Non-heart-beating organ donation in Canada: Time to proceed?

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Despite the proven success of solid organ transplantation, relatively few Canadians benefit from this therapy because of a shortage of organ donors. Over the past decade, the number of Canadians waiting for a transplant has increased by 84%, to nearly 4000, while the annual number of cadaveric organs available for transplantation has remained essentially unchanged.[1] During 2002, 237 Canadians died while waiting for an organ transplant, including 89 on the kidney wait list.[1]

Non-heart-beating donors (NHBD) represent a potential source of cadaveric organs that has not been used in Canada. NHBDs have experienced cardiac arrest, with the diagnosis of death being based on cardiac criteria (irreversible cessation of cardiorespiratory function) rather than neurologic criteria.[2] Such deaths can occur in an "uncontrolled" situation, such as failed resuscitation after major trauma, or in a "controlled" situation, after planned withdrawal of life support.[2] Hospitals in the United States,[3] the United Kingdom,[4] Spain,[5] the Netherlands,[6] Switzerland,[7] Japan[8] and other countries have established NHBD protocols. In Japan virtually all cadaveric transplantation involves NHBDs, as laws concerning brain death have only recently been established.[8] In 2001, 68 US hospitals performed transplants using organs from NHBDs (Organ Procurement and Transplantation Network database, as of Aug. 9, 2002).

Why has Canada not followed the lead of these other countries with regard to NHBDs? Lack of public support is certainly not the reason. In a recently published survey conducted in southwestern Ontario, the majority of respondents supported the use of organs from NHBDs.[9] We believe that 3 main issues have delayed the use of organs from NHBDs in Canada: education, ethics and availability of resources.

The concept of NHBDs is not new, as this was the only type of cadaveric organ donation before laws concerning brain death were established.[2] However, many health care professionals may be familiar only with the use of organs from brain-dead donors and may be unaware that organs from NHBDs have been used for kidney,[10,11] liver,[10,11] pancreas[10] and lung[10] transplantation. For kidney transplantation, early reports suggested inferior outcomes with organs from NHBDs,[12] but more recent data have demonstrated that long-term survival of renal transplants is similar to that of kidneys from brain-dead donors.[7]

The use and success of NHBD transplantation needs to be disseminated to physicians and nurses working in emergency departments, operating rooms and intensive care units (ICUs). The most successful education programs have been locally driven.[13,14] In Spain, transplant coordinators from a successful NHBD program organized courses and workshops to educate hospital personnel, later expanding their educational initiative to include an annual nationwide course.[13] Canada could emulate this model, and hospitals or regions with proven success in organ donation could initiate local educational programs in the use of NHBDs. Successful programs could later be expanded to the national level.

It is likely that many Canadian physicians have been reluctant to pursue NHBD transplantation because of ethical concerns.[15-17] A potential bias in recommending withdrawal of life support,[15,16] conflict of interest in the determination of death[2,15] and the timing of cardiac death[2,18] are the major ethical issues surrounding NHBDs. For example, intensivists might alter their approach to caring for brain-damaged patients to facilitate organ donation,[15,16] although there is no evidence to indicate that this occurs at current NHBD centres. To avoid potential bias, 2 intensivists or even the hospital's ethics committee could review each case to determine if withdrawal of support is appropriate.[16] To avoid any conflict of interest, all decisions concerning a potential NHBD (including the determination of death) should be made only by the intensivist or emergency physician caring for the patient.[2,16]

The issue of the timing of cardiac death is not whether circulation has ceased but at what point this cessation is irreversible[2,18,19] — after 1 minute of asystole? 5 minutes? 1 hour? Outside the setting of organ donation, the typical health care provider does not wait at the bedside with the family of an unresponsive, asystolic patient for even 15 minutes, let alone an hour, before declaring death.[2] The Ethics Committee of the American College of Critical Care Medicine has recommended that cardiac death be diagnosed according to certain uniform criteria, irrespective of whether the patient will become an NHBD.[2] The committee recommends that the patient be observed for a minimum of 2 minutes after asystole and up to a maximum of 5 minutes before death is declared.[2]

Emergency departments and ICUs across the country are overcrowded, and there is constant pressure to admit or discharge patients. There is no system in place to identify and manage potential NHBDs without diverting resources (physician and nursing time, beds, operating rooms) away from other patients. We need to create local or regional

systems for identifying and managing potential NHBDs that do not significantly affect the emergency department or ICU staff. This would require the establishment of organ donor teams, who would be responsible for coordinating all aspects of organ and tissue procurement. These teams could be established first in tertiary care hospitals, with later expansion to community hospitals. Under such a system the attending ICU or emergency physician would not need to be involved once death had been declared and consent obtained. The system would require additional critical care space, operating room time and extra funding, so that hospitals would not be penalized if they participated. In the case of kidney transplantation, any additional costs would probably be offset by savings in dialysis costs.[20]

How do we proceed with NHBDs in Canada? The Institute of Medicine[19] and the Ethics Committee of the American College of Critical Care Medicine[2] have both endorsed the use of organs from NHBDs, if appropriate guidelines are followed. However, the Canadian Critical Care Society does not currently support the use of NHBDs for transplantation.[17,18] Obviously organ donation of any kind cannot and will not occur without the leadership and support of Canadian intensivists. It is time for the transplant community and intensivists to develop guidelines for the use of organs from NHBDs. In this country, organ donation and transplantation, along with most other aspects of health care, are coordinated locally or regionally. Thus, it may be appropriate to begin discussions within local or regional committees involving physicians, nurses, ethicists and members of the general public. If local progress occurs, then expansion to a national committee could follow, with input from the relevant national specialty societies. As stated by Dossetor, "transplantation is now established as the norm of treatment. This creates an obligation for our health care system to provide organs, an obligation that has become more insistent with improved outcomes and rising public expectations."[21] It is time for Canada to move forward with non-heart-beating organ donation while we continue trying to improve rates of heart-beating organ donation.

