

Clinical and ethical perspectives on brain death

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Vegetative State

(Unresponsive Wakefulness Syndrome)

DESCRIPTION

A vegetative state is when a person is awake but showing no signs of awareness.

On recovery from the coma state, VS/UWS is characterised by the return of arousal without signs of awareness. In contrast, a coma is a state that lacks both awareness and wakefulness. Absence of awareness can only be inferred by lack of responsiveness to the environment and not as lack of consciousness that we may not be able to detect by behavioural measures

A person in a vegetative state may open their eyes, wake up and fall asleep at regular intervals and have basic reflexes, such as blinking when they're startled by a loud noise, or withdrawing their hand when it's squeezed hard.

They're also able to regulate their heartbeat and breathing without assistance.

However, a person in a vegetative state doesn't show any meaningful responses, such as following an object with their eyes or responding to voices . They also show no signs of experiencing emotions nor of cognitive function.

VS/UWS patients' eyes might be in a relatively fixed position, may track moving objects (visual pursuit), or move in a completely unsynchronised manner. Sleep-wake cycles may resume or patients may appear to be in a state of chronic wakefulness. They may grind their teeth, swallow, smile, shed tears, grunt, moan, or scream without any apparent external stimulus.

➤ VS/UWS patients do not respond to sound, hunger, or pain. Patients cannot obey verbal commands and lack local motor responses. Additionally VS/UWS patients cannot talk in comprehensible terms and may become noisy, restless, and hypermobile.

One of the most challenging tasks facing clinicians is that of differentiating VS/UWS from minimally conscious (MCS) states.

If a person is in a vegetative state for a long time, it may be considered to be:

a continuing vegetative state – when it's been longer than **four weeks**

a permanent vegetative state – when it's been more than **six months** if caused by a non-traumatic brain injury, or more than **12 months** if caused by a traumatic brain injury

If a person is diagnosed as being in a permanent vegetative state, recovery is extremely unlikely but not impossible

Brain death

Brain death is a legal term that is defined in most countries as the irreversible cessation of functioning of the entire brain, including the brainstem. The diagnosis of brain death by neurologic criteria based on the current medical guidelines is a combination of clinical, radiographic, and laboratory data. After certain prerequisites, three essential components are necessary for this determination:

- (1) irreversible coma due to a known proximate cause;
- (2) the absence of brainstem reflexes; and
- (3) Apnea.

In select patients, ancillary testing may be necessary to supplement these clinical findings.

Brain death (also known as **brain stem death**) is when a person on an artificial life support machine no longer has any brain functions. This means they will not regain consciousness or be able to breathe without support.

A person who's brain dead is legally confirmed as dead. They have no chance of recovery because their body is unable to survive without artificial life support.

Brain death is legal death

If someone's brain is dead, the damage is *irreversible* and, according to UK law, the person has **died**.

It can be confusing to be told someone has brain death, because their life support machine will keep their heart beating and their chest will still rise and fall with every breath from the ventilator.

But they will not ever regain consciousness or start breathing on their own again. They have already died.

The brain stem

The brain stem is the lower part of the brain that's connected to the spinal cord. The brain stem is responsible for regulating most of the body's automatic functions that are essential for life.

These include:

- breathing
- heartbeat
- blood pressure
- swallowing

The brain stem also relays information to and from the brain to the rest of the body, so it plays an important role in the brain's core functions, such as consciousness, awareness and movement. After brain death, it's not possible for someone to remain conscious.

Causes of brain death

Brain death can happen when the blood and/or oxygen supply to the brain is stopped.

This can be caused by:

cardiac arrest – when the heart stops beating and the brain is starved of oxygen

a heart attack – when the blood supply to the heart is suddenly blocked

a stroke – when the blood supply to the brain is blocked or interrupted

a blood clot – a blockage in a blood vessel that disturbs or blocks the flow of blood around your body

Brain death can also be caused by:

a severe head injury

a brain haemorrhage

infections, such as encephalitis

a brain tumour

Brain death is different from
vegetative state

The difference between [brain death](#) and a [vegetative state](#), which can happen after extensive brain damage, is that it's possible to recover from a vegetative state, but brain death is **permanent**.

Someone in a vegetative state still has a functioning brain stem, which means: some form of consciousness may exist breathing unaided is usually possible there's a slim chance of recovery because the brain stem's core functions may be unaffected Someone in a vegetative state can show signs of being awake. For example, they may open their eyes but not respond to their surroundings.

In rare cases, a person in a vegetative state may show some sense of response that can be detected using a brain scan, but not be able to interact with their surroundings.

