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Needs assessment to implement virtual clinics in primary health care, Riyadh, Saudi Arabia

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Abstract
Introduction: Telemedicine is an effective approach used by doctors and healthcare service providers to reach out to patients remotely away from their offices or clinics. It is a practice that has been applied for decades, and it continues to grow with the increasing advancement of technology. This paper has examined virtual clinics and ways in which telemedicine can be applied to improve patient care. It begins by providing extensive background information about the concept. It is noted that the term 'telemedicine' was first mentioned in 1906 in an academic publication, and ever since, it has been practiced in different medical settings across the world. This project has also discussed broadly the methodology it applied in gathering data.
Methods: A comprehensive literature review that included an exploration of diverse databases was found to be the most appropriate methodology.
Results: The findings present various intriguing issues that were helpful in understanding the research problem.
Conclusion and Recommendations: Three important recommendations have been suggested. These include training and education, policy formulation, and restructuring of referral forms. It is believed that through the implementation of these, it will be possible to obtain positive outcomes when it comes to application of telemedicine. This study was informative since it presented crucial discussion on different issues related to the improvement of patient care through the use of advanced and modern technology.

Keywords: virtual clinic; telemedicine, CQI

Introduction

In recent years there has been a growing, global acceptance of Virtual Clinics (telemedicine services) both by health care providers and patients. The reasons are varied and differ from one context to another. These services can provide widespread increased accessibility as telecommunication costs fall and as awareness of the advantages from eliminating travel costs increase. (Davis *et al*., 2018) [2]. Furthermore, telemedicine services often enhance the standards and quality of available healthcare. Given this backdrop, a project was commissioned to weigh the feasibility of introducing telemedicine services in Saudi Arabian hospitals. This paper provides a report on the pilot project.

General Circumstance of Telemedicine

Primary care is the foundation of effective and high quality health care. The role of primary care clinicians has expanded to incorporate coordination of care across multiple providers and management of more patients with complex conditions. Empowering technology has the potential to expand the capacity for primary care clinicians to provide holistic, accessible care that channels expertise to the patient and brings experts into the primary care clinic (Young & Nesbitt, 2017).
According to Davi *et al*. (2016), missed appointments and lack of treatment plan adherence are some of the many challenges that often lead to poor health outcomes. Patients' health outcomes become greatly improved by ensuring they have access to remote care. However, this aspect requires effective planning and robust strategic approach. Eventually, the healthcare system of a given community improves greatly with such effective programs.
Evidence suggests that less than 20% of the U.S. population reside in rural areas (Erdogan, Krupski, & Lobo, 2018) [3]. The population density is estimated at 87 people per square mile in the rural areas. However, in the urban settings, the density is as high as 2,500 people per square mile (Erdogan *et al*., 2018) [3]. More than 60 million US populations live in areas with limited access to effective healthcare services. This challenge is even worse in the developing countries where access to healthcare is considered a great privilege and a reserve for the financially affluent populations.
Telemedicine is considered as one of the best alternatives that can be explored to address this challenge. Setiawan, Syamsudin, and Ruhiyat (2018) explain that telemedicine has been in use for several decades in different clinical settings due to the many advantages that it brings. The first mentioning of this concept was in 1906 when the inventor of electrocardiogram published a paper on the subject. Different states across the United States have used this clinical practice to ensure access to medical services to diverse communities across the nation. For instance, in Alaska, the use of radio and other telecommunication technologies in the diagnosis and communication of different health concerns has remained famous since the 1920s. Most clinical facilities use radio to offer medical advice and support to the communities living within the state. It has even become possible for the clinical facilities and healthcare centers to perform otoscopy and

audiometry and have the results transmitted through the available telecommunication technologies. Office-based telemedicine has also become more popular in contemporary society. The use of flat-screen, high-definition units, and other peripheral devices has helped in ensuring accurate physical examination and diagnosis of patients' health problems.

