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# Organ Donation

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Young-Nam Roh

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## Abstract

Organ transplantation is the only way of giving the gift of life to the patients with organ failure; however, the inadequate supply of organs, especially from deceased donors, has created a wide gap between organ supply and organ demand. Many organs from deceased donors are still not being used worldwide because of lack of information, education, and social system. Effective systems such as opt-out, donation after circulatory death, and donor action programs are needed to promote deceased donations. Counseling on organ donations must be an essential step of families of brain-dead patients. Standard practice should include that physicians call an Organ Procurement Organization coordinator before meeting with the families of potential donors. Tight screening for potential organ donor in intensive care unit, decoupling, and professional counseling are key components. The authorities have to consider the establishment of an opt-out system, and social systemic efforts are needed.

**Keywords:** organ donation, deceased donor, promotion

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## 1. Introduction

Progress in transplantation science and medicine has been impressive in the last decades. Nevertheless, transplantation activity is constrained by the shortage of organs. How can we maximize the utilization of organs that are abandoned from the deceased donors? The process for organ donation is a complex one involving medical, psychological, ethical, and social scientific aspect. Public opinion on organ donation and social maturity is also important factors for a stable and sustainable social system for organ donation. This chapter describes the essential knowledge, principles, and considering factors for the promotion of organ donation.

2. Living and deceased donations

The demand for transplants continues to increase with the increasing aging population and prevalence of renal failure. Thousands of patients on the wait list die annually, and the wait for an organ transplant has significantly increased due to the wide gap between organ supply and demand. Transplantation has become a consolidated therapy to extend or improve quality of life, an activity that constitutes less than 10% of the global transplant needs [1].

Living and deceased donations are two sources for organ transplantation. Each organ donation has its advantages and disadvantages. The advantages and disadvantages for kidney transplantation from living and deceased donations are listed in **Table 1**.

There are also ethical issues associated with each donation. In living donations, it is the safety of the healthy individual undergoing the surgical removal of an organ. This is associated with long-term consequences and affects donors’ quality of life. Another important ethical concern is the motivation of the donor. The decision to donate is a psychologically complicated one. Living donors can be impacted by a feeling of moral obligation, not just pure altruism. In addition, there are issues surrounding the commercialization of organ donation and donor rewards. Deceased donations also have important ethical issues. In particular, who should be the one to decide on the donation in the absence of a declared opinion. Does the family have the right to decide? Deceased donations can also result from moral obligation. Financial and non-financial incentives for the families can also affect deceased donations.

Living donor kidney transplantation

Advantages	Longer graft survival than deceased donation
	Short cold ischemia time
	Planned surgery
	Possible pre-emptive transplantation
	No waiting time

Disadvantages	Requires that the donor undergo major surgery
	Long-term donor safety concerns

Deceased donor kidney transplantation

Advantages	No harm to the donor
	Possible options for patients without a living donor.

