

An institutional study of awareness of brain-death declaration among resident doctors for cadaver organ donation

Address for correspondence:

Dr. Vaishali Mohod,
4/31, Swastik Building, J J
Hospital Campus, Byculla,
Mumbai, Maharashtra, India.
E-mail: vamohod2001@yahoo.
co.in

Vaishali Mohod, Bharati Kondwilkar, Rohit Jadoun

Department of Anaesthesiology and Critical Care, Grant Medical College and Sir J J Group of Hospital, Mumbai, Maharashtra, India

ABSTRACT

Background and Aims: Brain death is defined as irreversible and complete cessation of all brain function including that of the brainstem. The aim of this study was to assess the level of knowledge and awareness about brain-death declaration among resident doctors. **Methods:** This was an observational questionnaire-based study conducted in single institute in which 112 junior residents and 46 senior resident doctors in various medical specialities were included by universal sampling method. A prevalidated questionnaire consisting of questions related to knowledge, attitude and performance of brain-death declaration were distributed among residents as per the inclusion criteria to fill in the time limit of 30 min. Statistical tools used were mean and standard deviation, proportion and Chi-square test. **Results:** A total 87 resident doctors consisting of 71.26% males and 28.73% females responded to the questionnaire. About 91.95% correctly defined it as complete cessation of brain activity including brainstem reflexes. Most of the resident doctors (80.45%) knew about the documentation of absence of brainstem reflexes at 6 h intervals and 64.36% were aware about positive apnoea test. When asked about whether there is legal sanction for disconnecting life support in India, 56.32% said no, and 43.67% said yes. Only 12.64% of resident doctors were aware about a panel of 4 physicians are mandatory to declare brain death in India. **Conclusion:** Awareness and attitude towards the identification of brain death and possible deceased donor organ transplantation were lacking amongst resident doctors.

Key words: Awareness, brain-death declaration, resident doctors

Access this article online

Website: www.ijaweb.org

DOI: 10.4103/ija.JJA_430_17

Quick response code



INTRODUCTION

Brain death is defined as irreversible and complete cessation of all brain function including brainstem. The term 'Brain death' was introduced by *Ad Hoc* Committee of the Harvard Medical School to facilitate organ donation.^[1] Common causes of brain death are traumatic brain injury, subarachnoid haemorrhage, post-resuscitation hypoxic insult, brain tumours, drowning, etc. In most cases, brain death is diagnosed at the bedside. Determination of brain death has significant legal and ethical implications; hence, it should be diagnosed and documented carefully. The concept of brain death and brain stem death is still in evolving stages in India. Many brain dead patients are kept on life support needlessly because of lack of awareness in public and medical professionals.^[2]

In June 1994, the Indian parliament passed the Transplantation of Human Organs Act.^[3] This law required brain death to be declared only in the institutions recognised by the state appropriate authority, leading to unnecessary transfer of brain-dead patient from one hospital to other for organ retrieval. As per the amendment of law in 2014, some of the institutions have been recognised as organ retrieval centres.^[4]

This is an open access article distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 3.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as the author is credited and the new creations are licensed under the identical terms.

For reprints contact: reprints@medknow.com

How to cite this article: Mohod V, Kondwilkar B, Jadoun R. An institutional study of awareness of brain-death declaration among resident doctors for cadaver organ donation. *Indian J Anaesth* 2017;61:957-63.

The aim of this study was to assess the awareness and level of knowledge about brain death and its subsequent declaration among the resident doctors.

METHODS

This study was an observational questionnaire-based study conducted in government medical college and tertiary care hospital in metropolitan city over a period of seven days. In this study, 112 junior residents and 46 senior residents in various medical specialities were included by universal sampling method. They were from the Departments of Anaesthesiology, General Surgery, Medicine, Paediatrics and superspeciality departments, namely, paediatric surgery, urology, nephrology, cardiovascular and thoracic surgery, neurology and neurosurgery [Figure 1]. These specialities were included considering their direct involvement during the procedure of brain-death declaration and maintenance of organs after brain death, as also during harvesting and transplantation. They were made aware about the purpose of this study. Those doctors who were willing to participate in the study and had given their consent were included in this study.

Resident doctors who were involved in the pilot study were excluded. First-year junior residents of all the departments were excluded assuming their lesser exposure about the subject.

First, a semi-structured questionnaire consisting of open-ended and close-ended questions were prepared and distributed among faculties of the department and checked for common errors. Then, a pilot study was conducted among 10 junior residents and 5 senior resident doctors. The questionnaire was then restructured after the analysis of the pilot study.

