Physician Assisted Homicide in Organ Donations After Cardiac Death: The Failure of Biotechnologies to Comply with the Uniform Definition of Death Act and the Dead Donor Rule

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Organ transplantation is often considered to be one of the greatest advances in medical history.¹ Seen as the givers of life, transplant surgeons are among the most revered members of society. What if, during the course of a typical transplant procedure, physicians were actually committing murder by removing the organs of patients who were statutorily considered to be alive, thus causing their death?² With

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² See DAVID PRICE, LEGAL AND ETHICAL ASPECTS OF ORGAN TRANSPLANTATION 1 (Cambridge Univ. Press 2000) (describing organ transplantation as a modern miracle and “an evolving . . . field of therapeutic pursuit . . . with even more potentiality than real[i]zed actuality”). But see RENEE C. FOX & JUDITH P. SWAZEY, SPARE PARTS: ORGAN REPLACEMENT IN AMERICAN SOCIETY xiii (Oxford Univ. Press 1992) (arguing that the development of organ transplantation is an example of overzealous experimentation resulting in unnecessary, deleterious impacts on many sick populations). Fox and Swazey additionally argue that many modern advances in organ transplantation, such as the discovery of groundbreaking immunosuppressant drugs like cyclosporine, have detrimental impacts on transplantation as a whole because these drugs exacerbate the organ shortage that is responsible for many ethical issues such as “rewarded gifting.” See id. at 5-7, 31-42.

This note deals primarily with issues surrounding cadaveric, solid organ transplantation. “Cadaveric” refers to the source of the organ and distinguishes these donations as coming from deceased donors, as opposed to those from living donors (as in many liver transplants), from an autologous transplant from one’s own body (as in bone marrow extraction or skin grafting), from a xenotransplantation (transplants from an animal such as a pig’s heart valve), and from artificially created organs or tissues. See PRICE, supra note 1, at 4-8. A solid organ refers to the type of organ being donated. Id. Solid organs include primary organs such as the heart, lungs, liver, kidneys and pancreas, for example, as opposed to non-solid organ transplants of corneas, bones, tendons, heart valves and veins. Id.
advancements of biotechnological therapies aimed at maintaining viability of organs during certain transplant procedures, doctors may be harvesting organs from patients who are not statutorily dead. This is a direct violation of the longstanding dead donor rule that requires donors to be dead before organs are removed. That, by every definition of the word, is homicide. The simple solution to this problem is to recommend the immediate cessation of these therapies to ensure compliance with the law. This safe and easy solution, however, would be deleterious to the public health of our nation, as thousands of people die every year because organs are not available for donation. Thus, difficult policy changes, such as whether to alter the definition of death or disband the dead donor rule, must be considered to allow for an additional allotment of organs to be available for donation.

The organ shortage is a unique public health emergency because the technology exists to save hundreds of people from dying every year of preventable deaths. As of September 22, 2011, the Organ Procurement and Transplantation Network (“OPTN”) reported that 112,202 people were on the waiting list for a solid organ transplant. But between January 2011 and June 2011, however, there were only 3,971 deceased donors. The waiting list could easily triple or quadruple if transplant centers succumb to pressures to relax the standards for inclusion on the donor list, and the list will continue to grow as the country’s population increases in size and average age. An estimated eighteen people die each day waiting for an organ transplant; every additional organ donor has the potential of saving eight lives. Thus, significant measures must be taken in order to ethically and legally increase the organ supply.

Organ transplantation is a unique procedure involving many complex medical issues that affect multiple parties. Transplant physicians must assure the health of the

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4 Id. However, this number can be deceiving, as multiple organs can be harvested from any single donor. Id.

5 See Arthur Caplan, Organ Transplantation, in FROM BIRTH TO DEATH AND BENCH TO CLINIC: THE HASTINGS CENTER BIOETHICS BRIEFING BOOK FOR JOURNALISTS, POLICYMAKERS, AND CAMPAIGNS 129, 129 (Mary Crowley ed., 2008). The additional groups of people that could be added to the list include the uninsured, those with severe intellectual disabilities, older persons, prisoners, illegal aliens, and foreigners who are unable to receive transplants in their own countries. Id.

donor in living donor transplants, monitor the immediate health of the transplant recipient, as well as assess the extensive mid-term and long-term risks to the organ recipients. Three of the most significant clinical risks in the transplant process include: 1) blood and tissue incompatibility between the patient and the donor; 2) ineffective treatment to restrict the patient’s own immune system from “attacking” the transplanted organ; and 3) deterioration of the organ caused by a lack of oxygenated blood, known as ischemia. The problem of ischemia is particularly troublesome in patients who die of a natural cardiopulmonary death, rather than the rare instances where someone is brain dead and thus kept on basic life support that continues to pump oxygenated blood to the brain dead donor’s organs. Scientific advances have allowed for more sophisticated screening technologies, which increase the probability of avoiding the first

7 See Q & A on Living Donation, NAT’L KIDNEY FOUND., http://www.kidney.org/transplantation/livingdonors/infoQA.cfm?id=6 (last visited Sept. 22, 2011) (stating that organ donation surgery includes many risks, such as: pain, infection, pneumonia, collapsed lung, and even a 0.6% risk of death). But see Hassan N. Ibraham et al., Long-Term Consequences of Kidney Donation, 360 NEW ENG. J. MED. 459, 466-68 (2009) (concluding that long term life span, general health, and quality of life of kidney donors is similar to that of persons who have not donated a kidney). Living organ donors either donate one half of paired organ (i.e. kidney) or a portion of an organ that will still function without it (i.e. portion of a liver or lobe of a lung). Id.
8 See FOX & SWAZEY, supra note 1, at 10. As of the late 1980s, more than 50% of kidney transplants were rejected within 10 years and the 30-day mortality rate among heart transplant recipients was over 10%. Id. at 10-22; see also Ravenis v. Detroit Gen. Hosp., 234 N.W. 2d 411, 414 (Mich. Ct. App. 1975) (holding that a hospital is liable for malpractice in case where two patients received a cornea from the same donor and both developed an eye infection that led to a loss of their eye); Ctr. for Disease Control and Prevention, HIV Transmitted from a Living Organ Donor – New York City, 2009, 60 MORBIDITY & MORTALITY WKLY. REP. 297, 297-99 available at http://www.cdc.gov/mmwr/pdf/wk/mm6010.pdf (Mar. 18, 2011), (reporting case where organ recipient contracted HIV from donated kidney). The Center for Disease Control and Prevention reports that although the living donor was tested for HIV and other various infectious diseases weeks before the transplant, the virus went undetected because the donor contracted the virus between the testing period and the transplant procedure. Id.
9 See PRICE, supra note 1, at 24. Ischemia is insufficient blood supply to an organ. Id. Organs in the human body are damaged from rapid cellular and tissue death when subjected to a lack of oxygenated blood, in a process called warm ischemia. See K.J. Halazun et al., Warm Ischemia in Transplantation: Search for a Consensus Definition, 39 TRANSPLANT PROC. 1329, 1329 (2007). Cold organs are damaged at a much slower pace when deprived of oxygen. See Suzanne A. Fidler, Implementing Donation After Cardiac Death Protocols, 2 J. HEALTH & LIFE SCI. L. 123, 140 n.51 (2008).
risk of blood and tissue incompatibility between the patient and the donor. Additionally, advances in pharmacologic immunosuppressants have drastically decreased the number of graft failures—the second enumerated risk. Preventing harmful ischemia is the most difficult of the three risks to control because it is largely limited by ethical and legal concerns. These concerns arise because the surefire way to increase the viability of the organs from a cardiac-death donor is to keep the donor’s heart beating artificially. Keeping the donor’s heart beating, however, would directly contravene the very definition of death that allows for the physician to harvest the organs. This note will evaluate some of the existing technologies used to prevent ischemic harm, and analyze the ethical and legal issues that they raise.

The primary ethical and legal limitation to preventing ischemia is the dead donor rule, a central tenet in organ transplantation, which provides that a person must be dead before an organ may be harvested for transplantation. In the United States, there are two separate and distinct situations in which a person may be declared dead so that organ donation can occur without violating the dead donor rule.


14 See Peter K. Linden, History of Solid Organ Transplantation and Organ Donation, 25 CRITICAL CARE CLINICS 165, 172 (2009) (describing innovation leading to tests to detect human leukocyte antigens (“HLA”), allowing physicians to better manage the immunosuppressive regimens of recipients more prone to rejecting the transplanted organs). Linden also describes the discovery of cyclosporine in the 1980s and FK-506 in the 1990s, drastically improving immunosuppressant capabilities. Id. at 170-71.

15 See infra notes 161-163 and accompanying text.


17 UNIF. DETERMINATION OF DEATH ACT § 1, 12A U.L.A. 781 (2008). Declaration by cardiopulmonary death is defined as “irreversible cessation of circulatory and respiratory functions.” Id. Donation after cardiac death situations, occurs when (1) patients are either severely ill, on life support, and have life support withdrawn with proper consent (“controlled”), or (2) they experience unexpected cardiac arrest, and cannot be resuscitated (“uncontrolled”). See
situation occurs when a person is declared brain dead, often as the result of acute trauma such as a motor vehicle accident.\textsuperscript{16} Brain death occurs when swelling of the brain is so severe that blood can no longer circulate into the brain, causing the brain to cease functioning.\textsuperscript{17} The advantage of donation after brain death is that the donor is placed on a respirator or ventilator, which maintains the functions of the heart and lungs and oxygenates the donor’s organs.\textsuperscript{18}

The second situation in which a person may be declared dead is when a patient loses all cardiac, respiratory, and circulatory function.\textsuperscript{19} Donation after cardiac death currently represents a small percentage of organ donations because it is inherently less advantageous given the diminished viability of the organs due to oxygen deprivation once the heart stops beating.\textsuperscript{20} Despite these disadvantages, donations after cardiac death must be viewed as a valuable secondary source, in addition to donations after brain death, because the current number of organs available from brain dead donors is insufficient.\textsuperscript{21} Additionally, certain organs, such as lungs, do not fare well from a brain dead donor on extended mechanical ventilation.\textsuperscript{22} Some hospitals have attempted to mitigate organ deterioration from ischemia in donations after cardiac death by providing extracorporeal membrane oxygenation (“ECMO”) to the donor after the declaration of

\textit{id.}

\textsuperscript{16} See \textit{id.} Declaration by brain death is defined as the “irreversible cessation of all functions of the entire brain, including the brain stem.” \textit{Id.} Head injuries are subcategorized based on various factors, but the category as a whole accounts for more than half of all trauma deaths in persons under age 45 in the United States. ALLAN H. ROPPER & ROBERT J. BROWN, ADAMS & VICTOR’S PRINCIPLES OF NEUROLOGY 747-68 (8th ed. 2005) (discussing head injury and its subcategories). In the United States from 1997-2007, an average of 53,014 persons died annually from traumatic brain injuries, a specific category of head injuries, with motor vehicle events accounting for 31.4% of these deaths. Victor G. Coronado, \textit{Surveillance for Traumatic Brain Injury-Related Deaths – United States, 1997–2007, Morbidity & Mortality Wkly. Rep.: Surveillance Summaries}, May 2011, at 1, 4, \url{available at http://www.cdc.gov/mmwr/pdf/ss/ss6005.pdf}.

