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LEAN APPROACHES IN IMPROVING LONG WAITING TIME FOR PATIENTS TO COLLECT MEDICINE AT HOSPITAL SULTANAH AMINAH, JOHOR BAHRU (HSAJB)

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ABSTRACT

The long waiting times in the outpatient pharmacy at Hospital Sultanah Aminah, Johor Bahru (HSAJB) are a persistent issue that negatively impacts patient productivity and hospitality experience. This unit serves an average of 1,800 patients daily from more than 25 specialist clinics in the HSAJB polyclinic building. Overcrowding, inefficient patient flow, and long waiting hours at HSAJB have led to increased dissatisfaction and patient complaints. On average, patients wait 76 minutes to collect medication at HSAJB, whereas the dispensing processing time should ideally be within 30 minutes according to our Key Performance Indicator (KPI). Lean methodology aims to improve the patient experience by reducing the waiting times. The drug preparation process involves 7 stages in the Value Stream Mapping (VSM), with 13 steps. Patients waited an average of 76 minutes for medication, with 69.05 minutes as non-value-added time and 7.05 minutes as value-added time. VSM considers patient journey experience, identifying root causes like insufficient workflow, limited counter space, resource allocation, overcrowding, and understaffing through fishbone and swim lane diagrams. Thirty (30) areas of waste were identified. Eight (8) Kaizen bursts were implemented, focusing on process optimization, workflow improvement, infrastructure enhancement, and patient mobilization. resulted in a standardized process. Kaizen bursts led to the development of a standardized process with total lead times reduced to 4.9 minutes. The 7 stages of the VSM were streamlined to 3, and the total processes reduced from 13 to 6. Workforce optimization reduced from 6 personnel to 1. MedXpress ordering service and improved collection points have significantly reduced waiting times, enabling convenient medicine collection. The Lean approach in an outpatient pharmacy reduced waiting times and improved satisfaction, with future promotion through a 'Lean Corner' and Kaizen culture through weekly gemba walks and brainstorming sessions.

1.0 Introduction

The extended waiting time in the outpatient pharmacy at Hospital Sultanah Aminah, Johor Bahru (HSAJB) has been a persistent issue that negatively affects patient productivity and hospitality experience. Since January to December 2020, the pharmacy received up to 38,000 patients per month, serving an average of 1,800 patients daily from more than 25 specialist clinics in the HSAJB polyclinic building. On average, 54% of patients came with newly prescribed prescriptions, while the remaining 46% came for follow-up medicines. The high number of patients often leads to overcrowding in the pharmacy area, exacerbating the problem. Inefficient patient flow and long waiting hours have resulted in increased dissatisfaction and a rise in patient complaints.

Lean management has been increasingly recognized as a valuable approach to improving efficiency and quality in outpatient pharmacy settings. Introducing the concept of lean management to healthcare, holds significant promise for improving efficiency and patient satisfaction [1]. A study highlighted there is potential impact of lean principles on reducing waiting times and improving patient satisfaction in healthcare [2]. By applying lean tools such as Value Stream Mapping (VSM) and Kaizen events, outpatient pharmacies can identify and eliminate waste, streamline processes, and enhance overall workflow efficiency. Research on Lean Hospitals demonstrated the effectiveness of lean management in reducing medication errors and improving medication safety in outpatient pharmacy settings [3]. By standardizing processes and implementing visual management tools, such as Kanban systems, pharmacies can enhance medication dispensing accuracy and ensure timely delivery of medications to patients. Furthermore, a study in Jordan emphasized the importance of leadership support and employee engagement in successfully implementing lean principles in outpatient pharmacy [4]. By fostering a culture of continuous improvement and providing staff with the necessary training and resources, pharmacies can sustain lean initiatives and achieve long-term efficiency gains [3, 4].

In outpatient pharmacy settings, understanding the patient's view and journey is crucial for the successful application of lean principles. By focusing on the patient's perspective, pharmacies can identify areas for improvement, streamline processes, and enhance overall patient experience. By mapping the patient’s journey, healthcare organizations can identify areas for improvement and implement strategies to enhance patient experience and outcomes [5].

