

Renal Services in Major Hospitals in Malawi: A survey of health facilities

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Abstract

Background

In 2016, we conducted a baseline survey of the renal services that were being offered in the major hospitals in Malawi. The main purpose of the survey was to conduct an analysis of the renal services that were being offered in the major hospitals in Malawi with the aim of identifying gaps in service provision.

Methods

The survey was conducted using a structured questionnaire to collect information relating to human resources, equipment and supplies, financing and patient management in major hospitals in Malawi. The hospitals were stratified according to level of service; Tertiary service level being the last in the referral line, whereas secondary level received referrals from the health centres. Summary statistics were computed and presented as median and inter-quartile range (IQR). Categorical data were analysed as counts and proportions. Fisher's exact test was used to test associations between two categorical variables. Wilcoxon Rank Sum test was used for comparing continuous outcomes between relevant groups. The analysis was restricted to univariate given the small sample size. Data was analyzed using Stata 14.0 (Stata Corp. Texas, USA). Statistical significance was declared at 5% significance level.

Results

Data from a total of 14 major hospitals was available for analysis. None of the hospitals had a local or resident nephrologist with 29% (4/14) of the hospitals indicating that their staff had received kidney related training albeit non specialist. Four of the fourteen facilities conducted routine meetings, to review renal patient services. Only two of the 14 hospitals conducted kidney biopsies and three hospitals have dialysis treatment facilities. All the 14 hospitals have a functional lab that assists in diagnosis of renal impairment. Urine analysis is conducted in all the 14 hospitals whilst 57% (8/14) conduct serum tests, 71% (10/14) provide stool diagnostic and only 29% (4/14) provide saliva tests. Half of the hospitals maintain records specifically of kidney patients with 43% (6/14) of them keeping in hard copy files. Only 21% (3/14) patients had a follow up system for patients in their communities. About 43% (6/14) of the hospitals receive specific funding for equipment and supplies for renal disease whilst the rest depend on general medical supplies.

Conclusions:

This study was the first of its kind that revealed that major hospitals in Malawi were inadequately equipped with the requisite facilities or infrastructure to manage renal disease exclusively. Resources

were limited in all categories assessed. With the surge of kidney disease that is predicted in the Sub Saharan Africa, the situation calls for urgent intervention if we are to ably manage kidney disease.

Background

Global statistics is pointing towards increased incidences of Non-Communicable Diseases (NCDs) with the highest prevalence in the Sub-Saharan region of Africa (SSA) (Gouda *et al.*, 2019). In recent years, emerging data from the region has indicated alarming statistics of NCDs that were once believed to belong to the affluent countries. In 2010 alone, around 12.1 million adults in the region were estimated to have diabetes mellitus (Motala, 2010). In the same region in 2013, NCDs killed eight million people before their sixtieth birthdays (Daniels, 2014). This underscores the importance of taking a positive action towards curbing the devastating effects of NCDs in the African population.

Chronic Kidney Disease (CKD), one of the important NCDs of concern, has been ranked as the 12th highest cause of death and 17th highest cause of disability worldwide (Codreanu, 2006). CKD is currently recognized as a global health problem owing to epidemiologic and clinical evidence (Yirsaw, 2012). The negative impact of the disease on health systems and the socio-economic status of those affected in the Low and middle income countries (LMICs) need not be emphasized. For instance, the long term treatment costs of CKD on an annual basis in terms of haemodialysis and peritoneal dialysis per patient in Malawi have been estimated to be approximately \$26,000 and \$65,000 respectively, figures which exclude staff costs and additional consumable supplies (NCD Action Plan). In a country whose majority of the population is living below the poverty line, this is highly unacceptable.

The situation calls for urgent action towards curbing the disease in a country where current development aid for health continually focuses on infectious diseases (World Bank, 2005). This has prevented the focus on emerging priority health problems that silently drain the nation's coffers. It therefore becomes expedient for a paradigm shift in the way in which chronic health conditions are managed across the health system.

