

QUALITY IMPROVEMENT Improving the efficiency and reducing variability in patient flow in an outpatient parenteral antibiotic therapy unit of a tertiary care hospital

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ABSTRACT

Outpatient parenteral administration of medications and blood transfusions using an outpatient parenteral antibiotic therapy (OPAT) unit has gradually become a standard of care. We report a continuous quality improvement project that was conducted on an OPAT unit of a tertiary care cancer hospital in Lahore, Pakistan. Prior to the initiation of the project, it was identified that 52% of the patient encounters in the OPAT unit were being delayed by a median of 63.5 minutes. A cause-and-effect analysis was performed, using a fishbone diagram, to identify the reasons for the delay in appointments. Based on the findings, several modifications were made to the processes of the OPAT unit including, but not limited to, a computerised physician order entry (CPOE) system module for prescribing, dispensing, reviewing and dispensing medications, changes in the nursing and staffing roster, and assignment of additional duties to the ward clerks. These changes resulted in improvement of waiting time to a median of 24.5 minutes and percentage delay in patient meetings decreased to 18%. Likewise, in 2019, 5,399 (27%) more patient meetings took place compared with 2018, which would have otherwise costed the hospital between 21.28 to 45.85 million Pakistani rupees. The use of continuous quality improvement techniques in the OPAT unit can result in substantial and appropriate changes in the process of patient flow, leading to measurable and significant reductions in the variability of care, and optimisation of service.

KEYWORDS: continuous quality improvement, outpatient parenteral antibiotic therapy, optimisation of care, patient flow

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Introduction

Shaukat Khanum Memorial Cancer Hospital and Research Centre (SKMCH & RC) is a 195-bed tertiary care cancer hospital located in

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Lahore, Pakistan. It provides oncological and ancillary services to patients with more than 300,000 patient encounters a year. The hospital has an outpatient parenteral antibiotic therapy (OPAT) unit. Patients can undergo administration of intravenous medications such as antibiotics, colony-stimulating factors, antigonadotropins, and supplements (iron sucrose) and blood transfusions. Twenty-thousand OPAT patient encounters occur per year.

Continuous quality improvement (CQI) is a structured organisational process that engages healthcare personnel (such as physicians, nurses and pharmacists) in planning and implementing proactive improvements in processes of care to provide better quality healthcare outcomes.^{1–4} A CQI can help in optimising clinical care by reducing variability and costs, enabling adherence to best practice clinical guidelines and enhancing service quality.^{1,4,5}

This case study aimed to implement structural, organisational processes in the OPAT unit that would enhance the clinical care by reducing the number and the duration of delayed appointments and improving patient service quality while following the standardised healthcare guidelines.

Methods

This project was conducted in the OPAT unit of SKMCH & RC from 01 January 2019 to 31 December 2019. It was initiated because, from 01 January 2018 to 31 December 2018, approximately 52% (10,526/20,243) of the total patient encounters in the OPAT unit experienced a delay for a median of 63.5 minutes. A cause-and-effect analysis was performed on the data from the first half of 2018 using a fishbone diagram to identify the reasons for the delay in appointments (Fig 1).⁶ Among the identified characteristics, the most noteworthy were delays related to the process of prescribing, reviewing, dispensing and documenting of medications, establishing intravenous line, inconvenient or inappropriate appointment slots, floating employees, lack of communication with patients, a slow bed turnover time and the limited role of patient care officers (PCO) and unit coordinators or ward clerk (UC).

The process of prescribing, reviewing, dispensing and documenting the medications was shifted onto a computerised physician order entry (CPOE) system. This was intended to reduce the time it took for a physical prescription to transfer between the prescriber and the pharmacy. The online module (CPOE) provided real-time user-specific notification of alerts and allowed efficient communication between individuals and the departments.