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References

1. 2003 preliminary statistics on organ donation. In: Canadian Organ Replacement Register [Web site]. Ottawa: Canadian Institute for Health Information; 2003. Available: secure.cihi.ca/cihiweb/dispPage.jsp?cw_page=services_corr_e#presentation (accessed 2003 Apr 7).
2. Recommendations for nonheartbeating organ donation. A position paper by the Ethics Committee, American College of Critical Care Medicine. *Crit Care Med* 2001;29(9):1826-31.
3. Cecka JM. The UNOS renal transplant registry. In: Cecka JM, Terasaki PI, editors. *Clinical transplants 2001*. Los Angeles: Regents of the University of California, UCLA Tissue Typing Laboratory; 2002. p. 1-18.
4. Nicholson ML, Metcalfe MS, White SA, Waller JR, Doughman TM, Horsburgh T, et al. A comparison of the results of renal transplantation from non-heart-beating, conventional cadaveric, and living donors. *Kidney Int* 2000;58:2585-91.
5. Sanchez-Fructuoso AI, Prats D, Torrente J, Perez-Contin MJ, Fernandez C, Alvarez J, et al. Renal transplantation from non-heart beating donors: a promising alternative to enlarge the donor pool. *J Am Soc Nephrol* 2000;11:350-8.
6. Daemen JHC, de Wit RJ, Bronkhorst MWA, Yin M, Heineman E, Kootstra G. Non-heart-beating donor program contributes 40% of kidneys for transplantation. *Transplant Proc* 1996;28(1):105-6.
7. Weber M, Dindo D, Demartines N, Ambuhl PM, Clavien PA. Kidney transplantation from donors without a heartbeat. *N Engl J Med* 2002;347:248-55.
8. Yoshida K, Endo T, Saito T, Iwamura M, Ikeda M, Kamata K, et al. Factors contributing to long graft survival in non-heart-beating cadaveric renal transplantation in Japan: a single-center study at Kitasato University. *Clin Transplant* 2002;16(6):397-404.
9. Keenan SP, Hoffmaster B, Rutledge F, Eberhard J, Chen LM, Sibbald WJ. Attitudes regarding organ donation from non-heart-beating donors. *J Crit Care* 2002;17(1):29-36.
10. D'Alessandro AM, Hoffman RM, Knechtle SJ, Eckhoff DE, Love RB, Kalayoglu M, et al. Successful extrarenal transplantation from non-heart-beating donors. *Transplantation* 1995;59(7):977-82.
11. Casavilla A, Ramirez C, Shapiro R, Nghiem D, Miracle K, Bronsther O, et al. Experience with liver and kidney allografts from non-heart-beating donors. *Transplantation* 1995;59(2):197-203.
12. Butterworth PC, Taub N, Doughman TM, Horsburgh T, Veitch PS, Bell PRF, et al. Are kidneys from non-heart-beating donors second class organs? *Transplant Proc* 1997;29:3567-8.
13. Alvarez J, Rosario del Barrio M. Transplant coordination as the "keystone" in non-heart-beating donations. *Prog Transplant* 2002;12(3):181-4.
14. Cumberland BG, De Wit RJ, Kootstra G. Organ and tissue procurement rates improve after professional healthcare education by hospital development coordinators and time sensitive requesting. *Transplant Proc* 1995;27(5):2957-8.
15. Guest CB, Devitt JH. Non-heart-beating organ donation [letter]. *CMAJ* 2000;162(2):194.
16. Sutherland F. Non-heart-beating organ donation [letter]. *CMAJ* 2000;162(2):194.
17. Rocker GM, for the Canadian Critical Care Society Working Group on Organ and Tissue Donation. Organ and tissue donation in the intensive care unit [editorial]. *CMAJ* 2002;167(11):1248-9.
18. *CCCS position paper on organ and tissue donation*. [place unknown]: Canadian Critical Care Society; 2001. Available: critcare.lhsc.on.ca/ccc/index.html (accessed 2003 Jun 25).
19. Non-heart-beating organ transplantation: medical and ethical issues in procurement. Washington: Institute of Medicine, National Academy Press; 1997.
20. Bibo JC, Engel GL, Kootstra G, Daemen JHC. Cost analysis of transplantation with ischemically damaged kidneys: preliminary results. *Transplant Proc* 1995;27(5):2959-61.
21. Dossetor JB. Death provides renewed life for some, but ethical hazards for transplant teams [editorial]. *CMAJ* 1999;160(11):1590-1.

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