Most LMICs including Malawi often lack adequate attention towards CKD mainly due to lack national renal disease registries; limited access to healthcare; lack of awareness; and limited capacity of health workers for CKD detection and prevention (Nugent, 2011). Research in such circumstances has a real place owing to its ability to accord a comprehensive understanding of the disease thereby enabling the implementation of strategies of disease prevention. Unfortunately, Malawi's investment in research remains to be an insignificant fraction of its Global Domestic Product (GDP), far less than what could effect appreciable changes in the national health systems. There is recognition of the overwhelming impact of chronic diseases which suggest the need for greater alignment of funding in an era that is incapacitated by a double burden of disease (Nugent, 2011). It is therefore highly essential that more research be conducted to enhance the ability to control the disease.

In 2016 a baseline study of the renal services that are currently being offered in the major hospitals in Malawi was conducted. The project aimed to take an inventory into the types of services that are

currently being offered towards the management and control of kidney disease in Malawi. Data was collected on human resources, equipment and supplies, financing, patient management and on general information regarding renal services. The project helped in identifying the gaps in service provision and provided recommendations for improvements in service provision.

Methods

This was a quantitative study in which a survey was conducted using a structured questionnaire to collect information relating to human resources, equipment and supplies, financing, patient management in major hospitals in Malawi. This hospital-based study involved respondents which were key informants at the hospitals including the District Health Officer, District Medical officer, Hospital administrator, Chief Finance Officer, Stores Manager, a resident Doctor and Matron. Stratified random sampling was used to sample Major Hospitals in Malawi according to the service provider (Table 1). The Government Hospitals were further stratified according to level of service; Tertiary service level being the last in the referral line, whereas secondary level received referrals from the health centres. The list of the major hospitals was obtained from the Medical Council of Malawi register to involve current registered facilities.

Table 1
Distribution of health facilities and sampling

Service Provider	Service level	Total number of health facilities	Sampled
Government	Tertiary	4	3
	Secondary	22	4
Private		8	3
CHAM		13	4
TOTAL		47	14

The country had a total of 47 hospitals at the time of the survey and we sampled 30 percent of them spanning the whole country. This gave us 14 hospitals in total. Data was entered into Microsoft Access and analyzed using Stata 14.0 (Stata Corp. Texas, USA). Summary statistics were described using medians and inter-quartile ranges [IQRs] because of the small sample size (N = 14). Wilcoxon Rank Sum test was used for comparing skewed continuous outcome variables between groups. Categorical variables were summarized using frequencies and percentages. Fisher's exact test was used to test associations between two categorical variables. The analysis was restricted to univariate given the small sample size.

Results

The data come from 9 Districts as follows: Blantyre, Chiradzulu, Chitipa, Kasungu, Lilongwe, Mchinji, Mzimba, Nsanje, Phalombe, Zomba giving a total of 14 facilities. Of the 14 facilities, 13 (92%) provide admission services, 13 (92%) have a biochemistry lab and 12 (86%) provide pharmacy services. Of these, one is managed by a consultant, one by a registrar and one by a clinician, the rest are managed by a Doctor. None of them is managed by a nurse or an intern.

Only four of the 14 facilities have meetings to review renal patient services. None of the hospitals had a local or resident kidney specialist. A total of 4/14 hospitals indicated that they had training for health workers in kidney related training with a total of 18 trained staff. These four hospitals were Kamuzu Central Hospital, Mzuzu central, Blantyre Adventist Hospital and Mwaiwathu Private Hospital with 1 (5%), 2(11%), 3(17%) and 12 (67%) trained staff respectively (Fig. 1).

The training at Mwaiwathu and while at Blantyre Adventist was done by Fresenius medical care and by a nephrologist respectively, while at Mzuzu central hospital the health workers did at Wits University during their specialization training.

Four hospitals: Blantyre Adventist Hospital, Deayang Luke hospital, St Gabriel hospital and Phalombe hospital have some consultant specialist such as a Nephrologist who assist at the kidney facilities but not employed by these hospitals. St. Gabriel hospital and Blantyre Adventist Hospital have one expatriate each who assist in renal service delivery.

