

Improving STI and HIV Passive Partner Notification using the Model for Improvement: A Quality Improvement Study in Lilongwe Malawi

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Abstract

Background: In Malawi, passive partner notification is the mainstay method of partner notification (PN). Despite its wide use, the proportion of sexual partners referred for care through this method is very low. We aimed to increase the proportion of sexual partner referral through passive PN.

Methods: We implemented a quality improvement (QI) project at Bwaila STI unit in Lilongwe, Malawi between January and June 2017 using a pre- and post- intervention quasi-experimental study design. Pre-intervention, we conducted key-informant interviews and clinic observations and used the findings to design a QI project using expert opinion. The intervention included three change ideas: early start time of the clinic, shortening of the group health talk and expedited clinic flow for sexual partners. Each change idea was tested twice through 1-week long Plan-Do-Study-Act cycles using the model for improvement (MFI) and then combined and tested twice. Process data were collected and monitored using run charts. Post-intervention, we evaluated the proportion of sexual partners who presented to the clinic, to detect a 10% increase at 95% power and $\alpha=0.05$, between pre- and post-intervention periods.

Results: The average duration of the group health talk dropped from 56 minutes to 38 minutes and the duration of clinic stay for sexual partners reduced by 45 minutes (from 1 hour 36 minutes to 51 minutes). The average clinic start time improved from 09:02 hours to 08:17 hours. The proportion of sexual partner referral increased by 37% ($P=0.04$) - from 15.6% to 21.4%. We observed an upward trend in the proportion of sexual partners referred in the post-intervention period.

Conclusion: The yield of sexual partners through passive PN was improved using a simple QI intervention implemented using the MFI. However, the proportion of sexual partner referral remains suboptimal. More effort is required to increase the proportion of sexual partner referral in Malawi.

Keywords: Passive Partner Notification; STI and HIV partner referral; Quality Improvement

Introduction

Sexually Transmitted Infections (STIs) and Human Immunodeficiency Virus (HIV) have a strong association that is beyond similar sexual risk behaviour [1]. STIs are an important cofactor in HIV transmission as they increase the risk of HIV acquisition and transmission from two to eight times [1]. Together, STIs and HIV constitute a very large public health burden worldwide. In 2016, there were 36.7 million people living with HIV and 1.8 million new infections globally [2]. Each year, more than 357 million new STIs infections occur worldwide from informing sexual contacts of a patient with HIV/STI that they may be at risk [8]. While several methods of PN exist and may be effective [8,9], the World Health Organization (WHO) recommended approach for resource-limited settings is passive partner notification which is the standard of care in Malawi [10,11]. In this method, the patient is responsible for informing their partner(s) to come to the clinic for services. This method is widely used and preferred by clinicians and patients [10,12]. However, the yield of sexual partners through passive PN is generally low in most settings [8,10], resulting in 24% of sexual partners in Malawi [8].

Despite successful efforts to increase the proportion sexual partner referral through other PN methods in Malawi [8], passive PN has remained the mainstay method and the yield of sexual partners has remained low. With an aim to increase the proportion of sexual

partners referred for care by 10% through passive PN, we implemented a quality improvement (QI) intervention through use of the model for improvement in Lilongwe, Malawi.

Methods

Study design and setting

We conducted a pre- and post-intervention quasi-experimental study at Bwaila STI unit (BSU) in Lilongwe, Malawi, between January and June 2017. BSU is a specialized STI clinic under the Bwaila District Hospital, a public secondary care facility. At the time of the study, the clinic served about 80 patients per day in a busy central town area. Operational hours were from 7:30 am to 4:30 pm on weekdays. BSU was

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mainly run by 2 nurses and other support staff. The University of North Carolina Project (UNC Project) and the Lighthouse Trust conducted research activities at the clinic with one medical doctor, a clinical officer, 4 nurses and 5 HIV Testing Services (HTS) counsellors who also provided general care services in collaboration with the district hospital staff.