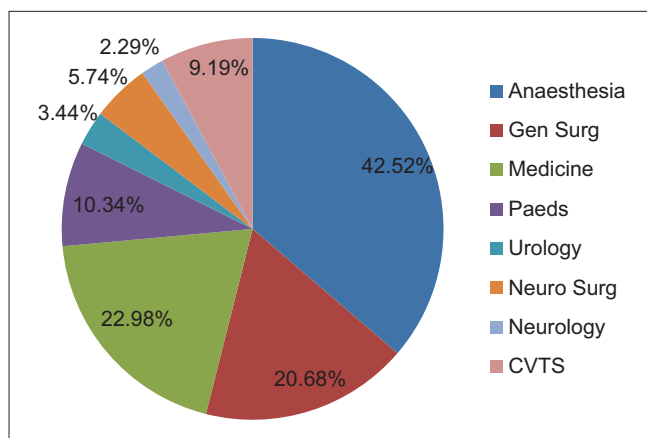


Figure 1: Departments participating in the study

After ethics committee approval, permission of all the heads of the departments was taken. A prevalidated questionnaire consisting of questions related to knowledge, attitude and performance of brain-death declaration was distributed among resident doctors. [Appendix 1, Questions 1 to 25] They were assured regarding the confidentiality of answers. After formal introduction, questionnaires were given to be filled in the time limit of 30 min. Data collected was entered in Microsoft Excel Software 2010 version and analysed using SPSS Software Version 17.0 by IBM Corp. (IBM SPSS 17) Statistical tools used were mean and standard deviation, proportion percentage and Chi-square test.

RESULTS

A total of 158 resident doctors were called for participation out of which 87 resident doctors consisting of 62 males (71%) and 25 females (29%) responded to the questionnaire [Table 1].

When the criteria for brain-death declaration were assessed, majority of resident doctors were aware about the exact definition of brain death. Eighty resident doctors (91.95%) correctly defined it as complete cessation of brain activity including brainstem reflexes [Figure 2]. They could differentiate between

Table 1: Demographic data

Parameter	Percentage
Sex	
Male/female	71.26%/28.73%
Years of residency	
2 years	41.37%
3 years	16.09%
Postgraduate	42.52%

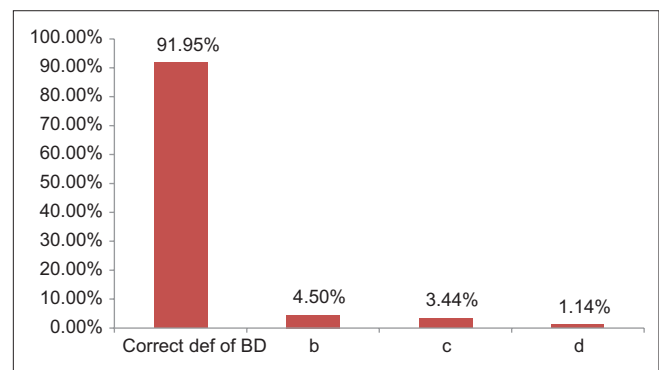


Figure 2: Responses for definition of brain death. X-Axis: Correct def of BD: Correct definition of Brain Death - Complete cessation of brain activity including brainstem reflexes; b – Brain death is defined as Partial cessation of brain activity with brainstem reflexes; c – Brain death is defined as Decerebrate state; d – Brain death is defined as Brain injury. Y-axis: Number of responses(%)

brain death and cardiac death as two different entities. Seventy-three resident doctors (83.90%) stated that coma and vegetative state are two different conditions.

Seventy resident doctors (80.45%) said ‘yes’ that it is mandatory to document the absence of brainstem reflexes at two examinations 6 h apart for documentation of brain death. However, only 25 resident doctors (54.73%) could correctly identify that absence of pupillary and corneal reflex, absence of oculovestibular reflex and absent grimace to noxious painful stimulus are required.

Fifty-six resident doctors (64.36%) responded positively that it is mandatory to do apnoea test and 75 resident doctors (86.20%) knew about positive apnoea test [Figure 3]. Regarding confirmatory test for brain death, 29 resident doctors (33.33%) responded that electroencephalogram should be done. Six resident doctors (6.89%) responded Somatosensory evoked potential, five responded as cerebral angiography (5.74%) and 47 resident doctors (54.02%) said that all above investigations should be done to confirm inconclusive apnoea testing.

