IJPP INTERNATIONAL JOURNAL OF Pharmacy Practice

ROYAL PHARMACEUTICAL SOCIETY

IJPP
International Journal of
Pharmacy Practice

Research Paper

International Journal of Pharmacy Practice 2016, 24, pp. 358–366

The Revolving Fund Pharmacy Model: backing up the Ministry of Health supply chain in western Kenya

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Keywords
access to medicines; essential medicines; pharmacy; Sub-Saharan Africa

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Received November 21, 2014
Accepted January 7, 2016

doi: 10.1111/ijpp.12254

Abstract

Objectives A pressing challenge in low and middle-income countries (LMIC) is inadequate access to essential medicines, especially for chronic diseases. The Revolving Fund Pharmacy (RFP) model is an initiative to provide high-quality medications consistently to patients, using revenues generated from the sale of medications to sustainably resupply medications. This article describes the utilization of RFPs developed by the Academic Model Providing Access to Healthcare (AMPATH) with the aim of stimulating the implementation of similar models elsewhere to ensure sustainable access to quality and affordable medications in similar LMIC settings.

Methods The service evaluation of three pilot RFPs started between April 2011 and January 2012 in select government facilities is described. The evaluation assessed cross-sectional availability of essential medicines before and after implementation of the RFPs, number of patient encounters and the impact of community awareness activities.

Findings Availability of essential medicines in the three pilot RFPs increased from 40%, 36% and <10% to 90%, 94% and 91% respectively. After the first year of operation, the pilot RFPs had a total of 33 714 patient encounters. As of February 2014, almost 3 years after starting up the first RFP, the RFPs had a total of 115 991 patient encounters. In the Eldoret RFP, community awareness activities led to a 51% increase in sales.

Conclusions With proper oversight and stakeholder involvement, this model is a potential solution to improve availability of essential medicines in LMICs. These pilots exemplify the feasibility of implementing and scaling up this model in other locations.

Introduction

A pressing challenge in low- and middle-income countries is inadequate access to essential medicines and medical supplies. The United Nations Development Program (UNDP) through target 5 of Millennium Development Goal 8, recognizes the importance of increasing the availability of affordable medicines for the world's poor. UNDP aims to reduce poverty by 50% by the year 2015, and one indicator of this initiative is the proportion of the population with access to affordable, essential drugs on a sustainable basis.[1,2] In 2008, the World Health Organization (WHO) resolved to improve the delivery of and access to all health products and medical devices by working toward overcoming barriers to access.[3,4] In an effort to provide greater guidance to developing world health systems, the WHO has created a list of minimum medicine needs for a basic healthcare system (the Model List of Essential Medicines). It includes the most clinically effective and cost-effective medicines for priority conditions.[5]

One method for overcoming the barriers to access to essential medicines is the revolving drug fund (RDF). The RDF concept was first introduced in Sub-Saharan Africa (SSA) in the 1980s through the Bamako Initiative, as a strategy to increase the availability of essential medicines in the region.[6] In the RDF model, an initial stock of essential medicines is obtained through donations or purchase. The medicines are then sold at a markup, which is sufficient to replenish the stock and ensure self-sustainability, but small enough to ensure that the medicines remain affordable to those who need them.[6–8]

While early implementation of the RDF approach had various failings and criticisms, analysis of its impact on the availability of essential drugs in primary healthcare facilities in south-east Nigeria by Uzochukwu *et al.* shows better availability both in number and in average drug stock in Bamako Initiative health facilities compared to the non-Bamako Initiative health facilities.[9,10] However, many of these initiatives have since disappeared due to lack of political will or waning support from the community.[11]

More than three decades later, despite demonstrating great improvements in the availability of HIV medicines throughout SSA, access to other essential medications within the public sector remains a largely unmet need within most settings.[3]

