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# *Organ Donation and Transplantation in Canada*

Publication No. 2011-113-E  
*Revised 10 November 2011*

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## ***Organ Donation and Transplantation in Canada*** **(Background Paper)**

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# CONTENTS

1	INTRODUCTION.....	1
2	BACKGROUND.....	1
3	TRENDS, STATISTICS AND COMPARISONS.....	2
3.1	Definitions .....	2
3.2	Identifying the Donor Pool.....	3
3.3	Use of Donated Organs .....	4
3.4	Non-use of Organs.....	4
3.5	Transplants and Candidates Awaiting Transplants .....	5
4	ORGAN AND TISSUE DONATION AND TRANSPLANTATION REGULATIONS .....	5
5	ADDRESSING DONOR RATES .....	6
5.1	Registries .....	6
5.1.1	National Database of Intended Donors .....	6
5.1.2	National Real-time Waiting List for Patients Requiring Transplants.....	8
5.1.3	Live Donor Registry .....	9
5.1.4	Living Donor Paired Exchange Registry.....	9
5.2	National Cord Blood Bank.....	9
5.3	Presumed Consent .....	9
5.4	Required Referral and Required Request .....	10
5.5	Professional Training in Donor Recruitment .....	10
5.6	Mandatory Declaration .....	11
5.7	Organ Donation Following Cardiac Death .....	11
5.8	Donor Age Limit .....	11
5.9	Public Awareness.....	11
6	CONCLUSION .....	12

# **ORGAN DONATION AND TRANSPLANTATION IN CANADA**

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## **1 INTRODUCTION**

The organ donor rate in Canada continues to be mediocre despite efforts in recent years to increase it. This paper will provide an overview of the Canadian experience with respect to the federal role in organ donation and transplantation, reveal some of the statistics involved and discuss the options for increasing the donor rate, such as through registries, presumed consent and expanding donor criteria.

## **2 BACKGROUND**

Two reports highlighting concerns about a persistent and growing gap between the supply of and demand for organs and tissues for transplantation in Canada were issued in 1999, one by the House of Commons Standing Committee on Health and the other by the National Coordinating Committee for Organ and Tissue Donation, Distribution and Transplantation.<sup>1</sup>

In its September 1999 response to the House of Commons Health Committee's report, the government stated that it accepted the recommendations "as the framework for discussions with the provinces and territories towards the establishment of a sustainable solution for transplantation in Canada" and acknowledged that proper implementation would be dependent on support from all levels of government.<sup>2</sup>

Both reports proposed the development of a national strategy and the formation of a council of experts to assist in developing and monitoring the strategy. A component of the proposed strategy was the establishment of the Canadian Council for Donation and Transplantation (CCDT), which was announced by the Government of Canada in April 2001. The CCDT was established in October of that year as an advisory body to the Conference of Deputy Ministers of Health in support of its efforts to coordinate federal, provincial and territorial activities relating to organ donation and transplantation. The CCDT was created as a Secretariat of Health Canada but in 2004 became a non-profit organization at arm's length to Health Canada and until 2007 had a contribution agreement with Health Canada.

The CCDT focused on conducting extensive consultations on standards and clinical practice guidelines and making recommendations on the issues of cardiac death, severe brain injury, immunological risk following transplant and medical management to optimize donor organ potential.

In October 2007, the deputy ministers of health for the provinces (except Quebec) and territories agreed that CCDT's functions be transferred to Canadian Blood Services and that Canadian Blood Services assume responsibility for Canada's organ and tissue donation and transplantation system. (In Quebec, the organization mandated to coordinate organ donation within the province is Québec-Transplant. Its mission includes both the identification of donors and the procurement and allocation

of organs.)<sup>3</sup> On 12 August 2008, Canadian Blood Services announced that it had merged with CCDT and its mandate would be expanded beyond blood to include organs and tissues.<sup>4</sup>

### 3 TRENDS, STATISTICS AND COMPARISONS

When considering the trends and statistics in organ donation, as well as when making comparisons of these figures among jurisdictions, it is important to keep in mind a number of variables. A low donor rate, for example, may be more reflective of lower rates of injury and better health care interventions than it is of a lack of altruism or poor recruitment of donors. Similarly, an ever-growing waiting list for organ transplant may indicate that patients are surviving longer while waiting than they once did. The following is a discussion of Canada's performance in organ donation and transplantation over the years and how that performance compares with that of other nations that are considered to be leaders in this area.

