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Effectiveness of Basic Quality Improvement Techniques in Reducing Patient Waiting Time for Outpatient Services at Primary Care Hospitals - An Interventional Study at Two Sri Lankan Divisional Hospitals

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ABSTRACT

Introduction: Increased waiting time for outpatient care services at primary care institutions was among the major factors inhibiting the services utilization of Divisional Hospitals in Kilinochchi District of Sri Lanka. Healthcare quality improvement techniques are proven management strategies for reducing patient waiting time in hospitals. However, the effectiveness of such interventions needs to be assessed in real-time settings to convince regional administrators to implement them in the local context.

Objective: The study aimed to evaluate the effectiveness of basic quality improvement techniques, in reducing patient waiting time for outpatient services at selected primary care hospitals in the Kilinochchi District

Methods: It was a quasi-experimental study conducted in the outpatient setting of two Divisional Hospitals (DHs) in Kilinochchi District of Northern Sri Lanka in 2022. The baseline situation of hospitals was studied with qualitative, observational, and quantitative tools. Accordingly, the interventions based on the basic healthcare quality improvement techniques were designed and implemented. The effectiveness of interventions was assessed by patient waiting time at both hospitals before and after interventions.

Results: The overall patient waiting time for outpatient services was reduced significantly at both hospitals by 21.8 and 13 minutes ($P<0.01$ and $P<0.05$).

Conclusion: The interventions were found effective at DHs as overall patient waiting time for outpatient services (OPD and clinic) was significantly reduced.

Recommendation: The intervention model could be appropriate to any primary care institution in the country as they have similar structures and functions.

Keywords: Effectiveness of interventions, quality improvement techniques, patient waiting time, outpatient services, primary care hospitals, Sri Lanka

Chapter 1 1. Introduction

Basic quality improvements roll around the concepts of 5s, kaizen, responsiveness, patient-centeredness, and WITs have been proven techniques to improve the quality of services, especially in healthcare settings (Directorate of Healthcare Quality & Safety, 2015). Quality of public services is defined by the degree of meeting customer needs and would be reflected in customer experience (CEOPEDIA MANAGEMENT, 2023).

1.1 Patient waiting time in hospitals

Patient waiting time is an important indicator of the quality of services offered by hospitals (Oche & Adamu, 2013). Waiting time is defined as the total time a patient spends in a facility from arrival at the registration desk until the time, she/he leaves the facility or last service (Biya et al., 2022). The amount of time a patient waits to be seen is one factor that affects the utilization of healthcare services (Oche & Adamu, 2013). Long waiting time adversely affects the willingness of the patient to return to the clinic/hospital and reduces the utilization of health services (Biya et al., 2022). Waiting time in hospitals is an important factor leading to patient dissatisfaction and causing discomfort for the patient (Biya et al., 2022). Patients perceive long waiting times as a barrier to actually obtaining services (Oche & Adamu, 2013). Excessive waiting time is a lose-lose strategy in that patients lose their valuable time; hospitals lose their patients and staff experience tension and stress (Biya et al., 2022). Healthcare interventions target the reduction of waiting time to generate satisfied customers and efficient services, ultimately enhancing productivity (Helbig et al., 2009)(Al-Harajin et al., 2019).

1.2 5s concept

5s is a Japanese concept to embark on quality improvements in institutions that begins with workplace organization and gradually concentrates on functional improvements (JICA, 2015). The 5S refers to; Sort (identify and remove unwanted/unused items from the workplace and reduce clutter), Set (organize everything needed in proper order for easy operation), Shine (maintain a high standard of cleanness), Standardize (set up the above 3S as norms in every section of the workplace), Sustain (train and maintain discipline of the personnel engaged) (JICA, 2015).

1.3 Kaizen

Kaizen is an approach to creating continuous improvement based on the idea that small, ongoing positive changes can reap significant improvements (Daniel, 2023). Kaizen is one of the most recognized techniques in continuous improvements to enhance the productivity of institutions (Jain, 2015).

