RESEARCH PAPER

Reducing Waiting-time of Preterm Babies at a Retinopathy of Prematurity Clinic: A Quality Improvement Project

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Objective: To decrease the waiting time for preterm babies visiting the Retinopathy of prematurity clinic in a tertiary eye hospital.

Design: Interventional study**.**

Setting: Tertiary eye care hospital.

Patients: All preterm babies reporting for screening and follow up at Retinopathy of prematurity clinic.

Intervention/Procedure: A quality improvement team comprising of a faculty (team leader), two senior residents, two junior residents, one nursing officer, and a registration staff was constituted. Fish bone analysis was done to understand various reasons for the high waiting time for preterm babies. Baseline data was collected followed by multiple Plan-Do-Study- Act (PDSA) cycles.

Main outcome measures: Average waiting-time, maximum waiting-time, and last baby entry-time were measured.

Results: The median average waiting-time, maximum waiting-time and last baby entry-time at baseline were 90.5 min (range 74.1 to 118.8 min), 177.5 min (range 160 to 190 min) and 111 min (90 to 118 min), respectively. At the end of 3rd PDSA cycle, these reduced to 77.6 min (range 55.2 to 94.3 min), 122 min (range 110 to 135 min), and 60 min (range 45 to 80 min), respectively and were sustained; the decrease from baseline being 14.3%, 31.2%, and 46%, respectively.

Conclusion: The time spent in the waiting area at the Retinopathy of Prematurity clinic was significantly reduced by simple changes in the process flow.

Keywords: *Consultation time, Hospital planning, Intervention, Quality of health care.*

Preterm babies with Retinopathy of prematurity (ROP) often require multiple hospital visits for retinal screening and follow-up [1]. The examination is usually performed in neonatal intensive care units (NICU) or specialized ROP clinic at tertiary eye care centres. With increasing neonatal care and improved survival of preterm infants, the magnitude of ROP blindness in India is worrisome [2]. Also due to improved screening services and detection of treatment requiring ROP, referrals to our tertiary eye care hospital was seen to be increasing.

Outpatient/clinic waiting time is an important parameter to assess quality of health care and patients' satisfaction towards hospital services [3]. We observed that there is a problem of long waiting time for these preterm babies during each visit at the ROP clinic in our hospital. These preterm babies are required to be kept fasting for one hour prior to procedure, but it gets extended indefinitely leading to prolonged crying and risk of systemic instability. The increased waiting may also increase stress in parents, and also the clinical staff. We undertook this quality improvement (QI) project with the aim of reducing the maximum waiting time of preterm babies in ROP clinic by 30% from baseline in 8 weeks.

METHODS

This QI project was done in the ROP clinic of a tertiary eye care hospital where preterm babies report for screening and follow up of ROP. The quality improvement (QI) team involved in this project included a faculty member (team leader), two senior residents (post-MD), two junior residents (postgraduate students), a nursing officer, and a registration counter staff. The ROP clinic at our tertiary-care centre runs twice-a-week and is visited by around 30-40 preterm babies in each session.

The baseline process flow is as follows: the registration time for these babies starts from 12.30 PM till 1 PM, and then again from 2 PM to 3 PM. During the lunch time (1 PM to 2 PM), the patient cards are collected, fasting instructions are given, and pupillary dilation is performed by the nursing officer. The clinic

starts at 2 PM when two junior residents (JR) and one senior resident (SR) arrive and set up the examination tables and equipment. The JR issues wide angle viewing lens for use with the retinal camera (Retcam) from lab in-charge after 2 PM. Thereafter the examination procedure starts. Sometimes another SR arrives at 2.30 PM (if available), and the faculty member arrives at 2.45 PM, to run 2-3 parallel examination stations (***Fig.* 1**).

The baseline data was collected over initial 3 weeks. A fishbone root cause analysis was done to identify issues with the policy, people, place and processes responsible for long waiting time (***Web Fig.* 1**). Three Plan-Do-Study-Act (PDSA) cycles were implemented.

First PDSA cycle: It was implemented in the 4th week. Here the JR segregated the cards according to first-come first-served basis and sorted them into three piles (one for each SR and one for the faculty), instead of a random pile. The purpose was to efficiently segregate patients depending on whether they need to be seen by an SR (old cases), faculty (new cases/opinion cases/post-operative cases) or had to undergo wide angle digital imaging by SR. The second change was that the second SR was made permanent and he reported on time at 2 PM, so that the clinic capacity was increased and it could start on time.

Second PDSA cycle: It was implemented in the 5th week wherein the faculty member also reported to the clinic at 2 PM. This ensured that all staff came on time and all three stations started at 2 PM. Since the card pile for faculty was segregated, he could independently start examining the new cases, and opinion cases could follow later.

