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Developing an Organ Donation Curriculum for Medical Undergraduates in China Based on Theory of Planned Behavior: A Delphi Method Study

School of Nursing, Third Military Medical University, Chongqing, P.R. China

Authors' Contribution:

Study Design A
Data Collection B
Statistical Analysis C
Data Interpretation D
Manuscript Preparation E
Literature Search F
Funds Collection G

BCEF **Lei Lei**
AE **Li Lin**
BC **Jing Deng**
BC **He Dong**
AEG **Yu Luo**

Corresponding Author: Yu Luo, e-mail: luoyuhlg@tmmu.edu.cn

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Background: Organ donation education as an important approach to improve support for donating, but it is inconsistent and unstructured. Therefore, the development of donation-related curriculum is essential, especially for medical undergraduates. This study aimed to define the fundamental contents for organ donation curriculum that could be useful for international organ donor agencies and educational institutions.

Material/Methods: The basic framework of the organ donation curriculum was constructed under the guidance of the theory of planned behavior in China. Then, Delphi method was used to modify and improve the contents by conducting 2 rounds of consultation with 22 Chinese experts from 6 professional fields. The surveys winnowed the list and assessed the accuracy and importance of each item.

Results: Response rates for the Delphi were 100.00% for the first round and 95.45% for the second round. A 3-layer curriculum system was developed based on 3 dimensions of the theory of planned behavior. The primary-layer items including the overview, cultural concepts, ethical issues, laws and regulations, medical knowledge, and psychological care in organ donation, elicited at least 85% of the experts to agree or strongly agree that the items were basic and core content for organ donation education. All of the 17 second-layer and 46 third-layer items also had 80% or more expert agreement.

Conclusions: This study identified the contents of an organ donation curriculum for medical undergraduates in China, which would be useful for researchers and instructors in medical education. Determining the fundamental content of a donation-related curriculum is an indispensable step for implementation of organ donation education and promotion of organ donation.

MeSH Keywords: Curriculum • Delphi Technique • Students, Medical • Theory of Mind • Tissue and Organ Procurement

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Background

Organ transplantation is one of the most important medical measures, especially for patients with severe organ failure. In recent years, the need for organ transplantation has increased as the burden of diseases, aging, and economic development increased [1]. However, the shortage of donors has seriously restricted the development of transplant surgery around the world [2,3]. More than 90% of the world's organ failure patients die while waiting for organs [4], and the average organ supply and demand ratio is only 1: 25 [3]. According to the International Registry in Organ Donation and Transplantation, there was a worldwide decrease in number of organ donors in 2018 [5], and the number of donors varies greatly from country to country. Even in Spain, whose donation rate has ranked high, with 48 donors per million population, not every organ request can be satisfied [4], and the situation in most countries around the world is far worse.

Due to the grim situation of organ donation, countries around the world are conducting research to increase the number of donated organs. The findings show that increasing organ donation awareness leads to more positive attitudes toward organ donation and stronger willingness to donate [6–8]. Hence, offering an organ donation curriculum is of great importance, especially among university students, who accept the idea of organ donation and put it into practice more readily than in other groups. The top organ donation countries in the world, such as Spain, the United States, and Canada, implemented organ donation education almost 20 years ago. Nowadays, hundreds of universities offer relevant curriculum and have rich professional educational resources [9]. But in many other countries, such as China, the relevant research is limited, the education content is not specific, and the educational mode is single, without a comprehensive and systematic curriculum education system for organ donation, and without local education programs [10]. Organ donation curricula that can increase the willingness to donate are still in the developmental stage in many countries.

Medical undergraduates, as an important group supporting and promoting public welfare, will be of vital importance in the new generation of organ donation efforts [11], and they more readily receive and disseminate knowledge about organ donation because of their medical background [12]. In terms of organ donation, they are not only the potential donor source, but have great potential to be organ donation coordinators. When they step into medical positions, their attitudes and behaviors will motivate more people to donate organs [13]. Therefore, it is extremely important to improve the awareness of medical undergraduates.

The theory of planned behavior, which fits very well with the aim of organ donation curricula, was first proposed by Icek

Ajzen [14] in social psychology. It posits that the intention of behavior directly determines individual behavior, and behavioral intention is affected by 3 factors: attitude (positive and negative cognitive evaluation of behavioral results), subjective norm (individual perception and identification level of behaviors occurring in social attributes), and perceptual behavior control (individual assessment of objective conditions of behaviors occurring) [15,16]. Although TPB originated from social psychology, it is now authoritative in explaining and predicting behavior, and has been widely used in decision-making research in health behavior [17] and developing curricula.