At BSU, patients started with registration of demographic information into the clinic register at the reception then directed to a waiting area for group health education conducted by a receptionist. The health talks included a topic on partner notification among others. Patients with a documented HIV test result were directed to the treatment rooms to receive care administered by nurses while those without were sent for HIV testing before receiving care as stipulated by the national guidelines [11]. Nurses handed out PN slips in the treatment rooms to aid the PN process. After receiving care, patients went back to the reception for final data entry for signs, symptoms, diagnoses and treatment before going home.

Study procedures and study population

The study was divided into pre-intervention, intervention and post-intervention phases.

Pre-intervention phase

In the pre-intervention phase, we conducted a record review to estimate the baseline proportion of sexual partner referral. We reviewed records of individuals, 13 years of age and above who sought STI care at BSU from June to December 2016. Individuals below 13 years were excluded as they were deemed not sexually active. We collected data from the clinic registers on age, sex, HIV status, STI syndromes, and if index case or partner and entered it into Microsoft Excel. Further, we conducted in-depth interviews with key-informants, the healthcare workers, and clinic observations on the processes involved during PN to identify health system factors that influenced passive PN at the clinic. All healthcare workers who consented were included in the interviews. Interview data were entered into NVivo version 11.0. Details of the interviews have been previously reported [13].

The investigator, data assistant and receptionist, to evaluate the PN process and the general conduct of the clinic, randomly conducted clinic observations (Table 1).

We collected data on data collection forms and entered into Microsoft Excel. The pre-intervention phase lasted 4 weeks. We used findings from the interviews and clinic observations to design a QI intervention.

An expert consultative meeting was conducted to select change ideas for the QI intervention with key stakeholders. Key stakeholders included the clinic and management staff from BSU and Bwaila district hospital, research and management staff from UNC project and Lighthouse Trust, and representatives from the STI program Malawi Ministry of Health. Suggested change ideas were voted for based on clinic needs, availability of resources and capacity, good fit, buy-in and ease of change at clinic level. We then selected a QI team from the clinic staff that consisted of the investigator, the nurse-in-charge, one HTS counsellor and the receptionist.

Intervention phase

The intervention consisted of three change ideas.

(1) Early clinic start time: Clinic start time was the time at which the group health talk, the first activity of the day, started. The target start

time was 08:00 hours.

(2) Shortened duration of the group health talk: This was the time taken to complete a health talk. The target was less than 40 minutes.

(3) Expedited sexual partner/couple visits: This was shortened duration of stay for partners and couples within the clinic. The target duration for the visits was less than 1 hour.

We implemented the intervention using the Model for Improvement (MFI) defining the aim for each change idea, set targets and selected process measures and balancing measures to ascertain improvement. We conducted two “Plan-Do-Study-Act” (PDSA) cycles for each change idea and another 2 cycles after combining all the change ideas. The PDSA cycles were conducted as follows:

Plan: For early start time, the receptionist was responsible for the health talks. A nurse or counsellor replaced the receptionist when not available. For shortened duration of the health talks, the team conducted dry runs of the health talk. The goal was to maintain content while shortening the duration. For expedited partner visits, the receptionist isolated partners by collecting PN slips after the health talks then directed partners/couples who were eligible for HIV testing to a designated partner/couple HTS counsellor. This step prevented partners/couples from queuing with the rest of the patients for HIV testing thereby expediting their visit. The counsellor then escorted partners/couples to the treatment rooms after testing. The HTS counsellor located next to the treatment rooms was selected for convenience of escorting patients. The receptionist escorted partners who had valid HIV test results directly to the treatment rooms bypassing HIV testing.

Do: For early clinic start time, we implemented the intervention starting on a Monday morning. A data assistant collected data on the start time on a daily basis. For shortened duration of the group health talks, we conducted talks as planned and monitored them. The data assistant collected data daily using the data collection forms. Expedited partner visits were conducted as planned. The receptionist randomly collected data on duration of visit for 10 patients per day using data collection forms (5 partners and 5 index cases).

Study: For all change ideas, the investigator compiled the data in Microsoft Excel and analysed it real time using run charts. The QI team met at the end of each test cycle to discuss results.

