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Brain Death

By Trevor Stammers

‘Death hath ten thousand several doors for men to take their exits’ but there can be little argument about the importance of making sure the door is forever firmly shut behind them, before declaring any individual dead.¹ Only after confirmation of his or her death can a medical team consider removing an individual’s vital organs to use in transplant procedures – the heart, kidneys, liver etc. These organs need to be in optimal condition to be used for transplantation. In order to deliver such viable organs, the moment of death has become defined as the time when the brainstem ceases to function, called ‘brain death’.

It is especially important to be unequivocally certain that those declared ‘brain dead’ are dead. A primary reason for this is that the ‘dead donor’ rule stipulates that vital organs intended for transplantation should only be taken from donors who are actually dead. However, even though brain death has been used for well over thirty years now, there is still a surprisingly large amount of general public disquiet, alleged medical duplicity and continuing academic dissent surrounding the concept.²

An ethical tension arises between the need to provide an unequivocal diagnosis of death and the possibility of saving another life or lives through organ transplantation. Whilst it remains true that ‘greater love has no one than this, that he lay down his life for his friends,’³ it is essential to be sure that life has expired, even when organs that may give life to others are to be removed from the body.

Questions of death... and life

Defining death or life seems simple until you try to define it precisely as people give different opinions even within the same culture.⁴ One key issue is the value we place on the capacity for self-awareness as a definitive criterion to whether we are alive or not. Competing definitions of death may at first appear purely ‘scientific’, but actually have distinct underlying philosophical roots. Philosopher Jonathan Glover explains this well:

‘The only way of choosing [between competing definitions of death] is to decide whether or not we attach any value to the preservation of someone irreversibly comatose. Do we value “life” even if unconscious, or do we value life only as a vehicle for consciousness?’⁵

Glover’s suggestion that the ‘permanently unconscious be classified as dead helps us to see that the brain death debate ‘is actually a debate about the moral status of human beings. It is a debate over when humans should be treated as full members of the human community’.⁶ The debate is, at least in part, about differentiating between death of the body and death of the person.

Are people souls who live in bodies (substance dualism), a body-spirit amalgam (hylomorphism), a body that actually generates consciousness, or something else? The answer will influence the definition of death.

The principal concept of personhood dominating Western philosophy was expressed by the physician John Locke (1632-1704).⁷ In his view, there is an intrinsic binding relationship between a person and their conscious personality. If there is no possibility of any consciousness, then although the body may still be alive, that body can no longer be the same person (or indeed any person) since their conscious personality is no longer there.⁸

Box 1:

Four levels of defining death¹¹

LEVEL 1

Basic Concept of Death

Philosophical (eg ‘permanent cessation of the integrated functioning of the organism as a whole’, or ‘irreversible loss of personhood’.)

LEVEL 2

General Physiological Standards

Medical and philosophical (eg ‘irreversible loss of spontaneous brain functions,’ ‘irreversible loss of the ability to respond or communicate’.)

LEVEL 3

Operational Criteria

Medical, further specifying chosen criteria at level 2 (eg ‘Inability to speak’, ‘Inability to blink’.)

LEVEL 4

Specific Tests and Procedures

Medical to establish chosen criteria at level 3 are fulfilled (eg ‘Corneal reflex testing’.)

The sixth century Roman philosopher Boethius presented another view. For him a person was ‘an individual substance of a rational nature’.⁹ You exist before you are conscious. This resonates with passages in the Bible that talk about God seeing us and knowing us before we were born – indeed even as we were being formed. Here God is treating us as individuals long before any conscious thought was possible.¹⁰ In contrast, the Lockean concept places little value on bodily life *per se*, and all on consciousness of self.

As distinct from determining:

- a) the criteria of death and
- b) the tests which establish that those criteria have been met – both of which are medical issues – defining death itself is primarily a philosophical task (see Box 1).

Defining death

Death is an event that marks the end of the process of dying and the start of the process of bodily disintegration. In 1982, a definition of 'the permanent cessation of functioning of the organism as a whole' was proposed.¹² Defining death as a biological event in this way has the advantage of applicability to both people and animals, but in an age of intensive care, determining when it has occurred is problematic.¹³ Definitions of death therefore balance two features: society's desire to include some form of self-conscious capacity in the definition of what it is to be alive and the ability to keep bodies alive in intensive care long after any chance of regaining conscious activity has passed. Consequently definitions tend to focus on brain activity.