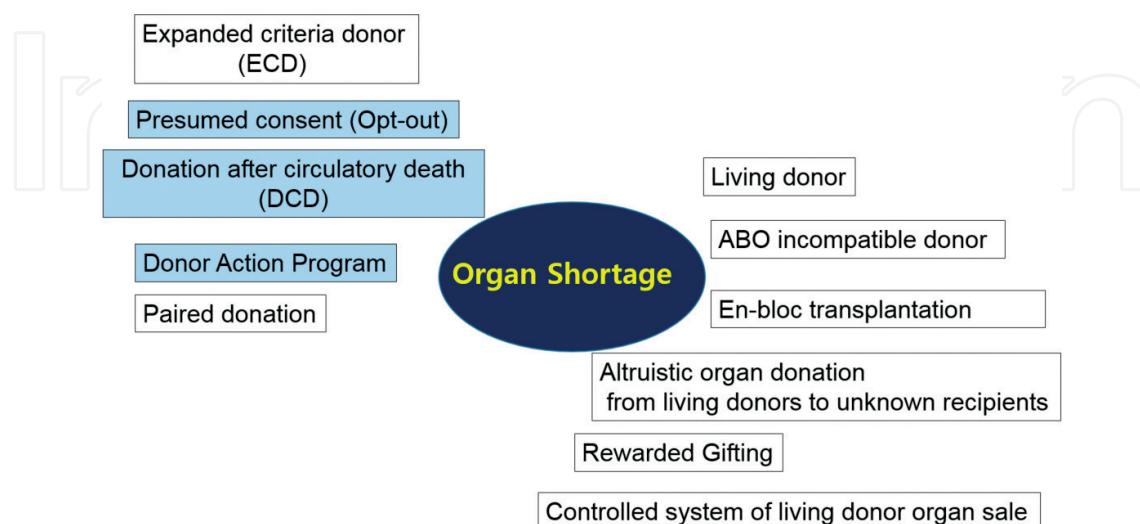
Disadvantages	Shorter graft survival than living donation
	Long cold ischemia time
	Long waiting time on list
	Requires an unplanned surgery

**Table 1.** Living versus deceased kidney donation.

The medical safety associated with living kidney donations is an ongoing issue. The premise of living donations of the kidneys is that the removal of one does not impair survival or long-term kidney function of the donors. Data have shown that live kidney donations are safe in northern European populations who underwent nephrectomy [2–5]. Nevertheless, Ellison et al. [6] identified 56 live kidney donors in the OPTN database who were subsequently listed for a kidney transplant. The rate of ESRD in donors (0.04%) is comparable to the rate in the general US population (0.03%). In a meta-analysis evaluating reduced renal mass in humans, Kasiske et al. [7] demonstrated that living donations were free of progressive renal dysfunction or an increased incidence of proteinuria. The data indicated little long-term medical risks in healthy donors after unilateral nephrectomy. However, it is recommended that before the donation, the donor receives a complete medical and psychosocial evaluation, provides informed consent, and is capable of understanding the information presented to ensure a voluntary decision.

Although living and deceased donations are important sources of organs for transplantation, a proportion of organs from deceased donors worldwide are not being used due to a lack of information, education, and social system. The use of organs from deceased donors could be significantly increased with the implementation of public education and social systems. Unlike the practical problems observed in living donors, the ethical issues associated with deceased organ donations occur post mortem and can be solved by social agreement and systemic supplementation. In addition to the efforts to increase living donation, a social infrastructure, including education and the creation of laws, should be established to promote deceased donations.

Most of the progresses made in modern transplantation were to overcome the organ shortage (**Figure 1**). Medical and surgical progresses include ABO-incompatible transplantation, en bloc transplantation, and using expanded criteria for donors. On a social level, progress includes the legalization of donations after circulatory death, an opt-out system, and donor action program. The establishment of these systems is needed to promote deceased



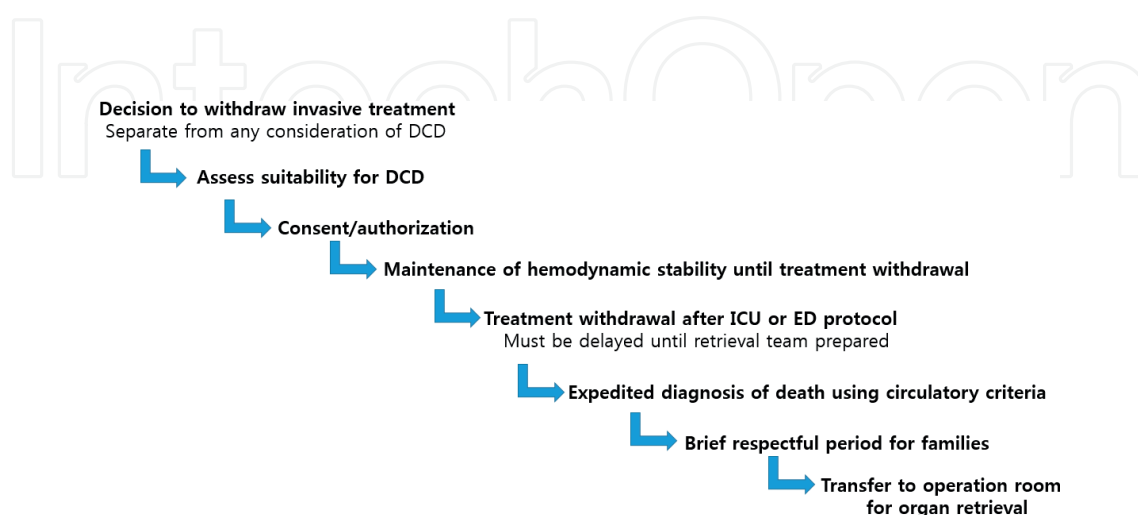
**Figure 1.** Measures used to overcome organ shortage.

