Donation after Circulatory Death
UK experience

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What's happened to Leeds United? From champions of England to Massimo Cellino

March 26, 2014 17:18 | by Alex Richards

Sunday Mirror journalist and author Anthony Clavane takes a look at Leeds United's fall from grace.

From "chasing the dream" in the Champions League semi-final in 2001, to financial ruin and...
UK deceased donors and transplant waiting lists, 1999 -2006
The UK Taskforce Report

- 14 recommendations
  - Donor identification and referral
  - Coordination
  - Retrieval
- Comprehensive UK-wide framework for donation and retrieval
- Accepted in full by all four health departments
- 50% increase in deceased donation by 2013
Local Donation Champions

Recommendation 4

All parts of the NHS must embrace organ donation as a usual, not an unusual event. Local policies, constructed around national guidelines, should be put in place. Discussions about donation should be part of all end-of-life care when appropriate. Each Trust should have an identified clinical donation champion and a Trust donation committee to help achieve this.

Donation should not be viewed as something to be inflicted upon patients and families after end of life care.

Rather, it should be considered to be a fundamental component of end of life care and not denied to patients because they are dying in the wrong place or in the wrong way.
Framework of Practice

Recommendation 3

Urgent attention is required to resolve outstanding legal, ethical and professional issues in order to ensure that all clinicians are supported and are able to work within a clear and unambiguous framework of good practice. Additionally, an independent UK-wide Donation Ethics Group should be established.

Wrong place of death
Wrong kind of death
Unknown wishes
The UK framework for donation

NHS Blood and Transplant

- National ODO
- Employment of coordinators
- Commissioning of retrieval
- Audit
- Public engagement
- Education and training

More patients having their wishes to donate recognised, fulfilled and maximised

Acute hospitals

Clinical leads
Embedded coordinators
Donation Committees

Departments of Health

- Funding
- Resolution of ethical and legal obstacles
- Regulation
- Public recognition
Deceased donors up to 2013-14

- 2007-8: 609 (DBD 200, DCD 609)
- 2008-9: 611 (DBD 288, DCD 335)
- 2009-10: 624 (DBD 624, DCD 373)
- 2010-11: 637 (DBD 637, DCD 436)
- 2011-12: 705 (DBD 652, DCD 436)
- 2012-13: 705 (DBD 705, DCD 507)
- 2013-14: 780 (DBD 780, DCD 540)

Total: 809 (DBD 200, DCD 609) - 1320 (DBD 780, DCD 540)

Increase in deceased donors: 63%
Deceased donors, transplants and the transplant waiting list 2003-2014

Number of Transplants, Donors, and Transplant List over the years from 2003-2014.
Inquiry on organ donation and transplantation in Sweden

Terms of Reference

• Improve public commitment to donation
• Improve conversion of current potential donors
• Explore new pools of potential donors
  – Donation after Circulatory Death

Anders Milton
Inquiry Chair
Objectives

• Introduction

• The controlled DCD pathway
  – Decision to withdraw life sustaining treatments
  – Donor identification and referral
    • Who can donate
    • Who will donate
    • Ensuring referral
  – Care before and after treatment withdrawal
    • Consent
    • Ischaemic injury
    • Treatment withdrawal
  – Diagnosis of death and post mortem intervention

• Contribution to transplantation
The controlled DCD Pathway

- Irreversible loss of circulatory function
- Permanent loss of consciousness and respiration
- Organ retrieval after death that follows planned withdrawal of life-sustaining treatments.
  After death, but before excessive ischaemic injury.
Decision to withdraw life sustaining treatments

Independent of donation

Initial assessment on suitability for DCD
  Early referral to coordinator

Family approach for consent
  Prior to treatment withdrawal

Continued physiological support

Treatment withdrawal
  Delayed until retrieval team are prepared

Expedient diagnosis of death

Rapid transfer to theatre for organ retrieval

Final acts of care and debriefing
DCD pathway
Key considerations

• Donation considered before death
  – Assessment – who can donate?
  – Family approach