Additionally, the store and forward technologies have also been phenomenal in advancing telemedicine in today's clinical settings. This aspect involves the application of information and communication technologies in obtaining clinical or health-related information and transferring it directly to another healthcare facility or site for examination or interpretation. For instance, in ophthalmology and optometry, non-mydriatic cameras are often used to conduct retinal screening efficiently in diabetes diagnosis without having to dilate the eyes.

Teledentistry is another important concept that dental hygienists can use to improve patient care, especially in oral healthcare. Other areas that use this approach include dermatology and psychology. Studies have shown that teledermatology is effective in ensuring that dermatological information is transferred through audio, visual, and data communication. Most importantly, the evolution of telemedicine seems unstoppable. Already, there are numerous e- health equipment and program that continue to enhance efficiency and positive technological interactions within the healthcare setting.

Hospital Resolve to Introduce Virtual Clinic

In August 2018, the hospital introduced the use of telemedicine services with the aim of improving access rate and delivering a high standard quality of care leading to a higher patient satisfaction rate. The service started with one clinic and one referring center as a pilot with an intention to expand the service after a month. Being part of the operating team and observing the challenges that doctors and patients face from the service, I decided to conduct a quality improvement project with the sole aim of fixing the challenges we are encountering as a team. Three issues caught my attention when starting to explore the available data. The first thing that caught my attention was the number of non-collected medications, which accounted for 41% of total prescribed medications. The number of inappropriate referrals, which accounted for 7%, was another issue that caught my attention although the 7% figure might have been underreported and appeared inconsistent with the reality. Finally, the number of no answer rate was also reported as a total of around 10% for two sessions with majority belonging to morning sessions compared to afternoon sessions. While these issues manifested are critical challenges that needed our quickest attention, we were focused majorly on telemedicine as a new program to replace the traditional healthcare provision approach. Telemedicine services proved as a promising solution that would change positively ways in which such overarching challenges could be addressed. It is worth noting that the definition of 'inappropriate referral' needs to be explained in order to create a clear understanding what it implies in our situation. According to Perry *et al*., (2018) [7], 'appropriateness' with regards to referral has to do with the benefits that a patient obtains from a given healthcare service. It implies that an inappropriate referral is that which fails to address the specific needs a patient has due to reason such as lack of facilities and other resources that may be required. Below is an illustration of appropriate referral:

