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Knowledge Gaps in Brain Death and Organ Donation Among Non-Healthcare Staff in Intensive Care Units

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Abstract

Aim: This study aimed to assess the knowledge levels of non-healthcare staff working in intensive care units regarding organ donation and brain death, with particular emphasis on their ability to distinguish brain death from coma or vegetative state.

Methods: This cross-sectional descriptive study was conducted among 100 non-healthcare staff working in the intensive care units of Dokuz Eylul University Hospital. Data were collected using a structured questionnaire and the 17-item Organ and Tissue Donation and Transplantation Knowledge Level Scale. Descriptive statistics and non-parametric tests were applied, and multiple linear regression analysis was used to identify factors associated with knowledge scores.

Results: Although most participants correctly identified the basic definitions of organ donation and brain death, only 59% were able to accurately distinguish brain death from coma or vegetative state, revealing a substantial conceptual gap in a clinically critical area. Furthermore, high proportions of incorrect or uncertain responses were observed for items addressing the clinical and legal boundaries of organ donation. Overall knowledge scores were not significantly associated with demographic or occupational characteristics, and no independent predictors were identified.

Conclusions: The findings suggest that non-healthcare staff working in intensive care units possess a basic level of familiarity with organ donation-related concepts; however, important deficiencies remain in clinically and legally critical areas, particularly in distinguishing brain death from coma or vegetative state. These gaps may have implications for communication and decision-making in the organ donation process and indicate the need for structured, continuous, and practice-oriented educational interventions targeting all intensive care unit personnel.

Keywords: Organ donation, Brain death, Disorders of consciousness, Intensive care units, Non-healthcare staff

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Introduction

Organ and tissue transplantation is widely recognized as one of the most effective treatment options for patients with end-stage organ failure, as it significantly prolongs survival and markedly improves quality of life [1,2]. In particular, organ transplantation provides better survival and functional outcomes than conservative treatment approaches in patients with renal, hepatic, cardiac, and pulmonary failure [1]. Despite substantial advances in surgical techniques, immunosuppressive therapies, and intensive care practices, insufficient organ donation remains the most fundamental challenge limiting transplantation [3].

Worldwide, organ donation rates show considerable variation among countries. In regions with high rates of deceased-donor organ donation, mortality on transplant waiting lists is lower; conversely, in countries with inadequate donation rates, waiting times are prolonged and waiting-list mortality increases [4]. In Türkiye, although living-donor transplantation is common, deceased-donor organ donation rates have been reported to remain below those of developed countries [5]. This situation necessitates a detailed evaluation of both individual and institutional factors influencing the organ donation process.

Organ donation is not merely an individual choice but rather a multidimensional decision-making process shaped by knowledge level, cultural values, religious beliefs, ethical considerations, and legal perceptions [6]. Previous studies have demonstrated that insufficient knowledge and misconceptions regarding organ donation negatively affect donation decisions [7]. In particular, inadequate understanding of the concept of brain death—and its frequent confusion with coma or vegetative state—has been identified as one of the most commonly reported reasons for hesitation toward organ donation [8,9].

Intensive care units (ICUs) are critical clinical settings where brain death is diagnosed and the organ donation process is effectively initiated. During this process, families' perceptions and donation-related decisions are influenced not only by interactions with physicians and nurses but also by the knowledge levels and attitudes of all personnel working in the intensive care environment [10,11]. International guidelines and studies emphasize that all ICU staff—including support and non-healthcare personnel—should possess accurate and up-to-date knowledge regarding brain death and organ donation, as this is crucial for effective communication with families and the success of the donation process [11–13].

Nevertheless, the majority of studies on organ donation have been conducted among physicians, nurses, or healthcare students, while research focusing on non-healthcare staff working in intensive care units remains limited [7,14]. However, non-healthcare personnel such as cleaning staff, auxiliary workers, and secretarial staff are in continuous contact with patients and their relatives in the ICU and constitute an important component of the institutional communication environment.