All the 14 hospitals have a functional lab for renal patients. All of them provide urine analysis services, 8/14 (57%) serum services, 10/14 (71%) provide stool services and only 4 (29%) provide saliva test services (Table 2).

Table 2
Summary of method of dialysis at the various hospitals

Hospital name	Method of kidney diagnosis
Chitipa district hospital	history taking and lab submissions
Mzuzu central hospital	biochemical and clinical
Kasungu district hospital	urine analysis by microscopy, biochemical analysis for urea electrolytes and creatinine
Kamuzu central hospital	kidney ultra sounds and urine microscopy
Mwaiwathu private hospital	history taking, physical examination, lab and radiology and biopsies
Mchinji district hospital	they use clinical presentation and examining the patient
St gabriel catholic hospital	biochemistry, ultra sound, urine microscopy and sending them to a nephrologist
Zomba central hospital	lab test
Deayang luke hospital	lab submissions
Blantyre adventist hospital	lab, clinical assessment and biopsies
Trinity hospital	clinical assessment
Nsanje district hospital	clinical presentations and lab investigations
Phalombe district hospital	clinical assessment, dipstick and urine microscopy
St joseph private hospital	clinical assessment, ultra sound and scanning

Deayang Luke Hospital, Mwaiwathu, Nsanje, St Gabriel, Trinity, Kamuzu Central Hospital and Kasungu District Hospital are the only 7 hospitals that keep records for renal patients.

Most hospitals conduct creatinine (13/14), Urea (12/14), potassium (12/14) and calcium tests (8/14). However parathyroid hormone and pituitary gland assessments are not commonly conducted (6/14) and (3/14) respectively.

Only 2 of the 14 hospitals conduct kidney biopsies (Mwaiwathu and Blantyre Adventist) and 3 hospitals have dialysis treatment facilities. Those that conduct dialysis either use haemodialysis (Mwaiwathu, Kamuzu Central) or peritoneal dialysis (Blantyre Adventist). A total of 8/14 had cytologies, 13/14 had urine microscopy, 12/14 had dip stick and 12/14 had ultrasound.

Eight out of 14 (57%) of the hospitals had reagents for creatinine test and albumin test and 10/14 (71%) had kidney treatment drugs. The main drugs were antibiotics, antihypertensive, diuretics, steroids ciprofloxacin, cefuroxime, frusemide, prednisolone, lasix, eurapril and nitrofratoin.

Seven out of fourteen hospitals keep renal disease records and 6/14 keep in hard copy files while the rest are electronic. Fifty nine patients are suspected to have died of kidney disease in all the sampled facilities. A total of 492 cases are suspected to be kidney disease patients in these hospitals. Only 3/14 facilities have a follow up system for kidney disease patients in their communities.

As shown in Table 3, 6/14 (43%) hospitals receive specific funding for equipment and supplies for renal disease. Of these, two could not tell the actual amount reserved per year. For the four that indicated the amount, the funding was very variable ranging from about half a million kwacha to half a billion kwacha.

Table 3
Summary of hospitals by equipment and supplies for renal disease indicated on budget

Amount indicated on budget/year (MWK)	Number of Hospitals
15,000,000	1
3,000,000	1
500,000	1
500,000,000	1
Funded but didn't know amount	2
Not funded	8
Total	14

The main source of funding for the hospitals that did not have special funding is through general medical supplies (Table 4)

Table 4
Alternative source of funding for renal service equipment and supplies

Source of funding	Table 4
Through general medical supplies	7
Through the government considering that this is a government hospital supplies are taken through medical stores	1

Discussion

Human resources

A critical component to the management of kidney disease is a well trained workforce that is capable of diagnosing and treating patients with kidney disease. In this Study none of the health facilities had a local or resident kidney specialist. Similar results were obtained in a survey of facilities and human resource for paediatric nephrology training and practice in Nigeria where over half of the respondents came from hospitals with just one or no paediatric nephrologist (Ibadin et al. 2020).

