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Cerebral Death: Unraveling the Mystery of the Silent Mind

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ABSTRACT

The permanent loss of all brain stem functions, such as breathing, awareness, and cranial nerve reflexes, is known as brain stem death (BSD), and it presents a significant medical and ethical issue. While other bodily functions, such as heart activity and circulation, can be maintained with medical intervention, BSD is defined by the cessation of brain stem activity. The key characteristic that distinguishes BSD from other conditions, such as coma or a persistent vegetative state, is the complete and irreversible loss of brain stem function—a critical control centre for basic physiological processes. Diagnosing BSD requires strict clinical criteria and diagnostic testing to confirm the full and permanent nature of the condition. This typically involves a comprehensive neurological examination, assessment of cranial nerve reflexes, and confirmation through additional tests, such as cerebral blood flow studies or electroencephalography (EEG). A diagnosis of BSD carries significant ethical and legal implications, particularly in relation to organ donation, as it often plays a role in identifying potential donors. The ethical considerations surrounding BSD include its impact on families, the distinction between death and end-of-life care, and the challenges posed by varying legal and cultural perspectives. It highlights the importance of a clear diagnosis, obtaining informed consent, and adhering to established medical protocols to uphold human dignity and ethical standards. As medical technology advances and societal views evolve, the discussion around brain stem death continues to be a critical issue in both bioethics and modern medical practice.

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1.0 Introduction

Confirming death used to be simpler. It was once believed that death occurred when breathing, heart activity, and responses all ceased (Timmermans et al., 1999). When blood flow stopped, the brain stem was deprived of oxygen, leading to irreversible brain damage (Sharma et al., 2016). However, because the heart can continue to beat even after the brain stem has permanently ceased functioning, the process of certifying death has become more complex. One method to maintain bodily functions is by using a ventilator, which supplies the body and heart with oxygen (Hameed et al., 2003). Yet, despite this, the individual will never be able to breathe or regain consciousness (Liotti et al., 2001). Once the brain stem stops working permanently, there is no possibility of recovery, and even with continuous ventilator support, the heart will eventually stop beating (Beachey et al., 2022). When brain death is confirmed, the patient is typically removed from the ventilator to spare their loved ones further emotional pain. It is important to note that brain death is not the same as a vegetative state, which can follow significant brain injury (De et al., 2016). A person in a vegetative state may exhibit signs of wakefulness, such as opening their eyes, but will not respond to their surroundings (Laureys et al., 2010). In rare cases, a person in a vegetative state may show detectable levels of awareness on brain scans but remain unable to interact with their environment (Langner et al., 2013).

When someone is declared brain dead, it can be difficult to comprehend, as their chest will continue to rise and fall with each breath delivered by the ventilator, and their heart will keep beating. However, they will never wake up or breathe on their own again (Purnell et al., 2013). At this point, the individual is considered dead. After brain death, their organs may be used for transplants, which often save the lives of others (Lock et al., 2002). Deciding whether to donate a deceased person's organs can be difficult for their loved ones, especially if the deceased had not previously expressed their wishes. Hospital staff are aware of these challenges and strive to approach the situation with care and sensitivity (Prescott et al., 1987; World Health Organisation et al., 2013; Bernat et al., 1998; Ganapathy et al., 2018). For example, the U.S. Presidential Council on Bioethics clarified in its December 2008 White Paper that the American diagnosis of death does not align with the British concept or clinical criteria. Trinidad & Tobago and India, however, adopt brain stem death as a basis for legally declaring death (McCloskey et al., 2012). In other parts of the world, the concept of neurological death is based on the idea of total brain death, which should not be confused with the British concept of the permanent cessation of all functions in every part of the brain (Ganapathy et al., 2018; Panna et al., 2021; Renal Association et al., 2002; Shibasaki et al., 2022; De et al., 2012).

2.0 Brain Stem Death

Animals confirming death used to be straightforward. It was once believed that a person died when their breathing, heart activity, and responses all stopped. Rapidly declining blood flow would cause a lack of oxygen, quickly leading to irreversible brain stem function loss. However, certifying death has become more challenging because the heart can continue to beat even after the brain stem has irreversibly stopped working. This can be achieved by keeping the patient on a ventilator, which provides artificial oxygenation to the body and heart. Yet, despite this, the individual will never wake up or be able to breathe again. Even if a ventilator is used indefinitely, the heart will eventually stop beating once the brain stem has permanently ceased functioning.