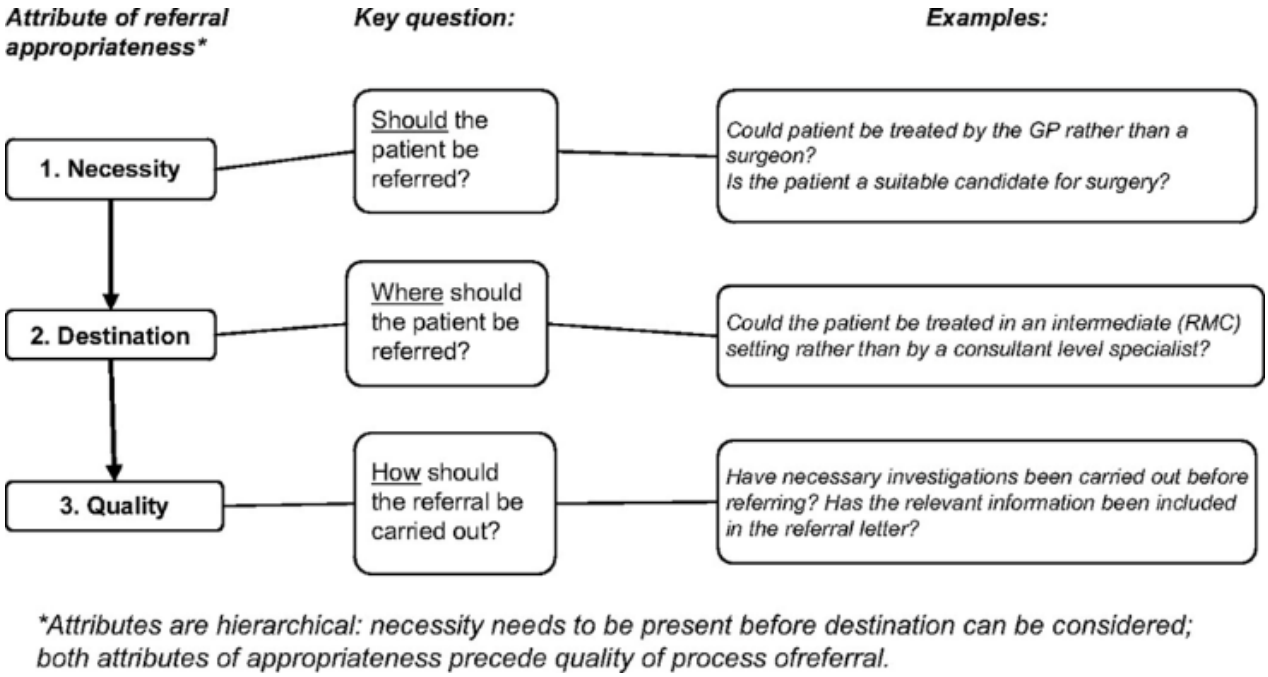

Fig 1

The Following chart identifies some of the inappropriate referrals that the facility may not make even after We introduce the virtual clinic programs in our facility:

Table 1

Patient not to be referred	Description/Rationale
Complicated cases	Patients with chronic diseases and multiple morbidities
Antenatal Screening	Patients require screening for high risks antenatal conditions for quick intervention
Cardiac patients	Require constant monitoring
Diabetic patients	Require constant monitoring
Tumors and malignancies	Are research studies or investigations that the facility has the capacity to handle
Patients with alarming signs	The red-sign symptoms may be too risky for referral

In Jun 2019, the findings of the pilot project were highlighted in an initial meeting held with the quality assurance department with the aim of exploring the chances of improving our telemedicine services. It was then agreed that a committee be formed to champion the quality improvement project including framing the project in a way to get the approval of higher management. Another meeting was then held with the Head of Department (HoD) to convince him of the merit and significance of the project. Our position was that the rate of inappropriate referrals overloads both general clinic and virtual clinic services and negatively impacts the quality of care. We also argued that this aspect was likely to reflect on the experiences of our patients and overburden medical practitioners. Further, we made the economic argument that such inappropriate referrals have a cost implication; thus, they increase the finical burden to the hospital. Our recommendation was to provide a more cost-effective service, that is, telemedicine services. There was then another meeting with the Head of Physician Affairs (HoPA) to list the project under his division. In parallel to these meetings, the quality office and I had decided which stakeholders would be involved in the project. We would like to make it clear that the telehealth does not affect other parts of the hospital due to lack of adequate staff. Moreover, there are other previous patients rural who are now using telehealth instead of traveling to the hospital. Finally, there is no opportunity to serve other rural populations through this service because it is not part of our plan.

Literature Review

The concept of telemedicine has been of interests to many scholars including (Ahmed, 2019) [1]. He argues that telemedicine has significantly improved with the advancement of technology witnessed in the contemporary society. Ahmed (2019) [1] mentions that telemedicine is about understanding ways in which the modern and post-modern information, communication, and technologies can be used to improve medical care. Efficiency and quality of patients' care have proved to be crucial part of today's medical care not only in the United States but across the developed and developing worlds.

