



Availability of Protocols, Equipment and Medicines for Cardiovascular Disease Risk Management in Primary Care Health Facilities in Nine African Countries

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Abstract

Background: Cardiovascular disease, including hypertension and diabetes, is a leading cause of the disease burden in African countries. The World Health Organization has targeted that basic technologies and essential medicines should be available in >80% of health facilities. We examined the availability of protocols, equipment and medicines for the management of CVD risk in primary care health facilities in the public sector in 9 countries in the African region.

Methods: Under the coordination of the African Heart Network, an affiliate of the World Heart Federation, survey officers visited 5-10 health centers purposively selected in and around an urban center in 9 African countries (Burundi, Niger, Uganda, Benin, Kenya, Sudan, Tunisia, South Africa, Seychelles). They assessed the availability of protocols, basic diagnosis equipment and medications related to CVD risk reduction.

Results: Protocols for hypertension, diabetes, rheumatic heart diseases, CVD or WHO PEN were available consistently (i.e. in >50% of health centers in a country) in only 4 of the

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9 countries. A sphygmomanometer was found in nearly all health centers but a large cuff was consistently available in only 4 countries. A glucometer was available consistently in 4 countries. Medicines from the four main classes for hypertension were available consistently in only 4 countries. Availability of these items was strongly associated with a country's Gross Domestic Product (GDP) per capita and adequate availability was found in the 3 countries with the highest GDP (>Int \$ 10'000).

Conclusions: Availability of protocols, basic diagnosis equipment and main medicines for CVD risk management was poor in primary health care facilities in the public sector in countries with a low GDP but was adequate in countries with a higher GDP. These findings underlie the need to strengthen the capacity of primary health care to address CVD reduction in the region.

Introduction

Cardio Vascular Disease (CVD) is the leading cause of the disease burden in Africa [1] and the prevalence of CVD risk factors such as hypertension and diabetes is high in the region [2,3]. The World Health Organization (WHO) Global Action Plan for the Prevention and Control of Non Communicable Disease (NCD) 2013-2020 has formulated a set of cost-effective interventions for reducing CVD risk in populations and among high-risk individuals. WHO has targeted that medicines to prevent major NCDs (including CVD) are available in 80% of public and private health facilities and that 50% of eligible individuals receive treatment to prevent heart attacks and strokes by 2015 (including blood pressure and glycemic control).

Suboptimal medicine use is a main barrier to adequate CVD risk reduction. A number of policy variables need to be addressed to improve the availability of CVD medicines in LMICs in relation to rational selection, affordable prices, sustainable financing and reorganization of health systems toward management of chronic diseases [4-6]. A particular issue is to maximize CVD risk reduction in the population while minimizing the number of individuals requiring medications. The number of individuals eligible for treatment can extend, for example, to all individuals with blood pressure $\geq 140/90$ mmHg according to various guidelines [7] or be limited to individuals with a total 10-year CVD risk $\geq 30\%$ according to WHO recommendations for low-resource settings [8-10]. Yet, irrespective of how CVD risk is stratified, the numbers of persons requiring medicines for CVD risk reduction will inevitably be large because of the high prevalence of hypertension, diabetes and other risk factors in the population. This underlies that it is crucial that management of CV risk is handled mainly at primary health care level.

Several studies have shown a low availability of medicines for CVD reduction (e.g. medicines for hypertension, diabetes, medicines for secondary CVD prevention) in low and middle-income countries (LMICs) [11-14]. A recent study in 18 countries, based on medicines found in pharmacies located in the surveyed communities, indicated that four main CVD medicines needed for secondary CVD prevention (aspirin, beta-blockers, angiotensin-converting enzyme inhibitors and statins) were available, in urban/rural settings, in 95%/90% of high income countries, 80%/73% of upper middle income countries, 62%/37% of lower middle income countries, and only 25%/3% of low income countries [14].

Few studies have documented the availability of diagnosis equipment, protocols and medicines related to CVD in the African region. Hence, this survey examined these variables in primary health care facilities in the public sector in nine African countries. It is expected that the findings can be useful to guide policy aimed at strengthening health system capacity for addressing CVDs in the region. The findings can also help inform progress toward achieving the WHO target of 80% availability of essential medicines in health facilities in the region.

