Why Organ Donation Rates in Canada are Changing

Sam D. Shemie

Transplant Atlantic, Halifax, Nov 10th 2015

McGill University Health Centre, Montreal Children’s Hospital, MUHC Research Institute
Division of Critical Care

McGill University
Professor of Pediatrics

Canadian Blood Services
Medical Advisor, Deceased Donation
Background

Transplant Program Development = Organ Donation Needs
Saving Lives

Intensive Care  Transplanters
Pro-Con Debate
Toronto Critical Care Medicine Symposium 1999

Sam Shemie, Canada
“ICU’s should take responsibility for organ donation”

Malcolm Fischer, Australia
“It’s not our fercucking problem”
Background

Impact of an ICU based organ donation team at HSC

Retrospective (1990-1997): Informal commitment of staff
Prospective (1998-2002): 24x7 service, formal team of ICU physician, nurse coordinator, chaplaincy, social work
Background

Brain death eligible for organ donation
(Hospital for Sick Children, Toronto 1990-2002)
Challenges
Deceased Donation in Canada - 2012

1:144
Canadian Death Ratio

34,754,312
Canadian Population
Deceased Donation in Canada

- 542 Actual Donors
- 3,711 Potential Donors
- 117,156 Hospital Deaths
- 243,643 Deaths
Deceased Donation in Canada

542
Actual Donors

3,711
Potential Donors

117,156
Hospital Deaths

243,643
Deaths

1,768
Transplants Performed

Source: Canadian Organ Replacement Register, Canadian Institute for Health Information
Challenges

Donation care is complex, difficult and emotionally straining

• Sensitive interplay between the deceased, their family and the medical profession – natural discomfort at the juncture where end-of-life and donation interface
• Donation is not a high profile concern for intensivists – there are no consequences for non-performance
• Physician workload and qualifications
• Hospital culture
• Donation occurs in low numbers in most hospitals

With thanks, S. Beed, E Macvean 2010
Challenges

Donation is dependent on where you die – which city, which hospital and where in the hospital

“Transplant hospitals had an actual donor rate per 100 deaths that was about 4 times the donor rate at large general hospitals”
Many ways to miss the donation opportunity

• Hospital staff does not recognize a potential donor or notify ODO in a timely manner
• Hospitals do not know patient’s wishes regarding donation
• Families are not asked about donation, or asked in a negative way
• Physicians are unaware of best practices for clinical management of donor, death determination procedures, NDD and DCD
• Hospital does not have a DCD program
• Access to surgical recovery teams
Challenges

The need for re-design was recognized, but little improvement seen

Source: CORR 2007 Annual Report and E-Statistics
Canadian ICU based Deceased Donation Leading Practice Recommendations 2003-2015

Shemie et al, CMAJ 2006

Shemie et al, CMAJ 2006

Shemie et al, CMAJ 2006

Shemie et al, Int Care Med, 2014

Shemie et al, Can J Neurol Scie 2008

Shemie, MacDonald CMAJ 2013

Shemie, MacDonald CMAJ 2013
FINAL RECOMMENDATIONS

• 25 recommendations in total—13 for TDT and 12 for ODT

• Completed and sent to Federal, Provincial and Territorial Deputy Ministers of Health in April 2011
Solutions

Leading Practices Development

- Donor Management (2004)
- Controlled DCD (2005)
- Donation Physician Specialists (2011, 2015)
- End-of-life Family Conversations/Consent (2014)

- Pediatric DCD 2014-15 in progress
- Death Audits/Medical Record Review 2014-15 in progress
- Uncontrolled DCD
Solutions

Leading Practices Implementation and Uptake

- Donor management and NDD recommendations well incorporated into current provincial ODO guidelines
- Where DCD programs have been implemented, national leading practices have been incorporated.
- DCD has not been implemented in 5 of 10 provincial ODOs – opportunity for future increases in donation
Solutions

Workshops and Training Courses

• DCD Workshop, Winnipeg, Saskatchewan Jan 2014
• End-of-Life Conversations with Families, Mar 2015
• Annual presentations and programs at conferences in collaboration with:
  • Canadian Critical Care Forum
  • Canadian Association of Critical Care Nurses
  • Canadian Critical Care Conference
  • Transplant Atlantic
  • Canadian Society of Transplantation
  • International ad hoc- ISODP, TTS, Sweden, Norway, South Korea, Saudi Arabia, Japan
Solutions

National Professional Education Curriculum in Deceased Donation

Jennifer Hancock, Ken Lotherington

- Professional education advisory committee
- Professional education web portal
- Organ donation course and certification
Solutions

