Organ and Tissue Donation and Transplantation in New Zealand

Report 2008

Organ Donation New Zealand

Contents

Introduction

This Organ Donation New Zealand (ODNZ) Annual Report summarises organ and tissue donation from deceased donors and organ and tissue transplantation in New Zealand in 2008, along with comparative data from the previous four years. Earlier data are in previous annual reports which are publicly available on our website at www.donor.co.nz/donor/statistics/annual_report.php

The report also includes a summary of the current and planned activity of ODNZ and some preliminary results from the ODNZ audit of Intensive Care Unit (ICU) deaths.

Acknowledgements

We thank Cecilia Westmacott, Rachel Josephson and Margaret Kent who all helped in preparing this report. We gratefully acknowledge the editors of the Australia and New Zealand Organ Donation Registry (ANZOD), Rosalie Gow from the Department of Molecular Medicine and Pathology, University of Auckland, Louise Moffatt and Helen Twohill from the New Zealand National Eye Bank, Jill Faulkner, Lorraine Craighead and Darren Welch from the New Zealand Heart Valve Laboratory, and Estelle Bester and Vladimir Slyshkov from the New Zealand Tissue Bank.

We are also grateful to Dr Toby Whitlock who again provided the actuarial survival statistics for heart and lung transplantation. We thank our many medical and nursing colleagues in ICU's, operating theatres, anaesthetic departments and transplantation who continue to generously support the work of ODNZ. In particular we acknowledge the commitment of the Link Team members (nurses from the ICUs and operating theatres and doctors from the ICUs). The ICU Link Nurses have collected and entered all the data for the ICU Death Audit and we especially acknowledge their commitment to organ donation and their support of ODNZ.

We appreciate the support and encouragement we receive from the ODNZ Advisory Committee, the Ministry of Health, the Australian and New Zealand Intensive Care Society and the Australasian Donor Awareness Programme (ADAPT).

Clinical Director, ODNZ

Team leader, ODNZ

Organ Donation New Zealand

ODNZ is New Zealand's national organ and tissue donation service with offices at the Green Lane Clinical Centre, in Auckland. ODNZ is responsible to the Auckland District Health Board, which is funded for ODNZ on behalf of all District Health Boards. ODNZ has an Advisory Committee comprised of representatives from intensive care medicine and nursing, organ and tissue transplantation, representatives of Maori health and Pacific health, and a consumer representative. This committee meets with ODNZ every six months.

Staffing

The staff of ODNZ includes three full-time Donor Coordinators, a part-time Clinical Director and a full time Team Support. Val Honeyman (Donor Coordinator) resigned in June and Rachel Josephson commenced in November 2008. Kerry-Lee Bruce (Team Support) resigned in April and Margaret Kent commenced in June 2008.

Activities of ODNZ during 2008

Coordinating organ and tissue donation from deceased-donors in NZ Intensive Care Units (ICUs)

The Donor Coordinators provide a 24-hour service for referrals from ICUs for organ donation, for tissue referrals and for liver referrals from Australia. ICUs are encouraged to consult with ODNZ early about possible donation. There were 70 such consultations in 2008 (c.f. 66 in 2007).

Tissue donation referrals to ODNZ

When family members volunteer donation from patients who cannot donate organs, ODNZ facilitates tissue donation (eyes, heart valves and skin) where possible. In 2008 tissue donation was facilitated by ODNZ from 12 donors – Whangarei Hospital ICU, North Shore Hospital ICU, Waikato Hospital ICU (2), Starship Children's Hospital PICU (2), Auckland City Hospital – CVICU, DCCM, Ward 75 and Ward 81 (2) and the Auckland Coronial Service.

A further 18 potential tissue donor referrals were received from – family members (3), funeral directors (2), Whangarei Hospital ICU, Auckland City Hospital – DCCM (2), CVICU, ED, Wards 65 and 31, Tauranga Hospital Medical Ward, Palmerston North Hospital Ward 26, North Shore Hospital ICU, Hutt Hospital Medical Ward, Timaru Hospital ED and the Mercy Hospice. Eight potential tissue donors were medically unsuitable to donate and one family did not want to proceed with donation for transplantation. The New Zealand National Eye Bank facilitated eye donation in eight of these referrals and the Donor Tissue Coordinator facilitated eye and skin donation in one referral.

