

# A few realistic questions raised by organ retrieval in the intensive care unit

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**Abstract:** Organ transplantation saves the lives of many persons who would otherwise die from end-stage organ disease. The increasing demand for donated organs has led to a renewed interest in donation after circulatory determination of death (CDD). In many countries (including France), terminally ill patients who die of circulatory arrest after a planned withdrawal of life support may be considered as organ donors under certain conditions. While having equal responsibility towards the potential donor and the persons awaiting a transplant, caregivers may experience an ethical dilemma between the responsibility to deliver the best care to the dying, and the need to retrieve the organs. Once it has been established that the patient wishes to be a donor, we assume that end-of-life care and organ donation may have convergent goals when they contribute to transforming a comfortable death into a chance of life for others in need.

**Keywords:** Cardiac arrest; decision making; end of life care; life support care; tissue and organ procurement; withholding treatment

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## Introduction

Transplantation brings sustainably-improved quality of life to patients with end-stage organ failure. In the past few decades, the need for transplants has grown more rapidly than the number of available organs. This situation of scarcity is fertile ground for illegal practices such as trade or coercive procurement of organs, transplant tourism and trafficking of human beings, practices which in turn will undermine the credibility of the legal methods.

On the other hand, many patients whose organs could potentially save the life of another, die in the intensive care unit (ICU) after a medical decision to forgo treatments deemed to be inappropriate. In some countries, most recently including France, terminally ill patients who die of circulatory arrest after a planned withdrawal of life support may be considered as organ donors under certain

conditions, according to a procedure entitled “Maastricht III category”.

Since the French program started at the end of 2014, we examine some of the practical, legal and ethical issues that arise when considering organ donation in the context of end-of-life decisions. We thus address factors determining how life-sustaining treatment is to be withdrawn, debates relating to the diagnosis and time of death, and identification of the donor’s overall benefit.

## A shortage of organs is fertile ground for illegal practices

Organ transplantation increases life expectancy and offers a better quality of life with the best cost-benefit ratio as compared to other organ-substitution therapies. It increases the opportunities for patients to participate in social,

working and sporting activities. In the past few decades, the need for transplants has grown faster than the number of available organs. Qualified as a worldwide shortage, the widening gap between organ demand (i.e., patients in terminal organ failure) and donor graft supply is forcing a rethink of the practical and ethical issues surrounding organ transplantation. French policy on organ retrieval essentially hinges on brain dead donors (termed “heart-beating donors”). Over the past decade, organ donation following traumatic brain death has become scarcer. Efforts to maintain a pool of available grafts revolved around extending the donor selection criteria to include elderly and/or chronically ill patients (such as diabetics or subjects with arterial hypertension) whose death mostly results from cerebrovascular accidents. This policy seems to have reached its limits, and can no longer meet the demand for transplants.

The shortage of available organs in the legal system encourages illegal practices that in turn could undermine the credibility of the conventional methods (living and deceased donation). These illegal practices include organ sales, coercive procurement of organs, transplant tourism and trafficking of human beings for the purpose of organ retrieval. Patients in need of organs with sufficient resources may travel in economically emerging countries to purchase a kidney mainly from poor individuals (1). It is estimated that organ trafficking accounts for 5–10% of the kidney transplants performed annually throughout the world (1). In the context of a global shortage of organs, the World Health Organization (WHO) called on member states in 2004 to address the urgent problems of organ sales, transplant tourism and trafficking in organ donors, and to take measures to protect vulnerable groups from such practices. With the adoption of the Istanbul declaration in May 2008 by more than 150 representatives of scientific and medical bodies from around the world, government officials, social scientists, and ethicists, trading and trafficking organs should definitively be prohibited in (and from) all signatory countries (2).