A study conducted by Khairat, Liu, Zaman, Edson, and Gianforcaro (2019), indicate that telecommunication helps in improving efficiency and accessibility of medical care. The fact that it has become easy for people to access laptops and other mobile devices to access internet and communicate directly with their healthcare service providers makes telemedicine a viable option for many individuals. It is worth noting that telemedicine has been used in different healthcare fields to improve patient care. In the field of liver disease prevention, telemedicine has been applied to examine and improve response to liver-related attacks that many people May experience. As hairat, Liu, Zaman, Edson, and Gianforcaro (2019) argue, the treatment of liver diseases is one of the most expensive and complicated tasks that professionals in the field of health can ever experience. Improved patient care requires constant communication with the patient and their families on their progress and related issues. Telemedicine helps in ensuring that the communication between the patient and the healthcare provider is positive and is delivered in the most efficient manner possible. Narva, Romancito, Faber, Steele, and Kempner (2017) further explain that telemedicine is not only helpful in the treatment of liver diseases but also in other areas. For instance, the program can be used in improving healthcare in areas such as in chronic illnesses prevalent in rural areas such as HIV/AIDS and cancer among others. Notably, the primary aim of every treatment plant is not just to reduce the symptoms and prevent the disease but also to ensure that the needs of the affected persons are also addressed.

Another important issue that has widely been examined by many past researchers is the efficiency and conscience that is provided by telemedicine among patients who do not know where they can retrieve the services they require. Studies by Young, Gupta, and Palacios (2018) indicate that it is easy to understand the level of satisfaction of the patients treated through the virtual and telemedicine systems used. It is noted that the extent to which patients are satisfied increases with the advancement of technology that is applied. Virtual clinics are essential in ensuring the interaction between the government and people is carried out with utmost effectiveness.

Family medicine was also found to be effective when telemedicine technique is used. According to Fatehi, Taylor, Caffery, and Smith (2019) [4], family medicine simply refers to medical specialty, which provides continuing and comprehensive health care for the individual and family. The scope of this specialty extends to all ages, gender, and organ systems. As previously mentioned, past studies have shown

that telemedicine can be applied to improve patient care in family medicine. Mehrotra *et al*. (2018) [5] explain that with telemedicine, family doctors can attend to individuals and families who do not want to go to the office or clinics. The conveniences created when telemedicine equipment or facilities such as video conferencing are used remarkably great. Patients who are limited in time and space can receive services, in the same manner, they would if they visited clinics physically. While using secure video chat and other telecommunication technologies, it is easy for the family doctor to gain access to the patient remotely, assess them, examine their vital organs, diagnose them and even discuss the medical outcomes with great efficiency. This has improved today's medical services significantly over the past years.

Methodology

The methodology adopted for the study involved two phases. Firstly, the team held our maiden meeting to explain the service we intend to provide and to identify other issues that may be related to our focus. It was therefore, a brainstorming session with the sole aim to explore all aspects of the problem. The identified issues are also illustrated in the diagram below:

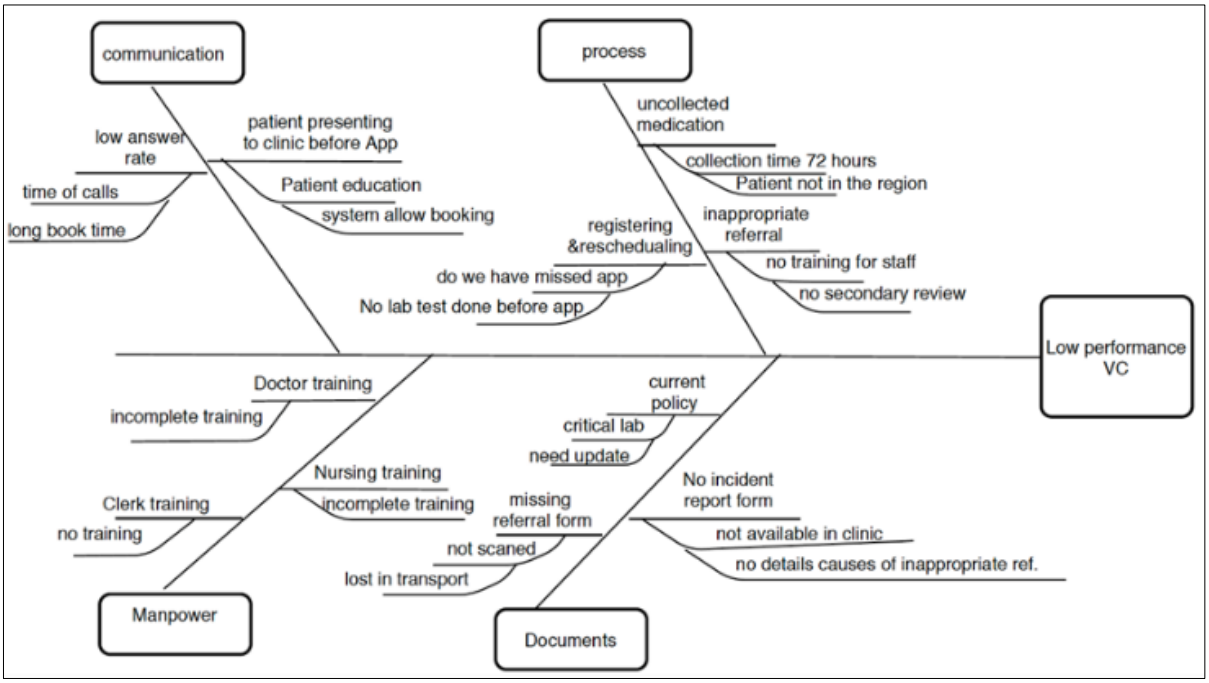

Fig 2

The following is the list of issues identified through the brainstorming session:

- **Process:** low answer rate, inappropriate referral, uncollected medication, registering and rescheduling
- **Communication**: critical lab, a patient presenting to the clinic before appointment.
- **Documentation**: current policy, missing form, missing incident report form
- **Manpower**: (Doctor, Nursing, Clerks) training

Secondly, it was identified that we did not have data to help us in our decision-making process and selecting what to improve that will have a great impact. As a result, we decided to start collecting data for at least two weeks and up to a month at most. This process was to be followed by a team meeting to evaluate the data and further exploring the challenge at hand. The table below was created to help with the collection process. It provides glimpses of the needed information from each nursing division, clerks, and pharmacy. A survey was also sent to the doctors who refer to the service or provide it.

Finding

During the data collection process, I started looking into the literature in order to identify a benchmark for our telemedicine services and what is considered the acceptable international quality standards for the initial points that we had identified in the telemedicine service:

- No answer rates 10%.
- Non-collected medications 61%.
- Inappropriate referral to the service 17%.
- The access improvement rate that telemedicine offer compared to traditional service.

It was also identified that the current international benchmarks such as Cleveland were problematic for our situation since the data collected was from all hospitals all over the world and not context-specific. However, there was no local benchmark suitable for our needs.

Therefore, we decided to have an improvement target and set our benchmark. There was also no current process map to guide the process. Thus, a high-level process map was designed to have a general view and a better understanding

As shown below. The policy for the virtual clinic had missed details for operation and standard to have unified services for the patient and patient safety measures in case of critical lab or radiological finding.