Donation Physicians - The professionalization of donation services

Organ donation as a **subspecialty of ICU services** lead by funded ICU physicians supported by donor coordinators

- 24x7 multi-hospital clinical service for all forms of deceased donation
- Quality assurance
- Performance metrics and accountability
- Clinical training and academic development
- Clinical trials, research and innovation
Solutions

Canadian Blood Services’ role in development Canadian donation physicians

- OTDT Ethics Consultation – Jan 2011
- “Donation Physicians in a Coordinated OTDT System” forum – Feb 2011
Implementation of donation physicians by ODOs

As of Feb 2015
Ethics Guide for Donation Physicians

Recommendations developed through a national collaboration among Canadian deceased donation experts and bioethicists. Endorsed by the Canadian Medical Association

February 23-24, 2015
Released: October 2015

Steering Committee
• Sam Shemie
• Christy Simpson
• Jeff Blackmer CMA
• Paul Byrne
• Shavaun MacDonald
• Sonny Dhanani
• Sylvia Torrance
• Dorothy Strachan

Recommendations
1. Benefits of the DP role
2. Communication with families
   • role disclosure, consent
3. Interprofessional conflicts
   • dual roles
   • conscientious objection
4. Donation clinical practices
   • NDD, DCD
5. Metrics, resources, remuneration
Results
Results

Data sources

- Transplant Quebec statistiques officielles: 2012
- Provincial ODOs: 2013, 2014 data & corrections
- Donation & Transplant Administrators Advisory Committee: validation of 2013 & 2014 data
Deceased organ donation
Canada 2005 - 2014

44% ↑ total in donors for 2005 – 2014
(15% ↑ NDD donors 2005 – 2014)
(86% ↑ DCD donors 2013 – 2014)

Canadian Provincial ODO derived
Deceased organ donation rates per million population (PMP) Canada 2005 - 2014

- 30% ↑ in donors PMP for 2005 – 2014
- 22% ↑ in donors PMP for 2010 – 2014

Canadian Provincial ODO derived
Some History

Organ and tissue donation in the intensive care unit

Graeme M. Rocker,
for the Canadian Critical Care Society Working Group on Organ and Tissue Donation

When patients will not survive (e.g., after severe head injuries), intensive care unit (ICU) teams face the challenge of conducting empathetic, honest, and appropriate donation in all eligible circumstances. In consequence, alternative ways to achieve improved rates of consent to organ and tissue donation within ICUs have been proposed. In the United States, for example, these initiatives include mandating representatives of transplant procurement organizations rather than ICU or hospital-based teams to interact with families at the time of death in the ICU. In Canada, other initiatives have resulted in provincial legislation that requires ICU physicians to provide outside agentic death - details that are contentious for critical care specialists.

The irony is that ICU physicians are as committed as any to the concept of successful organ and tissue donation, but we act and must act in the interests of our patient - the potential donor in the ICU - and his or her family. Transplant surgeons and transplant organizations have

Called for a Moratorium on DCD

© 2002 Canadian Medical Association or its licensors
Non-heart-beating organ donation in Canada: Time to proceed?

Greg A. Knoll, John E. Mahoney

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 units (ICUs). The most successful education programs have been locally driven. 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
Established the medical, ethical & legal framework for the practice of DCD in Canada

The Canadian Council for Donation and Transplantation

Donation After Cardiocirculatory Death: A Canadian Forum

February 17–20, 2005
Vancouver, British Columbia

Donation after cardiocirculatory death in Canada

Sam D. Shemie, Andrew J. Baker, Greg Knoll, William Wall, Graeme Rocker, Daniel Howes, Janet Davidson, Joe Pagliarello, Jane Chambers-Evans, Sandra Cockfield, Catherine Farrell, Walter Glannon, William Gourlay, David Grant, Stéphan Langevin, Brian Wheelock, Kimberly Young, John Dossetor*

Abstract

These recommendations are the result of a national, multi-disciplinary, year-long process to discuss whether and how to proceed with organ donation after cardiocirculatory death

There are 2 fundamental but not mutually exclusive perspectives on organ donation. As an important part of end-of-life care, patients who die should be provided the opportunity to donate organs and tissues. Potential transplant recipients, who would otherwise die or be substantially compromised, can benefit from initiatives that
Deceased organ donation
Canada 2005-2014

