**Decision made that to continue treatment would not be of overall benefit to the patient**

Exclude absolute contraindications to organ donation

Contraindications absent

Can be performed in parallel

Check Organ Donor Register

Notification of potential donor to Specialist Nurse Organ Donation

Refer to Coroner or Procurator Fiscal as required

Patient assessment

Approach family for solid organ donation following assessment?

Approach family to request consent / authorisation

Consent / authorisation given

Obtain specimens for investigations (including blood)

Go to DCD, Adult - Planning & Withdrawal

Consent / authorisation not given

Continue end of life care

Do not approach family to request consent / authorisation

Patient not suitable for solid organ donation. Consider tissue donation.

Continue end of life care

Contraindication present

Consider brain-stem death as a possible diagnosis

Go to Brain-stem Death Testing, Adult

Patient not suitable for organ donation

Continue end of life care
1 Background information

Quick info:

Donation after Cardiac Death, Adult Pathway

Scope:

- Donation after Cardiac Death (DCD) refers to the retrieval of organs and eye tissue for the purposes of transplantation after death that is confirmed using ‘traditional’ cardio-respiratory criteria. This pathway refers exclusively to ‘controlled’ DCD - that is, donation which follows a cardiac death that is the result of the withdrawal or non-escalation of cardio-respiratory support therapies that are considered to be no longer in a patient’s best interests. Controlled DCD classifications:
  - Maastricht Category III: 'Awaiting Cardiac Arrest', and
  - Maastricht Category IV: 'Cardiac Arrest in a Brain stem Dead Donor'

- In the UK, DCD programmes currently support the retrieval and transplantation of the following solid organs:
  - Kidney
  - Liver
  - Lungs
  - Pancreas
  - Successful cardiac transplantation using hearts recovered from asystolic donors has been reported in North America, although it is currently not practiced in the UK

- Tissue donation from potential DCD donor, including when solid organ donation does not progress

- Donation from all care settings, most commonly but not exclusively ICUs and Emergency Medicine Departments

Out of scope:

- Uncontrolled DCD - this refers to the retrieval of organs from patients who suffer an unexpected death that is confirmed on cardio-respiratory grounds. It accounts for only a small percentage of all DCD donors in the UK, largely because of the interventions that are necessary to maintain the viability of transplantable organs in a patient whose death has been declared whilst 'consent / authorisation' for donation is being sought from a deceased’s next of kin (‘consent’ is the term used in the Human Tissue Act (2004) and ‘authorisation’ is the term used in the Human Tissue (Scotland) Act 2006). Uncontrolled DCD is widely practiced elsewhere in the world, e.g. Spain. Uncontrolled DCD classifications:
  - Maastricht Category I: Dead on Arrival
  - Maastricht Category II: Unsuccessful Resuscitation
  - Maastricht Category V: Unexpected cardiac arrest in a critically ill patient

- Donation from paediatric patients

- Tissue donation from tissue only donors. However information is provided on tissue only donation for patients who start on the clinical pathway

Incidence and prevalence:

- There has been an increase in the annual number of DCD organ donors in the UK from 37 in 2000/01 to 336 in 2009/10. Although these are donors who are predominantly referred from intensive care units, it is also possible for DCD to be supported by Emergency Departments. The Potential Donor Audit suggests that in 2008/09 up to a third of hospitals in the UK did not have fully active DCD programmes. This, together with individual variation in practice results in as many as 600 of suitable patients being denied the option of donation after their death

- The donation potential of DCD donors is less than that of donors following brain-stem death (DBD), and currently offers little for those in need of thoracic organ transplant. DCD programmes are best viewed as offering the option of donation to a population of patients with little prospect of developing brain-stem death in a realistic time frame

- Further information can be found at the NHS Blood and Transplant Annual Transplant Activity Report [link]

Legal guidance

Legal guidance on issues relevant to DCD has recently been published.

References:

- 'Legal issues relevant to non-heartbeating organ donation' (England and Wales) [link]
- 'Guidance on legal issues relevant to donation following cardiac death' (Scotland) [link]
2 Information resources for patients / families

Quick info:
An information leaflet for families is available here: Organ and Tissue Donation following Cardiac Death

3 Updates to this pathway

Quick info:
This is the first version of this pathway.