• Requires delay in treatment withdrawal
  – ? Physiological instability

• Altered management of death
  – Location of treatment withdrawal
  – Rapid diagnosis of death
  – Rapid transfer to theatre

• Organ ischaemia and stand down of retrieval

End of life care has to be adjusted if DCD is to be possible
DCD pathway

Key considerations

• Donation considered before death
  – Assessment – who can donate?
  – Family approach

• Requires delay in treatment withdrawal
  – ? Physiological instability

• Altered management of death
  – Location of treatment withdrawal
  – Rapid diagnosis of death
  – Rapid transfer to theatre

• Organ ischaemia and stand down of retrieval

40% of DCD retrievals in the UK are stood down.
Decision to withdraw life sustaining therapies
The decision to withdraw life sustaining treatment

- Local policies based upon and consistent with relevant national policies and guidelines
- Multi-disciplinary or ‘collegiate’ one
- Independent of retrieval or transplantation
- Robust and defensible
Donor identification and referral
Who can donate
Who will donate
Ensuring referral
Absolute contra-indications to DCD

- Age >85 years
- Any cancer with evidence of spread outside affected organ (including lymph nodes) within 3 years of donation (however, localised prostate, thyroid, in situ cervical cancer and non-melanotic skin cancer are acceptable)
- Melanoma (except completely excised Stage 1 cancers)
- Choriocarcinoma
- Active haematological malignancy (myeloma, lymphoma, leukaemia)
- Definite, probable or possible case of human TSE, including CJD and vCJD, individuals whose blood relatives have had familial CJD, other neurodegenerative diseases associated with infectious agents
- TB: active and untreated
- HIV disease (but not HIV infection)

http://www.odt.nhs.uk/transplantation/guidance-policies/
Who can donate?

UK Potential Donor Audit (October 2009 – March 2012)
7504 patients referred as potential DCD donors
877 actual DCD donors
Who will donate: prediction of asystole

56% die within 60 mins
64% die within 2 hours
72% die within 4 hours

- Younger age
- High respiratory support
  - High FiO\textsubscript{2}
  - PEEP > 10 cmH\textsubscript{2}O
  - IPPV
- Inotropes
- GCS 3
- Terminal extubation
- BMI > 30

Suntharalingam et al. AJT 2009;9:2157
Identification of potential donors

- It is currently not possible to identify patients who will die within 2 – 3 hours of treatment withdrawal
- Donation should be considered whenever treatment withdrawal is planned

From Wind et al, Critical Care Medicine, 2012, 40: 766-9
81. If a patient is close to death and their views cannot be determined, you should be prepared to explore with those close to them whether they had expressed any views about organ or tissue donation, if donation is likely to be a possibility.

82. You should follow any national procedures for identifying potential organ donors and, in appropriate cases, for notifying the local transplant coordinator.
Ensuring referral 2

Identify potential donors as early as possible.

Base identification on either of the following criteria, while recognising that clinical situations vary.

Whichever is the earlier, either:
- use defined clinical trigger factors in patients who have had a catastrophic brain injury: the absence of one or more cranial nerve reflexes and a Glasgow Coma Scale score of 4 or less that is not explained by sedation unless there is a clear reason why the above clinical triggers are not met and/or
- a decision is made to perform brainstem death tests.

The intention to withdraw life-sustaining treatment in patients with a life-threatening or life-limiting condition which will, or is expected to, result in circulatory death.

