Towards a holistic definition of death: The biological, philosophical and social deficiencies of brain stem death criteria.

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With no statutory definition of death, the accepted medical definition relies on brain stem death criteria as a definitive measure of diagnosing death. However, the use of brain stem death criteria in this way is precarious and causes widespread confusion amongst both medical and lay communities. Through critical analysis, this paper considers the insufficiencies of brain stem death. It concludes that brain stem death cannot be successfully equated with either biological death or the loss of integrated bodily function. The overemphasis of the brain-stem and its operations leaves it open to significant philosophical critique. Further, in some circumstances, the use of brain stem death criteria causes substantial emotional conflict for families and relatives. Accordingly, a more holistic and comprehensive definition of death is required.

Keywords: brain stem death; brain death; defining death; disorders of consciousness; relatives. End-of-life

Defining Death: Background and History

Death is generally considered to be the only certainty of human life and, on the surface, the question 'what is death?' appears simple to answer. After all, the distinction between living and dead, is often axiomatic. However, in reality, defining death is both problematic and controversial. It is subject to a lack of consensus in the UK and internationally; in clinical settings as well as the public forum.

It seems logical that in order to appropriately diagnose death there needs to be a clear definition of death. Yet, such questions were not included in bioethical debate until the mid-20th century. Before this time, the definition of death rested unilaterally on a singular criterion: irreversible cessation of cardiopulmonary function (Ferrier, 1890, p.326). A person was declared dead when the two most observable life signs, circulation and respiration, were absent. However, rapid developments in life-sustaining technology such as artificial ventilation, and the increasing prevalence of organ transplantation has moved the conversation on from ontological questions of 'what is death?' to epistemological questions of 'when does it occur?'.

At present, the United Kingdom has no statutory definition of death. Despite the law's dependence on a clear and specific determination of death,[1] the courts choose instead to adopt the accepted medical definition (Academy of Medical Royal Colleges (AoMRC), 2008, p.11; *Re A (A Child)* [2015] EWHC 443 (Fam), at para.12). In *Airedale NHS Trust vs Bland* [1993] 1 All ER 821, HL., Lord Keith accepted that 'in the eyes of the medical world and of the law a person is not clinically dead so long as the brain stem retains its function'. This judicial acceptance of Brain Stem Death (BSD) as a definitive measure for death reflects previous medical developments. In 1976, the clinical community established a set of neurological 'brain [stem][2] death' criteria (Conference of Medical Royal Colleges and their Faculties in the United Kingdom, 1976, p.1187). These criteria were later equated with 'the stage at which a patient becomes truly dead' (Conference of Medical Royal Colleges and their Faculties in the United Kingdom, 1979, p.332). However, using the BSD benchmark to diagnose death in this manner is precarious. With the existence of several alternative definitions of death (including the aforementioned termination of cardiopulmonary function), the law relies upon a 'fictional' as opposed to a 'real' definition of death (Shah, Truog and Miller, 2011). Additionally, the application of BSD may have confusing consequences for relatives. Patients who meet the criteria for BSD may appear 'alive' in many ways; they are warm to the touch, breathe (albeit via mechanical ventilation) and display many other activities typical of an integratively functioning, living person.[3]

Furthermore, the pronouncement of death upon a person has significant moral, religious, ceremonial, sociological, psychological and legal implications. It marks a change in

[1] A clear definition of death is required in many aspects of law. For example, in criminal law, the difference between charges of murder and attempted murder rely on a strict definition of death. Similarly, death often nullifies agreements made under contract law.
[2] This important clarification and later addition of the word 'stem' appeared in subsequent updates to the publication. It was also officially adopted under Department of Health Guidelines (1998). On an interesting aside, the word 'stem' was dropped from the title of most recent guidelines (AoMRC, 2008), although it is used throughout its content.
[3] For a comprehensive list, see Shewmon (2001, pp.470-2).

behaviour by those associated with the deceased individual and triggers a series of actions that would otherwise be deemed unacceptable. The relatives begin to mourn, post mortems take place, funeral rites are enacted, a person's body is laid to rest, and their will is executed. In this way, as Pattinson (2014, p.424) notes, 'if death is to act as a gateway for… conduct that would otherwise be prohibited, then its determination cannot be morally neutral'.

Given the amplitude of the issue at hand, an examination into the most appropriate definition of death is of the utmost importance. This paper, then, will argue that BSD alone is an inadequate criterion for defining death due to its biological, philosophical and social deficiencies. Instead, a more holistic definition is required – one that considers multiple perspectives that reach beyond the realms of human physiology alone.

