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REVIEW

The critical pathway for deceased donation: reportable uniformity in the approach to deceased donation

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Summary

The critical pathway of deceased donation provides a systematic approach to the organ donation process, considering both donation after cardiac death than donation after brain death. The pathway provides a tool for assessing the potential of deceased donation and for the prospective identification and referral of possible deceased donors.

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Introduction

The *Third World Health Organization* (*WHO*) *Global Consultation on Organ Donation and Transplantation: Striving to Achieve Self-Sufficiency* was recently held in Madrid, Spain, on March 23–25, 2010 [1]. Participants to the Consultation '*urged the WHO, its Member States and professionals in the field to regard organ donation and transplantation as part of every nation's responsibility to meet the health needs of its population in a comprehensive manner and address the conditions leading to transplantation from prevention to treatment*'. The concept of self-sufficiency was defined as fulfilling the transplantation needs of a given population, by using the resources obtained from within that population, but not excluding opportunities of regulated and ethical regional organ sharing and cooperation.

As a result of the Consultation, a comprehensive list of recommendations directed at governments, international organizations and healthcare professionals on how to successfully and ethically meet the transplantation needs of patients was provided. The need for national accountability for the establishment of an effective planning context for diseases treatable through organ transplantation was the core of the Madrid Resolution. Strategies in the pursuit of self-sufficiency were to be consistent with the ethical standards already set down by the *WHO Guiding Principles for Human Cell, Tissue and organ Transplantation* [2] and the *Declaration of Istanbul on Organ Trafficking and Transplant Tourism* [3], where the principles of voluntary donation and noncommercialization are to be emphasized.

Deceased donation was considered an essential component in the pursuit of the self-sufficiency paradigm at the Consultation. This was highlighted by the *World Health Assembly* (WHA) through *Resolution 63.22* urging Member States '*to strengthen national and multinational authorities and/or capacities to provide oversight, organization and coordination of donation and transplantation activities, with special attention to maximizing donation from deceased persons* (...)' [4]. Moreover, the need to maximize deceased donation is included under the WHO *Guiding Principles for Human Cell, Tissue and organ Transplantation* (Cruzado WHO GP). The *Declaration of Istanbul on Organ Trafficking and Transplant Tourism* affirms the *WHA Resolution 63.22*: '*the therapeutic potential of deceased organ donation should be maximized not only for kidneys but also for other organs, appropriate to the transplantation needs of each country. Efforts to initiate or enhance deceased donor transplantation are essential to minimize the burden on living donors*' (Cruzado Istanbul).

The development of a critical pathway for deceased donation

To facilitate the practical development and progressive increase of deceased donation activities around the world, a common (universal) systematic approach to the process of deceased organ donation is needed. Thus, a critical pathway has been developed by a diverse, multicultural and multi-regional working group convened through the support of *The Transplantation Society*, the Spanish *Organización Nacional de Trasplantes* (*ONT*) and the *WHO*. This product emerged following several meetings initially begun in Sydney (Australia), August 2008, then continued in Geneva (Switzerland) and Berlin (Germany), March and October 2009, and finalized in Madrid, 2010. The working group used current scientific knowledge, its experience with programs of deceased donation, and existing national laws on death and organ donation in the formation of the Pathway.

Objectives of the critical pathway

1 To provide a common systematic approach to the deceased organ donation process, considering both donation after brain death (DBD) and donation after circulatory death (DCD).
2 To provide a useful and common tool for assessing the potential of deceased donation, evaluating performance in the deceased donation process and identifying areas for improvement.
3 To create a common scenario or trigger in which the prospective identification and referral of a possible deceased organ donor can be undertaken.

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This critical pathway is designed as a tool that can be applicable to every country, region or specific hospital, regardless of the level of development of its healthcare system, or its baseline experience on deceased organ donation. While not intending to provide the ethical standards in the realization of the deceased donation process, the critical pathway is to be understood as a practical element in the pursuit of self-sufficiency in transplantation and consistent with the ethical principles of this paradigm, as mentioned above.

Description of the critical pathway

The process of organ donation from deceased persons defined in this project is described under The Critical Pathway for organ donation (Fig. 1) and briefly explained below. Pathways are provided for both DBD and DCD. Reasons for not accomplishing organ donation and recovery along the Pathway are categorized in Fig. 1 as related to obstacles encountered in the system, the donor or the organ or the necessary permission to proceed with organ donation.