Act: Identified change actions were implemented in subsequent cycles. Finally, all three interventions were implemented concurrently and tested through another two small test cycles. The intervention phase lasted 8 weeks.

Observation	Number of observations conducted	Observer
Clinic start time	10	Data assistant Investigator
Duration of the group health talk	10	Data assistant
Waiting time to receive treatment	10	Receptionist Investigator
Proportion of patients who received a PN slip	20	Receptionist
Duration of index patients' visits	20	Receptionist
Duration of sexual partners' visits	20	Receptionist

Table 1: Details of PN and clinic flow processes observed at BSU.

Post-intervention phase

We conducted another record review similar to pre-intervention phase to identify partners who had presented to the clinic. The data assistant collected patient records and transferred them into a Microsoft Excel. Data were collected for a period of one week based on sample size.

Data analysis and sample size calculation

We used descriptive statistics such as mean, median and proportion to describe the demographic characteristics of patients who presented to the clinic for both record review periods. We estimated the pre- and post-intervention proportions of partner referral at BSU and calculated the percentage change between these periods using Stata Version 14.0. The sample size for the post-intervention phase, in order to detect a 10% difference at $\alpha=0.05$ (two-sided test) and 95% power, was 267 patients records.

The University of Witwatersrand Human Research Ethics Committee and the National Health Sciences Research Ethics committee of Malawi approved this research project.

Results

Pre-intervention phase

In the record review, we collected 1948 records and excluded 51 who were below 13 years of age making 1897 records available for analysis. The median age was 28 years (IQR: 25, 35). There were more females (1132, 59.7%) than males (763, 40.3%). The baseline sexual partner referral rate was 15.6% (Table 2). From the key-informant interviews, lack of incentives for sexual partners or couples who presented to the clinic for care was the most important health system factor that influenced the yield of partners. From the clinic observations, the average duration of the group health talks was 56 minutes and there was no difference in the time spent at the clinic between index cases and partners (1 hour 41 minutes versus 1 hour 36 minutes respectively). Detailed results from the interviews and clinic observations have been previously reported [13].

Intervention phase

Early clinic start time

The average clinic start time at the end of the first PDSA cycle was 08:46 hours. Notably, the clinic start time was closer to the target at the beginning of the week (Monday and Tuesday) but far from the target time towards the end of the week (Thursday and Friday) (Figure 1). We observed that the receptionist was ready to start the health talk on time but patients arrived late. In addition, there were more patients at the beginning of the week and less towards the end of the week. As a change action, the receptionist announced during each health talk that the start time of the clinic had changed to 08:00 hours to encourage patients to come early. After the second PDSA cycle, the clinic start time was 08:17 hours. We observed a similar pattern in start time by day of the week (Figure 1). The change action from the second test cycle was to continue encouraging patients to come early.

Shortened duration of group health talks

After the first PDSA cycle, the average duration of the health talks was 49 minutes. We observed that the duration of the talks were longer on some days (Monday and Thursday) because the talks were not consistent. The team introduced a job aide for the health talks and conducted more dry run sessions. After the second cycle, the average

duration of the health talk was 38 minutes, shortening the duration from baseline by 18 minutes (Figure 2). As a balancing measure, we monitored the waiting time for patients to receive treatment and found that the average waiting time increased from 22 minutes to 27 minutes. We observed that clinical care nurses were coming late, as a result, patients were waiting longer to receive treatment since the clinic was starting early and the duration of the talks were shorter. The nurse-in-charge motivated the rest of the nurses to come early.

Expedited partner/couple visits

The weekly average duration after the first test cycle was 54 minutes. We observed that it was relatively easier to expedite patients on days when there were fewer patient numbers (Wednesday) (Figure 3). The change action was that the research nurses, who were part of the overall clinic staffing but saw general patients occasionally, were going to help with providing clinical care on busy days to ease the pressure of work. After cycle two, the average duration of partner visit was 51 minutes (Figure 3). As a balancing measure, we randomly observed 25 index cases for their duration of visits. We found that the index patients visit duration dropped from 1 hour 41 minutes to 1 hour 13 minutes. The QI team continued reinforcing expedited partner visits and commended the team for their efforts.