#### 3.1 DEFINITIONS

Before defining donor rate, it is important to explain that there are different types of donors:

- Intended donor – An individual who has indicated a desire to become a donor upon death, or when appropriate, during life.
- Potential donor – An individual identified within a health care facility as being appropriate to pursue as a donor; includes those individuals from whom organs may have been procured but not allocated or transplanted.
- Actual donor – An individual from whom at least one organ has been procured, allocated and transplanted.
  - Deceased donor – An individual who becomes a donor following death, either brain death<sup>5</sup> or cardiac death.<sup>6</sup>
  - Living donor – An individual in good health who donates to either a related or unrelated recipient.

The deceased donor rate in Canada has fluctuated slightly over the past 10 years between 13 and 15 donors per million population (PMP), which translates to between 400 and 500 donors per year. The Canadian Institute for Health Information (CIHI) reports that there were 487 deceased donors in 2010.<sup>7</sup> In large part, deceased donation has followed brain death (referred to as neurologically determined death), as this has traditionally been the criterion.

However, since 2006, donors have been recruited, under certain circumstances, following cardiac death (also referred to as cardiorespiratory determined death). The number of donors in this new category has increased each year, accounting for 45 deceased donors in 2010. Although brain deaths still account for the majority of deceased donations, the proportion of deceased donors following cardiac death is expected to continue increasing. The issue of cardiac death is discussed further in section 5, "Addressing Donor Rates," in this paper.

Canada's deceased donation rate is reportedly lower than that of many of the countries with which it is compared. International comparisons of organ donor rates usually include Spain and the United States, whose donor rates are reportedly 34.13 and 26.27 PMP respectively.<sup>8</sup>

These countries, however, have different social, demographic and mortality characteristics than Canada, and they use a different definition of "donor rate." Both Spain and the United States include in their calculations those situations in which a donor is identified but ultimately no organ is transplanted into a recipient, thus inflating their numbers relative to Canada, where the numbers include actual donors only. In addition, the term "donor rate" refers only to the deceased donor rate, thus excluding living donors, an increasingly significant category in Canada.

Canada has been doing well relative to other countries with respect to recruiting live donors. In fact, the rate of live donors, both related and unrelated to the recipient, has been increasing in Canada for kidney and liver transplants. Between 2000 and 2010, the number of living donors grew from 409 to 549. The number of living donors has been greater than the number of deceased donors every year since 2001. Canada now has a live donor rate of just over 15 donors PMP. Spain has one of the lowest rates among 32 reporting countries at less than 1 PMP. At about 19 PMP, the live donor rate in the United States is higher than it is in Canada.

### **3.2 IDENTIFYING THE DONOR POOL**

There is a tendency to count all members of the general population as "potential donors." However, this is somewhat misleading, because so few will ever be in the situation of being considered for organ donation. Proponents of donor registries (databases containing the names of those who wish to donate their organs after death) suggest that such databases better reflect the donor pool. As with the general population, this is not strictly true because the number of individuals who ultimately become available as possible donors ("potential donors") is a small fraction of those who may be interested in becoming a donor ("intended donors").

Generally, deceased organ donors are identified from within the very limited pool of individuals who have been declared "brain dead."<sup>9</sup> Most brain deaths are the result of such incidents as trauma from a motor vehicle accident or a gunshot wound, for example, or a cerebrovascular accident such as stroke. Further, within this limited pool, there is a tendency, if not a medical necessity, to limit the candidates to those under the age of 70, although this policy is slowly changing.

