Letter to the Editor

Knowledge and Attitudes of Intensive Care Unit Healthcare Workers towards Human Organ Donation in Singapore

Dear Editor,

Organ transplantation is the treatment of choice for end-stage organ failure. However, there still exists a great imbalance between organ demand and organ availability worldwide, limiting the application of organ transplantation.[1]

The Human Organ Transplant Act (HOTA) was enacted in Singapore in 1987, with amendments made in 2004 and 2008 to expand the organ donor pool. Currently, HOTA includes donation of kidneys, liver, heart and corneas after certification of brain death. It remains an opt-out scheme in which all Singapore citizens and permanent residents aged 21 years old and above, who are not mentally disordered, are presumed to consent for organ donation.[2,3] For a patient who is eligible, the process briefly starts with the certification of brain death by 2 independent specialists, activation of the transplant coordinator, followed by assessment of suitability of organs, and if suitable, proceeding to organ retrieval. This is coordinated by a trained brain death coordinator.

Despite legislative amendments, the rate of organ donation in Singapore has remained low at 6.6 to 8.9 organ donors per million population (pmp) (unpublished data from the National Organ Transplant Unit, Ministry of Health, Singapore), in contrast to other developed countries such as the United States, Spain and the United Kingdom.[4-6]

Healthcare workers caring for potential brain-dead donors face highly stressful circumstances. A perceived "ethical dilemma" between the physician's primary responsibility of acting in the patient's best interests and supporting the social objectives of HOTA may make some intensive care unit (ICU) physicians reluctant to actively identify and refer potential donors.[4] Other barriers include unfamiliarity, variability in the conduct of brain death certification, and lack of knowledge about donor identification.[4,7]

Good working knowledge and positive attitudes of healthcare workers towards organ donation may result in increased donor actualisation rates, as well as improved holistic care of the donor's family—2 goals that are not mutually exclusive. A survey of medical students in Singapore found that the majority had favourable attitudes towards organ donation, but knowledge on HOTA was inadequate.[8] To date, there is scant literature on the attitudes of ICU healthcare providers in Singapore.

This study aimed to determine the knowledge and attitudes of healthcare personnel in ICU in Singapore, as well as assess their confidence in handling the complex issues surrounding organ donation. A secondary aim was to identify key factors that could improve the competency of healthcare workers in this regard.

Materials and Methods

Ethics approval was obtained from the National Healthcare Group Domain Specific Review Board prior to the commencement of the study.

This cross-sectional study was conducted in a single tertiary healthcare institution in Singapore. For 2 consecutive weeks, doctors, nurses and allied healthcare personnel who were on duty in any ICUs, or from the Department of Anaesthesiology and Intensive Care Medicine were invited to participate. They were recruited after verbal consent was obtained. Participants were asked to complete the anonymous questionnaire without reference to other resources and the completed questionnaires were collected on the same day.

Questionnaire

The questionnaire was created in English by the study group (Appendix 1) and comprised 24 questions split into 3 sections: 1) Participants' demographics; 2) Participants' knowledge of HOTA and the brain death certification process; and 3) Participants' attitudes towards organ donation, and their perceived roles in caring for potential organ donors and their families.

The difference in HOTA knowledge—by seniority and occupation—were measured by Pearson's chi-squared test. All statistical tests were evaluated assuming a two-sided test at the 0.05 level of significance. Analyses were performed with STATA/SE 13.1 software (StataCorp, Texas 77845 USA, 1985-2013).

Results

Out of a total of 418 staff, 172 out of 200 questionnaires given out were completed, with a response rate of 86%. Study population demographics are shown in Table 1. Majority were Singapore citizens or permanent residents.

There was an equal proportion (43.0%) of doctors and nurses; 60.5% of them had 2 or more years of experience working in the ICU.

Knowledge

HOTA Legislation and Eligibility

Doctors had better knowledge than non-doctors about HOTA ($P<0.05$) (Table 2). However, only 10 (13.5%) doctors correctly answered all questions relating to the identification of organ donors. Of all the respondents, only 44.7% were aware that HOTA is only applicable to the mentally sound and 50% were aware the lower age limit is 21 years.