The contents of the organ donation curriculum were modified and improved by Delphi method. Delphi method, which originated in the 1960s, was first applied by the Rand Corporation for use in areas such as corporate budget, policy, and urban planning. At present, it is widely applied in education, curriculum development, health sciences, and other research fields [18]. In essence, the Delphi method is an anonymous iterative expert letter consultation method, which uses an iterative back-and-forth approach. Through multiple rounds of questionnaire consultation, revision and feedback, the expert opinions tend to be consistent within a short period of time, forming a more scientific and authoritative professional scheme or system [19]. The advantage of the Delphi method is that experts are not in contact with each other, avoiding interference from other experts' opinions, ensuring that experts can independently and freely express their own opinions [20], and fully integrating the wisdom of experts. The anonymity, feedback, and statistics of the Delphi method make it one of the most innovative and efficient research methods to promote health science, education research, and other fields [21]. Therefore, we used the Delphi method to improve the organ donation curriculum content system.

Guided by the theory of planned behavior and considering the special characteristics of medical undergraduates, this study aimed to construct donation-related curriculum content through use of the Delphi method to enrich the educational resources for organ donation, provide reference for other countries, and support the promotion of organ donation.

Material and Methods

Based on the framework of TPB, we analyzed the cognitive status and influencing factors of organ donation among medical students. In terms of behavioral attitudes, medical students strongly support organ donation and recognize the value of donation. In terms of subjective norms, traditional death concepts and family members' attitudes have become important factors affecting medical students' organ donation behavior. In terms of perceived behavioral control, medical students have limited

knowledge of the donation process and related factors, which influences their willingness to donate. Therefore, medical students tend to have a low intention to donate organs [10,22,23]. This study makes use of the theoretical framework of planned behavior to analyze the cognition, influencing factors, and personal attitude of medical undergraduates regarding organ donation. After analyzing the actual situation of medical undergraduates, we designed a preliminary organ donation curriculum.

Expert selection

In this study, 22 experts were invited from 6 fields – clinical medicine, psychology, education, law, nursing, and medical statistics – by selecting representative experts in professional fields and determining the authority of experts in letter consultation [24]. The inclusion criteria were: (1) 10 years or more of professional work experience; (2) bachelor's degree or higher education experience; (3) understand the topic of the letter of inquiry about organ donation; and (4) willing to participate in the expert letter consultation. Exclusion criteria were: (1) less than 10 years of professional experience; (2) lack of a bachelor's degree or less than undergraduate education experience; (3) lack of timely reply and response to the questionnaire. The experts were selected from among CNKI (China National Knowledge Infrastructure) authors according to the inclusion criteria and they were identified by their research contributions in the professional fields, years of work, and professional positions. Questionnaires were sent after the email address or phone number were determined and the experts agreed to participate.

Questionnaire

The questionnaire consisted of 3 parts: (1) instructions for the questionnaire: the purpose, significance, matters needing attention, and time to send back the questionnaire; (2) basic information survey of experts, such as age, educational background, professional title, and research field; and (3) organ donation curriculum content inquiry form, including the contents of the organ donation curriculum, the degree of familiarity with the investigation content, and the basis of necessity. The contents of the organ donation curriculum were evaluated using the Likert 5-point scale, from 1 for “not important at all” to 5 for “very important”, and we also attached experts' opinions about deleting an item and other suggestions. The questionnaire was sent out via email, which reduced the limitation of space and time and enabled the experts to easily and quickly provide feedback.

Data analysis

Data analysis was conducted with Excel and SPSS 20.0 software. Descriptive analysis was used to calculate the mean and standard deviation, approval rate (the percentage of items evaluated as “important” and “very important”), and coefficient of

variation (CV). We selected the items with the mean value of significance assignment higher than 4.0, approval rate higher than 75%, and CV less than 0.25.