Providing ongoing support for the families of donors

The Donor Coordinators provide support and information for families following donation for as many years as the family wishes. In 2008 this support included 141 phone calls, 126 letters and 22 emails to donor families. In 2008, 79 recipients sent ODNZ anonymous letters of thanks for the family of their donor. These

Organ Donation New Zealand (CONTINUED)

were forwarded to the donor family if they wished to receive it. Twenty-three donor families sent letters (via ODNZ) to one or all recipients which were forwarded via the Recipient Coordinators. ODNZ organises two Thanksgiving Services annually. These services respectfully acknowledge the generosity of families who have donated organs and tissues following the death of a family member. Families of donors, recipients and their families and health professionals involved in both organ donation and transplantation are invited to these services. In 2008 services were held in Auckland and Wellington with approximately 500 attendees at the Auckland service and 250 at the Wellington service.

Donation after cardiac death (DCD)

During 2008 ODNZ completed a detailed education and implementation programme for DCD in Auckland City Hospital (DCCM), Wellington Hospital, Christchurch Hospital and Waikato Hospital. A similar programme in Starship Children's Hospital is underway and ODNZ has begun working with two other hospitals on DCD. There were two DCD donors during 2008. Information about DCD is also included on the ODNZ website.

Providing hospital study days for staff involved in organ and tissue donation

ODNZ provided eight study days on organ donation during 2008 for the following hospitals: Auckland City, Middlemore, Tauranga, Waikato, Hawkes Bay, Wellington and Palmerston North (2). These study days were well attended by nursing staff from ICUs and operating theatres and other health professionals involved in the donation process.

ODNZ provided educational sessions for post-graduate specialist nursing courses, in Auckland (Intensive Care), Wellington (Renal), Hutt (Perioperative) and Christchurch (Perioperative, 2). Teaching sessions were provided for nurses at the Perioperative Nurses College of the New Zealand Nurses Organisation, The Waikato Institute of Technology (Hamilton and Hastings) and the Eastern Institute of Technology (Taradale). In-service teaching sessions were provided for nursing staff at Rotorua, Wairau, Hawkes Bay, Taranaki, Whakatane, North Shore and Auckland City Hospital.

Australasian Donor Awareness Program Training (ADAPT)

ADAPT provides health professionals with expertise in the organ and tissue donation process. In 2008 ODNZ provided four ADAPT Nursing Modules (Auckland 2, Christchurch and Dunedin) with a total of 61 participants and two ADAPT Medical Modules (Auckland and Wellington) with a total of 19 participants. Dr Stephen Streat and Dr Peter Hicks presented at these two ADAPT Medical Modules. ODNZ recognises the commitment of ICU nursing and medical staff (including specialists and trainees in intensive care medicine) to the ADAPT workshops. So far a total of 84 doctors have attended an ADAPT medical workshop in New Zealand since they began in 2001.

The Link Team Program

ODNZ provided a two-day workshop for Link Nurses (ICU Link Nurses and Operating Theatre Link Nurses) in Auckland in November 2008 and 61 nurses attended. The workshop included a day-long workshop

on DCD including realistic simulation of the DCD processes. ODNZ acknowledges the considerable effort and enthusiasm of the staff of the Advanced Clinical Skills Centre at the University of Auckland in facilitating this day. Other topics presented included a review of ODNZ activities and plans for 2009, tissue donation, ICU Death Audit, ANZICS Statement on Death and Organ Donation 2008, Human Tissue Act 2008, ICU and OR Link Nurse activities, an update on renal transplantation and a presentation on Creutzfeldt-Jacob disease.

Assessment of local hospital "organ and tissue donation problem issues" and identifying and addressing local hospital organ and tissue donation needs

Dr Stephen Streat and Janice Langlands visited Link Team members at Tauranga and Hawkes Bay hospitals during 2008 and will visit the three remaining hospitals in 2009.

The ODNZ ICU Death Audit

This web-based audit of all ICU deaths in New Zealand was developed by ODNZ and Enigma (an IT company) with substantial support from Roche Pharmaceuticals during 2006 and the ICU Link Nurse began data entry after the Link Team workshop in November 2007. Preliminary data for 2008 are presented and discussed in the Appendix to this report.