Table 1. Background Demographics of Survey Participants

Demographics	n	%
Age		
Not stated	4	2.3
<20	2	1.1
20 – 29	75	43.6
30 – 39	67	38.9
40 – 49	19	11.0
>50	5	2.9
Gender		
Not stated	3	1.7
Female	117	68.0
Male	52	30.2
Ethnicity		
Not stated	36	20.9
Chinese	96	55.8
Malay	6	3.4
Indian	9	5.2
Others	25	14.5
Citizenship		
Not stated	6	3.4
Singaporean	111	64.5
Singapore PR	28	16.2
Foreigner	27	15.7
Religion		
Not stated	7	4.07
Christian/Catholic	71	41.2
Freethinker/atheist	41	23.8
Buddhist/Taoist	35	20.3
Muslim	8	5.6
Hindu	7	4.07
Others	3	1.74
Occupation	**n**	**%**
Medical doctor	74	43.0
Anaesthesia	56	32.5
Internal medicine	8	32.5
Neurosurgery	5	2.9

Table 1. Background Demographics of Survey Participants (Cont'd)

Occupation	n	%
General surgery	1	0.5
Orthopaedic	1	0.5
Emergency department	1	0.5
Other discipline	2	1.1
Nurse	74	43.0
Staff nurse	22	12.7
Agency nurse	16	9.3
Senior staff nurse	16	9.3
Registered nurse	14	8.1
Nurse clinician	2	1.1
Advanced practice nurse	1	0.5
Others	3	1.7
Allied health staff	22	12.7
Medical social worker	4	2.3
Respiratory therapist	2	1.1
Physiotherapist	75	43.6
Pharmacist	67	38.9
Dietician	19	11.0
Not stated	2	1.1
Years postgraduation		
<6 years	67	38.9
6 – 10 years	51	29.6
>10 years	43	25.0
Not stated	11	6.4
Years working in healthcare		
<6 years	69	40.1
6 – 10 years	56	32.5
>10 years	44	25.5
Not stated	3	1.7
Years working in ICU		
≤2 years	62	36.0
2 – 9 years	69	40.1
≥9 years	35	20.3
Not stated	6	3.4
Total	172	

ICU: Intensive care unit; PR: Permanent resident

Preconditions, Clinical Tests and Supplementary Tests

Doctors were more familiar with clinical and supplementary tests done for brain death certification than non-doctors ($P<0.001$). Only 14 out of 74 (18.9%) doctors were able to correctly answer all questions pertaining to preconditions required, clinical tests and possible supplementary tests for brain death certification (Table 2).

Table 2. HOTA Knowledge by Profession

HOTA Knowledge	Doctors (n = 74)	Non-Doctors (Nurses + Allied Health) (n = 96)	Total (n = 170)	*P* Value*
Legislation (answered correctly)				
Organs for transplantation under the HOTA	28 (37.84%)	16 (16.67%)	44 (25.88%)	0.002
Eligibility for HOTA • Singaporean/PR • Lower age limit (21) • Upper age limit (none)	29 (39.19%)	22 (22.92%)	51 (30.0%)	0.022
• Possibility to opt out of HOTA • Applicable to mentally sound • Benefits of not opting out • Muslims included	28 (37.84%)	20 (20.83%)	48 (28.24%)	0.015
Certification must be done by 2 clinicians who cannot be involved in the care of the donor or recipient	24 (32.43%)	15 (15.63%)	39 (22.94%)	0.010
Correct for all sections (legislation)	10 (13.51%)	5 (5.21%)	15 (8.82%)	0.058
Brain death certification (answered correctly)				
Preconditions for brain death certification include: • Reversible causes of coma must be ruled out • Absence of neuromuscular blockade • Computed tomography/magnetic resonance imaging evidence of brain damage • Normothermic, normotensive	34 (45.95%)	15 (15.63%)	49 (28.82%)	<0.001
Tests for brain death include: • Pupil reflex • Doll's reflex • Gag and cough reflex • Cornea reflex • Apnoea test • Pain response	33 (44.59%)	17 (17.71%)	50 (29.41%)	<0.001
Supplementary tests include: • Cerebral angiogram • Radionuclide scan	35 (47.30%)	9 (9.38%)	44 (25.88%)	<0.001
Correct for all sections (brain death certification)	14 (18.92%)	1 (1.04%)	15 (8.82%)	<0.001

HOTA: Human Organ Transplant Act; PR: Permanent resident

*P value from chi-squared test.