In Kenya, the Ministry of Health (MOH) through the Kenya Medical Supplies Agency (KEMSA) is in charge of supplying government healthcare facilities with medications. Every government health facility has a pharmacy that is stocked with medicines supplied by KEMSA that patients can access at low costs. However, availability of essential medicines within pharmacies in public facilities can be challenging. A 2009 MOH survey on access to essential medicines in Kenya reported a median availability of 67% of essential medicines in government health facilities. The survey further reported that medicines in government health facilities were out-of-stock for a median duration of 46 days in a year, with 14% of facilities experiencing durations that were greater than 90 days.[12] This presents a great challenge to patients who often resort to going without the medications or buying them from private commercial pharmacies when they are unavailable in public facilities. This is concerning considering that private pharmacies are usually more expensive (Table 1), harder to access and of indeterminate quality. A 2005 survey by the National Quality Control Laboratory and the Pharmacy and Poisons Board of Kenya found that 30% of medications primarily in the Kenyan private market were substandard.[13]

In response to these challenges, the Academic Model Providing Access to Healthcare (AMPATH) has implemented Revolving Fund Pharmacies (RFPs) in western Kenya. The United States Agency for International Development (USAID)-AMPATH Partnership, in cooperation with the MOH, delivers community- and facility-based healthcare services to a population of more than 3.5 million persons in western Kenya. It is one of the largest and most comprehensive HIV/AIDS care programmes in SSA and is rapidly expanding its focus to incorporate primary healthcare, chronic disease management and other aspects of health. In its vast western Kenyan catchment area, AMPATH delivers HIV care and treatment services to >150 000 ever enrolled HIV-infected persons through 65 MOH facilities.[14] AMPATH, in collaboration with stakeholders from the MOH and local communities, has been implementing the RFP model at several of its sites, while providing appropriate controls in order to ensure success and sustainability. This model is aimed at ensuring that all patients and particularly those with chronic diseases have access to a continuous supply of essential medicines.

Table 1 Comparison of select medication costs per tablet for Private* versus Revolving Fund Pharmacies (RFP)

	Private (USD) per tablet	RFP (USD) per tablet	Percent increase in price in private sector versus RFP
Antibiotics			
Amoxicillin/clavulanic acid 625 mg	$0.56	$0.24	133%
Azithromycin 500 mg	$1.18	$0.47	151%
Amoxicillin 500 mg	$0.06	$0.05	20%
Ciprofloxacin 500 mg	$0.12	$0.07	71%
Anti-diabetic			
Metformin 500 mg	$0.08	$0.04	100%
Glibenclamide 5 mg	$0.04	$0.02	100%
Anti-hypertensives			
Hydrochlorothiazide 50 mg	$0.02	$0.01	100%
Nifedipine Delayed Release 20 mg	$0.05	$0.02	150%
Carvedilol 6.25 mg	$0.35	$0.06	483%
Enalapril 10 mg	$0.12	$0.05	140%
Analgesics			
Acetaminophen 500 mg	$0.01	$0.01	0%
Ibuprofen 200 mg	$0.01	$0.01	0%
Gastrointestinal Medications			
Omeprazole 20 mg	$0.09	$0.04	125%
Ranitidine 150 mg	$0.05	$0.04	25%
Average Percentage Increase in Price in Private Sector			114%

*Prices at private pharmacies were collected by visiting commercial pharmacies in Eldoret, Kenya. The prices were converted to US dollars (Exchange Rate used: 80 KES = 1 USD).

Development of a revolving fund pharmacy–the process

Guiding principles for RFP

Based on the unique healthcare system dynamics found in western Kenya, we have developed RFPs around the principles seen in Table 2, which has led us to the implementation dynamics also seen in Figure 1. The RFPs, which are typically located within public health facilities but are distinct in operation from the government pharmacies, serve as a backup source of medications when they are not available at the government pharmacies. Figure 1 illustrates the perpetual revolving nature of our activities and the basic dynamics, which have ensured the sustainability of the RFP.

Revolving fund pharmacies are typically initiated in a stepwise fashion with the process starting with a thorough needs assessment of the medication availability, supply chain issues, staffing and security issues at each site.

