



## ***Ethics***

## Increasing Solid Organ Donation: A Role for Emergency Physicians

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□ **Abstract—Background:** More than 100,000 Americans with failing organs await transplantation, mostly from dead donors. Yet only a fraction of patients declared dead by neurological criteria (DNC) become organ donors. **Discussion:** Emergency physicians (EPs) can improve solid organ donation in the following ways: providing perimortem critical care support to potential organ donors, promptly notifying organ procurement organizations (OPOs), asking neurocritical care specialists to evaluate selected emergency department patients for death based on established neurologic criteria, participating in research to advance these developments, implementing automatic OPO notification technologies, and educating the professional and lay communities about organ donation and transplantation, including exploration of opt-out (presumed consent) organ recovery policies. **Conclusion:** With future improvements in organ preservation and DNC assessment, EPs may become even more involved in the donation process. EPs should support and engage in efforts to promote organ donation and transplantation. © 2022 Elsevier Inc. All rights reserved.

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## Introduction

American society suffers the financial and medical burden of having more than 100,000 Americans currently treading the precarious line between life and death while awaiting solid organ transplants. Successful transplanta-

tion improves and often extends the lives of patients with organ failure. As they await organ transplantation, patients must rely on medical treatments that inadequately substitute for their failing organs. Until we have better options to prevent and treat organ failure, maximizing the number of transplantable organs is a moral imperative. Although about 50,000 patients are declared dead by neurological criteria (i.e., “brain death”) in U.S. hospitals annually (2.06% of in-hospital deaths), only 12,600 of these patients became organ donors in 2020 (1). Because each donor supplies, on average, about three organs, and some 37,000 patients declared dead by neurologic criteria (DNC) in 2020 did not become organ donors, up to 100,000 potentially transplantable organs were not in the donor pool (2). Even when solid organ donation is precluded, tissue donation may be possible: one tissue donor can affect up to 75 lives (3,4). We believe that more can be done to recover these scarce resources, and that future advances in transplantation biology and neuroscience will allow us to have an expanded role.

Depending on which organ is failing, other substitution therapies are available, including dialysis as a renal replacement therapy and ventricular assist devices for some failing hearts. These alternatives, however, have far worse patient outcomes than organ transplantation. Despite its benefits, transplantation is still considered a “halfway technology,” described by Lewis Thomas as “at the same time highly sophisticated and profoundly primitive ... [representing things] one must continue to do until there

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is a genuine understanding of the mechanisms involved in disease” (5).

Several novel therapies are on the horizon, including better preservation or nanotechnology repair of failing organs; xenotransplantation; and synthetic, mechanical, or 3D-bioprinted organs (6–9). Until those therapies demonstrate clearly beneficial outcomes and become widely available, most organ failure patients will depend on transplantable organs from living or deceased donors. Transplantable kidneys can be recovered from deceased or living donors. The only available methods to increase donation of many organs (the heart, pancreas, and for most liver, lung, and intestine transplants) are donation after circulatory determination of death (DCD) or donation after neurologic determination of death (10). DCD can occur in different settings. Prehospital/emergency department (ED) organ recovery after sudden death has been referred to as “uncontrolled DCD” (uDCD). In-hospital organ recovery after patient- or surrogate-authorized withdrawal of life prolongation measures and subsequent declaration of death by circulatory criteria is sometimes called “controlled DCD” (11).

Emergency physicians (EPs) frequently treat patients in cardiac arrest. Return of spontaneous circulation in these patients is often accompanied by critical brain damage from trauma or stroke. Determining whether these patients may qualify as organ donation candidates typically occurs in a critical care unit, not in the ED. Nevertheless, EPs may play a major role in increasing referrals of potential donation candidates that may in turn increase the likelihood of eventual transplantation. The American College of Emergency Physicians has recognized this, declaring that “hospitals and EDs should have policies and procedures that facilitate donation and procurement. Procedures should specify the roles of the physicians, hospital staff, surgery recovery teams, and organ procurement agencies” (12).