1.4 Responsiveness

Responsiveness is how well the health system meets the legitimate expectations of the population for the non-health-enhancing aspects of the health system. It includes seven elements: dignity, confidentiality, autonomy, prompt attention, social support, basic amenities, and choice of provider (Darby et al., 2000). Patient-centeredness is the essence of responsiveness.

1.5 Work Improvement Teams (WITs)

Work Improvement Teams are developed for employee-based small-group activities. A WIT comprises a group of between 3-15 members of the same work unit who meet regularly to identify, analyze, and solve problems and improve the outputs of their work unit (Directorate of Healthcare Quality & Safety, 2015). They also take the initiative to introduce/implement improvement measures or recommend them to management (Directorate of Healthcare Quality & Safety, 2015).

1.6 Primary care hospitals in Sri Lanka

Divisional Hospitals (DHs) and Primary Medical Care Units (PMCUs) are the primary care hospitals in Sri Lanka to provide primary healthcare services through hospital settings (Ministry of Health, 2017). According to the Ministry of Health, Sri Lanka (Ministry of Health Sri Lanka, 2020), there are currently 973 PMCIs in the country (474 DHs and 499 PMCUs), out of a total of 1103 state-owned hospitals. They provide outpatient services, clinic services, basic emergency care services, and basic inpatient care services. They contribute to primary healthcare through health promotion, education, screening, diagnosing & treating of non-communicable diseases, diagnosis, treatment & prevention of communicable diseases, and maternal & child healthcare services. Kilinochchi District is one of the 25 Administrative Districts in Sri Lanka and has the services of eleven PMCIs (seven DHs and four PMCUs).

1.7 Research problem

The Ministry of Health, Sri Lanka heavily focused on strengthening healthcare services through primary care hospitals in recent times, as a viable option to achieve Universal Health Coverage (Ministry of Health, 2017)(Ministry of Health Nutrition and Indigenous, 2019)(Ministry of Health, 2016)(Thekkur et al., 2022). The Ministry launched multiple projects in this regard to enhance the services coverage and utilization of primary care hospitals (Ministry of Health, 2017) but with little success (Karunaratne et al., 2019).

Primary care hospitals (Divisional Hospitals) in the Kilinochchi District of Sri Lanka are usually manned by a single medical officer or two. Though smaller hospitals, the doctors who serve in primary care hospitals are responsible for managing outpatients, clinic patients, emergencies, inward patients, small surgical procedures, and transfers to bigger hospitals. Meanwhile, they have to carry out the administrative and public health commitments assigned to their job. Therefore, delays in medical management and customer-provider confrontations are frequent. Longer waiting times (which could last to couple of hours) and associated negative customer experiences are among the highlighted reasons for the underutilization of primary care hospitals in the District. Waiting time reduction through quality improvement techniques is a proven management strategy expected to increase the service utilization of primary care hospitals (Directorate of Healthcare Quality & Safety, 2015). However, many regional healthcare administrators were not optimistic about the effectiveness of such interventions in the local context.

1.8 Objective

To evaluate the effectiveness of basic quality improvement techniques, in reducing patient waiting time for outpatient services at selected primary care hospitals in the Kilinochchi District

Chapter 2 2. Methods

2.1 Study design

The study was conducted at two Divisional Hospitals (DHs) in Kilinochchi District of Northern Sri Lanka in 2022 as part of a project to strengthen the productivity of selected primary care hospitals in the District. The pre-interventional data collection took place in May 2022, followed by interventions for the next five months. Post-interventional data collection was done in November 2022. It was a quasi-experimental study where two study hospitals (DH Tharmapuram and DH Uruthirapuram) were selected from the total seven DHs in the district, based on the criteria of fair patient turnover (decided by secondary data) with longer waiting times (from the perceptions of local administrators). All the staff of selected DHs were included in the study's interventions. An observation record sheet (with a 5-point Likert scale) was used to make periodic assessments on improvements in the workplace organization (structure) and processes of hospitals. Periodic key informant interviews and focus group discussions with hospital staff, patients, and the community played a big role along with other empirical data in designing and implementing interventions based on basic quality techniques.

