

# Willingness of intensive care unit patients' family members to donate organs

## A cross-sectional study

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### Abstract

The large gap between the demand for, and the supply of organs worldwide makes promoting organ donation an important global social issue. Even after someone has signed a consent form or registered for organ donation, ethically, the hospital still requires a family member's written permission before organ donation can proceed. As a result, a family member rather than the patient makes the final decision. This study investigated the willingness of the family members of hypothetical patients in intensive care units (ICUs) suffering from an irreversible condition to sign an organ donation consent form. A cross-sectional survey was conducted among family members of ICU patients recruited from one medical center in southern Taiwan from April to October 2014, which followed the STROBE guidelines. Of 110 ICU family members, 71 (64.5%) were willing to donate the organs of hypothetical patients with irreversible conditions. Based on logistic regression, family support, attitude, and knowledge of organ donation significantly predicted 34% of the variance in willingness to sign consent. Attitude toward organ donation and behavioral knowledge of organ donation correlated significantly with a willingness to sign a consent form. This study found that family support and organ donation attitudes were important factors in predicting the willingness to sign a consent form for the organ donation of hypothetical patients. The study provides evidence that nurses and healthcare staff need to consider family support and educate families on organ donation to encourage potential donors to accept and agree to organ donation.

**Abbreviations:** COD = consent to organ donation, ICU = intensive care unit, MUIS = Mishel uncertainty in illness scale, PBD = patients with brain death, SD = standard deviation.

**Keywords:** attitude to death, brain death, consent forms, decision making, family, intensive care units (ICUs), tissue and organ procurement, uncertainty

### 1. Introduction

Organ transplantation is an alternative form of life-saving or life-enhancing therapy and a last-ditch strategy for patients with end-stage organ failure.<sup>[1]</sup> However, organ demand exceeds supply globally.<sup>[2]</sup> In clinical practice, accidental events are the most common reason for organ donation after brainstem death, with an average annual donation of 12.3 people per million population.<sup>[3]</sup> Family members of patients with brain deaths (PBDs) may find themselves in a state of panic, mental instability, or emotional turmoil and often find it difficult to accept that their loved ones are on the verge of death. They may cling to the belief that hope exists, request that medical personnel try to save and resuscitate the PBDs, and long for a miracle.<sup>[4]</sup> These circumstances make it highly challenging for medical personnel working in intensive care units (ICUs) and caring for PBDs whose condition was caused by an accident to raise the topic of organ donation with the patients' family members and to persuade them to consent

to it. The process is more difficult for the family members of PBDs because of strong Asian family values, cultural reluctance among family members to discuss matters related to death, and reluctance to accept that a sudden tragic event has occurred.<sup>[5]</sup>

#### 1.1. Background

Brain death can be caused in various ways, including head trauma (e.g., vehicular accidents, falling, and gunshot), brain lesions (e.g., intracranial hemorrhage), and others (e.g., cerebral hypoxia, cardiac paralysis, drug intoxication, and drowning).<sup>[4,6]</sup> Patients who suffer irreversible damage to their brains can fall into deep comas. If a patient's condition cannot improve and the patient's family members decide to donate the patient's organs, the donor must satisfy the legal definition of brain death, and the donor's organs must have sufficient functionality to justify donation.<sup>[4]</sup> After the cause of a coma is determined, 2 brainstem function tests are performed. Death is declared if the patient's

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brainstem reflexes are absent and the patient is unable to breathe independently. Cadaveric donation refers to the process in which organs are obtained from PBDs. If a patient's condition cannot improve and the patient's family members decide to donate the patient's organs, the donor must satisfy the legal definition of brain death, and the donor's organs must have sufficient functionality to justify donation.<sup>[4]</sup> In Taiwan, the legal and medical treatment of organ donation also follows the above steps.

