

Improving Utilization of the Chemotherapy Unit through Implementing the Medication Early Release Project

Mohsen Alzahrani^{1,2,3}, Mohammad Alkaiyat^{1,2,3}, Mona Alshami^{1,2,3}, Thamer Alotaibi⁴, Sultan Meashi⁴, Elham Al Enizi⁵, Hussam Shehata¹, Ammar Khaleel⁵, Anas Abu Esbaa⁵, Reem Al Harbi⁵, Mohamad Alharbi⁵

¹Department of Oncology, King Abdulaziz Medical City, Ministry of National Guard-Health Affairs, Riyadh, Saudi Arabia

²King Abdullah International Medical Research Center, Riyadh, Saudi Arabia

³King Saud bin Abdulaziz University for Health Sciences, Riyadh, Saudi Arabia

⁴Department of Pharmacy, King Abdulaziz Medical City, Ministry of National Guard-Health Affairs, Riyadh, Saudi Arabia

⁵Department of Nursing, King Abdulaziz Medical City, Ministry of National Guard-Health Affairs, Riyadh, Saudi Arabia

Address correspondence to Mohsen Alzahrani (alzahranim5@mngaha.med.sa).

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ABSTRACT

Introduction: The outpatient oncology infusion unit is very busy, serving 60 to 70 patients per day. Due to a limited number of nurses, treatment chairs, only one pharmacy hood for bio-hazardous drug preparation, and other factors, patients wait a long time before starting their treatment, which affects the patient experience negatively. We conducted a quality improvement project to reduce the waiting time before starting the treatment, improve the patients' experience, and allow the unit to work more effectively through better resource utilization and accommodating more patients. **Methods:** A committee was formed with representatives from oncology nursing and the quality specialist, chemotherapy pharmacy supervisor, data manager, and a medical consultant (team leader). We studied baseline data of patient waiting times from January to March 2019 and the factors that contributed to delays before starting the treatment. The charge nurse identified patients who could safely have their medication released early in the morning at 7 am, enabling the pharmacy to dispense at 8 am without their actual presence being required in the infusion suite (i.e., medication early release program or MERP). Multiple plan-do-study-act (PDSA) cycles were implemented to achieve a wait time from check-in to medication administration of less than 60 minutes. Data collected included check-in time, chair time, vital signs time, administration time, and discharge time. Additionally, reasons for drug wastage were assessed for patients who did not receive the prepared medication. A patient satisfaction survey was conducted with the patients before and after being enrolled in the program. **Results:** At baseline, average waiting time for patients receiving similar medications in the MERP was 2 hours and 27 minutes. After the first intervention, average waiting time was reduced to 1 hour and 24 minutes, and small improvements were observed after each PDSA cycle. A major breakthrough occurred after an intensive patient education program and enforcement of strict compliance with the criteria in selecting the patients appropriate for the MERP. Average waiting time was reduced to ≤ 60 minutes, and in November 2022, it was 30 minutes on average. Drug wastage was identified as a balancing measure. We were successful in reducing drug wastage by implementing several changes and patient education measures and achieved zero wastage. The patient satisfaction survey showed better satisfaction with the new changes. **Conclusion:** A positive impact was achieved in this quality improvement project, with a significant reduction in the average waiting time for patients to start receiving chemotherapy. The outcome of this project has been maintained for 4 years and is still ongoing.

Keywords: chemotherapy, quality, resource utilization, medication, PDSA

INTRODUCTION

Cancer is a global health issue, more than a million new cases are diagnosed in the United States.^[1] In Saudi Arabia, according to the most recent Saudi Cancer Registry report, there were more than 20,000 new cases diagnosed in 2018,^[2] with an expected 63% increase in new cases by 2030.^[3]

There are many treatment modalities for cancer (i.e. surgery, radiotherapy, immunotherapy and/or chemotherapy).^[4] Recent advances in cancer drugs produced more effective medication to control the disease for longer. This will eventually change the cancer management paradigm from being a life-threatening diagnosis to more like a chronic disease, with increased use of chemotherapy and other cancer-related infusible medications in outpatient settings.^[5]

Problems related to challenges and delays in scheduling chemotherapy in the outpatient unit is a global issue.^[6] Referring more patients to the outpatient chemotherapy clinic without solving the pre-existing scheduling issues increases the load on the unit, resulting in patient delays and crowdedness in the waiting areas, which negatively affect the patients' level of satisfaction, leading to an overall unpleasant patient experience. The negative association between waiting time and patient satisfaction has been reported in literature.^[5,7-9]