Providing increased public access to information on organ and tissue donation

ODNZ responds to public enquiries from the 24-hour 0800 number (0800 4 DONOR) and from the website (http//www.donor.co.nz). ODNZ is listed in all New Zealand telephone directories. ODNZ will commence initiatives to provide increased public access to information during 2009.

The Advisory Committee of ODNZ

The Advisory Committee of ODNZ met in May and December 2008. Committee membership was unchanged.

Revision of the ANZICS document on organ donation

ANZICS first created a reference document on brain death and organ donation in 1993 and revised it in 1998. A third and extensive revision began in 2005, was completed in September 2008 and is available on the ANZICS website. The new document contains several new sections, including *DCD* and the *language of organ donation* and is now entitled *The ANZICS Statement on Death and Organ Donation*. It will continue to provide the reference standard for clinical practice for these matters throughout Australia and New Zealand. ODNZ will now use the documentation for the determination of death (both brain death and DCD) which is part of the *ANZICS Statement*. The *ANZICS Statement* is congruent with the ODNZ protocol for DCD and with the (New Zealand) Human Tissue Act 2008.

Organ Donation New Zealand (CONTINUED)

Attendance at Conferences and Training Workshops

- **Organ Donor and Transplant Recipient Coordinators 2008 International Course, Adelaide**
  Cecilia Westmacott completed this five-day residential course. The program included the latest information and practical workshops in organ donation and transplantation. Cecilia was grateful to ATCA for financial support for this course.
- **Telephone Requesting Course, Melbourne, Australia**
  Cecilia Westmacott completed a two-day skills training course in approaching families for tissue donation. This workshop, facilitated by Margaret Verble and Judy Worth from USA, was attended by health professionals working in the tissue donation sector.
- **Face to Face Telephone Requesting Course, Sydney**
  ODNZ provided funding for three ICU Link Nurses, Alison McAlley (Waikato), Sue Macaskill (Waikato) and Sue Carn (Nelson) to complete the two-day workshop in approaching the family, face to face, for organ and tissue donation. This workshop was facilitated by Margaret Verble and Judy Worth from the USA.
- **Breaking Bad News Course, Melbourne**
  ODNZ provided funding for Dr Frank van Haren (Intensivist, Waikato Hospital) to attend this one-day workshop on breaking bad news to families. This workshop was also facilitated by Margaret Verble and Judy Worth from the USA.
- **Organ Donation Summit, 8th-9th July 2008, Adelaide**
  This meeting was organised by the South Australian Government and was attended by several hundred health professionals and representatives of government and special interest groups. The programme included presentations on organ procurement in Australia, Spain and California and workshops on organ donation and transplantation. Dr Streat participated as an invited guest.
- **Australian Society of Anaesthetists/ New Zealand Society of Anaesthetists Combined Scientific Congress, 10th-14th October 2008, Wellington**
  Dr Streat was invited to present on Donation after Cardiac Death and attended the conference on the 14th October.

Organ and Tissue Donation

During 2008 there were 31 deceased donors from ICUs in 12 donor hospitals who donated organs (and tissues) for transplantation. This does not include those who donated tissues (eyes, heart valves and skin) only. Twenty-nine donors were brain dead and there were two DCD donors.

Table 1 – Number of Organ Donors by Donor Hospital and Year

Hospital	2004	2005	2006	2007	2008
DCCM Auckland City	5	6	4	9	8 [1]*
Christchurch	4	3	3	9	4 [1]*
Dunedin	6	3	2	2	3
Gisborne	0	0	0	0	2
CVICU, Auckland City	0	0	0	0	0
Hawkes Bay	2	2	2	3	1
Hutt	0	0	1	0	0
Middlemore	2	1	3	1	1
Nelson	1	0	0	6	1
North Shore	1	0	0	0	0
Palmerston North	3	1	0	1	1
Rotorua	1	0	0	0	0
Southland	1	1	0	2	0
Starship Children's	0	0	0	0	1
Taranaki	0	2	1	1	0
Tauranga	1	3	2	0	0
Timaru	0	0	1	1	1
Waikato	3	1	1	1	5
Wairau	0	0	0	1	0
Wanganui	1	0	1	0	0
Wellington	9	5	3	2	3
Whakatane	0	0	0	0	0
Whangarei	0	1	1	0	0
Total	**40**	**29**	**25**	**38**	**31**

* DCD donors

Organ and Tissue Donation (CONTINUED)

Table 2 – Cause of Donor Death by Year

	2004	2005	2006	2007	2008
CVA	19	17	14	25	22
Trauma (road)	6	3	8	7	2
Trauma (other)	6	3	1	3	2
Other	9	6	2	3	5
Total	40	29	25	38	31

It is noteworthy that only four donors in 2008 died as a result of trauma, the lowest number since national New Zealand data were first collected in 1993. Figure 1 shows the cause of donor death since 1993. Since a peak in 1997 there has been an ongoing decline in trauma as a cause of donor death while the number of donors who died from other causes has remained more or less constant.