Family members play a critical role in deciding to donate organs because PBDs are unable to express their wishes directly. In Asia, family members are allowed to make decisions regarding organ donation that are not in agreement with the deceased's wishes, and such objections are the main bottleneck in the donation process.<sup>[7]</sup> The decision-making by family members is complicated, with 65% stating that they would respect the wishes of the PBD if the latter had registered for organ donation. Additionally, adult children (58.6%) were more likely than parents (37.4%) to consent to organ donation (COD).<sup>[7]</sup> The study found that young female family members and those with a college undergraduate degree or above were more willing to consider organ donation.<sup>[8]</sup> Individuals who were single and highly educated had better knowledge regarding the importance of organ donation.<sup>[9]</sup>

Although religious beliefs are generally considered an important factor affecting organ donation,<sup>[11]</sup> a study in Sweden<sup>[2]</sup> showed that religion could serve as an encouragement for believers to gain a higher level of knowledge regarding the importance of organ donation and to obtain reliable information through various media. Another study also found that higher educational qualifications (41%), age <30 (42%), and having participated in an organ donation campaign (60%) increased the likelihood of consent.<sup>[10]</sup> In Asian culture, which focuses on family ethics, those who have the first right to COD often face pressure from senior family members who oppose it.<sup>[11]</sup>

Similarly, a study in China<sup>[7]</sup> found that 69.9% of participants believed that they must concur with family members regarding organ donation, and 77.1% stated that their family members' opinions had a conclusive influence on their decision. When family members support and communicate with one another about organ donation, those with the right to consent will feel supported when they decide to sign a COD. Such consensus reduces pressure on the decision-makers.<sup>[12]</sup>

Ghaffari<sup>[13]</sup> first proposed identifying determinants of organ donation intention based on the Theory of Planned Behavior, and found that personal behavioral intention and attitude, subjective norms, and perceived behavior control will have a positive impact; the most important factor in changing behavior is to provide family members and friends' views on organ donation. Family members of South Korean patients in surgical ICUs found that 75% had positive attitudes toward organ donation, 60.9% were willing to donate their organs, and 38% were willing to donate the organs of their family members.<sup>[14]</sup> The more positive their attitudes toward organ donation were, the more significant their willingness to donate their family members' organs. The prerequisite for family members to agree to organ donation was a prior understanding of the PBD's medical condition and of brain death. Satisfying this prerequisite would lead to their acceptance that their loved one was brain-dead and to a greater likelihood of successful organ donor solicitation.<sup>[4]</sup> The perceptions and attitudes of most people toward brain death and organ donation are influenced by related reports on television and in newspapers and magazines. According to one study, although family members were generally positive about organ donation, <50% agreed to sign the COD for their brain-dead relatives.<sup>[3]</sup> Given that there remains a considerable gap between awareness of and action on organ donation, attitudes toward organ donation affect the willingness of individuals to donate their own or their family members' organs.

Uncertainty arises when decision-makers cannot define the value of an objective fact or event or correctly predict the outcome.<sup>[15]</sup> Uncertainty is related to individuals' experiences. Specifically, it is generated when one's experience of a medical condition is inconsistent with one's personal experience.<sup>[16]</sup> Only 19% of patients or their family members willingly register for organ donation.<sup>[10]</sup> In fact, patients' directives do not affect their family members' objections to organ donation, so PBDs' original wishes are not always realized.<sup>[11]</sup> Family members play an essential role in signing the COD. However, few studies have examined the relationship between family members' uncertainty about the medical condition of brain death and their willingness to sign the COD for adult ICU patients.

## 1.2. Aims of the study

This study aimed to examine the willingness of family members of patients in ICUs to sign the COD and the factors affecting their decision.

## 2. Method

### 2.1. Study design, setting, and participants

A cross-sectional quantitative research design was adopted, and data were collected through convenience sampling and structured questionnaires.

Data were collected at a medical center in southern Taiwan. The study participants were family members of ICU patients who met the following criteria: their relatives had been admitted to the ICUs for a minimum of 24 hours; they were the patients' spouses or relatives within 2 degrees of kinship; and they were at least 20 years old; and provided informed consent to participate in this survey. The exclusion criteria were ICU patients >65 years old; and patients with incapacitation or a mental illness.

