

# The Gift of Life: Knowledge and Attitude toward Organ Donation among Medical Students in Malaysia

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## INTRODUCTION

Globally, every 15 min, one more patient is added to the long waiting list for organ transplant. The waiting list keeps getting longer as the number of donors is few and far between.

The regional report of ONT-WHO Global Observatory on Donation and Transplantation showed seven actual deceased donors and 85 total organ transplants per million population during 2018, which was very low compared to its demands.<sup>[1,2]</sup> The *Star Online Report* in 2018 also showed that regarding registration for organ donation, Chinese were the highest followed by Malays, Indians, and others. However, this rate was also very

low (1 out of 30 million Malaysians) compared to the waiting list (>20,000) of the patients who are seeking organ transplantation.<sup>[3]</sup>

The purpose of this study was to determine whether the knowledge and attitude toward organ donation differ among the young population by identifying the causative factors, which will bring down the wide gap between the organ donors and the patients.

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## ABSTRACT

**Background:** In Malaysia, there is a large gap between the number of organ donors and recipients. **Aim and Objectives:** This study was done to determine the knowledge and attitude toward organ donation among medical students in a private medical institution in Malaysia. **Materials and Methods:** A cross-sectional study was conducted from April to June, 2019, among 122 randomly selected participants from MBBS students of a private medical university, Malaysia. Data were collected using a pretested semi-structured questionnaire. **Results:** The mean age of the study participants was 23.23 years (standard deviation  $\pm$  0.58 years). The male-to-female ratio was almost equal (49.2: 50.8%). All the participants (100%) had correct knowledge regarding brain death and the place of registration for organ donation. However, only 54 (44.3% students [95% confidence interval (CI): 35.49–53.11]) had adequate knowledge about organ donation and 59 (48.4%) students (95% CI: 39.53–57.27) had a positive attitude toward it. Younger respondents (odds ratio [OR] = 0.3685,  $P$  = 0.02) were more likely to have higher knowledge about organ donation. Positive attitude was more among male respondents (OR = 0.8788,  $P$  = 0.72) and those aged <24 years (OR = 0.5535,  $P$  = 0.19) but were not statistically significant. The study showed that there was no statistically significant relationship between knowledge of organ donation and attitude. **Conclusion:** Almost half of the study population had adequate knowledge of organ donation, but most of them had a negative attitude toward it. It is crucial to address the misconceptions and sociocultural beliefs regarding organ donation through various awareness campaigns. Further study is required to explore the factors hindering willingness to organ transplantation.

**KEYWORDS:** Attitude, awareness, medical students, organ donation

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## MATERIALS AND METHODS

### Setting

This cross-sectional study was conducted in Kedah, Malaysia, from April to June 2019.

### Study population

The study population consisted of MBBS year-4 students of the private medical university who identified themselves as Malaysian and who are currently undertaking full-time undergraduate medical course.

### Sample size calculation

The sample size was calculated using OpenEpi (version 3.01 updated 2013/04/06, USA); considering hypothesized % frequency of outcome factor in the population ( $p$ ):  $20\% \pm 5$  and 5% alpha error, the minimum sample size was calculated to be 122.<sup>[4]</sup>

### Data management

One hundred and twenty-two students were randomly selected from MBBS students (keeping nonresponse rate as 10% using this line list through simple random sampling. All the MBBS year-4 students were included in this study. MBBS students from years 1, 2, 3, and 5 were excluded from this study. A semi-structured questionnaire was administered after obtaining informed verbal consent. The purpose and motive of the study were explained to the participants. The questionnaire assessed knowledge and attitude. The validated questionnaire was made up of three parts: the first part contains the sociodemographic details of individuals such as gender (male/female), age in years (<24/>24), and ethnicity (Malay/Chinese/Indian).