Increasing organ donation rates in Türkiye requires more than legal regulations and improvements in medical infrastructure. It is essential that all employees working in healthcare institutions, particularly those in intensive care settings, have accurate and up-to-date knowledge regarding organ donation and brain death [11–15]. In this context, determining the knowledge levels of non-healthcare staff working in intensive care units, identifying misconceptions and knowledge gaps, and planning targeted educational programs are of great importance.

Accordingly, this study was designed to determine the knowledge levels regarding organ donation and transplantation among non-healthcare staff working in the intensive care units of Dokuz Eylul University Hospital.

Methods

Study Population and Sample

The study population consisted of all non-healthcare personnel working in the intensive care units of Dokuz Eylul University Training and Research Hospital, including the Anesthesiology, Internal Medicine, Thoracic Surgery, Cardiovascular Surgery,

Pediatric, Neurology, and Coronary intensive care units. In this study, non-healthcare staff were defined as hospital employees without formal clinical training or independent patient care responsibilities. This group included secretarial staff, auxiliary personnel who assist in patient care but are not nurses, and cleaning staff. Non-healthcare staff who were informed about the study and voluntarily agreed to complete the questionnaire were included, while those who did not consent to participate were excluded.

Organ and Tissue Donation and Transplantation Knowledge Level Scale

The Organ and Tissue Donation and Transplantation Knowledge Level Scale was developed by Emiral et al. and consists of 17 items designed to assess individuals' knowledge levels regarding organ donation and transplantation [7].

For items 1, 3, 4, 5, 7, 11, 12, 14, and 16, correct responses were scored as 1 point, whereas all other responses were scored as 0 points. For the remaining items, incorrect responses were scored as 1 point, while correct responses and "I do not know" options were scored as 0 points.

Scores obtained from each item were summed to calculate the total scale score. The minimum possible score is 0 and the maximum possible score is 17, with higher total scores indicating a higher level of knowledge regarding organ donation and transplantation.

Statistical Analysis

Statistical analyses were performed using IBM SPSS Statistics for Windows, version 26.0 (IBM Corp., Armonk, NY, USA). Participants' sociodemographic and clinical characteristics were evaluated using descriptive statistics. Categorical variables were presented as number and percentage [n (%)], and continuous variables were presented as mean ± standard deviation or median (minimum–maximum), as appropriate.

The distribution of responses to the scale items was calculated as numbers and percentages and is presented in Table 1. Comparisons of total scale scores according to demographic and clinical variables were performed using the Mann–Whitney U test for two-group comparisons and the Kruskal–Wallis test for variables with more than two groups; the results are presented in Table 2.

To identify independent factors associated with total scale scores, a multiple linear regression analysis was conducted. Gender, age group, marital status, education level (dichotomized), presence of chronic disease, and perceived adequacy of organ donation promotion were included as independent variables in the model. Regression coefficients, 95% confidence intervals, and model fit statistics are presented in Table 3.

A p-value of <0.05 was considered statistically significant for all analyses. The normality of continuous variables was assessed using skewness and kurtosis values (±1.5).

Results

A total of 100 participants were included in the study. Participants' knowledge levels regarding organ donation, the scale scores according to demographic characteristics, and factors associated with the scale scores were evaluated under separate subheadings.

Knowledge Levels Regarding Organ Donation

The majority of participants were found to have correctly identified the basic definitions related to organ donation and brain death. The proportion of participants who correctly answered the definition of "organ donation" was 97%, while 96% correctly identified the definition of "brain death."

However, knowledge levels were lower for certain critical concepts related to organ donation. The correct response rate for the question assessing the distinction between brain death and coma/vegetative state was 59%, and 17% of participants responded "I do not know" to this item.

High rates of incorrect and uncertain responses were observed for negatively worded statements. The statement "Organs can be retrieved for transplantation after every death" was answered incorrectly by 69% of participants, while only 22% provided the correct response. Similarly, 50% of participants incorrectly responded to the statement "Blood group compatibility alone is sufficient for all transplantation procedures," and 22% selected the "I do not know" option. For the statement "There is an age limit for organ donation," the incorrect response rate was 56%.