Figure 1 – Cause of donor death in 586 organ donors 1993-2008

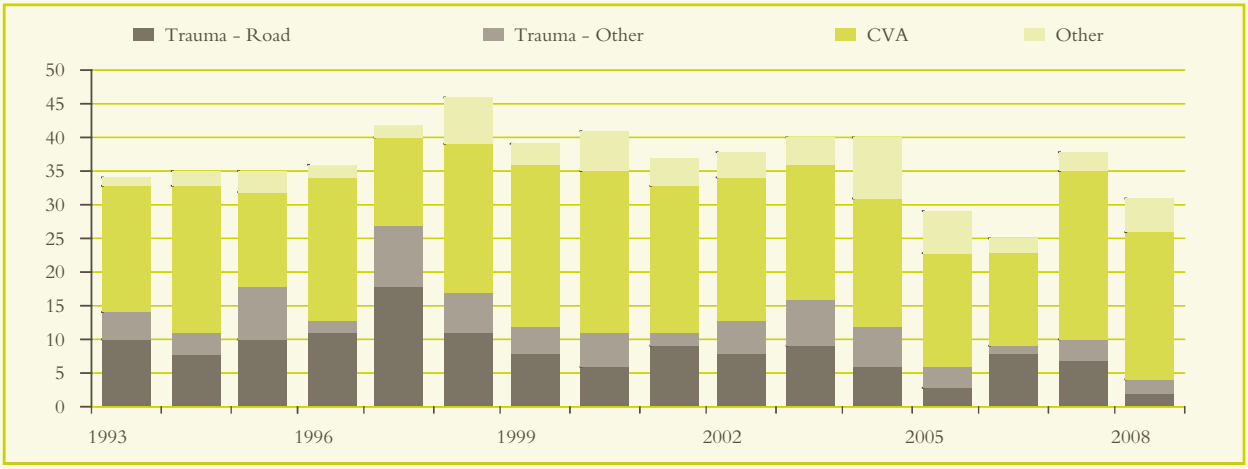

Table 3 – Age of Donors by Year

	2004	2005	2006	2007	2008
Mean	43.0	44.9	36.5	46.7	42.7
Median	46.1	48	35.4	48.8	44.4
Minimum	1.1	17	11.6	11.9	12.0
Maximum	78.2	64	69.4	71.7	67.6

Table 4 – Ethnicity of Donors by Year

	2004	2005	2006	2007	2008
European	35	25	17	37	27
Maori	3	0	7	0	3
Pacific People	1	0	0	0	1
Other	1	4	1	1	0
Total	**40**	**29**	**25**	**38**	**31**

Table 5 – Organs and Tissues retrieved for Transplantation

	2004	2005	2006	2007	2008
Kidneys★	65 (3)	55	42 (1)	68 (3)	59 (6)
Hearts	7 (1)	16	9	12	10
Lungs‡	12	11	13	13	14
Liver	35	22	24	32	23
Pancreas	2	2	6	1	4
Corneas#	32	11	9	20	15
Heart Valves#	21	6	7	14	8
Bone#	0	1	0	0	0
Skin#	0	0	0	1	3

★ Single kidneys, ‡ number of lung recipients, ( ) Organs not suitable for transplantation,
Number of donors of these tissues

Table 6 – Organs from New Zealand donors transplanted in Australia

	2004	2005	2006	2007	2008
Liver	6	4	8	8 (2)	2
Hearts	2	3	1	3	2
Lungs	3	2	3	4	2
Kidneys	1	4	0	0	0

( ) Number of splits (L or R Lobes)

Table 7 – Organs from Australian donors transplanted in New Zealand

	2004	2005	2006	2007	2008
Liver	7	6	12	4	9
Hearts	0	0	0	0	0
Lungs	0	0	0	0	0
Kidneys	0	0	0	0	0

Organ Transplantation

Overview

Transplantation in New Zealand includes organs: kidney, heart, lung, liver and pancreas and tissues: eyes (corneas and scleras), heart valves, skin and bone (from living donors).