Third PDSA cycle: It had several interventions aimed at timely reporting of staff, timely availability of equipments, proper examination order, and rescheduling of old and new patients. These changes of this PDSA were tested for the next nine clinic days for checking sustenance of the intervention. JRs and one SR reported now at 1.50 PM, sorted out the cards in three piles as before, and arranged all the equipments by 2 PM, this ensured the preparation time occurred before 2 PM, and the clinic could actually start at 2 PM. The 2nd SR and the faculty member reported at 2 PM, which allowed three examination stations to start functioning from 2 PM. The Retcam lens was issued beforehand and kept safe within the clinic cupboard, instead of issuing from the lab in-charge every time, who was on lunch and often lens procurement was delayed. The postoperative patients were called at 2 PM (instead of 12.30 PM) as their pupils were already dilated on postoperative cycloplegic medication, and they could be examined directly by faculty, who was now present at 2 PM.

To assess the impact of interventions, we measured the 'average waiting-time', 'maximum waiting-time' and 'last baby entry-time'. The Waiting-time was defined as the time interval from the arrival of baby at ROP clinic till first examination by the Senior resident (post-MS)/ faculty member. The Average waiting-time (AWT) was defined as algorithmic mean of waiting-time of all babies on each clinic day. The Maximum waiting-time (MWT) was the maximum time any baby had to wait before examination, and was calculated from the record sheet. The Last baby entry time (LBT) was defined as the time to examination for the baby entering last in the clinic premises, calculated from start of clinic at 2 PM – it approximately indicated total clinic time. To ensure the completeness and accuracy of data collection, one JR was solely allotted the task of recording the waiting time of babies on a record sheet starting from 12.30 PM in every clinic. The QI team was shown the power point presentation of benefits with each PDSA and were motivated to further reduce the waiting time.

The data were entered into Excel sheet and analyzed using STATA SE 12.1 software.

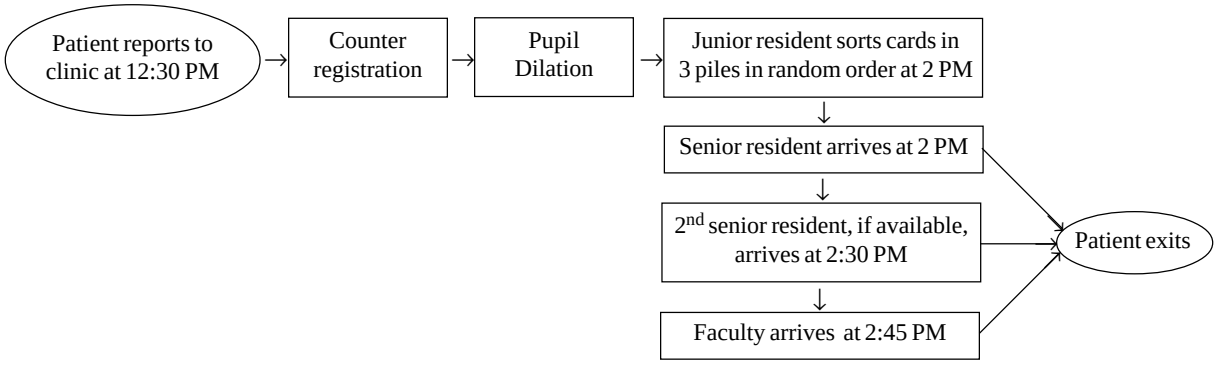


FIG. 1 *Baseline process flow chart for preterm babies attending the ROP clinic*.

RESULTS

The study was performed over 19 clinic days. The number of babies attending the ROP clinic varied across different clinic days during the study period (range 26-39, median 32). The median (range) AWT, MWT and LBT at baseline (6 clinic days) were 90.5 (74.1-118.8) min, 177.5 (160-190) min and 111 (90-118) min, respectively.

During 1st PDSA cycle, all these measures had worsened from baseline, indicating the changes did not work as expected (***Fig.* 2**). During the 2nd PDSA cycle, all the measures were improved from 1st PDSA cycle. During the 3rd PDSA cycle, the median (range) AWT, MWT and LBT were 77.6 (55.2-94.3) min, 122 (110-135) min, and 60 (45 to 80) min, respectively (***Fig.* 2**).

At the end of the project, the median AWT, MWT and LBT decreased by 14.3%, 31.2%, and 46%, respectively. The changes were sustained over the next few weeks.

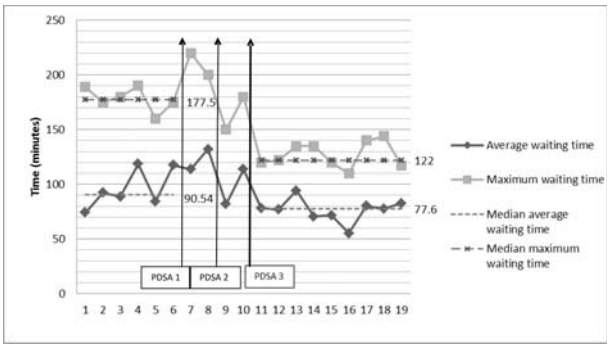
DISCUSSION

The waiting times for preterm babies decreased in our ROP clinic after well planned interventions in three PDSA cycles. The maximum decrease was noted in LBT (46%) followed by MWT (31.2%). The specific aim of reducing MWT to at least 30% of baseline was achieved. Multiple PDSA cycles were the strength of this study as improvement with the previous cycle motivated QI team to work harder in the subsequent cycles.