Quality control

The selection of experts strictly followed the principle of representativeness and authoritativeness, which ensures good coverage of the research fields of the experts. Before the consultation, researchers contacted the experts in advance by telephone or short message to get their agreement to participate in the study. A separate questionnaire was issued to the experts through email and the experts evaluated it by themselves. If the questionnaire was not returned within a certain period of time, the researchers contacted the experts again to remind them to reply in time. We ensured that each round of consultation was completed within 20 days. After the return of the questionnaire, we deleted invalid questionnaires that are incorrectly filled in or missing over 20% of the items. For the questionnaires that are not clearly filled in, we contacted and confirmed with the experts. Then, we double-checked responses and entered relevant data to ensure the accuracy of the expert evaluation information. The revision and additional opinions put forward by the experts were considered and modified after discussion with professors and members of the research group.

Results

General information on experts

This survey invited 22 experts from 6 fields, including education, psychology, and clinical medicine. The average age was 43.14 ± 6.10 years old, and the average length of work experience was 21.41 ± 7.52 years, as shown in Table 1.

Two rounds of expert consultation were conducted in this study. The response rate was 100% in the first round and 95.45% in the second round. Finally, a 3-layered curriculum on organ donation was formed, as shown in Table 2. The content on the theory of planned behavior included 6 core components: overview of organ donation, cultural concepts, ethics, laws and regulations, medical knowledge, and psychological care, and all were approved by more than 85% of the experts.

Overview of organ donation (approval rate: 90.48%). Based on the definition of organ donation, this part briefly introduces the origin and types of organ transplantation, history and current status of organ donation, and some issues regarding organ donation systems in countries around the world, highlighting its social and medical significance. Meanwhile, the relevant factors affecting organ donation are also analyzed

Table 1. General information on the experts.

Items	Classification	Number (percent)
Age	30–39 y	8 (36.36%)
	40–49 y	12 (54.55%)
	Over 50 y	2 (9.09%)
Years of working	10–19 y	9 (40.91%)
	20–29 y	9 (40.91%)
	Over 30 y	4 (18.18%)
Highest education	Bachelor	8 (36.36%)
	Master	4 (18.18%)
	Doctor	10 (45.45%)
Professional positions	Intermediate certificate	4 (18.18%)
	Senior position	18 (81.82%)
Specialist areas	Education	7 (31.82%)
	Clinical medicine	3 (13.64%)
	Psychology	2 (9.09%)
	Law	1 (4.55%)
	Nursing	7 (31.82%)
	Medical statistics	2 (9.09%)

to encourage the students to form a correct understanding of organ donation and eliminate misinformation, misconceptions, and misunderstandings. This part was approved by 20 experts in the first round of consultation, and 19 experts considered it important or even very important in the second round of consultation, since the questionnaire sheet answered by 1 expert was lost. Nevertheless, the overall opinion of experts was that an overview of organ donation is an important part of the whole curriculum.

Cultural concepts regarding organ donation (approval rate 85.71%). Chinese society is dominated by Confucian culture, so it is important to understand the basic values of helping others, positive life attitude, family-oriented culture, and family support, all of which foster a positive social atmosphere beneficial for organ donation. Moreover, the concepts of traditional filial piety, death culture, perception of our bodies such as post-mortem whole-corpse preservation were also analyzed. Discussing the cultural confusion about organ donation can raise awareness of organ donation in modern society. In the original curriculum design, besides positive and negative cultural concepts of organ donation, there was a cultural perspective of the conflicting influences on organ donation. But in the first round of expert consultation, the approval rate was less than 80% and the coefficient of variation was higher than 0.2. Therefore, on the second round, we deleted some paragraphs and reserved cultural values with great impact on organ

donation decisions. These contents were recognized by more than 80% of the experts, reflecting the regional characteristics of the curriculum and the relevance of teaching content in different countries. It should be revised over time, and necessary contents should be supplemented accordingly.

Organ donation ethics (approval rate 100.00%) includes 3 parts: the source of organs, protection of donors, and ethical review of organ donation. In class, the controversial ethical issues in modern society such as organs from executed prisoners, organ trade, and organ transplant tourism are discussed. The ethical education on body protection of donors after donation, donors' privacy, and informed consent of donors and their family members should be popularized and promoted. The ethical principles in organ donation and acquisition, and the duties and working procedures of the ethics review committee are also introduced to eliminate the students' doubts about organ source, donation process, and use of donated organs. The contents on organ donation ethics were unanimously endorsed by all experts in the 2 rounds of consultation, and they agreed that ethics education should be a focus of an organ donation curriculum.

