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The Current State of Kidney Transplantation in Kenya: Challenges, Opportunities, and Future Directions

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Abstract

Kenya, a lower-middle-income country in East Africa, faces a rising burden of chronic kidney disease (CKD), with an estimated 12,500 individuals suffering from end-stage renal disease (ESRD). Renal transplantation—the preferred treatment option for ESRD, remains underutilized. Since the first transplant in 1978, seven centers have been established, with 829 transplants performed by 2022. Living-related renal transplants (LRRT) dominate, while deceased donor renal transplantation (DDRT) is yet to be implemented. Recent data show improved outcomes, with one-year graft survival rates up to 96%, but challenges such as acute rejection rates (32.8%) and limited donor outcome data persist. Barriers include high costs, limited insurance coverage, inadequate laboratory infrastructure, and a transplant workforce shortage. Efforts to establish DDRT programs are underway but are hampered by the absence of organ procurement systems and insufficient laboratory capabilities. Future priorities include reducing costs and expanded insurance coverage for transplant care. Investments in laboratory infrastructure, local tissue typing, and surgical training are essential. Strengthening international collaborations and public education campaigns can improve donor pools and transplantation access. Strategic policy reforms and resource allocation are vital to scaling up Kenya's kidney transplant program and addressing the unmet needs of its ESRD population.

Keywords

Kidney, Transplant, Outcomes, Chronic Kidney Disease, End Stage Renal Disease

1. Introduction

Kenya, with an estimated population of 52.4 million, is a lower middle-income country (LMIC) situated in East Africa [1]. Like other low- and middle-income countries, Kenya faces an increasing prevalence of chronic kidney disease (CKD). Although no formal studies have been conducted specifically on patients with end-stage renal disease (ESRD), it is estimated that up to 50% of those requiring hemodialysis are unable to access it [2]. According to unpublished data from the Kenya Renal Association, by 2022, approximately 6300 patients had been receiving maintenance dialysis treatments, despite an estimated 12,500 individuals potentially suffering from ESRD. While dialysis and renal transplantation are both treatment options for ESRD, renal transplantation offers superior outcomes, including reduced mortality, lower cardiovascular risk, and improved quality of life [3]. It is thus recommended that all advanced CKD patients should be evaluated for renal transplantation and offered this treatment option if eligible. This paper shares a local perspective of the current transplant status, challenges, opportunities and future directions for kidney transplant in Kenya.

2. Current Transplant Status

The first kidney transplant in Kenya was performed in 1978, and in 1984, Kenyatta National Hospital, the largest public referral hospital in Nairobi launched a regular transplant program. Since then, transplant centers have grown to seven across the country, with four located in the capital, Nairobi, and three in Eldoret, a healthcare hub in Western Kenya. According to unpublished national data from the Kenya Renal Association, as of 2022, the total number of kidney transplant recipients in Kenya stood at 829.

Between 2012 and 2022, a total of 708 kidney transplants were carried out in Kenya. In 2021 alone, only 160 transplants were performed, representing just 2.8% of the estimated ESRD population of 5,700 patients [4]. Of these, 85% were living-related renal transplants (LRRT), typically involving a sibling donor. Living unrelated donations remained low, and accounted for the rest 15% [5]-[8]. In Eldoret, 150 transplants had been performed between 2006 and 2023 at the national referral facility. Despite plans for a deceased donor renal transplant (DDRT) program, no such transplants have been performed in Kenya to date.

3. Outcomes

Renal transplant outcome data remains scarce with only a few studies out of tertiary centers in the capital published for both recipients and donors. So far, existing data showed a largely young population of donors and recipients. The median donor age ranged from 32-34 years while the median recipient age was 36 years. Although just 55% donors were men, they accounted for 71% - 74% of recipients [5]-[10].

Published reports of early experiences between 1985 and 1989 in Nairobi reveal a high 1 year mortality of 40% among transplant recipients [9]. In 1996, Kayima

and colleagues reported improved outcomes with 1-year graft and patient survival rates of 93.0% and 86.6% respectively [6]. More recently, Onyango and colleagues in a retrospective chart review of 177 LRRT between 2010 and 2021 showed a 1-year allograft and patient survival rate of 96% and 94% respectively. Acute rejection episodes were however high at 32.8%. Of note is that these were mainly diagnosed clinically since kidney biopsy was not readily available. In another retrospective study by Atuhe *et al*., 22.6% of participants had some form of allograft dysfunction at 12 months [7] [8]. Unpublished preliminary data from the national referral hospital in Eldoret show a 1-year and a 5-year recipient survival of 94.6% and 86% respectively. To the best of our knowledge graft survival data is not available at this time. Living donors form the only donor pool at the moment in Kenya. However, outcome data for donors is still sparse. **Table 1** summarizes patient and donor demographic characteristics along with various recipient outcome data.

Regarding donors, a retrospective analysis from Kenyatta National Hospital in Nairobi showed normal renal function among transplant donors at 1 month with few non-fatal post-operative complications [10]. Still, long-term data is necessary to ensure safety of kidney donors in a set up where most renal transplant donors are first degree relatives to recipients. This might also bolster more confidence in the general population and increase the donor pool.

