

ORIGINAL RESEARCH

Knowledge and attitudes of undergraduate medical students in Kenya towards solid organ donation and transplantation: Are Africa's future clinicians prepared?

Nelson Mweteri Mpekethu¹, Newnex Brian Mongare¹, Victor Mutua¹, Marie-Claire Wangari¹, Chris von Csefalvay², Daniel Ojuka¹

¹School of Medicine, University of Nairobi; ²Starschema Inc., Office of Intramural Research, Arlington, VA, USA.

ABSTRACT

Background: Solid organ donation and transplantation remains grossly underdeveloped in most African countries. The knowledge and attitude of tomorrow's professionals may be key to the improvement of these services.

Methods: A sample of undergraduate medical students from all the medical schools in Kenya offering Bachelor of Medicine and Bachelor of Surgery degrees were surveyed using a self-administered, web-based questionnaire, between July and September 2018.

Results: Of the 303 participants, 167 (55.1%) were female. Only 8.9% of the students had read the laws governing transplantation in Kenya. An even lower percentage (3.3%) felt that they had learned enough about solid organ donation and transplantation from their medical curriculum. More than half (53%) of the respondents would subscribe as solid organ donors, which reduced to 47% when it came to consenting to donating their relatives' organs. Less than half of the students (40%) considered they would be comfortable introducing the topic or confident answering questions (23%) related to organ donation and transplantation. Only 9.9% of the sample had ever spoken to a patient about organ donation. There was no significant association between level of study (pre-clinical versus clinical) and comfort introducing the topic of organ donation ($P = 0.206$) or experience talking to a patient about the subject ($P = 0.102$).

Conclusion: Undergraduate medical students have significant knowledge gaps regarding organ donation and transplantation and feel ill-prepared to approach a potential donor or transplant recipient.

Keywords: organ donation, undergraduate students, transplantation.

INTRODUCTION

Organ transplantation is a highly effective and successful way of treating end-stage organ disease involving the kidney, liver, heart, lung, pancreas, and intestine. End-stage organ failure is a major cause of mortality and morbidity worldwide, with transplantation demonstrating excellent treatment outcomes. Organ transplantation not only improves the quality of life [1] but also offers a longer life span and lowers healthcare costs compared to alternative approaches; a case in point is kidney transplantation versus dialysis [2,3]. Organ transplantation, however, remains underdeveloped in Africa, including Kenya. Data

from the Global Observatory on Donation and Transplantation estimates that, in the year 2014, about 30,000 transplants were performed in the United States, and more than 4,500 in both Spain and the UK [4], compared to a mere 30 transplants per annum in Kenya, all of which were kidney transplants [5]. Despite challenges, including limited resources, African countries demonstrate the need and capacity for providing transplant surgery with proper planning [6].

The development of an effective transplant system in Africa is imperative. Kenya's recent legislation [7] allowing

cadaveric organ donation in the country is a step in the right direction, seeing as legislation is an important factor in setting up a successful organ donation [8,9]. Other factors include cultural and societal beliefs and the level of awareness and education on organ donation among the general public and healthcare practitioners [10]. Of these, healthcare practitioner (HCP) knowledge, beliefs and attitudes towards organ donation are at the epicentre of transplant medicine. Failure to identify potential donors, lack of physician training in donation, ineffective HCP and family communication, and refusal of family consent have been identified as major barriers to donor utilization [11].

Physicians' ability to address end-of-life issues is another essential component of organ donation, ranging from the identification of potential donors to appropriate counselling of family members [12]. Recognizing a potential donor and initiating the donation process by approaching the family for consent is as daunting a task, if not more so, as breaking the news of a dead loved one to a bereaved family. These two tasks are inextricably linked, and special skills are undoubtedly required on the part of the clinicians on how to compassionately convey such information to the relatives [13].

HCPs have a key role to play in providing education and support to families about organ donation [14]. The general public has traditionally looked up to the physician for guidance, and therefore their attitude towards organ donation will undoubtedly affect that of the public [12]. Medical students, as future clinicians, will take up the role of promoting organ donation, and therefore their knowledge and attitude towards the practice, in part, will shape the future of transplant medicine in Kenya. Several analyses of medical students' attitudes towards organ donation have been carried out, mostly in developed countries [12,15,16], with a relative dearth of such studies in Africa [17]. To the best of our knowledge, no study to date has examined this subject in Kenya. In this investigation, we examined the knowledge and attitude of undergraduate medical students in Kenya towards solid organ donation and transplantation, and their comfort and confidence when addressing end-of-life issues.