Tests to confirm brain death

Absence of Peripheral Motor and Sensory Responses

Noxious stimuli in the form of nail bed pressure or muscle pinching should produce no grimacing or withdrawal of the arms and legs.

- Occasionally, spinally mediated reflexes may remain intact.

Differentiating spinally mediated reflexes from retrained motor responses due to cortical activity can be difficult at times and require neurologic expertise.

ABSENCE OF BRAINSTEM REFLEXES

Pupillary Response (Cranial Nerve II)

Assessment of Eye Movements

- (Cranial Nerves III, VI, VIII)
- *Cervico-ocular Reflexes (“Doll’s-Eyes Maneuver”)* *Vestibulo-ocular Reflexes (“Cold Calorics”)*

Facial Sensation (Cranial Nerve V) and Motor

Response (Cranial Nerve VII) Gag and Cough

Reflexes (Cranial Nerves IX, X)

□ APNEA TESTING

□ ANCILLARY TESTING

- 1) Cerebral Angiography
- 2) Computed Tomography Angiography (CTA)
- 3) Transcranial Doppler Ultrasonography
- 4) Radionuclide Imaging
- 5) Electroencephalography

- **Organ donation**
- After brain death, it may be possible for the person's organs to be used in transplants, which can often save the lives of others.
- In cases where a deceased person has not made their wishes clear, deciding whether to donate their organs can be a difficult decision for partners and relatives.
- Hospital staff are aware of these difficulties and will try to ensure the issue is handled sensitively and thoughtfully.

History of brain death

The story of brain death begins with changing medical practices in the 1950s and 1960s. In this era, the mechanical ventilator came into widespread use, which allowed physicians to support the physiological functioning of severely neurologically injured patients who lacked a respiratory drive and thus would otherwise have died within minutes from lack of oxygen.

Almost immediately, physicians had ethical concerns about maintaining the physiological functioning of patients they believed to be “hopelessly unconscious”, or in a state of coma dépassé (beyond coma)

This included concerns about the just use of limited resources, financial burdens to families and hospitals, and the emotional toll on families whose grieving process seemed to be held in limbo, with a family member who was not yet dead and buried, but in a hopeless condition from which he or she could not recover.

Prior to this case, there was legal uncertainty, at least among physicians, as to whether removing life-sustaining treatment would be considered legally culpable homicide.

At the same time, the nascent field of human organ transplantation was beginning to show some promise, with early renal, hepatic, and cardiac transplantations taking place. Since human organs are highly sensitive to ischemic damage, donor organs that are perfused with oxygenated blood right up until the moment of retrieval – that is, organs that are removed from a body with continuing circulation – provide the greatest opportunity for successful transplantation.

Thus, due to their continued physiological functioning combined with permanent unconsciousness, patients in a “hopeless” or irreversible coma seemed to be ideal organ donors.

To address this array of concerns, physicians and scholars began to discuss whether patients in an irreversible coma should be considered to be dead already, prior to discontinuing the mechanical ventilator.

In 1968, an Ad Hoc Committee of the Harvard Medical School published a set of guidelines defining the condition of irreversible coma, along with clinical guidelines for its diagnosis, and asserted that irreversible coma should be considered “a new criterion for death”.

This paper was very influential, and within only a few years, several US states began to develop laws permitting physicians to declare patients on mechanical ventilators to be dead based on the absence of brain function.

However, not all states did so, creating legal ambiguity since the very same patient could be dead in one state but alive in another. This prompted the US President's Commission for the Study of Ethical Issues in Medicine and Biomedical and Behavioral Research to address the question as their first item.

Largely endorsing what came to be known as “the Harvard criteria”, the President’s Commission agreed that patients with lack of brain function should be considered to be dead. The President’s Commission was also instrumental in developing the Uniform Determination of Death Act, which was endorsed by the National Conference of Commissioners on Uniform States Laws, the American Medical Association, and the American Bar Association, and states: “An individual who has sustained either (1) irreversible cessation of circulatory and respiratory functions or (2) irreversible cessation of all functions of the entire brain, including the brain stem, is dead”.

This model law, or something very close to it, was subsequently adopted by all 50 states through either legislative or judicial action, and at least 70 countries of the world now endorse the practice of determining death by neurological criteria, though with some variation in both law and practice

Although the practice of determining death by (some) neurological criterion has found wide acceptance in much of the world, not all nations endorse the whole brain concept of death, in which all functions of the entire brain are required for the diagnosis. For example, the United Kingdom endorses a brainstem death concept, in which lack of all functions of the brainstem is considered to be sufficient for death. Japan initially resisted the concept of whole-brain death, although has now also endorsed whole-brain death criteria.