Some studies indicate that reducing the waiting time in healthcare services is an achievable goal that requires a collaborative integration of multidisciplinary efforts.^[5,9,10] Reducing the waiting time supports the concept of providing healthcare services in a timely fashion,^[11] which is one of the six domains of health care quality. Shorter waiting times improve patient satisfaction, facilitate better resource utilization, and reflect a well-organized and professional workflow.^[8] Studying the system's performance and design are essential to achieve good solutions.^[6]

The Oncology Center at King Abdulaziz Medical City in Riyadh is one of the largest cancer centers in Saudi Arabia that serve different specialties including adult oncology, adult hematology, adult stem cell transplant, gynecology, palliative care, and radiation therapy patients. On average there are 60–70 patients booked daily in the outpatient chemotherapy unit. We noticed that the waiting time of the patients from arrival to chemotherapy administration extend to hours for the majority of the patients. This led to patient dissatisfaction and frustration due to the long waiting time. To improve the patient experience in the chemotherapy infusion unit, a quality improvement project was initiated. The main aim was to reduce the waiting time from the patient's arrival at the unit to medication administration to be less than 60 minutes.

METHODS

This quality improvement project was exempt from ethical committee approval. SQUIRE guidelines^[12] were followed in reporting and publishing the findings.

PROBLEM DESCRIPTION

- The outpatient chemotherapy unit at our center is very busy, with a large number of patients arriving at the same time to receive their cancer treatment.
- On the treatment day, there are many steps and checkpoints that need to be verified after the patient's arrival, such as vital signs, laboratory results, and reviewing the physician's orders. The order for the chemotherapy preparation by the pharmacy can only be released after completing these checkpoints.
- This has resulted in delaying other patients who arrive at the same time, increasing patient dissatisfaction, and increasing medical staff stress. More importantly, this is a source of low-quality service and safety issues in this hazardous environment.

A multidisciplinary committee was formed, with representatives from oncology nursing and the quality specialist, chemotherapy pharmacy supervisor, data manager, and medical consultant (team leader). The committee started to meet on a weekly basis, the process measures were identified, and a database was designed to collect information about the measures. The time the patient checked in, chair time, vital signs time, order to pharmacy release time, and medication administration time all were identified as vital process measures to the project.

The primary outcome measure of this study was to reduce the wait time between the check-in and treatment administration to less than 60 minutes. Some other outcome measures were also identified, including the number of patients treated in the program and the chemotherapy preparation time. Balancing measures included the medication wastage rate as a result of the early preparation, no-show patients or other factors.

Baseline Data

Baseline data were retrieved retrospectively from January to March 2019. The daily average waiting time from check-in time to medication administration time was 2 hours and 27 minutes. The data were studied to identify the factors associated with a long waiting time by using a fishbone diagram (Fig. 1). The factors were categorized into main four categories: patient, process, nurses, and physician factors.

Intervention

We used the rapid cycle improvement plan-do-study-act (PDSA) methodology to test and evaluate the process. We implemented 3 PDSA cycles to achieve the desired outcomes. The team developed a new process to identify, prioritize, and arrange patients effectively and safely for treatment processing based on the patient's characteristics (Figs. 2 and 3). The key intervention was to select the patients who could have their treatment released before their arrival based on certain inclusion and exclusion criteria (Fig. 2).