METHODS

Study area and population

We report a descriptive cross-sectional survey. Between July and September 2018, we sampled undergraduate medical students from the nine medical schools in Kenya offering Bachelor of Medicine and Bachelor of Surgery (MBChB) degrees; these included Egerton University, Jomo Kenyatta University of Agriculture and Technology, Kenya

Methodist University, Kenyatta University, Maseno University, Moi University, Mount Kenya University, the University of Nairobi and Uzima University. The students were invited to take part in the project through online social-media platforms. The inclusion criterion was all undergraduate medical students (MBChB) registered by the Medical Students' Association of Kenya (MSAKE) who consented to the study. All medical students in Kenya are automatically members of MSAKE. Preclinical students were defined as those taking preclinical units (mainly anatomy, biology, physiology, and biochemistry) in the first two years of medical school. Clinical students (from the third year of medicine onwards) were those who were taking clinical units within the hospital and thus having patient contact. In Kenya, there are approximately 4770 medical students in harness every year.

Ethical approval was obtained from the KNH-UoN Ethics and Research Committee before the start of the study (UPI74/03/2018; ref: KNH-ERC/UA/60).

Sampling and data collection

Convenience sampling was employed to recruit the undergraduate medical students. Google Forms was used to develop an online questionnaire that included an electronic consent form. The would-be participant was redirected to the online questionnaire, only after well-informed electronic consent had been obtained. The questionnaire was designed to gather information in the following categories: demographic characteristics, general knowledge and attitudes towards organ donation and transplantation, and comfort and confidence addressing end-of-life issues. The questions were partly adapted from a questionnaire used in a previous related study in a separate setting [16].

RESULTS

Demographic characteristics

A total of 303 undergraduate medical students consented and responded to the questionnaire, of whom 167 (55.1%) were female and 136 were male. The levels of study of the different respondents were as follows: 66 (22%) students were in their first year, 40 (13%) in their second year, 58 (19%) in their third year, 60 (20%) in their fourth year, 42 (14%) in their fifth year, and 37 (12%) in their sixth year of study. The mean age was 22.06 ± 0.14 years. Eighteen (5.9%) of the respondents were irreligious. Of those with a particular religious affiliation, Protestantism was the most common, representing 51% of the study population, followed by Catholicism (22%), Islamic (15%), and Hinduism (4.6%). Details are summarized in Table 1.

Table 1. Current level of donation and transplantation knowledge.

Question		All (%)	Pre-clinical (%)	Clinical (%)	P value
Read the Kenya Health Act 2017?	Yes	27 (8.9%)	8 (4.9%)	19 (13.7%)	0.007
Feel you have learned enough relating to organ donation from your MBChB curriculum?	Yes	10 (3.3%)	4 (2.4%)	6 (4.3%)	0.585
	Somewhat	79 (26.1%)	45 (27.4%)	34 (24.5%)	
	No	214 (70.6%)	115 (70.1%)	99 (71.2%)	

Table 2. Attitudes towards donation and transplantation.

Question		All (%)	Pre-clinical (%)	Clinical (%)	P value
Would you accept a solid organ?	Yes	292 (96)	158 (96)	134 (96)	0.977
	Yes	160 (53)	76 (46)	84 (60)	
Would you subscribe as a donor?	Unsure	97 (32)	56 (34)	41 (30)	0.021
	No	46 (15)	32 (20)	14 (10)	
	Yes	141 (47)	67 (41)	74 (53)	
Would you consent to the donation of your relative's organs?	Unsure	84 (28)	45 (27)	39 (28)	0.024
	No	78 (26)	52 (32)	26 (19)	

Assessment of donation knowledge and training

The first subsection of the knowledge assessment part of the questionnaire assessed the students' awareness of the health legal environment pertinent to solid organ donation. Only 8.9% of the students had read the 2017 Health Act, with clinical medical students more likely to have read it than pre-clinical students (13.7% vs 4.9%, $P = 0.007$). More than a quarter (28%) of those who had not read the Health Act were hearing of it first at the time of the survey. Surprisingly, 10.9% of the students believed that solid organ donation was not at all being carried out in Kenya. Less than half (47%) were able to accurately identify the kind of solid organ transplantation carried out in the country at the time of the survey, that is, live organ donation.

The second subsection assessed the students' evaluation of the current medical curriculum with regard to solid organ donation. Only 3.3% of the students considered the curriculum adequately covered topics relating to organ donation. Level of study did not influence students' feeling of having learned enough about organ donation from the MBChB curriculum ($P = 0.585$).