When brain death is confirmed, the patient is typically removed from the ventilator to spare their loved one's further anguish. Brain stem death occurs when a person permanently loses the ability to breathe and remain conscious. It can be challenging to grasp the concept of brain death because the chest will continue to rise and fall with each breath provided by the ventilator, and the heart will continue to beat. However, the person will never breathe on their own again or regain awareness—they are already dead. There are rare

conditions that may mimic brain death, such as extreme colds or drug overdoses, particularly from barbiturates. A flashlight is typically used to check for pupil response to light, which is one of the many procedures used to assess brain death.

Following brain death, the organs of the deceased may be used for transplants, often saving the lives of others. When a person's organ donation preferences are unknown, it can be difficult for their loved ones to decide whether to donate their organs. Hospital staff are aware of these challenges and will do their best to handle the situation with care and sensitivity. Visit the NHS website to learn more about organ donation (Byrne et al., 1993).

3.0 Death Determination

In matters of death, doctors have certain moral and legal obligations. These include attempting to prevent death, identifying death, establishing the exact moment of death, declaring death, issuing a death certificate, and, if necessary, conducting an autopsy or retrieving organs for transplantation. This role raises numerous moral, legal, psychological, and scientific issues. It is understood that different bodily processes and cells deteriorate at varying rates during the process of death. It falls to doctors to determine when this process becomes irreversible and when a patient can officially be declared dead. In most countries, a doctor's legal obligation is to diagnose a patient's death and document the exact time of death. Establishing this moment is crucial for two reasons: first, it prevents unnecessary medical interventions on deceased patients; second, it ensures a transparent and ethical organ donation process. Additionally, the time of death has legal significance due to survivorship provisions in wills.

The boundary between life and death remains a topic of debate, as humanity has struggled for millennia with the concept and criteria for death. Modern advancements in organ replacement technology, transplantation, and life support for organ failure continue to challenge our understanding of life and death. Despite scientific progress, the diagnostic criteria for death used in various nations have not changed significantly in recent decades, and regulatory issues have led to misunderstandings between the public and medical professionals. For years, both academic literature and the public have expressed concerns about cadaver donation methods and the determination of death. It can be difficult to distinguish between valid scientific critique and objections fueled by fear of death, concerns about misdiagnosis or premature death declarations, or the fear of organ removal from living individuals.

Philosophical, theological, and cultural differences in the concept and meaning of death, along with debates over ethics, law, and religion, further complicate discussions about death and the dying process. These challenges are compounded by difficulties in conducting research and the resulting lack of data and evidence on many aspects of death. Additionally, disagreements over the validity of death determination procedures, a lack of understanding among the public and some medical professionals, and the sensitive nature of the subject all contribute to the complexity of the issue. There are many ways to die, but only one way to truly be dead. As a result, while respecting diversity, the fundamental criteria for determining death must be precise, thorough, and universally applicable to medical practice. To maintain public trust, uphold ethical standards that protect individual rights, and ensure the delivery of high-quality healthcare, there must be an international consensus on the clinical criteria for certifying death. The distinction between life and death must be clearly defined in both medical practice and the law.

This definition informs the moments that follow events such as the cessation of life without the need for life support or resuscitation, the loss of personal identity and individual rights, the execution of a deceased person's legal will, the distribution of assets, life insurance payouts, the final disposition of the body through burial or cremation, and religious or social ceremonies. Dying is a process, not a single event, and it affects different bodily functions at various rates. The doctor must determine when this process becomes irreversible and make a clear declaration of death. The permanent loss of certain cognitive functions

and biological characteristics is associated with the biological criteria for death. Legally, a patient may be considered deceased due to the loss of mental capacity, even though their heart may still be beating with the help of a mechanical respirator (Lewis et al., 2017).

4.0 Neurological Criteria

Instead of being published as a stand-alone guideline, the RCPCH working group's evaluation of the neurological criteria for diagnosing death in babies, children, and adolescents will be included as an appendix to the 2024 AoMRC Code of Practice. A methodological report from the RCPCH, detailing the reviewed evidence and the rationale behind any changes to the current pediatric criteria, will accompany the new pediatric criteria in the appendix. The main motivation for this change is to fully integrate the pediatric criteria into the AoMRC Code rather than having two separate publications. This will centralise access to the pediatric criteria, eliminating unnecessary repetition and potential confusion for the reader. This guideline provides instructions for assessing brain death or death in both adults and children using neurological criteria. In the case of infants, an additional precautionary requirement should be observed: for infants who have experienced asphyxia or are receiving intensive care after resuscitation, there should be a minimum observation period of 24 hours before initiating clinical testing for the diagnosis of neurological death (DNC). This monitoring period may need to be extended if there are concerns about lingering drug-induced sedation.