donations. However, organ donation also needs to be socially accepted, and public opinion should change before the change of social system.

### 3. Deceased donation: Donations after brain death versus Donations after cardiac death

Organ donation has traditionally been possible only after brain death. It now includes donations after cardiac death (DCD), which is increasing in European countries, North America, and Australia. However, the majority of deceased donor organs continue to be from donations after brain death (DBD). DCD are from donors who do not meet the criterion for brain death, and whose cardiac function stopped before the organs were procured. The cessation of cardiac function could have occurred spontaneously or initiated deliberately. There are two types of DCDs, controlled and uncontrolled. In controlled DCD, the donor is withdrawn from life support and his or her family has given written consent for organ donation in a controlled environment. The clinical steps for controlled DCD are shown in **Figure 2**. In uncontrolled DCD, the donor died in the emergency department or elsewhere in the hospital before consent for organ donation was obtained. Catheters are placed in the femoral vessels to cool organs and infuse perfusate until consent can be obtained.

DCD now accounts for 17% of the 31,812 donors reported to the Global Observatory on Organ Donation and Transplantation in 2015 [1]. DCD is used in a limited number of countries, because of legislative and ethical obstacles, lack of technical expertise, and/or insufficient organizational capabilities [2, 8]. There are also differences in DCD practices, including differences in legislative and ethical frameworks, patterns of end-of-life care, and approaches for the treatment of patients with cardiovascular arrest outside of the hospital [9]. Although transplant outcomes from organs obtained from DCD donors are appropriate overall, they need improvement [9]. It is generally accepted that DCD can substantially increase the availability of deceased donor organs with optimal results.



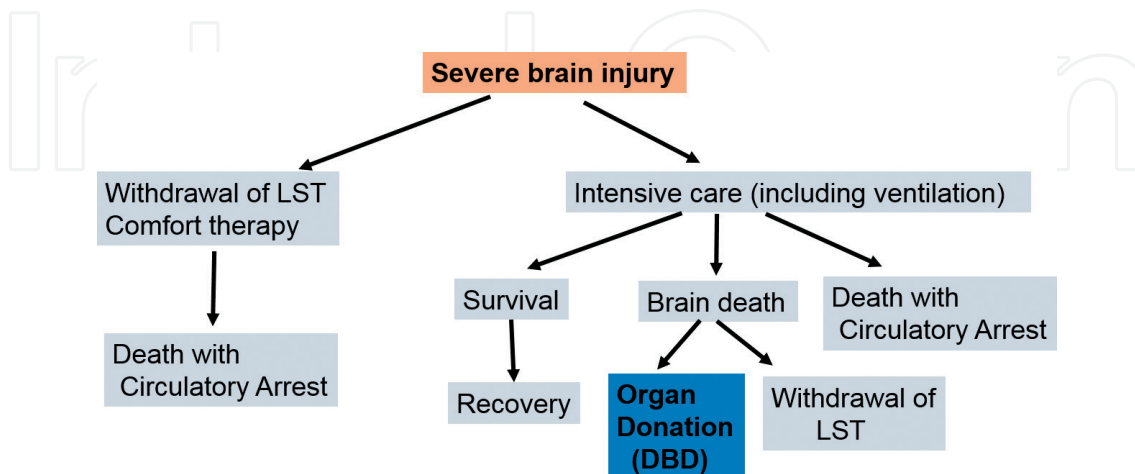
**Figure 2.** Clinical steps for controlled DCD.