The proposal of BSD as criteria

Most commonly, the use of BSD criteria is justified on the brain stem's association with the integrative functioning of the body. Once the brain stem dies, a person loses their ability to operate as a unified whole. Pallis, the originator of BSD, considered that 'all death… is, and always has been, brain stem death' (1990, p.10). Long-established, observable measures of life (such as respiration, or cardiac function) are 'merely surrogate signs with no significance in themselves' (President's Commission for the Study of Ethical Problems in Medicine and Biomedical and Behavioral Research, 1981, p.34). Thus, the irreversible termination of respiration and heartbeat are only indicators that the brain has ceased functioning. In this way, the beating heart is just a means to an end; the cessation of cardiopulmonary function and circulation only 'indicate death when they persist long enough[4] for the brain to die' (Pallis,

[4] The time-period for diagnosing death after cardiac arrest is internationally variable (Gardiner *et al.*, 1995). The UK adopts a '5 minute' standard (AoMRC, 2008, p.12).

1982, p.1410).

That is not to say that to pronounce death in every circumstance, definitive neurological assessments for BSD are required. This would be impractical, resource-intensive and, sometimes, impossible. Instead, a more pragmatic 'triadic' approach to diagnosing death is utilised whereby the most appropriate cardiopulmonary, somatic, or neurological determination is selected (Laurie *et al.*, 2016, pp.571-2; Oram and Murphy, 2011, p.78).[5] Whilst all these criteria result in BSD, in most cases, cardiopulmonary criteria are sufficient for diagnosis. In fact, this is the most conventional and widespread approach. Even so, it is in the hard cases, confined to the Intensive Care Unit, where 'medical technology creates a gap between the body and death', that a brain-based standard becomes necessary (Sarbey, 2016, p.750).

The determination of death using BSD criteria also has further corporeal significance. The brain stem is perhaps the best place to measure the operation of collective bodily capacities and a has a clear role in maintaining vital functioning. Of these, two are of note: the control of specific spontaneous reflexes such as respiration, associated within the medulla of the brain stem (McLaughlin and Miles, 2015, p.311); and the Ascending Reticular Activating System (ARAS) which mediates arousal, an essential component for the state of consciousness (Edlow *et al.,* 2012). As a result, the loss of brain stem function (and, by extension, the loss of the necessary physiological and mental functions for the existence of a living person), is equated to the 'death of the critical system' (Lamb, 1985, p.14) or the individual as a whole. Accordingly, the operational definition of (brainstem) death is a singular and unifying benchmark; 'the irreversible[6] loss of capacity for consciousness, combined with the irreversible

[5] See also Sarbey's 'death criteria trifecta' (2016, p.750).
[6] The World Health Organisation (2012, p.31) prefer the word "permanent". However, both terms are inherently ambiguous (Cole, 1992). For further discussion see Bernat, Culver and Gert (1982).

loss of the capacity to breathe' (AoMRC, 2008, p.11). Thus, building on Kass' (1971) groundwork, many supporters of a primarily neurological definition of death (including BSD) hold that death is 'fundamentally a biological concept' (Bernat, 1999, p.83), an 'objective, immutable… fact that can be studied, described, and modelled, but cannot be altered or contrived' (ibid, p.329).[7]

Death is not purely biological

Despite its ubiquitous application, there are several convincing critiques to BSD diagnosis. Such critiques illustrate why the exclusive application of BSD fails to operate as an all-encompassing definition of death.

Firstly, significant obstacles arise when defining death as a purely biological process. For most, human beings are, by very nature, more than the sum of their biological functioning. If this is true, then death is, 'not primarily a medical event. It is primarily a human and family event of the most profound significance' (Lynn and Cranford, 1999, p.112). As a result, physiological definitions of death (neurological, cardiopulmonary or other) are reductionist. Much has been written concerning the sociological, theological, metaphysical and cultural aspects of death. However, given the diversity of these aspects across the human race, so too the criteria for death will not be unanimous. As Lizza (2006, p.5) insightfully remarks, 'we can maintain that the death of the human being or person is strictly biological only if we accept that the human being…is fundamentally or strictly identical to a biological being.'