In the second part, students' knowledge on organ donation was assessed by using a 5-item questionnaire. The variables include can differentiate between persistent vegetative state and brain death (no/yes), eligibility status for organ donation (no idea/don't know and living donor/brain death person/after death), know the meaning of brain death (no idea/don't know, yes) [irreversible loss of brain functioning/patient is legally dead/heart continues to function due to support by ventilator]), knowledge regarding place of registration (no; yes [government hospital/medical college/nongovernmental organizations]), and a single donor can donate to multiple recipients (no/yes). Knowledge on organ donation was assessed based on one domain. It includes whether they have heard about eligibility status for organ donation or not. Participants who were able to answer correctly for this domain were considered to have adequate knowledge on organ donation.

The third part assessed the attitude toward organ donation among the study participants. It consisted of

three subsections measuring practices. The variables included any talk about organ donation during the study period with any patient (yes/no) and willing to donate organ in future (yes/no). The attitude toward organ donation was assessed based on one domain which was their willingness to donate organ in future. Participants who answered as willing to donate organ in future were considered having positive attitude toward organ donation.

Then the association of sociodemographic characteristics with the outcome variables (knowledge and attitude), and the relationship between the two outcomes (knowledge and attitude) on organ donation were assessed [Questionnaire 1].

### Statistical analysis

After collection of data, they were checked for completeness and were entered into EpiData 3.1 version and exported to SPSS 23.0 version for further analysis. Continuous variables such as age of the participants were summarized as mean (standard deviation [SD]). Categorical variables were summarized as frequency (percentage).

Binary logistic regression (Chi-square test/Fisher's exact test) was used to find the association between sociodemographic characteristics and knowledge and attitude toward organ donation, which was summarized as odds ratio (OR).  $P < 0.05$  was considered statistically significant. The Pearson's correlation test was conducted to establish the relationship between the outcome variables.

### Outcome variable

The main outcome variable was knowledge and attitude toward organ donation among the study participants.

### Explanatory variables

The sociodemographic variables and the variables related to knowledge and attitude toward organ donation were described at individual levels.

### Ethical considerations

The study was a part of a special study module of faculty of medicine of a private medical university MBBS program. The study was given ethical approval by the ethical review committee of the university (letter number FOM/SSM/2019/031 dated July 4, 2019). All ethical requirements including confidentiality of responses and informed consent were strictly ensured.

## RESULTS

Table 1 depicts the sociodemographic data of the respondents. Among 223 students, 122 were included in this study. The mean age of the respondents

was 23.23 years (SD  $\pm$  0.58 years). More than half (62 [50.8%]) were female; regarding their ethnicity, 2 (1.6%) were Malays, 55 (45.1%) were Chinese, and 65 (53.3%) were Indians [Table 1].

Table 2 shows the knowledge regarding organ donation determined based on one domain among the study respondents. Regardless, less than half (45.1%) of the respondents could differentiate between persistent vegetative state and brain death, and all the respondents knew the meaning of brain death and the place of registration for organ donation. Nearly nine out of ten (98.4%) knew that a single donor can donate to multiple recipients. Overall, 54 (44.3) respondents had adequate knowledge about organ donation (95% confidence interval [CI]: 35.49–53.11) [Table 2].

**Table 1: Sociodemographic data of the respondents (n=122)**

Sociodemographic characteristics (n=122)	Respondents in frequency, n (%)	95% CI
Gender		
Male	60 (49.2)	40.33-58.07
Female	62 (50.8)	41.93-59.67
Age (years)		
<24	97 (79.5)	72.34-86.66
>24	25 (20.5)	13.34-27.66
Ethnicity		
Malay	2 (1.6)	-0.63-3.83
Chinese	55 (45.1)	36.27-53.93
Indian	65 (53.3)	44.45-62.15

CI: Confidence interval

Table 3 represents the attitude toward organ donation determined based on one domain among the respondents. More than half of the study respondents (67 [54.92%]) talked about organ donation with the patients during the study period time, whereas 59 (48.4%) were willing to donate organ in future. Overall, 59 (48.4%) respondents showed positive attitude toward organ donation (95% CI: 39.53–57.27) [Table 3].