Table 1. Distribution of Participants' Responses to the Scale Items

Question	Right n (%)	Wrong n (%)	No Idea n (%)
Organ donation can be defined as the voluntary consent of an individual, given while alive, to allow their tissues and organs to be used for the treatment of other patients after medical determination of death, and to formally document this consent.	97 (97.0)	2 (2.0)	1 (1.0)
There is an age limit for organ donation.*	25 (25.0)	56 (56.0)	19 (19.0)
An individual can donate some organs (such as a kidney or part of the liver) while alive and in good health.	91 (91.0)	6 (6.0)	3 (3.0)
Chronic conditions such as hypertension and diabetes can result in the need for kidney transplantation.	71 (71.0)	18 (18.0)	11 (11.0)
Brain death refers to the irreversible loss of all brain functions, a condition in which independent survival without mechanical ventilation is impossible.	96 (96.0)	–	4 (4.0)
A person who has been diagnosed with brain death has the possibility of recovery.*	7 (7.0)	87 (87.0)	6 (6.0)
Brain death and coma/vegetative state are different conditions.	59 (59.0)	24 (24.0)	17 (17.0)
After every death, a person's organs can be removed for transplantation.*	22 (22.0)	69 (69.0)	9 (9.0)
Organs obtained from one person can be transplanted to anyone.*	78 (78.0)	14 (14.0)	8 (8.0)
In all transplantation procedures, blood group compatibility between the donor and the recipient is sufficient.*	28 (28.0)	50 (50.0)	22 (22.0)
In our country, organs and tissues such as the heart–lung, skin, bone marrow, and small intestine can also be transplanted, in addition to the kidney and liver..	73 (73.0)	20 (20.0)	7 (7.0)
For a person who donated organs while alive and is diagnosed with brain death in the hospital, the final decision regarding organ retrieval belongs to the family.	76 (76.0)	17 (17.0)	7 (7.0)
For a person who did not donate organs while alive and is diagnosed with brain death in the hospital, the final decision regarding organ retrieval belongs to the physician.*	10 (10.0)	85 (85.0)	5 (5.0)
A person who donates an organ while alive (such as a kidney or part of the liver) can live a healthy life thereafter.	76 (76.0)	13 (13.0)	11 (11.0)
Organ transplantation is performed only between relatives.*	6 (6.0)	90 (90.0)	4 (4.0)
The use of addictive substances such as alcohol and illicit drugs can lead to diseases that may necessitate organ transplantation.	64 (64.0)	27 (27.0)	9 (9.0)
Organ transplantation can be performed only from individuals who have undergone medical death (cadavers).*	24 (24,0)	60 (60,0)	16 (16,0)

** Indicates negatively worded items.*

Table 2. Demographic Characteristics and Mean Scale Scores with Between-Group Comparisons

	n	Mean Scale Score	p-value
Gender			
•*Male*	50	12.3 ± 2.4	0.956$^{\mu}$
•*Female*	50	12.5 ± 2.3	
Marital status			
•*Married*	65	12.2 ± 2.5	0.309¶
•*Single*	26	13.0 ± 1.9	
•*Divorced*	9	12.1 ± 2.1	
Having Children			
•*Yes*	66	12.3 ± 2.3	0.284$^{\mu}$
•*No*	34	12.7 ± 2.4	
Age Groups (years)			
•*18-29*	25	12.1 ± 3.0	0.793¶
•*30-39*	25	12.8 ± 2.2	
•*40-49*	38	12.3 ± 2.0	
•*≥ 50*	12	12.8 ± 2.2	
Educational Level			
•Primary education	23	11.6 ± 2.1	0.091¶
•High school	57	12.5 ± 2.3	
•College	9	12.7 ± 2.8	
•University	11	13.4 ± 2.5	
Occupation			
•Auxiliary staff	48	12.4 ± 2.3	0.076¶
•Cleaning staff	35	12.0 ± 2.3	
•Secretary	17	13.5 ± 2.1	
Chronic Disease			
•*Yes*	19	12.7 ± 1.9	0.783$^{\mu}$
•*No*	81	12.4 ± 2.4	
Organ Donor Card Status			
•Yes	15	12.7 ± 2.2	0.636$^{\mu}$
•No	85	12.4 ± 2.3	
Perceived Adequacy of Organ Donation Promotion			
• Adequate	59	12.3 ±2.1	0.201$^{\mu}$
• Inadequate	41	12.6 ± 2.6	

Data are presented as mean ± standard deviation. For between-group comparisons, the Mann-Whitney U test (μ) was used for variables with two groups, and the Kruskal-Wallis test (ɣ) was used for variables with more than two groups. A p value of <0.05 was considered statistically significant.

