Engaging the Entire Care Cascade in Western Kenya

A Model to Achieve the Cardiovascular Disease Secondary Prevention Roadmap Goals

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Cardiovascular disease (CVD) is the leading cause of death in the world, with a substantial health and economic burden confronted by low- and middle-income countries. In low-income countries such as Kenya, there exists a double burden of communicable and noncommunicable diseases, and the CVD profile includes many nonatherosclerotic entities. Socio-politico-economic realities present challenges to CVD prevention in Kenya, including poverty, low national spending on health, significant out-of-pocket health expenditures, and limited outpatient health insurance. In addition, the health infrastructure is characterized by insufficient human resources for health, medication stock-outs, and lack of facilities and equipment. Within this socio-politico-economic reality, contextually appropriate programs for CVD prevention need to be developed. We describe our experience from western Kenya, where we have engaged the entire care cascade across all levels of the health system, in order to improve access to high-quality, comprehensive, coordinated, and sustainable care for CVD and CVD risk factors. We report on several initiatives: 1) population-wide screening for hypertension and diabetes; 2) engagement of community resources and governance structures; 3) geographic decentralization of care services; 4) task redistribution to more efficiently use of available human resources for health; 5) ensuring a consistent supply of essential medicines; 6) improving physical infrastructure of rural health facilities; 7) developing an integrated health record; and 8) mobile health (mHealth) initiatives to provide clinical decision support and record-keeping functions. Although several challenges remain, there currently exists a critical window of opportunity to establish systems of care and prevention that can alter the trajectory of CVD in low-resource settings.

Cardiovascular disease (CVD) is the leading cause of mortality in the world, with 80% of CVD deaths occurring in low- and middle-income countries [1,2]. In sub-Saharan Africa, CVD is the leading cause of death among individuals over age 30 years [3]. In addition to the epidemiologic burden, CVD threatens to impose a significant economic burden on low- and middle-income countries [4-6]. Whereas atherosclerotic CVD (particularly stroke) [7] and CVD risk factors (particularly hypertension) [8] are increasing in Kenya, nonatherosclerotic CVD remains significant in Kenya, including rheumatic heart disease, heart failure, and household air pollution—related CVD [9,10]. In addition, the country continues to confront a "double burden" of disease, including a significant burden of human immunodeficiency virus and other communicable diseases (Figure 1) [11], representing the evolution of the epidemiologic transition in this country.

SOCIO-POLITICO-ECONOMIC REALITIES

Kenya is designated as a low-income country by the World Bank [12], and the average daily income for a substantial proportion of its population is <U.S. $1 per day [13]. In addition, total expenditure on health is <5% of gross domestic product, out-of-pocket expenditures are more than 75% of private spending on health, and government expenditure on health is <U.S. $40 per capita [14]. Although there is a national health insurance program, it has traditionally covered only inpatient admissions and is only recently expanding to outpatient coverage [15].

In Kenya, a Division of Non-Communicable Diseases was formed in the Directorate of Preventive and Promotive Services within the Ministry of Health. This division is charged with the responsibility of driving policy response to noncommunicable diseases for the whole country. It is in the process of concluding the development of a strategic plan for noncommunicable diseases, as well as ensuring that the national health policy includes measures to prevent and control noncommunicable diseases. Clear targets have been designated, and evidence-based interventions have been recommended, including those for secondary CVD prevention. However, widespread implementation of programs for CVD prevention is still lacking.

The infrastructure for CVD prevention is challenging. There are insufficient human resources for health overall [16], and the double burden of disease exacerbates this human resource shortfall. There are frequent and repeated

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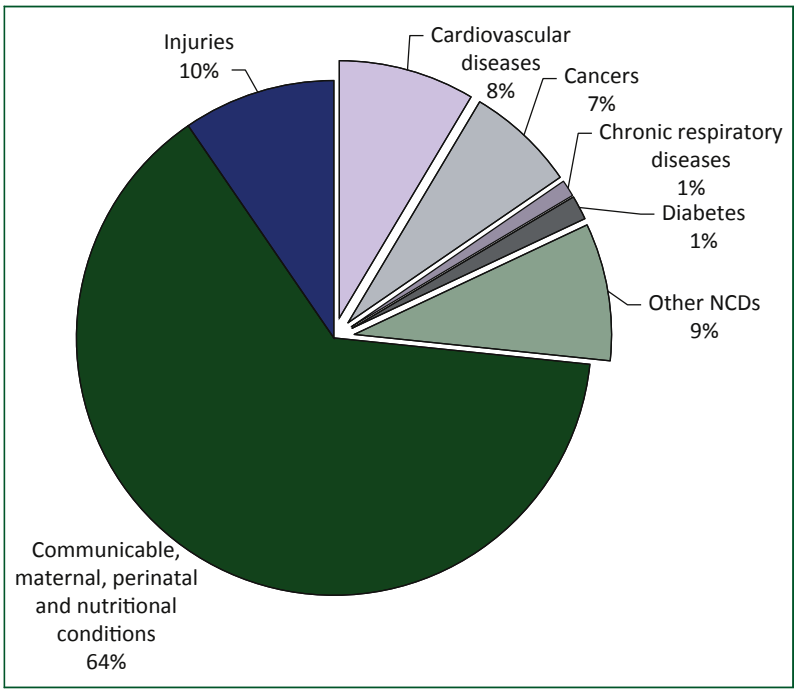