Initiate discussions with the specialist nurse for organ donation at the time the above criteria are met.
Care before and after treatment withdrawal
Consent
Solutions to ischaemic injury
Treatment withdrawal
Family approach

• Initial assessment of possibility for DCD made before end of life care discussions with family
  – Organ Donor Register

• Donation raised only when family have understood and accepted inevitability of loss
  – The decision to withdraw support is made independently of a decision to donate

• Should include
  – Timings
  – Location
  – Pre-mortem interventions
  – Possibility of stand down
UK family consent rates

family consent rate (%)

DBD
DCD
Ischaemic injury in controlled DCD

DCD timeline (not to scale)

decision re WLST
withdrawal
asystole
cold perfusion
transplant reperfusion

terminal physiological decline
SBP < 50mmHg
Ischaemic injury in controlled DCD

- **Decision re WLST**
- **Withdrawal**
- **Asystole**
- **Cold perfusion**
- **Transplant reperfusion**

**DCD timeline (not to scale)**

- Agonal period
- Cold ischaemia
- Functional warm ischaemia
- SBP < 50mmHg
Current UK guidance on DCD stand down

<table>
<thead>
<tr>
<th>Organ</th>
<th>Functional warm ischaemia</th>
<th>Agonal period</th>
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</thead>
<tbody>
<tr>
<td>Liver</td>
<td>30 min</td>
<td>3 hr</td>
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<tr>
<td>Pancreas</td>
<td>30 min</td>
<td>3 hr</td>
</tr>
<tr>
<td>Lung</td>
<td>60 min</td>
<td>3 hr</td>
</tr>
<tr>
<td>Kidney</td>
<td>120+ min</td>
<td>3 hr</td>
</tr>
</tbody>
</table>

40% DCD retrievals in UK are stood down
- Practicality (agonal period)
- Ischaemic injury (functional warm ischaemia)
Solutions to ischaemic injury

Before death

- **Ante-mortem**
  - Tissue typing
  - Steroids, heparin, vasodilators
  - Femoral cannulation

- Management at time of death
  - Withdrawal in theatre
  - Expedient diagnosis of death

- **Post-mortem** reperfusion
  - In situ
  - Ex situ
Solutions to ischaemic injury
During death

- **Ante-mortem**
  - Tissue typing
  - Steroids, heparin, vasodilators
  - Femoral cannulation

- **Management at time of death**
  - Withdrawal in theatre
  - Expedient diagnosis of death

- **Post-mortem reperfusion**
  - In situ
  - Ex situ
Solutions to ischaemic injury

After death

- **Ante-mortem**
  - Tissue typing
  - Steroids, heparin, vasodilators
  - Femoral cannulation

- **Management at time of death**
  - Withdrawal in theatre
  - Expedient diagnosis of death

- **Post-mortem reperfusion**
  - In situ
  - Ex situ
Management of treatment withdrawal

- Manner of treatment withdrawal should not be adjusted to promote donation
- But that donation is more likely if
  - Complete withdrawal of all cardio-respiratory treatments (inotropes, ventilation, endotracheal tube)
  - Nursed in supine position
  - Pharmacological comfort cares as required
- Treatment withdrawal in theatre may reduce ischaemia but has drawbacks
  - Staffing
  - Access to drugs
  - Privacy and dignity
  - Stand down
Diagnosis of death and post mortem interventions
Diagnosis of Death

In the UK, death can be confirmed after **5 minutes** of complete and continuous absence of cardio-respiratory function.

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www.aomrc.org.uk/publications/reports-guidance.html
Diagnosis of Death

• Asystole is absence of mechanical cardiac function, not electrical silence on ECG
• It is best diagnosed by
  – Invasive arterial pressure monitoring
  – Echocardiography
• If invasive pressure monitoring or echocardiography are not available, identify on basis of isoelectric ECG

Death can be diagnosed after five minutes of continuous asystole
Diagnosis of Death

• Death is confirmed by demonstrating the absence of neurological function (respiration, consciousness and brain-stem reflexes) after 5 minutes of continuous asystole.

• Any return of cardiac or respiratory function must prompt further 5 minutes of observation.