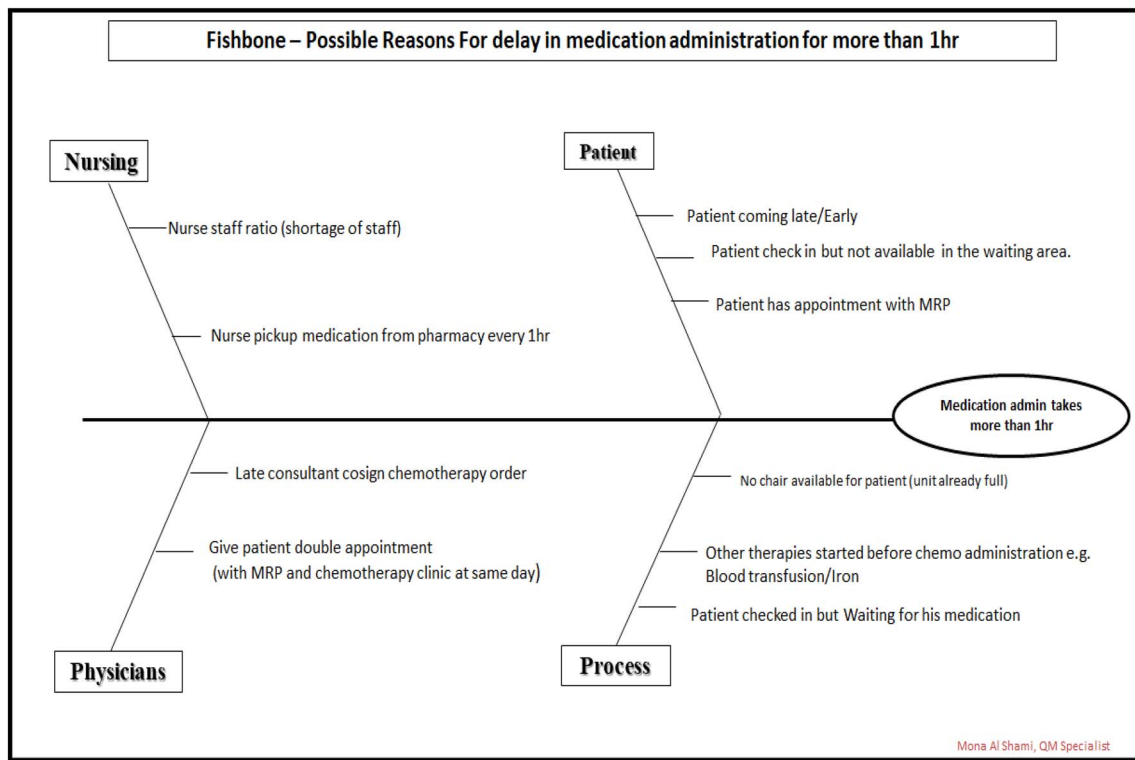


Figure 1. Fishbone diagram to investigate the factors associated with the long waiting times for medication administration in the chemotherapy unit. MRP: medication release program.

PDSA #1

Aim: Test releasing the chemotherapy orders before the patient's arrival to the chemotherapy infusion unit to reduce the patient waiting time.

Plan: Release the chemotherapy order early to the chemotherapy infusion unit charge nurse from 07:00 to 08:00 am.

Do: The charge nurse of the unit prepared the list of the patients booked for the next day, reviewed their orders and checked the laboratory values. The patient was called to confirm their attendance the next day. At the end of

the next day, the charge nurse was also assigned to monitor and report any medication wastage.

Study: The patients' compliance was poor, and wastage occurred due to patients not showing, even though they confirmed their attendance. The team discussed the medication wastage and assigned the charge nurse to develop a set of criteria to identify eligible patients to be involved in the medication early release program (MERP).

Act: The team constructed the patient inclusion and exclusion criteria for MERP. The list was distributed to all the oncology department staff to enhance the new process (Fig. 2). The patient educators were asked to

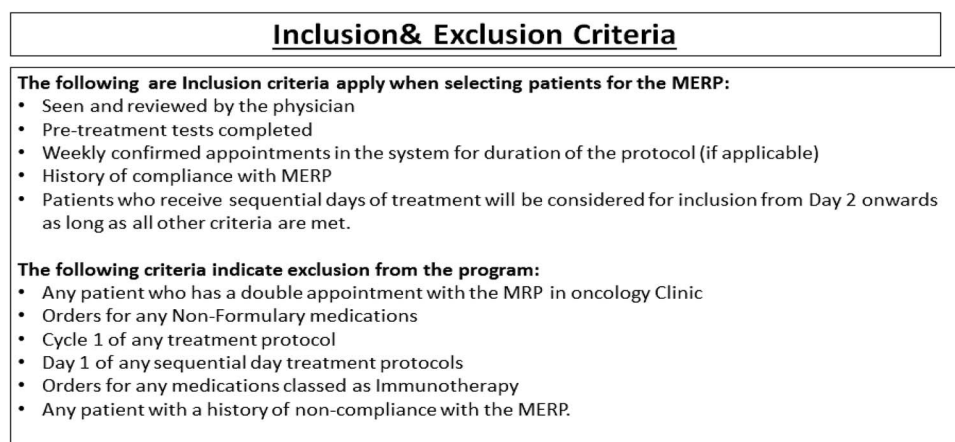


Figure 2. Medication early release program (MERP) patient selection criteria.