Table 2 Guiding principles built in to the design of the RFP model and their implication on implementation

Principle	Explanation	Implementation
Access, not profit	RFPs operate in an access-maximization model where patients should not be denied life-saving medications. Instead of a profit-maximization model, we promote an access maximization model	A waiver system has been established to identify patients who are genuinely unable to pay the subsidized price. The profits from paying patients is high enough to cater for fee waivers
Shared ownership	All relevant local and international stakeholders must be incorporated into the development.	AMPATH has developed the RFP model in direct partnership with the Kenyan Ministry of Health, local communities, and funding partners
Secondary source of medications	MOH pharmacy must remain the primary source of supplies and medications for patients to avoid absolving the Ministry of Health of their responsibility in providing medications to patients. This is a crucial element to maintaining a healthy partnership.	The RFP charges a price that is generally higher than the MOH to ensure patients will preferentially access MOH medications whenever available. The RFP also has the flexibility to expand the formulary beyond the MOH to adjust to patient needs. In order to properly forecast needs, the RFP performs an initial and follow-up needs assessment of MOH medication availability, staffing requirements, space, and security needs to continuously maintain high quality service delivery in each area where RFPs are established.
Sustainable	With the desire to maximize access over the long term, pharmacy operations must be designed to be sustainable to ensure patients have continued access to medications.	In addition to the price markup, we have streamlined our operations and try to engage the efforts of already employed government staff whenever possible to minimize costs. We also invest in contextualized awareness activities
Accountability	Since money is being collected with every transaction, all operations must be held to the highest standards to avoid wastage or fraud. Stock takes and detailed reporting are required to account for inventory and dispensing, cash transactions and totals, the number of fee waivers, and drug availability.	RFP's are audited on a weekly basis during the first 1–2 months of operation. As facilities demonstrate increased capacity and reliable functionality, in-person auditing is reduced to a monthly or bi-monthly basis with reports being provided to the management committee and all relevant stakeholders on a monthly or quarterly basis as desired.
Distinct operation	RFPs must have the ability to operate in a semi-independent manner to ensure they are able to remain flexible and responsive to patient needs without being restricted to the bureaucratic limitations often found in governmental healthcare systems	The operation of the RFP is distinct from the MOH pharmacy to ensure separation of stocks, records and cash. The RFP is located in a different area in the facility, has unique receipts, and its own bank account all under the management of a committee comprised of the different stakeholders.
Facilitated drug procurement	There are many inefficiencies and potential points of diversion within medication supply chains in LMIC settings. Developing internal supply chain capacity is crucial to meeting the constantly changing needs of RFPs.	The AMPATH pharmacy team facilitates drug procurement to ensure efficient drug resupply, quality medication and access to good prices. The drugs are stored centrally at the warehouse located at AMPATH and subsequently supplied to RFPs as needed, based on a standard ordering system that is consistent with the governmental procedures for commodity management.

AMPATH, Academic Model Providing Access to Healthcare; LMIC, low and middle-income countries; MOH, ministry of Health; RFP, revolving fund pharmacy.

Equipped with this data and clear documentation of the needs, relevant stakeholders are then engaged, which typically includes the MOH Facility Management Team, the AMPATH RFP team, and members of the local community. This emphasis on engagement then informs the daily operations as we work together to define the optimal workflow and patient flow dynamics in each setting. During these meetings, we establish a memorandum of understanding to govern the operations. This describes the staffing arrangements and pricing structure to ensure the RFP does not compete with MOH pharmacy infrastructure. Because of this dynamic, the RFP pharmacies charge slightly more than the government pharmacy as seen in Figures 1 and 2. In an effort to reduce operating costs, any available government staff who are appropriately trained are utilized within this model. As RFP patient volumes and subsequent revenue continues to grow, additional staff are hired from these funds to ensure a high level of quality is provided with minimal wait times. This typically includes hiring a cashier to ensure all cash collections maintain the highest level of integrity to prevent any misappropriation of funds. After agreeing upon these foundational aspects, we purchase an initial 3-month supply of medications to seed the pharmacies by utilizing funds from donors or profits from other RFPs. As these basic underlying dynamics are established, a management committee is appointed to provide oversight of the pharmacy and ensure that regular audits are performed and reports are disseminated.

The novelty of this service also necessitates investment on community awareness. To meet this need, we have hired peer educators to directly inform patients of the various facets of the RFP at the clinics where they are available and also within the community by holding village meetings called 'barazas' where community members commonly gather.

The objective of this paper is to describe the utilization of the RFP model within the AMPATH catchment area. It is hoped that the description can stimulate the implementation of such models elsewhere with the aim of ensuring sustainable access to quality medications in low and middle-income countries (LMICs).

