

December 2, 2017

# Options for Increasing the Supply of Transplantable Organs

**J. BRADLEY SEGAL & ROBERT D. TRUOG**



## ABSTRACT

Society's need for transplantable organs dwarfs its supply. Every day 22 Americans die while waiting for an organ to become available for transplantation.<sup>1</sup> The scarcity of

organs requires rationing, but merely because a strategy would improve organ availability does not mean it is ethically justified. In this article, we highlight options for increasing the supply of transplantable organs, and explore ethical constraints such as respect for autonomy, avoiding harm,

and limitations related to the necessity for rationing.

## AUTONOMY

Organ procurement is bound by the principle of autonomy. Under the principle of autonomy all competent persons have the authority to refuse unwanted bodily intrusion, and removing vital organs from a living patient without consent is uniformly condemned.

But do the same rules apply after the person has died? Some ethicists support “organ conscription,” or mandatory cadaveric organ donation.<sup>2</sup> Despite its utilitarian appeal, our society ascribes value to posthumous wishes, including those relinquishing corporal remains. Forgoing all such wishes would be seen by many as subversive to dignity. Accordingly, strategies to expand transplantation must respect the voluntary decision to not donate organs, even after death.

The field of behavioral economics has given us the concept of the “nudge,” which respects freedom of choice while at the same time deliberately framing choices in ways that make people more likely to choose options that are seen as objectively good for that individual or for society.<sup>3</sup> Along these lines, several countries have adopted an “opt-out” standard for donor consent — everyone is assumed to consent to organ donation by default — thereby increasing the activation energy for non-donation. Especially compared to organ conscription, this nudge respects the principle of autonomy because it allows people to act according to their preferences.

While opt-out countries must still ration organs, changing the United States to an opt-out system could help mitigate scarcity, especially if

combined with other nudges. Israel, already an opt-out country, recently

## Harvard Health Policy Review

candidates priority when their family members are organ donors.

Essentially, the nudge incentivizes reciprocity among families of transplant candidates — though arguably not to the extent that it is coercive. It also significantly increased the nation's rate of organ donation.<sup>4</sup> If new forms of nudging can similarly function in combination, they might help reduce organ scarcity without disrespecting the principle of autonomy.

### HARM

Organ procurement is also constrained by the duty to not harm, or the principle of nonmaleficence. Harm normally ought to be commensurate for the benefits of treatment, but because transplantation does not confer its medical benefits to donors, organ procurement should not unacceptably harm donors. Traditionally, the principle of nonmaleficence has been operationalized through a norm called the dead donor rule (DDR) which prohibits causing death through organ procurement.<sup>5</sup>

Patients who suffered a catastrophic brain injury but do not meet formal criteria for brain death currently have a single DDR-compliant option for organ donation, a practice known as donation after circulatory determination of death. A consenting donor's life support is withdrawn in an operating room: if the heart keeps beating, donation is eventually abandoned so as to not violate the DDR; otherwise, once death is pronounced, vital organs are rapidly procured to minimize ischemic injury. In practice, however, typically only kidneys can be obtained in this way, as the other organs cannot be safely transplanted due to excessive ischemic

injury.<sup>6</sup> Some patients and families have argued that since the patient is going to die anyway, why not permit surgeons to remove the organs before the heart stops (and under anesthesia if necessary)? This path would necessarily involve making an exception to the DDR, since the organs would be removed prior to the patient's death. For example, if a patient has suffered irreversible brain injury, is dependent on life-sustaining measures, and the clinical team and family have plans to imminently withdraw life sustaining treatment, some argue that no essential ethical principles would stand in the way of donation. Others argue further that not permitting patients to make donations under these circumstances unethically constrains their right to die in a manner of their choosing, thereby thwarting their desire to save as many lives as possible.