Laws and regulations on organ donation (approval rate 95.24%). This part introduces the relevant laws and regulations in developed countries with high prevalence of organ donation in the world (e.g., Spain and the United States) and analyzes the deficiencies of organ donation regulations in China. Organ donation should be carried out in accordance with current Chinese laws and regulations. The organ donation process is discussed in detail, including application for organ donation, review, acquisition, and distribution. Applicants can deliver their information to become an organ donor by on-site registration with the local Red Cross committees and organ donation organizations in hospitals, or logging onto the Chinese organ donation websites. The content on the status quo of organ donation legislation at home and abroad was approved by more than 80% of experts; other content on organ donation laws and regulations was approved by more than 95% of the experts. Law is the basis for practice of organ donation and is indispensable for organ donation education of medical staff.

Medical knowledge on organ donation (approval rate 100.00%) is important not only in the organ donation curriculum but also as a necessary supplement to the medical curriculum. This part reviews 2 organ sources: deceased donor organ donation and living donor organ donation, and introduces the criteria for determining death (donation after brain death, donation after cardiac death, and donation after brain and cardiac death), requirements and standards for organ donation, organ preservation methods and time, damage caused to living donors by organ donation, identification of potential organ donors and persuasion skills, medical skills for organ donation, and health management tips.

Table 2. Organ donation medical humanities curriculum content system.

First-layer items ($\bar{x} \pm S$, CV, Approval rate %)	Second-layer items ($\bar{x} \pm S$, CV, Approval rate %)	Third-layer items ($\bar{x} \pm S$, CV, Approval rate %)	
1. Overview of organ donation (4.571±0.676, 0.148, 90.48%)	1.1 Introduction to organ donation (4.476±0.602, 0.134, 95.20%)	1.1.1 Concepts about organ donation (4.429±0.598, 0.135, 95.24%)	
		1.1.2 History and development of organ donation (4.143±0.655, 0.158, 85.71%)	
		1.1.3 Types of organ donation (4.381±0.590, 0.135, 95.24%)	
	1.2 Importance of organ donation (4.524±0.750, 0.166, 85.70%)	1.2.1 Historical significance of organ donation (4.143±0.727, 0.175, 80.95%)	1.2.2 Social significance of organ donation (4.524±0.750, 0.166, 85.71%)
			1.3 Factors influencing organ donation (4.667±0.577, 0.124, 95.20%)
	1.3.2 Family members' attitude towards organ donation (4.571±0.598, 0.131, 95.24%)		
	1.3.3 Social education, public support factors (4.476±0.602, 0.134, 95.24%)		
	2. Cultural concepts on organ donation (4.476±0.750, 0.167, 85.71%)	2.1 Cultural attitudes on promoting organ donation (4.524±0.602, 0.133, 95.20%)	2.1.1 Helping others (4.333±0.577, 0.133, 95.24%)
			2.1.2 Positive life values (4.476±0.680, 0.152, 90.48%)
2.1.3 Family support culture (4.333±0.658, 0.152, 90.48%)			
2.2 Cultural attitudes on discouraging organ donation (4.429±0.676, 0.153, 90.50%)		2.2.1 Traditional death culture (4.381±0.669, 0.153, 90.48%)	
		2.2.2 Traditional filial piety and body concept (4.429±0.676, 0.153, 90.48%)	
		3. Organ donation ethics (4.762±0.436, 0.092, 100.00%)	3.1 Ethics of organ sources (4.524±0.680, 0.150, 90.50%)
3.1.2 Organ trafficking (4.429±0.746, 0.169, 85.71%)			
3.1.3 Organ transplantation tourism (4.381±0.669, 0.153, 90.48%)			
3.2 Ethical issues related to organ donors (4.857±0.359, 0.074, 100.00%)	3.2.1 Donor body protection (4.619±0.498, 0.108, 100.00%)		
	3.2.2 Privacy protection (4.857±0.359, 0.074, 100.00%)		
	3.2.3 Informed consent (4.857±0.359, 0.074, 100.00%)		
3.3 Ethical review of organ donation and access (4.810±0.402, 0.084, 100.00%)	3.3.1 Basic ethical principles for organ donation and access (4.810±0.402, 0.084, 100.00%)		
	3.3.2 Ethics review committee responsibilities and procedures (4.524±0.602, 0.133, 95.24%)		

Table 2 continued. Organ donation medical humanities curriculum content system.