44% ↑ total in donors for 2005 – 2014
(15% ↑ NDD donors 2005 – 2014)
(86% ↑ DCD donors 2013 – 2014)
DCD organ donation by province 2005 - 2014

n = 499 DCD donors
= 1136 transplants

Canadian Provincial ODO derived
DCD Programs in Canada 2006-2015

Established:
• Ontario (Province-wide)
• Quebec (Montreal, Quebec City)
• British Columbia
• Nova Scotia (Halifax)
• Alberta (Edmonton)
• Manitoba (initiated)
• Saskatoon (preliminary)
• Alberta (Edmonton implemented, Calgary pending)
### Four Leading Causes of Death by Donor Type

<table>
<thead>
<tr>
<th>Cause</th>
<th>DCD</th>
<th>NDD</th>
<th>% of DCD Donors</th>
<th>% of NDD Donors</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anoxia</td>
<td>86</td>
<td>188</td>
<td>39%</td>
<td>29%</td>
<td>274</td>
</tr>
<tr>
<td>CVA/Stroke</td>
<td>58</td>
<td>292</td>
<td>27%</td>
<td>46%</td>
<td>350</td>
</tr>
<tr>
<td>Head Trauma</td>
<td>61</td>
<td>119</td>
<td>28%</td>
<td>19%</td>
<td>180</td>
</tr>
<tr>
<td>Other</td>
<td>13</td>
<td>40</td>
<td>5%</td>
<td>6%</td>
<td>53</td>
</tr>
</tbody>
</table>

**Anoxic Brain Injury**
- 39% of DCD donors
- 32% of all donors

Total DCD Donors – 218
Total NDD Donors – 639

For the four leading causes of death.

*Apr 1, 2012 – Sep 30, 2015

---

TGLN, Sonny Dhanani, with thanks
Does DCD Steal from NDD?  No!!

<table>
<thead>
<tr>
<th>Donors by Type</th>
<th>2002/03-2005/06 Pre DCD</th>
<th>2006/07-2009/10 DCD era1</th>
<th>2010/11-2013/14 DCD era2</th>
<th>Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>NDD</td>
<td>578</td>
<td>679</td>
<td>712</td>
<td>+23%</td>
</tr>
<tr>
<td>DCD</td>
<td>0</td>
<td>96</td>
<td>193</td>
<td>N/A</td>
</tr>
<tr>
<td>TOTAL</td>
<td>578</td>
<td>775</td>
<td>905</td>
<td>+57%</td>
</tr>
</tbody>
</table>

Median number of days admission to NDD:  **1.71**

Median number of days admission to DCD:  **4.80**

*Pending publication Payne et al.*
An Under-Recognized Benefit of Cardiopulmonary Resuscitation: Organ Transplantation*

Alberto Orioles, MD¹; Wynne E. Morrison, MD, MBE¹; Joseph W. Rossano, MD, MS²; Paul M. Shore, MD, MS³; Richard D. Hasz, BS, MFS, CPTC⁴; Amy C. Martiner, BA⁴; Robert A. Berg, MD¹; Vinay M. Nadkarni, MD, MS¹

![Graph showing survival estimates for various organs](image)

*Figure 3. No difference in survival of overall organs, kidney, liver, and heart between cardiopulmonary resuscitation (CPR) organs and non-CPR organs.*
Cardiac Arrest, CPR, Deceased Donation
Differential Organ Vulnerability to Anoxia

1. Anoxic brain injury after resuscitated cardiac arrest is becoming the most common donor etiology

2. Cardiac arrest & CPR after brain injury does not impact transplant outcomes including the heart

3. DCD organs recover from >=2 distinct episodes of circulatory arrest- *the brain does not*
People on transplant waitlist
Canada 2005 - 2014

Canadian Provincial ODO derived
Day 1 Opening Plenary

Deceased organ donors in the UK 2007-14

13.4 ppm

19.9 ppm

58% more donors
49% increase in ppm

DCD

DBD

155%

27%

Dale Gardiner, Alex Manara, with thanks
The rise and rise of UK DCD
The most common donor pathway in ICU

Consents by quarter

<table>
<thead>
<tr>
<th>Quarter</th>
<th>DBD</th>
<th>DCD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apr 10 - Sep 10</td>
<td>321</td>
<td>413</td>
</tr>
<tr>
<td>Oct 10 - Mar 11</td>
<td>358</td>
<td>445</td>
</tr>
<tr>
<td>Apr 11 - Sep 11</td>
<td>383</td>
<td>478</td>
</tr>
<tr>
<td>Oct 11 - Mar 12</td>
<td>398</td>
<td>479</td>
</tr>
<tr>
<td>Apr 12 - Sep 12</td>
<td>406</td>
<td>480</td>
</tr>
</tbody>
</table>