4 Definition of commonly used terms

Quick info:

**Ischaemic injury to DCD organs**
Transplantable organs are particularly sensitive to warm ischaemia, since whilst metabolic processes continue, the supply of oxygen fails and cells switch from aerobic to anaerobic metabolism. Anaerobic metabolism is heavily adenosine triphosphate (ATP) dependent and as intracellular ATP stores deplete rapidly there is a corresponding failure of ATP-dependent membrane-associated ion exchange channels. This results in a loss of membrane integrity and cellular dysfunction and cell death occur. The same processes occur during cold ischaemia, but cooling slows metabolic rate markedly and allows cells and organs to tolerate much longer periods of ischaemia. DCD donors have a lower donation potential than DBD donors, in part because of the ischaemic damage that the organs retrieved from DCD donors have suffered. This results in more primary non function of DCD liver grafts, much increased post-operative morbidity and more ischaemic biliary complications. There is also a higher incidence of delayed graft function of kidney grafts and inferior pancreas outcomes compared to DBD.

Donation starts with treatment withdrawal, following which the patient's vital signs, in particular the blood pressure, deteriorate at varying rates until cardiac activity ceases (asystole). Following diagnosis and confirmation of death organ retrieval begins with perfusion of the donor with cold preservation solution. The following time periods have been defined:

- **The withdrawal period** (sometimes called the agonal period): the time from treatment withdrawal to onset of irreversible asystole.
- **The asystolic warm period** (also known as the primary warm ischaemic time): the time from cessation of mechanical cardiac function to the perfusion of the organs with cold preservation solution in situ.
- **The functional (or true) warm ischaemic period**: commences when the systolic blood pressure has a sustained (i.e. at least 2 minutes) fall below 50mmHg (or the haemoglobin oxygen saturation below 70%) and extends up to the onset of cold in situ perfusion. The functional (or true) warm ischaemic period reflects the fact that, even though a circulation exists, end organ perfusion is poor and the organs suffer a warm ischaemic insult. It is appropriate therefore to consider this warm ischaemic period when assessing likely organ damage, rather than the asystolic warm period. A systolic blood pressure of 50mmHg is currently identified as predicting the onset of warm ischaemia, although there is little published evidence to support this. In addition organs from young donors are likely to tolerate hypotension much more than older donors, and organs from patients who had a history of hypertension are likely to experience critical ischaemia with systolic blood pressures in significantly in excess of 50mmHg.

5 Decision made that to continue treatment would not be of overall benefit to the patient

Quick info:

This decision should:

- Be based upon a multi-disciplinary consensus that it would no longer be of overall benefit to the patient to continue or escalate life-sustaining cardio-respiratory support
- Be robust enough to bear objective scrutiny
- Adhere to a local policy on withholding and withdrawing treatment, based on national guidance
- Be documented, signed and dated in patient's notes
- Be fully independent from any subsequent discussion regarding organ donation
- Not involve members of staff potentially involved in transplantation of organs retrieved from the patient following death

Unless brought up by the family, the issue of donation should not be discussed until the decision to withdraw life-sustaining treatment has been accepted by the family.

Some units will leave discussions regarding organ donation until a subsequent conversation.

6 Consider brain-stem death as a possible diagnosis

Quick info:
In principle, and regardless of any subsequent consideration of organ donation, and in line with guidance for the Academy of Medical Royal Colleges, the Intensive Care Society, and the Organ Donation Taskforce, clinicians are encouraged to consider the diagnosis of brain-stem death, wherever this seems a likely diagnosis. This not only gives both clinical staff and families the confidence of a firm and absolute diagnosis, but also maintains the possibility of donation after brain-stem death.

Reference:

7 Exclude absolute contraindications to organ donation

Quick info:
In principle, all potential DCD donors without absolute contraindications (see below) should be discussed with the local Specialist Nurse Organ Donation, as per the recommendation of the Organ Donation Taskforce.