[7] In America, the Uniform Definition of Death Act (1980) relies on a whole-brain standard for the neurological definition of death. it is beyond the scope of this paper to discuss this in detail. However, despite their differences, it is noted that the 'clinical determination of whole brain and brainstem death is identical, although the role of confirmatory investigations is different' (Smith, 2012, i7).

Secondly, technological advancements in medicine have separated the biological from other aspects of life, leading to a sterilised version of death. Even so, there is ongoing debate as to what exactly constitutes a biological death with some even claiming that 'the science underlying the claim that the "brain dead" are biologically dead organisms is weak and fundamentally flawed' (Nair and Miller, 2017, p.753). As previously stated, brain stem death is often equated with the loss of integrative functioning of the body. This view was introduced in the USA by the President's Commission (1981, p.75). But, it was later acknowledged that patients suffering 'brain death' were not able to fulfil the measure of loss of total integrative functioning because 'some of the body's parts continue to work together in an integrated way for some time' after brain death (The President's Council on Bioethics, 2008, p.60). Both Joffe (2010) and Shewmon (2001) provide similar arguments naming growth, hormone balance, excretion, immune response and electrolyte regulation as some of these 'residual' integrative functions.

Thirdly, arguments against a strictly biological rendering of death, based on integrative function remain convincing, despite the counter-arguments which have been posed. Moschella (2016, p.551), for example, bypasses the problem of residual functions occurring after death by separating 'higher level substantial' integrative function from 'lower lever non-substantial' integrative function (which would include those listed above). Similarly, The President's Council on Bioethics (2008, p.60) proposed that it was the integrative functions of 'vital work' such as 'self-preservation, achieved through the organism's need-driven commerce with the surrounding world', including interaction with internal/external stimuli that are of importance. Nevertheless, the need for elucidation means this line of reasoning is incongruous. By attempting to isolate specific, more 'meaningful' biological processes, the argument's purpose in seeking to maintain the body's capacity as an integrative whole is undermined. Biological

integration in this sense is binary; the body is either functioning as a whole, or it is not.[8] Therefore, brain stem death cannot be equivalent to biological death and relies instead on philosophical underpinnings (Baker and Shemmie, 2014; Stammers, 2012) . It is not the death of the physical body alone that seems to be of primary importance then, but rather the loss of one or more metaphysical aspects of 'personhood'; that which is essential to being human (Schaible, 2011; Lizza, 1993, p.354-6; Gillon, 1990, p.3; Harris, 1985, p.242; Green and Wikler, 1980, p.127).

The elevation of the whole brain

Another concern of using BSD as the overarching criteria to diagnose death is its potential to elevate the brain or certain brain-associated functions to an unwarranted position of fundamentality. Historically, the limit of medical technology has served as a satisfactory marker for death. Before the heart could be replaced or restarted, the definition of death rested, in part, on the cessation of heart function. Similarly, today, death is defined by neurological criteria due largely to the brain stem's irreplaceable nature. In this way, death is defined by the answer to Machado's poignant question: 'What is it about human life, which is irreplaceable by any artifice, and that its loss is so essential, that the individual who loses it ought to be called dead?' (1994, p.209). Resultantly, it is foreseeable that death's definition may change with developments in medical technology, weakening the arguments of those who propose that death is primarily a neurological event. Kerridge *et al.* (2002, p.89), for example, observe that already 'medical therapy and intensive care have become increasingly sophisticated at replacing brain stem function'. One may also imagine a time where total brain transplant is no longer science fiction, thus making the BSD diagnosis obsolete.

[8] This is not to say that there is no biological aspect to death. Clearly, humans are biological beings in the same measure that they are social beings, or psychological beings. Neither is total cell death required for a satisfactory definition of death – a person is able to be declared dead, substantially before purification occurs.

Even though the brain is currently an indispensable organ, it is not the human body's sole constituent. An individual is not merely limited to 'the behaviour of a vast assembly of nerve cells and their associated molecules', as Crick (1994, p.3) suggests. Glannon (2009, p. 329), challenges such neuroreductionism, arguing that 'our brains are not us' and we exist, instead, as a complex distribution of 'continuous interaction between and among the brain, body and the social and natural world'. To elevate the brain then, is to do a disservice to these dialogical interactions which form a vital part of what it means to be human.