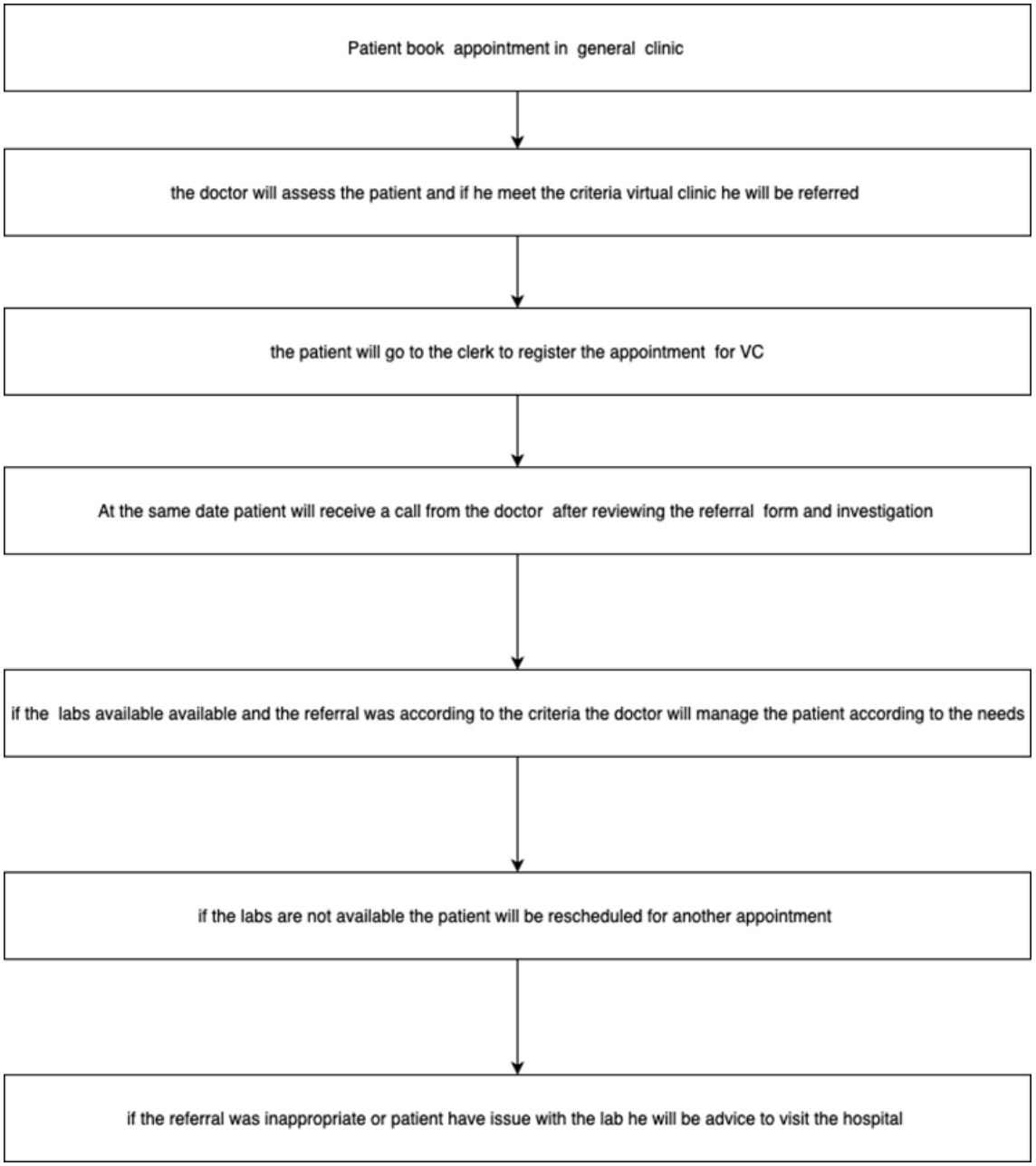

Fig 3

We determined that the following process can be followed to ensure a positive referral process is achieved. The first step involves having the patient book appointment in a general clinic. It is through this appointment that we can identify patients who need to be attended to. Second, the doctor of the healthcare provider responsible will assess the patient to determine whether they meet the inclusion criteria for the virtual clinic that they are to be referred to. This assessment is crucial in ensuring that the patient is referred right to the virtual clinic. Once this is done and the assessment shows they meet the criteria, the patient will then proceed to the clerk to book an appointment with the referred virtual clinic from where they are supposed to receive medical services. A doctor from the virtual clinic where the patient booked an appointment will make a call to the patient after they have examined the referral request form. In case the laboratories are available, the patient will be contacted the same day and an intervention recommended. If not, they will have to be rescheduled for another appointment. Most importantly, if the referral was inappropriate not meeting the inclusion criteria or the laboratory was not functional as expected, the patient will be allowed to visit the healthcare facility, perhaps physically this time around.