Attitudes and beliefs towards solid organ donation

Two of the respondents had benefited from solid organ kidney donation, whereas 69 students (23%) knew some-

one who had benefited from a solid organ transplant, with the kidney being the most identified organ (84%).

A majority (96%) of the students would accept a solid organ if they needed one. Only 53% would readily subscribe as solid organ donors, and an even lower percentage (47%) would consent for the donation of their relative's organs after death. There was a significant association between the level of study (pre-clinical vs clinical) and the willingness to subscribe as an organ donor (46.3% vs 60.4%, $P = 0.021$) or willingness to consent to the donation of a relative's organs (40.9% vs 53.2%, $P = 0.024$) (Table 2).

Among the factors influencing the students' willingness to donate, the following contributed the most: scientific beliefs (47%), my family would object (26%), religious beliefs (22%), inadequate legislation/policy (17%), and I think the preservation of an intact body is important (13%).

End-of-life issues and approaching potential donors

A small proportion of the students (14%) had been involved in informing the spouse/relative about the death of a patient, with clinical students more likely to have been involved than pre-clinical students (33% vs 9%, $P < 0.001$). A slightly higher number (40%) considered they would be comfortable introducing the topic of organ donation to a potential donor, and 23% felt they would be confident



Question		All (%)	Pre-clinical (%)	Clinical (%)	P value
Involved in informing the spouse/ relative about the death of a patient?	Yes	42 (14)	9 (5.5%)	33 (24%)	<0.001
	No				
Talked to a patient about organ donation?	Yes	30 (10)	12 (7)	18 (13)	0.102
	No				
Comfortable introducing the topic of organ donation?	Yes	120 (40)	62 (38)	58 (42)	0.206
	Somewhat	96 (32)	48 (29)	48 (35)	
	No	87 (29)	54 (33)	33 (24)	
Confident answering questions to a patient about organ donation?	Yes	69 (23)	35 (21)	34 (25)	0.029
	Somewhat	103 (34)	47 (29)	56 (40)	
	No	131 (43)	82 (50)	49 (35)	

answering questions from a patient about organ donation; just 10% of the study population had spoken to a patient about organ donation (Table 3).

DISCUSSION

Here we present the first formal survey of Kenyan undergraduate medical students' level of knowledge and attitudes towards solid organ donation, so this report provides a unique insight into Kenya's future physicians' perspectives on the practice. It is important to note that none of the Kenyan universities includes organ donation in its curriculum.

Appropriate legislation, regulation and oversight, resource allocation towards physician training, and implementation of a professional donor-procurement network are some ways in which a government can support the local establishment of organ donation and transplantation programmes [18]. Organ donation and transplantation remains underdeveloped in Africa. The passage of the 2017 Health Act by the Kenyan government hopes to underpin its development. The physician's role and support are vital for the success of the programme. Undergraduate medical students especially represent a cohort of future physicians who would be largely responsible for the programme's further growth.

Most medical students seem unaware of the legal and procedural aspects of organ donation in their countries. A Brazilian [19] and an Indian survey [20] both revealed comparably low levels of awareness (14.3% and 40%, respectively) among medical students regarding their national organ donation laws, with the respective reporters emphasizing a need for greater familiarization with these legal guidelines.

This study shows that our medical students hold somewhat positive attitudes towards solid organ donation, with slightly more than half the study population willing to subscribe as donors. Reflecting less supportive pro-donation sentiments than their counterparts in industrialized nations, our findings parallel patterns seen in most surveys where more than half of the population were positive about donating their organs, a large group undecided, and the smallest proportion being negative [21]. Dutra et al. recorded 69.2% of students were willing to be donors [19]. Schaeffner et al. reported a mean attitude score of 72.1 among pre-clinical students, which increased with level of education to 76.5 among clinical students and to 79.5 among physicians [25]. However, expression of explicit willingness to donate does not necessarily translate into action. Chung et al. [16] found a huge discrepancy between attitude and action, with a very small number of those willing to donate actually putting that into action, that is, signing an organ donation card. Social desirability, where people tend to answer moral or ethical questions in a way that society expects them to answer, is another phenomenon that may overestimate the number of students who would sign up as donors. Therefore, as local plans to establish the donor registration process advance, it is important to consider such public attitudes. Our study reports only 53% of students would subscribe as donors; this may be a bellwether of an even lower proportion of the general public willing to do the same.