The formal research process was conducted from April to October 2014. G\*Power software version 3.1 was used to estimate the number of samples needed for this study. Using G\*power software for sample size calculation, the details input parameters of power 0.8, the medium effect size of 0.5, and a two-sided significance level of 0.05. With the sample attrition rate estimated at 10%, the required number of confirmed cases was estimated to be 98. The target number of study participants was 110.

### 2.2. Ethical and institutional approvals

Approval for the recruitment of research participants and data collection was granted by the hospital's Institutional Review Board (IRB code: 10411-015). Before the survey was conducted, the researchers explained the purpose and nature of the study to the participants, assured them that their right to withdrawal and privacy would be protected, and then obtained their signed consent. If a family member raised a question regarding the information on organ donation, the researchers would wait until the survey was completed to provide explanation.

### 2.3. Data collection

A total of 110 family members of patients in adult medical and surgical ICUs to participated in the official survey, held from April to October 2014, with each survey requiring approximately 15 minutes. Informed consent was also obtained. Then, retrieve the completed questionnaire. After the questionnaires are collected, the questionnaires are reviewed, the invalid and incomplete questionnaires are eliminated, and the valid questionnaire information is established as a database.

## 2.4. Measures

Data were collected using a structured questionnaire divided into 3 sections, as detailed below.

**2.4.1. Family members' characteristics.** Family member participants' characteristics included gender, age, educational qualifications, relationship with ICU patient, religious beliefs, marital status, average family income, and relevant experiences with organ donation.

**2.4.2. Attitude scale.** The Chinese version of the "scale for attitude toward organ donation" developed by Shih<sup>[17]</sup> was used to assess the willingness, attitudes, and behavioral knowledge of the family members of ICU patients regarding organ donation. The scale was divided into 3 parts. The first concerned family members' willingness to donate organs, including donors' willingness to sign the COD. The second measured the family members' responses to evaluate their attitudes toward organ donation. There were a total of 22 questions, and the participants' responses were scored using a 5-point Likert scale, ranging from "strongly disagree" (1 point) to "strongly agree" (5 points). Questions 7 to 22 were reverse-scored, and the total score ranged from 22 to 110. The question topics included objection to organ donation (13 questions), concurrence with the value of organ donation (5 questions), and disagreement with the value of organ donation (4 questions). The higher the score was, the more positive the family members' attitudes toward organ donation. The third part was the "scale on behavioral knowledge of organ donation," with a total of 10 true-or-false questions. Correct and incorrect answers were awarded 1 and 0 points, respectively, with the total score ranging from 0 to 10 points.

The results from the formal survey were tested for internal consistency. The Cronbach  $\alpha$  for the "scale for attitude toward organ donation" was .80, and the Kuder–Richardson reliability coefficient for the "scale on behavioral knowledge of organ donation" was .42. Regarding internal consistency, a Cronbach  $\alpha > .70$  indicates good internal consistency.<sup>[18]</sup> Kuder–Richardson reliability coefficient is appropriate for questions involving dichotomous variables (i.e., a yes or no answer). The reliability coefficient is affected by the difficulty level, distribution score, and length of the assessment questions. A value between .35 and .70 is deemed acceptable.

**2.4.3. Scale for participants' sense of uncertainty.** The "Mishel uncertainty in illness scale" (MUIS), originally prepared by Mishel,<sup>[15]</sup> was translated into Chinese and modified as the "parents' perception of uncertainty scale–family member" by Mu.<sup>[19]</sup> This original scale included 34 questions. After deleting 3 inappropriate questions, we utilized 31 questions in our scale. The questions covered ambiguity (13 questions), inconsistency (9 questions), complexity (5 questions), and unpredictability (4 questions). A 5-point Likert scale was again used for scoring, ranging from "strongly disagree" (1 point) to "strongly agree" (5 points). Questions 6, 9, 11, 19, 23, 25, 27, 28, 29, 30, and 31 were reverse-scored. The higher the total score was, the greater the sense of uncertainty. The Cronbach  $\alpha$  for the MUIS, that is, the original English scale by Mishel<sup>[15]</sup> that includes 31 questions, was .91. For the parents' perception of uncertainty scale–family member, the Chinese version of the MUIS, was .87. The scale used in this study had a Cronbach  $\alpha$  of .92.