\textsuperscript{17} In re Bowman, 617 P.2d 731, 736 (Wash. 1980).

\textsuperscript{18} See PRICE, supra note 1 at 166.

\textsuperscript{19} See supra note 15 and accompanying text; see also JOHN T. POTTS & ROGER HERDMAN, NON-HEART-BEATING ORGAN TRANSPLANTATION: MEDICAL AND ETHICAL ISSUES IN PROCUREMENT 23-25 (1997) (reporting results of an Institute of Medicine study on donation after cardiac death in response to ethical concerns about this practice that had not been regularly used in over twenty years) [hereinafter IOM REPORT].


\textsuperscript{22} Id.
death to circulate oxygenated blood and prevent ischemia.\textsuperscript{23} ECMO circulates oxygenated blood into major blood vessels through cannulae, which are placed into the donor's blood vessels to provide oxygenated blood to major arteries.\textsuperscript{24} However, a thorough analysis of the relevant statutes shows that a “dead” donor receiving ECMO is dangerously close to being considered, in the eyes of the law, alive.\textsuperscript{25}

The first part of this note will describe the history of organ donation and the history of current relevant law, including various trends in organ donation, the evolution of the definition of death, and the legislative and regulatory responses to the advancement of organ transplantation. The second part will describe the current public health emergency resulting from an insufficient supply of organs for donation. It will then explain the status of the dead donor rule, and the policies and technology used to increase the donor pool, particularly in cases of donations after cardiac death. The third part will analyze the potential conflict between donations after cardiac death that utilize ECMO technology, and the Uniform Determination of Death Act and dead donor rule. The final section will make recommendations and suggest revisions to the laws to protect transplant surgeons and encourage organ donation, with the ultimate goal of improving public health through an increased organ supply.

I. Property Rights of Cadavers

Organ transplantation has always been intertwined with law regarding property rights of the dead. A family member of a deceased person has the right to make decisions about the fate of the body, including the choice of whether to donate organs and how to legally dispose of the body.\textsuperscript{26} Historically, the bodies of the deceased were not considered traditional property.\textsuperscript{27} Common law evolved to provide certain property rights to the next of kin, which were deemed “quasi-property rights.”\textsuperscript{28} The interest is

\textsuperscript{23} Magliocca, \textit{supra} note 20, at 1095-96; see also infra note 164 and accompanying text for a full description of ECMO.
\textsuperscript{24} Magliocca, \textit{supra} note 20, at 1097.
\textsuperscript{25} See \textit{UNIF. DETERMINATION OF DEATH ACT} § 1, 12A U.L.A. 781 (2008).
\textsuperscript{26} See \textit{UNIF. ANATOMICAL GIFT ACT} § 2(b) (amended 2006), 8A U.L.A. 116 (2008).
\textsuperscript{27} See Jessie Dukeminier, Jr. & David Sanders, \textit{Organ Transplantation: A Proposal for Routine Salvaging of Cadaver Organs}, 279 NEW ENG. J. MED. 413, 413-14 (1968) (citing Williams v. Williams, 20 Ch. D. 659 (1881)). In \textit{Williams}, the Chancery Division held that a mistress who exhumed and cremated her lover because he was buried against his wishes cannot sue for expenses of cremation because “it is quite clearly the law of this country that there can be no property in the dead body of a human being.” \textit{Williams}, 20 Ch. D. at 659.
\textsuperscript{28} Pierce v. Proprietors of Swan Point Cemetery, 10 R.I. 227, 227 (1872). This “quasi property” right was articulated as “[property] over which the relatives of the deceased have rights which the
limited to a quasi-property right because of the conflicting interests of human dignity for the deceased, which would support outright property rights, and the state’s public health interest in proper disposal of the bodies, which would support limited personal property rights in exchange for significant state intervention. The quasi-property rights provide the next of kin the right to the deceased for purposes of burial or other legal disposition such as cremation or donation for medical purposes. This concept of common law quasi-property rights was sufficient for more than one hundred years until the advent of organ transplantation, which raised many new issues involving the property rights of cadavers and organs.

In order to address these evolving ethical and legal issues created by organ donation, Congress enacted several legislative responses, primarily through the of the Uniform Anatomical Gift Act (“UAGA”), which are discussed below in further detail. The overall shift of property rights towards greater rights for the family—and thus less state involvement—was abruptly altered by the 1987 amended UAGA, which allowed for the harvesting of certain non-solid organs, such as corneas, without the consent of the decedent’s family. The current property rights of the dead are largely regulated by state statute, eliminating the longstanding common law quasi-property right.

A. Medical History of Transplantation

The transplantation of body parts has been studied and practiced in varying degrees since the prehistoric Bronze Age. Over 5,000 years ago, Hindu and Egyptian
societies transplanted skin to replace noses that were destroyed by syphilis;\textsuperscript{36} and in eighteenth century Scotland, teeth were transplanted from servants to their masters.\textsuperscript{37} While numerous attempts to transplant solid organs have taken place over the first half of the twentieth century,\textsuperscript{38} the first successful solid organ transplant from a living donor occurred in Boston in 1954,\textsuperscript{39} and the first cadaveric transplant occurred in 1967.\textsuperscript{40} Over the next twenty years, medical progress enabled the successful transplantation of the liver, pancreas, heart, and lungs.\textsuperscript{41} Despite this progress, the one-year survival rate for transplant recipients in the late 1970s was still below fifty percent until the discovery of immunosuppressant drugs, such as cyclosporine, dramatically improved these rates to over eighty percent in the early 1980s.\textsuperscript{42} In the 1990s, surgeons developed a new

\textsuperscript{36} PRICE, supra note 1, at 2.

\textsuperscript{37} Linden, supra note 12, at 166; LEO C. GINNS et al., TRANSPLANTATION 3 (Leo C. Ginns et al. eds., 1999).

\textsuperscript{38} Linden, supra note 12, at 166. Numerous accounts of failed attempts at solid organ donation are reported through the early 1900s, including a mother to son kidney transplant in 1936, and several transplants in 1949 which used organs harvested by convicts executed by guillotine. Id. at 167. Several of these early attempts were considered technical surgical successes, but the patients quickly succumbed to immunologic-mediated allograft failure. Id. The early twentieth century also saw extensive experimentation with xenotransplantation, which is the transplanting of animal parts into humans. See PRICE, supra note 1, at 2-4. In 1906, surgeons attempted to transplant the kidney of a pig and a goat into humans, and in 1909, an attempt was made to transplant a kidney from an ape into a girl dying of renal failure. Id. at 3.

\textsuperscript{39} Linden, supra note 12, at 167. The transplant was of a kidney from one identical twin to another. Id. Dr. Joseph Murray, one of the surgeons who performed the transplant, was awarded the Nobel Prize in Medicine in 1990 for this feat. Id.; The Nobel Peace Prize in Physiology or Medicine 1990, NOBELPRIZE.ORG, http://www.nobelprize.org/nobel_prizes/medicine/laureates/1990/index.html (last visited October 7, 2011).

\textsuperscript{40} PRICE, supra note 1, at 23. In 1963, over a dozen transplants were performed whereby patients received kidneys from chimps. Karen Hopkins, Animal Parts: Learning the Tricks, NAT’L INST. OF HEALTH (1999), http://science.education.nih.gov/home2.nsf/SearchDocs?SearchView&Query=animal+and+parts& (follow “Stories of Discovery: Animal Parts-Learning the Tricks” hyperlink) (last visited October 7, 2011). In addition, six patients received kidneys from baboons during this time. Id. All were failures, though one recipient of a chimp kidney did survive for nine months. Id. The most famous xenotransplant case was “Baby Fae,” a six day old German girl who died 20 days after receiving a baboon’s heart in 1984. Leonard L. Bailey et al., Baboon-to-Human Cardiac Transplantation in a Neonate, 254 J. AM. MED. ASS’N 3321 (1985); see also Arthur Caplan, Ethical Issues Raised by Research Involving Xenotransplantation, 254 J. AM. MED. ASS’N. 3339, 3340 (1985) (discussing ethical issues in xenotransplantation); see also PRICE, supra note 1, at 6 (describing 1996 report by Center for Disease Control and the Food and Drug Administration to establish national policy regarding xenotransplantation).

\textsuperscript{41} Linden, supra note 12, at 170. The first successful liver transplant occurred in 1967; the first heart transplant occurred in South Africa, also in 1967; the first pancreas transplantation occurred in 1968; the first successful lung transplant was part of a heart and lung transplant in 1981. Id.

\textsuperscript{42} Id. With the discovery of several immunosuppressive drugs that were combined into
procedure where sections of the liver were transplanted from a living donor; this was significant because humans only have one liver, as opposed to the more common living donation of one of two kidneys. Twenty-first century transplant medicine has been marked by the addition of quality-of-life improving transplants, such as face and hand transplants.