Of the 14 sampled facilities, only 4 had obtained kidney related training albeit non-specialist. Similar observations have been made in the Democratic Republic of Congo where it was estimated that by 2004 there was a count of 0.11 physicians per 1000 population (Sumaili, *et al.* 2009) thus placing a heavy burden on the human resource for kidney management. There is a need to train more health workers to manage the growing burden of kidney disease in the country if we are to win the war against raging kidney disease.

Equipment and supplies

Equipment and supplies lies at the helm of kidney disease management. Without the requisite equipment and supplies, end stage renal disease patients will not obtain the necessary treatment to enable them to lead productive lives. It is commendable that all the sampled facilities have a functional lab that can conduct urine analysis tests. Additionally most of the facilities conduct relevant tests that have the ability to diagnose any kidney malfunction such as creatinine and urea tests.

Despite the presence of some form of diagnosis, treatment infrastructure at the hospitals is far from adequate with only two of the sampled facilities able to conduct biopsies and three of them offer dialysis. The 14% kidney biopsy skill was lower than that observed in facilities in Nigeria with an average of 44.1% (Ibadin et al. 2020). Despite being resource intensive, renal replacement therapy is very essential to the survival of end stage renal disease patients (Dingwall, et al. 2019) hence the availability of these facilities need to be ensured to cater for a growing burden of kidney disease.

Supplies for conducting tests and dialysis are equally important as regards kidney disease management. Among others the supplies considered in this project are reagents and/or dip sticks and medicines. The 57% facilities that had reagents indicate that despite the availability of testing equipment in all the sampled facilities, at the time of the study only 57% had the ability to actually conduct the tests because they had reagents available. At the facilities, serum creatinine is widely used for the assessment of kidney complications; however it has limited diagnostic value compared to formula - based estimates of creatinine clearance or eGFR (Sumaili, *et al.* 2009). Thus in many instances, some cases may be missed hence the need to shift towards the tests that have more diagnostic value.

Financing

Renal disease is one of the NCDs of concern that requires huge sums of money for treatment of patients. Dialysis, a life changing treatment for renal disease, is of two types in Malawi; haemodialysis and peritoneal dialysis. Every year in Malawi, the cost of haemodialysis has been estimated to be US\$ 26,000

and peritoneal dialysis costs around US\$65,000.00 per patient (NCD Action plan). With such large sums of money, there is a requirement to provide adequate funding for the treatment of patients who in turn pay for the services provided regardless of whether the treatment is at a Government hospital or a private provider. Our study revealed that funding for CKD treatment is not adequate with 57% of facilities lacking funding. In a study that assessed key cost drivers associated with caring for chronic kidney disease patients, it was determined that dialysis was significantly higher in cost than non-dialysis and transplant groups (Damien *et al.*, 2016). Since Malawi has only the dialysis option available as the kidney treatment of choice, more funding is required to ensure that treatment is available to those who require it.

Records management

In the context of this project, records management referred to patient information management system which would essentially lead to community follow up of patients as in palliative care. Keeping of patient records is, especially those with chronic illnesses, is of high importance as it ensures that the patient welfare is assessed through frequent follow up. In a study to assess eligibility of patients for renal transplantation, it was observed that records kept in a database facilitated the selection of eligible patients for transplantation (Sanchez, *et al.* 2018). In our study regrettably only half of the hospitals keep some form of records of patients. The hospitals were able to report morbidity and mortality data giving an impression that some form of data was kept at the hospitals. However, a system of follow up was only available at three of the fourteen facilities.

