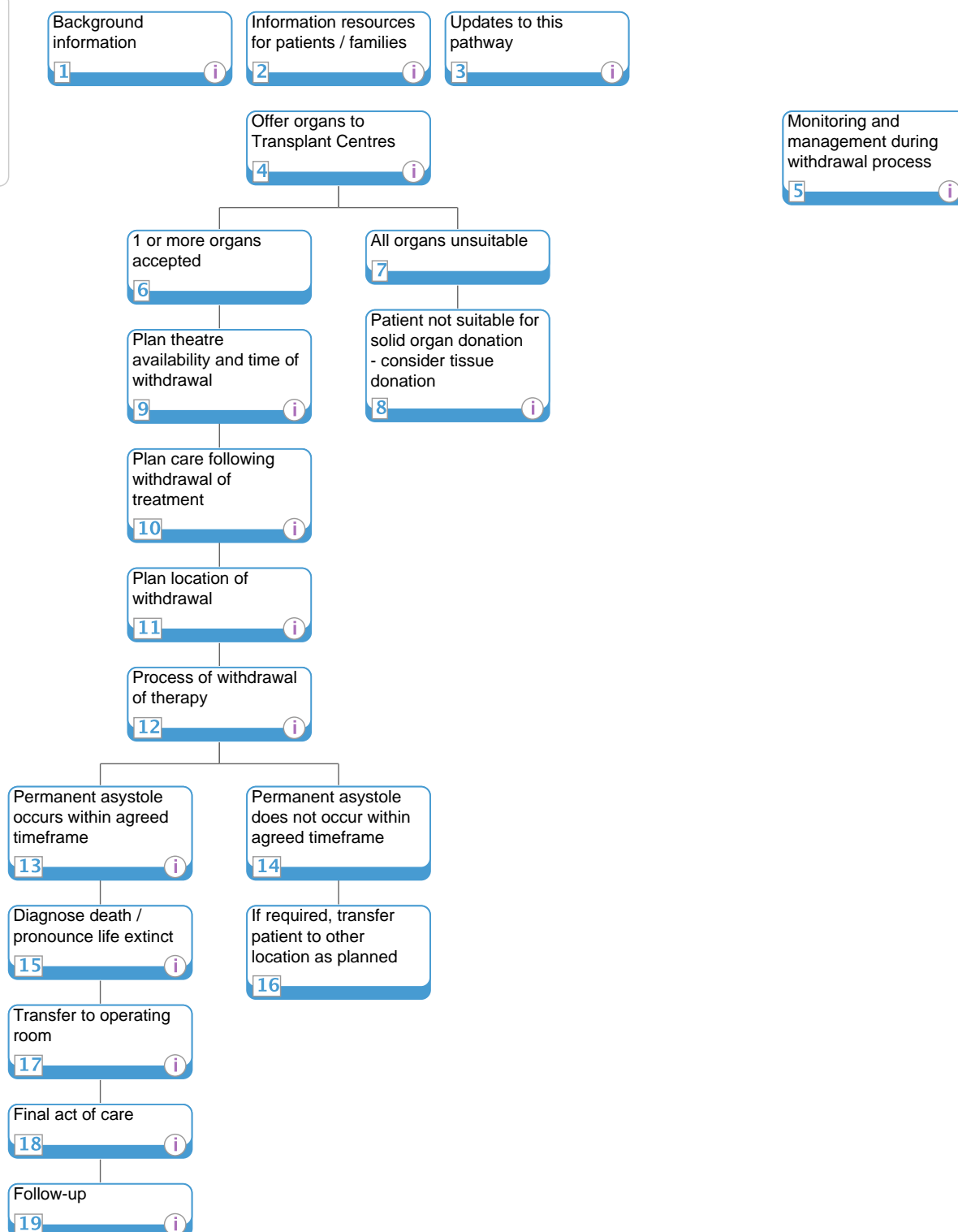
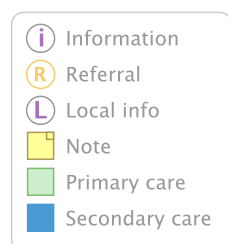


# Donation after Cardiac Death, Adult - Planning and Withdrawal

Medicine > Organ donation > Donation after Cardiac Death, Adult



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## 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 (covered by separate pathway which will be made available at a future date)
- 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 [http://www.organdonation.nhs.uk/ukt/statistics/transplant\\_activity\\_report/transplant\\_activity\\_report.jsp](http://www.organdonation.nhs.uk/ukt/statistics/transplant_activity_report/transplant_activity_report.jsp)

#### 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) [http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH\\_108825](http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_108825)

'Guidance on legal issues relevant to donation following cardiac death' (Scotland) [http://www.sehd.scot.nhs.uk/cmo/CMO\(2010\)11.pdf](http://www.sehd.scot.nhs.uk/cmo/CMO(2010)11.pdf)

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## 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. NB this is a draft version.