When asked about whether it is legal to disconnect life support in India, 49 resident doctors (56.32%) said no and 38 resident doctors said yes (43.67%). Only 11 resident doctors (12.64%) were aware about a panel of 4 physicians, i.e., one neurosurgeon/neurologist, one treating physician and surgeon are mandatory to declare brain death in India.

Seventy-three resident doctors (83.90%) replied positively when asked about organ donation of family member if the situation arises. However, when they were asked about the presumed consent, very few

knew about it. In addition, resident doctors were not aware about the little percentage of deceased donor organ transplant performed in India.

DISCUSSION

The term ‘brain death’ is widely accepted by health-care professionals in most parts of the world.^[5] There are no published reports of recovery of neurologic function after a diagnosis of brain-death.^[6] The concept of brain-death declaration and cadaveric organ harvesting for organ transplantation is still in primitive stages in India. Rather live donor transplant is preferred. There are various reasons behind it, such as lack of awareness, religious beliefs, social issues, ethical concerns, lack of motivation and huge disparity between the government and private hospitals in terms of infrastructure and trained humanpower, etc.^[7-9] A major limiting factor in organ donation from a brain dead donor is the attitude of health-care professionals. It is very stressful for a physician to explain brain death to bereaved relatives. In-house counsellors with good interpersonal communication skills are required in such situations to coordinate between relatives and hospital staff. In addition, good cooperation of the Intensive Care Unit and hospital staff for maintenance of organ function after brain death is necessary.^[10-12]

Determination of brain death requires a process of certification which includes identification of findings that provide a clear aetiology of brain dysfunction. It also requires exclusion of conditions that may confound the clinical diagnosis of brain death. This is followed by two complete neurological examinations and apnoea tests 6 h apart. The time of the death is the time at which PaCO₂ reaches target value during the second apnoea test.^[13] There is no sufficient evidence to determine the minimally acceptable observation period between two clinical examinations and safety of apnoea test techniques. Ancillary tests can be used when uncertainty exists about neurologic evaluation. However, the clinician has to judge on the use of ancillary tests to support brain death.^[14] The lack of evidence to determine the minimally acceptable observation period and reliability of newer ancillary tests affects early diagnosis of brain death.^[15]

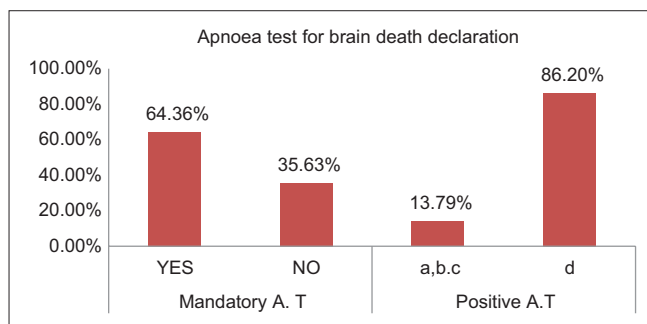


Figure 3: Responses to questions regarding the Apnoea test for brain death declaration. X-axis: A.T. Apnoea test; a – Positive Apnoea test if PaCO₂>60 mmHg; b - Positive Apnoea test if there is an increase in PCO₂>20 mmHg over baseline; c - Positive Apnoea test if there is no respiratory movement during test; d - Positive Apnoea test if all criteria a-c are met. Y-axis: number of responses (%)

The knowledge about determination of brain death involves, number of physicians required to certify it, controversies of presumed consent against informed consent and medicolegal aspects such as methods

of registering for organ donation were lacking in the majority of resident doctors. Only 12.64% resident doctors knew about the panel of four physicians are required to certify brain death in India. These physicians should not be part of transplant team.

A major article on international brain-death criteria by Wijdicks revealed that the majority of nations have guidelines for determination of brain-death. There is a scarcity of evidence-based literature on practices of brain-death determination.^[16] Although guidelines are available in many countries for the diagnosis of brain death, the variations and inconsistencies necessitate an international consensus and uniform guidelines.^[17] Despite global acceptance of brain death, from 'total brain death' to 'whole brain death' and with clear drafted policies in the Western world, still, differences in concept, assessment of clinical criteria and ancillary tests persist.^[18]

Seventy-three resident doctors admitted that they would encourage friends and family to donate organs and agreed that there was a need for creating awareness through media. Relatives are reluctant to donate because prior wishes of the deceased are not communicated to family members. The Spanish model of organ donation and transplantation by providing education to health-care professionals has directly resulted in continuous rise of families willing to donate organs.^[19]

Providing appropriate education regarding identification and notification of brain death can influence successful maintenance of potential donor for organ procurement.^[20] A formal training to initiate discussion about brain-death declaration and organ donation can significantly improve knowledge and positive attitude of health-care professionals. They can prevent the loss of potential donors and affect the rates of family refusal to donate organs.^[21] A multidisciplinary approach and good transplant coordinators can help in the successful management of brain-dead donors. Mandatory reporting of brain dead cases to appropriate authorities has to be enforced to gain momentum to this program.^[22]

This study was conducted in one of the premier government institute where live donor kidney and corneal transplant are regularly done. However a limitation of this study is that it was a single-centre study. A multicentre study should be conducted to provide more precise information.