Interestingly, compared to those willing to donate, virtually all of the medical students surveyed were willing to accept an organ if they required one on medical grounds. This parallels findings from a South African survey in which only 8% of medical students were registered donors compared to 87% willing to accept an organ donation [17]; an

intriguing conundrum affecting the “donation gap” already plaguing the organ donation and transplantation process. This incongruence, when it comes to willingness to donate versus to receive an organ, has been observed in multiple surveys. Sanner [21], for example, postulated that a kind of psychological discomfort stemming from anxiety about death may play a role. Furthermore, as in most other studies [22,23], our students were more willing to donate their organs than they were inclined to provide those of their relatives. Topic et al. [22] observed that the willingness to donate the organs of a deceased family member was positive but not as strong as that in respect of an individual's own organs in order to help a person in need. Donmez et al. [23] reported 52.2% of healthcare workers were in favour of donating their organs compared to only 37.6% who would allow organs to be donated from a relative. Some of the reasons often previously cited for the unwillingness to consent to the donation of organs of a deceased relative include discomfort deciding on the organs of someone who has died, religious beliefs, and hesitancy related to disturbing the intactness of the body [23].

With the advent of laws allowing and governing cadaveric donation locally, a sensitive and crucial aspect of solid organ donation is the process of approaching a grieving family with a request that they donate the organs of the member they have just lost. This requires mastery of communication skills by healthcare professionals. Our study shows that a very small proportion of medical students had been involved in the process of informing the spouse about the death of a patient. Being a clinical as compared to a pre-clinical student was not associated with comfort introducing the topic or actual clinical experience talking to a patient about organ donation. Billings et al. [24] demonstrated that learning about end-of-life care through clinical encounters was significantly associated with increased self-perceived preparedness. Our findings may therefore represent a worrying lack of exposure and attendant unpreparedness among medical students regarding end-of-life matters. Less than half the students would feel comfortable introducing the topic and an even smaller number would be confident answering questions from a patient about organ donation. This observation compares with other studies in which similarly low numbers of medical students felt sufficiently prepared to approach potential donors [22,25]. Although guidelines on how to pass on the information about a dead patient have been published, communication skills are lacking. As a result, many doctors report having difficulties in handling end-of-life issues [26,27]. The surest way of producing doctors who are better at coping with this awkward but extremely important aspect of clinical medicine is to fully integrate the

subject into the undergraduate medical curriculum [28,29]; equipping medical students with communication skills essential for handling end-of-life issues and approaching potential donors.

There are several limitations to this study. First, although we clearly explained the purpose of the survey and announced that no test was being taken and that everyone should answer the items by themselves, we cannot rule out the possibility of participants copying answers. Second, organ transplantation is an issue that can prompt people to feel moral pressure to report socially desirable answers. These factors could have led to an overestimated positive attitude towards organ donation among our participants. Future studies can include a larger sample size and investigate if there are any significant differences based on the different universities in Kenya.

CONCLUSION

Our survey reveals that there are fairly positive attitudes towards solid organ donation. Large knowledge deficits exist, however, when it comes to this topic, ranging from simple awareness of legislation governing transplantation locally to basic knowledge on organ donation that would enable a medical student to respond to questions a potential organ donor may pose. Undergraduate medical students also expressed concerns about their ability to handle end-of-life issues. The study supports the need to establish an elaborate education programme for these students on solid organ donation and end-of-life issues, including informal teachings such as through supervised clinical experiences. This would better equip future doctors with knowledge and confidence in counselling on organ donation issues and, being a growing field in the developing world, potentially inspire more medical students to consider a specialty in transplant surgery. A recommendation for future studies is to assess the general public's knowledge of and attitudes towards solid organ donation.

Author contributions

NMM and NBM conceptualized the study; NMM, NBM and MCW designed the survey; NBM and NMM curated the data; NBM and VM were responsible for the analytical software and formal analysis; NBM, VM and NMM wrote the first draft and all authors were involved in reviewing and editing the article.

Conflict of interest

The authors declare no conflict of interest.

Source of funding

The authors received no financial support for this study.

