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Original Article

Improving Patient Wait Times on the First Day of Radiotherapy Treatment

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Abstract

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Keywords

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► radiotherapy
► wait times

Long wait times on starting day of radiotherapy (day 1) can cause dissatisfaction among both patients and healthcare providers. Reducing these wait times will decrease stress and decongest hospital facilities especially in current coronavirus disease 2019 times. A multidisciplinary core team was formed during the Stanford-India Collaborative Quality Improvement training to reduce the median wait times on day 1 of treatment from 6 to 4.5 hours (a 25% reduction). Several factors were identified on the fishbone diagram, and key causes were identified using a Pareto chart and action prioritization matrix. The Plan-Do-Study-Act Cycle strategy was undertaken for the identified interventions. The outcome measure was time from arrival at the hospital to entry into a treatment room. Data were obtained from time charts at various stations and electronic records. The secondary measures were visual analog scale (VAS) scores, 80th percentile wait times, and the day-2 delay percentage. The balancing measure was "new errors" due to interventions. The interventions included the completion of all administrative tasks not needing patients' presence on the day before day 1. Baseline data from 198 patients and postintervention data from 160 patients were compared and analyzed. The median wait time at baseline, which was 6 hours, was reduced to 4.2 hours. The VAS score showed 70.4, 67.7, and 71.9% satisfaction for the resident physician, therapists, and patients, respectively. The 80th percentile wait times reduced from 8 to 5.7 hours; and the day 2 starting rate decreased from 22.5 to 2.04%, with no new errors reported. Radiotherapy day 1 wait times can be safely decreased, leading to improved satisfaction among patients and healthcare providers, by utilizing classic quality improvement methods and tools.

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Introduction

Our institute (Tata Memorial Centre, Mumbai) is a large comprehensive cancer center in South-East-Asia. About 7,000 patients receive external beam radiotherapy (RT) yearly with six linear accelerators and four telecobalt distributed at three locations.[1] The public and privately funded patients share the same machine space in 60:40 ratio. The RT process begins in the outpatient clinic with evaluation, treatment appointments, and simulation. To achieve a desired treatment plan, a long, complex pathway is followed by the medical team comprising physicians, physicists, and therapists. This process involves patient information transiting repeatedly through several human–machine and human–human interfaces.[2] Once the machine slot availability is confirmed, the patient is informed to report for treatment initiation. On the first day of the radiation treatment (day 1), several administrative tasks are undertaken such as confirmation of machine slot, payment, electronic record, and other documents (consent forms) preparation, and mobilizing accessories (e.g., immobilization devices) to machines. Day 1 is crucial, as all the planning and clinical information are compiled and verified to ensure safe and accurate treatment. The patient/attendant moves through various stations to help complete these tasks with their care team. On following treatment days, patients directly report to respective treatment units and treatment is provided with minimal delays.

Previously literature has focused on reducing wait times for RT appointments or planning process times.[2–4] We noticed no literature addressing wait times on day 1 of RT. The several steps on day 1 may result in long wait times for patients and attendants, and at times the delays in the completion of certain tasks such as e-RT charts or plan implementation may defer treatment to the second day (day 2). These wait times can be frustrating for patients and healthcare providers leading to dissatisfaction, distress, and overcrowding of finite waiting space. The additional stress on the healthcare team may lead to treatment errors and adversely affect the quality of patient care.[5] Our study aimed at reducing the wait times on day 1 of RT and improving the patient experience.

Patients and Methods

A core multidisciplinary team (two physicians, one medical physicist, and two therapists) participated in the "Enable Quality Improve Patient Care (EQuIP)," a Stanford-India Collaborative Quality Improvement (QI) training project 2019 to 2020. Other team members included the Quality Training Program mentors (two institutional and one international). This study was undertaken as a QI initiative at Tata Memorial Centre, Mumbai rather than a human participant research and therefore exempted from institutional review board approval.

For baseline data collection, all patients visiting the hospital on day-1 for RT initiation were included (with an exception of those requiring urgent palliative treatment) for 2 months. Wait times from entry into the hospital to the treatment machine for delivery were recorded manually and electronically from various stations such as reporting counter with a physician, e-RT chart completion, payment completion, plan implementation completion, reporting at the machine, and treatment execution. These were verified with the patients individually after the treatment delivery by various treatment unit therapists. All consecutive patients' day 1 time over a 2-week period was collated to derive the median day 1 time (hours).