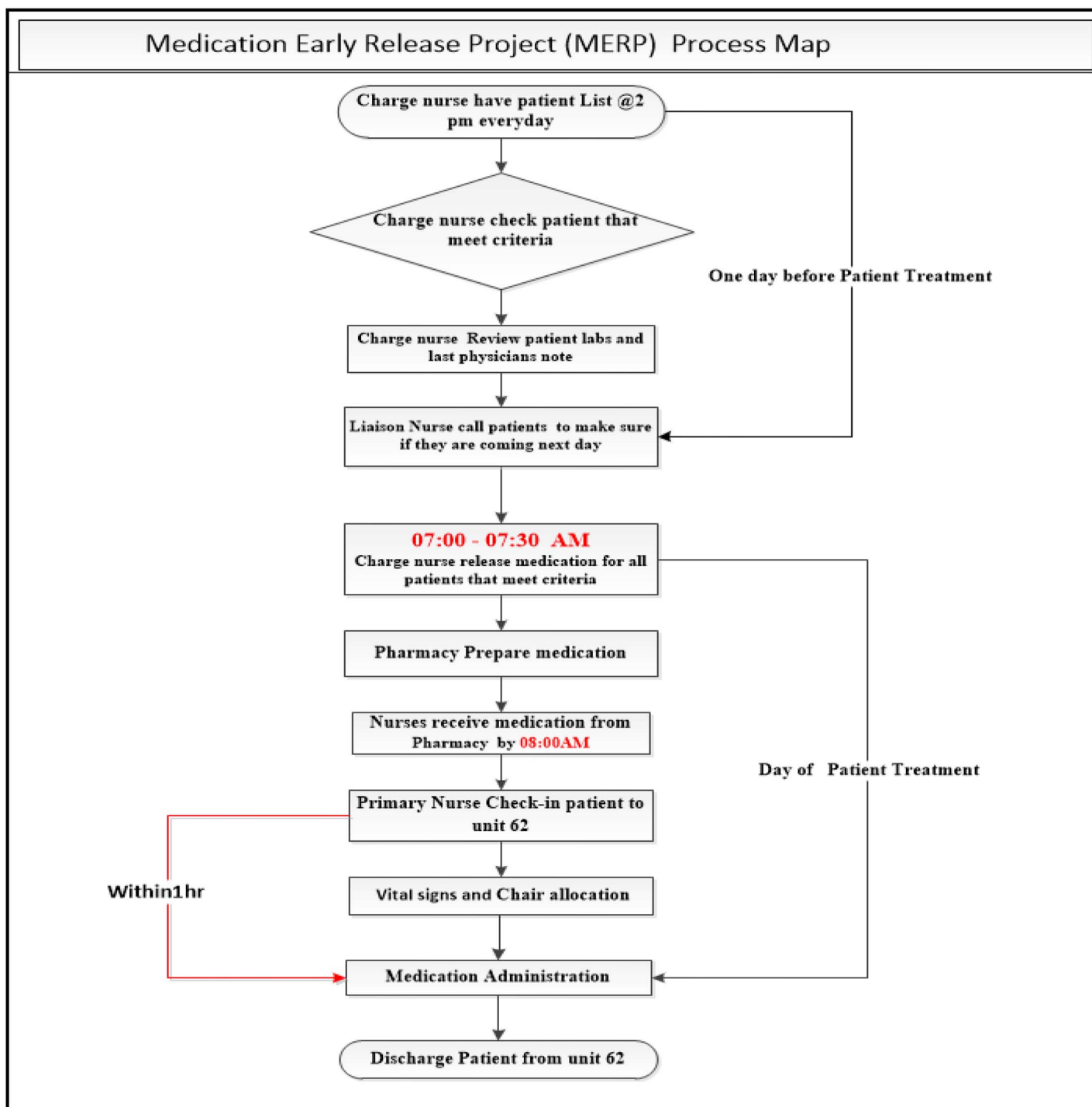


Figure 3. Process map for medication early release program (MERP) in the chemotherapy unit.

educate the patients about the benefits of this program. New educational material was created for this purpose (online supplement 1).

PDSA Cycle #2

Aim: Retest the early release of chemotherapy orders after educating staff and patients about MERP.