Conclusion

This study was designed as a baseline to conduct an inventory of the facilities available for renal disease management and care. The study was limited to a hospital setting and assessment was made regarding the availability of various equipment and supplies at the disposal of health care workers to enable them to adequately execute their management duties to renal patients. According to the assessment, no hospital was found to be adequately furnished with the requisite facilities or infrastructure to manage renal disease exclusively. There were limited resources in terms of human resources, equipment and supplies as well as uncomprehensive management of records. With the high prevalence of kidney disease that is currently being experienced in the Sub Saharan Africa, the situation calls for urgent intervention if we are to ably manage to curb kidney disease.

Abbreviations

CKD Chronic Kidney Disease

GDP Global Domestic Product

IQR Inter Quartile Range

LMIC Low and middle income country

NCD Non-communicable disease

NCST National Commission for Science and Technology

SSA Sub-Saharan Africa

Declarations

Ethics approval and consent to participate

Ethical approval for the study was granted by the National Commission for Science and Technology (NCST) with a reference number of NCST/RTT/2/6 and the protocol was registered as PROTOCOL NO. P.04/16/95 in the National Commission for Science and Technology (NCST) register. In order to ensure transparency and accountability throughout the conduct of the research, the study had received input from the teams' board of directors and the then Director of research from the Ministry of Health, Dr. Damson Kathyola. In addition all methods were performed in accordance with the relevant guidelines and regulations

In respect to participant's autonomy, we attuned to the need to disclose information about the study and informed consent was obtained from all subjects and/or their legal guardians for study participation. In order to protect the confidentiality of enrolled participants, procedures had been developed and were implemented throughout the conduct of the study. For example, the information sheet given to participants clearly indicated that they had the right to refuse to take part in the study and withdraw from the study at any time without compromising their confidentiality.

Consent for publication

"NOT APPLICABLE"

Availability of data and materials

The data that support the findings of this study are available upon request to Mavuto Mukaka mmukaka@gmail.com.

Competing interests

The authors declare that they have no competing interests.

Funding

The funding for the study was provided by the Founder and President of the Kidney Research Foundation Mr. Harrison Marrion Msungeni. Together with the Board of Directors, their role was to adequately finance the conduct of the study during preparation of the protocol to the final report writing.

Authors' contributions

LM was a major contributor in writing the manuscript. LMM provided valuable insights into the writing of the manuscript and did some proof reading. MM analyzed and interpreted the data and contributed to writing several sections of the manuscript. All authors read and approved the final manuscript.

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Authors' information

“NOT APPLICABLE”

Footnotes

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Figures

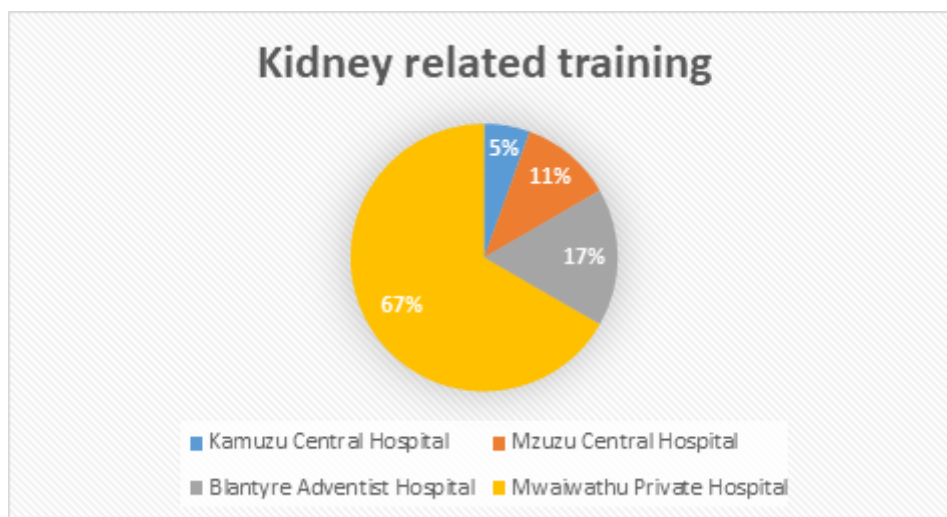


Figure 1

Percentage of trained personnel in kidney related topics