During the baseline period, the median day 1 wait times was 6 (range: 5.7–6.5) hours. The median 80th percentile time was 8.2 (7.4–8.3) hours with 20 (5.4–22.5) % of patients waiting till day 2. The "SMART goal" (Specific, Measurable, Achievable, Relevant, and Time-Bound) was identified as "to reduce the median Day one wait times from 6 to 4.5 hours (1.5 hours reduction; 25%) over a period of 6 months."

The team met weekly during the project and attended online lectures on various steps of QI monthly, with one hands-on visit in the middle of the project. To begin with, we reviewed the day 1 process through repeated site observations to ascertain the process map and identify various probable causes for delays. The semantic preintervention patient pathways are shown in ►Fig. 1. To understand actionable delays, the day 1 time was broken into various component activities documenting care provider and patient involvement. Baseline data from 198 patients were collected in total. A fishbone diagram was developed to determine the cause and effect of the current delays (►Fig. 2). Several meetings with varied disciplines involved in the patient pathway on day 1 were held to review the process map and fishbone diagram. As a team, the providers were asked to prioritize the most frequent causes for delays using a Pareto chart and interventions were designed around those areas that were easiest to implement and provided the highest benefit for patients and the care provider team (Action-Priority-Matrix).

Plan-Do-Study-Act Cycle 1 (PDSAC): Patients on day 1 usually waited to complete several administrative formalities before receiving treatment. Once the process steps were documented, it was observed that the patient's presence was not required for these tasks. As a first intervention, it was deemed necessary that these tasks should be completed before the patient reported to the hospital. To accomplish this goal, a set of interventions were required including (1) confirmation of machine vacancy, (2) completion of e-RT charts using patient plan printout that would be check-in/-checked out, and (3) development of a patient checklist for day 1 where instructions regarding reporting (time/place) and payment were carefully outlined. After several briefing sessions with the team, all interventions were launched simultaneously starting on January 10, 2020.