## 2.5. Data analysis

Statistical analysis was performed using the SPSS version 18.0 statistical software (SPSS Inc., Chicago, 2009) package. The descriptive statistics included the basic attributes of the ICU

patients' family members and the frequency distribution, percentage, mean, and standard deviation (SD) of the experiences related to organ donation. The statistical difference of the categorical variables was assessed using chi-square tests. Student  $t$  test was used to assess the statistical difference for continuous variables. For inferential statistics, normal distributions were first checked using different scales to analyze variance. Logistic regression analysis was then used to explore the crucial factors affecting the participants' willingness to sign the COD. A  $P$  value  $< .05$  represented statistical significance.

## 3. Results

### 3.1. Analysis of the family members' demographics and their willingness to sign the COD

The study participants – 110 family members of patients in adult ICUs – ranged in age from 20 to 65 years ( $38.04 \pm 10.71$ ). Females comprised 67.3% of the participants. Among the participants, 92.7% had no prior experience with organ donation, and 69.1% had previously obtained information on organ donation (of whom 59.1% had received it from the mass media). Nearly half (49.1%) did not know whether their family members supported organ donation; 33.6% had family members who supported organ donation; and only 17.3% had family members who did not. Statistical information on the participant variables is presented in Table 1.

### 3.2. Family members' willingness to donate their organs and sign the COD

The majority of family members (79.1%) were willing to donate their organs, and 20.9% were unwilling. Only 3 participants (2.7%) had registered their willingness to donate organs on their health insurance cards. Among those who were willing, the organs that they wished to donate (multiple-choice question) included the heart (58.2%), liver (58.2%), cornea (56.4%), and kidney (54.5%). Additionally, 84 participants (76.4%) would consider their family members' opinions before registering their willingness to donate their organs on their health insurance cards, followed by 78 (70.9%) who would decide for themselves. Regarding one's opinion on or decisions regarding organ donation, 91 participants (82.7%) had never discussed the matter with family members. A total of 97 participants (88.2%) indicated that they would support a family member wanting to register a willingness to donate organs on a health insurance cards, whereas 13 (11.8%) reported that they would object. In cases where the patient's life could not be saved, 71 participants (64.5%) were willing to sign the COD.

### 3.3. Attitudes, knowledge, and uncertainty regarding patient's condition of the family members with respect to organ donation

In terms of the participants' attitudes toward organ donation, the average score was 81.85 (SD = 11.75), indicating a highly positive attitude. For participants' behavioral knowledge of organ donation, the average score was 7.29 (SD = 1.19), indicating moderate-to-high levels of knowledge. Regarding their overall sense of uncertainty about the medical condition, the family members had an overall score average of 79.75 (SD = 15.21), which was moderate to high. The average item scores showed that the score of the ambiguity subscale was the highest, followed by inconsistency, complexity, and unpredictability (Table 2).

**Table 1**  
**Family members' willingness to sign a consent form for organ donation by demographic characteristics (N = 110).**