B. Legal and Legislative History

After the first successful heart transplant in 1967, legislators began to realize that the existing common law quasi-property rights of cadavers were insufficient to regulate the groundbreaking and often controversial medical advances in organ transplantation. In the interest of uniformity among states, Congress delegated the task of developing transplant regulations to the National Conference of Commissioners of Uniform Acts (“NCCUA”). The NCCUA issued the Uniform Anatomical Gift Act (“UAGA”) in 1968, which was adopted in some form by all fifty states. The most significant contribution of the 1968 UAGA was to establish a right to choose to successful drug regimens, the 1 year graft survival rates soared to over 89% in kidney transplantations, and 70% in heart and liver transplantations. See Roy Y. Calne, Organ Transplantation Has Come of Age, 93 SCI. PROGRESS 141, 141 (2010) (describing history of immunosuppression development from early, dangerous whole body X-irradiation techniques to destroy immune system, to the discovery of Cyclosporin in the 1980s which led to the dramatic increases in survival rates).

43 James F. Trotter et al., Medical Progress: Adult-to-Adult Transplantation of the Right Hepatic Lobe from a Living Donor, 346 NEW ENG. J. MED. 1074, 1074-75 (2002). The process of liver lobe donation from a living donor was developed extensively in Asia, where cultural beliefs discourage cadaveric donation. Id.

44 See, e.g., PRICE, supra note 1, at 4 (describing first cadaveric hand transplant); Jean Michel Dubernard et al., Outcomes 18 Months After the First Human Partial Face Transplant, 357 NEW ENGL. J. MED. 2451 (2007) (reporting first partial face transplant provided to a French woman whose face had been bitten by a dog).

45 See Alexandra K. Glazier, “The Brain Dead Patient Was Kept Alive” and Other Disturbing Misconceptions; A Call for Amendments to the Uniform Anatomical Gift Act, 9 KAN. J. L. & PUB. POL’Y 640, 642 (2000). The only related common law principles that existed prior to the 1950s were in regard to the property rights of cadavers. See Dukeminier & Sanders, supra note 27, at 413-14. Historically, dead bodies were not considered property in the traditional sense. See Williams v. Williams, 20 Ch. D. 659 (1881).

46 Glazier, supra note 45, at 644. The NCCUA is a non-profit association comprised of one delegate commissioner from each state. Id. The goal of the NCCUA is to create uniform laws that are adopted by each state (with ability to alter for local circumstances). Id. The NCCUA is often charged with adopting uniform laws in situations where state to state variations would prove troublesome. Id. at 645.

47 Id. at 644.
donate—or decline to donate—organs, tissue, and eyes. The UAGA also established a priority list of classes of persons who may consent to donation on behalf of the potential donor in situations where the donor is unable to consent because of illness or death. The NCCUA revised the UAGA in 1987; however, only twenty-one states adopted the revision, while many others adopted only some of the changes. Both iterations of the UAGA adopt the “opt-in” theory for solid organ donations, whereby all donation cases begin with a presumption of an absence of consent. Each version also states that an individual’s donative intent, or consent before death, cannot be revoked by someone else after the donor’s death, including those on the priority list who are able to otherwise be the legal decision maker.

The addition of Section Four to the 1987 UAGA contained a controversial change that led to significant debate and resulting litigation. The provision authorized coroners, medical examiners, and public health officials to remove designated body parts, such as corneas, without consent for transplantation if several conditions were met. Litigation addressing the constitutionality of presumed consent has resulted in

51 UNIF. ANATOMICAL GIFT ACT § 3 (amended 2006), 8A U.L.A. 116 (2008); Sheldon F. Kurtz et al., The 2006 Revised Uniform Anatomical Gift Act – A Law to Save Lives, 11 HEALTH LAW. NEWS 44, 45 (2007), available at http://www.uiowa.edu/~iibl/documents/Hln0702-kurtz.pdf. But see Calne, supra note 42, at 147 (explaining how several European countries currently have an “opt out” policy whereby all patients are considered to consent to organ donation unless the donor or their family explicitly states otherwise). Spain currently has a very successful “opt in” donation system. Id. Singapore adopted an “opt in” policy and experienced a tenfold increase in available organs with the policy change. Id.
54 UNIF. ANATOMICAL GIFT ACT § 4 (1987). Under the 1987 version of the UAGA, a medical examiner can remove part of a body if the examiner had: received a request from an appropriate medical organization or official to do so; the examiner has attempted to examine the decedent's medical records to “inform persons listed in Section 3(a) of their option to make, or object to making, an anatomical gift”; the examiner does not know of a refusal to donate; the removal will be performed by an appropriate medical professional; the “removal will not interfere with any
mixed decisions. The Sixth and Ninth Circuits have ruled that presumed consent violates the due process rights of family members by depriving them of the property rights of their deceased relative’s body parts without their permission. The Supreme Court of Georgia, however, has held that no due process rights exist for decedent’s families. States have been hesitant to alter their laws to incorporate seemingly drastic presumed consent policies, and only twenty-one states have adopted the 1987 version of the UAGA.

II. Dead Donor Rule and the Definition of Death

Since the beginning of solid organ transplants, the most fundamental ethical tenet has been the dead donor rule. This common law rule states that vital organs should only be harvested from dead donors, and the procuring of organs for donation should not cause the death of patients. The dead donor rule serves to protect the public from any situation where the donor would experience pain and suffering from the organ donation, and to protect physicians from being charged with homicide. Although the dead donor rule is typically discussed as a bioethical principle, it is also assumed to be common law, the violation of which would be homicide.

autopsy or investigation;” the removal will abide by medical standards; and, cosmetic restoration will be performed if needed. Id.

55 See infra, note 56. See generally Goodwin, supra note 29 (discussing legislation challenging the “opt out” provision of the 1987 UAGA)

56 Compare Brotherton v. Cleveland, 923 F.2d 477, 482 (6th Cir. 1991) (holding that a widow had a due process right to control her husband’s corneas), and Newman v. Sathyavaglswaran, 287 F.3d 786, 796-97 (9th Cir. 2002) (holding that parents had a due process right to control their deceased child’s corneas), with Georgia Lions Eye Bank, Inc. v. Lavant, 335 S.E.2d 127, 129 (Ga. 1985) (holding that parents of a deceased child had no right to notice before the removal of their child’s corneas).


58 See Truog & Miller, supra note 14, at 674.

59 See Stuart J. Youngner & Robert M. Arnold, Ethical, Psychosocial and Public Policy Implications of Procuring Organs from Non—Heart-Beating Cadaver Donors, 269 J. AM. MED. ASS’N 2769, 2771 (1993). The dead donor rule only applies to cadaveric donations, and not to living donor donations. See id.

60 D. Micah Hester & Jerril Green, It's All About the Brain, 11 AM. J. BIOETHICS 44, 44 (2011); Joseph L. Verheijde & Mohamed Y. Rady, Justifying Physician-Assisted Death in Organ Donation, 11 AM. J. BIOETHICS 52, 52 (2011). But see Rodriguez-Arias et al., supra note 14, at 41 (arguing that the point of the Dead Donor Rule no longer protects people from harm because donors after cardiac death may not always lose their capacity to experience harm).

61 See James M. DuBois, Non-Heart-Beating Organ Donation: A Defense of the Required Determination of
To fully understand the dead donor rule, one must understand how state statutes define death, because the dead donor rule heightens the significance of the precise moment of death. Organ removal surgery that occurs moments before death is an unlawful violation of the dead donor rule; however, the same surgery that takes place just moments after death is legal, despite the fact that the donor or his or her family consents to the surgery in both instances, and there is no meaningful difference in “harm” to the donor.62 The declaration of death was traditionally defined as the absence of a detectable heartbeat and the cessation of breathing.63 Historically, a declaration of death was a relatively simple determination that followed the cessation of breathing and of a detectable heart beat, and which could then be affirmed by waiting until a person turned blue and became cold.64 Historically, the determination of death was solely a medical question, determined by physicians.65 Organ transplantation and ventilator technology, however, transformed the determination of death into a legal question.66

With the evolution of life saving medical technologies, such as the mechanical ventilator, this static definition of death became troublesome.67 With this original definition of death, if a physician withdrew ventilation from a patient that was “only” brain dead, it would technically be considered homicide, even if done with the

\text{Death, 27 J. L. MED. \\& ETHICS 126, 133 n.1 (1999); Verheijde \\& Rady, supra note 60, at 52. See, e.g., MD. CODE ANN., HEALTH-GEN. § 5-202(b)(2) (LexisNexis 2009) (codifying dead donor rule by stating that “a pronouncement of death under this section shall be made before any vital organ is removed for transplantation.”); Jesse McKinley, Surgeon Accused of Speeding a Death to Get Organs, N.Y. TIMES (Feb. 27, 2008), available at http://www.nytimes.com/2008/02/27/us/27transplant.html (reporting the prosecutions of Dr. Hootan Roozrok on three felony counts related to his alleged improper dose of drugs given to a donor to hasten his death to increase the chance for a donation after cardiac death).}

\text{62 See James L. Bernat, The Boundaries of Organ Donation after Circulatory Death, 359 NEW ENG. J. MED. 669, 670 (2008).}

\text{63 See In re Estate of Schmidt, 67 Cal. Rptr. 847, 854 (Cal. Ct. App.1968) (holding that death has been “defined in Black’s Dictionary, Third Edition, ‘as the total stoppage of the circulation of the blood and cessation of the animal and vital functions of the body such as respiration and pulsation’”).}

\text{64 In re Welfare of Bowman, 617 P.2d 731, 734 (Wash. 1980); see also Truog \\& Miller, supra note 14, at 674; Hester \\& Green, supra note 60, at 44.}

\text{65 See In re Bowman, 617 P.2d 731, 736 (Wash. 1980).}

\text{66 See id. In addition to organ transplantation and “medicine’s technological ability to sustain life,” the potential waste of “enormous” resources by sustaining the legally dead was a principal factor in breaking away from common law tradition. Id.}

\text{67 See Robert D. Truog, Brain Death – Too Flawed to Endure, Too Ingrained to Abandon, 35 J. L. MED. \\& ETHICS 273, 276 (2007) (discussing the philosophical and societal dilemmas of labeling a breathing human being as deceased).}
permission of families and friends. Ad 1 Physicians had to declare their patients dead prior to removing ventilation support in order to avoid charges of homicide. See id.