Possible deceased organ donor

A possible deceased organ donor is defined as the patient with a devastating brain injury or lesion. In the most common, but not unique, scenario, the patient is hospitalized in an intensive care unit and sustained with mechanical ventilation. A possible deceased organ donor could also be a patient with a circulatory failure arriving to the hospital in the emergency ward or hospitalized. In either instance, the possible deceased organ donor is apparently medically suitable for organ donation.

Identification of the possible deceased donor and referral by the treating physician to a key donation person/organ procurement organization (OPO) should ideally occur as early as for the possible deceased organ donor, particularly when referring to the person with a devastating brain injury or lesion. For example, in the United States (US) each imminent death should be referred to the OPO for assessment, where imminent may be understood as the time of transition between therapeutic treatments to end-of-life care [5]. Imminent death is defined in the US as a patient who is 70 years old or younger

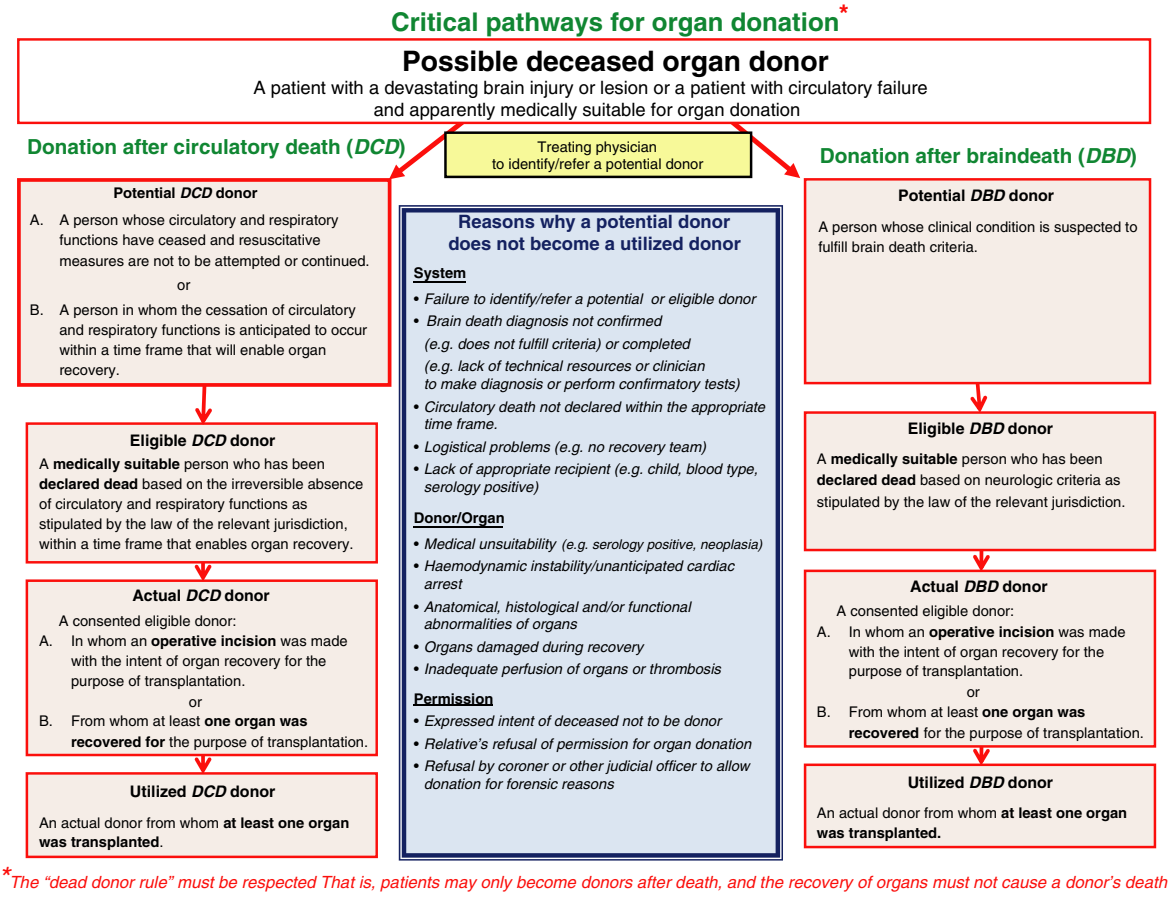

Figure 1 The critical pathway for deceased organ donation.

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with severe neurologic injury and requiring ventilatory support with an absence of at least three brainstem reflexes but not yet declared dead [6].