Design variables	Willingness to sign a consent form for organ donation			$\chi^2$
	n	Yes	No	
Gender				0.11
Male	36	24 (21.8%)	12 (11%)	
Female	74	47 (42.7%)	27 (24.5%)	
Age				2.94
≤30 yr	31	23 (20.9%)	8 (7.3%)	
31–40 yr	39	25 (22.7%)	14 (12.7%)	
≥41 yr	40	23 (20.9%)	17 (15.5%)	
Education				1.94
High school or less	45	31 (28.2%)	14 (12.7%)	
College	53	31 (28.2%)	22 (20.0%)	
Master's or above	12	9 (8.2%)	3 (2.7%)	
Relationship with patient				0.87
Parents' relationship with patient	15	10 (9.1%)	5 (4.5%)	0.87
Spouse	3415	21 (19.1%)	13 (11.8%)	
Parents		10 (9.1%)	5 (4.5%)	
Children	4934	31 (28.2%)	18 (16.4%)	
Spouse		21 (19.1%)	13 (11.8%)	
Daughter-in-law	349	2 (1.8%)	1 (0.9%)	
Children		31 (28.2%)	18 (16.4%)	
Brothers and sisters	93	7 (6.4%)	2 (1.8%)	
Daughter-in-law		2 (1.8%)	1 (0.9%)	
Brothers and sisters	9	7 (6.4%)	2 (1.8%)	
Religion				0.00
No religion	31	20 (18.1%)	11 (10.0%)	0.00
Yes	7931	51 (46.4%)	28 (25.5%)	
No		20 (18.1%)	11 (10.0%)	
Yes	79	51 (46.4%)	28 (25.5%)	
Marital status				0.45
Single marital status	47	32 (29.1%)	15 (13.6%)	0.45
Married	6347	39 (35.5%)	24 (21.8%)	
Single		32 (29.1%)	15 (13.6%)	
Married	63	39 (35.5%)	24 (21.8%)	
Experience with organ donation				0.41
No experience with organ donation	102	65 (59.1%)	37 (33.6%)	0.41
Yes	8102	6 (5.5%)	2 (1.8%)	
No		65 (59.1%)	37 (33.6%)	
Yes	8	6 (5.5%)	2 (1.8%)	
Experience with organ transplantation				0.33
No experience with organ transplantation	96	61 (55.5%)	35 (31.8%)	0.33
Yes	1496	10 (9.1%)	4 (3.6%)	
No		61 (55.5%)	35 (31.8%)	
Yes	14	10 (9.1%)	4 (3.6%)	
Obtained information on organ donation				1.61
No obtained information on organ donation	34	19 (17.3%)	15 (13.6%)	1.61
Yes	7634	52 (47.3%)	24 (21.8%)	
No		19 (17.3%)	15 (13.6%)	
Yes	76	52 (47.3%)	24 (21.8%)	
Family supports organ donation				9.07**
Yes family supports organ donation	37	31 (28.2%)	6 (5.5%)	9.07*
No	1937	10 (9.0%)	9 (8.2%)	
Yes		31 (28.2%)	6 (5.5%)	
Don't know	5419	30 (27.3%)	24 (21.8%)	
No		10 (9.0%)	9 (8.2%)	
Don't know	54	30 (27.3%)	24 (21.8%)	

\* $P < .05$ , \*\* $P < .01$ .

### 3.4. Difference between the family members' attitudes toward organ donation and their willingness to sign the COD

There was no significant difference in the chi-square difference test for the demographic characteristics of the family members of the patients in the adult ICU and the related experience of organ donation in the willingness to sign a consent form for organ donation.

The chi-square test indicated that family support did significantly differ with respect to the willingness to sign the COD ( $\chi^2 = 9.07$ ,  $P < .05$ ). Therefore, the family members of ICU

patients would be more inclined to sign the COD when they were aware of their family's support (Table 1).

The higher the score for participants' attitudes toward organ donation was, the greater the willingness to sign the COD ( $t = 3.96$ ,  $P < .001$ ). There were also significant differences between the willingness to sign the COD and behavioral knowledge of organ donation ( $t = 2.15$ ,  $P < .05$ ). There was no significant difference between the willingness to sign the COD and total score for the sense of uncertainty about the patient's medical condition or for the subscales for vagueness, ambiguity, lack of information, and unpredictability (Table 3).

### 3.5. Predictors of family members' willingness to sign the COD

Logistic regression was used to analyze the family members' willingness to sign the COD. The results are shown in Table 4, which offers a significant overall pattern for the 2 variables, "attitude toward organ donation" and "behavioral knowledge of organ donation." For every increase of 1-point in the family members' attitudes toward organ donation, their willingness to sign the COD was increased 1.08 times (OR = 1.08, 95% CI = 1.03–1.13). With every increase in 1-point behavioral knowledge of organ donation, their willingness to sign the COD was increased 1.57 times (OR = 1.57, 95% CI = 1.10–2.24). For every 1-point increase in family support, their willingness to sign the COD was increased 2.35 times but did not reach a statistically significant difference ( $P = .136$ ). Based on

logistic regression, family support, attitudes, and knowledge of organ donation significantly predicted a 34% variance in willingness to sign consent.