EPs can improve solid organ donation in several ways (Table 1) (13,14). This section will consider each of these ways to promote organ donation in turn.

### *Provide Appropriate Treatment*

The EP’s primary duty is to provide appropriate treatment for patients who can benefit from their help. This duty is limited by a duty to respect decisions to decline treatment by patients with decision-making capacity, by authorized surrogate decision-makers, and by treatment preferences expressed in advance directives. Aggressive treatment consistent with current resuscitation guidelines provides the best opportunity for patients to recover from their acute event and also max-

imizes the potential to recover transplantable organs in nonsurvivors.

### *Screen for Potential Donors*

Patients who achieve return of spontaneous circulation after a cardiac arrest and those with acute, life-threatening brain injuries from trauma or stroke are most often admitted to the hospital via the ED. EPs are usually not authorized to perform DNC examinations and to pronounce patients dead according to neurologic criteria. They can, however, perform an initial screening examination (i.e., a neurologic examination including pupillary reflex and apnea test) to alert the downstream providers who are charged with making referral decisions, discussing options with family, performing DNC examinations, and making the official pronouncement of death by neurologic criteria. Current tests may be inaccurate immediately after an acute brain insult, and some patients with apparently nonsurvivable brain injuries (e.g., Glasgow Coma Scale of 3, bilaterally fixed and dilated pupils) may survive and make a good recovery (15). Yet, early identification of patients with a poor neurological status and notification of neurocritical care specialists and organ procurement coordinators provide the organ procurement organization (OPO) an opportunity to marshal its resources and begin the donor evaluation process.

Although most states allow all physicians to determine DNC, the American Academy of Neurology (AAN) recommends that those with special expertise and intimate familiarity with DNC (e.g., neurologists, neurosurgeons, and intensive care specialists) make that determination (16). EPs should know which specialists are authorized to assess DNC at their institutions. Where teleneurology services exist, EPs may help facilitate consultation to determine neurologic death more accurately (17,18). Prior to a determination of death, ED staff and, preferably, the EP, should keep family members informed about the patient’s condition.

Despite the AAN’s recommended limitation on authorized DNC examiners, a recent survey study of DNC examiners at three academic medical centers reported that only 25% of the physicians who performed DNC evaluations did so correctly, according to current AAN guidelines (17). This finding, together with reports of incorrect DNC determinations, represents a growing challenge to recovery of organs for transplantation (18). Several efforts are currently in progress to improve the practice of determination of DNC. These efforts include revision of the AAN’s guidelines for determination of DNC and revision of the Uniform Determination of Death Act (19).

**Table 1. How EPs Can Improve Organ Donation**

- Provide appropriate treatment for the patient. Full critical care support is the standard of care for all patients regardless of their organ donation potential (13).
- Assess critically ill and perimortem patients for potential organ donation.
- Coordinate with the OPO early so it can assess whether the patient is an organ donor candidate. [Notification required per 42CFR 482.45 (a)(1)] (14)
- Because currently it often requires up to 72 h to determine DNC, ask neurocritical care specialists to assess whether the patient is an appropriate candidate for assessment of death by neurologic criteria.
- Interact with the patient's family to keep them informed of the patient's condition. If asked about organ or tissue donation, refer questions to the OPO's organ procurement coordinator.
- Help educate the professional and lay community about organ donation and transplantation.
- Participate in research to advance organ donation and transplantation.

EP = Emergency physician; OPO = Organ procurement organization; DNC = Dead by neurological criteria.

### *Notify the OPO*

U.S. law requires that hospitals with a ventilator and an operating room notify their OPO about any death or imminent death, including when resuscitation efforts are ending, seem to be ineffective, may result in an in-hospital death, or have been refused by the patient or surrogate (14). In situations in which the patient may qualify as an organ donor, the sooner the OPO is notified, the higher the chance of successful donation. Patients referred from the ED as potential organ donors are more likely to become donors than those referred from inpatient settings (19,20). Likewise, those with an early diagnosis of DNC are far more likely to become successful organ donors, possibly because early diagnosis enables recovery of organs that have sustained less damage (21–23).