The paper aims to outline the lean management approach employed to decrease waiting times at the hospital's outpatient pharmacy and illustrate its effect on patient and employee satisfaction.

2.0 Problem statement

The inefficient patient flow and long waiting hours have resulted in increased dissatisfaction and a rise in patient complaints. Prolonged waiting time is a common source of patient dissatisfaction with healthcare and is negatively associated with patient satisfaction [6,7,8]. After pinpointing the underlying issues and identify root cause of the problem, countermeasures were devised to enhance appointment scheduling processes and optimise efficiency without compromising necessary standard. [7].

The problem statement for the pharmacy department at HSAJB revolves around two main aspects which are inefficiencies and overcrowding contribute to rising complaints. In terms of inefficiencies, the dispensing processing time should ideally be within 30 minutes according to our Key Performance Indicator (KPI). However, the actual processing time where patient need to wait before implementing countermeasures is 76 minutes, indicating a significant gap of 47 minutes that needs improvement. Regarding overcrowding, 95% of prescriptions should be dispensed within 30 minutes. However, due to high peak times with increased patient numbers, outpatient pharmacy managed to achieve 65% compliance, resulting in a 30% gap. This overcrowding occurs predominantly between 10:30 am and 2:30 pm, leading to inefficiencies and failure to meet the KPI consistently. Table 1 shows data on average waiting times and total prescriptions from January to May, indicating a fluctuating trend with an average monthly achievement of 65%. However, 30% of patients experience wait times exceeding 30 minutes for their prescribed medicines. Table 2 provides a summary of the problem statement.

3.0 Research Methodology

The application of Lean tools and principles such as VSM, Kaizen events, waste identification, and standard work in an outpatient pharmacy provided a description of the current condition, leading to improvements in waiting times and overall efficiency, ultimately enhancing patient satisfaction. The pharmacy was able to improve efficiency and reduce patient waiting times by identifying and eliminating waste in the medication dispensing process.

Table 1. Average waiting time and total prescription from January to May 2023

	Jan	Feb	Mar	Apr	May	Avg.
Total Prescription	40,094	39,153	39,580	33,807	39,703	38,467
Avg. Waiting Time (mins)	37:29	58:03	57:03	44:08	40:48	47:38
Performance Monitoring	*80.5%*	*51.7%*	*52.7%*	*68.1%*	*74.1%*	*65.42%*

Table 2. Summarized problem statement context.

	Dispensing Process Time	*% Prescription Dispensed within Standard Time*
Context	Inefficiencies	Overcrowding
Trend	Fluctuate	
Actual	76 mins	65%
Gap	46 mins	30%
Standard (KPI)	30 mins	95%

Implementation of Lean Six Sigma methodologies, the pharmacy was able to improve efficiency and reduce patient waiting times by identifying and eliminating waste in the medication dispensing process [9]. Several Lean management tools like VSM, DOWNTIME waste identification, 5 whys, Root Cause Analysis (RCA), Kaizen burst (continuous improvement activities), and prioritization were applied to the facility to identify inefficiencies, optimize processes, and deliver timely and high-quality care. Seven stages involved in the medicine dispensing process were mapped out from patient

arrival at pharmacy until the patient receives medicine as shown in Figure 1. By mapping out each stage of the medicine dispensing process using VSM, a value-added total process times of 7.05 min, non-value-added total wait time of 69.05 min, and total lead time of 76.00 min were identified. Furthermore, through VSM, areas for improvement in reducing wait times, eliminating bottlenecks, and improving overall efficiency were found. Patient experience and journey map were plotted out to relate their feelings and thoughts directly with the Kaizen at every single stage of VSM. The measurement of processing time was based on the 7 categories, tracking the time at each counter and entity, as well as the waiting time patients had to endure while waiting to collect their medicines. The approach observed that patient arrived happily at the pharmacy, through to the moment they receive their medicines, eventually became moody at the end due to long waiting hours which took up to 76 minutes or 1 hour and 16 minutes.