### 4. Discussion

The results of this study indicate that 64.5 % of the family members of patients in adult ICUs were willing to sign a COD if the patients could not be saved. These results were higher than those obtained by Park.<sup>[14]</sup> The systematic review<sup>[5]</sup> found that better knowledge and religious beliefs negatively impacted Koreans' willingness and decision-making regarding organ donation. There was no statistically significant difference in terms of gender, age, or educational qualifications in this study. The results of this study were similar to those of

**Table 2**

**Score table for organ donation by family members (N = 110).**

Variable	Overall mean	SD	Single item mean	Score range
Attitude scale for organ donation	81.85	11.75	3.72	22–110
Reason for hindering organ donation	48.49	8.25	3.73	13–65
Certain regarding benefits of organ donation	20.66	2.76	4.13	5–25
Uncertain regarding benefits of organ donation	12.7	2.77	3.18	4–20
Knowledge	7.29	1.19		
Family member uncertainty regarding patient's condition	79.75	15.21	2.57	31–155
Ambiguity	36.43	8.0	2.80	13–65
Inconsistency	21.42	4.48	2.38	9–45
Complexity	10.99	2.72	2.20	5–25
Unpredictability	10.91	2.40	2.73	4–20

SD = standard deviation.

**Table 3**

**Analysis of the differences in the willingness of family members to sign a consent form for organ donation (N = 110).**

Variable	n	Mean	SD	t
Attitude scale for organ donation				3.96***
Unwilling	39	67.85	7.73	
Willing	71	61.44	8.31	
Reason for hindering organ donation				4.41***
Unwilling	39	35.69	6.71	
Willing	71	29.58	7.10	
Certain regarding benefits of organ donation				-2.66**
Unwilling	39	19.74	2.93	
Willing	71	21.17	2.55	
Uncertain regarding benefits of organ donation				3.25**
Unwilling	39	12.41	2.35	
Willing	71	10.69	2.81	
Knowledge				2.15*
Unwilling	39	7.62	0.91	
Willing	71	7.11	1.29	
Family members' uncertainty regarding patient's condition				1.06
Unwilling	39	96.69	10.18	
Willing	71	94.49	10.52	
Ambiguity				0.82
Unwilling	39	38.79	7.09	
Willing	71	37.55	7.91	
Inconsistency				0.36
Unwilling	39	29.56	2.53	
Willing	71	29.37	2.86	
Complexity				1.80
Unwilling	39	15.18	1.96	
Willing	71	14.52	1.59	
Unpredictability				0.20
Unwilling	39	13.15	2.49	
Willing	71	13.06	2.37	

n = number, SD = standard deviation.

\*  $P < .05$ , \*\*  $P < .01$ , \*\*\*  $P < .001$ .

**Table 4**  
**Willingness of family members to sign a consent form for organ donation: logistic regression results (N = 110).**

Variable	$\beta$	S.E.	Wald	df	Sig.	Exp ( $\beta$ )	95% CI	
							LL	UL
Family support	0.85	0.57	2.22	1	.136	2.35	0.76	7.23
Attitude toward organ donation	0.08	0.03	9.59	1	.002**	1.08	1.03	1.13
Knowledge of organ donation	0.45	0.18	6.13	1	.013*	1.57	1.10	2.24
Constant	-7.61	2.05	13.74	1	.000***	.000		

CI = confidence interval, Df = degrees of freedom, LL = lower limit, SE, standard error, Sig = significant, UL = upper limit.

\*  $P < .05$ , \*\*  $P < .01$ , \*\*\*  $P < .001$ .

Krupic<sup>[2]</sup>, whereby the difference between religious beliefs and willingness to sign a COD was not statistically significant. The studies involving family members of ICU patients, the organ donation drivers, and the cultural and religious beliefs differed between the studied countries, resulting in dissimilar donation intentions.