Table 4 represents the association of sociodemographic characteristics with adequate knowledge and attitude toward organ donation. Chi-square test/Fisher's exact test was used to find the association between sociodemographic characteristics and adequate knowledge regarding organ donation. Students aged <24 years (OR = 0.3685) were found to have more adequate knowledge on organ donation when compared to those belonged to more than 24 years of age and also found to be statistically significant ( $P < 0.05$ ). Male gender (OR = 1.5652) and the Chinese ethnic group (OR = 0.934) were found to have less adequate knowledge on organ donation. However, these variables were not statistically significant [Table 4].

The variables of male gender (OR = 0.8788) and age <24 years were found to have more positive attitude toward organ donation when compared to female gender and age above 24 years, but these variables were not statistically significant.

The Pearson's correlation test was conducted to establish the relationship between the outcomes (knowledge and attitude); the findings are presented in Table 5.

**Table 2: Knowledge regarding organ donation determined based on one domain among the study participants (n=122)**

Variables	Respondents in frequency, n (%)	95% CI
Can differentiate between persistent vegetative state and brain death		
No	67 (54.9)	46.07-63.73
Yes	55 (45.1)	36.27-53.93
Eligibility status for organ donation		
No idea/don't know	68 (55.7)	46.89-64.51
Living donor/brain death person/after death	54 (44.3)	35.49-53.11
Know the meaning of brain death		
No idea/don't know	0 (0)	0
Yes (irreversible loss of brain functioning/patient is legally dead/heart continues to function due to support by ventilator)	122 (100)	100-100
Knowledge regarding place of registration		
No	0 (0)	0
Yes (government hospital/medical college/NGOs)	122 (100)	100-100
A single donor can donate to multiple recipients		
No	2 (1.6)	-0.63-3.83
Yes	120 (98.4)	96.17-100.63
Knowledge regarding organ donation		
Inadequate	68 (55.7)	46.89-64.51
Adequate**	54 (44.3)	35.49-53.11

\*\*If one domain (eligibility status for organ donation) was correct, then they were considered to have adequate knowledge. CI: Confidence interval, NGO: Nongovernmental organization

There was no statistically significant relationship between knowledge on organ donation and attitude toward it. It showed that adequate knowledge on organ donation among the respondents does not translate into positive attitude toward it [Table 5].

## DISCUSSION

According to some studies on organ donation, medical students can serve as a role model by creating awareness on organ donation among the general

population.<sup>[5,6]</sup> Our study revealed that more than half (55.7%) (95% CI: 46.89–64.51) of the respondents had inadequate knowledge on organ donation. This finding is consistent with some other studies.<sup>[7-12]</sup> This limited knowledge of medical students about organ donation is likely a result of the limited time and resources on this subject in the undergraduate medical curriculum. Moreover, practicing less time to surgical topics in many countries is another explanation of it.<sup>[13]</sup> Lack of formal teaching about the identification of potential donors creates difficulties to the physicians in approaching the family members about the possibility of organ donation.<sup>[14]</sup> On the other hand, most of the people do not discuss any positive issue on organ donation with their family members.<sup>[15,16]</sup> Opposite findings had been reported in some studies.<sup>[17-20]</sup> More structured education system on organ donation is the predictor to this higher incidence regarding knowledge on organ donation.<sup>[21]</sup>

In this study, students' age was found to be significantly associated with knowledge regarding organ donation (OR = 0.3685) ( $P = 0.02$ ). Similar trends were noted by another study in Malaysia.<sup>[22]</sup> In our study, only 54 (44.3%) (95% CI: 35.49–53.11) respondents knew the eligible criteria for organ donation. Similar finding was found from other studies, which also showed that minority of their study population were aware of it.<sup>[15,23]</sup> Insufficient organ donation program strategies might be one of the possible reasons of it.