### **Patients whose organs could potentially save lives are dying every day in ICUs**

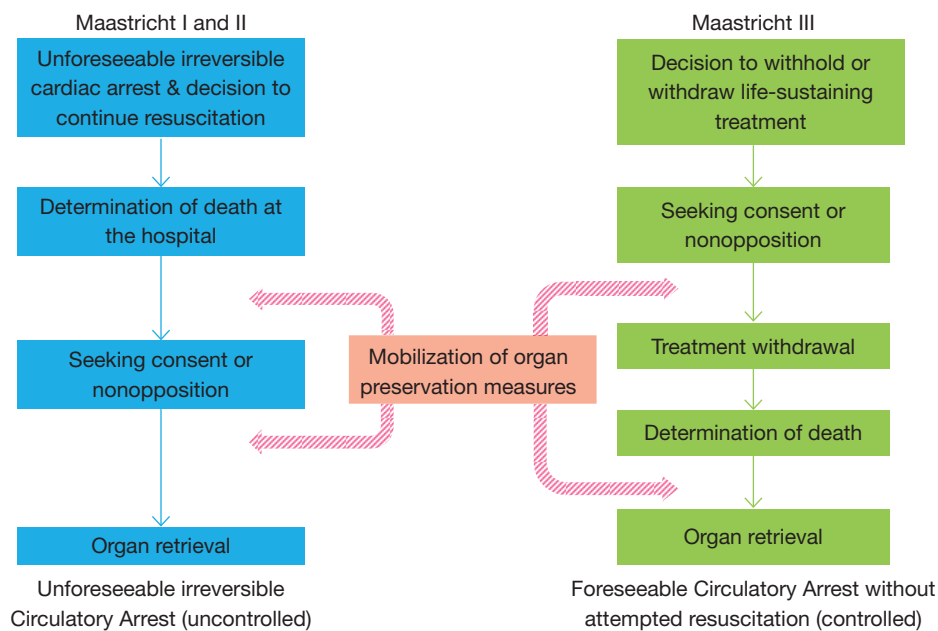
Some countries have developed all or part of their transplantation policy on donation after circulatory determination of death (CDD), so-called “non-heart-beating donation” (3-6). In 1995, Dutch transplant surgeons distinguished four circumstances of CDD into what is known as the Maastricht classification (7): unforeseeable irreversible circulatory arrest without (category I) or with

(category II) immediate cardiopulmonary resuscitation attempted by trained providers (uncontrolled CDD), foreseeable circulatory arrest occurring after a decision to forego life-sustaining treatment (category III, controlled CDD), circulatory arrest occurring after brain death (category IV). Donations after unforeseeable irreversible circulatory arrest (uncontrolled CDD, left-hand panel of *Figure 1*) are authorized in France since 2005 (9). As the procedure is restricted to a small number of suitably-equipped centers, relatively few organs have been retrieved under this system. A persisting shortfall in available organs prompted French authorities and practitioners to focus on organ retrieval in patients withdrawn from life-sustaining treatment and awaiting circulatory arrest (controlled CDD, Maastricht classification category III).

Terminally ill patients who die of circulatory arrest after a planned withdrawal of life support may be considered as organ donors under certain conditions. Prior to 2005, French regulations were not designed for such practices. With regard to patients in the final stages of incurable disease, law number 2005-370 dated April 22, 2005 authorizes the withholding or withdrawal (WhWd) of treatments when they appear “useless, disproportionate or having no other effect than solely the artificial preservation of life”. Advocates of organ donation after controlled CDD (right-hand panel of *Figure 1*) argue that the end-of-life care plan should incorporate the patient’s desires concerning organ donation and the public interest of transplantation. In many countries, teams involved in organ procurement after death (whatever the circumstances) consider organ and tissue retrieval as a routine part of end-of-life care, once it is established that the patient wishes to be a donor (10-13). However, until 2013, most French academics regarded the perceived conflict of interest that would arise for clinicians treating potential donors as a major ethical question, emphasizing that such procedures could be experienced as a form of utilitarian end-of-life practice (10,14-16). In 2013, a regulatory framework making this type of organ donation possible was debated in the French parliament. A dedicated steering committee drafted a protocol establishing the mandatory conditions to retrieve organs under the Maastricht III setting in France (17). The program officially got underway in December 2014.

