Global Dialysis Perspective: Uganda

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Introduction

Kidney injury and CKD are common complications of infectious and noncommunicable diseases (NCDs) alike. Patients with advanced kidney disease need RRT in the form of dialysis or renal transplantation. Both these interventions require substantial financing and infrastructure development. Low-income countries, such as Uganda, face challenges in developing these services, yet they bear a large burden of advancing kidney disease because of a lack of access to preventive measures. Uganda is a landlocked country in East Africa, with a population of close to 44 million. Its citizens are a young, with 53% aged <18 years and only 4% aged >60 years. There is no universal health coverage and most of the costs for the care of NCDs are out of the patient's pocket (1). We report the burden of kidney disease and financing of dialysis in Uganda.

Burden of Kidney Disease in Sub-Saharan Africa and Uganda

Kidney disease in Sub-Saharan Africa is estimated to be between 10% and 13% of the population, depending on the criteria used for definition (2). In Uganda, the prevalence of CKD in the community ranges from 2% to 7% (3,4), and up to 15% among patients with HIV or hypertension (5,6). Kidney disease in Uganda is increasing and is among the top 10 causes of death, with a case fatality rate of 21% among patients admitted with CKD (51% with ESKD) (7). The most common causes of CKD/ESKD in our setting are not yet well established. Although population-based studies have found that close to two thirds of those with CKD do not have the traditional risk factors of diabetes mellitus, hypertension, or HIV infection (3,4), 16% of patients admitted with CKD in Mulago National Referral Hospital (which admits patients from the whole country) had diabetes mellitus, 15% had HIV infection, whereas 90% had hypertension (8). This highlights hypertension as a common problem in CKD, but does not indicate CKD causation. In children, the leading cause of kidney disease is infections, such as malaria, which lead to AKI and CKD (9). AKI in children with malaria carries a mortality rate of 12%, compared with 4% without AKI (10), so it is a real cause of concern. Access to dialysis and intensive care unit services in Uganda is abysmal, and most of its citizens who need life-sustaining dialysis have no access to it because of cost and very limited availability (11). In addition to mechanical infrastructure, such as dialysis units, human resources are equally inadequate, with only 14 formally trained nephrologists (11 adult and three pediatric) for a population of >44.7 million people (Table 1).

Common Presentations of Kidney Disease in Uganda

Many patients with kidney diseases in Uganda present late for care (51% present for the first time with ESKD) and with advanced symptoms, such as edema, severe hypertension, and life-threatening electrolyte imbalances, such as acidosis or hyperkalemia (8). Among those on dialysis (hemodialysis), most patients undertake two sessions per week (due to limited space and finances) and often have cardiovascular complications (12).

Most patients on dialysis have a poor quality of life because they are very uremic, and often underdialyzed because of cost and availability. Many are debilitated by the time they present for dialysis, because of a lack of access to basic preventive CKD care, and even when on chronic RRT, they are plagued by ongoing uremic symptoms and anemia. Although the Ugandan population with CKD is generally quite young, and could be expected to be more resilient, the possibility of a lifetime on dialysis or access to a kidney transplant is overshadowed by ill health and poor quality of life, even among the few that make it to hospital for dialysis (13).

Access to Dialysis Services in Uganda

In Uganda, the mainstay of end-stage kidney care is palliative, because most patients cannot afford to pay for dialysis. In-center hemodialysis is the most common dialysis modality available in the country, and even this is very limited. Dialysis centers are only available in two districts (Kampala and Mbarara) out of >130 districts in the country, with each district serving between 400,000 and 1,500,000 people. Figure 1 shows the in-center dialysis units, highlighting

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Table 1. Demographics of Uganda

Demographic	Particulars
Country area	241,550 km^2(1)
Population	44.7 million (1)
Capital	Kampala
GDP	US$25.89 billion
GDP per capita	US$604.04
Human Development Index	0.516
Official currency	Uganda shillings
Total number of nephrologists	14 (11 adult and three pediatric nephrologists)
Total number of dialysis support staff	Nurses: 49 Technicians: 10
National Society of Nephrology	Uganda Kidney Foundation

GDP, gross domestic product.

government/public (only three) and private units. It also shows the number of machines or chairs per unit. There is one free-standing dialysis unit open to the public for a fee. Uganda has two patients that carry out home hemodialysis on a private arrangement (not included in Figure 1), and they have set up dialysis units in their homes.