The dead donor rule and consent for organ procurement

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The concept of brain death is inextricably linked to organ transplantation. One of the motivations that the Harvard Committee endorsed for adopting irreversible coma as a new criterion for death is that doing so would facilitate organ procurement from these patients . To this day, the majority of organs are removed from brain-dead donors.

Organs are removed while the donor remains on the ventilator and with a spontaneously beating heart (thus they are sometimes referred to as “heart-beating donors”). However, because such donors are considered to be “dead”, it is alleged that organ procurement practice is consistent with the “dead donor rule”, which is an informal ethical and legal constraint that prohibits causing death by organ removal.

The standard defense of the dead donor rule holds that it is a deontological constraint that forbids killing one person by organ removal in order to save others. This constraint holds regardless of whether the patient is unconscious, severely debilitated, or near death, and regardless of whether the patient has consented to being killed by organ removal..

Described as “a centerpiece of the social order’s commitment to respect for persons and human life”, this rule has been defended on the grounds of respect for persons and as a manifestation of traditional Hippocratic medical ethics according to which doctors must not kill. On this view, if brain death is not death, then heart-beating organ removal is ethically impermissible

Legal and public controversies

In the USA, the determination of death by neurological criteria has been legally recognized for decades, and the law in this area seems well settled.

However, there have been several recent controversies involving brain death and the courts, and these have contributed to the increased attention paid to brain death in both scholarly and public discourse

Case report

Jahi McMath, a 13-year-old girl, was admitted to Oakland Children's Hospital in California for a tonsillectomy and adenoidectomy for sleep apnea on December 9, 2013. Due to complications after the surgery, she suffered from heavy bleeding in the throat, lost her airway, and suffered from anoxic brain injury. She was declared brain dead on December 12, 2013 after examination by two physicians. However, her parents did not accept the diagnosis. After the hospital informed the parents of their intention to discontinue mechanical ventilation, the parents obtained legal counsel and initiated legal proceedings in an effort to block the hospital from discontinuing ventilator support against their wishes.

The parents argued that they would not accept that Jahi was dead while her heart continued to beat. They also argued that the California statute defining death by neurological criteria was unconstitutional because it violated their religious beliefs. The Alameda County Superior Court did not rule on the merits of either of these claims. However, the court did manage to broker an agreement between the hospital and the parents, so that Jahi was declared legally dead by the hospital and released to the coroner, and then the coroner released her to the family. Jahi was eventually transferred to Saint Peter's Hospital in New Jersey, and as of March 6, 2015, she is residing in an apartment with home ventilator care in New Jersey, 15 months after the declaration of brain death

This case illustrates the concept and limits of “reasonable accommodation”, in which patients (or their surrogates) object to neurological criteria for death and seek continued support after brain death. Given that death determined by neurological criteria is a legally valid determination of death, hospitals are not legally obliged to continue physiologic support of such patients.¹⁷ Physiologic support is usually only continued when the patient will be an organ donor, though many physicians and hospitals will voluntarily allow some additional time as a compassionate measure to help families cope with their grief. However, four states, New York, California, Illinois, and New Jersey, mandate accommodation of families or patients who object to the diagnosis of brain death.

Both New York and California have regulatory requirements that mandate “reasonable accommodation” of families that object to the diagnosis based on moral or religious beliefs, but they do not spell out what constitutes “reasonable” or “accommodation”, leaving individual hospitals to develop policies that will satisfy the regulations. Usually, this amounts to time for family members to gather at the bedside for a final visit before withdrawing support. Illinois’s accommodation clause was enacted through its hospital licensing statute, and requires only that hospitals “adopt policies and procedures [...] to take into account the patient’s religious beliefs concerning the patient’s time of death”.