Methods

This paper describes the service evaluation of pilot RFPs started between April 2011 and January 2012 within our catchment area of western Kenya. Between one to 3 months prior to the implementation of RFPs through this project, a cross-sectional availability assessment of 75 essential medications that the Kenyan MOH is responsible for supplying to facilities was performed at potential implementation sites. This evaluation was performed to generate a rough estimation of the needs of the potential implementation site facilities and to project the quantities of different medications needed to provide comprehensive care beyond HIV. The assessment analysed infrastructural needs and staffing needs in addition to a focused assessment of medication availability. This paper focuses on the findings related to medication availability. The medication assessment was performed by sending out experienced auditors (typically pharmaceutical technologists with good

Figure 1 Dynamics of revolving fund pharmacy.

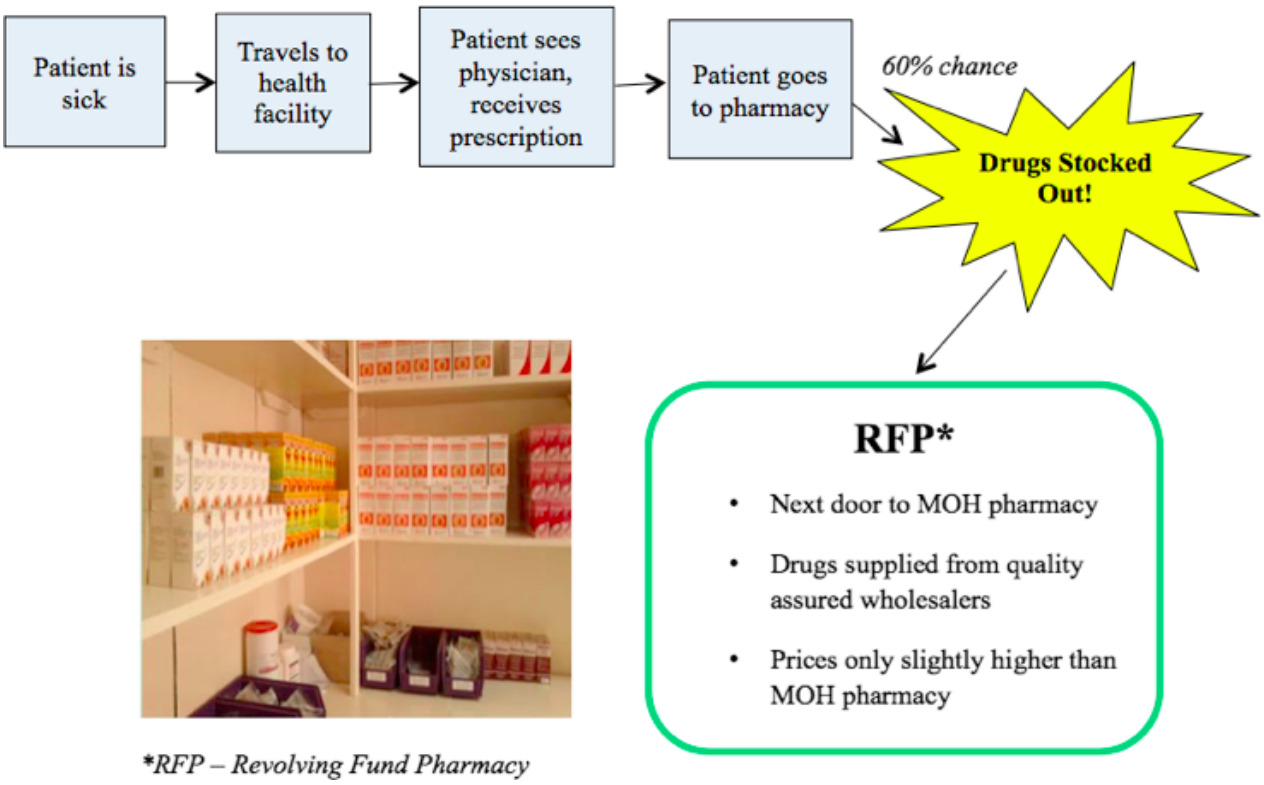

Figure 2 Patient flow in public sector medication acquisition and the role of revolving fund pharmacies.

knowledge of medicines) to the facilities who compared the list of medications that are supposed to be kept within each facility to the actual stocks of medications of that facility. The percentage availability was then calculated by dividing the number of medications available by the total number of medications that are supposed to be stocked at each facility. The availability on the day of the evaluation was then reported as the availability for that facility. We also captured anecdotal information from pharmacy staff at the facilities on the perceived trends of availability of medications for the RFP team's own projections; however, this qualitative information is not reported here.