The swimlane diagram and DOWNTIME waste identification are visual tools used to identify waste in the process, allowing understanding on the flow from one counter to another, from one entity to another, and from specific person in-charge to another specific person in-charge. The process of medicine collection involved 13 steps (Figure 2), and 30 total wastes were identified during the medication collection process to pinpoint areas where time or resources are underutilized or wasted.

The root cause analysis (RCA) methodology was employed to discover and resolve the fundamental causes of problems in a pharmacy (Figure 3). The RCA methodology was analyzed, with Gemba performed primarily during peak hours from 10:30 AM to 2:30 PM, to assess Process and Behavior Confirmation, focusing on the identification of the 5 Whys. The main root causes identified were insufficient workflow management systems, enclosed counters causing ineffective counselling, inadequate resource allocation, understaffed team causing delay, large volume of patients' arrival from clinic at peak time, and overcrowding.

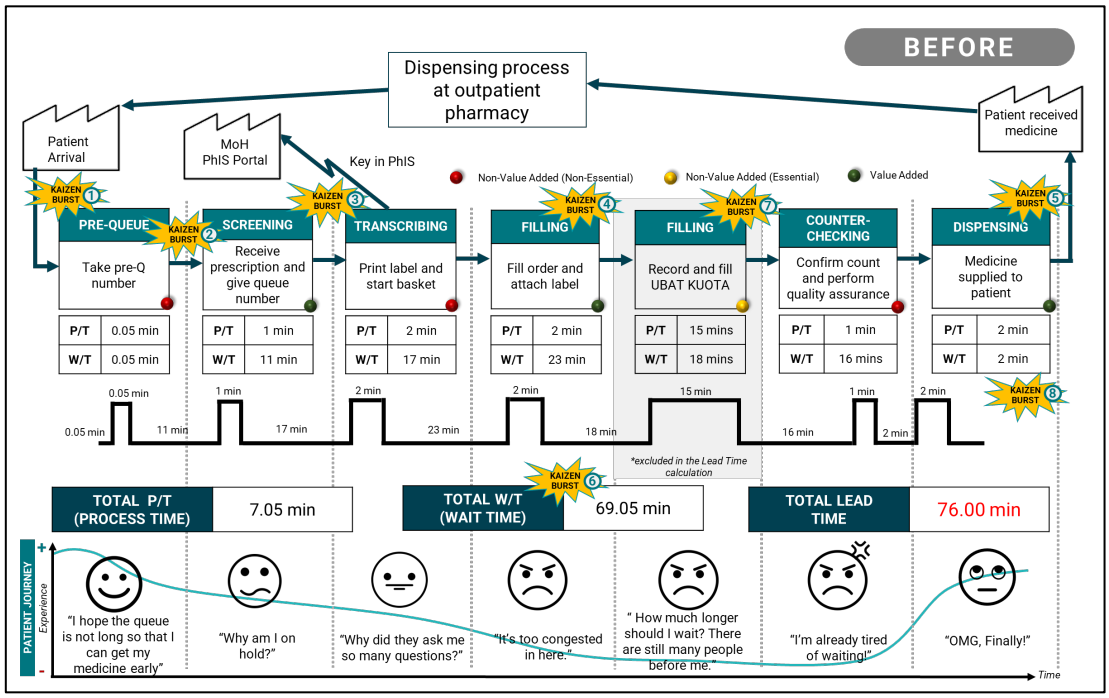

Figure 1. VSM and patient journey map as lean tools before Kaizen implementation.