There was a positive correlation between knowledge and years of experience working in the ICU for doctors (P <0.05). However, this correlation was not seen for the overall cohort which included non-doctors (Table 3).

Personal Attitudes and Preferences towards Organ Donation

Majority (93.0%) had a positive attitude towards organ donation and 92.4% supported donating their own organs under HOTA. There was significant difference when comparing between staff who had cared for organ donors versus staff who had not (supportive of organ donation 98% vs 90%, P = 0.01; supports donation of own organs 97% vs 88.6%, P = 0.03). However, 75.4% felt that organ donation should be entirely voluntary. Only 11.7% felt that people should not be allowed to opt out of HOTA.

Experience on Caring for an Organ Donor

A total of 83 (48.3%) of respondents were asked questions regarding organ donation by relatives of potential donors while 100 (59.2%) had been involved in the care of potential donors. Thirty-seven (21.8%) of respondents felt that medical treatment of potential donors may be compromised or prematurely terminated.

Confidence in Counselling Family and Relatives of Potential Organ Donors

A total of 124 (72.9%) of healthcare workers were willing to help counsel families; however, only 50 (29.1%) expressed confidence in doing so. Out of those who were not confident, 81 (66.4%) cited unfamiliarity with the process as a contributing factor. Other reasons cited

Table 3. HOTA Knowledge Stratified by Number of Years Working in ICU

HOTA Knowledge	ICU <2 Years (n = 62)	ICU 2 – 9 Years (n = 69)	ICU >9 Years (n = 35)	Total (n = 166)	*P* Value
All healthcare workers					
Preconditions for brain death certification	15 (24.19%)	16 (23.19%)	17 (48.57%)	48 (28.92%)	0.015
Tests for brain death					
Supplementary tests					
Correct for all sections (brain death certification)					
Doctors					
Preconditions for brain death certification	14 (35.00%)	9 (42.86%)	10 (83.33%)	33 (45.21%)	0.012
Tests for brain death	16 (40.00%)	10 (47.62%)	7 (58.33%)	33 (45.21%)	0.516
Supplementary tests	11 (27.50%)	14 (66.67%)	9 (75.00%)	34 (46.58%)	0.001
Correct for all sections (brain death certification)	5 (12.50%)	3 (14.29%)	6 (50.00%)	14 (19.18%)	0.012

HOTA: Human Organ Transplant Act; ICU: Intensive care unit

include inadequate medical knowledge (n = 50; 41.0%) and perceived lack of appropriate skills (n = 60; 49.2%). Only 9 (7.4%) cited personal conflict with the concept of organ donation as a factor.

Education

A total of 157 respondents agreed that education with regard to brain death certification should be part of their training while 110 (64.0%) felt the need for annual or biennial refresher courses.

Discussion

A previous study done in a Singapore tertiary neuroscience centre reported that 84% of physicians on the hospital brain death certification roster had performed 5 or fewer brain death certifications in the last 3 years.[9] Such infrequent exposure contributes to unfamiliarity with organ donation workflow.

In this study, we found that knowledge about HOTA amongst doctors, although better than non-doctors, was still suboptimal. The process of brain death certification is time-sensitive, often involving family members whom are acutely stressed. The capability of healthcare workers in the ICU to possess and dispense accurate information is important. Discrepancies in information received may lead to distrust of the medical team.

Our finding that healthcare workers were not entirely clear about HOTA emphasised the need for strict and systematic protocols during the conducting of brain death certification and organ donation.[9] There may be a need for refresher courses at regular intervals. Reassuringly, doctors' knowledge of steps for brain death certification was shown to improve with experience.

It may be tempting to rely on a highly subspecialised team to manage potential donors. However, a broad-based approach may be more practical. This is because family members may have questions about brain death and organ donation prior to formal activation of the brain death coordinator. Having frontline healthcare workers who are knowledgeable and supportive of the process may help to provide consistent care and information for patients and their relatives.