Combined intervention

The average proportion of sexual partners was 19.9% for cycle one and 20.2% for cycle two. The proportion ranged from around 19% to 22%. There were no new learning points so the QI team continued to reinforce all the change actions from the individual PDSA cycles.

Post-intervention Phase

We collected data from 278 patients in the post-intervention period

Characteristic	Total (n=1897)	Index 1602 (84.4%)	Partner 295 (15.6%)	P-Value	
Age (years)	28	27	30	*P<0.001	
Median (IQR)	(23, 35)	(23, 35)	(24,37)		
Sex n (%)	Male			**P<0.001	
	763 (40.3)	607 (79.5)	156 (20.5)		
Female					
HIV status n (%)	1132 (59.7)	994 (87.8)	138 (12.2)	**P=0.345	
	Positive				
	194 (10.2)	169 (87.1)	25 (12.9)		
Diagnosis	Negative			n (%)	
	1673 (88.2)	1409 (84.2)	264 (15.8)		
	Index Male	n (%)	Index Female		n (%)
	Genito-ulcer disease	108 (18.9)	Genito-ulcer disease		34 (4.2)
	Urethral discharge	375 (65.5)	Low risk abnormal vaginal discharge		72 (8.9)
	Scrotal Swelling	17 (3.0)	High risk abnormal vaginal discharge		370 (45.5)
	Balanitis	21 (3.7)	Lower abdominal pain		282 (34.7)
	Bubo	16 (2.8)	Bubo		2 (0.2)
Genital warts	8 (1.4)	Genital Warts	21 (2.6)		

Note: *Wilcoxon rank sum test, **Chi-squared test, There were 147 patients with more than one STI syndrome.

Table 2: Pre-intervention demographic characteristics of patients attending Bwaila STI Unit from June 2016 to December 2016.

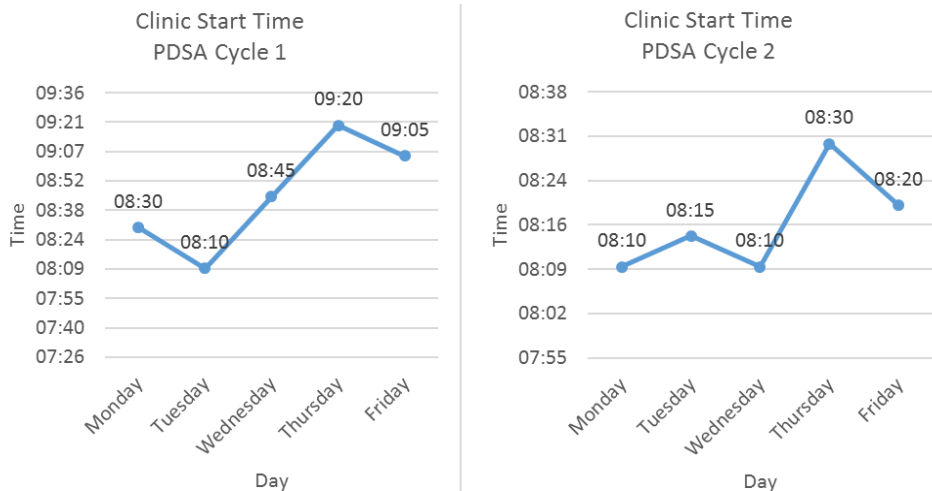


Figure 1: Trends of clinic start time at Bwala STI unit during the intervention phase.