## 4 Offer organs to Transplant Centres

Quick info:

The Specialist Nurse Organ Donation offers each consented / authorised organ to each Transplant Centre in sequence until either the organ is accepted or is deemed unsuitable, having been declined by each Transplant centre (lungs may also be deemed unsuitable if declined because of grossly subnormal organ function by at least 4 centres in the cardiothoracic offering sequence). Offering is normally undertaken using the national Electronic Offering System.

This process typically takes between 1 and 5 hours. Each Transplant Centre that is offered an organ is allowed 45 minutes (30 minutes for kidneys) to accept an organ. Only those organs that have been accepted by a Transplant Centre with the intention to transplant will be retrieved.

The decision whether or not to accept an organ is made by the Transplant Surgeon and is based on multiple factors, including:

- Clinical condition of recipient
- Logistics of potential recipients' arrival at the Transplant Centre within the required timeframe
- Individual Transplant Centre's acceptance criteria

## 5 Monitoring and management during withdrawal process

Quick info:

### Monitoring

The focus of care on the dying patient and the family should not differ from normal practice when withdrawal of life-sustaining treatment occurs. However, the continued use of some haemodynamic and respiratory monitoring will be necessary to assess the perfusion of potentially transplantable organs during the dying process, and to allow the accurate timing of asystole.

It will be necessary to monitor and record heart rate, blood pressure, respiratory rate and SpO<sub>2</sub>. These will be observed continuously and recorded as required from withdrawal of life-sustaining treatment until asystole. Urine output is also measured.

If invasive monitoring is being used at the time of withdrawal, this should be left in situ and may be used to allow blood gas analysis as requested. If no invasive monitoring is in use, non-invasive monitoring will be continued. Disconnect all unnecessary monitors, switch off all alarms, and use remote monitoring if possible.

### Management prior to withdrawal of cardio-respiratory support

In order to facilitate DCD it is almost invariably necessary to delay, by a few hours, the withdrawal of cardio-respiratory support in order to allow the retrieval team time to travel to the donating hospital. It is possible that the potential donor may become unstable during this period of time, and that this instability may jeopardize the potential for donation.

Recent legal guidance from the Department of Health and from the Welsh Assembly Government that covers practice in England and Wales advises that, '[m]aintenance of life-sustaining treatment may be considered to be in the best interests of someone who wanted to be a donor if it facilitates donation and does not cause them harm, or place them at significant risk of experiencing harm or distress'.

Recent legal guidance from the Scottish government advises that, '[t]here are a number of steps that can be taken before a person has died, which can optimise the chances of a successful donation and transplant. These steps fall into the broad categories of actions to check the person's wishes about donation and their suitability to be a donor, maintaining treatment and the timing of its withdrawal to coordinate with organ retrieval and introducing new treatment or activities that improve the chances of a successful organ transplant.'

Examples of interventions that may be considered appropriate in such circumstances include (applicable in England, Wales and Scotland):

- adjustments to existing treatments, e.g.:
  - increases in oxygen concentrations

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- fluid administration rates)
- the introduction of new therapies (such as temporary inotropic support.)

The guidance recognises that it is impossible to cover in detail all possible interventions that might be necessary to maintain the potential for DCD, and emphasises the role of the decision-maker in considering 'the risk of harm or distress the patient or their family might experience', since if there were to be a significant risk of harm or distress then such interventions would not be of overall benefit to the patient. Examples of such risks include systemic heparinisation and cardiopulmonary resuscitation.

## References:

'Legal issues relevant to non-heartbeating donation' (England and Wales only):

[http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH\\_108825](http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_108825)

'Guidance on legal issues relevant to donation following cardiac death' (Scotland)[http://www.sehd.scot.nhs.uk/cmo/CMO\(2010\)11.pdf](http://www.sehd.scot.nhs.uk/cmo/CMO(2010)11.pdf)

## 8 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](#)

## 9 Plan theatre availability and time of withdrawal

Quick info:

The Specialist Nurse Organ Donation will negotiate a time for the availability of theatre, and hence withdrawal of treatment, based on:

- Family wishes
- Availability of theatre
- Other pressures on donating unit
- Availability and arrival time of retrieval team(s) (there are separate abdominal and cardiothoracic retrieval teams)

## 10 Plan care following withdrawal of treatment

Quick info:

The withdrawal process *per se* will not differ from usual practice.

### Comfort measures

Analgesic or sedative drugs should be administered to ensure the comfort of the dying patient, if that is part of normal practice. The choice of drugs is at the discretion of the attending consultant/senior member of the medical team who retains a duty of care to the patient.

### Airway support

Whether or not to extubate should be at the discretion of the clinician.