However, referral of the possible donor might not be acceptable in all local circumstances (i.e. many countries do not find it acceptable to refer possible donors where death has not yet been established). Hence, it is accepted that referral might occur later on in the process of donation from deceased persons. Referral is understood as the action of making the key donation person/OPO aware of the possibility of deceased donation, but it does not mean any other subsequent action. Referral requires, and is linked to, the act of identification.

It should be noted that the term 'possible deceased organ donor' is applied, but that the process described sustains the 'dead donor rule', by which patients may only become donors after death, and the recovery of organs must not cause a donor's death [7].

The possible deceased organ donor, when defined as the patient with a devastating brain injury or lesion, represents the common starting point of two different pathways that activate depending upon evolution and clinical practice: the process of DBD and the process of DCD. The possible donor defined as the patient with circulatory failure might be the starting point of the process of DCD.

The process of donation after brain death

A potential donor after brain death is defined as a person whose clinical condition is suspected to fulfill brain death criteria.

A potential donor after brain death would become an eligible donor after brain death if the person is considered medically suitable for organ donation and is declared dead based on neurologic criteria, as stipulated by the law of the relevant jurisdiction. An eligible donor is ultimately legally declared brain dead, independent of family decision regarding donation or availability of next-of-kin, independent of medical examiner or coroner involvement in the case, and independent of local acceptance criteria or transplant center practice. The eligible donor does not exhibit medical contraindications for donation. Medical conditions precluding organ donation might vary between countries according to legal and/or technical provisions, or daily practice. Tables 1 and 2 summarize contraindications to organ donation as developed in the US [8].

The reasons why a potential donor after brain death does not become eligible for donation might be the following: (i) failure to identify and subsequently refer the case (if this is the point for referral, according to local circumstances); (ii) medical unsuitability; (iii) the diagnosis of brain death is not confirmed or completed (i.e. because of the lack of technical or human resources necessary for confirmation), or; (iv) hemodynamic instability leading to an anticipated cardiac arrest. The two last situations could still be linked to the possibility of DCD.

Table 1. Infection exclusions to the definition of eligible in the US [8].

Active infections (**specific diagnoses**)
Active fungal, parasitic, viral, or bacterial meningitis or encephalitis
Bacterial:
Tuberculosis, gangrenous bowel or perforated bowel and/or intra-abdominal sepsis
Viral:
HIV infection by serologic or molecular detection, rabies, reactive hepatitis B surface antigen, retroviral infections including HTLV I/II, viral encephalitis or meningitis, active herpes simplex, varicella zoster, or cytomegalovirus viremia or pneumonia, acute Epstein Barr virus (mononucleosis), West Nile virus infection
Fungal:
Active infection with Cryptococcus, Aspergillus, Histoplasma, Coccidioides,
Active candidemia or invasive yeast infection
Parasites:
Active infection with *Trypanosoma cruzi* (Chagas'), Leishmania, Strongyloides, or Malaria (Plasmodium sp.)
Prion: Creutzfeldt–Jacob Disease

Table 2. Other exclusions to the definition of eligible in the US [8].

Aplastic anemia, agranulocytosis
Extreme immaturity (<500 grams or gestational age of <32 weeks)
Current malignant neoplasms except non-melanoma skin cancers such as basal cell and squamous cell cancer and primary CNS tumors without evident metastatic disease
Previous malignant neoplasms with current evident metastatic disease
A history of melanoma
Hematologic malignancies: leukemia, Hodgkin's disease, lymphoma, multiple myeloma
Multi-system organ failure (MSOF)
Because of overwhelming sepsis or MSOF without sepsis
Defined as 3 or more systems in simultaneous failure
For a period of 24 h or more without response to treatment or resuscitation

An eligible donor after brain death would become an actual donor after brain death only after consent has been obtained for organ donation. Two possible situations define the actual donor after brain death, differences that have been encountered between the countries. The first situation would be that in which an operating incision has been made with the intent of organ recovery for the purpose of transplantation (actual donor after brain death type A). In the second situation, the condition of actual donation would be defined when at least one organ has been recovered for transplantation purposes (actual donor after brain death type B). The evolution from eligible to actual donor entails the need to obtain permission for

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organ donation, although such permission might have been obtained at an earlier stage during the process, according to the legal framework and practical provisions in place. Also according to local circumstances, permission might be based on the expression of the deceased during his/her lifetime (i.e. through a specific registry) or might be obtained from their relatives. Authorization by a coroner or other judicial officer to allow donation for forensic reasons, if applicable, might also be needed at a certain point. Continuous evaluation of medical suitability for organ donation, hemodynamic maintenance of the donor, organ allocation and finally the surgical incision and organ recovery are all necessary steps in the transition from eligible to actual donor after brain death. Losses because of maintenance problems would still be linked to the possibility of DCD.