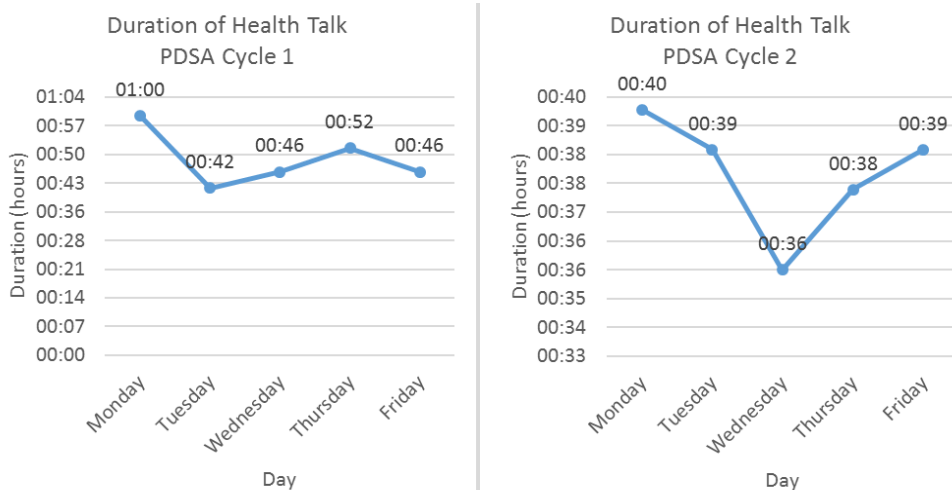


Figure 2: Trends in the average duration of group health talks at BSU during the intervention phase.

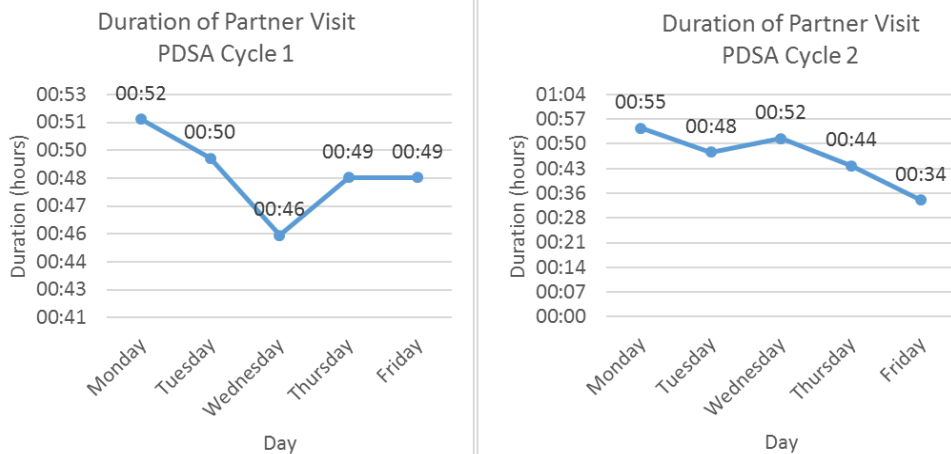


Figure 3: Trends in the average duration of sexual partner visits at BSU during the intervention phase.

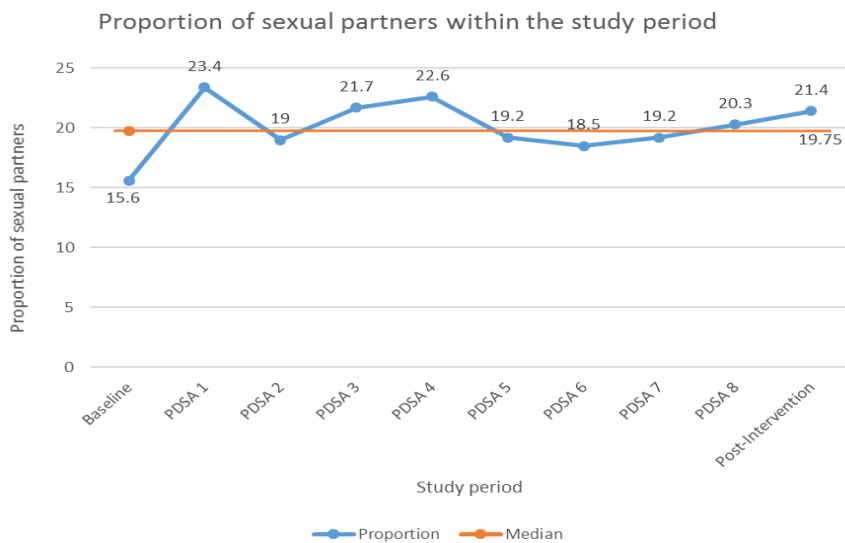


Figure 4: Trend of proportion of returning sexual partners at BSU.