Death is regarded as the simultaneous and irreversible loss of consciousness and respiration.
Diagnosis of death and organ retrieval

- A clear intention not to perform cardio-pulmonary resuscitation
- Confidence that the possibility of spontaneous return of cardiac function has passed
- An absolute prohibition on any intervention that might restore cerebral oxygenation
  - Restoration of myocardial contractility
  - Extracorporeal oxygenation

The brain remains responsive to restoration of oxygenation of some minutes
Methods of preservation and retrieval

- Crash laparotomy
- Super-rapid perfusion
Solutions to ischaemic injury

Normothermic regional perfusion

Normothermic reperfusion serves to restore aerobic conditions prior to cold perfusion
Reversing organ ischaemia

- Laparotomy, cannulation and perfusion with preservation solutions can begin as soon as death has been confirmed.
- Regional normothermic perfusion of abdominal organs with oxygenated blood cannot begin when the thoracic aorta has been occluded.
Deceased donation in UK, 2000-14

![Bar chart showing deceased donation in the UK from 2000 to 2014. The chart compares MC III DCD donors and DBD donors over the years.](chart.png)
MC III DCD in UK, 2012-13

Potential DCD donor: a patient who had treatment withdrawn and death anticipated within 4 hours

Conversion rate 14%

Potential donors: 6517

- Neurological death tests performed: 3114
- Neurological death confirmed: 1816
- Contraindications: 931
- Family approach: 449
- Consent/authorisation: 449
- Donation: 449
Number of organs recovered decreases with age (UK 2011/12)

Number of organs recovered decreases with age (UK 2011/12)

Number of organs/donor

Donor Age

UK data courtesy of NHSBT
Contribution of DCD to UK transplantation 2012-13

<table>
<thead>
<tr>
<th>Tissue</th>
<th>living</th>
<th>DBD</th>
<th>DCD</th>
<th>% total</th>
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</thead>
<tbody>
<tr>
<td>Kidney(^1)</td>
<td>1068</td>
<td>1167</td>
<td>749</td>
<td>25</td>
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<tr>
<td>Liver</td>
<td>31</td>
<td>637</td>
<td>136</td>
<td>17</td>
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<tr>
<td>Lung</td>
<td>0</td>
<td>153</td>
<td>34</td>
<td>18</td>
</tr>
<tr>
<td>Pancreas</td>
<td>0</td>
<td>33</td>
<td>5</td>
<td>13</td>
</tr>
<tr>
<td>Heart</td>
<td>-</td>
<td>145</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

\(^1\)Includes kidney and pancreas
Kidney transplant outcomes

Graft survival

Patient survival

% graft survival

% patient survival

0 1 2 3 4 5 years post-transplant

0 1 2 3 4 5 years post-transplant

DBD

DCD
Liver transplant outcomes

3 year transplant survival

3 year patient survival

% transplant survival vs. Years since transplant

% patient survival vs. Years since transplant

- Orange line: DBD
- Blue line: DCD
<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>08.30 - 09.30</td>
<td>Registration and coffee</td>
</tr>
</tbody>
</table>
| 09.30 - 09.35 | Welcome and introduction  
Catarina Andersson Forsman and Annika Tibell |
| 09.35 - 10.00 | Why DCD is needed  
Francis Delmonico                                                |
| 10.00 - 10.45 | International overview of DCD  
Marti Manyalich                                                  |
| 10.45 - 11.00 | Short break                                                          |
| 11.00 - 11.45 | Controlled DCD – implementation and practical aspects in the ICU  
Paul Murphy                                                    |
“Sometimes your only transportation is a leap of faith.”

~ Margaret Shepherd
You don't have to see the whole staircase, just take the first step.
“To succeed, jump as quickly at opportunities as you do to conclusions.”

Benjamin Franklin
These issues should not be particularly difficult, or even that costly to resolve. Overcoming them will require leadership, boldness and willingness to change established practice. The prize for doing so is considerable.