### Invasive monitoring

Any invasive monitoring should remain in situ.

### Observation

Following withdrawal of life-sustaining treatment, careful observation of the patient's haemodynamic status is essential. The aim is to quantify as much as possible the warm ischaemic insult to the organs and therefore to predict their viability. There is no robust data to support this, and all the literature is based on clinical series and experts' recommendations.

### Legal guidance

Recent legal guidance is referenced below.

### References:

'Legal issues relevant to non-heartbeating organ donation' (England and Wales) [http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH\\_108825](http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_108825)

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## 11 Plan location of withdrawal

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Quick info:

## Location of withdrawal

The patient and family should be afforded as much dignity and privacy as possible at this time.

The withdrawal of life-sustaining treatment should occur in a location that meets the patient and family's needs for privacy and dignity. Possible locations are:

- ICU
- Side room or other private area in an Emergency Medicine Department
- Anaesthetic room
- Other private area

In addition to privacy and dignity, consideration should be given to:

- Proximity to operating room, thereby minimising the time between asystole and cold perfusion of the organs for transplantation (warm ischaemic time):
  - Legal guidance for England and Wales states, '... changing a patient's location may be considered to be in the best interests of someone who wanted to be a donor if this facilitates donation and does not cause the person harm or distress, or place them at significant risk of experiencing harm or distress'
  - Legal guidance for Scotland states, 'Since it is necessary to begin organ retrieval very soon after death has been declared... local circumstances may necessitate moving the patient to a different location within the hospital, close to or within the operating theatre complex, ahead of withdrawal of treatment.'
- Suitability of location for ongoing care if asystole does not occur within the required timeframe for organ donation to proceed. If withdrawal is to take place in theatre suite, then a bed should be identified prior to withdrawal in case death does not occur within a timeframe that allows retrieval

## Reference:

'Legal issues relevant to non-heartbeating organ donation' [http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH\\_108825](http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_108825)

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## 12 Process of withdrawal of therapy

Quick info:

The withdrawal process *per se* will not differ from usual practice.

## Withdrawal of cardiorespiratory support

There is considerable clinical variation in the management of treatment withdrawal. It is emphasised that such practices should not be adjusted in order to facilitate donation and that they should be based upon local policies consistent with national guidance. Whilst some units would routinely extubate such patients, others would reduce ventilatory support but leave an artificial airway in situ.

However, such decisions are always a matter of clinical judgement based upon specific circumstances and there may be occasions where reductions in inspired oxygen concentrations and/or cessation of inotrope therapies may be judged to be sufficient.

## Comfort measures

Analgesic or sedative drugs should be administered to ensure the comfort of the dying patient, if that is part of normal practice. The choice of drugs is at the discretion of the attending consultant/senior member of the medical team who retains a duty of care to the patient.

## Airway support

The decision on whether to extubate should be based upon agreed local practices.

## Invasive monitoring

**Any invasive monitoring should remain in situ.**

Following withdrawal of life-sustaining treatment, careful observation of the patient's hemodynamic status is essential. The aim is to quantify as much as possible the warm ischaemic insult to the organs and therefore to predict their viability. There is no robust data to support this, and all the literature is based on clinical series and experts' recommendations.

## References:

'Legal issues relevant to non-heartbeating donation' (England and Wales only):

[http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH\\_108825](http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_108825)

'Guidance on legal issues relevant to donation following cardiac death' (Scotland) [http://www.sehd.scot.nhs.uk/cmo/CMO\(2010\)11.pdf](http://www.sehd.scot.nhs.uk/cmo/CMO(2010)11.pdf)

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## 13 Permanent asystole occurs within agreed timeframe

### Quick info:

Donation can only occur if irreversible asystole occurs within a certain timeframe after the withdrawal of treatment, and families will be made aware of these uncertainties around this during the consent / authorisation process. Retrieval teams are likely to define the acceptable timeframes before treatment is withdrawn.

The overall acceptability of a dying patient as a potential DCD donor is determined by various factors that relate to both the intrinsic quality of the potentially retrievable organs, the manner in which withdrawal of cardio-respiratory support is managed by a particular clinical area, logistical issues around availability of a retrieval team and the extent of need in the recipient population. As a consequence, it is only possible to describe in general terms the likelihood of DCD being possible for any particular patient.

Ischaemic injury is a major determinant of whether a retrieval team decides to accept a patient as a potential DCD donor. 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 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.

Factors that influence the degree of ischaemic injury include:

- **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
- the time from cessation of mechanical cardiac function to the perfusion of the organs with cold preservation solution in situ. This is referred to as the **asystolic warm period** (and is also known as the primary warm ischaemic time):
  - The duration of subsequent cold ischaemia (that may be lengthened unacceptably if there are delays in the identification of a suitable recipient)
  - Any acute that the organs may have suffered during the donor's final illness
  - The age of the potential donor, along with the consequences of associated chronic diseases such as hypertension, diabetes mellitus etc.