## 4. Practical issues with organ donation after brain death

The clinical course of patients with severe brain injury varies depending on the degree of injury and the clinical decisions made by the primary physician. The latter are impacted by legislative and ethical frameworks, as well as patterns of end-of-life care. Organ donation is one of the options in end-of-life decision, which must be considered in every patient who may become brain dead (**Figure 3**). Organ donation counseling is an essential step that should be incorporated in end-of-life decisions.

Although the consent rate for organ donation in Europe is 50–80% with approximately 85% of families being requested to donate, only 50% provide consent. Other studies have confirmed these findings [10–14]. It is important to identify potential cases of brain deaths and obtain informed consent for organ donation from the families of the patients. Because most countries have an opt-in system, voluntary consent is considered an essential factor in organ donation. Only a small portion of these brain-dead donors are being used for solid-organ transplantation, primarily because of the low percentage of families who consent to donation [15]. Several studies have evaluated the factors associated with these types [1–4, 12, 14–16], which are listed in **Table 2**.

How to ask for an organ donation correctly is another important practical issue. The physician should call an Organ Procurement Organization (OPO) coordinator before meeting with the family of a potential donor and it must be a standard practice. Including an OPO coordinator in conversation is critical to successfully counsel families. Studies have shown that the time spent with an OPO coordinator is strongly associated with a family's decision to donate organs [15]. Incomplete or inaccurate information about the donation process may limit consent. Furthermore, the early involvement of an OPO coordinator is the best way to deliver complete and accurate information to families. Discussion of common fears and misinformation about organ donation should be part of the organ donation request process during counseling. Important questions families typically have regarding organ donation focus on the process, physical impairment during organ recovery, and the way the organs are used.



**Figure 3.** Clinical pathways of potential brain-dead donor. LST, Life-Supporting Treatment; DBD, Donation after Brain Death.

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<b>Patient factors</b>
Age
Religion
Cause of death
Wish to terminate life support
Wish for organ donation
<b>Health-care factors</b>
<i>Request factors</i>
Timing and preparation for decision
Decoupling
Time to decide
Accurate information before decision
<i>Behavior of care professionals</i>
Care for patient and relatives
Supportive communication
Critical events before request
Respect for patients
Care professional's attitude toward organ donation
<b>Family factors</b>
<i>Prior knowledge and opinion</i>
Family culture
Religion
Education
Information about brain death
Information about organ donation
Opinion about who has to decide
<i>Decision making</i>
Emotional stress and grief
Family relationship
Agreement among relatives
Economic status
Financial incentives