The effectiveness of interventions was assessed by measuring patient waiting time for OPD (Outpatient Department) and clinic services. All the patients visiting the ambulatory care services of the hospital were included in the study; except inward admissions, emergency admissions, patients visited for dental services alone, children (below 18 years old) without guardians, and anybody struggling to cope with the research. The number of participants (sample size) was decided by the guideline from the Directorate of Healthcare Quality and Safety (DHQS) (Directorate of Healthcare Quality and Safety, n.d.) for measuring waiting time at OPD/clinic (Table 1). The DHs in the Kilinochchi district have an average daily turnover of around a hundred outpatients. The guideline says that 49 patients have to be recruited for the study if the daily outpatients' turnaround stands at 100. Hence it was decided to recruit 50 patients from each hospital to measure their waiting time for respective services (Directorate of Healthcare Quality and Safety, n.d.).

Table 1: Description of proposed participants to be studied for given outpatient numbers

Total number of outpatients per day	Participants need to be selected
100	49
200	65
300	73
400	78
500	81
600	83
700	85

The simple random sampling technique was applied to select participants among patients visiting study hospitals. The patients were identified when they were entering the hospital, based on random numbers. Their informed consent was obtained and was followed by all units they visited. The time spent at each station was measured in minutes, with the help of a waiting time record sheet. The total waiting time was calculated by measuring the time duration between patient arrival and departure. Both descriptive and inferential statistics were applied in data presentation and analysis. The effectiveness of interventions was evaluated based on the difference in OPD/clinic waiting time before and after interventions. The structure, functions, and services utilization of study hospitals were analyzed before and after interventions to legitimate the comparability.

2.2 Interventions

The research adopted the implementation-evaluation hybrid model, in which the researcher played a big role as an insider within the system. As interventions were not pre-determined but evolved from the same system that was studied, both formative and workplace structure/process evaluations were foundations for the project. The baseline data gathered through qualitative and quantitative methodologies provided insight into understanding the contexts of interventions and helped to design them. The FGDs and KIIs in regular intervals throughout the project together with empirical observations (monitoring) ensured the implementation of interventions with circumstantial modifications.

Waiting time reduction was one of the major objectives in instrumenting basic quality improvements at the DHs studied. The interventions were part of a broader project to strengthen the productivity of selected hospitals. The researcher and a team of resource people with experience and expertise in quality improvement activities conducted a series of participatory training programs for the entire staff of selected DHs throughout the interventional period. The training was focused on patient-centered services, quality (including safety & responsiveness) of services, outreach services, and patient/community involvement in services. Basic quality improvement techniques like 5S and kaizen were introduced to both hospitals. PowerPoint presentations portraying success stories of peer hospitals following quality interventions helped a lot in explaining the change process, change management, and the desired outcomes of even smaller interventions/improvements. Few such change makers were directly invited and shared their experiences.

The leadership, positive attitude, motivation, and teamwork fostered among staff. One Work Improvement Team (WIT) each for a Divisional Hospital was established. Responsibilities assigned to staff on areas of improvement. 5s and kaizen concepts were adopted in improving the workplace organization of OPD and clinic areas. The movements of patients were streamlined without cluttering. Responsiveness of staff improved with promptness in services. The staff was made to realize the importance of time to patients and themselves. The appointment systems for clinics and other procedures were

regularized to distribute services evenly throughout the days without overcrowding. Mechanisms were established to inform patients/the public regarding any alterations in services, thus unnecessary visits were avoided. Periodic review meetings were conducted with the participation of the researcher. The researcher used the observation record sheet to assist staff in making sustainable improvements. Staff were encouraged to share their experiences and contributions in meetings. Stories and photos of improvements were shared with the community in social media groups created as part of the project.