As in many parts of the world, there are many more men on dialysis than women. Out of 351 patients on hemodialysis, only 144 (41%) are females. Peritoneal dialysis (PD) was once the only method available in Uganda, but the logistics around PD delivery, lack of water, and proper hygiene, and a lack of community acceptance of the method made it difficult to sustain it after introduction of hemodialysis. As a result, PD is not readily available in Uganda. In rare instances, usually in acutely ill children, PD has been managed through support from Kenya, or through improvision of dialysates using locally mixed dextrose. Intermittent hemodialysis is normally undertaken two to three times a week for patients with chronic disease. Most patients have two sessions of dialysis per week in government dialysis units due to the excess numbers of patients, and the limited numbers of dialysis machines and trained health care workers. Some dialysis shifts have to begin at 3:00 AM to ensure that all patients can access dialysis. Uganda follows the international eligibility criteria for initiating dialysis. This option is available to all, irrespective of whether they are candidates for kidney transplantation. The greatest determinant of who gets dialysis and who does not is financial status. Whereas government or public centers fill to capacity at times, private centers often have empty dialysis chairs or beds that go unfilled for days because of their relatively high costs. Those that are not able to afford hemodialysis are offered palliative care at hospitals and dialysis units, whereas others are referred to be monitored by peripheral hospitals. There are palliative care services throughout Uganda, but the concept of palliative dialysis for young patients with kidney disease still needs additional advocacy and awareness.

Most patients with AKI (often children or pregnant women) recover, but the few that progress to acute kidney disease (lasting 7–90 days) or CKD (>90 days) resort to palliative care. Those who can afford to often use intermittent hemodialysis, and few are offered slow low-efficiency dialysis using conventional dialysis machines.

As of February 2022, Uganda had only two continuous RRT machines in two private hospitals. These are quite expensive for most Ugandans, costing up to US$2000 per session and often lasting between 24 and 72 hours. Most patients with AKI cannot afford to visit an intensive care unit or have dialysis, due to the prevailing costs and the lack of availability in most Ugandan hospitals (11).

The nephrology workforce in Uganda is too small for the need. The nephrologist to population ratio is 0.3 nephrologists per million people (pmp), compared with the global median of 9.1 nephrologists pmp (14).

The nursing dialysis expert to population ratio is 1.0 pmp, and the nurse to dialysis-patient ratio in the centers is

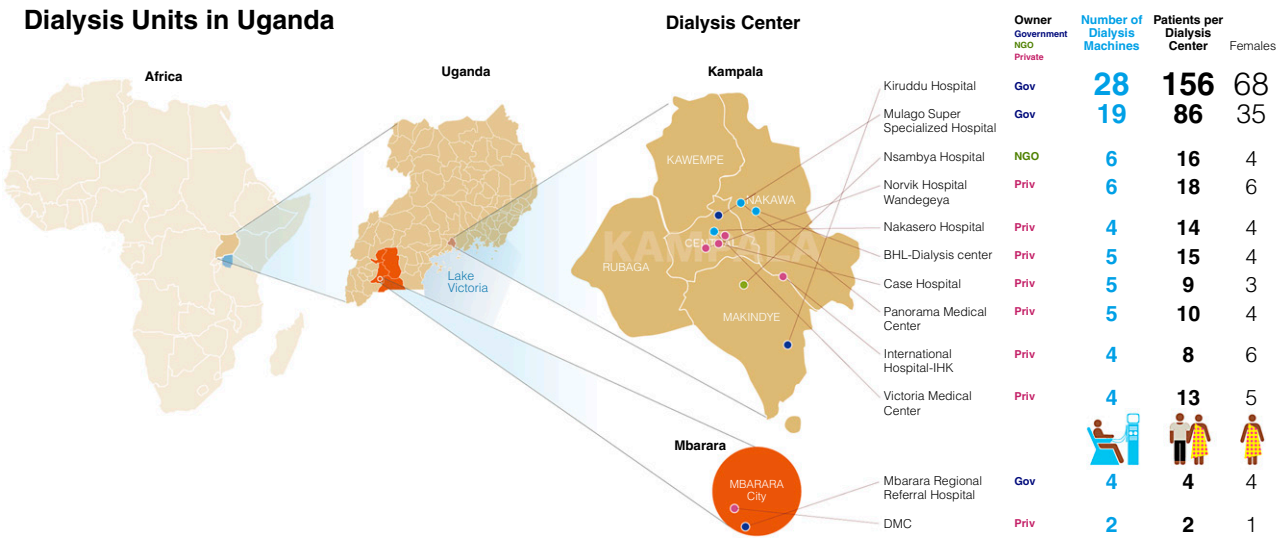

Figure 1. | **Dialysis units in Uganda.** NGO, nongovernmental organization; Gov, Government; Priv, private; DMC, Mbarara Medical Center; BHL, BHL Healthcare Limited; IHK, International Hospital, Kampala. Illustration by Helmut Kraus, Germany.