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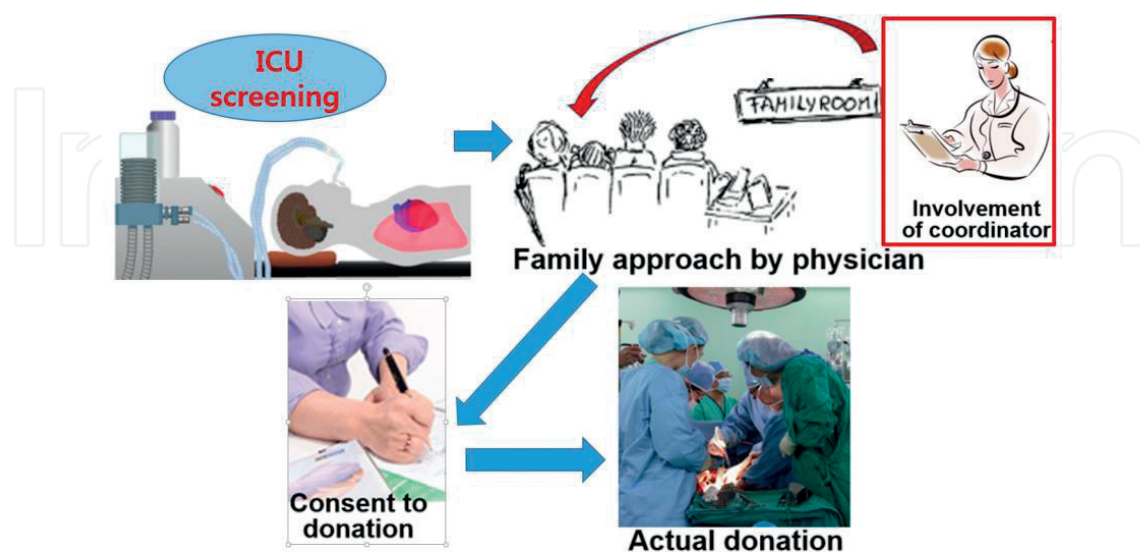
**Table 2.** Factors affecting deceased donation.

In addition, incentives for organ donations are a topic of interest. Most physicians cannot deliver enough information about these topics to the families. The early involvement of OPO coordinators is easy, and a definite solution for this problem has been recommended in many studies. A physician must be accompanied by an OPO coordinator before beginning family

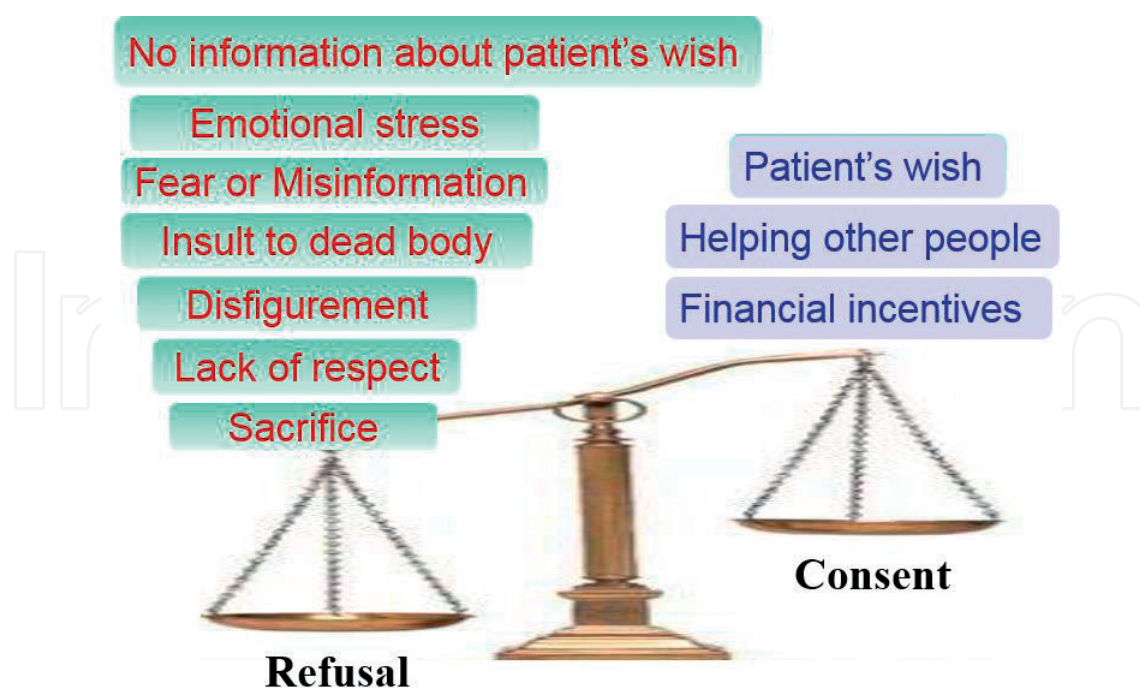
counseling, and precise information with supportive care must be given if the families need more information (**Figure 4**). Common reasons families refuse organ donation include the following:

1. Protecting and respecting the body
2. Fear that the surgery will disfigure the body
3. Belief that their loved ones have already experienced enough trauma
4. Concerns about the wholeness and integrity of the dead body
5. Wish to keep the body intact
6. Observation of a lack of respect for the deceased by the hospital staff
7. Gift of life is frequently considered by the relatives to be a sacrifice
8. Financial incentives do not influence the decision

OPO coordinators can counsel families on these specific topics. Families are often concerned about the physical impairment and pain sensation associated with preserving the donor's body or thinking that the donor will feel the pain. In addition, a significant portion of families believes that the surgery causes excessive physical damage. These are significant concerns associated with decision making in families. Therefore, it is important that the medical staff or a transplantation coordinator offers specialized information about this subject during counseling. Efforts to address families' concerns are an important step toward gaining consent to donate. OPO coordinators can provide the right information to families and address negative perspectives on organ donation (**Figure 5**).



**Figure 4.** Early involvement of OPO counseling.



**Figure 5.** Key negative perspectives on organ donation.

The decision to donate is often forced on families during complex clinical situations, at a time when they may be shocked and stunned, and ill-equipped to make a decision [16–19]. It can be difficult to accept the death of a loved one, and many family members are not prepared to understand the medical concept of brain death because of emotional stress. In addition, one of the most stressful situations is when a family member has to make this type of decision without his or her previously specified opinion about organ donation. Even when counseling is done correctly, nearly half families refuse to donate. However, some of the families refuse to donate to avoid the request as a nonresponse. Frutos et al. suggest discussing organ donation as an option more than once with relatives who initially refuse or are unsure [20]. Relatives should also have the opportunity to spend time with the donor and say their final farewell. More than one-third of relatives regret declining to donate soon after the funeral [18].

Emotional upheaval in acutely bereaved families and lack of clarity on brain death cause dissonance and distress that adversely affect decision making in families and grieving over time [21–23]. Several factors have been shown to affect decision making in family members [12, 14, 15]. The complex situation and emotional stress make it difficult for families to understand the nature of brain death and accept the actual death of their loved one. This ultimately impacts the decision-making process regarding organ donation. Multiple factors negatively affect the decision to donate and lead to time delay for the final decision. A final decision may require several hours to days. This time delay, though justifiable, can be associated with the refusal to donate or failure of a successful donation. In one study, researchers reported that a delay in decision making does not reflect a negative attitude about organ donation, but a reasonable and necessary amount of time for deliberation [24]. Therefore, the medical attendant and OPO coordinator should continue their efforts to maintain organ viability and consider extended repetitive counseling to encourage donation.

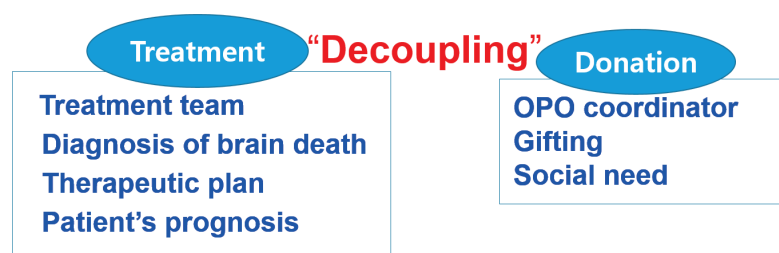


Figure 6. Principle of decoupling.