Kidney transplantation including live-donor kidney transplantation, is provided at Auckland City Hospital (and Starship Children's Hospital), Wellington Hospital and Christchurch Hospital. Heart, lung, liver and pancreas transplantation are provided at the Auckland City Hospital (including paediatric heart, lung, liver, and kidney transplantation at Starship Children's Hospital). The liver transplant program also performs live-donor adult-to-adult and adult-to-children transplantation.

Corneal tissue is stored for up to 21 days at the New Zealand National Eye Bank, at the Faculty of Medical and Health Sciences, University of Auckland. Corneal transplantation takes place in 13 centres throughout New Zealand, most commonly for keratoconus.

Heart valves are stored for up to five years at the New Zealand Heart Valve Laboratory, Starship Children's Hospital, and are transplanted at Auckland City Hospital, Starship Children's Hospital and very occasionally at other hospitals performing cardio-thoracic surgery.

Donated skin is stored at the New Zealand Tissue Bank at the New Zealand Blood Service and is used as a temporary dressing to cover large wounds, most commonly after large burns.

Kidney Transplantation

During 2008 there were 122 kidney transplants performed including 53 where the kidney was from a deceased donor and 69 from a living donor.

Table 8 – Kidney transplantation by year and donor type

	2004	2005	2006	2007	2008
Recipients, deceased-donor, single kidney	54	47	41	65	53
Recipients, deceased-donor, double kidney	4	0	0	0	0
Living donor	48	46	47	58	69
Total	**106**	**93**	**88**	**123**	**122**

Organ Transplantation (CONTINUED)

Heart and Lung Transplantation

There have been 209 heart transplants and 128 lung transplants performed in New Zealand up until the end of 2008, including eight heart transplants and twelve lung transplants in 2008.

Table 9 – Heart and Lung transplantation by year

	2004	2005	2006	2007	2008
Heart	4	13	8	9	8
Lung*	7	8	13	9	12

* Lung recipients

Liver Transplantation

There have been 362 liver transplants performed in New Zealand up until the end of 2008, including 319 transplants in adult recipients and 43 transplants in children. Seven of the 38 transplants performed in 2008 were from live donors (3 adult recipients and 4 children).

Table 10 – Liver transplantation by year

	2004	2005	2006	2007	2008
Adult, deceased donor	33	21	27	32	27
Adult, live adult donor	0	0	2	1	3
Child, deceased donor	3	3	5	3	4
Child, live adult donor	0	4	2	3	4
Total	**36**	**28**	**36**	**39**	**38**

Pancreas Transplantation

There have been 21 pancreas transplants performed in New Zealand (all simultaneous with kidney transplants).

Table 11 – Pancreas transplantation by year

	2004	2005	2006	2007	2008
Pancreas	2	2	6	1	4

Tissue Donation and Transplantation

Corneal Donation and Transplantation

During 2008 the New Zealand National Eye Bank received ocular tissue from 126 donors, including 52 donors from the Auckland Coroners service, 50 from public hospitals, 14 from organ donors and 10 from private hospitals or directly from the community. A total of 248 corneas were received of which 217 were suitable for transplantation. In addition 138 sclera were transplanted for surgical reconstruction following trauma or tumour removal.

Heart Valve Donation

During 2008 heart valves were retrieved from 29 donors, including ten donors who had undergone coronial autopsy at the Auckland Coroners service, eight organ donors, six tissue-only donors facilitated by ODNZ and five heart transplant recipients.

Skin Donation

Skin was donated from 25 donors in 2008 (c.f. 5 in 2007) including 19 who had undergone coronial autopsy at the Auckland Coroners service and six coordinated by ODNZ.

The ODNZ Intensive Care Unit (ICU) Death Audit

Introduction

A web-based tool to audit all ICU deaths in New Zealand was developed in 2006 by ODNZ and Enigma (an IT company) with substantial financial support from Roche Pharmaceuticals. The ICU death audit process was approved by the Multi-region Ethics Committee in October 2007. This audit collects some information on every patient who dies in an ICU. More information is collected on patients in whom brain death was suspected or determined and less on patients without severe brain damage.