PDSAC 2: For the first 2 weeks postintervention, new data points were added, such as visual analog scale (VAS) score for satisfaction (resident physicians, therapists, and patients) and e-RT chart transcriptional errors. It was noted that there were inconveniences in completing e-RT charts timely due to the single-time movement of documents per day. Hence, arrangements were made to allow these three times a day. The PDSAC-1 took place from January 10 to 24 2020, followed by 2nd cycle till February 28, 2020, including 160 patients.
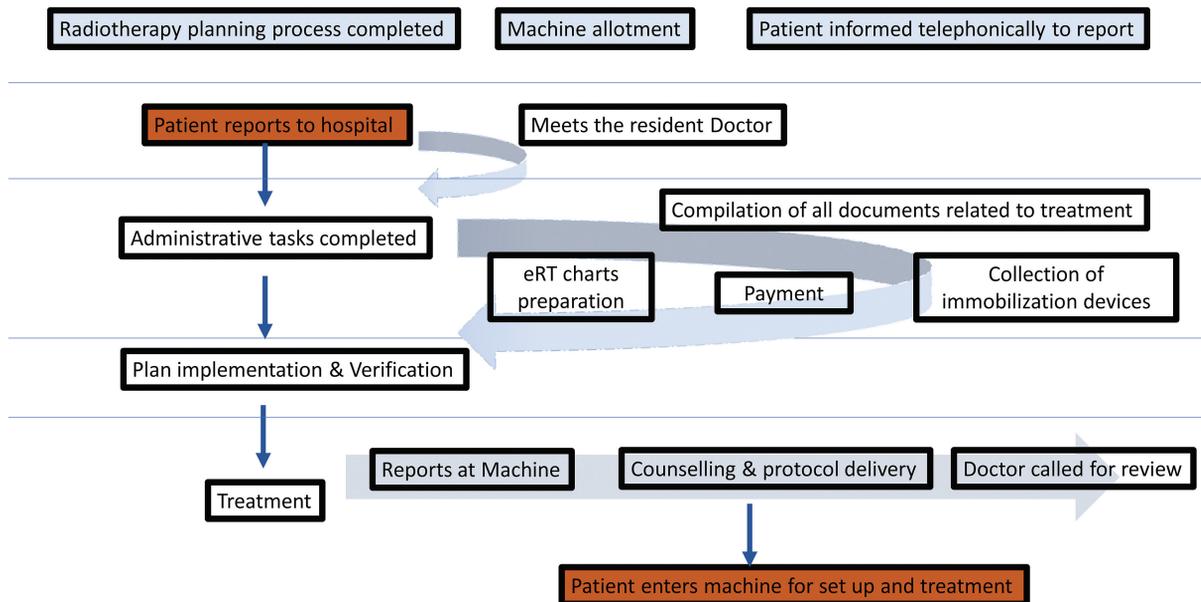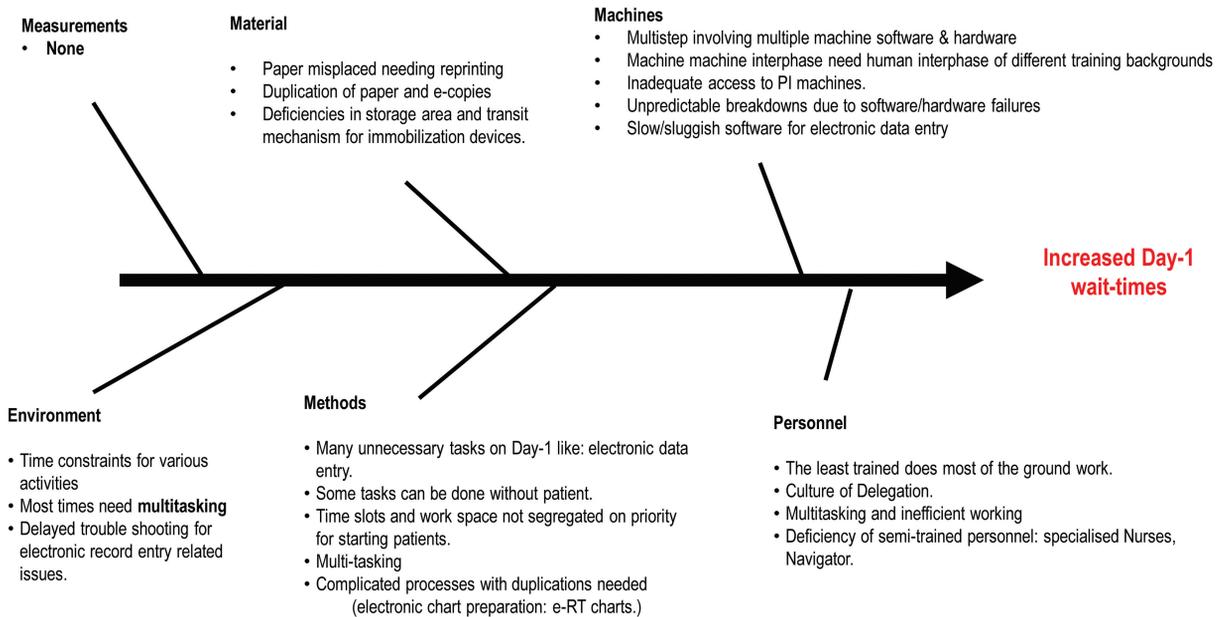
Fig. 1 Process map.

Fig. 2 Fishbone diagram.

The primary measure was the median time for treatment initiation on day 1 (hours). The secondary outcomes included the number of patients per time block, 80th percentile wait time(hours), percentage of patients starting day 2, and VAS scores (scores of "0" and "100" meant extremely dissatisfied and satisfied respectively) from treating resident physician, therapist, and patient. The balancing measure was the identification of any transcriptional errors.

Data Analysis

We used a run chart to objectively examine the median wait time change from baseline to PDSACs. The patient's wait times were arranged in ascending order to detect the wait times for the 80th percentile patient in each time block. The VAS scores were calculated as mean % for the whole PDSAC period.