Both Spain and the United States report significantly higher mortality rates from motor vehicle accidents than does Canada. Trauma due to gunshot wounds is a more frequent occurrence in the United States than it is in Canada. Additionally, Spain's demographics are different from those of the United States and Canada. Spain's population is older, and the mortality rate related to cerebrovascular accidents and motor vehicle accidents rises with age. As such, Spain has a larger proportion of donors aged 60 years and over, but this proportion includes patients identified as potential donors and those from whom ultimately no organs are procured, or the organs are not transplanted.<sup>10</sup> Conversely, Canada and the

United States have proportionally more people under the age of 15 than does Spain. This age group, as one would expect, has a relatively low mortality rate. However, the United States reports that it has twice the proportion of donors under the age of 15 than Canada has, reflecting the higher mortality rate from motor vehicle accidents and gunshot wounds in the United States.

The issues connected with mortality rate and demographics effectively reduce the available donor pool in Canada. Therefore, adopting the practices used in Spain and the United States cannot be expected to bring donor rates to similar levels.

### **3.3 USE OF DONATED ORGANS**

In 2010, 1,017 people, living and deceased combined, donated organs, and 2,153 transplants were performed in Canada.<sup>11</sup> The average number of organs used for transplantation from deceased donors, where multiple organs are available for transplant, has fluctuated slightly over the last decade between 3.4 and 3.8 organs/donor.<sup>12</sup> This value is higher than that in the United States and Spain; since their donor counts include donors from whom no organs are removed, as well as unused organs, their ratios are lower. Canada has also improved patient and organ maintenance in order to optimize organ viability, thereby further increasing the number of organs per donor.

### **3.4 NON-USE OF ORGANS**

As already discussed, Canada does not include in its donor rate calculations those potential donors whose organs were not used (either because the organs were not recovered or because they were not transplanted). There are numerous reasons for non-use of organs, only some of which can be controlled and possibly targeted as areas through which organ donor rates could be improved. Some of the reasons for non-use that cannot be overcome include viral infection (HIV, hepatitis), organ damage or other anatomical damage, and poor organ function. However, there are two circumstances under which organs have been lost that could be addressed: logistical problems with the donation and transplant teams, and failure to search for or locate potential recipients.

The logistical issues and identification of compatible recipients could be improved with an information management system like the real-time national waiting list operated by the United Network for Organ Sharing (UNOS) in the United States.<sup>13</sup> The Organ Procurement and Transplantation Network (OPTN), which was created under the *National Organ Transplant Act* of 1984 to link all professionals involved in the donation and transplant system, was awarded to UNOS in 1986, and UNOS remains the only organization to ever have run the OPTN. The OPTN maintains the national waiting list and allocates donated organs on an equity basis.<sup>14</sup> All U.S. transplant centres and organ procurement organizations are members of the OPTN. The U.S. national waiting list is discussed in greater detail in section 5.1, "Registries," in this paper.

### 3.5 TRANSPLANTS AND CANDIDATES AWAITING TRANSPLANTS

According to the Canadian Organ Replacement Register (CORR) operated by CIHI, while the number of transplants performed and the number of Canadians awaiting transplant have both risen slightly in the last decade, the gap between these two numbers has been largely constant since 2001. Every year, around 2,000 people fail to obtain an organ transplant.<sup>15</sup>

Although Canada's living donor rate is higher than that of many countries, the fact that many organs are not eligible for donation from living donors cannot be overlooked. As long as there is a gap between the number of organs available to carry out these transplants and the number of organs needed, there is a need to explore options for increasing both the deceased and living donor rates.

## 4 ORGAN AND TISSUE DONATION AND TRANSPLANTATION REGULATIONS

In December 2007, federal regulations for organ and tissue donation and transplantation came into effect. Health Canada indicated that the purpose of the new regulations was "to minimize the potential health risks to Canadian recipients resulting from transplantation."<sup>16</sup> The *Safety of Human Cells, Tissues and Organs for Transplantation Regulations* standardize the screening and testing of potential donors in Canada and are described as reflecting the best practices already in place across the country.<sup>17</sup>

The regulations require that the procuring establishment does the following to determine donor suitability:

- obtain donor information and history;
- perform a physical exam of the donor;
- perform certain tests for disease and disease agents; and
- ensure that the donor is not unsuitable to donate on the basis of the exclusionary criteria.