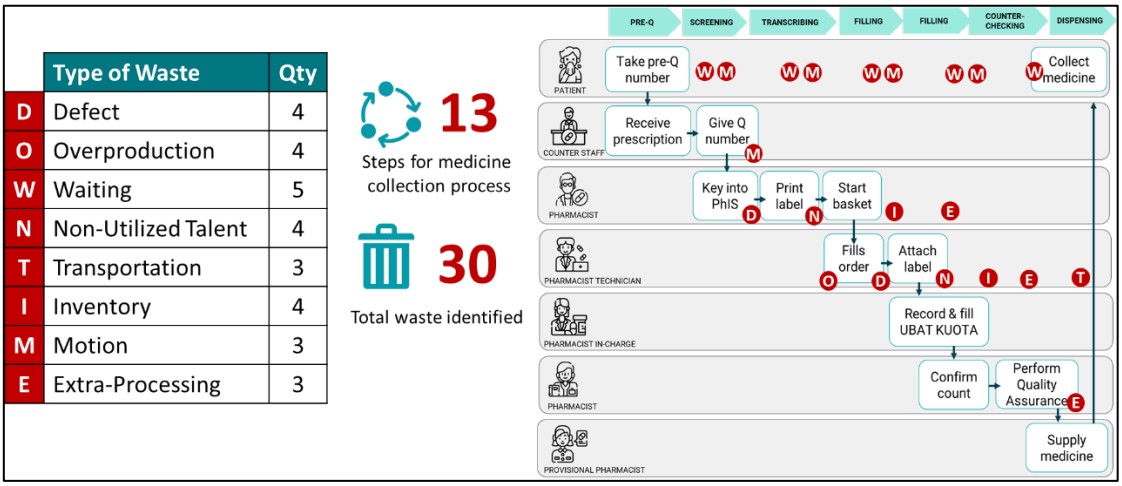

Figure 2. Swimlane diagram and DOWNTIME waste identification as visual tools.

Using lean management approach and brainstorming sessions, the team connected VSM, waste identification, and RCA to comprehensively identify areas of waste. This process enabled the team to pinpoint every single area of waste, which served as the foundation for the Kaizen burst activities.

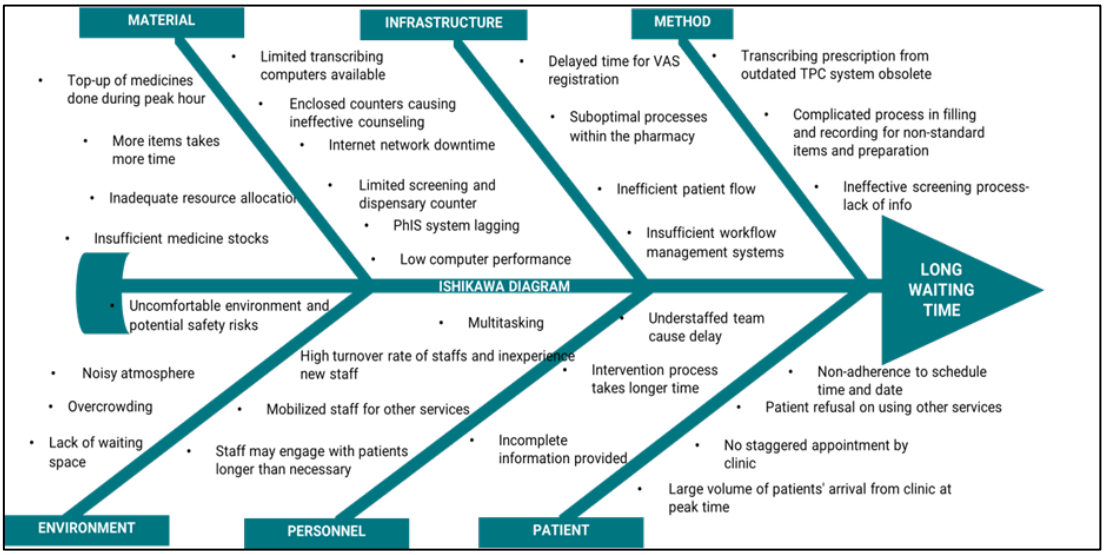

Figure 3. RCA using Fishbone or Ishikawa diagram

In the current condition, 8 Kaizen bursts were developed and implemented, which involved cross-functional teams working together as part of continuous improvement efforts. The 8 Kaizen bursts were introduced: *(1) The staggered hour system* involved implementing a block time at the pharmacy to avoid congestion during peak hours. *(2) Improvised patient flow* involved the implementation of a preliminary queuing system was introduced to avoid long queues and congestion at the clinic area. *(3) The process optimization* reduced the dispensing counter process from 13 steps to 6 steps using