Table 1. A summary of recipient and donor characteristics, along with various outcomes for renal transplant recipients in Kenya.

Author	Time period	Sample size (n)	Recipient age/donor age (yr.)	Reported outcome measure	Outcome estimate (%)
Oliech, J. S. 1993 [9]	1985-1989	20	-	1-year patient survival	60.0%
Kayima, J. K. 1996 [6]	-	15	Mean recipient: 32.6 Mean donor: 36.7	1-year graft survival	93.0%
				1-year patient survival	86.6%
Atuhe, M. D. 2022 [8]	-	150	Median recipient: 36 Median donor: 33	1-year allograft dysfunction	22.6%
Onyango, A. 2023 [7]	2010 to 2021	177	Mean recipient: 37.1 (+/−13.2)	1-year graft survival	96.0%
				1-year patient survival	94.0%
				Acute rejection rate*	32.8%
MTRH (Eldoret) unpublished data 2021	2006-2021	75	-	1-year patient survival	94.6%
				5-year patient survival	86.0%

*Acute rejection determined clinically as a diagnosis of acute allograft dysfunction treated by at least 3 days of methyl-prednisolone pulsing MTRH—Moi Teaching & Referral Hospital, Eldoret.

4. Challenges

Several barriers limit the development of a robust kidney transplant program in Kenya. Chief among these is the high cost of transplantation in a resource-constrained environment. Anecdotal evidence suggests that a kidney transplant costs between 10,000 USD in public hospitals and up to 15,000 USD in private facilities.

This does not include the pre-transplant workup, which is about 3,000 USD. Post-transplant care, including anti-rejection medications and routine tests, adds an additional 360 - 500 USD in the monthly out-of-pocket expenses [11]. The National Health Insurance Fund (NHIF), which has had significant uptake among ESRD patients, has been reimbursing healthcare providers between $5000 and $6500 for donor and recipient surgery, but hasn't been covering pre-transplant evaluation or long-term care. The Social Health Authority (SHA) has since replaced NHIF and promises post-transplant medication coverage in its benefit schedule. However, the fund is yet to be fully operationalized. A study published in Kenya assessing adherence to medication after renal transplant seems to suggest cost as a factor in high non-adherence rates of up to 46% underscoring the financial challenges around renal transplantation in Kenya [12].

While drug monitoring capabilities have improved over the years, testing for calcineurin inhibitor levels can take up to 48 hours and would delay medication adjustments in acute settings. Additionally, donor outcomes are not routinely assessed beyond the immediate post-transplant period [5]. Ethically, this raises concerns since most donations are from first-degree relatives, and genetic testing is not available. Equally, concerted effort to deter coercion within family settings is required beyond informed consent which is already in place. On the human resource front, the number of renal transplant surgeons is also low at less than 10 in Kenya. Equally important to note is the low nephrologist/million population numbers at 0.7 compared to the global average of 11.8.

Efforts are underway to establish a DDRT program, supported by the Human Tissue Act and national policy, which has criminalized organ sales and established a tissue and transplant authority [13]. However, key laboratory infrastructure to support tissue typing and cross-matching among other fundamentals for a DDRT program is yet to be set up. Currently, the reliance on overseas labs results in a high turnaround time. Additionally, an organ procurement program is yet to be established. There has been very little awareness campaigns to enlighten the general public on DDRT. Financing to actualize the program remains a key challenge since these endeavors are capital intensive for a LMIC.

Finally, public perception of both living and deceased kidney donation remains largely unexplored. Based on published literature, insights on public perceptions and attitudes towards kidney donation would help policy makers to not only understand barriers to donation but also tailor targeted interventions to address these challenges [14].

5. Future Directions

Significant progress has been made in kidney transplantation in Kenya, but there is still immense potential for growth. Advocating at the national level to reduce transplant costs, such as through bulk purchasing and tax exemptions on transplant-related medications could make the procedure more affordable. Expanding insurance coverage to include pre- and post-transplant care would also increase

access and improve transplant outcomes. Further investments in laboratory infrastructure are needed to support genetic screening, tissue typing, and to allow accurate and prompt diagnosis of native kidney disease and allograft rejections. Additionally, improved operating theater facilities and better transportation logistics are crucial for establishing a DDRT program [11]. A better understanding of public perception towards kidney donation and potential barriers to kidney transplantation is needed. This will potentially be helpful in tailoring awareness programs to improve uptake of kidney transplantation in Kenya.

Collaboration with more experienced transplant centers abroad could strengthen Kenya's transplant program by helping to train more transplant surgeons and nephrologists. Bidirectional partnerships would facilitate knowledge exchange and human resource development, enhancing the country's ability to provide high-quality kidney transplant services.

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Author Contributions

Conceptualization, J.T, M.K, A.M, and C.O.; Literature search, J.T, M.K, A.M and C.O.; writing—original draft preparation, C.O, A.M.; writing—review and editing, J.T, M.K.; supervision, J.T, M.K.; All authors have read and agreed to the published version of the manuscript.

Conflicts of Interest

The authors declare no conflicts of interest.

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