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Gloria Taylor

Karen Samartan

Kathryn Schroeter

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Gloria Taylor
United Network for Organ Sharing, Richmond, VA
Karen Samartan
OneLegacy, Torrance, CA
Kathryn Schroeter
Froedtert Hospital, Milwaukee, WI

THE REINVENTION OF A FORGOTTEN PROCEDURE

The current shortage of organs for transplantation has resulted in renewed interest in the use of organs from non-heart-beating donors (NHBDs). Obtaining organs from such donors is referred to as donation after cardiac death (DCD).

This article reviews key elements of the DCD procedure, including the decision to withdraw life support, operative procedure, and, perhaps most important, guidelines for introducing DCD to OR personnel (Table 1).

BACKGROUND

Donation after cardiac death is different than donation after brain death. The brain death policy has been followed for years, but it has limited the number of potential donors. In the case of cardiac death, arrangements for organ procurement can be made after a thorough discussion has occurred between the primary care physician and the patient's family. When permission is obtained, the patient is taken to the OR, the organ procurement team assembles, and plans are made for the patient to die a natural death in the OR following an ethically and legally acceptable protocol.

A CRITICAL DECISION

When a patient has suffered a devastating neurological injury, the family may decide to withdraw life support. Having made this decision in conjunction with medical staff members, the family will have the right to the option of organ donation. Organ donation is possible under certain circumstances after death from cessation of cardiac and respiratory functions. Generally speaking, trauma or stroke patients who will neither proceed to brain death nor be able to be declared legally brain dead fall into this category. These patients exhibit minimal brain function and their care is considered futile. There is no prognosis for any type of meaningful recovery for these patients. Many are ventilated patients with do-not-resuscitate orders. Additional circumstances under which a patient may be considered suitable for DCD are if the patient is under 50 years of age, with no active sepsis and no previous diagnosis of any malignancy.

After family members have made the decision to withdraw life support from their loved one, the organ procurement organization (OPO) evaluates the patient as a potential organ donor. If the patient is medically suitable, the option of DCD can be presented to the family. If the family agrees to organ donation, the OPO will initiate the procedure to recover the patient's organs after cardiac cessation. Typically, the procurement transplant coordinator will assemble a team of other coordinators to help with the care of the patient and family members, a hospital account executive to deal with hospital administrators, and the perioperative specialist who will manage the OR staff members.

The family members must be prepared for what they will see and hear during the DCD process. It is most helpful to have one OPO coordinator assigned to care for the family. This usually is the coordinator who has obtained consent and established a relationship with the family.

In many facilities, the DCD policy is either old and obscure or new and untested. Hospital administrators must be aware that this procedure is feasible and renewed. It also is prudent to have the hospital account executive present to answer family members' financial questions, allowing the coordinators to stay clinically focused. The OPO is responsible for all costs relating to the evaluation and retrieval of organs, regardless of whether the organs are recovered.

It will be necessary for the OPO perioperative specialist to meet with the OR staff members assigned to the case. This should include the circulating RN, surgical technologists, charge person, and anesthesia charge staff member. (Although DCD does not require support from an anesthesia care provider, it will

be necessary to include the anesthesia charge person in planning the organ recovery, as they usually are consulted when an OR is requested.) Depending on the hospital's withdrawal of care protocols, a respiratory therapist, critical care nurse, or other advanced cardiac life support-certified health care provider could provide the necessary ventilatory support. This meeting is imperative, as all staff members involved with the case must have a comfort level that will allow the case to proceed smoothly. Once the case comes to the OR, there will be no time to stop and resolve issues. Therefore, any staff member who is uncomfortable with this procedure should be reassigned.

OPERATIVE PROCEDURE

The withdrawal of life support and pronouncement of death should take place in a quiet, secluded area near the OR (eg, the postanesthesia care unit, preoperative holding area) or in the OR itself, if the institution can accommodate this. Many institutions, however, have difficulty in withdrawing life support in the actual OR, as there is a concern regarding family members' presence and the potential for case contamination and/or visitor injury.