ICU Link Nurses began entering data after the Link Team workshop in November 2007 and by January 1st 2008 most ICUs in New Zealand were entering data. Only one site is not yet entering data. This very small ICU has fewer than 20 deaths per year (less than 2% of the national ICU deaths).

The audit enables ODNZ, with the support of the ICU staff, to monitor the number of deaths in New Zealand ICUs, the incidence of severe brain damage and of brain death, the potential for organ donation (including DCD) and the associated practices related to organ donation. ODNZ expects that the audit will provide accurate information about many aspects of organ donation practices about which there is currently only speculation and will assist us to identify and address particular organ donation-related needs of various hospitals.

The identity of the patients in the audit is unknown to ODNZ (only the healthcare professionals who treated the patient know this). As with any audit of clinical practice, the value of the audit depends on a very high level of trust and cooperation among all the participants. ODNZ is committed to ensuring that this is maintained and will not publically report sensitive information which could jeopardise the audit process.

This preliminary analysis of the 2008 dataset makes initial estimates of national ICU deaths, deaths with severe brain damage, possible DCD donors, brain deaths, and actual donors and compares these estimates where possible to data obtained in 1999-2000 during a previous national audit of ICU deaths[1]. These results should be considered tentative and may change somewhat when the entire annual dataset has been completed and extensively cross-checked.

Methods

Data (de-identified to ODNZ as to patient identity) which had been entered up to 5th January 2009 on all 1017 deaths occurring on or after 1st January 2008 were downloaded from the secure Enigma website (as a .csv file) and analysed using Excel© and Foxpro© software. Data on seven patients were recorded by the ICU Link nurses as incomplete and these patients were excluded. Data on the remaining 1010 patients are reported here including an overview of ICU deaths, deaths where severe brain damage was present and when brain death was determined. Family discussion of organ donation and organ donation itself are also reported. Finally, some estimate of the potential for DCD is made from the available data on patients in whom extubation took place in such a circumstance that DCD might (theoretically) have been possible.

Results

Table 12. Cause of death 1010 ICU deaths between 1st January – 31st December 2008, together with number with severe brain damage

Diagnosis	Number of deaths	Severe brain damage	% with severe brain damage
Aortic aneurysm rupture	21	0	0
Asthma	3	1	33
Blood loss	13	0	0
Brain tumour	3	3	100
Burns	6	0	0
Cancer	11	2	18
Cardiac arrest	103	51	50
Cardiogenic shock	12	0	0
Cardiomyopathy	2	0	0
Cerebrovascular disease	22	2	9
Congestive heart failure	21	0	0
Congenital heart disease	3	0	0
Chronic obstructive pulmonary disease	14	0	0
Diabetic ketoacidosis	1	0	0
Haemorrhagic stroke	82	77	94
Hypoxic-ischaemic encephalopathy	68	61	90
Herpes simplex encephalitis	1	1	100
Ischaemic stroke	20	17	85
Ischaemic heart disease	6	0	0
Liver failure	8	3	38
Multiple organ failure	143	7	5
Myocardial infarction	34	5	15
Pneumonia	45	0	0
Poisoning	6	2	33
Pulmonary embolism	13	3	23
Renal failure	8	0	0
Respiratory failure	96	1	1
Sepsis	171	4	2
Sudden infant death syndrome	1	1	100
Trauma (other than burns)	72	60	83
Unknown	1	1	100
Total	**1010**	**302**	**30**

The ODNZ Intensive Care Unit (ICU) Death Audit (CONTINUED)

Table 13. Number of ICU's, number of deaths, deaths with severe brain damage, fixed pupils, no obvious brain stem function, brain deaths and brain dead donors in 1010 ICU deaths between 1st January – 31st December 2008

ICU's	Deaths	Severe brain damage	Fixed pupils	No obvious brain stem function	Brain dead	Brain dead donors
23	1010	301	164	94	40	29

Family discussion of organ donation

Organ donation was discussed with all but three of the families of the 40 patients reported as brain dead. In one circumstance the patient had metastatic malignancy which contraindicated organ donation; the other two families did not accept that the brain-dead patient was dead.