69 Id. Rodríguez-Arias et al., supra note 14; see supra note 9 and accompanying text.

70 Henry K. Beecher et al., A Definition of Irreversible Coma: Report of the Ad Hoc Committee of the Harvard Medical School to Examine the Definition of Brain Death, 205 J. AM. MED. ASS’N 337, 337 (1968). The Ad Hoc Committee proposed four elements to define brain death: (1) unreceptivity and unresponsivity; (2) no movements or spontaneous breathing; (3) no reflexes; and (4) a flat electroencephalogram. Id. at 337-38. Brain death occurs when a person suffers from irreversible cessation of brain function. UNIF. DETERMINATION OF DEATH ACT § 1, 12A U.L.A. 781 (2008). This includes the higher brain function that controls thinking and feeling and the lower brain function that maintains body temperature and breathing. See Jerry Menikoff, Different Viewpoints: The Importance of Being Dead: Non-Heart-Beating Organ Donation, 18 ISSUES L. & MED. 3, 4 (2002).

71 See, e.g., Smith v. Smith, 317 S.W.2d 275, 281 (Ark. 1958) (holding “that one breathing, though unconscious, is not dead”). Brain death has continued to be a controversial medical and legal concept. See, e.g., In re T.A.C.P., 690 So. 2d 588, 595 (Fla. 1992) (denying a couple’s request for a judicial order declaring their anencephalic infant brain dead despite the infant’s lack of brain stem activity).

72 See Jason L. Goldsmith, Note, Wanted! Dead and/or Alive: Choosing Among the Not-So-Uniform Statutory Definitions of Death, 61 U. MIAMI L. REV. 871, 885 (2007). By 1981, twenty-seven states had enacted or revised statutory definitions for death. PRESIDENT'S COMM’N FOR THE STUDY OF ETHICAL PROBLEMS IN MED. & BIOMED. & BEHAVIORAL RESEARCH, DEFINING DEATH: A REPORT ON THE MEDICAL, LEGAL AND ETHICAL ISSUES IN THE DETERMINATION OF DEATH 61 (1981) available at http://bioethics.georgetown.edu/pcbe/reports/past_commissions/defining_death.pdf. The Presidential Commission recognized a litany of statutory variations: (1) states following the “Kansas-inspired statutes” required spontaneous respiratory and cardiac failure or “the absence of spontaneous brain functions;” (2) states following the “American Bar Association Proposal” required “irreversible cessation of total brain function;” (3) states following the “Uniform Brain Death Act” required “irreversible cessation of all functioning of the brain, including the brain stem;” (4) states following the “American Medical Association Proposal” expressly limited physician liability in situations involving brain death; and (5) at least one state suggested that brain death “in the presence of artificially maintained respiratory and
inconsistent definitions of death were a central issue in the Washington state case of In Re Bowman,73 where physicians deemed a five-year-old boy to be brain dead and recommended to the boy’s mother that his ventilator be removed.74 However, the definition of death in Washington was a common law construct, defining death as the prevailing medical definition of death.75 The Washington Supreme Court held that brain death was a valid means of determining death under prevailing medical opinion, and affirmed the physician’s actions as legal.76 With this construct, physicians had to guess what the judge would determine to be the prevailing medical opinion of death—as opposed to an explicit statutory definition; this was undoubtedly a precarious way to define death, especially because death carries with it so many legal implications.77

In response to the emerging divergent definitions of death from state to state, Congress created the President’s Commission for the Study of Ethical Problems in Medicine, and called for the Commission to study the creation of a uniform definition of death.78 In 1981, the Committee released its report, Defining Death: Medical, Legal and Ethical Issues in the Determination of Death.79 This 166-page report yielded the Uniform Determination of Death Act (“UDDA”), which established brain death as a second means by which physicians could declare death.80 Some have criticized this binary approach as more confusing to the public and inferior to the unitary definitions of death; current Canadian law, for example, solely relies upon brain death for all determinations of death.81 These various distinctions in the definition of death are

circulatory functions” was sufficient to establish death. Id. at 61-67.

73 In re Bowman, 617 P.2d 731, 737-38 (Wash. 1980).
74 Id. at 733-34.
75 Id. at 733.
76 Id.
77 Id.
80 Id.; see also UNIF. DETERMINATION OF DEATH ACT § 1, 12A U.L.A. 781 (2008).
81 See, e.g., PRICE, supra note 1, at 79. This “binary” death definition is unique as many countries use brain death as the sole means by which death can be determined, theorizing that all cardiopulmonary deaths will eventually fit into the brain dead definition as well. Id. The unitary standard Model Law of the Canadian Reform provides:

(1) A person is dead when an irreversible cessation of all that person’s brain
vitaly important, as declaration of death notably impacts the feasibility of certain types of organ donation.

From the first organ donations in the 1950s, until the adoption of the UDDA in 1980, nearly all organs from cadavers were procured for transplant through donations after cardiac death.82 This practice immediately changed upon the addition of the brain death criteria because brain dead donors were far better candidates for donation, as mechanical ventilation maintained the viability of the organs.83 These brain dead donors could be on a ventilator artificially pumping oxygen to the organs, while still being considered dead despite the fact that their hearts were beating.84 For the next twenty years, nearly ninety-nine percent of organs were procured from brain dead donors.85

Once the UAGA and UDDA established the basic statutory framework for organ transplantation, Congress focused the remaining transplant-related legislation in the 1970s and 1980s on legitimizing and encouraging the emerging field of transplantation. Congress amended The Social Security Act in 1978,86 altering Medicare policies to cover kidney transplants because they were considered to be clinically superior, economically efficient, and medically beneficial as compared to a lifetime of dialysis.87 The result of this statutory change was a substantial increase in the number of

functions has occurred; (2) The irreversible cessation of brain functions can be determined by the prolonged absence of spontaneous circulatory and respiratory functions; (3) When the determination of the prolonged absence of spontaneous circulatory and respiratory functions is made possible by the use of artificial means of support, the irreversible cessation of brain functions can be determined by any means recognized by ordinary standards of current medical practice.

Id.; see also Truog & Miller, supra note 14, at 674. Part of the controversy surrounding the brain death determination is that a brain dead patient still appears alive and can digest and metabolize food, excrete waste, and undergo sexual maturation. Truog & Miller, supra note 14, at 674. See also Rodríguez-Arias et al., supra note 14, at 39-40 (discussing inherent conflict in a bifurcated definition of death because many people determined to be dead through cardio-pulmonary criteria may have the potential for brain function for some period of time).

82 See Fidler, supra note 9, at 125. But, nearly all cadaveric donors were declared dead from DCD patients. Id. Linden, supra note 12, at 172. Actually, most transplant procedures were kidney transplants, which were procured from living donors. Id.

83 See Fidler, supra note 9, at 125; see also Linden, supra note 12, at 172.

84 See Linden, supra note 12, at 172-73 (noting medical and ethical uncertainties created in regards organ procurement and continued life support).

85 See Glazier, supra note 45, at 643, app. A.


87 Paul W. Eggers, Effect of Transplantation on the Medicare End-Stage Renal Disease Program, 318 NEW
kidney transplants.\textsuperscript{88}

Congress passed two additional acts in the 1980s designed to further standardize organ procurement and allocation. In 1984, Congress passed the National Organ Transplant Act ("NOTA"), which prohibited the sale of organs and tissues, and ordered the Department of Health and Human Services ("DOHHS") to establish the Organ Procurement Transplant Network ("OPTN") to maintain a registry for organ matching.\textsuperscript{89} In 1986, DOHHS contracted with the United Network for Organ Sharing ("UNOS"), an independent non-profit organization, to ensure equitable access and organ allocation, and to provide oversight for procurement programs and transplant centers.\textsuperscript{90} UNOS’s primary responsibilities are to maintain the national organ waiting list, and to match available organs with proper recipients.\textsuperscript{91}

The NCCUA revised the UAGA in 1987 as a response to the NOTA legislation, and as a response to the reorganization of the organ procurement and allocation systems that resulted from the creation of UNOS.\textsuperscript{92} Aside from the “opt-out” provision regarding non-solid organs,\textsuperscript{93} the revised act clarified several important issues; for example, it explicitly banned payment for organs on a state level, and simplified the third party consent procedures.\textsuperscript{94}

Organ transplant legislation shifted again in the 1990s, and focused on mitigating the growing shortage of available organs, in contrast to the focus in previous decades on procurement and allocation policies.\textsuperscript{95} Many experts claim the organ

\textsuperscript{88} Id. at 24. From 1980 to 1985, there was an average annual increase of 10.4\% of kidney transplantations performed. Id.

\textsuperscript{89} See National Organ Transplant Act § 372, 42 U.S.C. § 274 (2006) (establishing the Organ Procurement and Transplant Network); id. at § 274(e) (prohibiting purchase of organs); see also id. § 273 (requiring creation of independent, non-profit Organ Procurement Organizations (OPO) to provide regional coordination of organ procurement matters).

\textsuperscript{90} See Linden, supra note 12, at Box 1; see also BARRY R. FURROW ET AL., THE LAW OF HEALTH CARE ORGANIZATION AND FINANCE 78 (6th ed. 2008).

\textsuperscript{91} See FURROW, supra note 90, at 80 (describing the process of listing patients for transplantation).

\textsuperscript{92} See Goodwin, supra note 29, at 152.