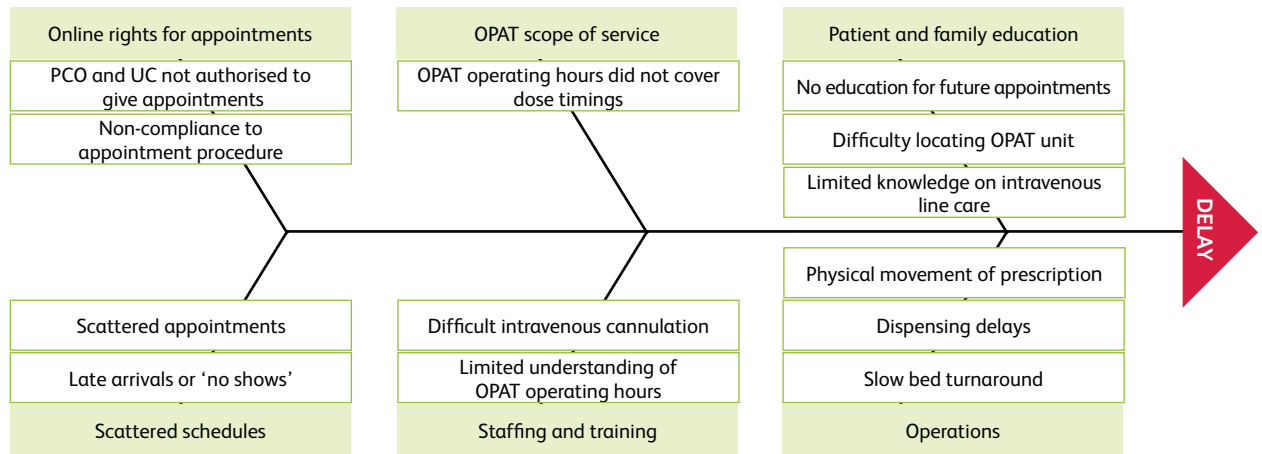


Fig 1. The outpatient parenteral antibiotic therapy unit process flow highlighting the variables that contribute to appointment delays. OPAT = outpatient parenteral antibiotic therapy; PCO = patient care officer; UC = unit coordinator.

The cloth sheets placed over the couches were also replaced with disposable sheets to reduce the bed turnover time.

To improve the role of PCO and UC and enhance communication between patients and the hospital, PCO and UC were given access rights on the hospital's online operating system to assign appointment slots to patients in the OPAT unit according to the patient's preference and the appropriate frequency of the medication, as per physician's orders. Furthermore, a modification in the operating system was implemented, ensuring that the PCO and UC would receive a real-time alert on their operating system dashboards that would notify them to schedule an appointment for a given patient without delay. This module would also allow patients to receive an auto-generated text message confirming their booking.

The staffing roster for the OPAT unit was modified and a nurse-preceptor was assigned to the team. The preceptor's role was to teach and train the nursing staff to improve delays associated with establishing central lines and administering medications and blood transfusions.

The organisation and implementation of these changes took 6 months to complete; they were launched on 01 January 2019.

Results

In 2018, 20,243 patient encounters took place in the OPAT, which averages nearly 1,687 patient visits per month. In 2019, 25,642 encounters took place, an average 2,137 meetings per month, approximately increased by 27% from the previous year (Fig 2).

Before implementing the CQI project, nearly 52% of the patient appointments experienced a delay in the OPAT unit. This ranged from 47% to 55% (Fig 3). The introduction of the CPOE module for prescribing, dispensing, reviewing and dispensing medications, changes in the nursing and staffing roster and assignment of additional duties to UC and PCO, along with other changes to the operations of the OPAT unit, resulted in a significant drop in the percentage of appointments experiencing a delay. During 2019, the average number of patient encounters experiencing a delay was around 18% (range 13–25).

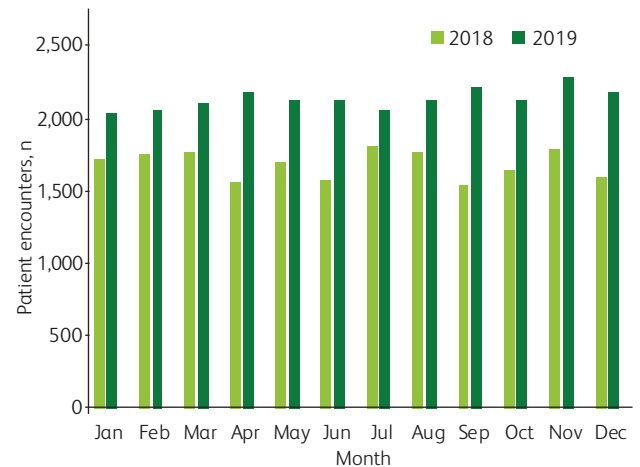


Fig 2. The number of patient encounters in the outpatient parenteral antibiotic therapy unit during 2018 and 2019.