McCallum et al. highlighted the importance of EP involvement in the organ donation process, finding that EDs are a site of many missed potential solid organ donors (24). These were patients who were intubated, had a pulse, and lacked exclusion criteria for solid organ donation. OPOs missed evaluating these patients due to ED staff not making a timely referral to them (3).

OPOs now routinely perform death record reviews to assess whether patients who might have been prospective organ donors (patients who died or were on ventilators in the ED) were overlooked. This information, as well as feedback on every donation case, is provided to the clinicians who referred the patient (Donor Network of Arizona, personal communication, December 1, 2021.)

### *Assist OPO Staff On-Site*

Once OPO staff are on-site, the EP or other members of the ED staff may assist them in gathering necessary information about the patient. Although it occurs elsewhere in the world, U.S. OPOs strongly discourage EPs, and all

clinicians caring for the patient, from discussing organ donation with families, preferring to do this themselves (25,26). OPOs often emphasize that health care provider influence decreases donation rates. “Decoupling” death notification from the discussion of organ donation has been found to be three to eight times more likely to result in family consent to donation compared with coupled requests (27,28).

A benefit for EPs is that this separates them emotionally and physically from the organ recovery and transplant teams. This may reassure family members that no conflict of interest places a potential organ recipient's needs against those of their loved one. EPs also benefit by neither having to focus on the details of donation screening criteria, as OPO guidelines often change, nor having to spend extended time discussing organ donation with the family, which of course would come at other ED patients' expense. It also spares EPs from complex discussions with families that do not endorse organ donation or determination of DNC (29–31).

### *Educate the Community and Healthcare Professionals*

In addition to providing appropriate technical medical interventions, EPs can express empathy for grieving family members and keep them informed about the patient's poor prognosis. Rather than broaching the topic of organ donation (OPO representatives will do that), the EP's role with patients and families is to clarify the clinical situation, dispel misinformation, and provide balanced information that facilitates informed decision-making. This is vital because, despite organ donor cards and registries, surrogates, who may be unaware of potential recipients' wishes, often make the ultimate decision regarding organ donation in perimortem patients (32).

Outside the clinical realm, EPs can educate their communities and social media users by providing science-

based information about the processes and benefits of organ donation and transplantation. This includes increasing awareness within the professional and public sectors about the scarcity of transplant organs and how increasing organ donation can save and enhance the lives of organ failure patients. They, and the medical and professional organizations to which they belong, may also choose to promote legislation that helps facilitate organ recovery.

EPs can also incorporate information about DNC examinations, organ donation protocols, transplantation benefits, advances in transplantation science, and interaction with OPOs into standard educational sessions for trainees and practitioners. EPs may work with OPOs, many of which have developed community educational programs, to encourage organ and tissue donation (33–35). If so inclined, they may coordinate with like-minded individuals to promote presumed consent (opt-out) laws that have increased organ donation in some countries with lower-than-expected donation rates, although such laws do not have universal public support (36).

### *Research*

Lastly, EPs can participate in both clinical and sociological research on organ donation, either at their own institution or as part of a multicenter trial. Some of these studies involve assessing willingness to donate organs and knowledge of organ transplantation, and others evaluate invasive procedures to preserve organ function in potential donors (36).

## **How Emergency**

A vital role for bioethics is to discuss issues that will most probably arise in the near future. Ongoing research on acceptable organs for donation and organ and tissue preservation have demonstrably moved the practice of organ transplantation forward over the past few years. The understanding and diagnosis of death by neurologic criteria has lagged but will undoubtedly also progress. Likewise, system changes will dramatically change, including reimbursement for managing the ED potential organ donor. These developments may give future EPs a much larger role in the organ recovery and transplantation process.