**Table 3: Attitude toward organ donation determined based on one domain among the study participants (n=122)**

Variables	Respondents in frequency, n (%)	95% CI
Talked recently about organ donation with any patient?		
Yes	67 (54.92)	46.09-63.75
No	55 (45.08)	36.25-53.91
Willing to donate organ in future*		
Yes	59 (48.4)	39.53-57.27
No	63 (51.6)	42.73-60.47
Attitude toward organ donation		
Positive attitude**	59 (48.4)	39.53-57.27
Negative attitude	63 (51.6)	42.73-60.47

\*\*Considered for determining attitude toward organ donation, \*If one (willing to donate organ in future) was present, then they were considered to have positive attitude. CI: Confidence interval

**Table 4: Association of sociodemographic characteristics with adequate knowledge and attitudes on organ donation among the study participants**

Sociodemographic factors	Adequate knowledge regarding organ donation, n (%)	OR	95% CI	P
Gender (n=54)				
Male	23 (42.59)	1.5652	0.76-3.2	0.223
Female	31 (57.4)			
Age (n=54)				
<24	38 (70.4)	0.3685	0.15-0.91	0.02*
>24	16 (29.6)			
Ethnicity (n=53)				
Chinese	24 (44.44)	0.934	0.452-1.930	0.854
Indian	29 (53.70)			
	Adequate attitude regarding organ donation, n (%)	OR	95% CI	P
Gender				
Male	30 (52)	0.8788	0.43-1.78	0.72
Female	29 (48)			
Age				
<24	44 (45.8)	0.5535	0.23-1.35	0.19
>24	15 (54.2)			
Ethnicity (n=58)				
Chinese	29 (52.5)	1.3846	0.674-2.847	0.3741
Indian	29 (47)			

\* $P < 0.05$ , statistically significant. OR: Odds ratio, CI: Confidence interval



**Table 5: Correlation between knowledge and attitude toward organ donation among the study participants (n=122)**

	Knowledge on organ donation	Attitude toward organ donation
Knowledge on organ donation	1	0.088
Significant (two tailed)		0.335
Attitude toward organ donation	0.088	1
Significant (two tailed)	0.335	

\*Correlation is significant at the 0.01 level (two tailed)

With regard to willingness, this study established that majority of the participants showed negative attitudes toward donating organ in future. Similar findings have been reported in other research, which showed a moderate attitude toward organ donation. The reasons behind unwillingness toward organ donation were psychological anxiety, myths, fear of disfigurement, and misconceptions about organ donation and religious belief.<sup>[24-28]</sup> On the contrary, opposite finding was noticed in some other studies, which showed that most of the participants would like to donate their organs. The reasons behind the willingness to donate their organs in future were to save someone's life, to make people healthy again, to live after death in another person's body, and to be a role model to other people. Besides, they believed that organ donation is honorable for the humanity.<sup>[21-29]</sup>

In the present study, gender and ethnicity were not significant predictors for willingness to donate organs. However, some studies opposed these findings. Their findings showed that higher percentage of female medical students had positive attitudes toward organ donation compared to their male counterparts. Those studies also indicated ethnicity as a significant predictor. Traditional cultural beliefs such as significance of preserving an intact body after death, objection from family members, and religious restrictions were the main factors of it.<sup>[30-36]</sup>

Of all the respondents, we did not find any significant correlation between adequate knowledge and positive attitude toward organ donation, which was showing poor commitment. However, correlation does not imply causation. One study finding reported opposite results, which showed higher percentage of both awareness and positive attitudes toward organ donation among the medical students.<sup>[37]</sup> More structured educational sessions in medical sciences curriculum can increase the awareness of organ donation that can lead to better procurement rates for organ donations.<sup>[15]</sup>

Students who have better knowledge on organ donation usually are confident on discussing the topic. A good

communication skill with sensitive approaches is very crucial to motivate the general public. Health-care specialists can influence organ procurement rates.<sup>[38-43]</sup> Effective awareness on organ donation among the future health-care providers would help to promote the positive attitude toward it.<sup>[6,23]</sup>

This study was conducted in a single private university, thus views of medical students in other institutions may differ. Despite this limitation, the findings regarding the knowledge and attitude toward organ donation was one of the strengths of this study.