Methods

The survey was organized through the African Heart Network (AHN) (www.ahnnetwork.org), a coalition of heart foundations, cardiac societies and individuals working in the field of CVD in Africa, and an affiliate of the World Heart Federation. The surveys took place between 2015 and 2016 in 9 countries in which AHN was active. In each country, 6-10 primary care health facilities of the public sector and including at least one medical doctor were selected. Selection of the health facilities was based on a purposive rather than representative sampling, aiming to strike a balance between representativeness and practicality, consistent with the very low budget available. Around half of the facilities were located within an urban center (Bujumbura, Burundi; Niamey, Niger; Kampala, Uganda; Nairobi, Kenya; Cotonou, Benin; Khartoum, Sudan; Monastir, Tunisia, Johannesburg, South Africa; and Victoria, Seychelles) and the other half were located in smaller towns at up to 100 km distance. During the visits in the facilities, survey officers, working in pairs, administered a structured questionnaire to two senior officers of the health facility. Questions asked about characteristics of the health facility, the estimated numbers of patients attending the health center, and selected procedures for CVD management. Survey officers assessed the presence of selected pre-defined items, including guidelines or protocols for different CVD conditions (CVD risk reduction, hypertension, diabetes, dyslipidemia, and rheumatic heart disease), basic equipment to measure blood pressure and blood glucose and pre-defined classes of medicines for the treatment of CVD, hypertension, diabetes, dyslipidemia, and Rheumatic Heart Disease (RHD). Authorization to conduct the surveys was obtained from administrative authorities in each country.

Data were tabulated according to country, sorted by their GDP per capita, expressed in international \$ in 2015, as an indicator of overall wealth of the country. The small number of observations within each country (5-10 health facilities per country) and the fact that multiple variables were examined make statistical tests neither relevant nor helpful in this context.

Results

Table 1 Shows the characteristics of the health facilities in the 9 countries. Health facilities had an average of 7-15 doctors and nurses, except for lower numbers in Benin. The average number of adult patients attending health centers in one day, as estimated by the senior health personnel of each facility, ranged from 54 to 233 in average per country, except in Benin where it was lower. These data suggest that health facilities were of a significant size in all countries except in Benin and that all health facilities acknowledged examining several hypertensive or diabetic adult patients every day.

Table 2 shows that a list of essential medicines was available in nearly all health centers. However, the presence of protocols for the management of CVD, hypertension, diabetes, dyslipid-

emia or rheumatic disease, were present in a majority of health facilities only in Tunisia, South Africa and Seychelles, which corresponds to the countries with the highest GDP per capita (e.g. exceeding Int \$ 10'000). The WHO PEN package for management of NCDs (9), which includes treatment protocols for CVD, hypertension and diabetes, were found in only a few health centers in 4 countries (Uganda, Benin, Kenya, and Tunisia).

Table 3 shows the availability of selected medicines in the health facilities in the 9 countries. Medicines in all main categories of hypertensive medications (thiazide diuretics, calcium channel blockers, ACE inhibitors/angiotensin receptor blockers and beta-blockers) were present in a majority of health facilities only in 4 countries, which also were those with the highest GDP per capita. Availability of oral antidiabetic medicines

or insulin, or that of cholesterol lowering medicines, was found consistently only in around half of the countries, and particularly in those with a higher GDP. These findings suggest that a consistent availability of the main classes of medicines for CVD risk reduction in health facilities in the public sector strongly correlates with a country's GDP per capita.

Table 4 shows that a sphygmomanometer was present in virtually all health centers in all countries but a large cuff was consistently available in health facilities only in a few countries. A glucometer was found in a majority of health facilities in half of the countries. Medicines for hypertension or diabetes were prescribed to well-controlled (stable) patients at adequately large time intervals (e.g. every 2-4 months) in only 3 countries, which also were with the highest GDP per capita.

Table 1: Characteristics of the health centers according to country.

Country	BUR	NIG	UGA	BEN	KEN	SUD	TUN	RSA	SEY
GDP/capita (Int\$ in 2015)	818	1'080	2'003	2'113	3'208	4'344	11'428	13'165	26'277
Health centers (n)	6	10	8	10	6	6	5	6	6
Nurses (n)	8.3	6.3	13.8	2.0	13.0	3.2	4.0	14.0	10.5
Doctors (n)	2.5	1.3	1.3	0.2	2.8	3.8	2.2	2.8	3.5
Pharmacists (n)	2.0	1.0	0.9	0.8	1.2	2.7	1.0	0.7	3.2
Patients per day (n)	68	60	126	13	233	114	54	170	160
Patients treated for HBP per day (n)	2	4	7	2	6	23	14	62	16
Patients with diabetes treated per day (n)	1	5	2	0	3	17	14	27	6
Percent patients with DM or HBP from all patients	3.7	15.0	7.3	14.7	3.9	34.9	51.7	52.3	13.8

Table 2: Proportions of health centers in which guidelines or protocols were found according to country.