Plan:

- 1- Identify eligible patients for the MERP 1 day before their treatment.
- 2- Release the chemotherapy orders early to the pharmacy before the arrival of patients to the unit from 07:00 to 08:00 am.

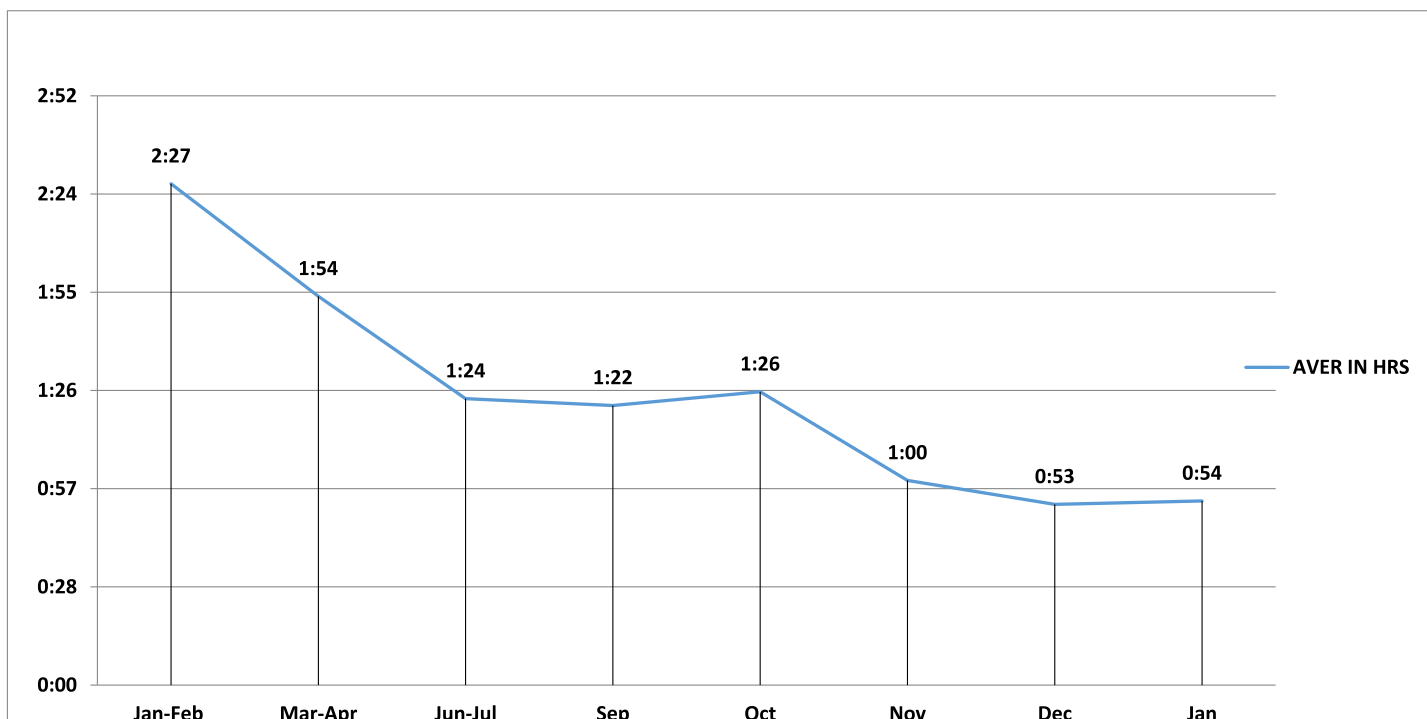


Figure 4. Baseline data for average (aver) wait time from check-in to medication administration in the chemotherapy unit.

Do:

- 1- The charge nurse identified and contacted eligible patients 1 day before their appointment.
- 2- The team collected data on a daily basis to monitor the new process measures closely.

Study: An improvement in the waiting times was recorded, however, there was some medication wastage. The team discussed reasons for the wastage, which were patients who did not show up for their appointment, no laboratory tests done 1 day before, and patients who had a double appointment with their doctor and the chemotherapy infusion unit. The team noticed that the actual medication pickup time from the pharmacy started at 09:00 am, which caused the delay in dispensing the medication.

Act:

- 1- Exclude patients with poor attendance compliance and involve the patient educators and the oncology helpline to enhance patient education about the process.
- 2- Direct the pharmacy team to change the pickup time from the pharmacy to 08:00 instead of 09:00 am to avoid a delay.