Three initial implementation sites were selected for implementation of the RFPs based primarily on the facilities' ability to provide space and staff, and the joint desire among the stakeholders to expand care access beyond HIV in these settings. These three health facilities included Mosoriot Health Centre, Turbo Health Centre and Eldoret HIV clinic based at Moi Teaching and Referral Hospital (MTRH). Mosoriot and Turbo Health Centres are both located in rural areas serving a catchment population of 49 095 and 208 583, respectively, based on 2009 census data. The Eldoret RFP is situated in a semiurban setting with a population of roughly 252 061 people.[15]

In order to provide a descriptive assessment of the utilization of the RFPs and the number of patients served, audit reports and prescription data were used to evaluate the types of medications dispensed and the change in patient volumes. Auditing activities include a physical stock take, reconciliation of all cash collections with medication dispensing to determine the sales and profits, if any, for the period, and prescription tracking to determine the number of patient encounters. RFP staff also tracked this information at specific time points to identify the impact of the community awareness activities through peer educators. However, during the pilot phase, the peer educators were only introduced at the Eldoret RFP and so the impact of community awareness activities was only assessed for the Eldoret RFP. The typical frequency for performing all of these evaluations depends on the maturation process for each RFP with the three RFPs included in this assessment starting with assessments on a weekly basis for the first 1–2 months, then every 2 weeks for the next 2 months, and then graduating to a monthly or bimonthly review. The frequency of review also depends on the stock availability and frequency of delivery as we simultaneously review facilities as we deliver additional stocks to reduce transportation costs.

Ethics approval for the evaluation was obtained from the Institutional Review and Ethics Committee (IREC) at MTRH and Moi University College of Health Sciences.

Results

During the period of evaluation, three pilot RFP sites were started with formal agreements established with the management of the overarching facilities.

For the selected sites, the initial cross-sectional availability of medications in Mosoriot health centre was 40%, while Turbo health centre was 36%.[16] Moi Teaching Referral Hospital in Eldoret houses an outpatient HIV clinic that previously only stocked non-HIV medications when they were donated, so their availability was less than 10%.

Within each of the RFPs, the number of patient encounters had rapidly grown over the period of assessment as seen in Figure 3. In the first quarter of operations, the lowest volume RFP had an average number of 89 patient encounters each week. However, by the fourth quarter of evaluation, the RFPs each had an average of over 200 patient encounters per week. During 1 year of evaluation, the three sites had a combined total of 33 714 patient encounters. Since many patients typically receive a prescription for more than one drug, the number of medications supplied is far more than this total, with the same patients likely returning for refills. As of February 2014, the first three RFPs have had a total of 115 991 patient encounters, with an average of 21%, 25% and 39% of total sales being attributable to chronic disease medicines in the Mosoriot Health Centre, Turbo Health Centre and Eldoret HIV clinic RFPs respectively. After about 4 months of standard operation in the Eldoret RFP, we introduced the peer educator advocacy model to increase awareness of the availability of the RFP services. Through the separate analysis performed on the impact of this modality of promotion, a 51% increase in sales was observed after having peer educators describe the RFP model to patients in the waiting areas as seen in Figure 4. This advocacy model was then introduced in all RFP sites as part of the standard operating model because of the pronounced impact on utilization of RFP services.

In February 2014, nearly 3 years after starting the first RFP, a cross-sectional analysis revealed that Mosoriot Health Centre's availability was 90%, Turbo Health Centre's was 94% and the Eldoret HIV clinic's was 91%. All three facilities have demonstrated profitable operations after 1 year of operation and have only had to provide a waiver for services for less than 2% of patients served. All RFPs are still in operation and continue to enjoy an outpouring of support from the communities and facilities where they operate.

Discussion

The findings of this study suggest that the RFP model can substantially and sustainably increase medication availability and utilization in LMIC settings. This is especially important as healthcare systems within these settings grapple with the dual burden of diseases attributed to communicable and non-communicable diseases.