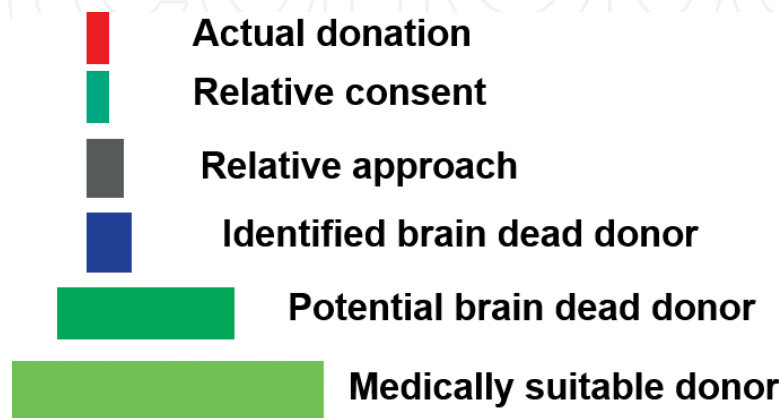


Figure 7. Multiple steps for organ donation after brain death in intensive care unit.

Decoupling is one of the best principles in which making a donation request is delayed until the family understands that brain death is the same as death and has the opportunity to realize that their loved one is dead (Figure 6). This principle of waiting to discuss organ donation until the family is ready to make end-of-life decisions is important to correctly timed request. The principle of decoupling is a well-known way to increase the consent rate for organ donations [25]. In a study by the Kentucky Organ Donor Affiliates in 1989–1990, researchers reported that the consent rate increased from 18 to 60% if there was a separation between when death is pronounced and the approach for organ donation [25]. However, decoupling frequently becomes impossible when the hemodynamics of a potential donor worsens. The patient’s attending physician may feel an ethical conflict about providing active or invasive life-support care that seems to have no therapeutic benefit on the patient’s recovery and appears to have significance solely for maintaining organ quality, especially when the family’s opinion about organ donation is not specified yet. This frequently occurs in the emergency department or the intensive care unit [26]. In addition, decoupling is sometimes not consistent with the current recommendation of early referral to the OPO coordinator [26]. If we profoundly believe that there is value in organ donation, a more flexible high-dimensional strategy is needed when a potential donor is progressing to circulatory death.

Identifying a potential brain-dead donor is the fundamental step for a successful donor action program. The typical steps of actual organ donation in the intensive care unit are illustrated in Figure 7. OPO coordinators or transplantation teams typically identify only a small portion of potential brain-dead donors. If the OPO coordinator approached the families and appropriate counseling was performed, the families consent is an invincible one. A tight screening system must be established to increase the rate of identification of potential donors in the intensive care unit. The generally accepted criteria for potential deceased donors are shown in Table 3.

Every ventilated patient with
Glasgow coma scale of <5
Brain death test being considered
Do-not-resuscitate or comfort care being considered
Withdrawal of life support being considered
Family initiates conversation about donation
Within 1 h of every cardiovascular death

Table 3. Criteria for referral of a potential donor.

5. Social system for organ donation

Strategic efforts by the government and local authorities, as well as individual efforts by medical personnel, are necessary to promote organ donation. These include the revision of laws, simplifying the required procedures for receiving consent, expansion of the donor card system, adoption of a presumed consent concept known as an opt-out system, and the establishment of a DCD system. The strategic processes put in place in Europe and the United States have resulted in a progressive and gradual increase of organ donation [27–30].

Despite the effectiveness of these strategies, public acceptance of organ donation is essential before these measures can be implemented in other countries. The establishment of social systems for organ donation depends on public consensus. There are currently two moral values on organ donation: deontologism versus consequentialism. This means where we put our maximum value of some behavior, as it were, the legitimacy of process or the benefit of consequence (Table 4). Many procedural details in organ donation and recovery have points of conflict, which can be solved with social agreement.