Our study was similar to Anthony,<sup>[20]</sup> who found that the support of other family members resulted in a significant difference in the willingness to sign the COD. These outcomes show that disagreements among family members often cause a failure to solicit organ donation. Although, in the study,<sup>[20]</sup> the patient signed an organ donation card before hospitalization, ICU patient families still refused to comply with the patient's will. Healthcare staff, especially nurses, frequently talked with family members to explore the barriers and find resolution strategies. This finding might be due to vigorous promotional efforts by the governments and medical institutions of the studied countries to increase family members' acceptance of organ donation, resulting in religious beliefs having less impact. Therefore, identifying factors that influence family organ donation decisions at critical moments is highly important to organ donation willingness.

Therefore, identifying factors influencing family organ donation decisions at critical moments is highly important to organ donation willingness. Regarding the "scale for attitude toward organ donation," there were significant differences between, on the one hand, the scores for the 3 subscales "object-to-organ donation," "agree with the value of organ donation," and "disagree with the value of organ donation" and, on the other, the family members' willingness to sign the COD. These results are similar to those of Rodrigue.<sup>[21]</sup> The family members of ICU patients had medium-to-high levels of behavioral knowledge of organ donation, which resulted in statistically significant differences in their willingness to sign the COD. Highlighted that family members might agree to organ donation after understanding the medical condition and brain death.<sup>[4]</sup> The family members of ICU patients had highly positive attitudes toward organ donation. There was a statistically significant difference between their attitudes toward organ donation and their willingness to sign the COD, similar to the findings of Park.<sup>[14]</sup> This result indicated that family members' attitudes toward organ donation were related to their willingness to sign the COD. Positive attitudes and knowledge of organ donation had a better behavioral understanding of organ donation and a more significant willingness to sign the COD. Improving the quality of communication between family members may affect and enhance their attitudes toward and willingness to support organ donation. Nurses and healthcare staff should educate ICU families on organ donation to encourage potential donors to accept and agree to organ donation.

Family members had a moderate degree of uncertainty regarding the patients' medical conditions. However, this uncertainty did not lead to a statistically significant difference in the willingness to sign the COD. This phenomenon may have occurred because even though most of the participants

were spouses and children of patients, the patients themselves had survived the critical period and were stable and steadily recovering. Therefore, the family members' sense of uncertainty over the patients' medical conditions was not severe. The scores for "ambiguity," "uncertainty," "lack of information," and "unpredictability" in the subscales for family members' and uncertainty regarding the patient's medical condition did not have any significant difference with respect to the willingness to sign the COD. This outcome might be related to the medical professionals in the ICU having provided the family members with adequate explanations regarding the patient's condition. Uncertainty regarding the patient's condition and attitudes toward organ transplantation affect ICU family members' decision-making. These factors offer healthcare staff knowledge on how to encourage ICU family members to look favorably on organ donation. Our study not only provides healthcare staff and organ recruitment coordinators information with which to help suffering families and realize patients' wishes but could also increase organ donation rates.

## 5. Limitation

There were some limitations to this study. First, this was a cross-sectional study based on the views of family members of adult patients in the medical and surgical ICUs of a medical center. Therefore, the results are limited in terms of generalizable implications. In future research, surveys should be conducted in multiple hospitals. Second, this study is that relationships among family members were not discussed because of the inherent complexity of the subject. Third, family members may think that organ donation is policy propaganda; to obtain the approval of doctors and nurses, they tend to have a more positive attitude when answering. Fourth, the willingness of the ICU family members may not necessarily lead to actual behavior, but it can enhance the family members' awareness of organ donation. Additionally, the sense of family uncertainty in this study came from the modification of the Chinese version Michel uncertainty scale of parents with child cancer<sup>[19]</sup>; the original version was validated in patients.<sup>[15]</sup> Therefore, establishing an uncertainty scale for critically ill adult family members deserves further study.

## 6. Conclusions

Organ donation can save dying patients and prolong the lives of others. Family members' understanding of brain death is an important factor in the successful solicitation of organ donation. The results of this study can provide medical care teams an improved understanding of the considerations and needs of family members of patients in different adult ICUs when they are asked to sign the COD so that proper assistance and support can be provided when they consider organ donation.