REFERENCES

1. Pinson CW, Feurer ID, Payne JL, Wise PE, Shockley S, Speroff T. Health-related quality of life after different types of solid organ transplantation. *Ann Surg.* 2000; 232(4):597-607.
2. Chen BY, Fletcher A, Damji AN, et al. Organ and tissue donation in Canadian undergraduate medical education. *Can Med Assoc J.* April 2016.
3. Eggers P. Comparison of treatment costs between dialysis and transplantation. *Semin Nephrol.* 1992; 12(3):284-289.
4. Matesanz R, Mahillo B, Carmona AM. International Figures on Donation and Transplantation 2013. Newsletter Transplant. Spain: Organizacion Nacional de Transplantes (ONT). 2014.
5. Murumba S. Kidney patients face higher bills as KNH increases transplant costs. *Business Daily.* Retrieved from <https://www.businessdailyafrica.com/news/Kidney-patients-face-higher-bills/539546-2938892-w8awczj/index.html>.
6. Pullen LC. Transplantation in Africa. *Am J Transplant.* 2017; 17(6):1431-1432.
7. Merab E. New law for organ donation to ease transplant pain. *Daily Nation.* Retrieved from <https://www.nation.co.ke/news/new-law-for-organ-donation-to-ease-transplant-pain/1056-3983126-7kgir5z/index.html>.
8. Cate FH. *Human Organ Transplantation: The Role of Law.*; 1994.
9. Da Silva IRF, Frontera JA. Worldwide barriers to organ donation. *JAMA Neurol.* 2015; 72(1):112.
10. Rizvi SAH, Naqvi SAA, Hussain Z, et al. Renal transplantation in developing countries. *Kidney Int.* 2003; 63:596-5100.
11. Ploeg RJ, Niesing J, Sieber-Rasch MH, Willems L, Kranenburg K, Geertsma A. Shortage of donation despite an adequate number of donors: a professional attitude? *Transplantation.* 2003; 76(6):948-955.
12. Hobeika MJ, Simon R, Malik R, et al. U.S. Surgeon and Medical Student Attitudes Toward Organ Donation. *J Trauma Inj Infect Crit Care.* 2009; 67(2):372-375.
13. Cook P, White DK, Ross-Russell RI. Bereavement support following sudden and unexpected death: guidelines for care. *Arch Dis Child.* 2002; 87(1):36-38.
14. Mercer L. Improving the rates of organ donation for transplantation. *Nurs Stand.* 2013; 27(26):35-40.
15. Bapat U, Kedlaya PG, Gokulnath. Organ donation, awareness, attitudes and beliefs among post graduate medical students. *Saudi J Kidney Dis Transpl.* 2010; 21(1):174-180.
16. Chung CKY, Ng CWK, Li JYC, et al. Attitudes, knowledge, and actions with regard to organ donation among Hong Kong medical students. *Hong Kong Med J [Xianggang yi xue za zhi].* 2008; 14(4):278-285.
17. Sobnach S, Borkum M, Millar AJW, et al. Attitudes and beliefs of South African medical students toward organ transplantation. *Clin Transplant.* 2012; 26(2):192-198.
18. White SL, Hirth R, Mahillo B, et al. The global diffusion of organ transplantation: trends, drivers and policy implications. *Bull World Heal Organ.* 2014; 92:826-835.
19. Dutra MM, Bonfim TA, Pereira I, Figueiredo I, Dutra AM, Lopes A. Knowledge about transplantation and attitudes toward organ donation: a survey among medical students in Northeast Brazil. *Transplant Proc.* 2004; 36(4):818-820.
20. Balwani M, Pasari A, Aziz F, et al. Knowledge regarding brain death and organ donation laws among medical students. *Transplantation.* 2018; 102: S812.
21. Sanner MA. People's attitudes and reactions to organ donation. *Mortality.* 2006; 11(2):133-150.
22. Topic I, Brkljacic T, Grahovac G. Survey of medical students about attitudes toward organ donation. *Dial Transplant.* 2006 ;35(9):571-574, 567, 577-578.
23. Donmez L, Ozbey C, Aydogan S. Knowledge, attitudes, and behaviors regarding organ transplantation in a primary healthcare region in Turkey. *Dial Transplant.* 2003; 32:324-329+348.
24. Billings ME, Engelberg R, Curtis JR, Block S, Sullivan AM. Determinants of medical students' perceived preparation to perform end-of-life , quality of end-of-life care education, and attitudes toward end-of-life care. *J Palliat Med.* 2010; 13(3):319-326.
25. Schaeffner ES, Windisch W, Freidel K, Breitenfeldt K, Winkelmayr WC. Knowledge and attitude regarding organ donation among medical students and physicians. *Transplantation.* 2004; 77(11):1714-1718.
26. Barnett MM, Fisher JD, Cooke H, James PR, Dale J. Breaking bad news: consultants' experience, previous education and views on educational format and timing. *Med Educ.* 2007; 41(10):947-956.
27. Marcus JD, Mott FE. Difficult conversations: from diagnosis to death. *Ochsner J.* 2014; 14(4):712-717.
28. Naik SB. Death in the hospital: Breaking the bad news to the bereaved family. *Indian J Crit Care Med.* 2013; 17(3):178-181.
29. VandeKieft GK. Breaking bad news. *Am Fam Physician.* 2001; 64(12):1975-1978.