Furthermore, data from the pharmacy team revealed some

Shocking numbers of none collection of medications, which accounted for 61%, which was higher than the initial data set in the pilot program. Upon further examination of the data, the team realized that the level of incidence was due to the type of medication prescribed. The finding was that 68% of the medications prescribed were vitamins and minerals. The team thought that is not of significant value for the patient. Moreover, by indirectly assessing the time of dispensing, it was reported that they had a problem with the time of collecting the medication. Therefore, we did not intend to have an intervention. Few medications were not collected such as antibiotics, and we decided to see if this is a systematic error or a random error to ensure patient safety. Information from clerks was not considered significant, so there was nothing to be done from their side. Moreover, the data from the doctors' survey came back showing 82% of our doctors use the service, 65% did not get training before using it, and 25% did not know that a policy existed. Additionally, 38% of doctors did not get the chance to read it, and 31% requested to get training for the service, which may explain the high number of inappropriate referrals that accounted for 17% of the total referred cases to the virtual clinic collected via the nurse collection sheet. It is important to explain that by appropriateness when it comes to referral has to do with the benefits one gets from a healthcare service to which they are taken. The no answer patients were described as patient didn't answer the call at the appointment time, with a total of (10%) that was accepted rate to the department and the aim to have reduced by 4%. with the new software booking system expected to be launched in May 2020 and expanding of virtual clinic provides.

From the current data that we collected, we have identified two issues that may contribute to the problem and lower the efficiency of telemedicine services. The first one is the high inappropriate referral rate at 17%, which can also be explained by the lack of awareness and educational sessions for the doctors using the service. For this challenge, the team decided to use a driver diagram to illustrate the problem and set timelines, the second is that quality improvement project must ensure the continuity of the standard and monitoring (Perry *et al*., 2018) [7]. However, it is established that an inherent principle in quality assurance is that one cannot fix what you cannot measure. Hence, we decided to define our key performance indicators (KPIs) to help measure the process and outcome:

Outcomes measures

- The inappropriate referral rates
- Awareness of the new updates policy

Process measure that will be included

- Inappropriate referral
- Number of referrals to the service
- Awareness of the doctors to the updated policy and procedure

At the same time, with data collection, a review of the current process to identify the areas that are critical for patient safety and areas to improve patients experience was evaluated. The researchers added and edited a few points that were thought to improve the quality and standard of service:

- Weight of the pediatric age group to be included in the referral form
- Patients with an inappropriate referral will be linked to a case coordinator to rebook them in a general clinic for further assessment.
- Patients with critical results will be reported and follow the main hospital protocol for the critical result (activate it) and insure not to be missed by the system by linking them to a case coordinator.
- Updated the timing and working days
- Level of qualification that can cover the clinic.
- Standard formal form for communication with the patient and regulating the process.
- Design the process map for implantation.

Results

Intervention measures that were taken into consideration had different impacts on each clinic's performance. The policy update and process map help in shaping doctors' queries regarding whom are eligible and whom is not. It also takes into account patients who have not previously been included without clear medical justification or limitations to the service, which is reflected in the number of patients benefitting from the service. Additionally, training and educational programs for health care professionals on the new policy, as well as user manuals, empowered the doctors to use the resource more frequently and decreased the burden on the system by lowering the total number of inappropriate referrals from 17% to 4.3%, which has an indirect impact on doctor and patient satisfaction in regards to the service.

Furthermore, designing and restructuring the referral form guided the doctors to enroll more correctly referred patients into the service in addition to the other interventions. The total number of patients utilizing the service had drastically increased, moving the benchmark from an average of 860 patients per month to 2300 patients each month in a timeline of three months.

In contrast, the suggested interventions did not improve the patient answer rate or the collection of medication over the intervention period due to hospital policy.

Finally, the education and promotion campaign increased both the utilisation and overall satisfaction of the service.