The only absolute contra-indications for organ donation are:

- known or suspected new variant Creutzfeldt–Jakob disease (nvCJD) and other neurodegenerative diseases associated with infectious agents
- known human immunodeficiency virus (HIV) disease (but not HIV infection alone)

In addition, it is highly likely that donors with the following conditions will also be declined, although there may be occasions when organs are accepted if the alternative for a specific recipient is imminent death (e.g. from fulminant hepatic failure):

- age > 90 years
- Disseminated cancer (above or below the diaphragm)
- Melanoma (except local melanoma treated > 5 years before donation)
- Treated cancer within 3 years of donation (except non-melanoma skin cancer and in-situ cervical cancer)

In practice however, many retrieval teams currently adopt a cautious approach to DCD donors. This is because the organs of DCD donors are unavoidably exposed to a period of warm ischaemia that may result in impaired function post-transplant. It is believed that this accounts for the higher incidence of delayed graft function following kidney transplantation and possibly the higher incidence of biliary complications after liver transplantation. As a consequence some retrieval teams may be reluctant to accept organs from so-called ‘marginal’ DCD donors – elderly donors or donors with medical co-morbidities such as diabetes mellitus or atherosclerosis - where co-existing chronic impairment may be superimposed upon this inevitable warm ischaemic damage. Nevertheless, as experience with DCD increases, it is likely that the criteria for DCD donors may begin to relax, and specifically the upper age limit may rise.

13 Check Organ Donor Register

Quick info:
The NHS Organ Donor Register (ODR) was established in 1981, and provides residents of the UK with a formal means of recording their desire to donate organs and / or tissue after death. By July 2010 the ODR had accumulated more than 17 million registrations. Registration occurs:

- when individuals apply for a driving licence
- when individuals register with a new general practitioner
- through applications for the Boots Advantage customer loyalty card
- online at http://www.organdonation.nhs.uk/ukt/default.jsp
- by telephone on 0300 1232323
- by texting SAVE to 84118

Before approaching a family, clinicians should confirm whether their patient is on the ODR (approximately a quarter of the UK population is currently registered on it), since this has a direct influence on the subsequent approach to the individual’s next of kin. This can be done on behalf of clinicians by the local Specialist Nurse for Organ Donation or directly by contacting the Duty Office at the Directorate of Organ Donation and Transplantation in Bristol on 0117 9757580 or 0117 9757581. When making an enquiry, clinical staff will be asked to provide the following information:
14 Notification of potential donor to Specialist Nurse Organ Donation

Quick info:
The Organ Donation Taskforce recommended the following criterion for the notification of potential DCD donors:

ʻIn patients for whom no further treatment options are available or appropriate (typically but not exclusively in the context of a catastrophic neurological injury), and there is no intention to confirm death by neurological criteria, the Donor Transplant Coordinator [Specialist Nurse Organ Donation] should be notified when a decision has been made by a consultant to withdraw active treatment and this has been recorded in a dated, timed and signed entry in the case notes.

[In the absence of an absolute contraindication to donation this] notification should take place even if the attending clinical staff believe that death cannot be diagnosed by neurological criteria, or that donation after cardiac death might be contra-indicated or inappropriate.ʼ

On notification, the Specialist Nurse Organ Donation will typically ask for the following patient information:

- Name
- Date of birth
- Post code
- NHS no. or Community Health Index no.
- Notifying clinician name, role and contact details
- Notifying hospital and unit
- Length of stay
- Primary diagnosis
- Significant clinical factors, e.g.
  - most recent urea and electrolyte and liver function test results
  - known virology
  - current instability
  - past medical history of note
  - past social history of note
- Blood group
- Next of Kin
- Next of kin location
- Other immediately relevant family information

Reference:

15 Refer to Coroner or Procurator Fiscal as required

Quick info:
Patients should be referred to the coroner or procurator fiscal at this stage if the cause of their eventual death following withdrawal of treatment will fall into one of the categories described below.

England, Wales and Northern Ireland
ʻGuidance for coroners and donor coordinators working with coronersʼ published by the Department of Health, Ministry of Justice and Welsh Assembly Government states:

ʻA death should be reported to the Coroner if:
• The cause of death is unknown
• It cannot readily be certified as being due to natural causes
• The deceased was not attended by a doctor during their last illness or was not seen within the last 14 days or viewed after death
• There are any suspicious circumstances or history of violence
• The death may be linked to an accident (whenever it occurred)
• There is any question of self neglect or neglect by others
• The death has occurred or the illness arisen during or shortly after detention in police or prison custody (including voluntary attendance at a police station)
• The deceased was detained under the Mental Health Act
• The death is linked with an abortion
• The death might have been contributed to by the actions of the deceased (such as a history of drug or solvent abuse, self injury or overdose)
• The death could be due to industrial disease or related in any way to the deceased’s employment
• The death occurred during an operation or before full recovery from the effects of an anaesthetic or was in any way related to the anaesthetic (in any event a death within 24 hours should normally be referred)
• The death may be related to a medical procedure or treatment whether invasive or not
• The death may be due to a lack of medical care
• There are any other unusual or disturbing features to the case
• The death occurred within 24 hours of admission to hospital, unless the admission was for the purposes of terminal care
• It may be wise to report any death where there is an allegation of medical mismanagement'