FIGURE 1. Percentage of total deaths by cause, all ages, both sexes. NCD, noncommunicable disease(s). Reproduced, with permission, from World Health Organization [11].

medication stock-outs, of even the essential medicines contained on the national formulary [17]. Even when medicines are available, they often remain unaffordable, are subject to price gouging, and can sometimes be of uncertain quality [18]. CVD medicines are even less reliably available, especially for the rural population. In addition, there is a profound lack of facilities, supplies, and equipment—spanning laboratory facilities, radiology equipment, even sphygmomanometers. Finally, patients often engage the health care system at advanced and complicated stages of disease, at which point, prevention efforts are too late and curative efforts are expensive and sometimes futile.

It is within this socio-politico-economic reality that contextually appropriate programs for CVD prevention need to be developed. Here, we describe our experience from western Kenya, where we have engaged the entire care cascade across all levels of the health system, in order to improve access to high-quality, comprehensive, coordinated, and sustainable care for CVD and CVD risk factors.

ENGAGING THE ENTIRE CARE CASCADE

Academic Model Providing Access to Healthcare (AMPATH) is a collaboration among the Moi University College of Health Sciences, the Moi Teaching and Referral Hospital, and a consortium of North American universities led by Indiana University. This partnership "leads with care" while addressing the full academic mission that includes education and research. AMPATH has established a human immunodeficiency virus care system in western Kenya that has served over 160,000 patients [19,20]. Recently, AMPATH has leveraged this infrastructure to expand its clinical scope of work to develop a comprehensive chronic disease management program, focusing initially on CVD, hypertension, and diabetes [21]. In so doing, the program was guided by the following principles across the entire care cascade: find, link, treat, and retain. These four principles were embodied in several initiatives (Table 1): 1) population-wide screening for hypertension and diabetes; 2) engagement of community resources and governance structures; 3) decentralization of care services in order to improve geographic access; 4) task redistribution to allow for more efficient use of available human resources for health; 5) ensuring a consistent supply of essential medicines; 6) improving physical infrastructure of rural health facilities; 7) developing an integrated health record across all levels of the Kenyan health system; and 8) targeted, strategic use of mobile health (mHealth) initiatives to provide clinical decision support and record-keeping functions for rural clinicians.

By bringing together all of these components, AMPATH has been able to create an integrated system of chronic disease treatment and prevention services throughout its catchment area. Community health workers at the village level have received structured training to provide health education and assist with linkage and retention to chronic disease care. Nurses in rural dispensaries have been provided specialized training and support in order to independently manage hypertension and diabetes. Referral networks have been established that connect dispensaries, health centers, district hospitals, and the Moi Teaching and Referral Hospital. At the referral hospital, AMPATH has established outpatient cardiology and diabetes clinics that provide comprehensive, multidisciplinary, and longitudinal care for patients, many of whom have advanced or complex cardiovascular and metabolic diseases. Finally, by leveraging the academic partnership and philanthropic support, the program has built the first inpatient cardiac care unit in western Kenya, which allows for management, resuscitation, and rehabilitation of critically ill cardiovascular patients [22]. This integrated and comprehensive system of care provides the foundation for education, capacity building, and research, in line with the mission of AMPATH. The program has also launched a community-based outpatient health insurance program to facilitate greater access by resource-limited rural populations to the integrated care system.

AMPATH has also implemented creative and novel programs to increase access to CVD medicines. The program has partnered with key stakeholders in the Kenya Ministry of Health and local communities to establish a network of revolving fund pharmacies [17]. At the rural health center level, each revolving fund pharmacy is located within the government health center and serves as a

TABLE 1. The care cascade (find, link, treat, retain), with associated challenges, responses, and future directions