	BUR	NIG	UGA	BEN	KEN	SUD	TUN	RSA	SEY
List of essential medications (%)	100	80	100	100	83	50	60	100	100
Guideline/protocol for blood pressure (%)	0	20	50	40	83	50	100	100	100
Guideline/protocol for diabetes (%)	0	10	38	20	67	33	100	100	100
Guideline/protocol for MI (%)	0	0	13	0	17	33	40	100	100
Guideline/protocol for cholesterol (%)	0	10	0	0	17	17	20	100	100
Guideline/protocol for RHD (%)	0	0	38	0	33	33	0	100	100
WHO PEN package (%)	0	0	13	10	17	0	40	0	0

Int\$: International Dollar; MI: Myocardial Infarction; RHD: Rheumatic Heart Disease.

Table 3: Proportions of health centers with cardiovascular medicines, according to country.

	BUR	NIG	UGA	BEN	KEN	SUD	TUN	RSA	SEY
Hypertension									
Thiazide diuretic (%)	0	0	13	20	83	67	60	100	100
Furosemide (%)	33	90	25	40	50	83	100	100	100
Aldosterone (%)	0	0	0	0	0	50	60	50	100
Beta-blocker (%)	50	0	13	0	17	83	100	100	100
Calcium channel blocker (%)	50	20	25	10	67	83	100	83	100
ACE inhibitor (%)	33	30	0	0	67	83	100	100	100
Angiotensin receptor blocker (%)	0	0	0	0	17	67	20	0	100
Aldomet (%)	17	10	0	90	83	33	80	83	100

Diabetes									
Oral antidiabetic medications (%)	0	10	50	0	100	83	100	100	100
Insulin (%)	50	20	38	0	0	83	100	67	100
Other									
Aspirin (%)	0	40	25	60	50	83	100	100	100
Cholesterol lowering medication (%)	0	10	0	0	0	83	100	100	100

Table 4: Proportions of health centers with selected equipment procedures for cardiovascular management, according to country.

	BUR	NIG	UGA	BEN	KEN	SUD	TUN	RSA	SEY
Equipment									
Device to measure blood pressure (%)	67	100	100	100	100	100	100	100	100
Large cuff is available (%)	0	0	0	70	50	17	20	67	100
Glucometer for capillary glucose (%)	83	40	50	20	100	50	80	100	100
Procedures									
HBP patients often seen by same doctor (%)	0	0	0	70	17	33	100	17	17
Number of readings when checking BP (n)	2	2	2	3	1	2	1	1	1
Duration of prescription for diabetes (wks)	4	2	3	2	3	4	13	11	16
Duration of prescription for HBP (wks)	4	2	3	3	3	4	14	11	16
Waiting time at HC for HBP patients (min)			51	18	17	56	38	94	40

Discussion

We found that the availability in primary care facilities, in the public sector, of basic diagnosis equipment, protocols, and medicines for CVD risk management was strongly correlated with a country's wealth (i.e. GDP per capita), consistent with other studies [15]. An adequate availability of these items was found only in the three countries which had a GDP per capita > Int\$10'000. According to these findings, only a few countries in the region would meet the WHO target of 80% availability of essential medicines. Of note, availability of diagnostic material, protocols and medicines does not imply that eligible patients are adequately treated but this study did not examine this question.

The availability of diagnosis equipment in health facilities is a necessary, although not sufficient, condition for management of CVD risk. Basic diagnosis material, such as blood pressure devices or glucometers were available in a majority of health facilities, which is reassuring. However, a large cuff was not available in many health centers, including in countries where all medicines were available, which makes diagnosis of hypertension in obese persons difficult or biased [16]. Of note, the study did not assess whether sufficient amounts of batteries were available for electronic blood pressure devices or sufficient amounts of strips for glucometers.

Similarly, protocols for CVD risk management (including for hypertension and diabetes) were not consistently available in several countries, which generally were the same countries in which basic diagnostic devices and medications for CVD reduction were not also consistently available. While some countries may face difficulty to develop their own national guidelines or protocols for CVD risk reduction, WHO has developed the PEN protocols [9], and more recently the HEART package [16], which are designed to provide guidance for diagnosis and management of CVD risk, including diabetes and other chronic conditions.