The regulations incorporate by reference the "Cells, Tissues, and Organs for Transplantation and Assisted Reproduction: General Requirements" ("the general standard"), a document prepared by and available from the Canadian Standards Association. The regulations stipulate that this general standard provides the criteria for determining donor suitability and it establishes exclusionary criteria in this respect:

- death from unknown causes;
- infection from a prion disease, such as Creutzfeldt-Jakob disease or encephalitis;
- affliction with dementia; and
- infection with, or a high risk of infection with, HIV, viral hepatitis or rabies.



Annex E to the general standard expands on the final category of those at risk for HIV and viral hepatitis, primarily hepatitis B and C (HBV and HCV). The exclusionary criteria listed in the annex are these:

- men who have had sex with men in the preceding five years;
- persons who have used intravenous, intramuscular or subcutaneous drugs in the preceding five years;
- persons with hemophilia who have received clotting factor concentrates;
- persons who have traded sex for money or drugs in the preceding five years;
- persons who have had sex in the past year with someone described in the above categories;
- persons who have been directly exposed in the preceding year to known or suspected HIV-, HBV- or HCV-infected blood;
- current correctional institution inmates or individuals who have been incarcerated for 72 consecutive hours in the preceding year;
- persons who, within the preceding year, have undergone tattooing or ear or body piercing with shared instruments; and
- persons who have had close contact within the preceding year with another person having clinically active hepatitis.

However, Section 40 of the regulations allows for “exceptional distribution” and permits the use of organs from donors who would fall under the exclusionary criteria under certain conditions, including an informed consent from the recipient and a notice of exceptional distribution in the recipient’s health records.

## **5 ADDRESSING DONOR RATES**

### **5.1 REGISTRIES**

Containing information about either donors or recipients, a national registry can help authorities to identify who is willing to provide an organ or who requires one. While a database of donors might be helpful in identifying greater numbers of donors, a transplant recipient database can help to improve efficiency in identifying compatible recipients. Here are three types of national registries for consideration.

#### **5.1.1 NATIONAL DATABASE OF INTENDED DONORS**

Also referred to as a donor registry, this is what most people have in mind when they discuss a national registry. It refers to a database of names or other identifying information of individuals who have registered their intent to donate one or more organs and tissues after death. The registry could be set up only for those individuals interested in registering their consent to donate or, as is the case in Australia, for registering either consent or refusal to become a donor.

In Canada, British Columbia, Nova Scotia and Ontario maintain databases of those individuals who have registered their names as intended donors. British Columbia has operated its database since 1997.<sup>18</sup> However, British Columbia's deceased donor rate remains lower than Canada's average rate and performs better than the Canadian average for living donations.

Nova Scotia's organ and tissue donation program is called Legacy of Life, and this province has maintained an organ donor database since 1995. It is compiled via registration through the health card system. Individuals must reconfirm their intent each time their health card is renewed. Ontario's database, maintained through the Trillium Gift of Life Network, has been in place since 2000 and operates similarly to Nova Scotia's.<sup>19</sup> No information regarding the number of potential donors in either Nova Scotia or Ontario was available at the time of this publication.<sup>20</sup>

A registry can help to identify individuals who have consented to donate their organs should they become candidates; however, this may be overshadowed by several other factors:

- Do the number of organ donations that result from the quick identification of potential donors upon their death warrant the complex logistics involved in maintaining and updating a database of several hundred thousand or even millions of names? As already discussed, only a small percentage of individuals becomes eligible for deceased donation.
- Is the health care sector properly pursuing organ donors? A registry is of little use if potential donors are not being followed up for organ retrieval. The efficiency and coordination of the donation/transplantation system in Canada has not been comprehensively studied.
- Has the family been part of the individual's decision to register as an intended donor? Health care professionals are unlikely to go against the family's wishes despite an individual's registration in the database. It is therefore necessary also to inform one's family of the decision to donate, arguably making the registration itself unnecessary.
- Would the database be voluntary or mandatory? A voluntary system as operated within British Columbia, Nova Scotia and Ontario could be run through the existing provincial or territorial health card system, but to obtain information for a national database, cooperation among jurisdictions would be needed. A registry is maintained in Quebec by its notaries. The *Registre des consentements au don d'organes et de tissus* compiles the consents of about 250,000 people in Quebec collected by 3,400 notaries.