Donation after Cardiac Death (DCD)

In accord with the ODNZ national protocol, DCD in New Zealand is possible if all of the following conditions are met –

- The patient is 50 years old or younger, has severe brain damage and is being ventilated
- A consensus decision has been reached between the treating team and the family that treatment will be withdrawn as it is no longer in the patient's best interest.
- This decision has been reached prior to and independent of the possibility of organ donation.
- The patient is anticipated as likely to die within an hour of withdrawal of treatment including extubation and withdrawal of any inotrope infusion.
- There are no medical contraindications to donation (as per donation after brain death).
- The family agree to organ donation taking place without delay after death has occurred following withdrawal of treatment.

There were 148 patients who were reported to the audit (~15% of the deaths) to have had severe brain damage (but had not been determined to be brain dead), and who had died after treatment had been withdrawn, including having been extubated.

The age of these 148 patients ranged from 1 month to 90 years with a median of 55 years; 64 patients (43%) were aged 50 or less. Time of death after extubation for these 64 ranged from 'immediately' to 36 hours, with a median time of 30 minutes. Forty-seven of these 64 deaths in patients aged 50 or less (73%) occurred in the six ICUs in tertiary hospitals with neurosurgical services. Thirty-eight patients (59%) died within one hour. It is possible that at least ten of these 38 were brain dead but they had not been tested (they had fixed pupils and no apparent brain stem reflexes) and all died within 23 minutes of extubation. In seven cases testing was not done because of family interdiction of organ donation.

The other three had contraindications to organ donation, which were absolute in at least one case. If these ten are excluded then 27 of the remaining 54 patients (50%) died within one hour.

Discussion

Deaths

The one small centre that is yet to contribute to the audit will begin during 2009. This centre is likely to have <2% of the national ICU deaths and <1% of donors. The 1010 reported deaths probably represent more than eleven months but certainly less than a complete year of ICU deaths. Even if these are only eleven months data, the number of reported deaths (1010) would only extrapolate to ~1100 deaths for the year for a (June 2008) population of 4.27 million people.

This is an incidence of 258 ICU deaths per million per year. This compares to 1404 ICU deaths in 1999 – 2000, for a population then of 3.84 million (366 ICU deaths per million per year). At that time 5% of all deaths in New Zealand took place in ICU. It seems very likely but perhaps not certain that the national ICU mortality has fallen in recent years. The UK audit of ICU deaths[2], probably the only comparable audit to the ODNZ audit, reported 48,801 deaths over the two-year period 1st April 2003 – 31st March 2005 for a population of 59.8 million – a rate of ICU death of 408 per million per year. By comparison, it has been estimated that 20% of all deaths in the US occurred in ICUs in 1999 – 540,000 ICU deaths for a population of 273 million – a rate of ICU death of 1978 per million per year[3].

Moderate falls in ICU mortality for various highly lethal conditions (e.g. acute lung injury[4], sepsis[5,6], and traumatic brain injury[7]) have been reported in recent years, including from Australasia. In addition, reported Australasian mortality[8-10] is usually at or below the low end of the range of reported mortality in multinational or US-based trials or registries.

Deaths with severe brain damage and with fixed pupils

In a similar fashion, the number of patients with severe brain damage (301) would extrapolate to ~330 for the year (c.f. 522 in 1999 – 2000). Finally, the number with fixed pupils (164) would extrapolate to ~180 (c.f. 234 who both had fixed pupils and were being ventilated at the time of death in 1999 – 2000). These numbers are not strictly comparable as the current audit tool asks simply if the pupils were fixed, not whether the pupils were fixed and ventilation was continuing at the time of death. There were patients (in the 2008 data) who were breathing spontaneously up until the time of death and yet had fixed pupils.

Brain Deaths

The number of patients reported to the audit as having been determined to be brain dead is considerably lower (39, perhaps ~ 45 per year) than in 1999-2000 when there were 116. This may to some extent represent incomplete data or a change in clinical practice away from determining brain death but a fall in the incidence of brain death seems likely (as a result of prevention, medical and surgical[11] treatments). Similar large falls (~50%) in brain death incidence in traumatic brain injury and intracranial bleeding have been recently reported from the Netherlands[12].

The ODNZ Intensive Care Unit (ICU) Death Audit (CONTINUED)

Brain death and organ donation

Organ donation was discussed with families in 37 of the 40 circumstances (93%) when brain death was determined. Such discussion would have been contrary to good clinical practice in the two cases where the family could not accept that death had occurred and in the situation of known metastatic malignancy.