### **Caregivers have equal responsibility towards both the dying patient and the patient awaiting transplant**

There is significant variation in how treatment withdrawals



**Figure 1** Organ retrieval under Maastricht I, II, and III settings. The Maastricht classification distinguishes four circumstances of organ retrieval after circulatory determination of death (CDD): unforeseeable irreversible circulatory arrest without (category I) or with (category II) immediate cardiopulmonary resuscitation attempted by trained providers (uncontrolled CDD, left-hand side), foreseeable circulatory arrest occurring after a decision to withhold or withdraw life-sustaining treatment (category III or controlled CDD, right-hand side), circulatory arrest occurring after brain death (category IV, not displayed on the panel). Adapted from (8).

are implemented in ICUs, particularly with regard to airway management (18). Published guidelines mainly focus on the decision-making principles rather than practical details about how end-of-life care should be managed (19,20). Once artificial breathing support is switched off, it becomes possible to remove the endotracheal tube that connects the patient to the ventilator and secures the airway (10). Rather than an abrupt “on-off” discontinuation of mechanical ventilation, with or without extubation (removal of the endotracheal tube), many teams prefer a progressive withdrawal of mechanical ventilation (termed “terminal weaning”), as they feel the physical symptoms of airway obstruction may harm the patient and be distressing to relatives and caregivers (21). However, some consider this progressive weaning as an unnecessarily prolonged agony if death is the only possible outcome (22), especially since these distressing symptoms might be thoroughly anticipated (23). In either case, once a life-support withdrawal decision has been made, delivering comfort care becomes priority. While the technical environment of ICUs does not offer optimal conditions for a quiet end-of-life, therapies from this point mainly focus on relieving pain, anxiety and discomfort.

Enrolling death into an organ retrieval procedure entails

a number of organizational constraints that may interfere with the comfort care traditionally given to dying patients and their loved ones. Under Maastricht III conditions, in order to meet the time framework tied to organ viability, life-support is withdrawn either in the operating room or in the ICU, provided that the patient can be swiftly transferred to the operating room once death is certified (12). These operational requirements contrast with the regular palliative approach (i.e., with no intention of organ retrieval). Even though it is theoretically possible to maintain contact between the patient and relatives up to surgical intervention, the technical environment of an operating room is far from the ideal place to organize spiritual assistance and end-of-life rituals (24). Furthermore, the quality of the organs harvested under such conditions is closely dependent on how early technical organ preservation measures are implemented. One of these technical measures consists in catheterizing the aorta and inferior vena cava in order to connect an extracorporeal pump and maintain circulation in the abdominal organs. Once life-sustaining treatments get discontinued according to a formal collegial debate, any intrusive intervention practiced before the subject is declared dead could be seen as conflicting with

efforts to deliver terminal supportive care. Thus, a formal policy regarding the comfort of both patients and relatives throughout the procedure is essential for the acceptance of organ donation under Maastricht III conditions. Since caregivers represent the interests of both the potential donor and the persons awaiting a transplant (an approach called “dual advocacy”), high-level palliative care would converge with organ transplantation so as to transform a respectful death into a promise of life for others in need (25).

### **Withdrawal of life support for highly-dependent patients is the only situation compatible with organ donation**

The period between withdrawal of life-sustaining treatment and death (the so-called “withdrawal period”) is a major determinant of organ donation and of the quality of the organs retrieved for transplantation (26,27). It is not the duration per se but rather the hemodynamic profile during the withdrawal period that determines the consequences of warm ischemia on organ viability (26). However, a long withdrawal period often results in severe ischemic damage, compromising organ usability for transplantation (26,28). This period may range from a few minutes to many hours or days, depending on the level of life support engaged at the time of the decision for WhWd, and how withdrawal is achieved. Because circulatory arrest must occur after a short period, only the withdrawal of life-sustaining cardiopulmonary support for highly-dependent patients [high inspired oxygen fraction (FiO<sub>2</sub>), non-triggered modes of ventilation, inotrope/vasoactive drug use] is compatible with post-mortem organ donation (26,28-32). Any patient in whom the elective WhWd measure is not withdrawal of life-sustaining treatment should therefore be definitively excluded from any intention to retrieve organs.