	Challenges	AMPATH Responses	Future Directions
FIND	Identifying individuals at risk and individuals with disease	Home-based, door-to-door screening Community-based screening	Evaluation of different screening and detection strategies
	Laboratory facilities and diagnostic equipment not accessible to entire population	Providing diagnostic equipment to rural health facilities	Development and evaluation of low-cost, point-of-care diagnostic technology
	Mistrust of public sector services	Improve relationship with community leaders and tribal elders	Continue to engage community and elicit feedback as to future services and quality care
LINK	Excessive distance to health facilities	Geographic decentralization of care services	Further geographic decentralization and portabilization of care delivery
	Low awareness of risks	Community health workers with specialized training	Evaluation of different strategies to improve linkage to care
	Asymptomatic disease at early stages	Smartphone-based tailored behavioral communication	Evaluate mHealth initiatives
	Emotional factors (fears)	Community health workers with motivational interviewing	Engage individuals emotionally as well as cognitively
	Poverty	Microfinance initiatives	Iteration and improvement of microfinance
	Lack of health insurance	Community-based outpatient health insurance	Iteration and improvement of program Scale-up of insurance coverage
	Poor reputation of public sector facilities	Community health workers with motivational interviewing	Raise awareness of quality improvement initiatives and improve desirability of public sector services
TREAT	Insufficient human resources	Task redistribution	Evaluation of task redistribution strategy Development of optimal health care provider composition
	Inadequate training and knowledge of management approaches	Targeted training; mHealth with clinical decision support	Evaluate mHealth initiatives
	Poor knowledge of secondary prevention measures	Training of physicians in guideline-based practices at the referral hospital	Capacity building of clinicians at district hospitals in catchment area
	Medication stock-outs	Revolving fund pharmacy with community governance and oversight	Novel community-based supply chain solution development
	Lack of facilities and equipment	Improving physical infrastructure of rural health facilities Development of cardiac care unit	Continued improvement of rural health facility infrastructure and equipment Strengthening referral pathways
	Lack of integration of medical records across levels of care	Integrated electronic health record with real-time access for rural clinicians	Improvement and optimization of health record functionality and clinical applicability
	Lack of health insurance	Community-based outpatient health insurance	Iteration and improvement of program Scale-up of insurance coverage
	Poor provider-patient relationship	Incorporate patient-centric approaches into care model	Iteration and optimization of program

(continued)

TABLE 1–*continued*. The care cascade (find, link, treat, retain), with associated challenges, responses, and future directions

	Challenges	AMPATH Responses	Future Directions
RETAIN	Low awareness of risks	Community health workers with specialized training	Evaluation of different strategies to improve retention in care
	Asymptomatic disease at early stages	Smartphone-based tailored behavioral communication	Evaluate mHealth initiatives
	Emotional factors (fears)	Community health workers with motivational interviewing	Engage individuals emotionally as well as cognitively
	Poverty	Microfinance initiatives	Iteration and improvement of microfinance
	Lack of health insurance	Community-based outpatient health insurance	Iteration and improvement of program Scale-up of insurance coverage

mHealth, mobile health.

backup to the government pharmacy, in order to prevent stock-outs of essential medicines. The revolving fund pharmacy dispenses medications only when the medication is out of stock at the government pharmacy, and the generated revenues are used to restock the pharmacy. At the dispensary level, supply of CVD medications was previously not available due to the commonly held view and policy that CVD was a health issue that required more expertise than could be provided at the dispensary level. In this setting, the revolving fund pharmacy serves as the primary supply for these medications. Thus, the availability of essential CVD medicines has improved dramatically across all levels of the health care system [17]. Local communities help to govern and monitor the operations of each revolving fund pharmacy in order to ensure accountability to the local population and patients. Demand for these services has increased, leading to the launch of revolving fund pharmacies throughout the AMPATH catchment area.

The role of primary care clinicians, including nurses, clinical officers, and generalist physicians, in this entire cascade cannot be understated. They will continue to provide care to the vast majority of patients attending allopathic care facilities in low-resource, rural settings. They also are often embedded in communities and have long-standing relationships with community leaders and governance structures. Therefore, they have a great potential to raise awareness both among individual patients as well as throughout entire communities. Because they ultimately care for the bulk of patients in Kenya, these rural primary care clinicians require appropriate training, mentorship, and support. In addition, they need to be made aware of the relevant clinical guidelines, and be incentivized and motivated to use and adhere to them. As has already been described, AMPATH has actively engaged primary care clinicians with training, mentorship, and support, and those efforts need to continue and be expanded.

Several challenges remain in terms of developing a roadmap for secondary CVD prevention in a low-income country such as Kenya. Screening and detection of individuals with risk factors and subclinical CVD requires the development and dissemination of novel diagnostic equipment, including low-cost point-of-care technology that is portable and durable. Simplification of CVD medication regimens, such as a cardiovascular polypill, could potentially have benefit with respect to affordability and adherence [23]. For individuals with known CVD, novel strategies to use mHealth to strengthen the link between patients and providers may improve retention and adherence to care; however, the literature lacks strong evidence in this regard [24]. New approaches to behavior modification and careful attention to promoting healthy lifestyles, within the context of socio-politico-economic constraints and life circumstances, will be required. Poor knowledge of secondary prevention measures among clinicians needs to be addressed with training, capacity building, and strong referral networks across the health system. Finally, ensuring high-quality clinical care with a motivated health workforce can also promote a favorable clinical experience for patients, thereby improving retention in care and adherence to treatment regimens.

SUMMARY

CVD is a global problem, and increasingly so, even for low-income countries. While the global CVD burden is still on the rise in low-income countries such as Kenya, there exists a critical window of opportunity to establish systems of care and prevention that can alter the trajectory of CVD in these settings. Engaging the entire care cascade, in the context of epidemiologic and socio-politico-economic realities, is a promising way forward to achieve the roadmap goals for secondary prevention of CVD in low-resource settings.

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