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## References

- [1] Umair S, Ho JA, Ng SSI, et al. Moderating role of religiosity and the determinants to attitude, willingness to donate and willingness to communicate posthumous organ donation decisions among university students in Pakistan. *Omega*,302228211045170. Advance online publication.
- [2] Krupic F, Westin O, Hagelberg M, et al. Taiwan's organ donation and transplantation: observation from national registry point of view. *J Formos Med Assoc.* 2017;116:649–51.
- [3] Wang TH, Lee PC, Chiang YJ. Taiwan's organ donation and transplantation: Observation from national registry point of view. *J Formos Med Assoc.* 2017;116:649–51.
- [4] Kentish-Barnes N, Siminoff LA, Walker W, et al. A narrative review of family members' experience of organ donation request after brain death in the critical care setting. *Intensive Care Med.* 2019;45:331–42.
- [5] Li MT, Hillyer GC, Husain SA, et al. Cultural barriers to organ donation among Chinese and Korean individuals in the United States: a systematic review. *Transpl Int.* 2019;32:1001–18.
- [6] Saran J, Padubidri JR. Brain stem death - An overview. *Medico Legal J.* 2019;87:18–20.
- [7] Pan XT, Ji-Ma W, Bai ZC, et al. Investigation and strategic analysis of family barriers to organ donation in China. *Transplant Proc.* 2021;53:513–9.
- [8] Mossialos E, Costa-Font J, Rudisill C. Does organ donation legislation affect individuals' willingness to donate their own or their relative's organs? Evidence from European Union survey data. *BMC Health Services Research.* 2008; 8:48.
- [9] Abukhaizaran N, Hashem M, Hroub O, et al. Knowledge, attitudes, and practices of Palestinian people relating to organ donation in 2016: a cross-sectional study. *Lancet.* 2018;391(suppl 2):S45.
- [10] Ismail ASB, Lim KG, Mahadevan DT. Knowledge, attitude and factors influencing public willingness towards organ donation among hospital patients and relatives in Negeri Sembilan, Malaysia. *Med J Malaysia.* 2020;75:260–5.
- [11] Weng LC, Chiang HHL, Tsai YH, et al. Factors associated with registration for organ donation among clinical nurses. *PLoS One.* 2021;16:e0247424.
- [12] Lin YP, Chen J, Lee WC, et al. Understanding family dynamics in adult-to-adult living donor liver transplantation decision-making in Taiwan: motivation, communication, and ambivalence. *Am J Transplant.* 2021;21:1068–79.
- [13] Ghaffari M, Rakhshanderou S, Najafizadeh K, et al. Determinants of medical students for intention to organ donation: application of theory of planned behavior. *Saudi J Kidney Dis Transpl.* 2019;30:1375–80.
- [14] Park UJ, Han SY, Han KH, et al. Effects of phased education on attitudes toward organ donation and willingness to donate after brain death in an Asian country. *Asian J Surg.* 2019;42:256–66.
- [15] Mishel MH. Adjusting the fit: Development of uncertainty scales for specific clinical populations. *West J Nurs Res.* 1983;5:355–70.
- [16] Selder F. Life transition theory: the resolution of uncertainty. *Nurs Health Care.* 1989;10:437–40.
- [17] Shih LC, Tseng MY, Chen SC, et al. Establishing an instrument of organ donation for the General Public. *Chang Gung Nurs.* 1998;9:11–9. (Original work published in Chinese)
- [18] Al-Osail AM, Al-Sheikh MH, Al-Osail EM, et al. Is Cronbach's alpha sufficient for assessing the reliability of the OSCE for an internal medicine course? *BMC Res Notes.* 2015;8:582.
- [19] Mu PF, Ma FC, Ku SM, et al. Stress on families of children with cancer: the impact on mothers. *Nurs Res.* 2000;8:568–78.
- [20] Anthony SJ, Lin J, Pol SJ, et al. Family veto in organ donation: the experiences of organ and tissue donation coordinators in Ontario. *Can J Anesth.* 2021;68:611–21.
- [21] Rodrigue JR, Cornell DL, Howard RJ. Organ donation decision: comparison of donor and nondonor families. *Am J Transplant.* 2006;6:190–8.