A national system could be run, but only voluntarily, through information provided on federal income tax or census forms. Even so, provinces could argue that this approach encroaches on their jurisdiction. Additionally, even with a database, voluntary or otherwise, there would still be the issue of family consent overriding a potentially cumbersome and costly system. Furthermore, many people believe that if they grant consent before the fact, then less effort will be put into saving their lives. This perception may explain the discrepancy between the high proportion of people

who say they support organ donation and the low percentage of individuals who actually sign their donor cards.

#### 5.1.2 NATIONAL REAL-TIME WAITING LIST FOR PATIENTS REQUIRING TRANSPLANTS

In the United States, when an organ donor is identified and consent has been obtained, the procuring organization accesses the national transplant computer system, the OPTN, through the Internet or contacts the UNOS Organ Center directly to enter donor information, and a donor–recipient match is run for each donated organ. The resulting match list of potential recipients is ranked according to objective medical criteria (i.e., blood type, tissue type, size of the organ, medical urgency of the patient’s situation, as well as time already spent on the waiting list and distance between donor and recipient). Each organ has its own specific criteria. Using the match list of potential recipients, the local organ procurement coordinator or an organ placement specialist contacts the transplant centre of the highest-ranked patient, based on policy criteria, and offers the organ. If the organ is turned down, the next potential recipient’s transplant centre on the match list is contacted. Calls are made to multiple recipients’ transplant centres in succession to expedite the organ placement process until the organ is placed. Once the organ is accepted for a patient, UNOS assists with the transportation arrangements, and the transplant surgery is scheduled.<sup>21</sup>

As mentioned earlier, Canada has not had a centralized list of patients waiting for an organ. However, since accepting responsibility for Canada’s organ and tissue donation and transplantation system, Canadian Blood Services has undertaken to develop three national patient registries with a view to increasing transplant rates and efficiencies in Canada. These are:

- the Living Donor Paired Exchange (LDPE) Registry, which is described in section 5.1.4 of this paper;
- the National Organ Waitlist (NOW), which is a real-time, online listing of Canadians awaiting transplant for all organs with the exception, initially, of kidneys; and
- the Highly Sensitized Patient (HSP) Registry, which will be a registry for kidney transplant candidates who are difficult to match and will provide increased opportunity through national sharing.

The NOW and HSP initiatives are projected to be launched by Canadian Blood Services by spring 2012, at which time the three registries are to be integrated into a single platform. The integrated system is to provide aggregated and anonymous statistical reporting and analysis.<sup>22</sup>

A limiting factor for both the donor and waiting list registries is geography. The viability of retrieved organs is measured in hours and the faster an organ can be transplanted, the better are the chances for a successful transplant. For example, transplantation should occur within eight hours for a liver or a pancreas, four hours for a heart and two hours for a heart/lung. The time constraint creates a geographical

limitation for a large country like Canada for recipient possibilities, which is not an issue for smaller countries like Spain.

### 5.1.3 LIVE DONOR REGISTRY

In Canada, the OneMatch Stem Cell and Marrow Network is a national registry of potential live donors of bone marrow or circulating peripheral blood (both sources of stem cells). This database was founded in 1987 as the Unrelated Bone Marrow Donor Registry by the Bruce Denniston Bone Marrow Society and was moved to the Canadian Red Cross Society in 1989. It now exists under Canadian Blood Services, and more than 300,000 Canadians are registered.<sup>23</sup>

### 5.1.4 LIVING DONOR PAIRED EXCHANGE REGISTRY

On 24 June 2009, Canadian Blood Services announced the first kidney transplants performed through the LDPE, the first registry of its kind in Canada. The LDPE, which is both a donor and a recipient registry, aims to optimize the use of kidneys from living donors. It registers pairs of individuals: a willing donor and a needy recipient looking for another donor/recipient pair where tissue type and blood group make “swapping” possible. If an individual is willing to donate a kidney to a certain recipient but is not a match for that recipient, the donor may register and possibly be a match for another recipient. Between June 2009 and 19 November 2011, the LDPE Registry facilitated 75 kidney transplants.<sup>24</sup>