Results

During the PDSAC-1, all described interventions were launched after a mock drill to understand ground challenges and were mitigated beforehand, as it was a major workflow change. For example, the day before machine vacancy prediction was practiced for concurrence for 2 weeks
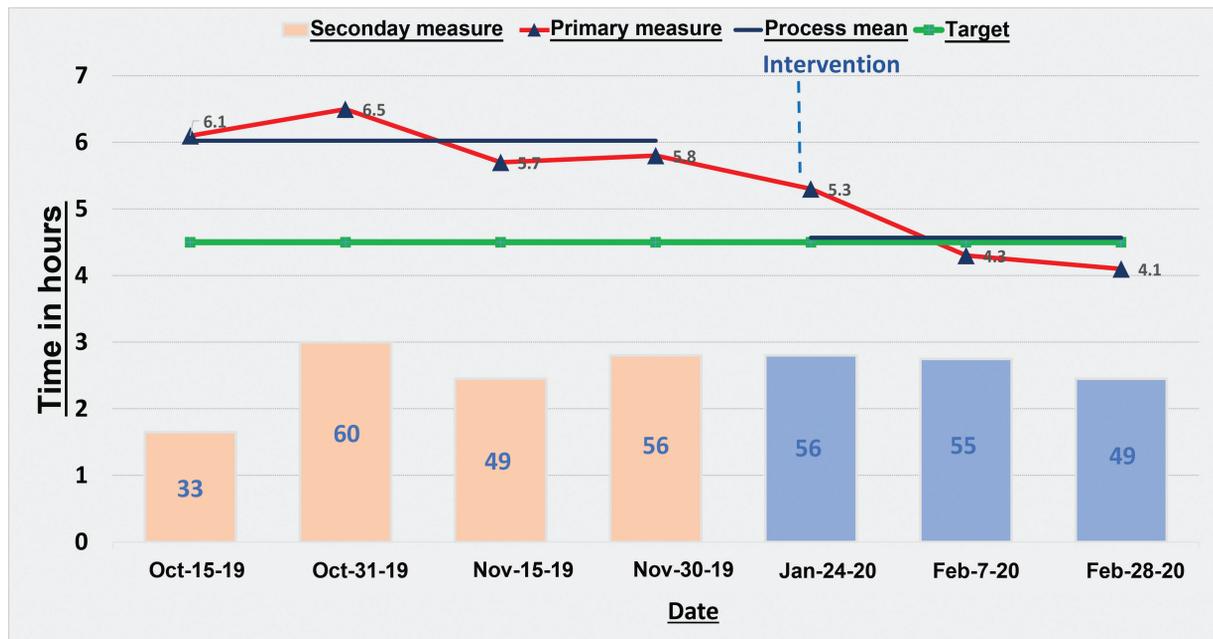
Fig. 3 Run chart.

beforehand to get the expected error rate and its adjustability. Similarly, the residents were trained with a proper checklist so that they know the complete information to be provided to the patients. Once the team was confident of implementing all the steps, then only it was implemented. For the first few days, compliance to patient instructions and prior administrative paperwork was 60%, but over 3 days it reached a satisfactory level of 95% and was maintained thereafter. The median day 1 wait times and 80th percentile time dropped to 5.3 and 7 hours, respectively, with day 2 treatment at 5.4% during PDSAC-1.

In PDSAC-2, the median day 1 wait times and 80th percentile time further decreased to 4.2 (70% decline; ►Fig. 3) and 5.7 hours, respectively, with day 2 treatment in 1.5%. There was 100% compliance for prior machine confirmation and e-RT chart completion improved from 50 to 95% from cycles 1 to 2. The VAS score showed 78.5, 75.5, and 79.3% satisfaction for the resident physician, therapists, and patients, respectively. There were no new errors detected during PDSAC-1&2.

The aim of this initial study was achieved. However, additional QI interventions are planned with the provider team to reduce the variation observed in plan implementation and on-machine waiting time. Due to the implementation of coronavirus disease 2019 (COVID-19) precautions in March 2020, further interventions were halted and will be considered in future.

Discussion

Our study demonstrated a 1.8-hour reduction in the median wait times on the first day of RT treatment (day 1) that exceeded the target aim before starting the study. We noticed a consistent improvement in all secondary measures as well.