PDSA Cycle #3

Aim: To reduce wastage of early-release medication and continue monitoring and improving patient compliance.

Plan: Enforce strict compliance with the MERP eligibility criteria and continuously monitor and report wastage on a daily basis to the team.

Do: The charge nurse submitted a daily report to the team about any wasted medication and the reasons for the wastage.

Study: The team discussed possible methods to maintain the achieved reduction in waiting time and attempted to reduce it further to less than 30 minutes. The team decided to do a root-cause analysis (RCA), using a fishbone diagram to analyze the most common reason for wastage and to solve the contributing factors one by one (online supplement 2).

Act: Monitor wastage on a daily basis, keep calling patients 1 day before to confirm their attendance, and provide educational material for patients who are involved in MERP.

Patient Satisfaction Survey

As a balancing measure, we assessed patient satisfaction by randomly selecting 12 eligible patients or their family members who were enrolled in the program. These participants were invited to partake in the evaluation and were asked to rate their level of satisfaction before and after the implementation of the project.

RESULTS

The baseline data (Fig. 4) identified that the daily average waiting time from the check-in time to the administration time was 2.27 hours. After the first intervention, the average waiting time was reduced to 1 hour and 24 minutes. Through each PDSA cycle, there was a noticeable improvement in the average

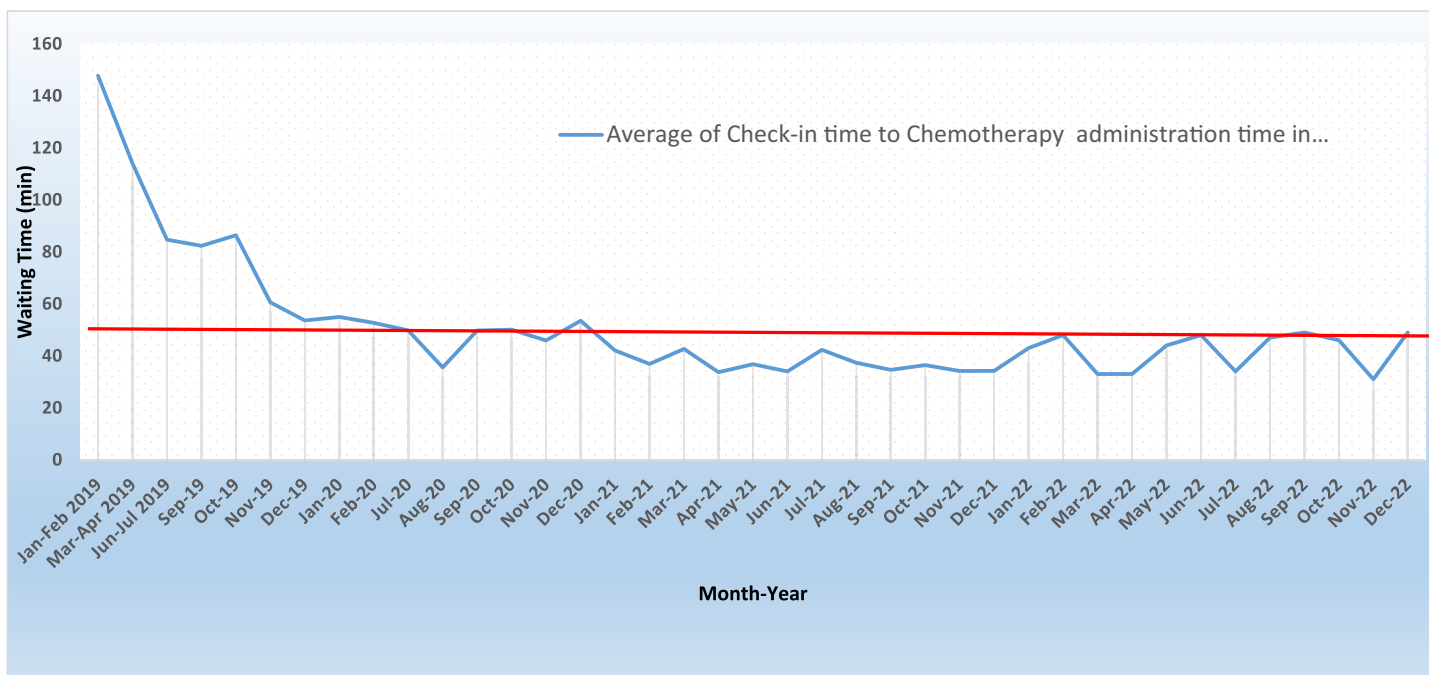


Figure 5. Four years data for average wait from check-in to medication administration in the chemotherapy unit.