Chapter 3 3. Results

3.1 Structure, functions, and services utilization of hospitals

The primary and secondary data throughout the study revealed that there were no major changes in the structure and functions of DHs studied except for on and off temporary alterations. DH Tharmapuram was staffed by two doctors and DH Uruthirapuram by one. The total staff of DH Tharmapuram and DH Uruthirapuram stood at 34 and 16 respectively. The major services utilization at DHs per doctor is described in Table 2.

Table 2: Services utilization of studied DHs before and after interventions (2022)

	DH Tharmapuram		**DH Uruthirapuram**	
Services	**Before intervention**	**After intervention**	**Before intervention**	**After intervention**
Daily OPD attendance per doctor	38	41	56	57
Monthly medical clinic attendance per doctor	226	228	153	177
Monthly Healthy Lifestyle clinic attendance per doctor	90	134	61	196

3.2 Workplace organization and processes

The observation tool for the project evaluated 37 aspects related to workplace organization and processes of DHs, many of them associated with patients' waiting time at OPD and clinic. The final evaluation found that there were improvements in 26 and 24 components respectively at DH Tharmapuram and DH Uruthirapuram after interventions.

3.3 Patient waiting time

3.3.1. Participants' demography and purpose of visit

The sample populations studied in hospitals before and after interventions were found to be identical. Overall, females counted more than males, and the majority of participants fell within the age group of 25 - 64 years. Nearly three-fourths of study participants visited for OPD services and the rest for clinic services, with small variations between hospitals.

3.3.2. Mean patient waiting time

The OPD and clinic patients were considered together as there was no significant demarcation between OPD and clinic services. Though patient waiting time was measured at every station they visited, the data of major waiting points that most patients experienced were only summarized. OPD/clinic registration, waiting for consultation, consultation duration, and waiting at the pharmacy were the major waiting points identified where almost all patients spent time during their hospital visit. More than half of their overall waiting time was spent on the waiting for consultation alone.

Both hospitals showed reductions in patient waiting time at all major waiting points for OPD and clinic services after interventions except an increase in consultation duration by one minute at DH Tharmapuram (Table 3).

Table 3: Summary of mean waiting time of patients at selected DHs in Kilinochchi District before and after interventions in 2022

Hospital		**Patient waiting time (minutes) - Mean, Standard Deviation, Number**											
		OPD registration		**Clinic registration**		**Waiting for consultation**		**Consultation duration**		**Waiting at pharmacy**		**Total**	
		B	**A**	**B**	**A**	**B**	**A**	**B**	**A**	**B**	**A**	**B**	**A**
DH Uruthirapuram	Mean	4.5	2.2	4.2	3.3	44.9	27.5	5.0	4.4	1.6	1.4	**64.4**	**42.6**
	SD	6.5	1.3	3.4	1.7	38.3	12.7	3.5	1.9	.76	0.7	**40.5**	**20.7**
	N	42	41	8	9	50	50	50	50	50	50	**50**	**50**
DH Tharmapuram	Mean	2.2	1.8	2.3	1.7	25.1	17.7	3.0	4.0	2.74	1.5	**43.9**	**30.9**
	SD	1.5	1.0	2.2	0.7	19.9	12.3	2.7	1.7	1.89	0.8	**26.9**	**14.3**
	N	33	32	17	18	50	50	50	50	50	50	**50**	**50**

B-Before intervention A-After intervention

3.3.3. Statistical analysis and findings

The waiting time results were statistically analyzed to determine the significance (P<0.05) of changes associated with interventions. The data was checked for their distribution with the help of SPSS to select appropriate methodologies. The Kolmogorov- Smirnov and Shapiro-Wilk tests (P <0.001) depicted that none of the results were normally distributed.

Meanwhile, the samples studied before and after interventions were different (independent of each other). The particular results were measured on interval scales and tested against categorical variables (hospitals and interventions). Therefore, the non-parametric, independent sample Mann-Whitney U Test was identified to be appropriate for statistical analysis.