On the other hand New Jersey's brain death statute, the New Jersey Declaration of Death Act, includes a categorical exemption, in which a patient may not be declared dead based on neurological criteria if the attending physician has reason to believe that doing so would violate that patient's religious beliefs. This amounts to a mandate for indefinite accommodation for such patients. This categorical exemption for religious objections to brain death presumably means that, in New Jersey, she is not legally

Elijah Smith was a 22-year-old man who was hit by a car while riding a bicycle on July 3, 2013. He suffered from a severe head injury and was declared dead by neurological criteria the following day, at Grant Medical Center in Ohio. Mr Smith had previously registered as an organ donor when he applied for his driver's license. When he was determined to be dead by neurologic criteria, Grant Medical Center notified Lifeline of Ohio, the local organ procurement organization, which took steps to begin the process of organ procurement

However, his parents, Pamela and Rodney Smith, learned that organ removal takes place while the donor remains on mechanical ventilation during the surgery, and attempted to block Lifeline from removing Mr Smith's organs. According to Mrs Smith, her son did not understand what he was agreeing to when he registered as an organ donor, and that, had he understood that organ removal takes place while on a ventilator and with a beating heart, he would not have registered as a donor

Because of his parents' objections, Grant Medical Center denied Lifeline access to his organs without a court order. Lifeline subsequently obtained a court order from the Franklin County Probate Court, which was granted on the basis of Ohio law prohibiting anyone from reversing a donor's decision other than the donor. Mr Smith's organs were removed on July 11 over the objection of his parents.

According to the Columbus Dispatch, the Smith family wanted mechanical ventilation discontinued prior to organ removal. "We wanted for him to be unplugged, to see him die completely, so that we could accept that we did everything we could", Mrs Smith said. "If he did not continue breathing, then that would be how we would finally accept the fact that he was dead". Mrs Smith later described brain death as "a convenient way to facilitate the donation of [Mr Smith's] organs". However, "it's not that we're against organ donation", she said. "We just don't like the way it's done".

As this case illustrates, there is continued misunderstanding about the process of organ procurement after brain death, and this public misunderstanding can lead to confusion and, occasionally, conflict. Given the lack of information available on OPO websites, and the use of mass media campaigns as advertisements rather than information sources, it is unsurprising that Mrs Smith alleged that her son, like much of the general public, did not have a reasonable understanding of the circumstances of organ procurement to allow an informed choice, particularly when he registered as an organ donor by checking a box at a motor vehicle agency

Conclusion

The concept of brain death remains both settled and unsettled. The law and clinical practices in declaring death by neurological criteria are well established, and yet new controversies and challenges to both law and settled practice continue to surface. These controversies have taken on a new urgency in recent years , not only in academia, but also in the clinic, in the courtroom, and in the public arena. The status quo is one of “muddling through” in spite of long-known criticisms and controversies. It remains to be seen whether the recently increased scrutiny and debate signals the beginning of a fundamental reassessment of settled laws and practices, or if it is simply another phase of the same muddling through that has prevailed for decades, where brain death is paradoxically both well settled and persistently unresolved

مرگ مغزی از دیدگاه اسلام : در اسلام هرگونه تصمیم گیری اخلاقی در چارچوب ارزش هایی انجام می شود که از وحی و سنت پیامبر و تفسیر قوانین اسلامی منشاء می گیرند . اسلام در این مسیر متناسب با رشد و پیشرفت تکنولوژی پاسخگوی مسایل اخلاقی موجود می باشد. در اسلام انسان اشرف مخلوقات و جانشین خداوند بر روی زمین است . اسلام بر ارتباط جسم با روح و ماده با ماوراء الطبیعه و اخلاق و فقه تاکید دارد . قرآن و سنت پیامبر دستورالعمل های اخلاقی مخصوصی در موضوعات مختلف پزشکی دارند. از نظر اسلام مرگ زمانی اتفاق می افتد که روح از بدن خارج می شود. باتوجه به این که زمان دقیق خروج روح را نمی توان مشخص کرد، لذا مرگ را فقط از طریق علائم فیزیکی موجود می توان تشخیص داد.

دانشمندان و حقوق دانان اسلامی در سومین کنفرانس
حقوقدانان مسلمان در اکتبر 1986 مفهوم مرگ مغزی و
شاخص های تشخیص آن را پذیرفتند و اکثریت کشورهای
مسلمان و نه همه آنها، هم اکنون شاخص های مرگ مغزی
را پذیرفته اند . برای مثال در عربستان سعودی تقریباً نیمی
از کلیه های موردنیاز برای پیوند با استفاده از شاخص های
مرگ مغزی از جسد گرفته می شود

تصمیم‌گیری در خصوص اهداء عضو در مرگ مغزی : به طور کلی تصمیم‌گیری به وسیله فرد جایگزین در بیمارانی انجام می‌شود که خود قادر به اخذ تصمیمات لازم نیستند . این کار باتوجه به اصل اخلاقی احترام به خودمختاری افراد صورت می‌پذیرد . اما سوال اصلی این است که چه کسی می‌تواند این تصمیم‌گیری را انجام دهد. لازم به ذکر است فردی که دارای ظرفیت نیست، به همان اندازه فرد دارای ظرفیت حق دادن رضایت برای اهداء عضو را دارد و فردی که دچار مرگ مغزی است، از این موضوع مستثنی نیست