Family Approaches
Consents

<table>
<thead>
<tr>
<th>April 2014 to March 2015</th>
<th>DBD</th>
<th>DCD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Family Approaches</td>
<td>1,283</td>
<td>2,012</td>
</tr>
<tr>
<td>Consents</td>
<td>858</td>
<td>1,045</td>
</tr>
</tbody>
</table>

Dale Gardiner, Alex Manara, with thanks
POPULATION - 34,754,312

DEATHS – 243,643

HOSPITAL DEATHS – 117,156

VENTILATED DEATHS - 4,790*

BRAIN-INJURED VENTILATED DEATHS

POTENTIAL DONORS (PD) – 3,711

REFERRED PD – 3,000

ELIGIBLE DONORS (ED) - 728

APPROACHED ED

CONSENTED DONORS

ACTUAL DONORS 542

CBS – D3WG Working copy

Individual data

National, aggregate, data

DRAFT DATA FOR 2012

data based on local standards

data based on national standards
Identifying Potential Donors in Canada

ON: Ventilated and any of the following: Grave prognosis or GCS = 3 OR Injured brain or non-recoverable injury/illness OR Family-initiated discussion of donation or withdrawal of life-sustaining therapy (WLST) OR Therapy-limited, de-escalation of treatment, or WLST discussion planned

QC: Severe neuro insult + mechanical ventilation

AB (EDM) - ventilated with severe/devastating illness or injury, neuro consult ruling out recovery. Indicators include, but are not limited to: GCS 3 OR 3 or + absent brain stem reflexes OR Plans for WLST OR Family initiated donation discussion

BC - GCS < 5, Injury to brain, Ventilated, EOL care

SASK - GCS ≤5 OR Injured brain OR Ventilated (no respiratory effort) OR EOL discussion of WLST

MAN - GCS ≤5 + Severe neuro insult/injury + Ventilator dependent + Grave prognosis/EOL discussion

NS - GCS < 5, Irreversible Brain Injury, Ventilated, End of life discussion

AB (CAL): Patient who is brain dead
1. NDD (brain death) only?

= deceased donor rates will not improve.

2. NDD & DCD = all patients with catastrophic brain injury who have withdrawal of mechanical ventilation?

= deceased donor rates (NDD & DCD) will likely improve
Deceased donation rates per million population by province 2015 projections

BC

AB

SK

MB

ON

QC

NS

NL

NB

Projected rates for 2015

sources & limitations - refer to data notes page
# or Rate

Time
It’s difficult to improve donor rates

- Hard to get to 10 dpmp
- Harder to get from 10-20 dpmp
- Much, much, much harder to get from 20-30 dpmp
UK NATIONAL AUDIT OF POTENTIAL DONORS

Breakdown of audited deaths in ICU's, 1 April 2011 – 31 March 2012

Stages at which possible organ donors lose the opportunity to become actual donors, 1 April 2011 to 31 March 2012

Source: Transplant activity in the UK, 2011-2012, NHS Blood and Transplant

Source: Transplant activity in the UK, 2011-2012, NHS Blood and Transplant
Consent/authorisation rates by Organ Donation Services Team, 1 April 2010 – 31 March 2011

Source: Transplant activity in the UK, 2011-2012, NHS Blood and Transplant
Elements of high performing donation systems

- System-wide donor coordinators & donation physicians
- Medical record review to identify missed donation opportunities
- On line intent-to-donate registries, legal authorization to proceed with donation
- Mandatory referral to ODOs (standardized clinical triggers)
- Implementation of leading practices
- Professional education
- Timely performance data, data transparency
- ICU/hospital capacity
- ODO funding
- National coordinating authority
PROVINCE X
DECEASED DONATION PERFORMANCE—For Illustrative Purposes Only