Though waiting times were reduced at all major waiting points for OPD and clinic services, the reductions were not statistically significant (P>0.05) except for the waiting time for consultation at DH Uruthirapuram (P=0.04) and the waiting time at the pharmacy in DH Tharmapuram (P<0.01). However, the overall waiting time was reduced significantly at both hospitals by 21.8 and 13 minutes, respectively at DH Uruthirapuram and DH Tharmapuram (P<0.01 & P<0.05). Likewise, the increase in the consultation duration at DH Tharmapuram was found significant (P<0.01) (Table 4).

Table 4: Summary of change in patient waiting time at selected DHs in Kilinochchi District before and after interventions in 2022

Waiting points	**DH Uruthirapuram**		**DH Tharmapuram**	
	Change[a] (minutes)	**Statistical significance***	**Change[a] (minutes)**	**Statistical significance***
For OPD registration	-2.3	U=698 P=0.12	-0.4	U=506 P=0.75
For clinic registration	-0.9	U=32 P=0.67	-0.6	U=145 P=0.81
Waiting for consultation	-17.4	U=946 P=0.04	-7.4	U1037 P=0.14
Consultation duration	-0.6	U1125 P=0.38	+1.0	U=685 P<0.01
Waiting at the pharmacy	-0.2	U1059 P=0.13	-1.2	U=654 P<0.01
Total waiting time	-21.8	U=800 P<0.01	-13.0	U=963 P<0.05

Change[a] = Mean waiting time before interventions – Mean waiting time after interventions *independent sample Mann-Whitney test applied.

Chapter 4 4. Discussion

4.1 Study design

The research was conducted as a participatory action research, where participants (healthcare managers/staff/patients/communities) were involved in planning, designing, implementing, controlling, and modifying the interventions executed. This dual role of local-level people as research participants and implementers at all stages of implementation studies was highly praised for enhancing the validity of the project (Peters et al., 2013). Appropriate selection of study designs is vital to the production of high-quality evaluations (NSW Ministry of Health, 2019). Choosing before and after study design with random allocation of participants for waiting time measurement could be the pragmatic study design for the evaluation of such complex healthcare interventions (NSW Ministry of Health, 2019).

Baseline variations like major changes; in the structure and functions of hospitals, services utilization, and the demography of participants could impair the validity of results (NSW Ministry of Health, 2019)(Berger, 2006). The study analyzed those baseline factors before and after interventions and found only minimal variations. Thus, the legitimacy of making comparisons on waiting time before and after interventions was ensured before the evaluation.

The selected workplace organization (structure) and processes of hospitals were monitored and evaluated throughout the study with empirical data (from the observation record sheet) to affect the desired outcomes of the project. The particular approach assisted the researcher in understanding the context, identifying gaps, planning and implementing interventions, strengthening the system to accommodate changes, modifying interventions according to temporal changes, controlling the project, and sustaining outcomes. The same was stressed by a researcher (Limbani et al., 2019) when advocating for the importance of process evaluation in the successful implementation of complex interventional research in public health.

4.2 Interventions

It was a challenge to design and implement effective interventions by considering the severe limitations of resources at hospitals, especially for human resources. More specifically at DH Uruthirapuram, which had the services of a single doctor, organizing the workplace and clinic schedules was challenging to manage OPD and clinic patients at the same time. There were big variations between the hospitals in gaps identified for improvement and available resources to make those changes. Therefore, the interventions were tailor-made to the local context and hybrid in origin by both the researcher

and the participants (hospital staff). Such an approach ensured the involvement and accountability of heads of hospitals and the rest of staff towards interventions. A study said that participatory research is a favourable approach to healthcare research, by improving research quality, empowerment, capacity building, sustainability, program extension, and unanticipated new activities (Jagosh et al., 2012). The information from qualitative data (KIIs and FGDs), observation (of workplace structure and processes), and quantitative data (waiting time measurement) were integrated well to generate interventions that could be effective and pragmatic (UN Aids, n.d.).