## 5.2 NATIONAL CORD BLOOD BANK

Umbilical cord blood is a rich source of stem cells, which are used in the treatment of blood disorders such as aplastic anemia and leukemia. There is also less tissue rejection from cord blood than from other sources of blood stem cells. On 14 March 2011, the provincial and territorial ministers of health (except Quebec’s minister) announced that they would together fund a national public umbilical cord blood bank, to be created and managed by Canadian Blood Services. The bank is to be implemented over eight years with a target inventory of 20,000 cord blood units.<sup>25</sup>

## 5.3 PRESUMED CONSENT

Another option often suggested as a way to increase the donor rate is presumed consent, sometimes called the opting-out system. Under this approach, consent to donate is presumed unless a person has expressly indicated otherwise during his or her lifetime. Canada operates under an opting-in system (also referred to as required consent) whereby individuals express the intention to become a donor. However, failure to express a desire to donate during one’s lifetime is not necessarily deemed a refusal to become a donor. Again, the family becomes the ultimate source for consent. Proponents of the opting-out approach note that the vast majority of Canadians are in favour of organ donation when polled, but that only a small percentage of them actually fill out their donation cards.

Several countries have adopted the presumed consent approach. An American study reports that there is no direct correlation between organ donor rates and presumed consent.<sup>26</sup> Although presumed consent is the approach used in Spain, the country with the highest reported organ donor rate, several other countries that have also adopted that approach have donor rates that are far lower than countries that operate an opting-in system. For example, Poland and Sweden, which both operate presumed consent systems, report lower donor rates than does Canada. The United States and Ireland, which are among the higher donor rate countries, have opting-in systems.

The study's authors indicate that presumed consent is rarely enforced and that family consent is always sought regardless. However, they argue that after accounting for other determinants of donation, such as family consent and effective identification of donors within the health care setting, presumed consent may increase rates of donation, but it cannot be implemented on its own and be expected to increase rates. Once other determinants of donation have been adequately addressed, such as awareness campaigns that reinforce the need to voice one's intentions to family, and professional awareness and training programs that ensure donor identification and recruitment are done under a specific set of guidelines and policies, then benefit might be gained from a presumed consent system.

Consent to donate is covered under the provincial and territorial statutes pertaining to organ and tissue donation, and in all cases consent is required; that is, all provinces and territories operate opting-in systems.

#### **5.4 REQUIRED REFERRAL AND REQUIRED REQUEST**

Required referral refers to the requirement that health care professionals report all brain deaths (and possibly cardiac deaths) or imminent deaths to their local organ procurement organization. Required request obliges health care professionals to approach the families of identified, potential organ donors to inquire about donation. The introduction of such measures in Canada would require regulatory or legislative change at the provincial and territorial levels. These obligations could increase the number of potential and actual donors but would be a further stressor on the health care profession and would undoubtedly require additional resources. Such obligations would supply useful data which could be collected, with provincial and territorial cooperation, by CORR to measure the efficiency and level of coordination within the procurement/transplantation community. British Columbia and Ontario have legislated required referral (or mandatory reporting), while New Brunswick and Nova Scotia have instituted required request. Manitoba and Alberta have both required request and required referral.<sup>27</sup>

#### **5.5 PROFESSIONAL TRAINING IN DONOR RECRUITMENT**

Health care professionals are generally not given specific training for recruiting organ donors. Surveys of health care professionals have revealed a high degree of reluctance to approach the families of potential donors and a low level of knowledge about organ referral. Organ donor coordinators are found at most major hospitals, but there are many settings where potential donors are lost because no one with the

proper training is available to approach the family and discuss donation. Where organ donor coordinators are found, resources may be limited and candidates may be missed. These coordinators should have adequately trained support to assist them in these instances. As with required referral and required request, professional training is under the purview of the provincial and territorial governments.