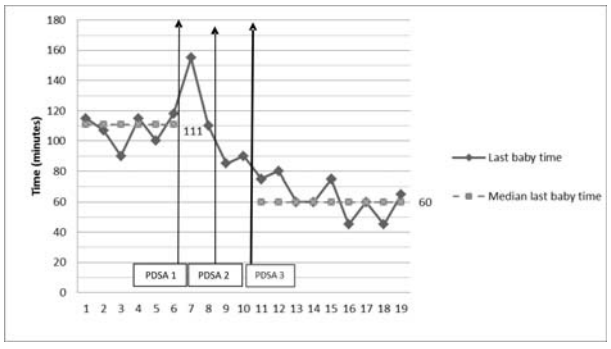
PDSA is a widely accepted method of quality improvement in healthcare system [4]. The first PDSA was aimed at improving the process related flow by segregation of cards, which allowed clear division of patient flow and allowed patient's reporting earlier to be seen earlier – which not only brought in a sense of order in patient flow, but also reassured the patients that late reporters do not jump the queue. The staff capacity was permanently increased by bringing in one more working SR (who previously used to come if available), which led to three examination stations. However, these steps increased the waiting time which was surprising to the team. It was because the clinic was not starting on time as the preparation time was prolonged, and the staff came late. It highlights how small-scale testing helps to realize that outcomes may not occur as expected. A failed PDSA should not be disheartening, as it provides deeper insights into the process problems, and provides new ideas to tweak the process.

The 2nd PDSA was aimed at all the staff (SR and faculty member) starting clinic on time, which led to an improvement, but was far from the expected goals. More extensive tweaks were tested in the 3rd PDSA – it reduced preparation time (by starting even earlier and keeping all equipment ready), and optimized flow of postoperative patients and significantly reduced their waiting times. These small quality improvement changes were tracked across the next few weeks and the changes were sustained.

The study had a few limitations. Due to quick changes and less clinic visits between each PDSA cycle, we could not statistically analyze the difference achieved with each PDSA cycle. The reporting time was noted by the resident from the time they entered the clinic area, but it could have been logged in a more automated way by coordinating with the patient registration time. We are now working on an automated way of measuring waiting times, which will allow hospital administrators to easily visualize and optimize patient waiting times across different clinics in our hospital. There were no balancing outcomes measured. A more detailed interview/questionnaire from parents before and after the study would have strengthened the study with useful qualitative data.



(*a*)



(*b*)

FIG. 2 *(a) Change in Average waiting time and Maximum waiting-time at a ROP clinic after a Quality-improvement intervention; (b) Change in Last baby entry-time at a ROP clinic after a Quality-improvement intervention.*

WHAT THIS STUDY ADDS?

- The waiting-time for preterm babies at a Retinopathy of prematurity clinic can be reduced with simple Quality-improvement changes.

To conclude, the ROP clinic waiting area time was significantly reduced by small QI changes and served as a model for improvement in other clinics at our hospital. Small scale testing can lead to systems improvement via repeated PDSA cycles and can significantly improve patient quality of care.

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Contributors: PC and DK: Conceptualization of the research and interpretation of data; RT, RRP and SS: Data collection; PC, DK, RT, RRP and SS: Manuscript preparation and/or critical revision. All authors approved the final manuscript and agree to be accountable for all aspects of the manuscript.

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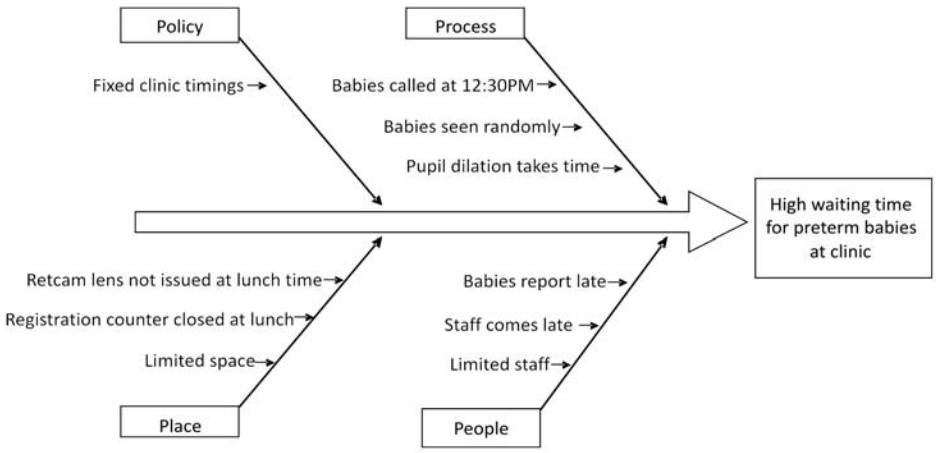

WEB FIG. 1 *Fishbone root cause analysis for long waiting-time at a retinopathy of prematurity clinic*.