MedXpress, which leverages digital platforms to streamline the prescription filling process. *(4) Improved workflow*: The pharmacy layout was streamlined, and the Spaghetti diagram, a lean tool, was used to track staff movement. Lean management eliminated 26 non-value-added steps and motion waste from 30 identified during medicine preparation. *(5) The infrastructure enhancement* involved upgrading the pharmacy kiosk as the new collection place through involvement and budget allocation from stakeholders, which now known as "Pusat Pengambilan Ubat Setempat" (PPUSS) HSAJB. This collection counter is located 500 meters from the main outpatient pharmacy, reducing unnecessary motion of walking by patients. *(6) Reduce congestion and compliance*: diverting the collection flow by delivering the medicine at PPUSS reduces physical congestion within the pharmacy area. *(7) Increase flexibility and just-in-time (JIT):* MedXpress uses digital platforms to streamline prescription filling, allowing patients to order medicines from home, preventing overstocks and allowing better control over schedules. Patients can submit prescriptions online, reducing waiting times and allowing pharmacy staff to prepare medications in advance. *(8) Patient mobilization:* FAST LANE items were re-categorized to PPUSS in order to encourage patient movement and alleviate traffic. According to data retrieved from the Pharmacy Information System (PhIS), the majority patients came from cardiology and urology clinics. Consequently, we have re-categorized several items from these two clinics as FAST LANE items.

The Prioritization Matrix (Figure 4) was used to prioritize tasks and plan Kaizen activities. The action priority matrix helps team members prioritize tasks based on their potential impact and effort, allowing focus on high-impact activities that require a reasonable amount of effort.

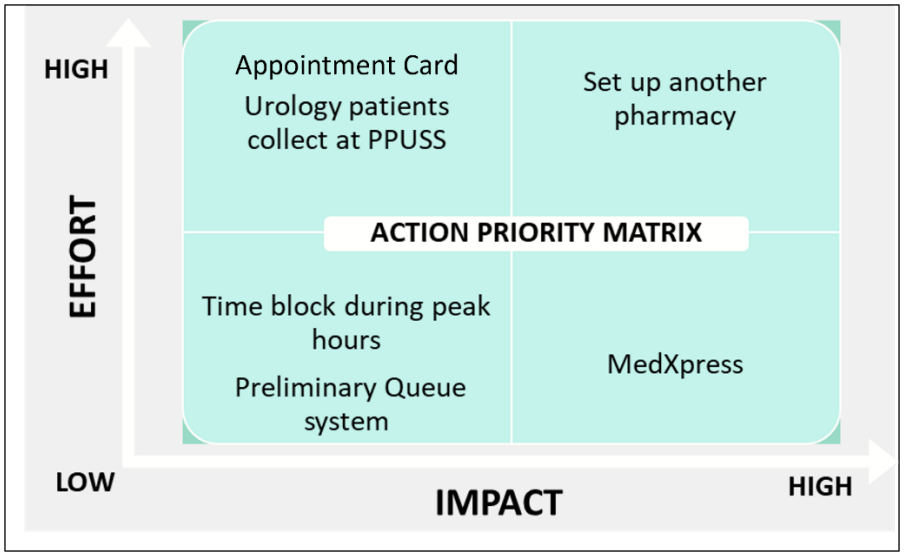

Figure 4. Action Priority Matrix.

4.0 Results and Discussion

The team were able to standardize the medication dispensing process, streamlined the initial 7 stages identified in VSM to 3 stages after implementing Kaizen bursts. the total number of processes from 13 steps were reduced to 6 steps. Kaizen bursts also optimized workforce allocation, reducing the number of personnel needed from 6 to 1. Referring to Table 3, there were significant improvements

in the medication dispensing process, with total process times reduced from 7.05 minutes to 4.0 minutes, non-value-added wait times shortened from 69.05 minutes to just 0.9 minutes, and waste effectively eliminated from 30 wastes to just 4. These results are indicative of a highly successful outcome, especially on patient satisfaction levels, as the first four steps of drug preparation have been completed earlier, then the medicine package is delivered to PPUSS.