## **5.6 MANDATORY DECLARATION**

Mandatory declaration ties organ donation consent to a different area, usually a regulated program such as the procurement of a driver's licence or a health card. This approach requires that an individual declare whether or not he or she consents to organ donation.

## **5.7 ORGAN DONATION FOLLOWING CARDIAC DEATH**

In a July 2005 report, the CCDT recommended considering, as organ donor candidates, people who have succumbed to cardiac death, also referred to as cardiorespiratory determined death, or DCD, by CIHI. Circumstances that could result in DCD include cardiac arrest in someone already brain-dead, unsuccessful resuscitation of a person in cardiac arrest, and cardiac arrest following withdrawal of treatment in the intensive care unit. The latter is referred to as "controlled" DCD because preparations for organ removal and preservation can be initiated before the donor's death, thereby controlling the timing of the withdrawal of treatment.<sup>28</sup> Information from CIHI indicates that people who passed away due to DCD began to be considered as organ donor candidates in 2006, but only in Ontario and Quebec.

## **5.8 DONOR AGE LIMIT**

Traditionally, seniors have not been candidates for organ donation. Many jurisdictions have been re-examining whether biological age should be a criterion for donation or if a potential donor's organs should be assessed on a case-by-case basis. Age distribution of deceased donors is available from CIHI and indicates that the proportion of donors over 70 years of age fluctuated between 4% and 12% of the total between 1999 and 2006.<sup>29</sup>

## **5.9 PUBLIC AWARENESS**

Many of the preceding options cannot easily be addressed federally due to jurisdictional concerns. It is possible that the government could use its spending power to link health transfers to issues such as required referral and required request or to cooperation in a national database, but proving the necessity of such a measure could be difficult. Public awareness campaigns, however, can be coordinated federally.

A key component of the national donation and transplantation strategy that was recommended in the 1999 reports of the House of Commons Standing Committee on Health and of Health Canada<sup>30</sup> was a public awareness campaign. Such a campaign would be essential for providing individuals with relevant information and dispelling

myths. The aim would be to enable informed choice and to increase support for and participation in the donation and transplantation process. Health Canada has a clear mandate to design and implement such campaigns. In fact, when the minister of Health announced a national organ and tissue plan, including the creation of CCDT, in 2001, the news release indicated that the plan was to include “implementation of a national public awareness campaign to promote organ and tissue donation across Canada, developed in partnership with various non-governmental organizations, as well as a number of volunteers.”<sup>31</sup> It was proposed that the Governor General of Canada would serve as honorary campaign patron. Although public awareness campaigns were designed and implemented in 2001 and 2002, there have been none since. To be effective, a public awareness campaign must be a longer-term commitment.

The Canadian Blood Services has not launched a public awareness campaign since assuming responsibility in 2008, but it did hold public dialogue sessions across Canada in 2009 and 2010. It also provides information kits on how to initiate and facilitate family discussions on organ donation.

## 6 CONCLUSION

Canada’s deceased organ donor rate lags behind several other countries. However, Canada has been successful in recruiting live donors, primarily for kidney donation but also for partial liver and pancreatic islet cells. Nevertheless, the availability of organs for transplant still lags behind the demand for organs and, for that reason, Canada has an organ transplant waiting list that has not diminished over the past decade, despite efforts to increase efficiencies.

In 2008, responsibility for coordinating national efforts in organ donation and transplantation was transferred to the Canadian Blood Services. Since that time, Canada has seen more transplant activity due to the LPDE Registry as well as advances in developing a real-time national organ transplant waiting list through the ongoing development of the HSP and NOW.

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## NOTES

1. House of Commons, Standing Committee on Health, [Organ and Tissue Donation and Transplantation: A Canadian Approach](#), April 1999; and Health Canada, National Coordinating Committee for Organ and Tissue Donation and Transplantation, [A Coordinated and Comprehensive Donation and Transplantation Strategy for Canada](#), 18 November 1999.
2. Health Canada, [Government Response to the Report of the Standing Committee on Health, Organ and Tissue Donation and Transplantation: A Canadian Approach](#), September 1999.
3. Please see the [Transplant Québec](#) website.
4. Canadian Blood Services, [“Organ donation and transplantation streamlined in new national system; Patient/donor registries and \\$35 million in new funding will save lives.”](#) News release, 12 August 2008.