\textsuperscript{93} See supra notes 53-57 and accompanying text.


shortage is the single largest issue facing organ transplantation. The number of people who are determined dead by brain death criteria is relatively low compared to the number of cardiac deaths; most people who die do not reach brain death before cardiac arrest. Therefore, in the 1990s, donation after cardiac death began to be considered as the primary means to decrease the organ shortage gap. Successful kidney transplants from donations after cardiac death may be able to increase the number of available kidneys by thirty percent. However, donation after cardiac death raises many unique ethical implications. In 1997, the Institute of Medicine (“IOM”) released a report that addressed several of these basic regulatory and ethical issues, and provided some uniformity among state laws and local practices. The IOM report outlined the importance of conflict of interest policies for physicians involved in transplant procedures, and stressed the importance of formal communication and education policies for the families of both the donor and recipient. The report allowed hospitals to use their discretion to create protocols for controversial interventional procedures, such as the administration of vasodilators and cannulation to the donors, which help

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97 See Magliocca, supra note 20, at 1095.
98 See Linden, supra note 12, at 174. Significant reliance on brain death donors detrimentally impacts children awaiting organ transplants because, when compared with adults, children engage less frequently in the types of activities that produce traumatic injuries resulting in brain death, and thus fewer children die in brain death situations. MARY CROSSLEY, In re T.A.C.P. and In the Matter of Baby K.: Anencephaly and Slippery Slopes, in HEALTH LAW AND BIOETHICS: CASES IN CONTEXT 127, 127 (Sandra H. Johnson et al. eds., 2009).
100 See POTTS & HERDMAN, supra note 19, at 4-5 (citing end of life ethics issues including controversies surrounding the administration of anticoagulants or vasodilators to the donor before his or her death that are solely for the benefit of the transplant recipient). While donation after cardiac death had always been legal, its practical absence since the creation of brain death in 1980 meant that there was little bioethical “common law” or regulation regarding the ethical issues to donation after cardiac death such as the timing of when a person can be declared as dead by cardio-pulmonary means. See id.
101 See id. at 1-6. The IOM Report suggested that variations in local policies and protocols may be appropriate to reflect regional differences, but that some national uniformity should exist around certain main principles. Id. at 4. The IOM suggested that each donation center have a written, publically accessible protocol. Id.
102 See POTTS & HERDMAN, supra note 19, at 55-57, 61-64. The IOM Report suggested implementation of conflict of interest policies that separate life support withdrawal and related decisions from decisions concerning donor consent and organ retrieval. Id. at 55. The “Families” section of the report underscored the importance that families are informed about the transplant situation and educated on the declaration of death and procurement procedures. Id. at 61-63.
preserve the health of the organs by increasing oxygen before the donor dies. These procedures are controversial because they are administered to the donor before their death for the sole purpose of maintaining the viability and health of the organs, which exclusively benefits the recipient. Many argue that these procedures, which do not benefit the donor and could possibly hasten his or her death, violate the basic tenants of medical ethics and contravene the physician’s duty under the Hippocratic Oath to “do no harm.” Lastly, the IOM report addressed how long one must be without a heartbeat before death can be declared. In the end, the IOM deferred to the professional judgment of the hospital or individual physician, recommending that the proper waiting period is the length of time the expert physician believes is sufficient to ensure that the probability of a return of the circulatory function is “vanishingly small.”

In 2007, a national conference focusing on donation after cardiac death was convened in order to issue a consensus statement concerning additional medical and ethical concerns in the re-emerging field of donation after cardiac death. The conference provided suggestions for the expansion and improvement of donation after cardiac death. These suggestions include improving protocols to better identify the best possible candidates for donation after cardiac death, and gathering experts to issue consensus statements on the best pharmacologic and cooling techniques to increase the viability of the organs.

103. See POTTS & HERDMAN, supra note 19, at 51. The “Medical Interventions and Ethics” section of the IOM Report referred to several different procedures that are administered to the donor, often while he or she is still alive, for the sole or primary purpose of maintaining the viability of the organs (rather than standard medical practice outlined in the Hippocratic Oath taken by all physicians which obliges them to always act in the best interest of the living patient). See id. at 50-55. Interventional procedures mentioned by the IOM Report include prescribing drugs such as vasodilators or anticoagulants or heating or cooling the body to best preserve the organs. See id. at 51.

104. Id.; see Bernat, supra note 62, at 670.

105. See POTTS & HERDMAN, supra note 19, at 60-61.

106. See id. at 59-60. The IOM recommends that physicians wait 5 minutes of asystole (lack of heart beat) before a person can be declared dead. Id.; see also Bernat, supra note 62, at 670.

107. See POTTS & HERDMAN, supra note 19, at 59.


109. Id.

110. Id. at 281.
The scholarly debate of organ transplantation issues came full circle in 2008 when clinicians and academics returned to challenging the soundness of brain death criteria. A growing minority of experts argued that brain death is a legal fiction that has grown less persuasive and less ethically sound, particularly in light of recent research that shows many complex bodily functions are still active after brain death. The President’s Council on Bioethics released a report in response to the groundswell of dissent to the brain death standard. The President’s Council concluded that if the brain death criteria should continue, a more advanced definition should be instituted that defines brain death as “the cessation of the fundamental vital work of a living organism—the work of self-preservation, achieved through the organism’s need-driven-commerce with the surrounding world.” While this stronger definition of brain death may help ensure that brain dead donors have even less “human” functions, the proposed definition has generally been criticized as vague and arbitrary, and thus has not been adopted by any states.

A. The Organ Allocation Process

As a result of the growing organ shortage, rationing in organ transplantation is unavoidable because there is never a supply of donors that is large enough to meet the demand for organs. The result is an allocation system that prioritizes certain donors over others, possible only through the difficult task of determining which values and characteristics take priority over others. This allocation process occurs on two levels: first, by transplant centers, which act as the gatekeepers in determining who will be admitted as transplant candidates; and second, by UNOS, which is responsible for matching cadaver organs with patients on the waiting list. The transplant centers use many nonmedical values to shape their decisions about which patients will be admitted as transplant candidates, including their access to insurance, their age, and their...
immigration status. UNOS uses various point systems, each catered to the specific organ, to match organs to recipients. In general, UNOS first uses objective criteria such as blood type, tissue type, and organ size to determine matches between the donor and recipient. Out of all possible matches, UNOS then generally employs a “first come, first serve” policy, with some preference also given to those with the most severe illnesses. A recent proposal by UNOS would change this longstanding policy by creating a group consisting of the youngest and healthiest twenty percent of patients who would be prioritized to receive the best kidneys. The goal of this proposed change is to ensure that the best kidneys are given to the patients with the longest life expectancies to best maximize their utility.

Experts have long debated whether organs should be allocated to recipients within the same geographic region. Certain organs must be transplanted to recipients within a close proximity from the donor because the organ cannot remain viable in the extended period of time required to travel across geographic regions. For organs that can survive transnational disbursement, some argue that a region that invests in promoting organ donation should be rewarded by receiving a proportional number of organs. Others counter argue that certain regions will receive fewer organs due to the

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120 Id. at 130 (noting that transplant centers’ policies that determine who will get donor organs vary).
122 See id.
123 See id. (noting that along with the point systems, UNOS looks at the length of time a transplantation candidate spent on a waiting list).
125 Id. While similar though slightly more complex policies have been suggested before with support from many surgeons and bioethicists, they are often unsuccessful among legislators and the general public. Id.
126 See Spielman, supra note 53, at 154 (explaining that while NOTA originally allowed for the allocation of organs on a local basis, Congress has twice amended the statute to reflect its interest in national distribution). Several states, including Louisiana, South Carolina, Wisconsin, Oklahoma, Texas, Arizona, and Florida, have passed laws against this NOTA national allocation policy. Id. These laws restrict transfers of organs out of state when no suitable in-state recipient could be found. See, e.g., ARIZ. REV. STAT. ANN. § 36-852 (2007); LA. REV. STAT. ANN. § 17:2353 (2010); OKLA. STAT. ANN. tit. 63, § 2204 (West 1999).
socioeconomic status of the residents, and because fewer resources are available to promote donation. An additional issue in the allocation process is a practice called multiple listing, where patients enroll at more than one transplant center to increase their chance of obtaining an organ. This practice disproportionately benefits the wealthy because additional listings require high out-of-pocket costs. Even with the various proposals to amend the process, the root of the issue is the widespread organ shortage, which leads to such difficult allocation policy decisions.

B. Current Organ Shortage

The current shortage of transplantable organs is responsible for the loss of thousands of lives per year. One reason for the shortage is a lack of consent from either the donors or his or her family. In the United States, a person can indicate his or her desire to donate organs upon death by registering as an organ donor when obtaining or renewing a license; by signing up through a regional organ registry; or by indicating her intent to her family through conversation, a living will, or an advance health care directive. A 1997 survey indicated that half of the adults in the United States said that they are registered organ donors; however, only a quarter of Americans have told their families. Further, only thirty-eight percent of licensed drivers are registered as donors.


129 Caplan, supra note 5, at 130.

130 Id. Multiple listing is achieved by paying tens of thousands of dollars to be evaluated at additional facilities. Id. It is estimated that ten-percent of current waiting lists are comprised of multiple listers. Id.

131 See, e.g., Alexander & Sehgal, supra note 128 (noting “the scarcity of donor organs means that only a small fraction of patients receive transplants.”).

132 See supra notes 3-6 and accompanying text.


on their license. This trend of would-be donors failing to indicate their desire to be donors is especially problematic because families refuse to consent to donation—or limit the scope of donation—for upwards of fifty percent of donors. The reasons for public apprehension of organ donation are quite diverse, including fears that emergency medical providers will withhold possible lifesaving procedures for a known donor, or that brain death is reversible.

C. Proposed Strategies to Increase Organ Supply

The myriad of proposed strategies to increase the supply of organs address nearly every facet of the complex transplant process. There is no panacea to the problem; an effective increase will come from multiple changes to the culture, laws, and medical policies. At the individual level, patients awaiting donors have gone to great lengths to find an organ donor. For example, one patient with advanced liver cancer advertised his need for an organ donation on a billboard, and on a personal website that he created to advertise his request; and another patient on dialysis successfully found a volunteer living donor on a commercial website that catered to helping find organs for donation. Such practices have led experts to consider changing policy to allow patients in need of a transplant to solicit organs from living or cadaveric donors with whom they have no preexisting relationship; whereas the current policy only allows


136 See Jeffrey M. Prottas and Helen Levine Batten, The Willingness to Give: The Public and the Supply of Transplantable Organs, 16 J. HEALTH POL’Y & L. 121, 124 (1991) (stating that a sample of US public question found that 53% of relatives would have given permission for their relatives’ organs to be donated). Additionally, a 2007 Harris Interactive Poll indicated that only a quarter of those who were registered organ donors had told their families. Americans Register Importance of Organ Donation, REUTERS, (June 7, 2007) available at http://www.reuters.com/article/2007/06/07/us-organ-donors-idUSN0645054320070607.