Prompt notification of OPOs is the EP's most important duty in organ recovery. Some EDs have already implemented a simplified, automated system to notify an organ procurement coordinator via a phone call, e-mail, or text message (13). That system can function automatically through an electronic medical record flag, tag, or automatic message tripped when cardiopulmonary resuscitation, mechanical ventilation, comfort care, or related

orders are detected (13,36). Health Insurance Portability and Accountability Act regulations permit early identification and referral of potential organ donors to OPOs so that they can begin medical screening and subsequently discuss donation with the family (37). From an ethical perspective, sharing information with the OPO does not breach confidentiality because they are members of the health care team.

Current organ preservation techniques that mirror resuscitation interventions include vasopressors, fluids, and cardiopulmonary resuscitation (CPR) (38). EP participation is essential for the advancement of resuscitation science, and future EPs will inevitably use new resuscitation techniques, medications, and equipment to benefit both patients in extremis and their organs.

EPs in some countries already are involved in multi-specialty teams using novel organ retrieval protocols on uDCD patients; others are developing protocols to do so. In recent years, some U.S. EDs and Emergency Medical Services systems have tested methods to increase organ recovery from patients with out-of-hospital medical or traumatic cardiac arrest and improve post-transplant function of organs recovered in this way (39–41). Several uDCD research studies were halted after generating significant ethical backlash and failing to generate transplantable organs (38,42–45). These studies raised moral questions about the permissibility of perimortem organ-preservation interventions (e.g., femoral arterial and venous cannulation and extracorporeal membrane oxygenation, in situ cooling with flushing), despite family consent. Patients in these studies both “failed to respond” to CPR and did not auto-resuscitate after a predefined time (38). If OPOs participate in these protocols, it is incumbent on them to pay the costs. With the current state of organ donation, OPOs should not request EPs to perform any organ preservation procedures on patients undergoing resuscitation outside approved research protocols.

If our goals are to improve resuscitation techniques, increase organ recovery for transplant, improve subsequent organ function, and allow patients to donate organs after death, it may be time to develop new protocols and expand their use. A recent study may have clarified one disputed area for EPs that use medical criteria and their professional knowledge and experience to guide decisions to initiate, continue, and discontinue cardiopulmonary resuscitation efforts (3). It found that after onset of pulselessness in patients with Do Not Attempt Resuscitation orders, no cardiac activity resumed spontaneously (auto-resuscitation) after 4 min and 20 s (46). This finding suggests that once clinicians decide to stop CPR, identification of the time at which cardiopulmonary arrest becomes irreversible enables pronouncement of death by circulatory criteria and subsequent recovery of organs and tissues from the newly deceased patient.

Decision-making about organ and tissue donation varies throughout the world. In the United States, individuals' advance directives, driver's licenses, organ donor cards, state organ donor registry enrollment, and post-mortem family consent can all authorize organ recovery. Many European countries use an "opt-out" policy, also known as presumed consent, that has worked well, especially in those with previously low donation rates, such as Spain (47,48). Emergency medicine organizations could lend support to efforts to make organ donation automatic unless individuals or their survivors object. Individual EPs can also work through organ donation/transplantation organizations to promote awareness of the need for organ donation. Raising this issue could increase public awareness and eventual acceptance of an opt-out approach to organ recovery.

EPs rarely pronounce patients DNC. In the future, development of simplified and validated tools to determine which patients most likely will progress to DNC that can be used early in the patient's clinical course may allow EPs to be more involved in this process. This, in turn, may increase organ donation because rapid declaration of death is associated with higher donation rates.

If these future changes occur, it may be reasonable for EPs to begin discussing organ donation with families. Within our current systems, OPOs and Health Care Finance Administration rules discourage this (49). They cite the perception of conflict of interest if EPs raise the issue while life-sustaining measures are ongoing but seem unlikely to succeed, or have ceased but the patient has not yet been declared dead. Also, some EPs may lack knowledge of current organ donation requirements or may not be comfortable discussing this based on their own cultural or religious beliefs. On a practical level, tasking EPs with this responsibility would take significant time away from their other patients and ED duties, although in the future it might become a factor in scheduling and reimbursing EPs.