Table 3. Analyzed results after Kaizen activities.

	BEFORE	***AFTER***	***% IMPROVEMENT***
TOTAL PROCESS TIMES	7.05 min	4.0 min	43.3%
TOTAL WAIT TIMES	69.05 min	0.9 min	98.7%
TOTAL LEAD TIMES	**76.00 min**	**4.9 min**	**93.5%**
TOTAL PROCESS	13	6	53.8%
TOTAL WASTE	30	4	86.7%

The team followed a prioritization approach, focusing on "low-hanging fruit" activities such as time blocks during peak hours and the initiation of a Fast Lane for urology patients. These changes helped achieve immediate improvements and fostered a sense of ownership and commitment to the improvement process. The improved process flow and VSM after Kaizen implementation are as shown in Figure 5 below.

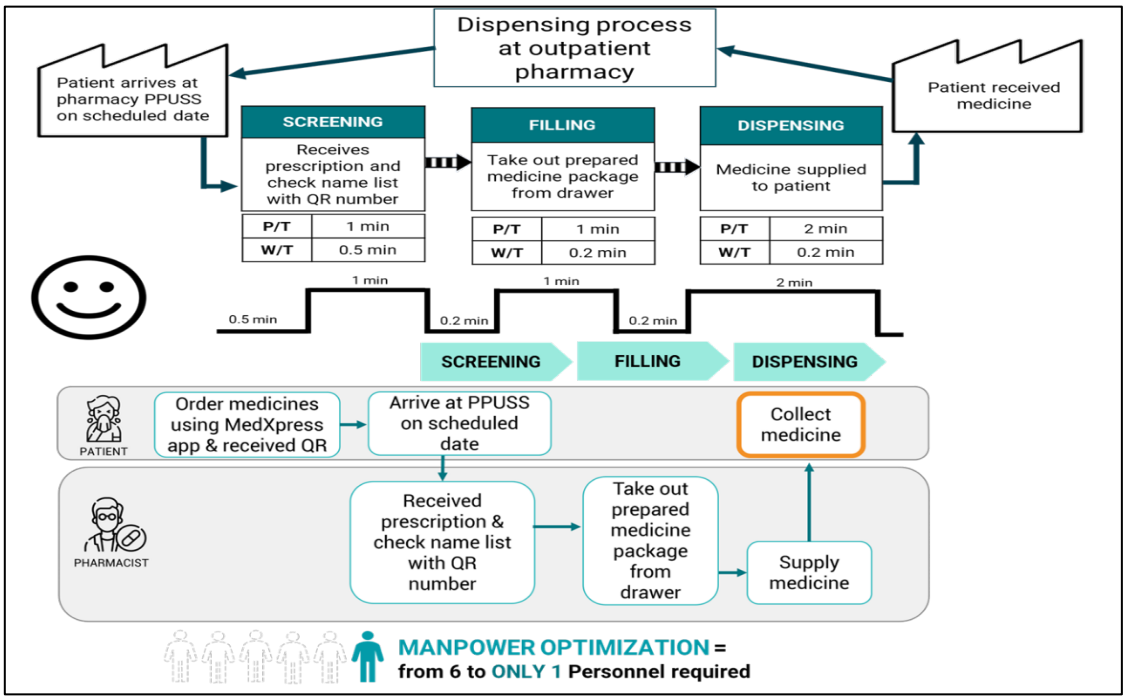

Figure 5. Improved process flow and VSM after Kaizen implementation

The implementation of the MedXpress service at HSAJB outpatient pharmacy significantly reduced waiting times by breaking down silos and fostering a culture of continuous process improvement. The MedXpress service is an innovative project that harnesses technological advances to address the challenges associated with long waiting times in the polyclinic pharmacy. This cutting-edge solution aims to meet the needs of patients by providing a more efficient service and satisfactory experience.