and excluded data for 11 individuals who were below 13 years leaving 267 patient records available for analysis. The median age was 29 years (IQR; 24, 35) and 56% were female (Table 3). The pre- and post-intervention populations had similar demographic characteristics. The proportion of sexual partners who presented to BSU increased from 15.6% to 21.4% representing a 37% increase (P=0.040). There was an upward trend with more than five consecutive data points reflecting an increasing trend that was indicative of a non-random signal of improvement in the proportion of sexual partners (Figure 4).

Discussion

In our attempt to use a quality improvement method to improve the yield of sexual partners through passive partner notification, we demonstrated that it is possible to increase the proportion of sexual partner referral with a simple intervention implemented using the MFI at a dynamic specialized STI clinic in Malawi. We used local data from key-informant interviews and clinic observations to identify health system factors that influenced sexual partner referral and used local expert opinion to design a feasible, sustainable and setting-specific intervention.

This is the first study to attempt the use a QI method to improve the sexual partner yield of passive PN in developing countries. The proportion of partners reporting back for care through passive PN in developing countries is generally low ranging from 20% to 34% [14]. The proportion of partner referral of 21.4% in our study falls within this range and is comparable to an earlier study conducted in Lilongwe, Malawi of 24% [8]. However, despite the fact that we increased the proportion of sexual partner referral by 37%, when compared to other methods of PN, the yield in our study is low. Contract and provider PN yielded about twice as many sexual partners in a previous study in Lilongwe, Malawi [8].

We used local data and expertise to develop the QI intervention. We believe this resulted in a feasible and sustainable tailor-designed intervention for BSU. This approach brought a sense of ownership of the intervention that was pivotal to the success of the intervention. Use of local data and experts has been associated with successful interventions in other studies [15-17]. For instance, researchers in Ghana used hospital-level data, senior managers, regional and district

Characteristic	Total (n=267)	Index 210 (78.7%)	Partner 57 (21.4%)	P-Value
Age (years)	29	29	30	*P=0.738
Median (IQR)	(24, 35)	(24, 35)	(24,35)	
Sex n (%)	Male			**P=0.444
	117 (43.8)	93 (79.5)	24 (20.5)	
	Female			
HIV status n (%)	150 (56.2)	994 (87.8)	33 (22.0)	**P=0.345
	Positive			
	9 (3.4%)	5 (2.4)	4 (12.9)	
Diagnosis n (%)	Negative			n=117
	258 (96.6)	1409 (84.2)	264 (15.8)	
	Index Male n=93 Index Female n=117			
Diagnosis n (%)	Genito-ulcer disease	32 (34.4)	Genito-ulcer disease	8 (6.8)
	Urethral discharge	53 (57.0)	Low risk abnormal vaginal discharge	16 (13.7)
	Scrotal Swelling	2 (2.2)	High risk abnormal vaginal discharge	49 (41.8)
	Balanitis	5 (5.4)	Lower abdominal pain	41 (35.0)
	Bubo	2 (2.2)	Bubo	0 (0.0)
	Genital warts	0 (0.0)	Genital Warts	4 (3.4)

Table 3: Post-intervention demographic characteristics of patients at Bwaila STI Unit May 2017.

*Wilcoxon rank sum test, **Chi-squared test, There were 28 patients had a missing diagnosis.

health management members and frontline providers, among others, to implement the “Project Fives Alive” intervention successfully [17]. In addition, the QI team was very instrumental in our study. The team worked together with the rest of the clinic staff to encourage them towards achieving our goal without any additional compensation. The QI team had representation from different cadres within BSU ranging from managers to frontline workers. This made everyone play an important role in the implementation and success of the intervention. Similar benefits of using QI teams have also been reported by other authors [15,17,18].