The reduced time spent in the hospital may also reduce the chances of nosocomial infection and spreading infections such as COVID-19. The reduction in the number of hours patients/attendants spend RT waiting for areas further emboldens the basic principle of RT, "ALARA" (as low as reasonably achievable).[6] Patients may be able to use this time to ease their travel schedule to the hospital and may spend it on their activity of choice. It is estimated that with the current reduction, the patient would save 10,800 person-hours per year and the hospital would save 21,600 seating space hours in waiting areas every year. The multidisciplinary team is also less stressed and it was remarkable that no transcriptional errors were reported during the PDSACs compared to prior reports from our institutional audit.[5] We plan to sustain these interventions to see the long-term effects on patients and the care team.

Previously, we have tried several times to reduce wait times on day 1 but were largely unsuccessful. The key to successfully reducing patient wait times was the development of a culture for improvement at the local level. This experience allowed the multidisciplinary team to have an open dialogue and use standard QI tools to outline each process step before interventions were tested or implemented. The administrative support from the department and hospital was also crucial to support proposed process changes and remove barriers to implementation. We believe our experience will be a useful guide to other large busy academic centers to help improve their patient care quality and wait times. Also, a similar system can be extrapolated to other hospital areas. However, a single-center study and exact baseline wait times and challenges may not be applicable to other centers directly. But if we look closely, basic problems such as precompletion of administrative paperwork for patients and good comprehensive patient communication addressed the underlying problems/bottlenecks/

Table 1 Strategies to improve wait times on day 1 of radiotherapy treatment

S. No.	
1	Completion of paper work and other administrative formalities prior to patient arrival to the hospital
2	Clear communication with the patient regarding place, time of reporting, billing formalities and any specific protocol such as fasting and premedication
3	Keeping time stamps to understand the times
4	Collect patient feedback and satisfaction scores

wastes. These may guide them in similar problems in their conditions as well. Of these continued clear communication with all the information can be difficult to sustain in centers where it is by temporary or rotating staff. It would be important to establish a checklist of instructions so that it is sustained (►Table 1).

This study is important from the Indian perspective, as we have unique challenges related to the large number of patients that we treat every day with skewed recourses every day at almost all centers.[7] The wider implementation of audits in the systems is catching up to understand the scopes of quality improvement programs implementation.[5,8] We have similarly shown, previously, complex problems can be mitigated for the long term through a systematic quality improvement approach.[9] We hope, with the help of the research wing in EQUiP India under the National Cancer Grid, various government and private centers with radiation oncology departments in the country would review their wait times and look for larger concurrence and variabilities in causes and interventions related to it.

Conflict of Interest
None declared.

References
1 Accessed July 10, 2023 at: https://tmc.gov.in/PDF/Annual_Report/AR_2019E.pdf
2 Agazaryan N, Chow P, Lamb J, et al. The timeliness initiative: continuous process improvement for prompt initiation of radiation therapy treatment. Adv Radiat Oncol 2020;5(05):1014–1021
3 Ho AS, Kim S, Tighiouart M, et al. Quantitative survival impact of composite treatment delays in head and neck cancer. Cancer 2018;124(15):3154–3162
4 Gomez DR, Liao KP, Swisher SG, et al. Time to treatment as a quality metric in lung cancer: staging studies, time to treatment, and patient survival. Radiother Oncol 2015;115(02):257–263
5 Agarwal JP, Krishnatry R, Panda G, et al. An audit for radiotherapy planning and treatment errors from a low-middle-income country centre. Clin Oncol (R Coll Radiol) 2019;31(01):e67–e74
6 Yeung AWK. The "As Low As Reasonably Achievable" (ALARA) principle: a brief historical overview and a bibliometric analysis of the most cited publications. Radioprotection 2019;54(02):103–109
7 Maitre P, Krishnatry R, Chopra S, et al. Modern radiotherapy technology: obstacles and opportunities to access in low- and middle-income countries. JCO Glob Oncol 2022;8:e2100376
8 Manjali JJ, Krishnatry R, Palta JR, Agarwal JP. Quality and safety with technological advancements in radiotherapy: an overview and journey narrative from a low- and middle-income country institution. JCO Glob Oncol 2022;8:e2100367
9 Krishnatry R, Johnny C, Tahmeed T, et al. Quality improvement process with incident learning program helped reducing transcriptional errors on telecobalt due to mismatched parameters in different generations. J Med Phys 2022;47(04):367–373