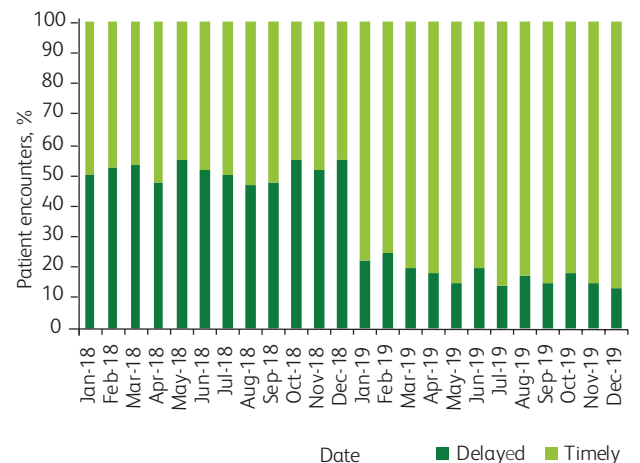


Fig 3. Percentage of patient encounters that were seen on time in the outpatient parenteral antibiotic therapy unit during 2018 and 2019.

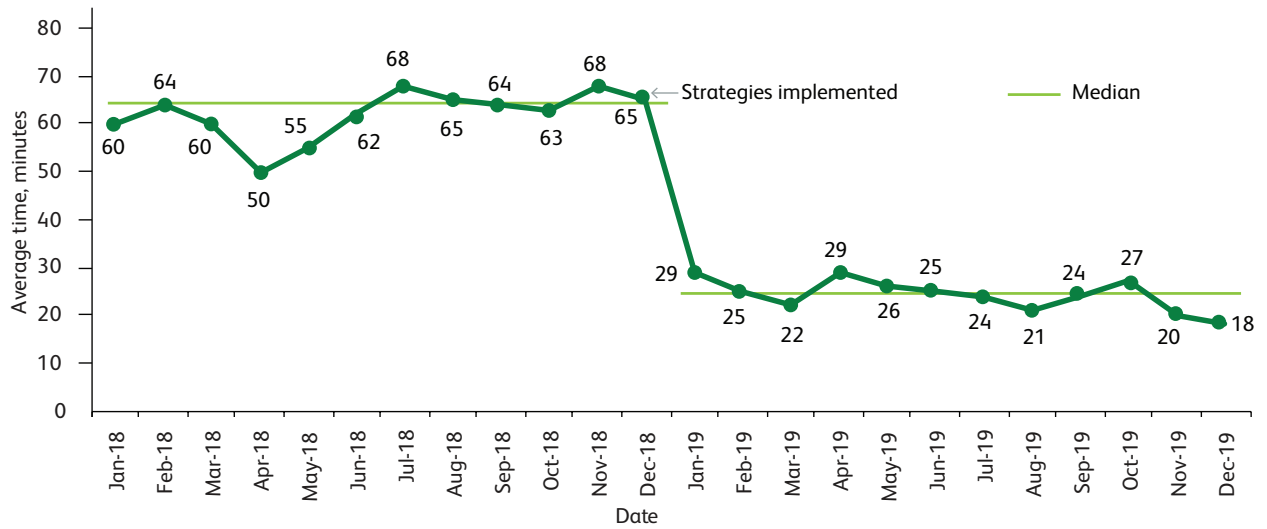


Fig 4. Average waiting time in the outpatient parenteral antibiotic therapy unit during 2018 and 2019. In 2018, the median waiting time was 63.5 minutes and, after the implementation of changes, this reduced to a median of 24.5 minutes in 2019.

The median waiting time of the appointments during 2018 was 63.5 minutes (range 50–68; Fig 4). Following changes to the OPAT unit, this reduced substantially to approximately 24.5 minutes during 2019. There was an immediate drop in the waiting time from 65 minutes during December 2018 to 29 minutes in January 2019, which continued to reduce gradually until December 2019 (18 minutes). However, there were exceptions noted to this flow in April 2019 and August 2019 to October 2019. In September 2019, new staff were hired, who required time to acclimatise to the system.

In 2019, 5,399 (27%) more patient meetings took place compared with 2018. Among these, 2,160 patient encounters were for blood transfusion and 3,275 patient visits were associated with parenteral antibiotic therapy. Assuming that the patients who underwent antibiotic treatment would have otherwise required hospital admission, the hospital saved between 21.28 to 45.85 million Pakistani rupees (Table 1).