### Conclusion: Emergency Physician's Role in Organ Donation and Transplantation

Promoting organ donation and transplantation helps to relieve suffering and extend life, two fundamental goals of medicine and of emergency medicine. As our specialty matures, we recognize the need to do more than simply respond to acute illnesses and injuries. Helping to optimize organ donation while maximizing resuscitation efforts for those who can benefit is part of that mission.

Tens of thousands of Americans die annually while awaiting organ transplants. In the ED, our patients include both those needing transplants and those who can donate organs. Benefitting both groups means maximizing resuscitative efforts while facilitating organ donation for those who are eligible and willing to donate. The considered

conclusion of the authors is that our primary goal is to save lives, but that we can also help facilitate the organ donation process for our patients and families desiring to donate their loved ones' organs.

At present, society asks relatively little of EPs regarding organ donation. We need only to know about the process, practice good emergency medicine, and notify our local OPO and hospital's neurocritical care specialist. This includes knowing enough about the potential benefits of organ transplantation to discuss it with patients and colleagues when asked, and being familiar with their institution-specific protocols for organ donation.

Such protocols include critical care interventions to maximize patient survival, and these interventions also preserve organs for possible future transplantation. Even in cases where the probability of a patient's survival and acceptable recovery is thought to be low, routine provision of aggressive treatment is warranted in the immediate stages after injury (50). When a high level of uncertainty exists about the patient's outcome, EPs should provide initial aggressive treatment and then admit the patient to a critical care unit to await a clearer clinical picture (37,51). In the future, EPs may also need to decide whether to participate in organ preservation protocols in patients who have been declared dead.

The field of organ transplantation is progressing, but more research is necessary to improve both patient resuscitation procedures and the organ donation system. When possible, EPs should participate in ethical research protocols to assist those efforts. The outcome may be an enhanced future role for EPs in the organ recovery process that would benefit both our patients and society.

### References

1. Seifi A, Lacci JV, Godoy DA. Incidence of brain death in the United States. *Clin Neurol Neurosurg* 2020;195.
2. Organ Procurement and Transplantation Network. Annual record trend continues for deceased organ donation, deceased donor transplants. Available at: <https://optn.transplant.hrsa.gov/news/annual-record-trend-continues-for-deceased-organ-donation-deceased-donor-transplants/> Accessed January 9, 2022.
3. McCallum J, Yip R, Dhanani S, Stiell I. Solid organ donation from the emergency department—missed donor opportunities. *CJEM* 2020;22:701–7.
4. Trillium Gift of Life Network. Organ and tissue donation: the facts; 2019. Available at: <https://www.beadonor.ca/about-donation>. Accessed December 20, 2021.
5. Thomas L. *Lives of a cell: notes of a biology watcher*. New York: Penguin Books; 1974.
6. Porrett PM, Orandi BJ, Kumar V, et al. First clinical-grade porcine kidney xenotransplant using a human decedent model. *Am J Transplant* 2022;22:1037–53.
7. Ekser B, Li P, Cooper DK. Xenotransplantation: past, present, and future. *Curr Opin Organ Transplant* 2017;22:513–21.
8. Pedersen RA, Mascetti V, Mendjan S. Synthetic organs for regenerative medicine. *Cell Stem Cell* 2012;10:646–7.