4.3 Findings

The results convincingly proved that the introduction of basic healthcare quality techniques was effective in reducing patient waiting time at both DHs. The results were confirmed with similar healthcare research elsewhere (Helbig et al., 2009)(Tan et al., 2017)(Garay et al., 2021)(Robinson et al., 2020)(Sadi et al., 2021). Being a hospital staffed by a single doctor and comparatively fewer human resources, DH Uruthirapuram had a longer waiting time than DH Tharmapuram, the hospital served by two doctors and a total workforce two times higher than DH Uruthirapuram (64.4mins and 43.9mins respectively before interventions). The waiting time recordings clearly illustrated that waiting for consultation is the major determinant of longer patient waiting in these hospitals. The single doctor station DH Uruthirapuram again registered considerably longer waiting time than DH Tharmapuram (44.9mins and 25.1mins respectively before interventions), the situation was straightforward to interpret. The phenomenon is common in outpatient care in developing countries (Oche & Adamu, 2013). These empirical data showed the obvious discrepancies between the hospitals that caused difficulties in replicating interventions. Therefore, the interventions were flexible enough to adopt the local context within the framework of guided principles (quality concepts). The waiting time at other major waiting points for OPD and clinic services was much less when compared with the overall waiting time.

The interventions were quite successful at DH Uruthirapuram in significantly reducing the waiting for consultations by 17.4 minutes ($P=0.04$) which mostly contributed to the overall waiting time reduction of 21.8 minutes ($P<0.01$). Though the reduction in waiting for consultation was not significant at DH Tharmapuram (7.4 minutes, $P=0.14$), the overall waiting time registered a significant reduction by 13 minutes ($P<0.05$), which could be attributed to the combination effect of reductions at all waiting points. Unlike other waiting points, the longer time for a consultation is a perception of better quality of services, as patients prefer doctors to spend adequate time discussing their illnesses (Amarathunge et al., 2021). Despite reductions in time spent at all waiting points the duration of consultation was almost maintained at DH Uruthirapuram and significantly increased at DH Tharmapuram (by one minute, $P=<0.01$).

4.4 Limitations

The impact of national economic crises was reflected in every aspect of social and health systems which made things difficult for planning and implementing interventions as the situation widened the scarcity of resources (Matthias & Jayasinghe, 2022). More importantly, the morale of the staff and community was down, something which was crucial in such participatory healthcare intervention (Matthias & Jayasinghe, 2022).

Though it's (before-and-after) the most pragmatic study design used in implementation-evaluation studies in healthcare intervention, the design is weaker in establishing a cause-effect relationship when compared with randomized control trials (Songer, n.d.). However, such trials sound less practical in real-time complex interventions in healthcare management. The before-and-after design was usually criticized for its ineffectiveness in minimizing the effect of temporal change, the term describes the effect of independent factors over a period of time on the outcomes of the project (Songer, n.d.). Anyhow, the project concentrated hard to minimize temporal effects due to changes in the internal and external environments of the hospital.

Chapter 5 5. Conclusion

Increased waiting time for outpatient care services at primary care institutions was among the major factors inhibiting the services utilization of Divisional Hospitals in Kilinochchi District. The situation was afraid of hindering the government initiatives to enhance universal health coverage in the district. Healthcare quality improvement techniques are proven management strategies for reducing patient waiting time in hospitals. However, the effectiveness of such interventions needs to be assessed in real-time settings to convince regional administrators to implement them in the local context.

The interventions based on the basic healthcare quality improvement techniques like; 5s, kaizen, Responsiveness, patient-centeredness, and work improvement teams (WITs) were found effective at DH Tharmapuram and DH Uruthirapuram as overall patient waiting time for outpatient services (OPD and clinic) significantly reduced.

Recommendation

The interventions proved that the quality improvement techniques applied in the project were flexible and could be modified according to local conditions. The intervention model could be appropriate to any primary care institution in the country as they have similar structures and functions.

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