time (Fig. 5). A major breakthrough occurred after the applying eligibility criteria for inclusion in MERP and after providing an intensive patient education program and enforcing strict compliance with the criteria for appropriate selection of patients for MERP. Following the third PDSA cycle, the team kept the average waiting time within the target of less than 1 hour.

Medication waste was reduced, and we achieved zero wastage in most months (Fig. 6). Reasons for drug waste included family or transportation-related issues, illness, changes in lab results or treatment plan, no shows, and others (online supplement 2).

Most patients in MERP were satisfied or very satisfied with the improvement. Satisfaction rates improved

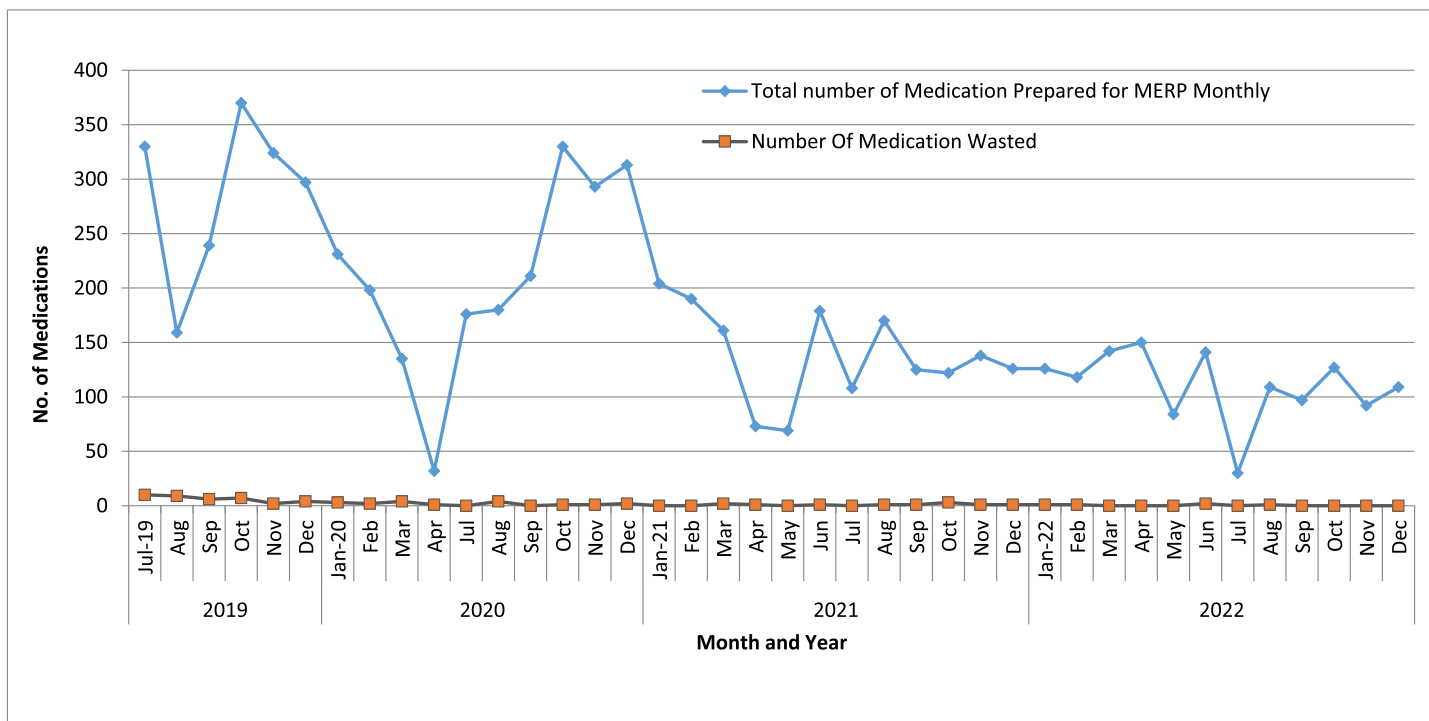


Figure 6. Monitoring the wastage of chemotherapy during the medication early release program (MERP).