## ORGAN DONATION AND TRANSPLANTATION IN CANADA

5. Brain death refers to the total cessation of brain function as manifested by the absence of consciousness, spontaneous movement, absence of spontaneous respiration, and absence of all brain stem functions.
6. Cardiac death refers to irreversible cessation of the heart after cardiac arrest.
7. Canadian Institute for Health Information Canadian Organ Replacement Register [CIHI CORR], "[e-Statistics on Organ Transplants, Waiting Lists and Donors](#)," 2010.
8. Information about U.S. and Spanish donation rates are 2008 statistics from Global Observatory on Donation and Transplantation, [Organ donation and transplantation: Activities, laws and organization 2010](#), Report prepared for Government of Spain, Ministry of Health and Social Policies, and World Health Organization.
9. There can also be donors following cardiac death (see section 5.7, "Organ Donation Following Cardiac Death," in this paper).
10. For more information on the non-use of organs, see section 3.4, "Non-use of Organs," in this paper.
11. These preliminary statistics were calculated from CIHI CORR (2010).
12. CIHI, "Table 2: Mean Number of Organs Transplanted per Deceased Donor by Age Group, Canada, 1999–2008," [Organ Donor Activity in Canada, 1999–2008](#), p. 10.
13. [United Network for Organ Sharing](#) [UNOS] originated in 1977 as the South-Eastern Organ Procurement Foundation and developed the first computerized system for matching organs to recipients. In 1984, UNOS was incorporated as an independent, non-profit organization.
14. According to UNOS, "equity basis" refers to the principle that compatible transplant candidates have an equitable chance of receiving a transplant according to appropriate medical criteria. Candidates for deceased donor organs are prioritized for organ offers only on the basis of medical and logistical characteristics, not on personal/social/economic factors such as wealth, underlying cause of organ failure, celebrity status, etc.
15. CIHI CORR, [e-Statistics on Organ Transplants, Waiting Lists and Donors](#), 2001–2010.
16. Health Canada, "Fact Sheet – Safety of Cells, Tissues and Organs (CTO) for Transplantation," News release, 28 January 2008.
17. Links to the *Safety of Human Cells, Tissues and Organs for Transplantation Regulations*, as well as other background information, can be obtained at Health Canada, "[Cells, Tissues and Organs](#)," *Drugs and Health Products*.
18. See the [BC Transplant](#) website.
19. See the [Trillium Gift of Life Network](#) website.
20. See the [Legacy of Life](#) website.
21. This information was obtained from the [UNOS](#) and the [U.S. Department of Health and Human Services Organ Procurement and Transplantation Network](#) websites.
22. Canadian Blood Services, [Organ Transplant Registry – Background](#), 19 May 2011.
23. Information about the OneMatch Stem Cell and Marrow Network is available on the [Canadian Blood Services](#) website.
24. For more information, see Canadian Blood Services, "[Living Donor Paired Exchange \(LDPE\) Registry–Kidneys](#)," *Organ & Tissue Donation and Transplantation*. See also Canadian Blood Services, "[Living Donor Paired Exchange: Operations Update, May 19, 2011](#)," *Organ and Tissue Donation and Transplantation in Canada*.



## ORGAN DONATION AND TRANSPLANTATION IN CANADA

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26. Alberto Abadie and Sebastien Gay, "The Impact of Presumed Consent Legislation on Cadaveric Organ Donation: A Cross-Country Study," *Journal of Health Economics*, Vol. 25, No. 4, July 2006.
27. Jocelyn Downie et al., "Pre-mortem transplantation optimizing interventions: the legal status of consent," *Canadian Journal of Anesthesia*, Vol. 55, July 2008. Alberta passed the *Human Organ and Tissue Donation Act* in 2009.
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29. See Lilyanna Trpeski, "[Recent Trends in Donor Activity](#)," PowerPoint presentation to CORR annual meeting, 16 March 2007.
30. House of Commons Standing Committee on Health (April 1999) and Health Canada (November 1999).
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