Table 3. Multiple Linear Regression Analysis of Factors Affecting the Total Scale Score

	Unstandardized Coefficients		Standardized Coefficients	t	p	95.0% CI	
	B	SE	Beta			LL	UL
(Constant)	12.555	0.589		21.312	<0.001	11.385	13.725
Gender	0.120	0.488	0.026	0.245	0.807	-0.850	1.090
Age	0.007	0.518	0.002	0.014	0.989	-1.022	1.036
Marital Status	-0.482	0.524	-0.099	-0.919	0.360	-1.522	0.559
Educational Level	0.625	0.620	0.109	1.008	0.316	-0.606	1.856
Chronic Disease	0.302	0.661	0.052	0.456	0.649	-1.011	1.614
Organ donation promotion	-0.123	0.496	-0.026	-0.247	0.805	-1.108	0.863

Data are presented as regression coefficient (B), standard error (SE), standardized coefficient (B), 95% confidence interval (CI), t values, and p values. A p value of <0.05 was considered statistically significant. The coefficient of determination was $R^2 = 0.031$, with an adjusted R^2 of −0.032. For the overall model, F = 0.494 and p = 0.812.

Comparison of the Scale Scores According to Demographic Characteristics

Participants' scale scores were compared according to demographic and clinical characteristics. No statistically significant difference was observed in mean scale scores between male and female participants ($p = 0.956$). Comparisons across age groups, marital status, parenthood status, education level, and occupational categories also revealed no statistically significant differences in scale scores (all $p > 0.05$).

Similarly, no significant differences in the scale scores were observed according to the presence of chronic disease, possession of an organ donor card, or participants' perceptions regarding the adequacy of organ donation promotion activities (all $p > 0.05$).

Evaluation of Factors Associated with the Scale Scores

A multiple linear regression analysis was performed to identify factors associated with the scale scores. Gender, age, marital status, education level, presence of chronic disease, and perceived adequacy of organ donation promotion were included in the model. The regression model was not statistically significant ($F = 0.494$; $p = 0.812$). The explanatory power of the model was low, with an R^2 value of 0.031 and an adjusted R^2 of −0.032. None of the variables included in the regression analysis independently predicted the scale scores (all $p > 0.05$).

Discussion

In this study, the knowledge levels, attitudes, and factors associated with knowledge regarding organ donation and transplantation among non-healthcare staff working in the intensive care units of Dokuz Eylul University Training and Research Hospital were evaluated. The main finding of the study was that although participants were largely familiar with the basic definitions of organ donation and brain death, substantial knowledge gaps were identified in areas involving the clinical, ethical, and legal aspects of the organ donation process.

In our study, the majority of participants correctly identified the definitions of "organ donation" (97%) and "brain death" (96%). These findings are consistent with the high levels of basic awareness reported in previous studies conducted among healthcare professionals and community-based samples [7,12,16]. However, it is well recognized that such surface-level knowledge does not always translate into an adequate understanding of critical details that influence decision-making processes. Indeed, the finding that only 59% of participants were able to correctly distinguish brain death from coma or vegetative state indicates that conceptual confusion persists even among individuals working in healthcare institutions. Similarly, Siminoff et al. and Kentish-Barnes et al. have reported that incomplete or incorrect understanding of brain death increases hesitation and reluctance toward organ donation among patients' relatives [8,9].

Previous studies have demonstrated that self-reported familiarity with the concept of brain death does not necessarily correspond to accurate conceptual understanding, and that confusion between brain death and other disorders of consciousness, such as coma or vegetative state, is common. In particular, misleading or oversimplified portrayals of brain death in movies, television series, and mass media—including depictions suggesting recovery after brain death—have been shown to contribute significantly to public misunderstanding of this concept [17,18]. Such distorted representations may reinforce false beliefs and explain why individuals who believe they understand brain death may still fail to correctly distinguish it from coma or vegetative state. These findings are consistent with our results and highlight the need for targeted educational interventions addressing media-driven misconceptions [19].