Organ transplantation is an emerging issue of public health importance. Unfortunately, there is a large gap between the need and actual status of organ donation. This inequity is not only in Malaysia but it is also a global finding. Despite moderate knowledge about organ donation, the willingness toward it is very poor. Because of being the critical link in the organ procurement process, the health-care professionals can play a vital role to motivate the community toward willingness to organ donation. From this study, we note that medical students lack the knowledge, awareness, and motivation they should have for organ donation; though we cannot extrapolate to other universities, academicians can play an important role in emphasizing the importance of organ donation as they are our future doctors.

## CONCLUSION

Organ transplantation is a cost-effective treatment option for many end-stage organ diseases, including liver disease, heart disease, and renal failure. The key to success in organ donation largely depends on individuals' attitudes and awareness. The large gap between organ donors and the receivers can only be bridged by increasing public awareness, especially among the young generation, about organ donation along with ethical fundamentals. Medical students are future health professionals, so their willingness toward organ donation can play a crucial role to motivate the general population about it. Effective strategic interventions are required to boost organ donation. Government initiatives can promote the general public to commit to organ donation, which, in turn, can provide life benefits to many patients suffering from end-stage diseases.

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## Conflicts of interest

There are no conflicts of interest.

## REFERENCES

- Organ Donation and Transplantation Reports. Global Observatory on Donation and Transplantation (GODT) World Health Organization. 2018. Available from: <http://www.transplant-observatory.org/>. [Last accessed on 2018 Feb 14].
- Organ Donation and Transplantation Activities. Global Observatory on Donation and Transplantation (GODT). World Health Organization; 2015. Available from: <http://www.transplant-observatory.org/Pages/Data-Reports.aspx>. [Last accessed on 2018 Feb 15].
- The Star Online. Malaysia's Organ Donation Rate among Lowest in the World. Available from: <https://www.thestar.com.my/news/nation/2016/10/04/malaysia-organ-donation-rate-among-lowest-in-the-world>. [Last accessed on 2018 Feb 15].
- OpenEpi – Toolkit Shell for Developing New Applications. Available from: <http://www.openepi.com/SampleSize/SSPropor.htm>. [Last accessed on 2017 Oct 31].
- Abidin ZL, Ming WT, Loch A, Hilmi I, Hautmann O. Are health professionals responsible for the shortage of organs from deceased donors in Malaysia? *Transplant Int* 2013;26:187-94.
- Schaeffner ES, Windisch W, Freidel K, Breitenfeldt K, Winkelmayr WC. Knowledge and attitude regarding organ donation among medical students and physicians. *Transplantation* 2004;77:1714-8.
- Savaser S, Sahiner NC, Dogan Z, Caglar S, Mutlu B. The effect of nursing education on the opinion of students regarding organ donation. *Int J Nurs Clin Pract* 2015;2:124.
- Ali NF, Qureshi A, Jilani BN, Zehra N. Knowledge and ethical perception regarding organ donation among medical students. *BMC Med Ethics*. 2013;14:38.doi:10.1186/1472-6939-14-38.
- Bardell T, Childs AL, Hunter DJ. Organ donation: A pilot study of knowledge among medical and other university students. *Ann R Coll Physicians Surg Can* 2002;35:77-80.
- Laederach-Hofmann K, Gerster BI. Knowledge, attitude and reservations of medical students about organ transplantation: Results of a survey during the first year of study. *Schweiz Med Wochenschr* 1998;128:1840-9.