Brain death marks the beginning of a process that eventually ends in somatic death, though somatic death does not occur at that moment

The US Uniform Determination of Death Act therefore defines death as 'irreversible cessation of all functions of the entire brain including the brainstem'.¹⁴ A more recent definition of death is 'the irreversible loss of psychophysical integration, where psycho refers to a capacity or potential for conscious experience of the world.'¹⁵

Brain death then marks the beginning of a process that eventually ends in somatic death, though somatic death does not occur at that moment.

A brief history of brain death

It is interesting to see how the definition of brain death evolved from the first clinical description published in 1959.¹⁶ In the 1960s, the arrival of ventilators to maintain respiration in brain-injured patients, combined with controversy over obtaining organs for transplantation, created an urgent need to reconsider the now 'obsolete criteria' of death.¹⁷

As recently as 1976, one transplant surgeon

stated: *'I doubt if any of the members of our transplantation team could accept a person being dead as long as there is heartbeat... Would any physician be willing to remove an unpaired vital organ before circulation had stopped?'*¹⁸ Yet by 1968, a Harvard Medical School committee, chaired by Henry Knowles Beecher, had proposed a new definition of brain death that would change such attitudes forever.

Their report, 'A Definition of Irreversible Coma', concluded that both 'irreversible coma' and 'permanent loss of intellect' are criteria for death.¹⁹ Coma is an interesting term when applied to a cadaver and it is clear the authors considered 'brain dead' patients were:

'biologically alive and deeply comatose... and that their permanent unconsciousness justified legally defining them as "dead", especially for the purposes of transplantation'.

Beecher subsequently explained that he felt it was arbitrary to puzzle over where to draw the line in the process of death, and that the motivation of saving lives by transplantation was a good and sufficient reason for drawing it at brain death.²⁰ In 1981, the US President's Commission, by a majority, accepted brain death as actual death.²¹

In the UK, Royal Colleges had already agreed by 1976, that brain death could be:

*'accepted as being sufficient to distinguish between those patients who retain the functional capacity to have a chance of even partial recovery from those in whom no such possibility exists'.*²²

This definition was initially seen as a prognosis, a prediction of what *will* happen. But a memorandum added in 1979 shifted the emphasis to a diagnosis, ie the patient was considered to be already dead, since 'all functions of the brain have permanently and irreversibly ceased'.²³

In 1995, however, the terminology was changed from 'brain death' to 'brainstem death', as residual activity in parts of the brain other than the brainstem had been demonstrated in 'brain dead' patients.²⁴ This activity was considered irrelevant however because it was held the individual could not

be 'alive' if the brainstem itself was not functioning.

A series of highly influential articles in 1982 led to virtually universal acceptance of brainstem death.²⁵ The central argument given was that, just as the irreversible cessation of heartbeat and respiration imply the death of the whole patient without implying the immediate death of every cell in the body, so the irreversible cessation of function of the brainstem does not immediately imply the death of every brain cell but it does imply the death of the whole brain.

Clinical criticisms of brain death

Though the vast majority of medical texts accept that brain death (whether whole brain, higher brain or brainstem) equals death, critics maintain that while:

*'death is properly understood as a biological phenomenon, "death" is a social construct created for utilitarian purposes, primarily to permit organ transplantation'.*²⁷

If brain dead patients are truly dead, why is there no widespread use of such 'cadavers' for teaching anatomy or training in surgery?

Such critics include Peter Singer:

*'The idea that someone is dead when their brain is dead is, at best rather odd... Is the distinction between life and death so basic that what counts as dead for a human being also counts as dead for a dog, a parrot, a prawn... or a cabbage?'*²⁸

The critics repeatedly raise a number of clinical issues.

- a) The formulation of brain death varies from country to country with some such as the UK focusing on brainstem death, while others like the USA focussing on whole brain death. This leads to different countries using different criteria for

Box 2: Diagnosis of brainstem death²⁶

Exclusions

- Where the patient may be under the effects of drugs.
- Where the core temperature of the body is below 35°C (eg exposure).
- Where the patient is suffering from severe metabolic or endocrine disturbances which may lead to reversible coma (eg diabetes).

Preconditions of diagnosis

- The patient must be deeply comatose.
- The patient must be maintained on a ventilator.
- The cause of the coma must be known.

Personnel

- The brainstem death tests must be performed by two medical practitioners.
- The doctors involved should be experts in this field and should not be connected in any way to the transplantation team treating any organ recipient(s).
- At least one of the doctors should be of consultant status. Junior doctors are not permitted to perform these tests.
- Each doctor should perform the tests twice.