137 See Parker-Pope, supra note 135. According to a recent online survey of 5,100 people conducted by Donate Life America, 23 percent of people fear they are not healthy enough or are too old to donate their organs; 50 percent of respondents are concerned that doctors will not try as hard to save them if they are known to be an organ donor; 44 percent believe there is a black market in which people can buy or sell organs or tissue; 57 percent question whether or not a person can recover from brain death. Id.

138 See Prottas & Levine Batten, supra note 136, at 121-124.

organ donations to be coordinated through official organizations.\footnote{See id. Hanto argues that personal solicitation of organs would circumvent the principles of justice and utility on which the organ-allocation process was based. Id. at 1063. Exceptions are often made to the general policy of UNOS of no directed donation, including cases where the family of a dead donor requests that the organs be donated to another family member and in some cases where the family of a donor requests that the organs be donated in response to a public plea. Id. at 1062.} This change could have devastating effects, and could create situations in which those who can afford public relations campaigns would regularly receive organs over those who cannot afford them.\footnote{See id. at 1064 (arguing that well-educated and wealthier patients have better skills to market their need for an organ and thus have an unfair advantage).} It would create a bottom-up economic situation where the rich would easily be able to obtain organs, and the poor would be inclined to sell their organs for monetary benefit; this could lead to far greater problems for society than it solves.\footnote{See id. at 1065 (arguing that selling of organs could potentially hurt more vulnerable individuals, such as the poor, the psychologically unstable, and the mentally impaired). See also Caplan, supra note 5, at 130; Blood, Bones, and Organs: The Gruesome 'Red Market', NATIONAL PUBLIC RADIO (June 10, 2011), http://www.npr.org/2011/06/10/136931615/blood-bones-and-organs-the-gruesome-red-market (discussing growing trend of impoverished people in India selling their kidneys on the black market).}

Some federal laws have been enacted to promote organ donation, including the UAGA, which, as discussed, requires hospitals to ask incoming patients about their donation preferences.\footnote{See Wojciech Baginski, Hastening Death: Dying, Dignity, and the Organ Shortage Gap, 35 AM. J. L. & MED. 562, 567 (2009). For example, the UAGA establishes the Uniform Organ Donor Card as a legal document in all fifty states, making it possible for anyone 18 years or older to legally donate his or her organs upon death. Id.} Other federal laws require all hospitals to have a formal protocol to better identify potential organ donors, and ensure that families and patients are informed about the option of organ donation.\footnote{See Omnibus Budget Reconciliation Act of 1986, Pub. L. No. 99-509, § 9318, 100 Stat. 1874 (codified as amended at 42 U.S.C. § 1320b-8 (Lexis Nexis 2011)) (including standards and regulations for hospitals and organ procurement agencies); Kathleen S. Andersen & Daniel M. Fox, The Impact of Routine Inquiry Laws on Organ Donation, 7 HEALTH AFFAIRS 65, 72 (1988) available at http://content.healthaffairs.org/content/7/5/65.full.pdf (describing how 1986 federal law established minimum procedures to promote organ donation, and many states have passed additional laws increasing procedures).} Recently, Congress passed the Organ Donation and Recovery Improvement Act (“ODRIA”), which provides twenty-five million dollars to various programs designed to increase organ donation.\footnote{Organ Donation and Recovery Improvement Act, Pub. L. No. 108-216, 118 Stat. 584 (2004) (codified as amended in scattered sections of 42 U.S.C.); see Proclamation No. 5366, 69 Fed. Reg. 19309 (Apr. 8, 2004) available at http://georgewbush-whitehouse.archives.gov/news/releases/2004/04/20040408-4.html (proclamation of President George W. Bush declaring that his 2005
intended programming resulting from ODRIA includes public awareness studies and informative projects; assistance for living donors; grants for hospital-based donation programs; and studies relating to organ donation recovery, preservation, and transportation.\textsuperscript{146} However, additional, and likely more drastic, legislative changes would be needed to eliminate the immense organ shortage, given the severity of the shortage and because of the incremental impact that many of the proposed changes would provide.

One strategy to increase organ donation is to create incentives for potential donors, which, in its most drastic form, would be to change NOTA to allow for the sale of organs through brokers.\textsuperscript{147} By allowing an open market to control, donors would be more inclined to consider donating organs at their death, knowing that it would help cover funeral costs and provide financial gain to their heirs.\textsuperscript{148} Related but less extreme strategies could include federally controlled stipends for organs, or, at the very least, tax breaks or funeral expense support provided by the federal or state government.\textsuperscript{149} Incentives need not be limited to those financial in nature: Israel is currently implementing a law that gives higher priority on a waiting list for organ allocation to those who are registered organ donors.\textsuperscript{150}

Additional approaches to increase the number of people consenting to donation include educating in order to dispel the false rumors that permeate donative decision making,\textsuperscript{151} or establishing presumed consent or implementing “opt-out” laws that would make all individuals organ donors unless they indicate otherwise.\textsuperscript{152} While these laws would undoubtedly raise the number of donors, they have yet to gain the political and budget proposal includes nearly $25 million for organ procurement and transplantation and $23 million for a bone marrow donor registry).


\textsuperscript{147} See Caplan, supra note 5, at 131.

\textsuperscript{148} See id. This is strongly criticized as it could easily result in poor and desperate people selling their organs, effectively eliminating the choice and autonomy that is so important to the current system. Id.

\textsuperscript{149} See Spielman, supra note 53, at 151. Pennsylvania offers a financial incentive to families for providing organs of their deceased relatives. Id. at 152.


\textsuperscript{151} See Hanto, supra note 139 at 1062-64 (advocating for millions of dollars for education to increase understanding of organ donation in the hopes of increasing consent).

\textsuperscript{152} Michael Gormley, New York Lawmaker Wants Presumed Organ Donation Consent, DAILY NEWS LOS ANGELES, (Feb 27, 2010); see also Calne, supra note 42, at 144, 147 (explaining current success of opt-in law in several foreign countries).
public support they need to be passed.\textsuperscript{153} Other proposals to increase organ donation are more drastic, such as policies calling for the continuation of CPR after a person is pronounced dead in order to obtain consent.\textsuperscript{154}

III. Donation After Cardiac Death as a Solution to the Shortage of Organs

The inadequate supply of organs can best be remedied by increasing the number of donations after cardiac death.\textsuperscript{155} Brain deaths occur at much lower rates than traditional cardio-pulmonary deaths, and the number of brain deaths is declining; meanwhile, the demand for organs is increasing.\textsuperscript{156} Advances in transplant medicine now allow for organs from donations after cardiac death to be accepted as kidney, liver, lung, and pancreas donors.\textsuperscript{157} Donation after cardiac death is an especially appealing solution in certain types of organ donations, such as lung donations, because only fifteen to thirty percent of brain dead patients have those organs suitable for donation.\textsuperscript{158}

\textsuperscript{153} Gormley, supra note 152.
\textsuperscript{154} See James Doig and David A. Zygun, Organ Donation and Death from Unexpected Circulatory Arrest: Engaging the Recommendations of the Institute of Medicine: (Uncontrolled Donation after Cardiac Determination of Death: A Note of Caution, 36 J. L. MED. & ETHICS 760, 761 (2008). For example, some European hospitals have begun implementing policies to promote donations after cardiac death whereby patients who die of cardiopulmonary death are provided with continued cardiopulmonary resuscitation after the determination of death to preserve their organs while family is contacted to try to obtain consent to donate the organs. Id.; see also Jenifer Goodwin, Shortage of Transplant Organs Spurs Proposals But No Solution, U.S. NEWS (May 25, 2010), available at http://health.usnews.com/health-news/managing-your-healthcare/treatment/articles/2010/05/25/shortage-of-transplant-organs-spurs-proposals-but-no-solution.html (last visited September 19, 2011); NORA MACHADO, USING THE BODIES OF THE DEAD: LEGAL, ETHICAL AND ORGANIZATIONAL DIMENSIONS OF ORGAN TRANSPLANTATION 46 (Ashgate Publishing 1998) (noting that thirteen European countries, including Spain and Portugal, have and practice forms of presumed consent).
\textsuperscript{155} See POTTS & HERDMAN, supra note 19, at 45. The report states that a 1992 study estimated the national total of in-hospital brain deaths to be around 6,900-10,700, whereas another study in 1990 estimated that there were potentially 13,700 potential heart-beating donors. Id. at 14; see also Glazier, supra note 45, at 643.
\textsuperscript{156} See Doig & Zygun, supra note 154, at 760. An increase in prevalence of certain diseases such as viral hepatitis, diabetes, and hypertension has increased the incidence of end-organ failure, which in turn increases demand for organs to transplant. Id. While developments in policy and technology in areas such as car safety decreases number of critical injuries, advances in critical care have decreased the progression of irreversible injury and brain death. Id.
\textsuperscript{158} Thomas M. Egan et al., Whence the Lungs? A Study to Assess Suitability of Donor Lungs for Transplantation, 53 TRANSPLANTATION 420, 421 (1992).
Various studies have projected that regular use of donations after cardiac death would increase the organ supply by anywhere from forty-five to six hundred percent. The large disparity in these projections results from the way each study was calculated, and whether death occurred in the presence of medical professionals or in an uncontrolled setting.

Although the potential donor pool from donations after cardiac death is plentiful, several limiting factors have led to the underutilization of the practice. Ischemic damage is the primary reason that organs from donations after cardiac death are not used for transplantation because the organs are without oxygenated blood during the procurement procedure. There is often a period of time at the very end of the donor’s life in which they have a very slow and ineffective heart beat. Then, upon cessation of heart function, physicians must wait the required time to ensure that the failure of a heart to beat is permanent and irreversible. Upon the moment of pulselessness, and during the waiting period until death is declared, the organs are deprived of oxygen, which begins to damage the organs, threatening their suitability for transplantation. Thus, unlike donation after brain death, where families can take time to make the decision of whether or not to donate, donation after cardiac death leaves little time to make such decisions. In sum, donation after cardiac death has great potential to increase the supply of organs, but it inherently involves many more ethical, time sensitive issues.