Our intervention included change ideas selected by local experts based on clinic needs, availability of resources and capacity, good fit,

buy-in and ease of change at clinic level. The experts felt that the late start of clinic activities compromised the clinic's efficiency in providing services due to congestion of patients and work overload. In addition, the long duration of the health talks worsened the lack of efficiency. Finally, experts felt that the lack of incentives for sexual partners and couples reporting to the clinic was the most important factor that influenced PN. Expert consultation is critical to successful implementation of programs or interventions [19]. Among other functions, expert consultation can be used for planning interventions, problem-solving of implementation barriers, creation of favourable implementation climate and planning for sustainability of interventions/programs [19]. Our team used expert opinion to plan the intervention, create a favourable implementation climate and ensure sustainability by engaging and obtaining buy-in from all key stakeholders including providers.

We included expedited partner visits as one of the change ideas to incentivize sexual partners and couples. Incentives play a major role in the healthcare. Incentives have been used by many researchers and program implementers to improve outcomes [20-24]. Conditional or unconditional, monetary or non-monetary incentives have led to increased contact notification [25], increased HIV testing [20], increased retention in HIV care [24], increased condom use and safe sex behaviour, and reduced unwanted pregnancies and HIV acquisition [22]. Experts perceived expeditious partner visits as the best non-monetary incentive for sexual partners/couples. Further, there was a reduction in the average duration of index patient visits by 28 minutes because of the expedited partner visits.

In our intervention, we used pre-existing resources to improve the PN process. Resources included time, staff and infrastructure/space. By restructuring processes and redirecting the available resources, we managed to improve the efficiency of the clinic resulting in an increased yield of sexual partners. Improving the clinic's efficiency reduced wastage of resources within the clinic - an approach defined as "lean methodology" in QI field [26]. Removing wastage in health systems helps to channel resources to other areas where they are of more value [26]. In this study, we eliminated wastage of time, space and human resource by starting the clinic early, shortening duration of health talks and visits and redirecting the flow of sexual partners. Similarly, researchers in Canada eliminated waste by assigning specific nurses and redirecting the flow of non-urgent patients in the emergency room, which led to a reduction in the duration hospital visits [15].

The merit of this study is that, to our knowledge, this is the first research to attempt improving the yield of sexual partners for passive PN through use of a QI method. We believe that the results will help inform researchers and policy makers on the role of QI methods in PN. Secondly, the QI method used in this study may be easily adopted in any other clinical setting making our results likely generalizable to other hospital settings. The study had a few limitations. First, the short duration of the study, especially the post-intervention period, may have affected the outcome of our intervention as it did not allow the intervention to mature. Second, the stigma and discrimination associated with STI clinic may have discouraged partners from presenting to the specialized STI clinic reducing the sexual partner referral proportion. Third, BSU largely catered for busy small-scale business people some who did not stay in Lilongwe. These people may have been involved in short-term casual relationships making it difficult for them to trace their sexual partners. Lastly, due to the busy clinic, some partners may have reported to other clinics to avoid long queues making the proportion of partner referral low.

Conclusion

In conclusion, we demonstrated an increase in the proportion of sexual partner referral for passive partner notification, using locally developed, sustainable and easily adoptable solutions implemented using the model for improvement, at a dynamic specialized STI clinic in Malawi. However, despite the success of the intervention, the proportion of sexual partner referral through passive partner notification remains low in Malawi suggesting further improvements are required. Improved partner notification through QI research may lead to more opportunity for screening, early detection, treatment and prevention of transmission of STIs and HIV. With early detection of HIV, more people can start treatment early (test and treat) thereby preventing further transmission of HIV (treatment as prevention) and contributing to the 90-90-90 targets. We recommend future research to evaluate impact of such intervention in other clinic settings, to evaluate the long-term impact of such an intervention, the potential for scalability, the cost-effectiveness and other implementation science strategies for further improvement.

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