preferable to use validated data endorsed by the wider corporation against which to measure achievements.

Another limitation in this QI project was the lack of a supporting policy to deal with undated appointments that would enable the team to clear the list. Undated referrals were considered as a challenge, and their clearance required resources. The same patients who had undated appointments may have already attended the clinic as walk-ins and might even have been given future appointments.

An effort was made to start electronic triage (E-triage) and the system was modified to accept this change. However, the implementation of this change was delayed due to the lengthy process to obtain approval from the hospital executive team. The project team believes that e-triage will reduce the average waiting time significantly as well as prevent the loss of referrals and increase the efficiency of resources utilization.

A high no-show rate was a complex issue in this clinic. The number of people who do not arrive (DNA) for appointments disrupts a healthcare system and causes financial loss to any organization, including HMC. This issue was responsible for the lack of improvement in the TNAA, and so affected the waiting time results.

The time allocated for this QI project to improve waiting times for Hand Surgery Clinic patients was one year. Changes were implemented over a period of four months for academic submission purposes. The result presented in this study shows improvement, but to determine the success of this project more time is needed for sustained improvement in waiting time to achieve the desired outcomes.

Implementation of a patient experience survey after the introduction of changes can be considered in the future in order to compare patient satisfaction in relation to the

implemented changes. As this quality improvement project is still in the early stages, there are ongoing efforts to track, review and improve waiting times. Future changes will focus on more accurate scheduling of appointments between care providers for appointments on the same day, a real-time patient tracking system that can facilitate treatment delivery and a more efficient patient flow, and a responsive patient notification and rebooking SMS system.

CONCLUSION

The project team did extensive research in understanding the complex process of OPD appointment and clinic consultation. The project team tested three change ideas that yielded the desired results they defined at the start of the project of increaseing the percentage of new urgent patients seen within 14 days of referral from 12 to 40 %.

The team is planning to test the next change idea to improve the triaging process by implementing electronic triaging, which is expected to reduce the waiting time for an appointment in the clinic. Our primary outcome did not exhibit sustainability; more work is still ongoing to achieve this as we need to have >10 data points to meet the designated outcome. Given the favorable results, the next step would be to sustain the outcome and then to spread the work to similar clinics.

To reach sustainability for this improvement project, a contnous monitoring of waiting time by the team is needed. A quarterly report with detailed analysis of waiting times, waiting list,and follow -up the implementation of the E-triaging would be tabulated and printed for the quality department in RH and to the head of plastic surgery department. With this information, quality reviewers, and project team can monitor the waiting time to get an appointment and identify causes and troubleshoot for, and deviations may happen.

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APPENDIX A: PDSA CYCLES 1

Department: Plastic Hand Surgery Clinic	Date: 29th April 2019	**PDSA Cycle# 1**

PLAN

Task no.	List the tasks needed to set up this test of change (Please add Rows as necessary)	**Person responsible**	When to be done (completion date)	Where to be done (location)
1.	To add on 2 specialist evening clinic	Operational lead	5th May 2019	Hand Surgery clinic OPD

Item No.	**Predict what will happen when the test is carried out**	**Measure to determine if prediction is correct. Choose one of the following measures, and then delete rows as necessary.**
1.	2 evening clinic will be added	*Total* Number of new patients seen in Hand Surgery Clinic at RH after newly added slots

DO

What did you observe?

2 evening specialist clinic were added.

Was the plan carried out as planned? Yes No

STUDY

What did you learn?
By adding the slots we were able to accommodate extra 10 new urgent patients per week . Still there are waiting patients exceeding the current slots.

ACT

What did you conclude from this study?

Plan to add one specialist clinic and one resident clinic.

Department: **Plastic Hand Surgery Clinic**	Date: 6th May 2019	**PDSA Cycle# 2**

PLAN

Task no.	List the tasks needed to set up this test of change (Please add Rows as necessary)	**Person responsible**	When to be done (completion date)	Where to be done (location)
1.	To add one specialist clinic and one resident clinic	Operational lead	11th may 2019	Hand surgery OPD

Item No.	**Predict what will happen when the test is carried out**	**Measure to determine if prediction is correct. Choose one of the following measures, and then delete rows as necessary.**
1.	one specialist clinic and one resident clinic will be added per afternoon consultant clinic	Number of overbooking slots added per consultant clinic in afternoon

DO

What did you observe?

one specialist clinic and one resident clinic were added.

Was the plan carried out as planned? Yes No

STUDY

What did you learn?
By adding the slots we were able to accommodate extra 14 new urgent patients.