It is now accepted that whilst the duration of the withdrawal period (the length of time from treatment withdrawal to onset of irreversible asystole) may be important logistically, it has little influence per se on ischaemic injury and transplant outcomes. The duration of functional warm ischaemia is considered to be of greater significance in this regard, and the duration of organ-specific stand-down times from the onset of functional warm ischaemia are as follows:

- Liver: 30 minutes (although 20 minutes is ideal, and age and steatosis are also important)
- Pancreas: 30 minutes
- Lungs: 60 minutes (this is the time from onset of functional warm ischaemia to post mortem lung inflation)
- Kidney: 120 minutes, and then re-assess the logistics of waiting for longer. (It is possible to wait for up to a further 180 minutes in selected donors).

## 15 Diagnose death / pronounce life extinct

### Quick info:

Death is regarded as the simultaneous, complete and irreversible loss of the capacity to breathe and the capacity for consciousness. In the context of DCD, guidance from the Academy of the Medical Royal Colleges advises that this state (as evidenced by the absence of respiration, absence of pupillary and corneal light reflexes and the absence of any motor response to supra-orbital pressure) can be diagnosed and confirmed after 5 minutes of continuous asystole. Any return of cardiac or respiratory activity during this period of observation should prompt a further five minutes observation after asystole develops again. This diagnosis should only be made by a clinician who is familiar with the specific implications of confirming death by cardio-respiratory criteria in this fashion.

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Asystole refers to the absence of mechanical cardiac function. Guidance from the Academy advises that it can be identified in a number of ways that will in part be dependent upon the monitoring modalities that are being employed or are available. In practice, this will involve a combination of continuous ECG and intra-arterial pressure monitoring.

Within the context of DCD, the starting point for the determination of cardio-respiratory death should be the loss of circulation as demonstrated by the absence of pulsatile flow on a correctly functioning arterial line (or alternatively with echocardiography where the expertise exists), rather than electrical silence on an ECG. In the absence of an arterial line, asystole on the ECG is the only reliable way of confirming 5 minutes of absent circulation.

## Reference:

'A code of practice for the diagnosis and confirmation of death'

[http://www.aomrc.org.uk/publications/reports-guidance/doc\\_download/42-a-code-of-practice-for-the-diagnosis-and-confirmation-of-death.html](http://www.aomrc.org.uk/publications/reports-guidance/doc_download/42-a-code-of-practice-for-the-diagnosis-and-confirmation-of-death.html)

## 17 Transfer to operating room

### Quick info:

Expedient transfer to the operating theatre is essential if further warm ischaemic injury is to be avoided. The patient should be transferred to the operating theatre as soon as cardiorespiratory death has been confirmed and the family have had the opportunity to pay their last respects. Should the family need more time with their loved one at this point then donation should be stood down (although tissue donation may still be possible).

It is important that, as far as is possible, staff have made the necessary preparations for transfer to theatre in advance. If involved in the transfer, a theatre porter must be immediately available on the unit. Consideration should be given to the route to theatre, particularly if it involves any public corridors, and some units will apply an oxygen face-mask to the donor for aesthetic reasons. It is recommended that the donor is accompanied by the Specialist Nurse for Organ Donation and wherever possible the doctor who has diagnosed cardio-respiratory death, and that the latter confirms this diagnosis, along with the time of onset of irreversible asystole, on hand over to the leader of the surgical retrieval team. The ICU nurse caring for the deceased may also wish to be involved in the transfer. Some unit protocols advise that the continued absence of a central pulse should be confirmed in the operating theatre before the retrieval laparotomy is allowed to commence.

## 18 Final act of care

### Quick info:

The Final Act of Care will be carried out as per hospital policy. Appropriate arrangements will be made for transfer of the patient's body to the mortuary and subsequent viewing in the chapel of rest if requested. Families will be given the opportunity to spend time with their relative following donation if desired. Arrangements for any tissue donation will be organised by the Specialist Nurse Organ Donation

See attachment for detailed information on tissue (including eye) donation: [Tissue and Eye Donation Information](#)

## 19 Follow-up

### Quick info:

The Specialist Nurse Organ Donation will ensure family follow-up is arranged.

Some units also offer family follow-up. It may be beneficial to combine the Specialist Nurse Organ Donation's and unit's follow-up, where appropriate.

The Specialist Nurse Organ Donation will offer staff debriefing.

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## 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

### ID Reference

- 1 A Code of Practice for the Diagnosis and Confirmation of Death. 2008.  
<http://www.aomrc.org.uk/aomrc/admin/reports/docs/DofD-final.pdf>

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