One of the key strengths of this investigation is that it provides unique insight into the dynamics and feasi-

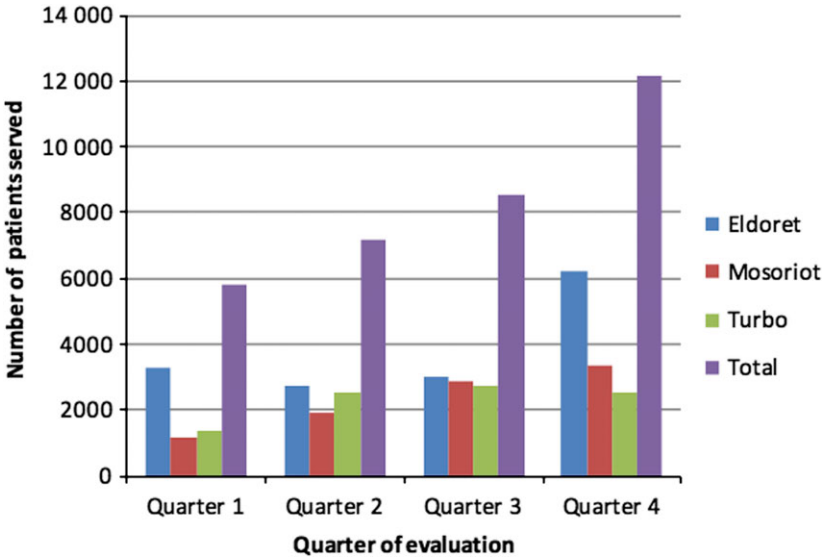

Figure 3 Trend of patient utilization of the revolving fund pharmacies over the first year of operation in three sites.

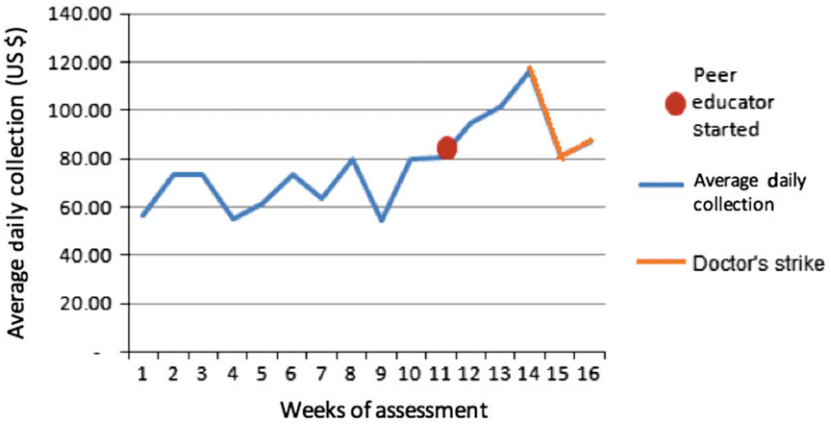

Figure 4 Impact of peer educator on average daily collection.

bility of addressing the marked deficiencies in supply chains seen in LMICs. There are limited practical evaluations describing the factors required for the contextualized implementation of pharmacy services in LMIC settings.

The rapid increase in utilization of the RFPs illustrates the dramatic increase in public sector facility utilization that can occur when supply chain issues are addressed. While the data are not sufficient to determine the precise reason for this growth pattern, it is likely related to multiple factors including the MOH's continued struggle in ensuring a reliable supply of medicines, the patients' growing awareness and acceptance of the RFP, increased trust in facilities, and expansion of care to include chronic diseases. The emphasis on involving the local community is also likely to have contributed to the increase in patient numbers. In addition, the use of peer educators to provide targeted education to the community appeared to have had an impact on the increase in patient numbers. Because of the dramatic impact of this service in the Eldoret RFP, peer educators have been introduced as a standard component of the process for initiating and informing the community of new RFPs.

Lack of medicines is costly to the health of patients and detrimental to generating demand among patients to obtain care for chronic diseases. In the ecosystem of MOH facilities, it can sometimes take months until the medications are available countrywide. This dynamic often results in patients typically deciding to forego the transportation costs associated with going to clinic and deciding not to rely on public sector facilities for their health care needs. Because of the immense resource constraints in this setting, this leads to excess morbidity and mortality, as the majority of people do not have the funds available to receive care in the private sector.