First-layer items ($\bar{x} \pm S$, CV, Approval rate %)	Second-layer items ($\bar{x} \pm S$, CV, Approval rate %)	Third-layer items ($\bar{x} \pm S$, CV, Approval rate %)	
4. Laws and regulations on organ donation (4.714±0.561, 0.119, 95.24%)	4.1 Organ donation laws and regulations (4.667±0.577, 0.124, 95.20%)	4.1.1 Current situation of organ donation legislation at domestic and overseas (4.333±0.796, 0.184, 80.95%)	
		4.1.2 Regulations on organ donation in China (4.667±0.577, 0.124, 95.24%)	
		4.1.3 Relevant regulations for medical personnel (4.714±0.561, 0.119, 95.24%)	
	4.2 Organ donation process (4.762±0.436, 0.092, 100.00%)	4.2.1 Organ donation application process (4.762±0.436, 0.092, 100.00%)	
		4.2.2 Steps to obtain donated organs (4.762±0.436, 0.092, 100.00%)	
		4.2.3 Organ donation allocation process (4.762±0.436, 0.092, 100.00%)	
	4.3 Organ donation organizations (4.429±0.598, 0.135, 95.20%)	4.3.1 Red Cross Association (4.429±0.598, 0.135, 95.24%)	
		4.3.2 OPO, organ procurement organization (4.429±0.598, 0.135, 95.24%)	
	5. Medical knowledge of organ donation (4.762±0.436, 0.092, 100.00%)	5.1 Donation after death (4.762±0.539, 0.113, 95.20%)	5.1.1 Standard of determination of death (4.714±0.561, 0.119, 95.24%)
			5.1.2 Standards for donation after death (4.857±0.478, 0.098, 95.24%)
5.1.3 Methods and time of different organs preservation (4.857±0.478, 0.098, 95.24%)			
5.2 Live organ donation (4.810±0.512, 0.106, 95.20%)		5.2.1 Standards for live donor donation (4.857±0.478, 0.098, 95.24%)	
		5.2.2 Possible harm from organ donation (4.714±0.561, 0.119, 95.24%)	
		5.2.3 Care for living organ donors (4.857±0.478, 0.098, 95.24%)	
5.3 Medical skills for organ donation (4.714±0.561, 0.119, 95.20%)		5.3.1 Identification and interpretation skills of potential organ donors (4.667±0.658, 0.141, 90.48%)	
		5.3.2 Health management skills of organ donors (4.714±0.644, 0.137, 90.48%)	
		5.3.3 Humanistic care skills on organ donation (4.619±0.669, 0.145, 90.48%)	

Table 2 continued. Organ donation medical humanities curriculum content system.

First-layer items ($\bar{x} \pm S$, CV, Approval rate %)	Second-layer items ($\bar{x} \pm S$, CV, Approval rate %)	Third-layer items ($\bar{x} \pm S$, CV, Approval rate %)
6. Psychological care in organ donation (4.714±0.463, 0.098, 100.00%)	6.1 Psychological care for living organ donors (4.857±0.359, 0.074, 100.00%)	6.1.1 Psychological activities and characteristics of living organ donors (4.762±0.436, 0.092, 100.00%)
		6.1.2 Factors affecting the psychological changes of living organ donors (4.810±0.402, 0.084, 100.00%)
	6.2 Psychological care for family members (4.762±0.436, 0.092, 100.00%)	6.2.1 Psychological activities and characteristics of the relatives of living organ donors (4.810±0.402, 0.084, 100.00%)
		6.2.2 Psychological activities and characteristics of the relatives of dead organ donors (4.810±0.402, 0.084, 100.00%)
		6.2.3 Factors affecting the psychological changes of family members (4.714±0.463, 0.098, 100.00%)
	6.3 Psychological care skills (4.762±0.436, 0.092, 100.00%)	6.3.1 Standards for psychological caregivers (4.619±0.590, 0.128, 95.24%)
		6.3.2 Goals of psychological care (4.571±0.598, 0.131, 95.24%)
		6.3.3 Skills of psychological care (4.762±0.436, 0.092, 100.00%)

As the main content of an organ donation curriculum for medical students, this part was approved by more than 90% of experts. Medical knowledge is the theoretical foundation of clinical organ donation, and it is an essential and important part of an organ donation curriculum for medical students.