Scotland
'Death and the Procurator Fiscal' published by the Crown Office states:
'Any death which the circumstances or evidence suggest may fall into one or more of the following categories must be reported to the Procurator Fiscal:
(1) any death due to violent, suspicious or unexplained cause.
(2) any death involving fault or neglect on the part of another.
(3) possible or suspected suicide.
(4) any death resulting from an accident.
(5) any death arising out of the use of a vehicle including an aircraft, ship or train.
(6) any death by drowning.
(7) any death by burning or scalding, or as a result of a fire or explosion.
(8) certain deaths of children - any death of a newborn child whose body is found, any death from sudden infant death syndrome [...] any death due to suffocation including overlaying, any death of a foster child.
(9) any death at work, whether or not as a result of an accident.
(10) any death related to occupation, for example, industrial disease or poisoning. [...] any death due to poisoning or suspected poisoning, including prescription or non-prescription drugs, other substances, gas or solvent fumes.
(14) any death due to notifiable infectious disease, or food poisoning.
(15) any death in legal custody.
(16) any death of a person of residence unknown, who died other than in a house.
(17) any death where a doctor has been unable to certify a cause.'

References:
Guidance for coroners and donor coordinators working with coroners (England and Wales only):
Death and the Procurator Fiscal (Scotland): http://www.show.scot.nhs.uk/publications/me/death%20and%20pf.htm#Index2

16 Patient assessment
Quick info:
The Specialist Nurse Organ Donation will attend the Unit and carry out a detailed patient assessment. This assessment consists of:

- Review of medical records, including, if appropriate, from external healthcare providers
- Review of laboratory and radiology results
- Discussion with Clinician with responsibility for patient
- Discussion with nursing staff
- Physical examination
- Checking the Organ Donor Register, if this has not already taken place

and will ascertain:

- Age / past medical history
- History of current admission
- Next of kin and family details
- Possible contra-indications
- Cardiovascular status (use of inotropes / pressors)
- Respiratory status (level of ventilatory support, inspired oxygen fraction)
- Assessment of level of cardio-respiratory support will enable estimation of time from withdrawal of treatment to asystole.
- Whether a referral to the Coroner / Procurator Fiscal is required

17 Approach family for solid organ donation following assessment?

Quick info:
Dependent on outcome of Specialist Nurse Organ Donation's assessment of donor and response from Coroner / Procurator Fiscal.

18 Approach family to request consent / authorisation

Quick info:
The legislative framework for consent / authorisation for controlled DCD is rather more complicated than that which applies to heartbeating donation from the brain-stem donor. For instance, donation from the DBD donor is considered after death has been diagnosed and confirmed using neurological criteria, and is governed by the Human Tissue Act 2004 and the Human Tissue (Scotland) Act 2006. In contrast, controlled DCD must be considered whilst a patient is dying but before it has been confirmed – indeed, before the withdrawal of treatments that are expected to result in it. Thus, whilst the Human Tissue Acts referred to above are still relevant, of greater importance are the Mental Capacity Act 2005 and the Adults with Incapacity (Scotland) Act 2000. (The professional guidance on treatment and care towards the end of life issued by the General Medical Council is also of considerable importance.)

Little of this primary legislation has been enacted with controlled DCD in mind. Nevertheless, recent guidance that has been issued by both the Department of Health in London together with Welsh Assembly (to cover practice in England and Wales) and also by the Scottish government, both documents indicating the circumstances in which the actions that are required to facilitate controlled DCD can be considered to be lawful. This guidance is based largely upon the concept of best interests, and therefore is strongly reliant upon the principles that are enshrined within the Mental Capacity Act 2005 and the Adults with Incapacity (Scotland) Act 2000. Within this framework, knowledge of a patient's desire to donate after death, for instance through registration with the NHS Organ Donor Register, should be used to inform an assessment of best interests rather than advance consent for DCD. For instance, legal guidance for England and Wales states, 'While registration on the ODR provides consent for donation after death for the purposes of the HTA, the Department of Health does not consider that registration can be viewed as advance consent to steps to facilitate NHBD [DCD]. It would, however, be important evidence of a person's wish to donate.'

