

Normothermic Regional Perfusion and the Determination of Death

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Recently, some organ procurement organizations (OPOs), agencies responsible for organ retrieval and transplantation in the United States, have initiated a procedure that challenges Catholic ethics on organ donation. It is called normothermic regional perfusion (NRP).¹ This procedure provides artificial circulation of blood to diminish the deterioration of organs for transplant. This is not a topic that occurs in ordinary conversation. However, it is a topic that should be understood by those who work in Catholic health care to make informed decisions about organ transplants that occur in its facilities.

To place this procedure in context, it is helpful to first review existing policies and laws about organ donation and the determination of death. When organ donation was first successful in 1954, with the transplantation of a kidney from one brother to another in Boston, the success of the procedure was unexpected, and it raised several ethical issues. Many questioned the ethics of removing a healthy organ from one person and implanting it in another to replace a diseased organ. In Catholic moral theology, the procedure seemed to violate the understanding that it was immoral to remove a healthy organ from a person.

Shortly after this transplant, Pope Pius XII weighed in on the conversation and said that in the instance of a transplant for a paired organ, such an act of donation was charitable and not selfish. So, it was moral under Catholic teaching.²

In the following years, the success of organ transplantation led to further conversations of moral clarification. Once organ transplantation

became clinically successful, other ethical issues arose. Most accepted that organ donations were moral, so long as the donation was not the cause of the death of the donor. So, deathbed donations that benefited one person but that hastened or resulted in the death of another were not allowed.

Next, the discussion shifted to whether some people who were now bedridden and sustained on respirators and other equipment, with little hope of recovery to ordinary existence, could be considered organ donors. Harvard Medical School and, later, the Uniform Law Commission took on the challenge.

Both asked, “When is a person dead?” Traditionally, for most of human history, the answer to this question has been that we are dead by cardiopulmonary criteria. In short, we are dead when our heart and lungs cease to function. The lack of circulation and respiration are established through ordinary observation and simple tests.

In 1968, the Ad Hoc Committee of Harvard

Medical School to Examine the Definition of Brain Death discussed the issue and argued that we could also be declared dead by neurological criteria, when the entire brain ceases to function. This is known as whole brain death.

It is important to say that there was a choice here as to a definition of brain death. An alternative proposed definition, which is still being debated more than 50 years later, is whether damage to the “thinking” parts of the brain is sufficient to declare death.

The Harvard Committee did not think that the alternative definition was sufficient. Later, when the Uniform Law Commission, which suggests common language to states for drafting legislation, proposed a legal definition of brain death, it used the Harvard criteria. I think that this was and is the correct definition.

So, assuming that cardio-pulmonary criteria are usually used to determine death, how would NRP challenge that? In short, NRP recognizes cardio-pulmonary criteria at the start of the procedure to harvest organs and then ignores them during the procedure to ensure more viable organs for transplant.

ETHICAL AND LEGAL CHALLENGES

When physicians have a high degree of certainty, because of underlying clinical criteria, that a person already meets the criteria for a neurological determination of death, or that once life support is discontinued, cardio-pulmonary death will occur, the process for assessing the patient for organ donation can occur. The patient may have already given consent before they were incapacitated through an advance directive, or the patient’s health care proxy may also have the legal authority to consent for the patient. Then an assessment is done by the OPO to determine if there are viable organs for transplant. If so, the donor is brought to the surgical suite, and the procedure of discontinuing life support is performed. After the required time period when there is no heart or lung activity, the patient is declared dead. Then, the transplant team begins the process of retrieving the viable organs.

The challenge for the transplant team is that once cardio-pulmonary activity has ceased, the organs to be harvested will begin deteriorating. The transplant team’s goal is to harvest as many viable organs as they can with the best chance for transplantation in possible recipients.