Previous studies have identified numerous ethnic, societal, cultural and religious factors that contribute to a negative attitude towards organ donation, especially in Asian and Chinese communities.[10-12] It is encouraging that a majority surveyed in our institution were supportive of organ donation. This compares favourably with other Asian countries.[13,14] A 2013 survey of healthcare workers in the ICUs of a public hospital in India showed that only 55% of healthcare workers—in contrast to 90% of our survey participants—were agreeable to donation of their own organs after death.[14]

Being a single-centre survey, limitations of this study include possible sampling bias. Majority of respondents worked in the surgical and neurosurgical ICUs, and many were relatively junior staff. Our institution has Singapore's largest neurosurgical ICU and contributes a large percentage of brain-dead organ donors nationwide. Hence, respondents may have been more knowledgeable of or accepting towards organ donation. The same may not be extrapolated for healthcare workers elsewhere.

Conclusion

Despite HOTA being an opt-out legislation, many healthcare workers do not have adequate knowledge of

the process and workflow. There are opportunities for improvement of knowledge and communication skills. Providing healthcare workers with more confidence to handle care of potential organ donors and their families may potentially increase the number of actualised donors and result in an overall positive experience for all involved.

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Appendix 1
Patient Questionnaire

GENDER (*please check one*) ☐ Male ☐ Female	**CITIZENSHIP** (*Please check one*) ☐ Singaporean ☐Singapore PR ☐Other: _____
AGE (Please check one) ☐<20 ☐20-29 ☐30-39 ☐40-49 ☐ ≥50	**RACE**: ☐Chinese ☐Malay ☐Indian ☐ Other:_____
RELIGION: ☐ Free-thinker ☐Christian ☐Buddhist ☐Muslim ☐Hindu ☐Other: _____	
OCCUPATION: ☐ Doctor (Anaesthesia) ☐ Doctor (Dept: _____) ☐ Medical Student (year___) ☐ Pharmacist ☐ Nurse (pls circle): AN/ RN/ SN/ SSN/ APN/ Other: _____ ☐ MSW ☐ Other: _____	
NO. OF YEARS POST-GRADUATION:	
NO. OF YEARS WORKING AS A HEALTHCARE PERSONNEL:	
NO. OF YEARS WORKING IN ICU:	
HIGHEST EDUCATIONAL QUALIFICATION:	

* please indicate NA where not applicable

KNOWLEDGE

1. The Human Organ Transplant Act (HOTA) in Singapore allows for the removal of which organs for the purpose of transplantation? (*Select all that apply*)

☐ Cornea ☐ Blood vessels ☐ Liver
☐ Skin ☐ Pancreas ☐ Bones
☐ Lungs ☐ Kidney ☐ Tendons
☐ Heart ☐ Intestines

2. Eligibility for HOTA (*Check ONE option for each stem*)

a. HOTA is applicable to:
☐ Singapore Citizens only
☐ Singapore Citizens and Permanent Residents
☐ Anyone of any nationality residing in Singapore

b. HOTA is applicable to the mentally sound only
☐ True ☐ False

c. **One can opt out of HOTA**
☐ True ☐ False

d. **There are benefits to not opting out of HOTA**
☐ True ☐ False

e. **Muslims are automatically included in HOTA unless they opt out**.
☐ True ☐ False

f. **The lower age limit of HOTA is:**
☐ None ☐ 16 ☐ 18 ☐ 21

g. **The upper age limit of HOTA is:**
☐ None ☐ 55 ☐ 65 ☐ 75

3. Regarding Certification of Brain Death

a. **It must be done by:** *(Select all that apply)*
☐ Two clinicians, both of whom cannot be involved in the care of the potential donor
☐ Two clinicians, both of whom cannot be involved in the care of the potential recipient
☐ One clinician will suffice.
☐ Only neurology specialists may certify brain death

b. **Brain death is irreversible brain damage causing the irreversible cessation of all brainstem functions**
☐ True ☐ False

c. **The following are necessary before brain death certification may be carried out:** *(Select all that apply)*
☐ CT or MRI evidence showing proof of extensive brain damage
☐ The patient must be sedated
☐ There must be no change to the patient's drug regime in the ICU over the last 24 hours
☐ The patient must be normothermic and normotensive
☐ There must be an absence of neuromuscular blockade
☐ Reversible causes of coma are ruled out

d. **What is tested during brain death certification?** *(Select all that apply)*

☐ Pupil reflex	☐ Masseter inhibitory reflex
☐ Corneal reflex	☐ Knee jerk reflex
☐ Jaw jerk reflex	☐ Apnoea test
☐ Gag and cough reflex	☐ Pain response over peripheries
☐ Doll's reflex	Tonic neck reflex

e. **During brain death certification, if all the standard tests cannot be completed for any reason, and those completed are consistent with brain death, which supplementary test(s) may be performed to confirm brain death?**

☐ Cerebral Angiogram	☐ Radionuclide scan
☐ Transcranial doppler	☐ MRI brain
☐ Diffuse optical imaging	☐ Electroencephalography

4. Regarding organ donation

a. In recent years, what percentage of patients who needed a liver transplant received one?