In response, some contend that upholding the DDR is essential to maintain public faith that organ procurement will never be the proximate cause of the patient's death. A few countries blur this line of reasoning by legally permitting organ donation in physician aid-in-dying contexts but, oddly enough, stop short of violating the DDR by not removing organs before the patient's heart stops. In Belgium, for instance, several dozen terminally-ill patients have donated kidneys immediately following medical euthanasia. Estimates suggest that a formalized DDR-compliant “donation after euthanasia” program in Belgium could more than double the national supply of transplantable kidneys.<sup>7</sup>

A separate strategy would expand the source of organs by allowing patients who are not infected with either HIV or hepatitis C (HCV) to receive organs that carry these pathogens. In the United States, currently only

previously-infected transplant candidates are eligible to receive a transplant from a donor with known HIV or HCV infection. However, given recent improvements in the treatment of HIV and HCV, some advocate allowing non-infected patients to consent to receive these organs. The importance of this will likely rise in the short term: drug overdose is the fastest-growing cause of death among organ donors—in 2016, one in four of these donors tested positive for HCV.<sup>1</sup>

## LOOKING AHEAD

Modern science could plausibly obviate the problem of organ scarcity. The advent of CRISPR-Cas9 has enabled researchers to edit the pig genome in a bid to improve immunological compatibility for pig-to-human organ transplants and to prevent porcine viruses from infecting human recipients.<sup>8,9</sup> The approach has been validated in animals, and human trials are on the horizon.

No longer constrained by a scarcity of organs, medicine would face new challenges. Would we have a society where everyone simply received replacement organs whenever their old ones began to wear out, potentially dramatically increasing the human life-span? Or instead, would we agree to constrain the availability of transplanted organs, perhaps creating eligibility criteria similar to what we have now, but without the convenient justification afforded by our shortage of transplantable organs?

In sum, there are many options for increasing the supply of transplantable organs, but each brings with it a constellation of knotty ethical problems that will require thoughtful public engagement. The path we choose will

ultimately become a defining feature of the world in which we live.

## REFERENCES

1. United Network for Organ Sharing: Data. 2017;  
<https://www.unos.org/data/>.
2. Spital A, Erin CA. Conscription of cadaveric organs for transplantation: let's at least talk about it. *American Journal of Kidney Diseases*. 2002;39(3):611-615.
3. Thaler RH, Sunstein CR. *Nudge: Improving Decisions About Health, Wealth, and Happiness*. New York: Penguin Group, 2008.
4. Lavee J, Ashkenazi T, Stoler A, Cohen J, Beyar R. Preliminary marked increase in the national organ donation rate in Israel following implementation of a new organ transplantation law. *American Journal of Transplantation*. 2013;13(3):780-785.
5. Miller FG, Truog RD. Rethinking the ethics of vital organ donations. *The Hastings Center Report*. 2008;38(6):38-46.
6. Doshi MD, Hunsicker LG. Short- and long-term outcomes with the use of kidneys and livers donated after cardiac death. *American Journal of Transplantation*. 2007;7(1):122-129.
7. Bollen J, van Smaalen T, Ten Hoopen R, van Heurn E, Ysebaert D, van Mook W. Potential Number of Organ Donors After Euthanasia in Belgium. *JAMA*. 2017;317(14):1476-1477.
8. Niu D, Wei H-J, Lin L, et al. Inactivation of Porcine Endogenous Retrovirus in Pigs Using CRISPR-Cas9. *Science (New York, NY)*. 2017;357(6357):1303-1307.
9. Denner J. paving the Path toward Porcine Organs for

Transplantation. New England Journal of Medicine.  
2017;377(19):1891-1893.

#### ABOUT THE AUTHORS

##### Brad Segal

Brad Segal is a fourth year medical student at the Harvard Medical School. He graduated from UC San Diego with a BA in Philosophy and BS in Physiology and Neuroscience. Mr. Segal received his master's in Bioethics from Harvard Medical School. He is a 2017 FASPE Medical Fellow and was a Student Fellow for the Petrie-Flom Center at Harvard Law School.

##### Robert Truog

Robert D. Truog is the Frances Glessner Lee Professor of Medical Ethics, Anaesthesia, & Pediatrics at Harvard Medical School, where he directs the Center for Bioethics. At Boston Children's Hospital he is a senior attending physician in the Medical/Surgical Intensive Care Unit, where he has practiced for more than 30 years. He has published more than 300 articles and books in bioethics and related disciplines.

#### RELATED ARTICLES