Such a procedure could even become intolerable for relatives and caregiving staff if the eventuality (still possible) of a prolonged agonal period making organ donation impossible has not been explicitly addressed beforehand. It is thus essential to accurately predict time to circulatory arrest after withdrawal of life-sustaining treatment (28,29,31,33,34). When death is the most likely outcome, withdrawal of life-sustaining treatments usually involves disconnection of mechanical ventilation (with or without removal of the endotracheal tube) and cessation of vasoactive drugs. Removal of the endotracheal tube (extubation) is more often associated with progression to organ

donation than terminal weaning without extubation (12). Death within one or two hour(s) of withdrawal usually correlates with severe brain injuries (low Glasgow Coma Scale, absence of brainstem reflexes) (30-32,35-38), high dependence on mechanical ventilation (non-triggered mode, high FiO<sub>2</sub>, high positive expiratory pressure) (28-32,36,38,39), use of inotrope drugs (29,30,35,39), young age (28,35,40), underlying diseases (37,39), and physiological anomalies (high severity index scores, low blood pressure, low pH on arterial blood gas analysis) (37,38,40,41). Under Maastricht III conditions, the removal of organs must be scheduled before withholding/withdrawal implementation and starts as soon as death is certified. As removal of organs should not precede the donor’s death (so as to fulfill the “dead donor rule”), defining the precise moment of death after withdrawal requires very explicit criteria to be determined, despite the lack of biological evidence supporting this accuracy (42,43). Several organizations state that “if the patient or surrogate understands the circumstances of the determination of death”, physicians are legally authorized to declare death after 2 minutes of absent circulation (44).

### **Brain-injured patients are more likely to die under circumstances which may fulfill the Maastricht III conditions**

Severely brain-injured patients are more likely to die after withdrawal of life-sustaining treatments, in circumstances which may fulfill the requirements for organ retrieval under Maastricht III conditions (8,12,32). Contrary to ethicists (22,45,46), many intensivists clearly distinguish between “withholding” and “withdrawal” decisions, with the former being perceived as more passive (47-52). By establishing a three-level hierarchy of decisions (“stop” > “do not increase” > “do not start”), a French epidemiological survey demonstrated that the more “active” limitations (withdrawal of life-sustaining therapy) mostly involved severely brain-injured patients (post-anoxic coma, stroke, head trauma), whereas patients with chronic respiratory disease, pre-existing disability affecting autonomy or cognition, and/or respiratory failure on admission had treatment preferentially withheld rather than withdrawn (53). This study was conducted before the Maastricht III program was launched in France, under conditions enabling a state-of-play of practices without the physicians responsible for WhWd decisions being pressured by any

ethical dilemma between the obligation to accompany the dying patient and the need to retrieve the patient's organs. One potential explanation is that prognostic indices based on several factors in combination may predict outcome with better accuracy in neuro-critical care than in other areas in medicine (54-58). For patients with congestive heart failure, obstructive bronchitis, cirrhosis, kidney disease or cancer, it is rarely possible to prognosticate with certainty that a chronically ill subject will not survive an acute episode (59). However, at an individual level, available prognostic indices are not accurate enough to make definite end-of-life decisions without foretelling a destiny that would become self-fulfilling ("self-fulfilling prophecy") (60-65). In addition, most prediction models were not developed with the specific aim of informing end-of-life decisions (58,62).

In case of brain injury, the predicted outcome measure is either death or poor functional fate. Continuation of treatment may prolong life for months or years at the cost of being in a severely disabled state that these patients would not have accepted (58). Yet, "against all odds", many people with serious and persistent disabilities report afterwards a good quality of life, although most external observers (physicians and relatives) consider that they live an undesirable existence. This phenomenon is known as "the disability paradox" (66). Brain-injured patients are rarely or never conscious at the time of the decision-making and cannot be involved in the discussions. In the survey mentioned above, the low level of patients being directly or indirectly involved in the decision-making (23%) may reflect that many were unable to express their preferences once hospitalized, and/or that they did not anticipate such conditions of being before admission (53). While the French law authorizing such practices was passed in 2005, the prevalence of advance directives and designated surrogate persons remains low (53). When patients in the ICU lack decision-making capacity, WhWd discussions are often shared between physicians, nurses, and family members or relatives acting as surrogates and representing the patient's values and preferences (67,68). Once a WhWd decision has been made, a physician who has no direct knowledge of the deceased's wishes must question the relatives about a possible consent/opposition to organ or tissue donation expressed during the patient's lifetime. However, because the patient's wishes are rarely known at the time of the deliberation, decisions concerning WhWd (and organ donation) remain primarily based on medical authority and substituted judgment (69,70).