Discussion

Outpatient parenteral medication administration and blood transfusions using an OPAT unit have gradually been accepted as a standard of care. However, its use in low–middle-income countries is uncommon. Outpatient parenteral administration of therapeutics can improve patient care quality, allow early discharge from the hospital, reduce the risk of associated healthcare infections and decrease the cost of patient appointments.^{1,3,5} This can be very useful and cost effective, especially for hospitals in the low–middle-income countries, where the healthcare institutions are often overburdened and working with limited resources.

In this study, the OPAT unit was identified to have considerable issues with delays. Nevertheless, the modifications that were made to the processes of the OPAT unit resulted in improvement and stability of care, efficiency and quality of service. Ultimately, this

Table 1. Summary of the cost saving from implementation of changes that were identified during the continuous quality improvement project

Variables	Calculations	Outcome
Additional number of visits to the OPAT units recorded in 2019 (compared with 2018), n	25,642 – 20,243	5,399
Additional number of visits to OPAT units for the administration of antibiotics recorded in 2019 (compared with 2018), n	3,275 × 1	3,275
Approximate cost due to additional visits to the OPAT unit for administration of antibiotics (1,000 PKR/visit)	3,275 × 1,000 PKR	3.28 million PKR
Approximate cost if the additional patients had to be admitted to the inpatient unit (7,500 PKR/day; and stay can range between 1–2 days)	(3,275 × 7,500 PKR × 1) to (3,275 × 7,500 PKR × 2)	24.56 million PKR to 49.13 million PKR
Cost savings by administering antibiotics in OPAT unit	(24.56 million PKR – 3.28 million PKR) to (49.13 million PKR – 3.28 million PKR)	21.28 million PKR to 45.85 million PKR

OPAT = outpatient parenteral antibiotic therapy; PKR = Pakistani rupees.

was reflected in the overall drop in number and duration of delays, increase in number of visits to the unit and potential savings. These changes are similar to those reported by other healthcare facilities where investigators have shown that changes made using CQI techniques can aid in improving the process of patient flow, which can lead to measurable and significant reductions in hospital stays and cost of care and improvement in overall service.^{1,4}

Continuous quality improvement projects are feasible in small- and large-scale settings.^{7–9} However, the sustainability of the changes to the processes after their initial implementation tends to deteriorate, particularly after the primary facilitator leaves the project. It has been suggested that a continuous intensive support is necessary to implement and maintain CQI.⁸ In this CQI, the primary facilitator continues to supervise and monitor the progress of the unit.

The most noteworthy change in the process flow was introducing the CPOE module in the OPAT unit. The CPOE module drastically reduced the time it took for a prescription to move between the necessary healthcare personnel and the pharmacy. Previously, patients carried the handwritten prescriptions from the clinic to the OPAT unit, where they were verified by the unit nurse and sent to satellite pharmacy with a porter's help. Here the prescription underwent initial appropriateness review by the pharmacist and then the prescription was sent to the main hospital pharmacy to be dispensed. This whole process, on average, took 41 minutes (range 30–45). However, after introducing the CPOE module in the hospital information system, the prescription was received by the pharmacy in real time. Furthermore, since all the information was electronic, it reduced the risk of errors that commonly occurred with handwritten prescriptions (indecipherable writing, misreading the label or losing prescription).¹⁰ The benefits of using digital resources are well documented and it has been acknowledged that these advances in technologies play a vital role in improving efficiency and optimising clinical flow.^{10,11}

The allocation of a nurse-preceptor and anchoring staff to the unit helped improve the level of staff competence, as well as their familiarity with the processes of the unit. This allowed for the efficient establishment of central lines, better communication between team members, and better communication between staff and the patients and their attendants. Similarly, housekeeping measures such as substituting bed sheets with disposable sheets helped improve patient turnaround and expedite patient flow.

A potential limitation of this study is that we did not conduct a patient satisfaction survey before and after implementing changes in the OPAT unit. This would have highlighted the impact of these changes on the service of the unit.

Conclusion

The application of CQI techniques in the OPAT unit can result in substantial and appropriate changes in the process of patient flow,

leading to measurable and significant reductions in the variability of care, cost-saving and optimisation of service. ■

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