We designed the service in collaboration to streamline the medication collection process and reduce waiting times in the pharmacy. Patients can electronically submit their prescriptions to order their medications from the comfort of their homes, guaranteeing that the pharmacy will have them ready for collection upon their arrival. Simple steps comprise the process: patients scan a QR code to access the online registration and ordering system, uploading a picture of their prescription. Pharmacy staff then approves and processes the picture, enabling the preparation of medicines in advance. On the collection day, patients visit the pharmacy's designated collection point, PPUSS HSAJB, where patients simply show their QR code to collect their medication. The service significantly reduces waiting times, enabling patients to spend less time in the pharmacy and have better control over their schedules. This collaborative effort not only improved operational efficiency but also positively impacted patient satisfaction, with 97% of patients rating the waiting time quality as excellent.

MedXpress service also facilitates effective communication between patients and pharmacy staff, allowing patients to seek over-the-counter consultations. Change management plays a crucial role in increasing the adoption rate of MedXpress, with an increase of 66.25% from 2020 to July 2023. The action plan for the Kaizen project began three years ago, with the digital transformation beginning during the COVID-19 pandemic.

In April 2020, a digital ordering system was initiated using Google Forms, allowing patients to scan and order medicines for collection at the pharmacy counter. In December 2020, we completed the construction and operation of a new pharmacy building, PPUSS, with the goal of streamlining operations and minimizing overcrowding. To assist tech-illiterate patients, the HSA uploaded a promotional video on its website in February 2021 and collaborated with the HSAJB Information Technology department to design the MedXpress website, enhancing accessibility and convenience for patients.

In June 2021, the team established a helpdesk to facilitate patient inquiries and distributed banners and flyers to promote the new services. The team added QR codes to the back of medicine slips to facilitate easy access to information. The services underwent a rebranding as MedXpress by December 2022 with a focus on patient empowerment and convenience.
In May 2023, the services were further optimized by utilizing the current space for medicine collection kiosk to divert urology patients, reducing congestion in the main pharmacy. The introduction of Appointment Card or “Kad Temujanji” (KTJ) service was developed to streamline appointment scheduling.

5.0 Lessons and limitations

The application of lean principles in a healthcare setting has led to the reduction of waiting times for medicine collection at an outpatient pharmacy. The key lessons learned include a patient-centric approach, data-driven decision-making, and understanding patient needs and preferences through a

patient journey map. Data-driven decision-making helps prioritize improvement efforts and ensures meaningful results.

The main limitation in the setting was excluding inventory management from the scope of the project, which may have impacted the results. Cross-collaboration from other departments and change management may come into play to achieve the goal. Implementing lean principles is more challenging compared to other industries, as healthcare processes are often complex, with multiple stakeholders and regulatory requirements. Sustaining improvements in the long term can be tough, requiring ongoing commitment from leadership and staff.

We shortlisted three sustainability strategies to ensure long-term sustainability: establishing a system to monitor and evaluate the impact of implemented solutions (MedXpress) on patients' waiting time and overall satisfaction, collecting regular feedback from patients and staff, promoting lean awareness by launching a comprehensive LEAN awareness campaign, enhancing feedback sharing with other health facilities during monthly meetings, and establishing cross-industry collaboration with other practitioners on LEAN experience and innovative solutions for the 2024 plan.

Lastly, the sustainability strategy includes empowering a Kaizen culture through weekly Gemba and brainstorming sessions to identify areas for improvement and implement necessary adjustments [10]. Encouraging Lean thinking among leaders during troubleshooting experiences, offering alternative solutions, and reviewing best practices for database backups (MedXpress website) optimizes sustainable productivity and service impacts.

6.0 Conclusion

In conclusion, lean management offers significant potential for improving efficiency, quality, and patient satisfaction in outpatient pharmacy settings. By adopting lean principles and practices, pharmacies managed to streamline operations, reduce waste, reduce waiting time, and enhance overall performance, ultimately leading to better patient outcomes.

6.0 Acknowledgement

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