- Darlington D, Anitha FS, Joseph C. Study of knowledge, attitude, and practice of organ donation among medical students in a tertiary care centre in South India. *Cureus The Cureus Journal of Medical Science*;11:e4896.
- Sindhu A, Ramakrishnan TS, Khera A, Singh G. A study to assess the knowledge of medical students regarding organ donation in a selected college of Western Maharashtra. *Med J DY Patil Univer* 2017;10:349.
- Richardson JD. Workforce and lifestyle issues in general surgery training and practice. *Arch Surg* 2002;137:515-20.
- Schütt GR. True organ donor potential: A retrospective single-center study. *Transplant Proc* 2000;32:66-7.
- Bardell T, Hunter DJ, Kent WD, Jain MK. Do medical students have the knowledge needed to maximize organ donation rates? *Can J Surg* 2003;46:453-7.
- Sawhney C, Kaur M, Lalwani S, Gupta B, Balakrishnan I, Vij A. Organ retrieval and banking in brain dead trauma patients: Our experience at level-1 trauma centre and current views. *Indian J Anaesth* 2013;57:241-7.
- Emdadul Haque AT, Adaikalasamy A, Beh Li E, Yi Ying RW, Haque M. Organ donation and transplantation: Awareness, attitude and aptitude of the UniKL-RCMP students, Malaysia. *Res J Pharm Technol* 2015;8:1333-42.
- Sah SP, Bhandari K, Acharya S. Organ donation: Perception among medical students. *IP Indian J Anat Surg Head Neck Brain* 2019;5:118-23.
- Bapat U, Kedlaya PG, Gokulnath. Organ donation, awareness, attitudes and beliefs among post graduate medical students. *Saudi J Kidney Dis Transpl* 2010;21:174-80.
- Ali NF, Qureshi A, Jilani BN, Zehra N. Knowledge and ethical perception regarding organ donation among medical students. *BMC Med Ethics* 2013;14:38.
- Bharambe V. K, Rathod H, Angadi K. Knowledge and Attitude Regarding Organ Donation among Medical Students, BANTAO Journal, 2016;14:34-40. doi: <https://doi.org/10.1515/bj-2016-0008>.
- Huern S, Shin Yee K, Rajah J, Ponniah M. Knowledge, awareness and attitudes on organ donation among undergraduate medical students in Malaysia: An Analytical cross sectional study. *J Adv Med Med Res* 2016;16:1-14.
- Saleem T, Ishaque S, Habib N, Hussain, Syedda J, Areeba K, et al. Knowledge, attitudes and practices survey on organ donation among a selected adult population of Pakistan. *BMC medical ethics*. 2009;10:5. <https://doi.org/10.1186/1472-6939-10-5>.
- Tumin M, Tafran K, Tang LY, Chong MC, Mohd Jaafar NI, Mohd Satar N, et al. Factors associated with medical and nursing students' willingness to donate organs. *Medicine* 2016;95:e3178.
- Riyanti S, Hatta M, Norhafizah S, Balkish MN, Siti ZM, Akmal AH, et al. Organ donation by sociodemographic characteristics in Malaysia. *Asian Soc Sci* 2014;10:264-72.
- Zhang L, Li Y, Zhou J, Miao X, Wang G, Li D, et al. Knowledge and willingness toward living organ donation: a survey of three universities in Changsha, Hunan Province, China. *Transplant Proc*. 2007 Jun;39(5):1303-9. doi: 10.1016/j.transproceed.2007.02.096. PMID: 17580127.
- Inthorn J, Whlke S, Schmidt F, Schick Tanz S. Impact of gender and professional education on attitudes towards financial incentives for organ donation: Results of a survey among 755 students of medicine and economics in Germany. *BMC Med Ethics* 2014;15:56.
- Burra P, De Bona M, Canova D, D'Aloiso MC, Rumiati GR, Ermani M, Ancona E. Changing attitude to organ donation and transplantation in university students during the years of medical school in Italy. *Transplant Proc* 2005;37:547-50.
- Tontus O, Karabey M, Gurdal N. Survey of medical students' attitudes, religious beliefs, and knowledge of organ donation. *Cells Tissues Organs* 2011;14:203.
- Rasiah R, Manikam R, Chandarsekaran SK, Thangiah G, Puspharajan S, Swaminathan D. The influence of socioeconomic and demographic variables on willingness to donate cadaveric human organs in Malaysia. *Medicine* 2014;93:e126.