### **Everybody should be offered "a right to donate" whatever the circumstances of death**

Brain-injured patients are more likely to die under circumstances which may fulfill the technical requirements for a Maastricht III procedure, whereas they are rarely or never conscious at the time of decision-making, and empirically have the poorest ability to participate in the discussion. Practice irrespective of the rule (i.e., first-person consent) would consist in determining whether close relatives under emotional stress wish to donate their loved one's organs. Many of those who deny donation regret their decision soon after the funeral (71). If one considers the interest of potential recipients to be pre-emptive over all other considerations, a majority of the community expresses the belief that cadaver organs should be used for transplantation. An adequate regulatory framework regarding the use of organs for transplantation and the implementation of high-level quality and safety criteria fortify the trust of all relevant stakeholders (citizens, donors, recipients and caregivers) in the area of transplantation. Competent authorities should also consider correcting people's false assumptions and taboos in this area, and encouraging discussion about the therapeutic usability of organs for the living. Public awareness of the possibility to donate one's organs and that those organs are allocated to recipients free of charge, according to transparent and non-discriminatory criteria should be enhanced (72). Every citizen should be offered a "right to donate" whatever the circumstances of their death (death after circulatory arrest, brain death), whenever and wherever it occurs, and thus be ensured that their wishes will be respected after death (73). Individuals should have opportunity to enroll in a national organ/tissue-donor register when completing certain administrative formalities such as applying for a passport, a driving licence or a health insurance card (72). The European parliament resolution of 19 May 2010 urges the EU states to look into adopting a program of on-line enrolment in a national or international donor register (72).

One possible solution (cited above and already established in certain countries) consists in registering an explicit consent/opposition to organ donation, modifiable at all times, recorded in a national computerised registry. However, regardless of the system of consent that is in place (opt in or opt out), individuals should above all be aware of the legislation in force. Guibet Lafaye and Kreis proposed that the health insurance card (or other personal



document) could act as a support, mentioning not whether an individual agrees to donate his/her organs after death (a decision that remains revocable at all times), but rather, whether he/she is fully aware of the legislation in force (74). This registration would be coupled with a public obligation to inform (general practitioners, schools, universities, military draft, public administrations...). The recording (or absence thereof) in the consent/opposition registry, combined with the mention of the individual's awareness of the legislation in force, should ensure that the individual's wishes will be respected after death, thus relieving the deceased's surrogates of the emotional burden of decision-making (74). Families and organ procurement coordinators would no longer have to confront the emotional, and laborious question of the patient's preferences. Time spent with relatives could be preferentially and usefully employed on other important issues such as the vital benefit for the recipient and the guarantee of protection from "desecration" for the deceased. Furthermore, participation of families in decisions that respect their loved one's wishes could help to ease the grieving process. By asking citizens to make a choice or at least to be aware of the legislation in force, the state would encourage a responsible exercise of autonomy while minimizing intrusion into individual autonomy (75).

## Conclusions

Every citizen wishing to donate organs or tissues after death should be assured that their willingness will be respected once deceased or severely disabled. Unfortunately, the rights to govern one's own health conferred on citizens by law (advance directives, designated surrogates, national registers) appear to be under-used. Because organs cannot be appropriated against the living individual's will, a personal document prepared beforehand should mention whether an individual wishes to donate, or at least whether he/she is aware of the legislation regarding transplantation. Relatives and caregivers would then no longer have to challenge the laborious question of the patient's preferences.

Based on the concept of "dual advocacy" that simultaneously takes into account the interests of the dying patient and those of potential recipients, end-of-life palliative care and organ donation are not incompatible, once it is established that the patient wished to be a donor. In such situations, caregivers must tackle the care for the dying (and relatives) and the purpose of organ retrieval with equal determination. However, it seems crucial to focus on the factors determining how and when life support has

to be withdrawn in the ICU, particularly discontinuing mechanical ventilation and removing the endotracheal tube, with a sensitive issue unavoidably arising: in which conditions are we medically and ethically authorized to revise our practices and make them suitable for organ donation after circulatory death?

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## Footnote

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