TABLE 1: GUIDELINES FOR **INTRODUCING** DCD TO **O.R. PERSONNEL**

Traditionally, the organ donor is a patient with a severe head injury who is pronounced dead according to neurological criteria. In contrast, the donor from a donation after cardiac death (DCD) situation has sustained a severe head injury, is not brain dead, and is unlikely to progress to brain death. When the family chooses to withdraw life support, the option of DCD is offered to the family in a separate conversation. The family's desire to donate drives this type of donation. It has been estimated that there are at least 1,000 potential donors each year that fall into this DCD category. To help build trust in the donation process for both donor families and hospital staff members, we, the Organ Procurement and Transplantation Network (OPTN)/United Network for Organ Sharing (UNOS) OR Advisory Council, recommend the following.

1. Each hospital practice site should organize a group of representatives to form a committee that will work with the organ procurement organization (OPO) to create or modify DCD protocols for the needs of their institution.
2. The DCD committee members should represent the interests of the hospital and all affected sites of care. Each institution needs to determine who those individuals are; however, we suggest that a representative from the OPO or a consultant to policy development and institution process be involved .We also highly recommend that, at minimum, one representative from the OR (who will represent the interests of anesthesia care providers, OR nurses, and surgical technologists) be involved in the institution and execution of DCD protocols.
3. Each DCD committee member must be able to act as an independent representative for his or her health care specialty. The institution may choose to use a consensus panel from each health care specialty and send representatives from these panels.
4. Each institution should recognize the importance of opinions from all health care providers when developing a DCD policy. Thus, a "grass roots" movement may promote cohesive and cooperative care for donors and donor families, making the administration of any DCD protocol easier and more practical.
5. Scheduling of DCD cases at all involved hospitals must follow routine channels in the OR. However, special attention must be given to ensure that cases will be seen as a priority. To do otherwise would place the donor family in an uncertain and uncomfortable situation. Thus, we recommend routine scheduling

commitments that provide for a predetermined time that withdrawal of care, declaration of death, and procurement will occur.

6. The OPO must be involved in scheduling DCD cases for the OR and thus serve to link withdrawal of life support to the donation process, preventing any overlap of responsibilities by the primary care team with the recovery and transplantation teams. Consultation with the involved withdrawal of care/recovery services should precede scheduling of the OR.
7. Each institution always must have staff members available to care for DCD donors and families. We acknowledge that there will be individuals who will feel they are unable to provide this serv- ice in the OR. Therefore, we recommend that guaranteed staffing for DCD should proceed through normal institutional protocol.

Recommendations for treatment of DCD cases in the OR

1. There must be a designated individual or service specializing in providing continuity of care to ensure that the donor receives good care. The OPO is an excellent resource, as it is not a member of the primary or transplant team.
2. Designated OPO personnel will provide support during the donation process to the perioperative and operative teams. Otherwise, the institution must designate someone for this task.
3. There are a number of health care professionals capable of terminating ventilatory support (ie, withdrawal of care) for DCD cases. The needs and resources of the institution will determine the choice of appropriate personnel. We support the Institute of Medicine **(IOM)** recommendation to separate withdrawal of care from the actual procurement process and propose that no one who is or may be involved with the procurement of organs or tissues participate in the termination of ventilatory sup- port for DCD patients.
4. Should re-establishment of ventilatory support be required (ie, the family rescinds consent and requests reintubation), the institution should designate health care professionals who meet institutional credentials to perform this task.
5. If a patient does not expire within set criteria, the patient will be moved to a designated unit of care that must be outlined in institutional protocol.
6. All institutions should establish a debriefing mechanism for perioperative and operative teams involved in all donation cases.
7. There are a number of individuals and groups that are capable of providing emotional support to the DCD donor family. Further honoring the separation of withdrawal of care from the procurement process, health care professionals who are involved in the withdrawal of care must ensure that support services are readily available to care for all donor families. These services cannot be provided by the individuals or organization(s) involved in the procurement of organs or tissues.
8. DCD should occur in an environment that balances the following factors: the relationship of the family, donor family comfort, institutional resources, and needs of procurement personnel.
9. Each institution must weigh the benefits of all interventions before death that may improve donor organ function against the risks to the donor. All interventions should conform to the 2000 IOM report *Non-heart-beating Organ Transplantation: Practice and Protocols* recommendations.'