Asking families for organ donations to families is generally regarded as a stressful task by primary physicians. Only a small portion of potential donors are being asked about organ donation as an option of end-of-life decision, and it is decided according to the primary physician’s point of view or belief. Despite the important role of the medical staff in recommending organ donation to families, imposing this burden on physicians alone may not be adequate. If we, including local authorities and the general population, agree on the importance of organ donation, its promotion would not be the sole responsibility of individual medical staffs. The authorities have to consider establishing an advanced system that links potential donors to organ donations, known as an “opt-out” system. Many valuable lessons can be learned from the efforts of European countries to adopt it [28].

Religious beliefs were found to be important. Officially, nearly all religious groups support organ transplantation as long as it does not impede the life or hasten the death of the donor [31]. However, only a small portion of the public knows about the stance of their religion on organ donation. More active involvement of religious bodies is needed to raise the public’s awareness and encourage organ donation.

Deontologism	Consequentialism
<i>Moral principle</i>	<i>Moral principle</i>
Duty or obligation-based ethics	Outcome-based ethics
Action or process is more important than the consequences.	A morally right act is one that will produce a good outcome.
A moral obligation may arise from rules	The end justifies the means
<i>Donation system</i>	<i>Donation system</i>
Donor's will	Social need
"Opt-in" system	"Opt-out" system
Informed consent	Presumed consent
Explicit consent	Implicit consent
No donor incentives	Donor incentives
Individual decision	Social campaign
Donor management after consent	Donor management before consent
Volunteering	ICU screening and family approach
Resuscitation for organs forbidden	Resuscitation for organs allowed
Femoral cannulation after consent	Femoral cannulation before consent

**Table 4.** Moral dilemma surrounding organ donation.

Asian countries have delayed the creation and adoption of social systems for organ donation. Despite the socioeconomic development of several Asian countries, the number of organ donations per million is extremely low, compared with western countries. In addition, most of the data on organ donation consent after brain death are largely based on findings from Western populations. The current opinion on organ donation after brain death is unclear in Asian countries. Traditionally, the body of a loved one should not be tampered with after death in Asian cultures, especially in Korean, Japanese, and Chinese. This belief originates from the Confucian tradition, and it is believed that this tradition may be the main reason for the low consent rate of organ donation in Asian countries. In addition to cultural differences, it is thought that widely differing opinions, perceptions, and concerns may be related to low frequency of organ donation in Asia. However, these factors are not well studied. The general opinion on brain death and organ donation appears to be quite positive in Asia [24, 32]. The perception of brain death as death is widely accepted [32]. However, there were several perceptual barriers against organ donation in Asia [32]. Evidence-based strategies focused on these barriers should be established to increase the rate of organ donation effectively.

## 6. Summary

- Living and deceased donations are two sources of organs for transplantation. Each type of donation has its advantages and disadvantages.
- Many organs from deceased donors are still not being used worldwide because of lack of information, education, and social system.

- Effective systems such as opt-out, donation after circulatory death, and donor action programs are needed to promote deceased donations.
- DCD is developed in a limited number of countries, because of legislative and ethical obstacles, lack of technical expertise, and/or insufficient organizational capabilities. It is generally accepted that DCD can substantially increase the availability of deceased donor organs with optimal results.
- Counseling on organ donations is an essential step for stable end-of-life decision of families. Standard practice should include that physicians call an Organ Procurement Organization (OPO) coordinator before meeting with the families of potential donors.
- Delays in deciding on organ donation do not reflect a negative attitude, but a reasonable and necessary time for families to deliberate.
- Decoupling is important to properly timed organ donation requests. However, a more flexible high-dimensional strategy is required when the potential donor is progressing toward circulatory death.
- A tight screening system must be established to increase the rate of identification of potential donors in the intensive care unit.
- The authorities have to consider the establishment of an opt-out system.
- More active involvement of religions is needed to encourage organ donation. The participation of religious societies in public campaigns would also be helpful.

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