Finally, a utilized donor after brain death would be the actual donor after brain death from whom at least one organ has been transplanted. Medical unsuitability learnt during organ recovery (i.e. incidental tumor), organ damage during recovery, anatomical, histological and/or functional abnormalities of the organs detected during or after recovery, inadequate perfusion/thrombosis of the organs, logistical problems and lack of an appropriate recipient are the categorical reasons why an actual donor after brain death does not become a utilized donor after brain death.

The process of donation after circulatory death

Two conditions deriving from the possible deceased organ donor could define the potential donor after circulatory death. A person whose circulatory and respiratory functions have ceased and in whom resuscitative measures are not to be attempted or continued would define the first of these two conditions (uncontrolled DCD) [9]. DCD under these particular circumstances is so far limited to some specific countries (i.e. France, Spain), although possible to be developed in many other settings [10].

The second condition defining a potential donor after circulatory death would be that of the patient in whom the cessation of circulatory and respiratory functions is anticipated to occur within a time frame that will enable organ recovery (controlled DCD) [9]. This situation usually applies when withdrawal of life-supporting therapy has been decided on the basis of the ominous prognosis of the patient, pursuant to the family decision or the request of the family. An additional small number of patients may fulfill these criteria of potential donors after circulatory death but without brain injury, i.e. end-stage lung disease patients with elective withdrawal of ventilatory support or patients with progressive neurodegenerative diseases such as Amyotrophic Lateral Sclerosis with elective withdrawal of life-sustaining therapy.

A potential donor after circulatory death would become an eligible donor after circulatory death when the person is considered medically suitable for donation and has been declared dead based on the irreversible absence of circulatory and respiratory functions as stipulated by the law of the relevant jurisdiction, within a time frame that enables organ recovery. We recognize that the duration of the absence of circulation and respiration varies [11–15]; however, a specified time should be established to witness that circulation is not resuming spontaneously and that there is no intent to have circulation resumed by resuscitation [16].

The steps required for a potential donor after circulatory death becoming an eligible donor after circulatory death would be: (i) the identification and subsequent referral of the case for organ donation (if not previously performed); (ii) the declaration of death by circulatory and respiratory criteria within an appropriate time frame that allows organ recovery; (iii) permission obtained for organ recovery (the moment varies depending on the type of DCD, controlled versus uncontrolled); and (iv) evaluation of the medical suitability for donation.

An eligible donor after circulatory death would become an actual donor after circulatory death if an incision has been made for organ recovery (actual donor after circulatory death type A) or at least one solid organ has been recovered for the purpose of transplantation (actual donor after circulatory death type B). This requires at least continuous medical evaluation, preservation measures, organ allocation and recovery. Reasons why an eligible donor after circulatory death does not become an actual donor after circulatory death are as for the process of DBD.

A utilized donor after circulatory death is defined as the actual donor after circulatory death from whom at least one organ has been transplanted. Organ allocation and transplantation are the conversion steps in this process. The same categorical reasons as those described for the process of DBD justify that an actual donor after circulatory death is not converted to a utilized donor after circulatory death.

Point for referral

Identification and referral of the potential deceased organ donor is one of the most critical steps in the realization of donation after death. Referral should occur when the clinical prognosis is established and the patient is either dead by neurologic criteria, the clinical condition reveals death to be imminent, or further treatment would be futile.

Identification of a potential deceased organ donor should be inherently linked to the act of referral to a key

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donation person/OPO specifically appointed for the activation of the deceased donation process. The act of referral means informing key organ donation personnel of an individual that could be a possible, a potential or an eligible organ donor, according to the pathway described above. As previously stated, referral should ideally occur as early—as for the possible deceased organ donor. This may also include patients who are in the Emergency Room before being transferred to the critical care units. At a minimum, however, referral should occur when the critical pathway establishes and eligible donor for donor after brain death or a potential donor for DCD. Referral may also occur when the family requests to speak with the key organ donation personnel/OPO.

Conclusions

This critical pathway is intended to be a tool for those whose responsibility is to assess the opportunity of deceased organ donation in each hospital. This tool can be used retrospectively to assess performance and also prospectively to monitor deceased donor activity. The critical pathway can also be useful as a comparative assessment of organ donation within regions or among countries. Noteworthy, a universal agreement has been reached on definitions relevant for the assessment of the realization of the process of deceased donation comprehensively, recognizing both DBD and DCD for the first time. Each country should assess its organ donation and transplantation needs so that a national self-sufficiency can be achieved.

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