Recommendations for quality assurance and risk management matters

1. The quality assurance (QA)/risk management (RM) process is required at several levels of the DCD process. Similar to all QA/RM information, each department should undertake a thorough QA/RM analysis for each donation case.
2. All standardized data should be recorded in a database.This does not necessarily have to be associat- ed with the QA/RM process unless there is an adverse outcome.Adverse outcomes may arise in the withdrawal of

care, organ or tissue procurement, or interactions with donor families. QA/RM process- es must be constructed recognizing at least these three areas.

Institute of Medicine, *Non-heart-beating Organ Transplantation: Practice and Protocols* (Washington, DC: National Academies Press, 2000) http://www.nap.edu/b ooks/0309064 I 7/html/ (accessed 18 April 2003).

It will be necessary for OR staff members to open and prepare the back table before the arrival of the patient. Ideally, the back table is prepared, the sterile saline slush is ready, and the patient is transferred to the OR bed. The patient then is prepped and draped in the usual fashion. The cold perfusion solution should be hanging from an IV pole, and the infusion tubing and aortic cannulae should be flushed and secured to the drapes. For aesthetic purposes, it is accepted practice to cover the prepped area with sterile towels if the family will be entering the OR. The OPO coordinator or intensive care unit RN will initiate the comfort measures to the patient according to the hospital's withdrawal of care policy. Based on the hospital's protocol, comfort measures could include the administration of sedation, analgesia, or pain relief medications (eg, morphine, benzodiazepines, midazolam, fentanyl). It also will be necessary to bolus the patient with heparin (300 u/kg) to prevent clotting in the vasculature. All vasopressor support will be discontinued.

Organ recovery team members should be gowned and gloved and waiting in an adjoining room or substerile room. Under no cirumstances should the recovery team be in the same room with family members. Operating room staff members can elect to remain in the room or wait with the recovery team.

When the room is ready and the patient is draped, the family can be escorted into the OR, where they may stand or sit at the head of the bed. Keeping the patient's arms extended on arm boards allows family members more opportunity to touch their loved one. The family may request the presence of a chaplain or pastor. It is appropriate to dim the lights, as this will help to limit the visual stimulation of a brightly lit OR room and will add to the family's comfort level. Family members may request that special music-in the form of a compact disc or an audio-tape-be played.

It is important that the coordinator assigned to the family set a limit for how long family members can stay in the OR. For example, if the family enters after extubation, they may stay until the pronouncement of death is made. If the family has been accurately assessed and prepared, they will exit the OR when appropriate.

According to hospital policy, the patient will be extubated. The patient should become asystolic within 60 minutes. The time of death will be noted after asystole has been observed for three to five minutes, depending on hospital policy. Only then will the organ recovery team enter the room to initiate the recovery surgery. If the patient continues to have a blood pressure and has not reached asystole after 60 minutes have passed, the decision may be made to move the patient from the OR to a prearranged room and provide him or her with further comfort measures, such as sedation, analgesia, or pain relief medications, depending on hospital protocol.

ORGAN RECOVERY

When the organ recovery surgery begins, the procedure will progress at a rapid pace because once asystole has occurred, the organs are warm and without oxygen. It is expected that the recovery team will be able to cannulate the aorta within 20 minutes or less of the initial incision. After cannulation, the sterile saline slush will be packed into the abdomen, accelerating the cooling of the organs, thereby preserving them.