One solution to the problem of organ deterioration in donations after cardiac death is the use of ECMO. ECMO is induced after the prescribed waiting period has elapsed following the cessation of the donor’s heartbeat so that the medical staff can ensure “irreversible” cardiopulmonary death has occurred. ECMO is similar to a heart-lung machine whereby catheters are placed in large blood vessels and the ECMO

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159 Singhal, supra note 157, at 1662.
160 Id. The latter, uncontrolled donations after cardiac death are complicated by difficulties in obtaining consent from the donor or their family and are thus a less reliable source of donation. Id. at 1658.
161 See David P. Foley et al., Donation After Cardiac Death: The University of Wisconsin Experience With Liver Transplantation, 242 ANN. SURGERY 724, 725 (2005).
162 See Magliocca, supra note 20, at 1095-97. A primary reason for the longstanding preference of brain dead donors is that brain dead donors do not suffer the damage that organs of cardiac donors incur during the time from when their heart stops beating until the time of the organ removal. Id. A possible additional factor in the lack of donations after cardiac death is the public’s fear of consenting to this type of donation. Glazier, supra note 45, at 643-44.
163 Glazier, supra note 45, at 644.
164 Gravel, supra note 21, at 57-58.
machine continuously pumps blood from the patient through an oxygenator so that carbon dioxide is removed and oxygenated blood is returned to the organs.\textsuperscript{165} For example, if a patient is dying of heart failure and consents to be an organ donor, as soon as he is determined to be dead, ECMO could be induced, preserving the viability of the organs while transplant surgeons begin harvesting procedures.\textsuperscript{166} If ECMO were not available, the organs would be nonviable in a matter of mere minutes because of a lack of oxygen.\textsuperscript{167}

IV. Current State of Regulation

Organ donation is regulated on the state and federal level. The National Organ Transplant Act of 1984 and its amendments created the Organ Procurement Transplant Network, which enforces transplantation policies and procedures.\textsuperscript{168} Organ transplantation is also regulated on a state level through the UAGA, which outlines donation request, consent, and organ removal procedures, either by donors or by the donor’s family.\textsuperscript{169} Additionally, the UAGA disclaims physician and hospital liability if the physicians act or attempt to act in good faith.\textsuperscript{170} Lastly, regulation regarding transplants also occurs on a local level through hospital policies, which regulate many of the details of the transplant procedure, such as what drugs can be administered to a donor before they die, and how long after a final heart beat a surgeon must wait before the removal surgery can begin. These hospital regulations are generally consistent with

\textsuperscript{165} See Fidler, supra note 9, at 129 n.16. See generally Magliocca, supra note 20 (describing the protocol for donations after cardiac death at the University of Wisconsin Medical School which utilizes ECMO).

\textsuperscript{166} See Gravel, supra note 21, at 57. Additionally, if a family wanted more time to make such a decision, or if they wanted to first consult with other family members, clergy, etc., they would be able to place the patient on ECMO while such decisions are made. See id. Without ECMO, an organ would not be viable enough to donate minutes after the death of the potential donor. See id.

\textsuperscript{167} See id.

\textsuperscript{168} Baginski, supra note 143, at 567. Also in response to NOTA, DOHHS created a Division of Organ Transplantation. Id. DOHHS then contracts for the OPTN with UNOS, a non-profit organization that maintains waiting lists, organ matching, and provides guidance to people and organizations concerned with organ transplantation. Id.

\textsuperscript{169} Id. at 568. The UAGA also imposes duties on hospitals, similar to the 1984 Omnibus Budget Reconciliation Act, to inquire about their donation preferences with patients and families of patients that are admitted. Id.

\textsuperscript{170} Id. at 570. But see Williams v. Hofmann, 223 N.W.2d 844, 846 (Wis. 1974) (holding that the UAGA’s limitation in liability only extends to the transplant process after death has been determined). Therefore, a hospital or physician’s premature harvesting of an organ is not considered to be exempt from liability under the UAGA. See id.
professional organization guidelines that outline consent procedures and additional safety measures, leading to minimal discrepancies from one facility to another.171

V. Analysis of the UDDA, Dead Donor Rule, and ECMO Therapy

Apart from the aforementioned regulations, nearly every state in the country has adopted a law based on the UDDA that outlines the two means by which death can be determined for organ transplantation.172 While the law was largely successful in creating a uniform definition of death among the states, its final sentence provides for variations in its application.173 The law also states that, “[a] determination of death must be made in accordance with accepted medical standards.”174 While physicians must comply with the standard binary definition of death, the areas not explicitly addressed in the law must comply with a standard of care that can vary by region or differing medical beliefs.175 For example, the UDDA does not address the issue of how long cardiac and respiratory functions must have ceased before they can be considered irreversible, so physicians must wait the length of time they believe is an acceptable medical standard.176 This leads to variations in the determination of death from physician to physician.177

The first clause of the UDDA states, “irreversible cessation of circulatory and respiratory function” controls the determination of death for donations after cardiac

171 Baginski, supra note 143, at 575-77. An example of an additional hospital policy is the standard policy that disallows a physician from declaring the donor dead and being involved in the transplant process. Id. at 576.
172 See Goldsmith, supra note 72, at 889-91. As of 2007, fourteen states and the District of Columbia have adopted the UDDA in its original form, eighteen have adapted an abbreviated or augmented analog thereof, fourteen have codified common law death laws, and four have no legislation. See, e.g., ARK. CODE ANN. § 20-17-101 (2011); CAL. HEALTH & SAFETY CODE § 7180 (West 1982); D.C. CODE §7-601 (1981); KAN. STAT. ANN. § 77-205 (1984); ME. REV. STAT. ANN. tit. 22, § 2811 (1983); MASS. GEN. LAWS ch. 190B, § 1-107 (2010). The pertinent language from the Massachusetts statute provides that “an individual [who] has sustained either (i) irreversible cessation of circulatory and respiratory functions or (ii) irreversible cessation of all functions of the entire brain, including the brain stem is dead]. A determination of death shall be made in accordance with accepted medical standards.” Ch. 190B, § 1-107.
173 See Goldsmith, supra note 72, at 887-88, 916-17 (noting that “accepted medical standards” was incorporated to reduce liability exposure and discussing varying state interpretations).
175 See Goldsmith, supra note 72, at 887, 916-17.
176 Id. at 916-17; Rodríguez-Arias et al., supra note 14, at 38 (noting that the required period of time between loss of circulation and the declaration of death ranges from 75 seconds to 10 minutes).
177 Id.
The “irreversible” language of the statute cannot be applied in its strictest interpretation, as the entire purpose of a heart or lung transplant is for that organ to function again in another person’s body. Despite this, most laypeople view the definition as straightforward and reasonable. However, there is much debate in the transplant and bioethics communities regarding this definition, in particular the length of time that a physician must wait after the final heart beat before organs can be harvested; or more specifically, how long after a heartbeat can one assume that another will occur so that the definition of death is fulfilled and harvesting of organs can begin? The longer one waits, the more “ethical” the declaration of death, because one can be more certain that another heart beat will not occur. Consequently, the viability of the organ is deteriorating with every passing moment.

Though every state has a statute regarding the definition of death, the length of asystole, the absence of a heartbeat, is not statutorily defined, but rather varies from hospital to hospital. A 2005 national conference restarted the debate on the proper length of time of asystole before an organ may be harvested for donation, and altered the five minute duration suggested by the IOM, to “no less than 2 minutes and no

179 See id. at 672-73. There is also debate surrounding the definition of “irreversible” in the context of DCD donation for non-heart and lung donations. Rodríguez-Arias et al., supra note 14, at 39. Experts have argued whether irreversible should be interpreted as when a donor’s cardiac function will be irreversible, or when it absolutely is irreversible. Rodríguez-Arias et al., supra note 14, at 39. The difference is drastic: the first interpretation allows for a quick removal of the organs, assuming that the donor’s heart will not autoresuscitate, and assuming that the intent of the donor is to have no further attempts at cardio-pulmonary resuscitation. Rodríguez-Arias et al., supra note 14, at 39. In this case, the heart will not resuscitate for these reasons. Rodriguez-Arias et al., supra note 14, at 39. The latter interpretation is that the organs absolutely cannot be resuscitated, which would require waiting an extended period of time until the organs could not be resuscitated even if cardiopulmonary resuscitation was attempted. Rodríguez-Arias et al., supra note 14, at 39. This would eliminate the possibility of donation after cardiac death leading to heart of lung transplants. See Rodríguez-Arias et al., supra note 14, at 39.
180 See Goldsmith, supra note 71, at 912 (discussing the Virginia statute’s requirements for a doctor in determining a somatic death).
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182 See id. at 133-34.
183 Id. at 130-33. This leads to various hospital protocols suggesting varying time limits. Id. at 132. The Institute of Medicine was asked to evaluate the length question and, in response, extended the time frame in which death must be determined. POTTS & HERDMAN, supra note 19, at 5.
184 POTTS & HERDMAN, supra note 19, at 59-60 (recommending a uniform wait period of five minutes, in all regions, after a heart stops before defining a donor as dead).
longer than 5 minutes.”185 This led to a split among various hospitals’ policies regarding the length of asystole designated in their protocols for donation after cardiac death.186 With each hospital creating their own transplant protocol, a wide spectrum of protocols has been created ranging from conservative to controversial.187

VI. Legal Issues With Donation After Cardiac Death and the Use of ECMO

One particularly controversial organ preservation strategy involves placing an organ donor on ECMO at the moment that cardiac death is declared.188 The goal is to reduce the warm ischemic time by providing oxygenated blood to the organs until they are harvested, when cooling agents can be flushed through the organ to reduce the amount of oxygen that is needed.189 This practice of administering full body ECMO upon declaration of death raises serious legal issues. Because the UDDA defines death as “irreversible cessation of circulatory and respiratory functions,”190 the legality of