Tests

The diagnosis of brainstem death is established by testing the function of the cranial nerves that pass through the brainstem. If there is no response to these tests the brainstem is considered to be irreversibly dead.

- The pupils are fixed and do not respond to changes in the intensity of light.
- There is no corneal reflex.
- The vestibulo-ocular reflexes are absent, (ie no eye movement occurs after the instillation of cold water into the outer ears).
- No motor responses within the cranial nerve distribution can be elicited by painful or other sensory stimuli, (ie the patient does not grimace in response to a painful stimulus applied to the face or to the limbs).
- There is no gag reflex to bronchial stimulation by a suction catheter passed down the trachea.
- No respiratory movements occur when the patient is disconnected from the ventilator for long enough to ensure that the carbon dioxide concentration in the blood rises above the threshold for stimulating respiration, (ie after giving the patient 100% oxygen for five minutes the ventilator is disconnected for up to ten minutes. If no spontaneous breathing of any sort occurs within those ten minutes, the brain stem is incapable of reacting to the presence of the carbon dioxide and is thus dead).

Once two doctors have performed these tests twice with negative results the patient is pronounced dead and a death certificate can be issued.

brain death (eg EEG testing, which is mandatory in France), and different restrictions on the circumstances in which it can be used to certify death (for example, Japan only permits use of brain death when organ removal for transplantation is being considered). Furthermore, the use of a variety of secondary tests such as brain scans and cerebral blood flow scans to determine brain death leads to further uncertainty about the tests sufficient to prove the

diagnosis, especially when secondary tests are unreliable indicators of brain death, when used on their own.

- If brain dead patients are truly dead, why is there no widespread use of such 'cadavers' for teaching anatomy or training in surgery? Such experience would be much more realistic than using corpses after circulatory-respiratory death. These functioning circulation cadavers would also be valuable in

testing drug toxicity and other experimental treatments, where they would offer distinct advantages over animal models. If they are dead, why is this not considered appropriate?²⁹

- Though the vast majority of brain dead cases require intensive hormonal support and monitoring to preserve the body's physiological functioning, not *all* do so. For example, *diabetes insipidus* does not always occur, implying at least part of the area of the brain responsible for this element of homeostasis is intact.³⁰ Brain dead 'cadavers' also react to incisions for organ removal with an increase in heart rate and blood pressure.³¹ The use of muscle relaxants and even general anaesthesia of donor 'cadavers' does not exactly square with the assertion that all integrative function of the body is lost in brainstem death.
- Though every neurologist I have ever asked has told me that all their patients who have been diagnosed as brainstem dead have died within weeks at most (an interesting contradiction in terms in itself), there still remain cases of patients declared brain dead who are maintained on ITU support for months or even years.³² Though brain death in pregnancy is uncommon, when it does occur the mother can be kept alive for months to deliver the baby; there are dozens of reported instances of this.³³

Theological reflections on brainstem death

There are hundreds of references to death in the Bible. Death is seen as both physical and spiritual but arguably the nearest Scripture comes to a definition of somatic death is 'the dust returns to the ground it came from, and the spirit returns to God who gave it'.³⁴

It is important to realise that this verse, and the biblical concept of the spiritual soul outliving our physical body, does not help us in defining the moment of death. However, such attempts are often made by Christian doctors; one argued that 'the destruction of the brain is the moment when the soul leaves the body, and the organs of a soulless body are there for the taking'.³⁵ However, this is more of a dualist view of the soul as a ghost in a machine rather than a biblical one

of humans being 'living souls'.³⁶ In an increasingly utilitarian world, such a dualist view leaves brain-damaged individuals vulnerable. If being brainless equates to being soulless why not take their organs sooner rather than later and why not use, or even genetically engineer, anencephalic fetuses as a source of organs?

The Bible does assure us that 'when we die and leave this earthly body, we will have a house in heaven';³⁷ that our new bodies after death will differ from, and not be dependent upon, the state of those we leave behind.³⁸ This does not mean, however, that we can be indifferent about the diagnosis of death; as Peter Singer correctly points out, when 'warm, breathing, pulsating human beings are declared to be dead...their organs can be cut out of their bodies and given to strangers'.³⁹

In our quest to optimise availability of organs for transplantation and not to waste valuable resources on indefinitely ventilating corpses, we should not forget the undeniable reality that currently 'the condition of the terminally comatose patient is masked by more than technology: it is masked by a diagnosis which regards the dying as already dead'.⁴⁰ There is ongoing need for more debate and empirical research on the reliability of and outcomes following a diagnosis of brainstem death.

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