After the cannulation has taken place and the organs are cooled, the dissection will continue until the organs are ready to be removed. If the liver and kidneys are being recovered, the liver will be taken to the back table first, where it will be triple sterile bagged with a liter of preserving solution, then placed in an ice chest. The kidney dissection will continue. After the kidneys are removed, they are separated on the back table, inspected, and packaged according to United Network for Organ Sharing (UNOS) standards. The recovery surgeons will close the patient at the conclusion of the surgery, and the patient then is prepared for transfer to the hospital morgue.

DEBRIEFING

It is very important to hold a debriefing meeting with OR staff members involved in the DCD case, ideally within one week of the case. Staff members must be allowed the time and opportunity to discuss the case and their feelings regarding DCD. It is imperative to reinforce that this patient would not have survived his or her injuries, and that the family's decision to withdraw care would have been carried out in any case. This is an opportunity to reinforce that, with the staff members' help, family members were given the opportunity to give the gift of life, and as is often the case, ease their own grief.

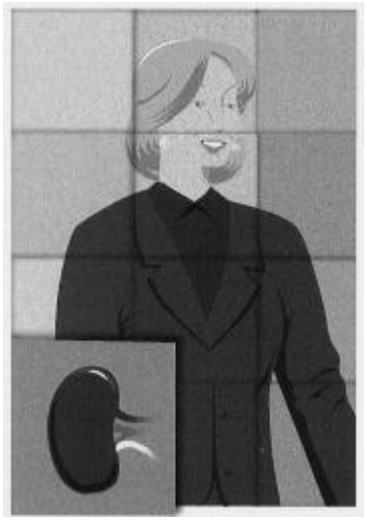
Kidney recovery after cardiac arrest has been performed since the early 1970s, and because of successful results, many transplant programs again are pursuing DCD candidates as a viable source of kidneys for transplantation. However, this procedure is performed only at hospitals that have a specific DCD protocol in place. Operating room personnel are aware of organ procurement procedures, yet may find it difficult to deal with a procedure such as DCD. The concerns of surgical services staff members have resulted in the implementation of an educational initiative to address these issues.

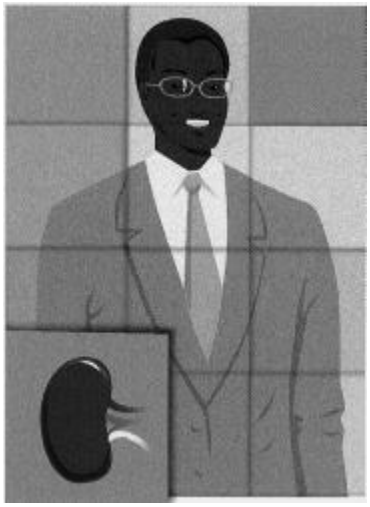
THE OPTN/UNOS OR STAFF ADVISORY COUNCIL

An OR Staff Advisory Council was formed by UNOS, which administers the Organ Procurement and Transplantation Network (OPTN), in 2001. Since its inception in 1986, UNOS has joined with professional organizations to collaborate on educational initiatives regarding organ donation and transplantation. As a result of these efforts, tailored educational resources have been created for targeted professional groups. The United Network for Organ Sharing historically has formed advisory councils to initiate a dialogue among particular groups, and this has led to the creation of appropriate initiatives and resources.

The United Network for Organ Sharing is a national, nonprofit organization that, under contract with the US Department of Health and Human Services, administers the national OPTN. As the OPTN, UNOS maintains the national list of patients awaiting solid organ transplants, operates the computer system for allocating organs to those on the waiting list, and gathers data to evaluate the clinical and scientific

status of donation and transplantation in the United States. Equally important is UNOS' commitment to educate professional groups and the general public regarding donation- and transplantation-related issues.





FOCUS GROUPS

The OPTN/UNOS OR Staff Advisory Council helped organize OR-specific focus groups to identify current obstacles to the acceptance of DCD by OR staff members; to assess current knowledge, attitudes, and ethical concerns regarding DCD; and to examine the prevalence of historic barriers to acceptance of DCD (Table 2).