Another notable finding of our study was the high rate of incorrect and uncertain responses to negatively worded statements. High rates of incorrect responses to statements such as "organs can be retrieved after every death," "blood group compatibility alone is sufficient for all transplantations," or "there is an age limit for organ donation" suggest that non-healthcare staff lack adequate knowledge regarding the medical and legal boundaries of organ donation. These findings are consistent with previously reported knowledge gaps in both national and international literature [7,13,20].

The absence of significant differences in the scale total scores according to demographic and clinical variables—including sex, age, marital status, education level, occupational category,

and presence of chronic disease—suggests that these knowledge deficiencies may reflect structural rather than individual factors. Likewise, the lack of association between knowledge levels and possession of an organ donor card or perceived adequacy of existing promotional activities indicates that current informational efforts may be insufficient in terms of content and effectiveness, despite their quantitative presence. Previous studies have shown that passive informational methods (e.g., posters, brochures) have limited impact on knowledge and attitude change, whereas structured and targeted educational interventions are more effective [11,21].

In the multiple linear regression analysis, none of the examined variables independently predicted the scale total scores, and the explanatory power of the model was low. This finding suggests that factors influencing organ donation knowledge may extend beyond the variables assessed in this study. It further supports the notion that organ donation knowledge is more closely related to institutional educational policies, working environment, and continuous professional training rather than individual demographic characteristics [10,11].

International guidelines and intensive care literature emphasize that the success of the organ donation process depends not only on physicians and nurses but also on the knowledge levels and attitudes of all personnel working in intensive care units [11–13]. Daily interactions between non-healthcare staff and patients' relatives contribute to the institutional communication climate and may indirectly influence donation decisions. From this perspective, the present study is valuable in that it focuses on a non-healthcare staff group that has been rarely examined in the existing literature.

Several limitations of this study should be acknowledged. The single-center design and relatively small sample size may limit the generalizability of the findings. In addition, the cross-sectional design precludes the establishment of causal relationships. Nevertheless, the study's focus on non-healthcare personnel working in intensive care units—a population rarely targeted in previous research—represents a key strength.

Limitations

This study has several limitations that should be acknowledged. First, its cross-sectional design precludes the establishment of causal relationships between participant characteristics and knowledge levels. Second, as data were collected using self-reported questionnaires, the findings may be influenced by social desirability bias, potentially leading to an overestimation of participants' knowledge regarding organ donation and brain death.

In addition, the study was conducted at a single tertiary university hospital, which may limit the generalizability of the results to other healthcare settings with different institutional cultures, staffing structures, or educational practices. The relatively modest sample size may also have reduced the statistical power to detect small but potentially meaningful associations between knowledge levels and demographic or occupational factors. Therefore, the findings should be interpreted with caution, and multicenter studies with larger and more diverse samples are warranted to confirm and extend these results.

Conclusions

This study indicates that non-healthcare staff working in intensive care units demonstrate a general awareness of organ donation and brain death concepts; however, this awareness does not consistently extend to clinically and legally decisive aspects of the organ donation process. In particular, the limited ability to differentiate brain death from coma or vegetative state highlights a meaningful conceptual gap that may affect the accuracy of information conveyed within the intensive care environment. Accordingly, improving organ donation practices requires not only broad informational efforts but also targeted, practice-oriented educational programs addressing clinically critical misconceptions among all personnel working in intensive care settings.

Ethical Approval and Study Design

This study was conducted after obtaining approval from the Dokuz Eylul University Hospital Ethics Committee (Decision No: 2022/7179). The research was designed as a cross-sectional and descriptive study aimed at evaluating the knowledge levels, perceptions, and attitudes of non-healthcare staff

working in the intensive care units of Dokuz Eylul University Training and Research Hospital regarding organ donation, as well as identifying factors associated with organ donation.

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Conflict of Interest

The authors declare no conflict of interest.

Data Availability Statement

The data are available from the corresponding author upon reasonable request.

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