185 Bernat et al., supra note 108, at 282. The conference adopted the recommendation of the Society of Critical Care Medicine of “at least 2 minutes of observation is required, and not more than 5 minutes is recommended.” Id.
186 Maxine M. Harrington, The Thin Flat Line: Redefining Who is Legally Dead in Organ Donation After Cardiac Death, 86 DENV. U. L. REV. 335, 350, 363 (2009). Protocols defining transplant procedures were suggested by several national panels, though never statutorily required. Id. at 350. However, the Joint Commission, which oversees the accreditation process of hospitals, requires transplantation procedure protocols. Id. This effectively results in all hospitals having written transplant protocols which indicate, among other things, the length of time that physicians must observe asystole before they can harvest the organ. Id. at 363.
187 Bernat et al., supra note 108, at 282. Conservative protocols would include long observation times of 5 minutes, as well as not allow for therapies to be given to the donor in the interest of preserving the organ, such as vasodilators or blood thinners. Id. More controversial protocols decrease the length of asystole and allow for such therapies. See Mark M. Boucek et al., Pediatric Heart Transplantation after Declaration of Cardiocirculatory Death, 359 NEW ENG. J. MED. 709, 711 (2008) (reporting a patient was observed for three minutes before death was declared and the transplantation occurred).
188 See David P. Price, Organ Transplant Initiatives: The Twilight Zone, 23 J. MED. ETHICS 170, 170 (1997). Such protocols are in use in England, Italy, France, Spain, the Netherlands, Japan and the United States. Id. Additionally, ECMO practice is encouraged by UNOS, assuming that patient or family consent has been received, as it includes ECMO as a standard procedure for which consent should be obtained in its Model Elements for Controlled DCD Recovery Protocols. See id.
189 Fidler, supra note 9, at 140. Warm ischemic time is a phase of transplantation during which damage to the donor organ can occur because oxygenated blood is not being circulated to the organ, and a cooling procedure reducing the required level of oxygen has not yet been implemented. Id.
190 In re Bowman, 617 P.2d 731, 738 (Wash. 1980). However, the UDDA does not provide any further insight into the definition of “circulatory function.” See UNIF. DETERMINATION OF
ECMO depends on how “circulatory function” is interpreted. 191

One plausible interpretation of a complete cessation of “circulatory function” is any circulation of oxygenated blood. If this strict interpretation were applied, patients receiving ECMO therapy would no longer be dead because they would have circulation of oxygenated blood. 192 This interpretation would result in physicians causing the death of countless live organ donors when they harvest the organs of donors receiving ECMO therapy. 193 This violates the dead donor rule, which would open the physicians to criminal liability for the death of the patient. 194 If the definition were statutorily clarified today to define death as the complete cessation of all circulatory functions, regardless of their scope or source, then ECMO use in transplantation would have to cease immediately. The result would be devastating to the donations after cardiac death movement, leaving a supply of thousands of potentially lifesaving organs unavailable for donation. 195

Statutes are open to varying degrees of interpretation, and the statutes defining death are no exception. For example, these “definition of death” statutes, created in light of organ transplantation, are not intended to have an absolute interpretation of the word “irreversible” because, as mentioned, this would make heart and lung donations impossible because their functions are ultimately reversed. 196 In contrast to the strict

DEATH ACT § 1, 12A U.L.A. 781 (2008); see also Harrington, supra note 186, at 354-55 (examining case law on construction of phrase “irreversible cessation of circulatory and respiratory functions” under UDDA).

191 See Harrington, supra note 186, at 360-61. If circulatory function is interpreted to include the movement of oxygenated blood caused by ECMO, then a donor receiving this therapy is alive; if circulatory function only refers to the natural circulation created by a human heart, then ECMO is not considered circulatory function in relation to the UDDA statutes. See id.


193 See Bernat, supra note 61, at 671 (indicating that ECMO is used by “several” hospitals in their standard protocols for donation after cardiac death); see also supra note 61 and accompanying text (discussing breach of dead donor rule as homicide).

194 See McKinley, supra note 61 (examining California case in which transplant surgeon was accused of hastening donor’s death to procure organs for transplant); see also Youngner & Arnold, supra note 59, at 2771 (discussing dead donor rule).

195 See Magliocca, supra note 20, at 1095-96 (discussing the shortage of donor organs and the potential for donations after cardiac death to increase substantially the number of available organs); see also Wight, supra note 96, at 2253 (noting that ”a critical shortage of donor organs is the single greatest impediment facing transplant programs around the world”).

196 The UDDA refers to “irreversible cessation of circulatory and respiratory functions.” UNIF. DETERMINATION OF DEATH ACT § 1, 12A U.L.A. 781 (2008). In the case of a heart or lung transplant, of course, the goal of UDDA is not to ensure that cessation of the organ’s circulatory
interpretation of “circulatory function,” which would outlaw ECMO, this term could also be interpreted as only requiring the cessation of natural circulation caused by a naturally functioning heart to declare someone as dead. This alternative definition would be equally problematic, as it would allow for a person to be on any and all mechanical means to keep a person alive, such as implanted heart pump devices, while still being statutorily dead, so long as their natural circulatory function has ceased. The appropriate legal interpretation of “circulatory function” should be a balance between protecting the individual from being considered dead when they are merely on mechanical ventilation or heart devices, while allowing for certain ECMO therapies that have led to thousands of successful organ donations.

In 2007, a group of transplant experts reported in a consensus statement that a reasonable means by which to measure circulatory function for purposes of determining death in transplant situations is by electrocardiography and pulse pressure, as determined by monitoring through an arterial catheter. While ECMO would not cause a reading on an electrocardiograph, it would undoubtedly produce some reading of pulse pressure through an arterial catheter if placed just “downstream” from the ECMO catheter, which would be forcing oxygenated blood into the body. Thus, by the means for measuring circulatory death as approved by the 2007 expert panel, ECMO reverses the declaration of death.

Many experts have expressed concern about the ethical and perhaps legal implications of full body ECMO. The University of Michigan desired to use the
ECMO technology to maintain the viability of the organs, while still protecting itself from legal and ethical issues by excluding the brain from receiving the oxygenated blood through ECMO. The Michigan protocol calls for an occlusion balloon to be placed just before where the oxygenated blood would enter the heart, which allows for the thoracic organs (liver, kidneys, and pancreas) to receive oxygenated blood, while preventing the heart, lungs, and brain from receiving oxygenated blood, just as would have occurred with no ECMO therapy.

The “Michigan Protocol” is a more ethically sound approach as compared to full body ECMO. The essence of the cardio-pulmonary definition in the UDDA and the dead donor rule is to protect donors from having their organs removed when they are alive. An extreme consequence of full body ECMO could result in the reanimation of the heart and blood flow to the brain, thus creating a situation where organs are being harvested from a live person. The UDDA and dead donor rule should abolish this practice of full body ECMO. However, if the UDDA and dead donor rule were to make the Michigan Protocol illegal, it would be counterproductive, as the heart and brain would be in no more danger from reanimation than they would without such technology because the occlusion balloon prevents oxygenated blood from reaching the heart and brain.

A. Option 1: Alter the Definition of Death

The key change to the UDDA that would make full body ECMO and similar practices illegal, but still allow for the Michigan Protocol, would be to clarify the definition of death from “circulatory” to “cardiac functions.” By defining death as cardiac rather than circulatory, the appropriate tools to measure death would be electrocardiograph, or any other means of determining if the heart is functioning or receiving oxygenated blood. With an aortic balloon in place, the heart would still have no more function than it would with no additional therapies.

A common counter-argument would be that tinkering with the statutory definition of death is far more dangerous than simply banning ECMO and similar

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202 See Magliocca, supra note 20, at 1096.
203 See id. at 1097. But see Steven M. Rudich et al., Extracorporeal Support of the Non-Heart Beating Organ Donor, 73 TRANSPLANTATION 158, 158 (2002) (describing the continued use of full-body ECMO at the University of Michigan (“Michigan Protocol”) in special cases where brain function has been lost and informed consent has been obtained).
204 See supra notes 14-18 and accompanying text (discussing the dead donor rule and the cardio-pulmonary definition of death).
therapies altogether. The simple response is that facing difficult challenges is often necessary to create meaningful change that will save lives.

B. Option 2: Abandon the Dead Donor Rule

The second option to address the potential illegality of ECMO is to abandon the dead donor rule to allow for the death of a donor to be caused by organ donation in cases where the donor is facing inevitable terminal death, is in a state of unconsciousness where the donor is beyond the ability to experience pain and suffering, and the donor (or his or her agent) has provided informed consent to this living donation. This alternative would allow the definition of death to remain unchanged. However, even if a patient were statutorily considered to be alive while receiving the ECMO, the removal of the organs would not be unlawful because the dead donor rule would no longer define this as homicide.

The proposed process would be that a patient with a terminal prognosis nearing the end of his or her life would provide informed consent, and then all life saving therapies would cease. At the moment of death, ECMO could begin with an aortic balloon to prevent reanimation of brain activity, and the organs could be harvested. Once harvested, the ECMO support would cease and the deceased donor would be properly processed. This is essentially the same as the current practice; however, physicians would not need to worry about the legal issues raised in this note—for example, the patients receiving ECMO being considered alive due to circulatory function.

C. Conclusion

The first and most important conclusion is that, in the best interest of the public health of our country, strategies must be taken to increase the supply of organs

205 See James M. DuBois, Dead Tired of Repetitious Debates About Brain Death, 11 AM. J. BIOETHICS 45, 45-46 (2011) (arguing that modification of laws in favor of weaker protections for organ donors will cause social problems such as decreased rates of consenting donors and logistical problems such as obtaining proper informed consent).

206 A 2005 study showed that using the University of Michigan protocol increased the potential donor pool by 33% without short-term adverse effects on the organ function. Magliocca, supra note 20, at 1098.

207 See Truog & Miller, supra note 14, at 674-75; Rodríguez-Arias et al., supra note 14, at 41. Rodríguez-Arias et al., supra note 14, at 41 (calling for the abandonment of the dead donor rule because it fails to adequately protect donors, as some donors after cardiac death may still have sufficient brain function to experience harm).
for donation; and promoting donations after cardiac death is the most advantageous means by which to significantly increase the supply of organs. Additionally, ECMO therapy is an important therapy to increase the success of non-beating heart donation; however, in light of the Uniform Determination of Death Act and the dead donor rule, the legality of ECMO is questionable. Therefore, one of the two statutory or common law amendments detailed in the final part of this note should be implemented. The informed consent aspect of the second dead donor rule option will create less confusion or controversy and is the simplest means of creating a safe, legal way to maintain the viability of organs in non-beating heart donors.