TABLE 2: FOCUS **GROUP** FEEDBACK

The Organ Procurement and Transplantation Network (OPTN)/United Network for Organ Sharing (UNOS) OR Staff Advisory Council, formed by the United Network for Organ Sharing in 200 I, helped organize OR-specific focus groups to identify current obstacles to the acceptance of donation after car- diac death (DCD) by OR staff members; to assess current knowledge, attitudes, and ethical concerns regarding DCD; and to examine the prevalence of historic barriers to acceptance of DCD.

Overall feelings

Presently, most study participants do not know much about controlled DCD. Current perceptions are often more a matter of conjecture rather than fact or experience. In the absence of established proto- cols, OR personnel

are uncomfortable with DCD, yet many believe they would feel differently about con- trolled DCD after learning more about this type of donation and gaining some experience with it.

- The OR staff member participants know that more organs donated translates to more lives saved.
- They feel it is permissible to continue to care for potential donors until an OR becomes available.
- They feel the option of controlled DCD honors the patient's wish to be a donor; reduces long-term, ventilator-dependent cases; and gives the patient greater dignity.
- The OR focus group participants further feel that DCD offers some mitigation of grief to survivors and recognize the potential for increased cost efficiencies as a result of increased volume of these procedures.
- They feel the need for donor organs will not influence physicians' patient care decisions.

Questions

Focus group participants asked the following questions about DCD.

- Are controlled DCD organs viable?
- Will hospitals, fearing litigation, refuse to approve DCDI
- If DCD is confusing to us, will the public understand it?
- Can we be sure that DCD donor evaluation protocols will be consistently practiced?
- Will hospital staff members misunderstand what is going on?
- Can we really predict when someone's heart will stop beating (after the withdrawal of life support)?
- If mistakes are made here, would it undermine the credibility of organ donation as a whole?
- Will the public trust us if we start doing this procedure?
- Is this another name for euthanasia?

Concerns

Some perceptions appear to stem from misunderstanding of neurological criteria against which prospective controlled DCD donors would be evaluated. Perceptions of incidence were based more on hearsay than first-hand experience.

- Nurses commonly cited conflict between contemporary ethical standards and their Christian faith- none believe it is a good idea to bring patients to the OR for the purpose of allowing them to die.
- All participants were uncomfortable with the idea of family members being present in the OR.
- Further, participants questioned family members attending the withdrawal of life support and death of their loved one.They worried that the patient might not die, or might not die soon enough.
- Anesthesiologists are particularly uncomfortable pronouncing death for DCD donors.
- Separating the discussion about withdrawal of life support from the discussion of organ donation is still of great concern to the OR focus group members.
- Participants voiced mixed feelings regarding the possibility of adverse publicity, the competency of
- physicians to determine medical futility, and potential legal repercussions from family members.
- Also of mixed concern was the thought that the patient may be suffering during withdrawal of life sup- port or premortem cannulation.
- The concept of irreversibility in determination of death by cardiopulmonary criteria troubled some members of the group.
- Some participants wondered if the donor might feel pain during organ recovery and if the timing of death (five minutes, per Institute of Medicine criteria) was sufficient.
- Additionally, some were concerned about financial protection for the dying patient's family members.
- Participants did not think there was potential for the patient's death to be hastened by pain medica- tion, anticoagulants, and vasodilators, nor did they feel that withdrawal of life support causes death.
- The group as a whole disapproved of premortem cannulation, even with family consent.

The OR staff member focus groups were part of a nationwide study undertaken by UNOS as the OPTN and supported by the Health Resources and Services Administration. In all, there were 26 focus group

discussions, with a total of 206 participants, 24 of whom were OR personnel. Representation in the study included

- members of the National Medical Association,
- emergency room nurses,
- medical examiners,
- emergency physicians,
- neuroscience nurses,
- organ procurement directors,
- neurosurgeons,
- trauma surgeons,
- transplant surgeons,
- neurologists,
- critical care nurses, and
- OR personnel (eg, anesthesiologists, nurses, surgical technologists).