For those OPOs that accept normothermic regional perfusion, after the patient is declared dead, NRP is then initiated before any organs are removed. The carotid arteries to the brain are clamped to prevent blood flow to the brain and to concentrate circulation in the thorax and abdomen. Then, lines are placed, which are connected to a machine that oxygenates the blood, so that the organs to be transplanted are perfused.³

There are two types of NRP. In donors where the heart, as well as other abdominal organs, are planned to be recovered, thoracoabdominal normothermic regional perfusion (TA-NRP) is performed, while in donors with only abdominal organ recovery, abdominal-normothermic regional perfusion (A-NRP) is performed. They differ in the placement of where the lines go. In TA-NRP, they are placed in the aorta and right atrium of the heart, while in A-NRP they are placed in the femoral artery and vein.⁴

From the perspective of the OPOs, this practically results in more viable organs. Since the patient has been declared dead by cardio-pulmonary criteria, they assert that the patient remains dead. In their view, by clamping the carotid arteries, the perfused blood is now directed only to the organs that will be retrieved, which increases the likelihood of successful transplantation. The brain does not receive the blood and the oxygen the blood carries is now directed to the other organs.

But, in clamping the carotid arteries, there is a problem with the determination of death, from a Catholic, and even, perhaps, from a legal perspective. First, death was initially determined by cardio-pulmonary criteria, but by clamping the carotid arteries and then restoring circulation and restarting the heart, they are no longer met. There is now a functioning heart, which invalidates the initial determination of death. Of course, the person is no longer breathing, so that part of the definition of death is still met. In NRP, the oxygenation of the blood is done by a machine.

With the carotid arteries occluded, there is now a direct action taken which will cause brain death. Without circulation, the criteria for whole brain death are met. But, the action by which that happens is not the result of the natural process of death. Instead, it is a result of a deliberate decision to occlude the carotid arteries. To be clear, there is not a second determination of death by neurological criteria, since the OPOs think that the first determination of death is sufficient.

EXAMINING A SOLUTION

So, NRP scrambles the two definitions of death. While cardio-pulmonary criteria start the process and are met, the procedure then invalidates those accepted criteria by restarting the heart, which is still in the body. It resumes its natural function of perfusing organs with blood. Then, by occluding the carotid arteries, brain death results, but not by the natural process of death.

The OPOs intention of perfusing the organs to increase the viability of the organs to be harvested is a practical answer to a problem that does limit organ transplantation. The problem is that the solution of restarting the donor's heart in order to initiate NRP violates the agreed ethical and legal definitions of declaring death by cardio-pulmonary criteria.

There is a solution to this problem, but, for now, it is expensive. Perhaps, if it is adopted, the expense can be reduced. If a patient were declared dead by cardio-pulmonary criteria, and their organs were viable, then they can be ethically removed for transplant. The solution is to perfuse those organs outside of the donor's body. Once the organs are removed, we have a very different ethical context. Now, the organs are not considered to be co-existent with the personhood of the donor. They are separate, and their viability for transplant becomes the concern. The technology is present, but it is expensive because it is infrequent.

Perfusing an organ outside of a direct transplant can add \$65,000 to the cost.⁵ So, I understand the motivation of the OPO's approach, which

seeks to minimize the expense. But I will argue that it also comes at a moral cost. NRP is not ethical for Catholic health care because it confuses the accepted criteria for death and then uses that confusion to make ethically challenging choices about organ donation.

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NOTES

1. "Introduction to NRP and Perfusion in DCD: What Do These Concepts Mean?," The Alliance, July 2022, <https://www.organdonationalliance.org/insight/introduction-to-nrp-and-perfusion-in-dcd-what-do-these-concepts-mean/>.
2. Pius XII to the Italian Union for The Blind, "Comment on Corneal Transplants," *Acta Apostolicae Sedis*, May 14, 1956.
3. The technical term for the machine is a venoarterial extracorporeal membrane oxygenation unit, which is usually shortened to the term VA-ECMO.
4. Emad Alamouti-Fard et al., "Normothermic Regional Perfusion Is an Emerging Cost-Effective Alternative in Donation After Circulatory Death (DCD) in Heart Transplantation," *Cureus: Journal of Medical Science* 14, no. 6 (June 29, 2022): <https://doi.org/10.7759/cureus.26437>. I disagree with the ethics of NRP in this article, but they have a very detailed clinical explanation of the procedure.
5. Ted Alcorn, "The Organ Is Still Working. But It's Not in a Body Anymore.," *The New York Times*, April 2, 2024, <https://www.nytimes.com/2024/04/02/health/organ-transplants-perfusion.html>.

JOURNAL OF THE CATHOLIC HEALTH ASSOCIATION OF THE UNITED STATES

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Reprinted from *Health Progress*, Spring 2025, Vol. 106, No. 2
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