ACT

What did you conclude from this study?

Plan to see how many patients will be seen within 14 days after the added extra slots.

Department: **Hand surgery clinic**	Date: 22 April 2019	**PDSA Cycle# 3**

PLAN

Task no.	List the tasks needed to set up this test of change (Please add Rows as necessary)	**Person responsible**	When to be done (completion date)	Where to be done (location)
1.	To clear the backlog of the waiting list for the appointments more than 60 days	RBMS, operational lead	June 2019	Hand surgery clinic

Item No.	**Predict what will happen when the test is carried out**	**Measure to determine if prediction is correct. Choose one of the following measures, and then delete rows as necessary.**
1.	The RBMS will call parents/family to re-schedule their late scheduled appointment date to near one	Third next available appointment

DO

What did you observe?
RBMS will call patients to re-schedule their late scheduled appointment date to near one and cancel the patients
Was the plan carried out as planned? Yes No

STUDY

What did you learn?

30% of patients agreed to re-schedule their appointment from June and July 2019 to the nearest appointment in May 2019.

ACT

What did you conclude from this study?

Plan to continue call the patients to ensure the other 50% is re-scheduled.

APPENDIX B: PDSA CYCLES 2

Department: **Hand plastic surgery**	Date: 4th August 2019	**PDSA Cycle# 4**

PLAN

Task no.	List the tasks needed to set up this test of change (Please add Rows as necessary)	**Person responsible**	When to be done (completion date)	Where to be done (location)
1.	The Hand surgery clinic consultant will triage urgent new patients referrals from A&E for 2 weeks .	Hand surgery clinic consultant	28 Aug, 2019	Hand surgery clinic

Item No.	**Predict what will happen when the test is carried out**	**Measure to determine if prediction is correct. Choose one of the following measures, and then delete rows as necessary.**
1.	The triaged referrals will increase from 30% to 40 %	Percentage of triaged urgent Referrals

DO

What did you observe?
The Hand surgery clinic consultant triaged urgent new referrals
Was the plan carried out as planned? Yes No

STUDY

What did you learn?

The pediatric consultant triaged new urgent referrals from A&E for one week and the percentage increased from 30 % to 40 %, the team noticed that only 2 patients have triage decision as urgent.

ACT

What did you conclude from this study?
Plan to continue testing for 2 weeks.

Department: Hand plastic surgery	Date: 28h August 2019	PDSA Cycle# 5

PLAN

Task no.	List the tasks needed to set up this test of change (Please add Rows as necessary)	Person responsible	When to be done (completion date)	Where to be done (location)
1.	The Hand surgery clinic consultant will triage urgent new patients referrals from A&E for 2 weeks .	Hand surgery clinic consultant	11 Sep , 2019	Hand surgery clinic

Item No.	Predict what will happen when the test is carried out	Measure to determine if prediction is correct. Choose one of the following measures, and then delete rows as necessary.
1.	The triaged referrals will increase from 56 to 99%	Percentage of triaged urgent Referrals

DO

What did you observe?
The Hand surgery clinic consultant triaged urgent new referrals
Was the plan carried out as planned? Yes No

STUDY

What did you learn?

The pediatric consultant triaged new urgent referrals from A&E for one week and the percentage increased from 56 % to 99 %, the team noticed that only 2 patients have triage decision as urgent.

ACT

What did you conclude from this study?
Implement the triaging for all Referrals

APPENDIX C: PDSA CYCLE 3

Department: Hand surgery clinic	Date: 30 Aug 2019 PDSA Cycle# 6

Plan

Task no.	List the tasks needed to set up this test of change (Please add Rows as necessary)	Person responsible	When to be done (completion date)	Where to be done (location)
1.	To educate the clerk to cancel walk in patients from the waiting list		4th Sep 2019	Outpatient clinic registration disk

Task no.	List the tasks needed to set up this test of change (Please add Rows as necessary)	Person responsible	When to be done (completion date)	Where to be done (location)
1.	To educate one clerk to start collecting the walking in patients for one week and to send them to RBMS to cancel them from the waiting list and to use their next appointment if not needed.		4th Sep 2019	Outpatient clinic registration disk

Do

What did you observe?
The Head nurse educate five clerk about how to contact RBMS and provide sheet with all walk- in patients to be cancelled from the waiting list
Was the plan carried out as planned? Yes No

STUDY

What did you learn?

The clerk were able to send walk in patients list to RBMS and they were cancelled from the list.

ACT

What did you conclude from this study?

Plan to educate Five more clerks .