Table 2. ESRD and dialysis in Uganda

Characteristic	Particulars
Prevalence of ESKD	2020–51.8 pmp (4)
Number of patients in hemodialysis (5)	2020: 173 2021: 351
Number of patients in peritoneal dialysis (5)	2020: 3 2021: 2
Percent of patients on home dialysis	0.3%
Percent of patients with insurance coverage for dialysis sessions	<5%
% of free-standing dialysis units in Uganda versus in-hospital	20% (three of 15 units)
Cost of dialysis session in Uganda	Public unit: US$20–45 Private for-profit unit: US$90–150
Average length of dialysis session	4 hr
How many times per month are patients seen by a nephrologist during dialysis sessions?	Once a month standard; additional as needed
Dialysis access, AVF, AVG, and CVC	AVF: 21% AVG: 0.9% CVC 79%

pmp, per million population; AVF, arteriovenous fistula; AVG, arteriovenous graft; CVC, central venous catheter.

estimated to be 1:13 in public hospitals and 1:4 in private centers. All dialysis patients are reviewed once every month by a nephrologist as standard practice.

Financing Dialysis in Uganda

Dialysis in Uganda is mostly paid as an out-of-pocket cost. For those in government (public) hospitals, each dialysis session ranges from US$20 to US$45, equivalent to a 10-day wage for an average Ugandan, whereas in private units each dialysis session costs between US$90 and US$150, equivalent to a 24-day average wage. Continuous RRT costs about US$2000 per session of 24–72 hours; see Table 2 for costs related to dialysis in Uganda. There are unfortunately no central data on the cost of dialysis from the suppliers. Many suppliers exist, and some hospitals and dialysis units import dialysis equipment directly from manufacturers from outside Uganda. Because public hospitals make large purchases, they can negotiate lower prices than private hospitals. Nevertheless, the price of dialysis in private hospitals is still way above the purchase price of the supplies. The government subsidizes dialysis in one of the two public hospitals.

It is common for public hospitals to run out of supplies, such as dialyzers, acid or base concentrates, and heparin. If this happens, patients have to procure items from nearby pharmacies and carry them to the dialysis center. There is no universal health insurance in Uganda, which presents the greatest hinderance to dialysis access. Most private health insurance plans exclude kidney transplant and dialysis fees, further limiting access to dialysis. Most insurance companies are willing to cover the cost of drugs such as iron sucrose, hypertensive medications, heparin, and erythropoietin, which are often needed for patients on dialysis. These accessory treatments are not included in the dialysis package.

Transportation to and from dialysis is also a major issue for many patients. There is no ready transportation to the dialysis unit, and, because of the scarcity of units, some patients have to travel up to 300 km to access this lifesaving procedure, which is a real practical and financial burden for patients and their families (15). To access dialysis, many patients have to relocate to cities such as Kampala, which further incurs higher costs of rent, changing livelihoods, loss of jobs, or a lack of support. Even then, only an estimated 15% of people who need dialysis in Uganda can afford it.

Most units are run by dialysis nurses supported by technicians and nephrologists. In public dialysis units, experts are recruited as part of the health workforce, whereas in private units they are recruited as consultants. It is very common for dialysis nurses and nephrologists to work in more than one dialysis unit. There is no a central dialysis coordinating unit in the country and each unit has its own operating standard and costs. The Uganda Kidney Foundation (UKF), in collaboration with Uganda Ministry of Health, is working toward regulating these processes.

Plans for Kidney Care in Uganda

Without universal health insurance, the limited numbers of dialysis nurses, nephrologists, and centers for dialysis mean the future of kidney care in Uganda is uncertain. However, there are a lot of efforts to change this. Working with the UKF, International Society of Nephrology, International Pediatric Nephrology Association, and other international partners, such as the Yale School of Medicine, McMaster University, University of Cape Town, India, and Kenya, we have been able to train nephrologists and dialysis nurses. We are also working with the Uganda parliamentary committee to ensure we improve access to dialysis (including PD) and kidney transplantation. The Uganda Ministry of Health has set up a multidisciplinary taskforce to establish a kidney transplant program in Uganda. The UKF is made of people from different professions, including lawyers, social scientists, patients, and advocacy experts. This helps ensure nephrologists and dialysis nurses concentrate on caring for patients and help where the foundation needs technical support. The main mandate of UKF is preventing kidney disease and advocating for kidney health. Organizations such as the Uganda Kidney Psychosocial Support Organization support the UKF to enhance awareness of kidney disease and the preventive strategies to slow progression.

We have set up a dialysis training program for nurses and plan to establish a nephrology fellowship program in the near future. This will be more certain once the kidney transplant program is underway.

Recommendations

Uganda has made tremendous steps in improving access to RRTs over the last 5 years. Although there were only had two dialysis chairs and two nephrologists in Uganda in 2012, in 2022 we have 94 dialysis chairs and 14 nephrologists. However, access to dialysis and kidney transplantation remains out of reach for most of the population, due to high costs and a lack of health insurance schemes to support patients with CKD. International partners and the Uganda government are encouraged to join together to help Uganda improve prevention and care for kidney disease.

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Author Contributions

R. Kalyesubula conceptualized the study, was responsible for the project administration and resources, and provided supervision; G. Kansiime was responsible for the visualization; G. Kansiime and R. Kalyesubula were responsible for the validation; U. Brewster, R. Kalyesubula, and G. Kansiime wrote the original draft and reviewed and edited the manuscript.

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