<table>
<thead>
<tr>
<th>Leading practice uptake</th>
<th>DCD Program</th>
<th>ICU Capacity</th>
<th>Dedicated Personnel</th>
<th>Medical Record Review</th>
<th>ODO Funding</th>
<th>Data Transparency</th>
<th>Intent to Donate Registries</th>
</tr>
</thead>
<tbody>
<tr>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>90%</td>
<td>90%</td>
<td>90%</td>
<td>90%</td>
<td>90%</td>
<td>90%</td>
<td>90%</td>
<td>90%</td>
</tr>
<tr>
<td>80%</td>
<td>80%</td>
<td>80%</td>
<td>80%</td>
<td>80%</td>
<td>80%</td>
<td>80%</td>
<td>80%</td>
</tr>
<tr>
<td>70%</td>
<td>70%</td>
<td>70%</td>
<td>70%</td>
<td>70%</td>
<td>70%</td>
<td>70%</td>
<td>70%</td>
</tr>
<tr>
<td>60%</td>
<td>60%</td>
<td>60%</td>
<td>60%</td>
<td>60%</td>
<td>60%</td>
<td>60%</td>
<td>60%</td>
</tr>
<tr>
<td>50%</td>
<td>50%</td>
<td>50%</td>
<td>50%</td>
<td>50%</td>
<td>50%</td>
<td>50%</td>
<td>50%</td>
</tr>
<tr>
<td>40%</td>
<td>40%</td>
<td>40%</td>
<td>40%</td>
<td>40%</td>
<td>40%</td>
<td>40%</td>
<td>40%</td>
</tr>
<tr>
<td>30%</td>
<td>30%</td>
<td>30%</td>
<td>30%</td>
<td>30%</td>
<td>30%</td>
<td>30%</td>
<td>30%</td>
</tr>
<tr>
<td>20%</td>
<td>20%</td>
<td>20%</td>
<td>20%</td>
<td>20%</td>
<td>20%</td>
<td>20%</td>
<td>20%</td>
</tr>
<tr>
<td>10%</td>
<td>10%</td>
<td>10%</td>
<td>10%</td>
<td>10%</td>
<td>10%</td>
<td>10%</td>
<td>10%</td>
</tr>
</tbody>
</table>

Overall Program Efficacy

- Leading practice uptake: 100%
- DCD Program: 100%
- ICU Capacity: 100%
- Dedicated Personnel: 100%
- Medical Record Review: 100%
- ODO Funding: 100%
- Data Transparency: 100%
- Intent to Donate Registries: 100%
## Components of high donation performance

*Early draft, not validated*

<table>
<thead>
<tr>
<th>Components</th>
<th>BC (20%)</th>
<th>AB (N/S)</th>
<th>SK (1%)</th>
<th>MB (27%)</th>
<th>ON (25%)</th>
<th>QC (55%)</th>
<th>NB (5%)</th>
<th>NS (5%)</th>
<th>NL (29%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>On-line Intent-to-Donate (% pop)</strong></td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td><strong>Mandatory Referral</strong></td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td><strong>Donation Physicians</strong></td>
<td>● (20%)</td>
<td>● (5%)</td>
<td>● (1%)</td>
<td>● (27%)</td>
<td>● (25%)</td>
<td>● (55%)</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td><strong>NDD Leading Practices</strong></td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td><strong>DCD Programs (% DCD donors)</strong></td>
<td>● (23%)</td>
<td>(17%/0%)</td>
<td>● (0%)</td>
<td>● (0%)</td>
<td>● (29%)</td>
<td>● (12%)</td>
<td>● (0%)</td>
<td>● (29%)</td>
<td>● (0%)</td>
</tr>
<tr>
<td><strong>Hospital Death Audits</strong></td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td><strong>Trained Requestors</strong></td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td><strong>Donor Management LP</strong></td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td><strong>DD PMP 2014</strong></td>
<td>14.9</td>
<td>13.8</td>
<td>9.8</td>
<td>5.5</td>
<td>19.4</td>
<td>18.7</td>
<td>9.3</td>
<td>18.0</td>
<td>15.2</td>
</tr>
<tr>
<td><strong>2010-2014 (mean DPMP, % change)</strong></td>
<td>13.6</td>
<td>11</td>
<td>9.3</td>
<td>9.3</td>
<td>17.3</td>
<td>17.2</td>
<td>9.5</td>
<td>20</td>
<td>17.1</td>
</tr>
<tr>
<td></td>
<td>+36%</td>
<td>+56%</td>
<td>-31%</td>
<td>-65%</td>
<td>+28%</td>
<td>+25%</td>
<td>-12%</td>
<td>-11%</td>
<td>+58%</td>
</tr>
</tbody>
</table>
Why Are Donation Rates in Canada Changing?

1. Gradual, incremental & sustained improvement in deceased donation and transplantation rates in Canada
2. Elements of donation performance are better understood
3. Ongoing investment is required in deceased donation services:
   - ODO
   - DCD
   - Donation-focused personnel
   - Professional education
   - Infrastructure
With appreciation and thanks

Collaborators
Dorothy Strachan, Damon Scales, Stephen Beed, Matthew Weiss, Nathan Scales, Sonny Dhanani, Jason Shahin, Amanda Van Beinum, Ivan Ortega, Raluca Pana, Kim Trickey, Jeanne Teitelbaum, Ali Rutman, Alexandra Fletcher

Canadian Blood Services
Sylvia Torrance, Kimberly Young, Laura Hornby, Karen Hornby, Nick Lahaie, Ken Lotherington, Jennifer Hancock, Jim Mohr, Amber Appleby, Sophie Gravel
END