CONCLUSION

It was observed that awareness of brain death, procedure followed during declaration of brain death and deceased organ donation was lacking in resident doctors.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

REFERENCES

1. A definition of irreversible coma. Report of the ad hoc committee of the Harvard Medical School to examine the definition of brain death. *JAMA* 1968;205:337-40.
2. Dhanwate AD. Brainstem death: A comprehensive review in Indian perspective. *Indian J Crit Care Med* 2014;18:596-605.
3. Shroff S. Legal and ethical aspects of organ donation and transplantation. *Indian J Urol* 2009;25:348-55.
4. Government of India. Ministry of Law, Justice and Company Affairs (Legislative Department) New Delhi. The Transplantation of Human Organs (Amendment) Act (No. 16 of 2011); 2011. Available from: <http://notto.nic.in/WriteReadData/Portal/images/THOA-Rules-2014.pdf>. [Last accessed on 2014 Jul 11].
5. Spoor MT, Sutherland FR. The evolution of the concept of brain death. *Ann R Coll Physicians Surg Can* 1995;28:30-4.
6. Wijdicks EF, Varelas PN, Gronseth GS, Greer DM, American Academy of Neurology. Evidence-based guideline update: Determining brain death in adults: Report of the Quality Standards Subcommittee of the American Academy of Neurology. *Neurology* 2010;74:1911-8.
7. Siminoff LA, Gordon N, Hewlett J, Arnold RM. Factors influencing families' consent for donation of solid organs for transplantation. *JAMA* 2001;286:71-7.
8. McGlade D, Pierscionek B. Can education alter attitudes, behaviour and knowledge about organ donation? A pretest-post-test study. *BMJ Open* 2013;3:e003961.
9. Wig N, Gupta P, Kailash S. Awareness of brain death and organ transplantation among select Indian population. *J Assoc Physicians India* 2003;51:455-8.
10. Kosieradzki M, Jakubowska-Winecka A, Feliksiak M, Kawalec I, Zawilinska E, Danielewicz R, *et al.* Attitude of healthcare professionals: A major limiting factor in organ donation from brain-dead donors. *J Transplant* 2014;2014:296912.
11. 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.
12. Edwin AR, Raja D. Attitude of healthcare professionals towards organ donation. *Indian J Urol* 2000;16:98-105.
13. Kumar L. Brain death and care of the organ donor. *J Anaesthesiol Clin Pharmacol* 2016;32:146-52.
14. Welschehold S, Boor S, Reuland K, Thömke F, Kerz T, Reuland A, *et al.* Technical aids in the diagnosis of brain death: A comparison of SEP, AEP, EEG, TCD and CT angiography. *Dtsch Arztebl Int* 2012;109:624-30.
15. Powner DJ, Hernandez M, Rives TE. Variability among hospital policies for determining brain death in adults. *Crit Care Med* 2004;32:1284-8.
16. Wijdicks EF. Brain death worldwide: Accepted fact but no global consensus in diagnostic criteria. *Neurology* 2002;58:20-5.
17. Greer DM, Varelas PN, Haque S, Wijdicks EF. Variability of

- brain death determination guidelines in leading US neurologic institutions. *Neurology* 2008;70:284-9.
18. Smith M. Brain death: Time for an international consensus. *Br J Anaesth* 2012;108 Suppl 1:i6-9.
 19. Matesanz R, Dominguez-Gil B. Strategies to optimize deceased organ donation. *Transplant Rev* 2007;21:177-88.
 20. Kaur S, Sandhya G, Nadiya K, Rana D, Kathania D, Kaur G, *et al.* Knowledge attitude and perception regarding organ donation among the nursing students. *J Postgrad Med Educ Res* 2015;49:105-10.
 21. Araujo C, Siqueira M. Brazilian healthcare professionals: A Study of attitudes toward organ donation. *Transplant Proc* 2016;48:3241-4.
 22. Sawhney C, Kaur M, Lalwani S, Gupta B, Balakrishnan I, Vij A, *et al.* 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.