With some caution, given the small numbers and preliminary nature of this analysis, it seems that a change has occurred in discussion of donation with families when brain death is present. In 1999 – 2000 a discussion was held with the family about donation in only 69 out of 116 cases (59%) when brain death was determined. Even if those 14 occasions in 1999 – 2000 when the coroner interdicted donation (3) or there were absolute medical contraindications to donation (11) are excluded, donation was discussed on only 69/102 (68%) occasions in 1999 – 2000.

There were 29 donors after brain death in 2008, and two DCD donors. Assuming that there were ~1100 ICU deaths for the year, this represents a (brain dead) donor rate of 2.64% of all ICU deaths, compared to 1244 brain dead donors from 46,801 ICU deaths in the UK[2] in 2003-2005, or 2.66% of ICU deaths.

DCD

There are a number of patients who have been reported to the audit who appear to meet the criteria for being potential DCD donors (aged 50 or younger, treatment withdrawal including extubation, with severe brain damage). Prediction of likelihood of death within an hour of extubation is an area of difficulty in DCD. Guidelines that bear on this issue[13,14] have been derived from patients in the US, and in circumstances that are subject to various selection biases.

Although approximately half of those potential DCD donors in this audit who died did so within an hour, it is likely that there were some patients (often reported as 5 –10%) who did not die in ICU following treatment withdrawal. The audit does not capture data on those patients. Accordingly, caution should be used when considering the likelihood of death within an hour of extubation – decision-rules derived from only patients who died (and not from all who were extubated) will somewhat overestimate the probability of death within the one-hour time frame that permits DCD. Usual clinical practice in DCD is to use a combination of guidelines and expert clinical opinion to identify patients considered to be 'likely to die within an hour of extubation'. Such a prospective estimate is necessarily imprecise. There is a need to maximise the opportunity for donation to occur, when this is in keeping with family wishes. At the same time, DCD will achieve limited acceptance by both families and healthcare professionals if the DCD process is frequently abandoned without donation taking place. This would be because the patient does not die within the time frame (currently one hour after extubation) that allows for subsequent safe transplantation of organs from DCD donors. Finding the 'correct' balance between these issues will take some time and local experience.

Most of the potential DCD donors in this audit have been reported from large tertiary ICUs, most of which have now completed DCD preparation and are either ready for DCD now or soon will be. This location of potential DCD donors represents referral of children and younger adults from smaller ICUs for tertiary neuro-intensive care. It also reflects clinical practice within these large ICUs which have considerable familiarity with withdrawal of treatment in such often-tragic situations.

Extrapolating from these data would suggest a maximum possible number of potential DCD donors of ~30 per year. Some of these would be excluded because of medical contra-indications and coronial interdiction. The number who could be prospectively identified, with an acceptable (30-50%) rate of 'false positives', is not clear; some Auckland data suggest that it could be around 60% ie ~15. We do not yet have experience with the relative acceptability to families (other than those who spontaneously offer donation) of DCD compared with donation after brain death and international data on this point are scant and selection-biased. DCD could potentially provide a significant number of additional donors, perhaps of the order of 5-10 per year nationally.

Summary

The ICU death audit is proceeding well. There are still some aspects of the on-line software that can be improved and these issues are being attended to as they arise.

The data from this audit, taken together with the ongoing average 4% annual fall in road trauma fatalities over the last six years[15] and data from the DCCM in Auckland City Hospital[16], make it seem highly likely that fewer patients are dying in New Zealand ICUs as a result of severe brain damage, particularly from traumatic brain injury. While this is highly desirable from the perspective of individuals with such conditions, and from the public health perspective, it will inevitably lead to fewer opportunities for organ donation, making it even more important that all such opportunities are identified and expertly supported.

Organ donation was discussed with families of all suitable patients who had been determined to be brain dead (except when families could not accept that brain death had occurred) and was also discussed with families of some other patients who may have been brain dead but were not examined for brain death because the families did not wish either to donate or to have brain death determined.

There are a modest number of apparently suitable 'potential DCD donors', whose deaths are most likely to occur in the six ICUs which provide neuro-intensive care alongside neurosurgical services. Because DCD is new and unfamiliar in New Zealand and the number of potential DCD donors in any one ICU is small, it will take some time for local expertise in DCD to develop in each ICU.

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