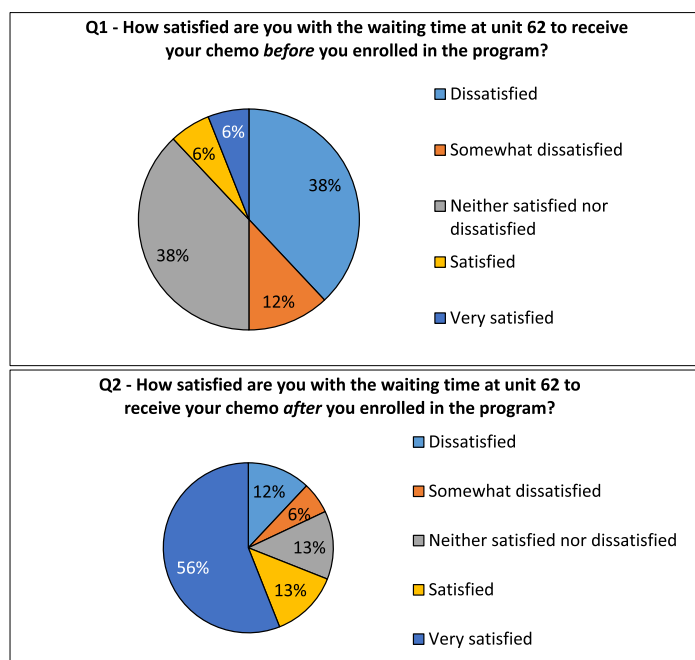


Figure 7. Medication early release program (MERP) patient satisfaction survey results ($N = 12$ survey participants, including patients or their family members).

from 12% pre-enrollment to 69% after enrollment in the program (Fig. 7). The team continues to improve the project and sustain the achieved goal by constantly monitoring the project, as well as conducting a root cause analysis for any deviation and implement corrective actions. Finally, we developed departmental policies and procedures for this project, which were approved by local authorities of the concerned departments and medical services (online supplement 3).

DISCUSSION

This project was conducted to improve the utilization of a chemotherapy treatment unit by following a new systematic workflow and integrating the efforts of multiple parties. The project team was able to achieve the desired outcome by identifying the problem and contributing factors, then implementing appropriate interventions.

The waiting time in chemotherapy units is a frequent problem, and many initiatives have been performed to address this issue.^[5-7,11,13-15] The desired improvement can be achieved by implementing a system thinking approach,^[13,14] assigning a multidisciplinary team,^[8,10] using the necessary quality tools,^[14] and implementing a specific set of interventions. There is no one size fit all solution that can be generalized to all settings, but following well-defined steps and involving the patients in the process led to a positive outcome and improved the process in our chemotherapy unit.

In summary, a multidisciplinary team utilized the following approach to reduce waiting time for patients and reduce medication waste:

- Enhance patient education to increase compliance with the schedule
- Perform laboratory tests 1 day before the treatment
- Order the chemotherapy 1 day before the treatment
- Create inclusion and exclusion criteria for eligible patients to be enrolled in the early-release program
- Select eligible patients based on the set criteria 1 day before the treatment
- Contact patients 1 day before with instructions regarding the treatment time, including a direct contact number for patients who cannot attend on time or need to cancel to avoid drug wastage.
- On the day of treatment, release the chemotherapy before patient arrival

Although the amount of wasted medication was significantly reduced, more interventions and data collection are needed to calculate the actual cost reduction.

This project has some limitations. Firstly, some patients who met the inclusion criteria for MERP were unable to participate due to a variety of reasons (i.e., non-compliance, same-day laboratory tests, immunotherapy (to avoid wastage of these expensive drugs), and double-booked appointments). This was expected due to the nature and complexity of the chemotherapy medication and its scheduling. Secondly, generalizability is limited due to the nature of the project being in a specific setting at a single institution. This project could serve as a framework for similar units, such as the blood transfusion unit and dialysis unit, with modifications based on specific needs and resources.

CONCLUSION

A positive impact on patient satisfaction in the chemotherapy unit was achieved by decreasing the average wait for treatment to be less than 1 hour. The outcome of this project has been maintained for 4 years and is still ongoing.

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Supplemental Material

Supplemental materials are available online with the article.

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