The elevation of brain function: consciousness

The AoMRC's operational medical definition is clear that 'the brainstem controls all the essential functions that keep us alive' (2008, p.34), with the capacity for consciousness and the capacity to breathe being deemed the most important. Yet, on their own, neither of these would be sufficient to diagnose death. For example, a patient with quadriplegia (who is unable to breathe independently) or a person in a coma (who is rendered unconscious) is still classified as alive. However, the centralisation of consciousness within functions of the brain stem also faces fair (and persuasive) criticism, under two main themes.

Firstly, there remains some doubt as to whether the locus of consciousness is situated within the brain stem itself. Undeniably, the brain stem is important for consciousness (Merker, 2007; Parvizi and Damasio, 2001), but developments in neuroscience frequently seat consciousness within an interconnected network between the brain stem and other regions of the cortex (Fischer *et al.,* 2016; Demertzi et al, 2015; Medford and Crinchley, 2010). Thus, consciousness cannot be a function of the brain stem alone.

Secondly, the promotion of consciousness as a minimum criterion for either living, or personhood is problematic (Blain-Moraes, Racine and Mashour, 2018; Kaufman, 2005). Jones (1999), in agreement, states that in over-emphasising consciousness, 'being human and a living organism is not enough to qualify as being a person… extra qualifications are now being demanded'. Such elevation of consciousness reveals itself as a form of mind-body dualism. Some commentators have even acknowledged this point, arguing explicitly that we are in fact a 'mind, a mind that is necessarily embodied' (McMahan, 2006, p.47). Attracting criticism on several philosophical (Seifert, 1993; Grisez and Boyle, 1979, pp.374-9; Jonas, 1974), as well as theological (Verheijde, Rady and Potts, 2018; Keown, 2010; Pannenberg, 2004, 2:180 ff.) fronts, this kind of dualism also devalues the physical nature of death. The body is reduced to a container in which the is mind enclosed, useful only for diagnosing the death of the mind. If consciousness is elevated to a position where the body ceases to be of importance, then neurological criteria for death are not adequately considerate of the person as a whole.

The impact of BSD on a patient's relatives.

Capron (1999, p.128), although acknowledging that dying is a process, advocates that a line dividing the living from the dead must be drawn somewhere. However, knowing where to draw this line is challenging. Since death's empirical reality can only be conceptualised through metaphors, it is only the effects of death can be measured and never death *per se*. Bleyen (2009, p.340) puts its simply stating that 'death is an act of presentation, rather than one of representation'. Whilst then, the line between living and dead may be arbitrary (it could be one of many sufficient criteria), its actuality is imperative due to its significance in legal and medical issues. For example, a singular defining 'line' is required in knowing when to remove artificial ventilation; in the medical care of those who have disorders of consciousness; and in

organ transplantation practice (specifically in cases of heart-beating-donors of non-regenerative tissue).[9]

Nevertheless, there is another, at times ignored, area of care that the determination of such a definitive line impacts. Namely, the patient's relatives. A patient does enter the Intensive Care Unit an isolated individual, hermetically sealed off from the social networks in which they operate. Rather, death and dying always occur within a social context and '"making" a death good or bad is an active process in which both dying people and those around them participate' (Seale and Van der Geest, 2004, p.883). It is in these circumstances that the criteria used, and the language deployed by healthcare professionals can have a lasting impact (for better or worse) on those closest to the dying patient.

Arguably the biggest psychological and emotional conflict for a patient's family also results from a neurologically based definition of death. Through BSD criteria, a patient can be declared dead, yet they are presented with a physical body which, for all intents and purposes, looks to be functioning in a similar way as someone who is 'alive'. As a result, relatives often struggle to accept that their loved one is dead, or distinguish between their own and the medical concept of death (Reid, 2013; Fris, Bergbom and Haljamae, 2001; Dinsmore and Garner, 2009; Edwards and Forbes, 2003). It often seems counterintuitive to define those who are breathing, or whose heart is still beating, as dead and it is no wonder that some have dismissed brain stem definitions of death on this basis (Youngner and Arnold, 2001, p.529; Evans, 1994, p.4).

[9] The *Human Tissue Act* 2004 (ss. 33(1a-b)) prevents the removal of transplantable organs from individuals who are alive. However, as the quality of organs deteriorate over time, the time that death is diagnosed is of crucial importance. Resultantly, although beyond the scope of this paper to discuss, the issue of organ procurement for transplantation is foundational in controversies surrounding the definition of death (Campbell, 2002).