Several classes of the main medicines for hypertension treatment were only consistently available in the 3-4 countries with the highest GDP per capita. This suggests that CVD risk management has not been prioritized and integrated into primary health care in these countries, despite the fact hypertensive or diabetic patients were reported to attend health care services in all countries, which is consistent with the high prevalence of these conditions in all countries. This calls for strengthening the health care systems toward management of NCDs and CVDs, and particularly at the primary health care level. Lifelong treatment for hypertension or diabetes incurs substantial costs to both the health systems and the patients, but some medicines from all antihypertensive and antidiabetic main classes are now available under generic low-cost forms (e.g. < Int\$ 0.1 per daily dose) and procurement can be optimized by different means, including pooled purchasing and purchasing by generic name [12].

Inefficient management of CVD risk is also apparent from our data. For example, medicines for hypertension and diabetes were prescribed at short intervals (e.g. every 1-2 months) in several countries, particularly in countries where only few medications were available in health facilities. A high frequency of visits, when applied for patients with stable conditions, increases workload of health professionals and loss to follow up chronic patients who often cannot afford frequent visits and subsequent loss of wages on these days, particularly if waiting time in health facilities is long. Efficiency of CVD risk management can be improved by spacing out appointments to every 3-6 months for patients with stable conditions; setting fixed time appointments to minimize waiting time; relying on good information systems (e.g. forms for CVD patients or electronic medical files); and sharing tasks (nurses can attend stable patients) [15]. Countries that do not have yet integrated hypertension and diabetes in routine health may consider entry points through programs for other diseases. Malawi has successfully initiated hypertension and diabetes control through HIV programs [17].

Robertson et al have called for standardized monitoring of availability of medicines [18]. They found that medicines availability differed between 3 facility surveys made in Tanzania, a rare country where several facility-based survey had been done (with the help of donors), but the overall pattern was fairly consistent for some medicines. Some protocols for assessment or availability and affordability of medicines exist [19,20], but they require resource intensive data collection with subsequent substantial funding which may not be easily available in low resource settings. It was also suggested that facility-based surveys of medicines availability should be integrated in routine information systems to provide a reliable platform to best spearhead progress in improving access to medicines, which is a valid concern. Yet, pending optimal surveillance systems are functioning in low-resource settings, rapid, inexpensive and simple surveys (as our survey relying on good will of AHN members) may provide useful information that can assist health policy at country level. For example, our finding that some important hypertension medicines were available in nearly none of the survey health facilities in some countries and, inversely, in all health facilities of some other countries likely represents a real situation and estimates might be not markedly altered if our country surveys had included larger numbers of health facilities in larger country areas.

There are a few limitations in this study. First, the number of health centers was limited (5-10 per country) and their locations limited to a main urban center and nearby areas. The finding may therefore not necessarily represent the situation in the whole country. Second, the study only involved health centers in the public sector with no comparison with other types of facilities (e.g. hospital, dispensary) or private premises. Third, some results (e.g. numbers of hypertensive or diabetic patients seen every day) relied on estimates made by the referents. Fourth, the study only assessed the presence of medicines but not amounts available. Fifth, the study did not assess treatment costs incurred to the patients. In the Seychelles, medicines are supplied at no cost to all inhabitants but patients must pay part or all of their medication cost in several other countries. Finally, the study did not assess whether treatment was given adequately to patients, e.g. according to CVD risk. One may expect some inadequacy, particularly in countries where protocols were not available. The study also has several strengths. It is based on same methods in the 9 countries, allowing direct comparison of the point-in-time findings. Importantly, several variables were assessed *de visu* in this facility survey.

In conclusion, we found that availability of essential diagnosis tools, guidelines and medications in primary health care facilities in the public sector was poor in several countries in the African region but adequate in the few countries with a higher GDP per capita. Although our findings are based on small sample sizes, it is unlikely that our overall findings would be markedly altered had our survey included more health facilities in each country. The findings may provide useful information on gaps in availability of basic equipment and essential medicines in primary health facilities in the public sector in the region. More generally, it would be important that monitoring of availability and affordability, through standardized facility surveys, are regularly conducted and integrated in national health information systems to spearhead efforts to improve access to CVD and other medicines. In addition, studies should examine factors associated with availability and affordability of medicines in the region.

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