Organ Donation Taskforce, 2008
Donor identification and referral

- Donation should be considered whenever treatment withdrawal is planned
- National criteria for the identification and referral of potential donors
- National criteria for the acceptance of potential cDCD donors
- There is an on-going need to improve the accuracy of tools that predict the time interval from treatment withdrawal to asystole.
- All healthcare professionals involved in the care of potential cDCD donors should have the appropriate knowledge and skills, and should be supported by senior clinical staff

European DCD Consensus Statement (in press)
Care before and after treatment withdrawal

• There should be clear national guidance on
  – the lawfulness of ante mortem interventions
  – the location of treatment withdrawal
  – how treatments are withdrawn.
  – the role of the transplant team and transplant coordinators in cDCD pathway.

• Healthcare professionals who are uncomfortable with controlled DCD may choose not to be involved in the care of such patients, although this should not deny the opportunity for a suitable patient to donate.

• Education of healthcare staff is essential as many are uncomfortable at the clinical interface between end-of-life care and organ donation.

European DCD Consensus Statement (in press)
Diagnosis of death and post mortem interventions

- Death should be regarded as a state in which a patient has permanently lost the capacity for consciousness and all brain-stem function, including respiration.

- Clinical staff should be provided with a clear and unambiguous code of practice for the diagnosis of death following loss of circulatory function that include
  - the minimum monitoring requirements
  - the minimum period of observation required to confirm the permanent loss of circulatory and neurological function
  - these criteria must be independent of organ retrieval and in no way determined by the ischaemic tolerances of transplantable organs.

European DCD Consensus Statement (in press)
European deceased donation rates, 2013

- Spain
- Croatia
- Belgium
- Portugal
- France
- Estonia
- Slovenia
- Italy
- United Kingdom
- Ireland
- Latvia
- Lithuania
- Sweden
- Hungary
- Netherlands
- Germany
- Greece

DBD
DCD
Maastricht Classification of DCD

<table>
<thead>
<tr>
<th>Definition</th>
<th>Where</th>
</tr>
</thead>
<tbody>
<tr>
<td>I  Dead on arrival</td>
<td>Spain, France, Italy, Netherlands, Belgium, Scotland</td>
</tr>
<tr>
<td>II Unsuccessful resuscitation</td>
<td>Belgium, United Kingdom, Netherlands, Australia, USA, New Zealand</td>
</tr>
<tr>
<td>III Cardiac arrest awaited after withdrawal of life support in patients who are not brain dead</td>
<td></td>
</tr>
<tr>
<td>IV Cardiac arrest after brain death</td>
<td></td>
</tr>
</tbody>
</table>

MC I, II, uncontrolled
MC III, IV: controlled
Lung retrieval from DCD donors

- Re-intubation can take place as soon as death has been confirmed.
- Lungs can be re-inflated with a single insufflation after 10 minutes.
- Cyclical mechanical ventilation can only begin when the cerebral circulation has been isolated.

DCD donors may become the preferred source of lungs – particularly if assessed and re-conditioned ex-vivo.
Organ-specific contra-indications to DCD

Liver
- Acute hepatitis (Serum AST or ALT>1000 IU/L if of liver origin)
- Cirrhosis
- Portal vein thrombosis

Kidney
- Chronic kidney disease (CKD stage 3B and below, eGFR<45)
- Long term dialysis
- Renal malignancy (prior kidney tumours of low grade and previously excised would not exclude donation)
- Kidney transplant (> 6 months previously)

Pancreas
- Insulin dependent diabetes (excluding ICU associated insulin requirement)
- Pancreatic malignancy

Lungs
- donor age >65 years; DBD donor age >70 years
- Intra-thoracic malignancy
- Significant, chronic destructive or suppurative lung disease (those with controlled asthma are suitable donors)
- Chest X-ray evidence of major pulmonary consolidation

http://www.odt.nhs.uk/transplantation/guidance-policies/