Psychological care in organ donation (approval rate 100.00%). This part mainly summarizes the psychological characteristics of living organ donors and their family members, analyzes the main factors affecting their psychological changes, and introduces psychological care skills. The curriculum on psychological nursing is designed to meet the psychological needs of living donors and their family members, including the standards for psychological caregivers and expected achievement of psychological care in organ donation. During the 2 rounds of consultation, the content involved in psychological care was approved by almost 100% of experts. Psychological care for organ donors, especially for their family members, is important, even affecting the organ donation decision. Therefore, the content of psychological care is indispensable in an organ donation curriculum.

Discussion

It is significant and timely to develop an organ donation curriculum, given the continuing efforts in advocating for widespread

promotion of donation-related knowledge designed to increase organ donor rates. As an important medical means to save patients with organ failure, organ transplantation is a major breakthrough in the history of medicine in the 21st century. However, limited organ resources restrict the development of organ transplantation operations, and organ donation has become the bottleneck of organ transplantation in all countries around the whole world. Medical students will be the main force in the development of organ donation in the future. Developed areas such as Europe and the United States have paid attention to the design and development of organ donation curriculum since the end of the last century, and various groups have started using organ donation curricula [9]. The professional education on organ donation for medical undergraduates in China is just beginning. Although more than 90% of medical students have heard of organ donation, 90% know little about the specific procedures and uses of organ donation [25]. The current situation of organ donation awareness is worrying. Moreover, most of the knowledge about organ donation of medical students comes from media reports, but organ donation as an independent curriculum is rarely implemented. So, the education channel of organ donation curricula in colleges and universities needs to be fully opened. The development of the contents of the organ donation curriculum complements the education resources in China to a certain extent. The development of organ donation curriculum

content is conducive to the development of medical undergraduates' corresponding education practice, the improvement of their knowledge level about donation, and the exploration of potential organ donors. Although the design and development of the education content is only the first step in the construction of a curriculum system, it is an indispensable and important prerequisite inclusion in a comprehensive humanities curriculum.

Based on the investigation of the knowledge of organ donation among university students in the early stage, the analysis of influencing factors and the qualitative interview of the content design of the organ donation curriculum, we found that medical undergraduates have positive attitudes towards organ donation, but rarely donate [8,22]; this is influenced by traditional death concepts and family members' attitudes. Most medical undergraduates are not familiar with the donation process and other details, so that their willingness to donate cannot be implemented. Therefore, the current situation of organ donation among medical undergraduates is not promising, and development of organ donation curriculum content is urgent [26].

This study aimed to improve the behavior and intention of medical students regarding organ donation, and the organ donation curriculum is designed from the 3 dimensions of planned behavior theory. From the perspective of behavior and attitude, the learning of basic concepts such as the definition of organ donation, history, and status quo of organ donation enables medical students to better understand organ donation, to become familiar with the advantages and disadvantages of organ donation, and form a positive attitude about organ donation to give emotional support for this cause. From the perspective of subjective regulations, the curriculum content on social significance, influencing factors, cultural concepts, and ethical issues regarding organ donation enables medical students to understand the positive effect of organ donation in modern society, and its great significance for the development of medicine and society, in order to create a positive social atmosphere for organ donation. From the perspective of perceived behavior control, the content on organ donation laws and regulations, medical knowledge, psychological care, and introduction on organ donation methods, application procedures, organ acquisition, and family psychology will enable medical students to assess the difficulty of organ donation and create conditions for organ donation in their medical practice. Using the Delphi method, we have created a more comprehensive and systematic framework of organ donation curriculum developed for medical undergraduates, which includes education on organ donation, cultural concepts, ethical consideration, laws and regulations, medical knowledge, and psychological care. The curriculum received more than 80% agreement from the experts.