9. Iram D, a Riaz R, Iqbal RK. 3D bioprinting: an attractive alternative to traditional organ transplantation. *Biomed Sci Eng* 2019;5:7–18.
10. Levvey BJ, Whitford HM, Williams TJ, et al. Donation after circulatory determination of death lung transplantation for pulmonary arterial hypertension: passing the toughest test. *Am J Transplant* 2015;15:3208–14.
11. Bernat JL, Bleck TP, Blosser SA, et al. Circulatory death determination in uncontrolled organ donors: a panel viewpoint. *Ann Emerg Med* 2014;63:384–90.
12. American College of Emergency Physicians (ACEP). Emergency medicine's role in organ and tissue donation. Reaffirmed February 2018, April 2012, October 2006, October 2000. Originally approved April 1996. Available at: [www.acep.org/patient-care/policy-statements/emergency-medicines-role-in-organ-and-tissue-donation/](http://www.acep.org/patient-care/policy-statements/emergency-medicines-role-in-organ-and-tissue-donation/). Accessed November 5, 2022.
13. Kim K, Lee SH, Kim DH, et al. Effect of a multidisciplinary program to improve organ donation in the emergency department. *Eur J Emerg Med* 2021;28:58–63.
14. National Archives, Code of Federal Regulations. 42 CFR 482.45a)1) Condition of participation: Organ, tissue, and eye procurement. Available at: <https://www.ecfr.gov/current/title-42/chapter-IV/subchapter-G/part-482/subpart-C/section-482.45>. Accessed October 29, 2022.
15. Chamoun RB, Robertson CS, Gopinath SP. Outcome in patients with blunt head trauma and a Glasgow Coma Scale score of 3 at presentation. *J Neurosurg* 2009;111:683–7.
16. Wijdicks EF, Varelas PN, Gronseth GS, Greer DMAmerican Academy of Neurology. Evidence-based guideline update: determining brain death in adults: report of the Quality Standards Subcommittee of the American Academy of Neurology. *Neurology* 2010;74:1911–18.
17. Braksick SA, Robinson CP, Gronseth GS, Hocker S, Wijdicks EF, Rabinstein AA. Variability in reported physician practices for brain death determination. *Neurology* 2019;92:e888–94.
18. Nair-Collins M, Miller FG. Commentary: false positives in the diagnosis of brain death. *Camb Q Healthc Ethics* 2019;28:648–56.
19. Uniform Law Commission. Determination of Death Committee home page. Available at: <https://www.uniformlaws.org/committees/community-home?communitykey=a1380d75-62bc-4a5b-ba3a-e74001a9ab57>. Accessed September 14, 2022.
20. Lachance BB, Morris NA, Brust JC. Teleneurology for determination of death by neurologic criteria: adapting to the times. *Neurology* 2021;96:691–2.
21. Michael GE, O'Connor RE. The importance of emergency medicine in organ donation: successful donation is more likely when potential donors are referred from the emergency department. *Acad Emerg Med* 2009;16:850–8.
22. Miller LD, Gardiner SK, Gubler KD. Emergency department referral for organ donation: more organ donors and more organs per donor. *Am J Surg* 2014;207:728–33.
23. Yenioçak T, Özcan PE. Brain death and deceased organ donation in a hospital in İstanbul, Turkey: the effect of early identification of brain dead on organ donation rates: a retrospective study. *Istanbul Med J* 2020;21:115–19.
24. McCallum J, Ellis B, Dhanani S, Stiell IG. Solid organ donation from the emergency department – a systematic review. *CJEM* 2019;21:626–37.
25. Shemie SD, Robertson A, Beitel J, et al. End-of-life conversations with families of potential donors. *Transplantation* 2017;101(S5 suppl 1):S17–26.
26. Jawoniyi O, Gormley K, McGleenan E, Noble HR. Organ donation and transplantation: awareness and roles of healthcare professionals—a systematic literature review. *J Clin Nurs* 2018;27:e726–e738.
27. Franz HG, DeJong W, Wolfe SM, et al. Explaining brain death: a critical feature of the donation process. *J Transpl Coord* 1997;7:14–21.
28. Klieger J, Nelson K, Davis R, Van Buren C, Davis K, Schmitz T. Analysis of factors influencing organ donation consent rates. *J Transpl Coord* 1994;4:132–4.
29. Bresnahan M, Mahler K. Ethical debate over organ donation in the context of brain death. *Bioethics* 2010;24:54–60.