Process map

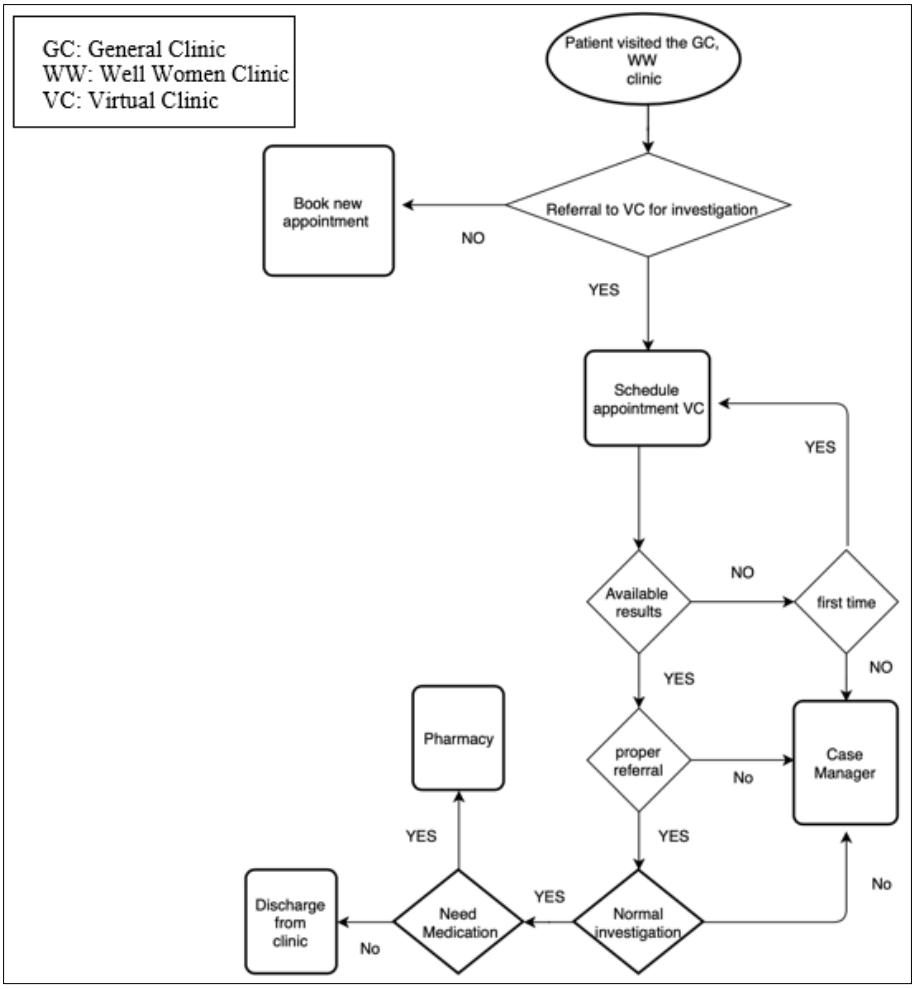

Fig 4

Recommendations

The following recommendations were made for consideration at the end of the project:

Training and education: There is the need to conduct a training and educational program to help overcome the obstacles that doctors face when making referrals. This intervention is important since it will help to equip service providers with new and better skills that can address different challenges that they are likely to face when pursuing this program. The doctors should also be updated on new and emerging approaches that can be applied to enhance service delivery and patient care. For instance, they should be oriented with new technological tools that can enhance the quality of telemedicine services that they offer to their patients.

Policy Formulation: The high rate of non-collected medication may be due to the types of prescribed medication or due to the current policy that specifies a collection time of 72 hours from the time of the prescription. Policy forms the basis of every professional practice. It sets the framework that guides the services providers on what they should do and the procedures they are to follow in ensuring positive service delivery. It is recommended that the existing policy should be reviewed and appropriate adjustment made to ensure that the procedures and framework guiding practice match the situation in contemporary society.

Restructure the Referral Form: Most importantly, it is suggested that the referral form should be restructured and be designed in a way that matches the needs that are to be addressed in the most effective way. A good referral form should capture various details. First, it should have personal details of the patients including aspects such as age and physical address. It should also capture the patients' health history including a well-stated reason for referral. While the specific detail included in a telemedicine referral form may differ from one patient to another, the bottom line is to ensure that every basic and important detail is included.

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