One of the key limitations of this analysis is the utilization of a health service evaluation approach. While it does not provide the definitive assessment of impact that a randomized control trial would offer, it does provide insight on the real world application of a sustainable model for improving medication availability. Another limitation is the utilization of a cross-sectional analysis for estimating the availability of medications prior to the implementation of the RFP. While it only provides a limited snapshot of medication availability, the anecdotal comments of the staff received during the evaluation are consistent with the unacceptably low availability found during the evaluation.

In addition to the many positive experiences described with the RFP, several challenges have been faced in the process of implementing the RFPs. Because each RFP serves as a backup when the MOH pharmacy runs out of medicines, the need for specific medications is highly variable and forecasting medication supply needs was initially a challenge in the absence of appropriate data. Compounding this challenge, in 2012, Kenya struggled with multiple nationwide doctors' and nurses' strikes, which considerably decreased utilization. This made it difficult to accurately predict the medication consumption.

Despite these challenges and limitations, the early experience with the RFP initiative has been successful by the different metrics described in this paper. It has been able to improve access to essential medicines as did similar models implemented in west Africa through the Bamako initiative.[9,10] Although some of these RDF initiatives are no longer in existence due to lack of political will to keep them running, it is hoped that the AMPATH RFP model will be sustainable in the long run largely because of its tripartite management structure that has a strong community ownership component.[11]

The success of the RFP model has helped support the broad expansion of the underlying principles of this model. AMPATH is now using this infrastructure to support the provision of essential laboratory services based

on the same model, with two sites carrying point of care laboratory supplies in their RFP. Laboratory infrastructure includes reagents needed for the improvement of the overarching government healthcare system, but has a specific emphasis on tests needed for chronic diseases. This includes a basic metabolic panel, point of care glucose test strips and pregnancy tests.

Following the success of the pilot sites, the model has been scaled up to include nine other sites in 2013 and 2014, and another eight RFPs are projected to be implemented by the end of 2015. The RFP model has also been implemented at a smaller scale for chronic disease medications in over 30 village dispensaries within the AMPATH catchment area and has been able to sustainably avail these medications closer to the people who need them. It is hoped that the RFP model will be scaled throughout western Kenya with subsequent implementation throughout the rest of Kenya.

Conclusion

The success of AMPATH's RFP model has led to thousands of patients in both rural and urban settings gaining access to essential medicines through a backup of the MOH pharmacies. These patients would have been forced to pay substantially higher amounts at commercial pharmacies or, more likely, go without medication.

By building relationships with public healthcare facilities and communities, and developing a carefully thought out implementation model and monitoring system, revolving fund pharmacies can improve medication access for populations in LMICs. With the growing burden of chronic diseases throughout Kenya, the RFP represents a viable solution for ensuring public sector facilities can sustainably provide medications to prevent the inevitable morbidity and mortality anticipated from chronic diseases in the coming years.

Declaration

Conflict of interest

The Author(s) declare that they have no conflicts of interest to disclose except Sonak D Pastakia has received fees for serving as a speaker and consultant for Abbott within the last 3 years.

Funding

This research received no specific grant from any funding agency in the public, commercial or not-for-profit sectors.

Author's contributions

Imran Manji is the Project lead and primary author; he contributed to conceiving and implementing the idea and coordinated all aspects of manuscript development. Simon Manyara is the Project coordinator; he contributed to implementation of the idea as well as writing and reviewing of the manuscript. Beatrice Jakait is the Associate Program Manager for Pharmacy Operations; contributed to reviewing the manuscript. William Ogallo, Isabel C. Hagedorn and Stephanie Lukas were Global Health Pharmacy Residents at the time the manuscript was being developed; they contributed to generating the first drafts of the manuscript. Eunice J. Kosgei is the lead pharmaceutical technologist for the project; she was involved in the implementation of the idea and contributed to reviewing the manuscript. Sonak D. Pastakia is an Associate Professor, Purdue University College of Pharmacy; he contributed to conceiving and implementing the idea and reviewing the manuscript. Ethics approval to carry out this study was obtained from the Moi University and MTRH IREC, Eldoret, Kenya (Ref: IREC 000993).

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