The same research facilitator conducted all of the focus groups and used a standardized discussion outline. A separate questionnaire was used to collect additional background and demographic information. No known study bias was identified.

Groups were defined by a wide variety of perspectives: age, race, gender, geography, educational preparation, professional experience, religious/spiritual orientation, and organ recovery experience.

SCENARIOS. There are two types of NHBDs: controlled and uncontrolled. Identical controlled and uncontrolled DCD case studies were presented to the groups. A "controlled" donor is someone who is being maintained on life support-the time and place of life support withdrawal and eventual cardiac death are "relatively controlled." These patients usually have very minimal brain function but cannot legally be declared brain dead. Physicians and family members agree to withdraw the ventilator because no further treatment would benefit the patient.

The "uncontrolled" donor has a sudden, uncontrolled death, usually in an emergency situation. This adds variables that may affect the viability of the organs and their function. Potential problem areas created by this type of donor are consent/history taking, prolonged ischemic time, serology results, and recovery team availability. In many instances, families are not readily available when a decision to donate has to be made. Availability will affect both informed consent and obtaining required information related to the patient's medical history.

Although prolonged ischemic time could be avoided by instituting an in situ flush (ie, premortem cannulation) until this information is obtained, additional downtime and transport to the hospital also can add uncontrolled ischemia. Normally, ischemic time should be minimized whenever possible, but should not exceed 45 minutes. Family members could take hours to get to the hospital, especially if they are in another state. Serology results will not be available until sometime after the donor surgery. Also, a team of qualified surgeons and coordinators would need to be immediately available to respond to such situations. This may be possible at a transplant center but becomes less likely at any

hospital facility in the middle of the night. Equipment and materials would need to be instantly accessible.

RESULTS. A lively and generally engaging mix of health care professionals' perspectives demonstrated consistency on key issues and concerns regarding donation as a whole. Subtle differences were based more on age, experience, and personality than on specialty.

The OR personnel demographics were as follows: mean age, 48; male, 33%; female, 67%; states represented, 17; mean years in health care, 26; mean years in OR, 22; had heard of NHBD or DCD, 56%.

The OR personnel differed from other specialties mainly in regard to their feelings about the sanctity of the OR, their fear of decisions that prevent unexpected positive outcomes, and their discomfort with taking part in the declaration of death.

Results reveal a universal acceptance of organ donation and a desire to encourage greater participation in the process. However, frustration was voiced over low participation rates based on geography, income, race, and a sensitivity to not wanting to send the wrong signals to society.

RECOMMENDATIONS

To help make OR personnel more comfortable with the DCD process, the focus group participants recommended

- educating hospital staff members, family members, and the public;
- promulgating clear clinical pathways with all possible contingencies accounted for;
- developing guidelines regarding futility and time of likely heartbeat cessation;
- helping OR staff managers handle emotional stresses;
- allowing staff members with faith-based objections to opt out; and
- promoting education that reinforces ethical legitimacy of controlled DCD.

As for uncontrolled DCD, the group felt that there may be some long-term merit to this type of donation (ie, more organs). However, they felt it is just too risky to think about at this time. Group members thought there were too many adverse ethical/legal implications regarding uncontrolled DCD and that the entire organ recovery and transplantation movement is too young to risk destroying with this easily misunderstood practice.

UNDERSTANDING

The DCD procedure is believed to be a medically and ethically acceptable source of organs. However, education is needed to promote DCD understanding by all health care providers involved. The public also must be educated, and that is beyond the scope of this advisory council's work.

The document "Guidelines for Introducing Donation after Cardiac Death (DCD) to OR Personnel" was produced as a result of the advisory council's focus group study and work group meetings. It includes recommendations for handling DCD cases in the OR, as well as recommendations for quality assurance and risk management matters.

It is hoped that perioperative managers, educators, and clinicians will benefit from these guidelines. All health care providers are encouraged to use the guidelines to increase their understanding and enhance their overall practice as it relates to organ donation and procurement.