30. Padela AI, Shanawani H, Arozullah A. Medical experts & Islamic scholars deliberating over brain death: gaps in the applied Islamic bioethics discourse. *Muslim World* 2011;101:53–72.
31. Rich BA. Structuring conversations on the fact and fiction of brain death. *Am J Bioethics* 2014;14:31–3.
32. Liu CW, Chen LN, Anwar A, et al. Comparing organ donation decisions for next-of-kin versus the self: results of a national survey. *BMJ Open* 2021;11.
33. Deshpande PP, Jariwala S, Martin L, Golestaneh L. Impact of technology-based interventions on linking potential kidney donors and transplant candidates: a scoping review. *Transpl Int* 2021;34:2781–93.
34. Smith S, Haseley N, Keller M, Cadzow R, Feeley TH, Kayler LK. Development and preliminary evaluation of a patient-facing educational video about live kidney donor surgical complications. *Transplant Direct* 2021;7:e744.
35. Wood EH, Waterman AD, Pines R. Storytelling to inspire dialysis patients to learn about living donor kidney transplant. *Blood Purif* 2021;50:655–61.
36. Sandiumenge A, Ramirez-Estrada S, Mazo C, et al. Donor referral from outside the intensive care unit: a multidisciplinary cooperation model using communication apps and redefining referral criteria. *Med Intensiva (Engl Ed)* 2020;44:142–9.
37. Organ Donation and the Emergency Department Strategy Group, NHS Blood and Transplant. (November 2016, revised November 2019). Organ donation and the emergency department: a strategy for implementation of best practice. Available at: <https://nhsbt.dbe.blob.core.windows.net/umbraco-assets-corp/2098/ed-strategy-final-nov-2016.pdf>. Accessed December 20, 2021.
38. Ortega-Deballon I, Hornby L, Shemie SD. Protocols for uncontrolled donation after circulatory death: a systematic review of international guidelines, practices and transplant outcomes. *Crit Care* 2015;26:1–15.
39. Tisherman SA, Alam HB, Rhee PM, et al. Development of the emergency preservation and resuscitation for cardiac arrest from trauma clinical trial. *J Trauma Acute Care Surg* 2017;83:803–9.
40. Sasson C, Hegg AJ, Macy M, et al. Prehospital termination of resuscitation in cases of refractory out-of-hospital cardiac arrest. *JAMA* 2008;300:1432–8.
41. Wall SP, Kaufman BJ, Gilbert AJ, et al. Derivation of the uncontrolled donation after circulatory determination of death protocol for New York City. *Am J Transplant* 2011;11:1417–26.
42. Annas GJ, Grodin MA. Frozen ethics: melting the boundaries between medical treatment and organ procurement. *Am J Bioeth* 2017;17:22–4.
43. Truog RD, Miller FG. The dead donor rule and organ transplantation. *N Engl J Med* 2008;359:674–5.
44. Brat A, Venema LH, Bens BW, et al. Potential of donation after unexpected circulatory death programs defined by their demographic characteristics. *Transplant Direct* 2022;8:e1263.
45. Wall SP, Kaufman BJ, Williams N, et al. Lesson from the New York City Out-of-Hospital Uncontrolled Donation After Circulatory Determination of Death Program. *Ann Emerg Med* 2016;67:531–7 e39.
46. Dhanani S, Hornby L, van Beinum A, et al. Resumption of cardiac activity after withdrawal of life-sustaining measures. *N Engl J Med* 2021;384:345–52.

47. Matesanz R, Dominguez-Gil B, Coll E, de la Rosa G, Marazuela R. Spanish experience as a leading country: what kind of measures were taken? *Transpl Int* 2011;24:333–43.
48. Bilgel F. The impact of presumed consent laws and institutions on deceased organ donation. *Eur J Health Econ* 2012;13:29–38.
49. U.S. Department of Health and Human Services Centers for Medicare & Medicaid Services. Pub. U.S. Department of Health and Human Services Centers for Medicare & Medicaid Services. Pub. 100-07 State Operations; Provider Certification. May 23 , 2014.
50. Graham M. Burying our mistakes: dealing with prognostic uncertainty after severe brain injury. *Bioethics* 2020;34:612–19.
51. Manara A, Thomas I, Harding R. A case for stopping the early withdrawal of life sustaining therapies in patients with devastating brain injuries. *J Intensive Care Soc* 2016;17:295–301.