Legal guidance for Scotland states, 'Some people will have indicated their wish to be an organ donor by joining the NHS Organ Donor Register (ODR) or by carrying an organ donor card. Others may have discussed their wishes with family or friends or by indicating this in some other way. All of these count as authorisations under the 2006 Act. Clinicians should, therefore, consult the ODR and talk to the person's family and friends to find out if the person had expressed any wishes about donation to them. Under the HTSA, where authorisation has been given, the nearest relatives have no legal right to overrule those wishes. Where no formal authorisation has been given by the potential donor, authorisation for organ donation may be given by the person's nearest relative, as defined through the hierarchy set out in the 2006 Act, assuming that the relative has no actual knowledge that the person was unwilling to be a donor. In considering whether to give authorisation, the nearest relative is expected to act on the basis of what they believe the deceased's wishes would have been.'

In the consent / authorisation process, families should be aware that:
Donation after Cardiac Death, Adult - Assessment

- the timing of withdrawal will be determined by the availability of an operating theatre and surgical retrieval team as well as by the needs of the patient and his / her family
- of the need for additional blood sampling to allow microbiological screening, blood grouping and HLA tissue typing. Consent / authorisation must be obtained for microbiological screening if the results may have health implications for family or partners
- the time available to be spent with the patient after the confirmation of death will be strictly limited because of the need for prompt transfer to the operating theatre
- donation may not be possible if
  - the time interval between withdrawal and asystole is prolonged or
  - the Coroner / Procurator Fiscal refuses permission
- they can withdraw consent at any time up until the beginning of the retrieval procedure (in England, Wales and Northern Ireland)
- under Scottish law, it is unlawful to allow authorisation to be withdrawn once it has been given. However, clinicians sometimes take the pragmatic view that donation cannot proceed without the support of the family

Consent / authorisation for virology, blood grouping and HLA typing is also part of the consent /authorisation process.

Reference:
'Legal issues relevant to non-heartbeating organ donation' [link]
'Guidance on legal issues relevant to donation following cardiac death' (Scotland) [link]

Do not approach family to request consent / authorisation

Quick info:
Potential reasons why families may not be approached:
- Family has expressed a strong view that patient would not have wished to be a donor
- Coroner or Procurator Fiscal does not give permission for donation
- Presence of absolute contraindications:
  - known or suspected nvCJD and other neurodegenerative diseases associated with infectious agents
  - known HIV disease (but not HIV infection alone)
- In addition, it is highly likely that donors with the following conditions will also be declined, although there may be occasions when organs are accepted if the alternative for a specific recipient is imminent death (e.g. from fulminant hepatic failure):
  - disseminated malignancy
  - melanoma (except local melanoma treated > 5 years before donation)
  - treated malignancy within 3 years (except non-melanoma skin cancer)
  - age > 90 years
  - known active tuberculosis
  - untreated bacterial sepsis

Patient not suitable for solid organ donation. Consider tissue donation.

Quick info:
See attachment for detailed information on tissue (including eye) donation: Tissue and Eye Donation Information

Obtain specimens for investigations (including blood)

Quick info:
2 specimens of blood will be taken, 1 for microbiology and 1 for tissue typing. These will be sent to a regional laboratory and this would be organised by the Specialist Nurse in Organ Donation.
1 microbiology sample will be tested for:
  - HIV
• Hepatitis B
• Hepatitis C
• CMV
• Toxoplasmosis
• Syphilis
• HTLV (some laboratories)

If there is a possibility that a female patient may be pregnant, the unit should undertake a pregnancy test.

Reference:
'Guidance on the Microbiological Safety of Human Organs, Tissues and Cells used in Transplantation', Advisory Committee on the Microbiological Safety of Blood and Tissues for Transplantation (MSBT)

Donation after Cardiac Death, Adult - Assessment
Medicine > Organ donation > Donation after Cardiac Death, Adult

Key Dates

- Due for review: 02-Sep-2012
- Locally reviewed: 16-Sep-2010, by England & Wales
- Updated: 16-Sep-2010
- Search date: Sep-2009

References

This is a list of all the references that have passed critical appraisal for use in the pathway Donation after Cardiac Death, Adult

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