31. Loch A, Hilmi I, Mazam Z, Pillay Y, Choon D.S.K. differences in attitude towards cadaveric organ donation: observations in a multiracial Malaysian society. *Hong Kong Journal of Emergency Medicine*. 2010. 17:236-243. 10.1177/102490791001700306.
32. Siminoff LA, Burant CJ, Ibrahim SA. Racial disparities in preferences and perceptions regarding organ donation. *J Gen Internal Med* 2006;21:995-1000.
33. Regalia K, Zheng P, Sillau S, Aggarwal A, Bellevue O, Fix OK, *et al.* Demographic factors affect willingness to register as an organ donor more than a personal relationship with a transplant candidate. *Dig Dis Sci* 2014;59:1386-91.
34. Agrawal S, Binsaleem S, Al-Homrani M, Al-Juhayim A, Al-Harbi A. Knowledge and attitude towards organ donation among adult population in Al-Kharj, Saudi Arabia. *Saudi J Kidney Dis Transpl* 2017;28:81-9.
35. Bilgel H, Sadikoglu G, Bilgel N. Knowledge and attitudes about organ donation among medical students. *Transplantationsmedizin*. 18. Tx Med 2006;8:91-6.
36. Chung CK, Ng CW, Li JY, Sum KC, Man AH, Chan SP, *et al.* Attitudes, knowledge, and actions with regard to organ donation among Hong Kong medical students. *Hong Kong Med J* 2008;14:278-85.
37. Rykhsch ME, Coupland C, Dionne J, Fudge B, Gayle C, Ortner TL, *et al.* and Wroblewska, M., A clinical group's attempt to raise awareness of organ and tissue donation. *Progress in Transplantation* (Aliso Viejo, Calif.). 2010;20:33-9. DOI: 10.7182/prtr.20.1.g72751q64l63g7w5.
38. Riker RR, White BW. The effect of physician education on the rates of donation request and tissue donation. *Transplantation* 1995;59:880-4.
39. Wamser P, Goetzinger P, Steininger R, Gnant M, Sautner T, Mühlbacher F. Discontinuing of a permanent information and education program among donor ICUS leads to a 50% decrease of organ donor rates. *Transplant Proc* 1993; 25:2988-9.
40. Evanisko MJ, Beasley CL, Brigham LE, Capossela C, Cosgrove GR, Light J, *et al.* Readiness of critical care physicians and nurses to handle requests for organ donation. *Am J Crit Care* 1998;7:4-12.
41. Henderson SO, Chao JL, Green D, Leinen R, Mallon WK. Organ procurement in an urban level 1 emergency department. *Ann Emerg Med* 1998;31:466-70.
42. Novello AC, Braslow JB. Increasing organ donations: An important issue for medical educators. *Acad Med* 1992;67:314-5.
43. Soubhanneyaz A, Kaki A, Noorelahi M. Survey of public attitude, awareness and beliefs of organ donation in Western Region of Saudi Arabia. *Am J Internal Med* 2015;3:264-71.

**Questionnaire 1: Organ donation****Part-1: Demographic data**

Gender	Male
	Female
Age	<24
	>24
Ethnicity	Malay
	Chinese
	Indian

**Part-2: Knowledge on organ donation****Yes No No Idea**

- 1 Do you know in a brain-dead patient, all brain stem reflexes are absent? (can differentiate between persistent vegetative state and brain death)
- 2 Who can be an organ donor? (living donor/brain death person/after death)  
(eligibility status for organ donation)
- 3 Do you know the features of brain death? (irreversible loss of brain functioning/patient is legally dead/heart continues to function due to support by ventilator) (know the meaning of brain death)
- 4 Do you know the place of registration for organ donation in your country? (government hospital/medical college/NGOs) (knowledge regarding place of registration)
- 5 Do you know that a single donor can donate to multiple recipients?

NGO: Nongovernmental organization

**Part-3: Attitude toward organ donation****Yes No**

- 1 Have you talked recently about organ donation with any patient?
- 2 Would you like to be an organ donor in future?