Sidebar

Focus group results reveal acceptance of organ donation and a desire to encourage participation in the process.

RESOURCES

J Alvarez et al, "NON-HEART-BEATING DONORS: ESTIMATED ACTUAL POTENTIAL," Transplant Proceedings 33 (February/March 2001) 1101-1103.

J Alvarez et al, "NON-HEART-BEATING DONORS FROM THE STREETS: AN INCREASING DONOR POOL SOURCE," Transplantation (July 27, 2000) 314-317.

M A DeVita,'THE DEATH WATCH: CERTIFYING DEATH USING CARDIAC CRITERIA," (Review) Progress in Transplantation 11 (March 2001) 58-66.

MA DeVita, T May,"DECISIONS BY CONSCIOUS PERSONS ABOUT CONTROLLED NHBD AFTER DEATH: EYES WIDE OPEN," The Journal of Clinical Ethics 11(Spring 2000) 85-89. Discussion 92-93.

M A DeVita et al, "OBSERVATIONS OF WITHDRAWAL OF LIFE-SUSTAINING TREATMENT FROM PATIENTS WHO BECAME NON-HEART-BEATING ORGAN DONORS," Critical Care Medicine 28 (June 2000) 1709-1712.

J M DuBois,"ETHICAL ASSESSMENTS OF BRAIN DEATH AND ORGAN PROCUREMENT POLICIES: A SURVEY OF TRANSPLANT PERSONNEL IN THE UNITED STATES," Journal of Transplant Coordination 9 (December 1999) 210-218.

J M DuBois, "NON-HEART-BEATING ORGAN DONATION. DESIGNING AN ETHICALLY ACCEPTABLE PROTOCOL," Health Progress 82 (January/February 2001) 18-21.

J M Edwards, R D Hasz, V M Robertson, Jr, "NON-HEART-BEATING ORGAN DONATION: PROCESS AND REVIEW," AACN Clinical Issues 10 (May 1999) 293-300.

Institute of Medicine, Division of Health Care Services. Non-heart-beating Organ Transplantation Practice and Protocols (Washington, DC: National Academies Press, 2000) http://books.nap.edu/books/0309066417 /html/index.html (accessed 30 April 2003).

G Kootstra,"RE:A CASE-CONTROL COMPARISON OF THE RESULTS OF RENAL TRANSPLANTATION FROM HEART-BEATING AND NON-HEART-BEATING DONORS," Transplantation 71 (June 15, 2001) 1509-1510.

J A Light et al, "EXCELLENT LONG-TERM GRAFT SURVIVAL WITH KIDNEYS FROM THE UNCONTROLLED NON-HEART-BEATING DONOR," Transplant Proceedings 32 (February 2000) 186-187.

J A Light et al, "LONG-TERM GRAFT SURVIVAL AFTER TRANSPLANTATION WITH KIDNEYS FROM UNCONTROLLED NONHEARTBEATING DONORS," Transplantation 68 (Dec 27, 1999) 1910-1911.

D J Reich et al, "CONTROLLED NON-HEART-BEATING DONOR LIVER TRANSPLANTATION: A SUCCESSFUL SINGLE CENTER EXPERIENCE, WITH TOPIC UPDATE," Transplantation 70 (Oct 27, 2000) 1159-1166.

J A Robertson, "The dead donor rule," The Hastings Center Report 29 (November/December 1999) 6-14.

J Spike,"CONTROLLED NHBD PROTOCOL FOR A FULLY CONSCIOUS PERSON: WHEN DEATH IS INTENDED AS AN END IN ITSELF AND IT HAS ITS OWN END," The Journal of Clinical Ethics 11 (Spring 2000) 73-77.

J A van der Vliet et al, "PRESERVATION OF NON-HEART-BEATING DONOR KIDNEYS:A CLINICAL PROSPECTIVE RANDOMISED CASE-CONTROL STUDY OF MACHINE PERFUSION VERSUS COLD STORAGE," Transplant Proceedings 33 (February/March 2001) 847.