☐ 50% ☐ 25% ☐ 10% ☐ 5% ☐ 1%

Select True or False for the following statements:	TRUE	FALSE
b. The heart can be beating in a brain dead patient.		
c. It is acceptable to harvest organs from a brain dead patient who is for Coroner's case. (i.e. when a Coroner is called upon to investigate a death which occurs under unusual or suspicious circumstances)		
d. The hospital's involvement with organ donation is monitored and influenced by state laws.		
e. According to the law, people who are brain dead are legally dead.		
f. The time of death for a brain dead person is the time that the heart stops beating (i.e. asystole)		
g. The time of death for a brain dead person is the time when brain death is certified.		
h. Patients who are brain dead may still have limb movement to simuli		
i. The donor's family pays for the cost of organ donation.		
j. The recipient will know the identity of the donor.		
k. One can dictate who they prefer to donate their organs to.		
l. Malignancy is always a contra-indication to organ donation.		
m. Hepatitis B and C carrier can donate all solid organs except for their liver.		
n. It is possible to transplant an adult liver into a paediatric patient.		
o. In Singapore, there is an opt-in scheme for people to pledge their organs or body parts for the purposes of transplant, education or research after they pass away.		

PERSONAL ATTITUDES AND PREFERENCES REGARDING HOTA

Select Yes or No for the following statements:	YES	NO
5. I support organ donation as a philosophical concept		
6. I support the donation of my family member's organs under HOTA		
7. I support the donation of my own organs under HOTA		
8. I feel that organ donation should be a purely voluntary process		
9. I feel that people should not be allowed to opt out of HOTA		
10. I know of a friend or family member who has opted out of HOTA		

CARING FOR AN ORGAN DONOR *(medical students to skip questions 11-15)*

11. In my last 5 years of work, I have been asked questions pertaining to brain death by relatives:

☐ Not applicable ☐ 0 times ☐ 1-10 times ☐ 11-20 times ☐ >20 times

Select Yes or No for the following statements:	YES	NO
12. I have cared for an organ donor before		
13. I believe that I play a role in counselling organ donors' families regarding organ donation		
14. I am willing to play a role in counselling organ donors' families regarding organ donation		
15. I have discussed organ donation with families of organ donors		
16. I feel that there may be premature termination of medical treatment, or that medical care will be compromised for potential organ donors.		

COMPETENCE

17. I am confident in approaching relatives of potential organ donors and discussing issues related to organ donation with them.

☐ Yes (Skip question 18) ☐ No (Proceed to question 18)

18. Why is that so? *(Check all that apply)*

☐ Do not feel comfortable broaching a sensitive topic

☐ Not familiar with the process / workflow of organ donation and/ or brain death certification

☐ Not good at counseling distressed members of the family

☐ Personal conflicts with concept of organ donation

☐ Inadequate medical knowledge, therefore do not want to give wrong information to patient's relatives

☐ Other reasons: _____

EDUCATION

19. I have received teaching on the subject of brain death certification

☐ Yes (Proceed to question 20 and 21) ☐ No (Skip question 20 and 21)

20. How long ago was it?

_____ years/ months

21. How was it carried out?

☐ Lecture ☐ Bedside teaching ☐ Others: _____

22. Education regarding knowledge about brain death, donor management and communication with family needs to be part of my training

☐ Yes (Proceed to question 23) ☐ No (Skip question 23)

23. I would like to have additional training in: *(Select all that may apply)*

- ☐ Clinical management of the donor
- ☐ Coordinating the donation process
- ☐ Family grief counselling
- ☐ Brain death and certification of brain death
- ☐ Communication skills
- ☐ Others: _____

24. How often should refresher courses be? _____ years/ months

THE END.
Thank you for your participation.