Accordingly, this 'death paradox' (Doran and Black, 2017; Schiff and Fin, 2016) leads families into a coping strategy which Long, Sque and Addington-Hall (2008) deem as 'conflict rationalisation'. Desiring to reduce anxiety and avoid the situation at hand, those affected employ several (often unhelpful) practical and psychological actions. Such actions involve underestimating or explaining away the severity of the situation, all with the purpose of 'rationalising real or potential emotional and cognitive conflict' (ibid, p. 260). These issues are compounded when a patient who is diagnosed with BSD criteria is also a heart-beating organ donor. In these cases, the family observe as their loved one is treated in a manner that is not normally associated with the 'dead'; such as the sustenance of intensive and intimate care (Youngner, *et al.,* 1985, p.321) and the provision of anaesthesia before organs are procured (Young and Matta, 2008). In this regard, even the term 'brain stem death' is unhelpful and may lead some families to believe that a patient may recover, as they are not wholly or completely 'dead'. Resultantly, any workable definition of death should take into consideration the implications for the patient's family. This is especially true if they, alongside medical professionals, must make remarkably weighty, and time-sensitive decisions on behalf of their loved ones.

What next?

The discussion above highlights some of the inherent medical, philosophical, and sociological difficulties in providing a singular, neurological definition of death. Although the House of Lords Select Committee (1994, p.107) claim that 'both medical and lay opinion have evolved to a point where there is now almost total acceptance of a single definition of brain stem death', this paper has shown that this is far from the case. Instead, there exists ongoing disagreement as to the proper and exacting nature of death which continues to cause significant confusion and debate within the medical community. So too is the case for the public and a patient's

families, who are also unable to reach a consensus on the issue (Siminoff, Burant and Younger, 2004; Siminoff, Mercer and Arnold, 2003).

In light of this widening disagreement, further questions are raised; ‘what next?’ and ‘is there any hope for resolution?’. When considering this paper’s proposal that BSD criteria alone is an insufficient criteria for death, more answers become available. It is beyond the scope of this paper to discuss every option in detail. However, in general, scholars have proposed solutions that fall into two broad categories. Firstly, there are those who, recognising the complexities, reject the notion of consensus and choose instead to focus their efforts elsewhere. Choing (2005, p.20), for example, suggests that death is beyond definition and Truog and Robinson (2003) argue that trying to define death is futile and a more appropriate question is to ask ‘at what point are certain actions acceptable?’. Secondly, there are those who embrace the plurality of viewpoints as a positive concept.

In the latter category, the need for a singular international and uniform definition of death is less pronounced. It is recognised that death, as it pertains to humanity, is embodied and changed by the diversity of cultural and social practices across the world. Correspondingly, some (Veatch and Ross, 2016; Bagheri, 2007) have advocated that we should have an element of personal, familial, or communal choice over which reasonable definition of death is most congruous with our socio-ethnic background. The addition of such a conscience clause would, for instance, allow the possibility for members of the Jewish community to select the cardiopulmonary criteria for death, in line with religious convictions.

Although not without its own legal or clinical challenges (Kirkpatrick, Beasley and Caplan, 2010), the option for conscientious choice within a regulated framework necessitates

both precursory and imminent discussions about death and dying. Such dialogue, both within the hospital and at home, can only assist in lifting the taboo surrounding death. Moreover, it also recognises that, for families, the definition of death is not an isolated determination but is intrinsically amalgamated with different personal, cultural, and spiritual understandings of suffering, bereavement, purpose, and life itself. What is at stake then, 'Is not merely a value pluralism, but a metaphysical pluralism supported within a diversity of moral communities' (Engelhardt, 1999, pp.330).

Conclusion

This paper has sought to argue that the isolated use of the neurological criteria of brain stem death (BSD) is an insufficient basis for the definition of death. BSD cannot be successfully equated with either biological death or the loss of integrated functioning. Human beings are more than their physiology and the tensions surrounding the question 'when do we die?' are unable to be reconciled using BSD criteria alone.

Further, the elevation of the brain and/or its specific functioning is an insufficient definition of death due to the brain's complex interactions with the rest of the body and the surrounding world. The brain is not the body's sole constituent and many of its functions, including consciousness, are not the work of the brain stem alone. Thus, overemphasising the brain stem and its operations reveals itself as a form of mind-body dualism, open to persuasive philosophical critique.

Finally, the use of BSD has caused widespread confusion in its application amongst the medical and lay communities. The death paradox of BSD causes substantial emotional conflict

for families, where death appears artificial or unclear. Resultantly, a more holistic and comprehensive definition of death is required.

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