در فرهنگ غربی تصمیم گیرنده جایگزین، باید فردی باشد که با تمایلات شخصی، ارزش ها و باورهای بیمار بیش از همه آشنا باشد و بتواند منعکس کننده تصمیم بیمار در حالتی که ظرفیت تصمیم گیری دارد، باشد. این فرد می تواند از نزدیکان و بستگان فرد و یا یک دوست و یا حتی پزشک و پرستار او باشد. در کشورهای اروپایی از دیدگاه قانون قیم قانونی فرد حق تصمیم گیری برای فرد در زمان عدم وجود ظرفیت برای فرد را دارد. مناسب ترین فرد برای تصمیم گیری به جای بیمار فردی است که بیمار در زمان داشتن ظرفیت او را انتخاب کرده است، دیگر تصمیم گیرندگان به ترتیب اولویت عبارتند از: همسر، فرزند، والدین، نوه یا دیگر خویشاوندان او. در کشورهای اسلامی تصمیم گیری به ولی فرد واگذار شده است. بهترین معیارها برای تصمیم گیری ارزش ها و باورهای فرد و مصالح عالییه او می باشد

با توجه به این که احتمال خطا در تصمیم گیری به وسیله فرد جایگزین وجود دارد، استفاده از طراحی مراقبت های پیشرفته برای بیمار در کشورهای غربی دارای ((Advance Care Planning اهمیت زیادی می باشد. طراحی مراقبت های پیشرفته به وسیله فرد روندی است که در آن بیمار با همکاری کادر درمانی با اعضای خانواده و افراد مهم دیگر در ارتباط با آینده مراقبت های پزشکی خود تصمیم می گیرد. در این روش رضایت بیمار در تصمیم گیری های درمانی قبل از فقدان احتمالی ظرفیت (مرگ مغزی) کسب می شود (کارت اهدای عضو)

آیا شخص مبتلا به مرگ مغزی زنده است، قطع کردن وسایل

مصنوعی پزشکی از وی از موارد قتل

مستوجب ضمان است؟

در پاسخ به این پرسش دو نظر متفاوت وجود دارد:

برخی شخص مبتلا به مرگ مغزی را زنده می دانند و بیان می کنند چون معیار در تحقق موت، عرف است و عرف شخص مبتلا به مرگ مغزی را برخوردار از حیات نباتی و زنده می داند پس مصداق مرده نیست، پس درمان نکردن چنین شخصی جرم و قطع وسایل متصل به بدن وی مصداق قتل عمدی خواهد بود و معتقدند صدق خارج شدن روح از بدن در حالت مرگ مغزی مشکوک است و در صورت یقین نیافتن به موت باید صبر شود

برخی دیگر شخص دچار شده به مرگ مغزی را مرده می دانند. به طور کلی شخصی که دچار مرگ مغزی شده و پزشک یا هر شخص دیگری با ترک فعل اسباب ادامه حیات نباتی وی را فراهم نمی کند، در حقیقت قانوناً و شرعاً مرتکب جرم یا حرامی نشده، زیرا ترک فعل در این جا مصداق هیچکدام از مواد قانون مجازات اسلامی نخواهد بود و شخص مبتلا به مرگ مغزی، مصدوم زنده عرفی نیست که کمک نکردن به او مصداق قانون خودداری از کمک به مصدومین شود.

به یقین قطع وسایل متصل به بدن شخص مبتلا به مرگ مغزی مصداق قتل اعم از عمد و شبه عمد نیست، زیرا از نظر عرف خاص شخص مبتلا به مرگ مغزی حیات ندارد و همچنین قطع کردن وسایل مصنوعی از بدن او عنوان مجرمانه ای ندارد، زیرا سلب حیات زمانی مستلزم مجازات جنایت بر مرده است که آسیب فیزیکی بر شخص وارد شود در اینجا با قطع این وسایل هیچ آسیبی به بدن مرده وارد نمی شود تا مصداق جنایت بر مرده باشد. قانون مجازات اسلامی صراحتاً مرگ مغزی را به عنوان مرگ عرفی محسوب ننموده اما از مضمون ماده ۲۱۷ آن چنین بر می آید که قانونگذار با این امر موافق است، زیرا حدوث جنایت بر شخص مبتلا به مرگ مغزی «جنایت بر مرده» تلقی می نماید.