The major difference from previous organ donation education is that the content on cultural concepts of organ donation is based on the cultural background of the country where the curriculum is taught, and it is a specific, flexible, and essential part of the curriculum [27]. Organ transplantation and donation are major fields of medical science, and are also an important part of the humanities and social sciences. Organ donation is affected by the deep-rooted cultural background and religious beliefs of different countries [28]. Each culture may contain some positive or negative factors affecting organ donation. For example, in China, on one hand, some beliefs that *the whole corpse should be preserved after death and human bodies including every hair and bit of skin are received by us from our parents so that we should not bring damage to the bodies* may contribute to resistance to organ donations; on the other hand, some ideas such as *taking pleasure from helping others* may help to increase the rate of organ donation. The significant role of religion in organ donation is indisputable. Mainstream religions around the world support organ donation because *saving life is most important*, which is a common belief in any religion; for example, the Quran states *whoever saves one life, saves the world entire* [29,30]. But differences in the understanding of religious scriptures and advice of faith leaders can also lead to differences within a religion [31]. Gaining knowledge can change people's minds about organ donation [29]. Therefore, the organ donation curriculum can be an important way to bridge the knowledge gap, to better understand cultural or religious content, and to make one's own choices. However, only 85.71% of the experts approved inclusion of the cultural aspect of organ donation, perhaps because experts believe that the third layer of cultural content designed for this curriculum has an impact on the willingness to donate organs, but its influence on the younger generation has gradually decreased in recent years [32]. Culture and religion play dual roles in promoting organ donation [33], and it is important to correctly understand the positive and negative influences of culture and religion on organ donation. With the development of modern society, the teaching content of cultural concepts should keep up with the times, with constant supplementation and improvement, in order to promote the organ donation through the influence of culture.

Organ donation ethics and psychological care got the highest approval rate (100%) of experts, along with the basic medical knowledge of organ donation required by medical students. Unlike other surgeries, organ donation and transplantation not only involve anxiety, anticipation, and joy of the recipient, but also, most importantly, injury or bereavement of the donor [34]. Therefore, ethical issues and psychological care are particularly important. On the one hand, the ethics section of the curriculum explains the ethical rules that should be followed in the organ donation process. On the other hand, it also helps medical undergraduates understand that the decision to

donate depends on a comprehensive consideration of belief, value, subjective attitude, and knowledge. Individuals should be free to decide, without moral coercion. This curriculum helps people better understand the concepts and process of organ donation to reduce misunderstandings about organ donation by provision of organ donation-related knowledge. Medical undergraduates should also learn psychological care skills to deal with the donors' doubts, fear, sadness, and other complex emotions. Care is demonstrated through acknowledging donors' and their family members' emotions, satisfying their legitimate needs, and giving psychological support and guidance. Learning to express empathy and sympathy and to provide grief counseling are important for building an ethical and psychological climate supporting organ donation. Organ donation ethics and psychology are indeed important in fostering a positive view of organ donation.

Next, we intend to use this curriculum design for organ donation education in our university, and we will conduct a cross-sectional survey to objectively assess the knowledge, attitudes, and behavioral intentions of medical students regarding organ donation before and after completing the curriculum. A comparative study comparing medical students who did and did not complete the organ donation curriculum will also be performed to assess the outcomes of organ donation education. During the teaching practice, the contents of the organ donation curriculum will be continuously modified and improved through feedback from students and professors. Medical staff and institutions are professional channels for public education on organ donation and can also help to promote organ donation [35]. The Massive Open Online Curriculum (MOOC) can also help popularize organ donation in various social groups.

This study has the following limitations. First, we only invited Chinese experts in medicine, education, and other related fields, and did not include international professionals in the development of the organ donation curriculum. The curriculum

contents may be more suitable for Chinese medical undergraduates, but the framework of the curriculum can provide a reference for organ donation education in other countries, and the contents on cultural concepts of organ donation can be revised according to the situation of each country. Second, the experts were from different but limited fields, and there were a few experts in law and social psychology; therefore, the contents on laws and regulations and psychological care pertaining to organ donation may still need professional evaluation. However, this is a curriculum of general education only to popularize organ donation. It is intended for inclusion in the liberal studies of medical undergraduates, but it cannot be used as a training curriculum for medical staff engaged in organ donation practice. Finally, some contents that were excluded or not covered in this study may be dispensable in organ donation education, so this curriculum system still needs to be further improved. However, compared with other curricula emphasizing individual donors or typical cases, this curriculum is more systematic and comprehensive. As a supplement to educational resources for organ donation, it will be gradually modified and improved in the future.

Conclusions

Organ donation education urgently needs further development. We believe this is the first domestically developed organ donation curriculum using the Delphi technique, guided by the planned behavior theory. There are few comprehensive and systematic studies on organ donation curriculum design in educational systems. Organ donation is a dynamic and positive process that should be promoted. This study helps to complement international organ donation education resources from the perspective of curriculum design in China, and provides references for organ donation curricula and promotion of organ donation.

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