APPENDIX

Questionnaire

1. What is brain death?
 - a. Complete cessation of brain activity including brainstem reflexes
 - b. Partial cessation of brain activity with brainstem reflexes
 - c. Decerebrate state
 - d. Brain injury
2. Are brain death and cardiac death the same?
 - a. Yes
 - b. No
3. Are coma and vegetative state same?
 - a. Yes
 - b. No
4. How many medical professionals are required to declare Brain Death in India?
 - a. 2
 - b. 3
 - c. 4
 - d. 1
5. Which are the three essential findings in brain death?
 - a. Coma, absence of brainstem reflexes, apnoea
 - b. Coma, loss of cardiac function, apnoea
 - c. Coma, absence of moving and breathing
 - d. Coma, loss of movement, decerebrate posture
6. What do you mean by a Brain dead patient?
 - a. Legally dead
 - b. Clinically dead
 - c. Legally and clinically dead
 - d. Vegetative
7. Is it essential to document absence of brainstem reflexes at two separate examinations 6 h apart?
 - a. Yes
 - b. No
8. Is it mandatory that examination of patient should provide clear aetiology of brain dysfunction?
 - a. Yes
 - b. No
9. Which are the confounding clinical factor for diagnosis of brain death?
 - a. Drug intoxication/poison
 - b. Sedatives
 - c. Neuromuscular blocking agents
 - d. All above

10. Which brainstem reflexes are assessed to declare a patient brain dead?
 - a. Absent pupillary and corneal reflex
 - b. Absent oculovestibular and gag reflex
 - c. Absent grimace to noxious painful stimulus
 - d. All above
11. Is it mandatory to perform apnoea test for Brain death declaration?
 - a. Yes
 - b. No
12. What are the prerequisites for apnoea test ?
 - a. Correction of hypotension
 - b. Correction of hypothermia
 - c. Stopping of all drugs minimum 4 h before
 - d. All above
13. Is it necessary to preoxygenate and correct metabolic acidosis before apnoea test?
 - a. Yes
 - b. No
14. What are the criteria for positive apnoea test?
 - a. $PCO_2 > 60$ mmHg
 - b. Increase in $PCO_2 > 20$ mmHg over baseline
 - c. No respiratory movement during test
 - d. All above
15. When you will say that, it is difficult to diagnose Brain death clinically.
 - a. If respiratory movements during apnoea test
 - b. If $PCO_2 > 10$ mmHg
 - c. If $PCO_2 > 15$ mmHg
 - d. If $PCO_2 > 18$ mmHg
16. Which are the confirmatory test used in patients who do not fulfil clinical criteria of Brain death?
 - a. SSEP
 - b. EEG
 - c. Cerebral angiography
 - d. All above
17. What are the contraindications for apnoea testing?
 - a. Haemodynamic instability/increasing doses of vasopressors
 - b. Metabolic acidosis
 - c. High-level ventilator support
 - d. All above
18. How long apnoea test is performed ?
 - a. 2 min
 - b. 3 min
 - c. 5 min
 - d. 10 min
19. When apnoea test should be aborted ?
 - a. If patient develops hypertension
 - b. If patient develops Hypotension
 - c. If patient develops Tachycardia
 - d. If patient develops decrease in CO_2
20. Is it true that Brain death declaration is a legal sanction for disconnecting life support in India?
 - a. Yes
 - b. No
21. Will you allow organ donation after brain death declaration of your family members?
 - a. Yes
 - b. No

22. What is presumed consent?
 - a. Consent was given by patient
 - b. Consent was given by family members
 - c. Citizens have said YES to organ donation
 - d. Request consent
23. Which country follows the law of presumed consent?
 - a. India
 - b. Spain
 - c. Australia
 - d. England
24. Are the criteria's for brain death declaration same all over the world?
 - a. Yes
 - b. No
25. Which country has highest cadaver organ transplant in world?
 - a. India
 - b. Spain
 - c. Australia
 - d. England

Announcement

Northern Journal of ISA

Now! Opportunity for our members to submit their articles to the Northern Journal of ISA (NJISA)! The NJISA, launched by ISA covering the northern zone of ISA, solicits articles in Anaesthesiology, Critical care, Pain and Palliative Medicine. Visit <http://www.njisa.org> for details.

Dr. Sukhminder Jit Singh Bajwa, Patiala
Editor In Chief

Dr. Zulfiqar Ali, Srinagar
Co-Editor