In the UK, the criteria for diagnosing death due to neurological causes were revised in 2021. This revision followed a case where bilateral therapeutic decompressive craniotomy was performed to treat a severe traumatic brain injury. After reviewing the case, the expert panel's key recommendation was to add "therapeutic decompressive craniectomy" as a warning indicator on nationally recognised test forms. The College and the Intensive Care Society adopted this recommendation. Making a neurological diagnosis of death is a critical responsibility, with intensive care doctors making almost all such diagnoses in the UK. According to the 2008 AoMRC Code of Practice for Diagnosing and Confirming Death, the specified forms should be used in conjunction with it. Additionally, there are informative videos on this topic available on the NHS Blood and Transplant website (Morenski et al., 2003).

5.0 Patient Dignity

A person's self-respect is supported, acknowledged, and encouraged when they receive care with dignity, without it being undermined in any way. According to a 2015 article from ResearchGate, "Care from the Heart: Older Minoritized Women's Perceptions of Integrity in Care," elderly immigrants to this country found they could distinguish between professional care and personal attention, as well as the respect, generosity, and care shown by family members. They referred to this personal attention as "care from the heart," which preserved their dignity. Dignity is a fundamental component of well-being, and humans inherently require it. However, the definition of dignity can vary, not only from person to person but also across different countries and cultures. In healthcare, dignity is commonly described through a comprehensive approach to patient interactions that includes respect, autonomy, empowerment, safety, communication, privacy, acceptance, inclusion, recognition, and equity. Yet, the very nature of healthcare can sometimes provoke emotions that contradict the principles of dignity. Patients may feel vulnerable, judged, anxious, or fearful during medical encounters.

Additionally, the fast pace of healthcare, combined with a greater focus on measurable objectives and advancements, can sometimes compromise values that uphold dignity, such as compassion, empathy, and care. Despite these challenges, treating patients with respect is essential for patient-centred care, patient participation, and patient satisfaction. Even small actions or minor adjustments can significantly impact a patient's sense of dignity. This article discusses eight areas

where healthcare providers can enhance patient-centred care and promote patient dignity in their everyday work. When interacting with patients regularly, be mindful of basic courtesy, such as saying hello, introducing yourself to new patients, asking how they feel, and maintaining eye contact.
When first meeting patients, ask how they would prefer to be addressed. Some patients may prefer titles and surnames, while others might prefer their personal names or nicknames. Additionally, the names and pronouns some patients use may differ from those listed in their medical records. Making assumptions about how to address a patient, especially if there are cultural or generational differences, can make them feel disrespected. Examine your demeanour and attitude toward patients to ensure that no external or personal factors, such as fatigue, stress, or staff or technology interruptions, influence your interactions. Avoid letting these factors affect your feelings toward patients (Lang et al., 2014). Maintaining patient privacy and confidentiality is crucial to establishing and preserving dignity. Ensure that patients are aware of your organisation's commitment to protecting their health information. You can also take steps to ensure privacy during in-office visits, such as lowering your voice when discussing sensitive information and avoiding conversations about personal matters in public areas. A breach of privacy and confidentiality, whether real or perceived, can cause a sense of disrespect and harm the relationship between the patient and practitioner (Manookian et al., 2014).

6.0 Conclusion

In summary, brain stem death (BSD) is the complete and permanent cessation of all brain stem activity, marking the point at which awareness and essential autonomic processes stop. BSD has significant implications for medical practice, particularly in organ transplantation and end-of-life care, as it represents a distinct and definitive state of death. The strict clinical and diagnostic criteria that underpin BSD ensure both the accuracy and ethical integrity of the diagnosis, providing a sound basis for transitioning from life-sustaining care to the consideration of organ donation. However, BSD raises complex ethical and legal issues, including the need for sensitive communication with families, respect for diverse cultural and personal values, and adherence to legal standards. The challenges posed by advancements in medical technology and evolving societal attitudes towards organ donation and death require ongoing dialogue and the refinement of protocols. Ultimately, maintaining patient dignity and upholding ethical medical practices rely on the integrity of the diagnostic process in cases involving neurological conditions.

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The authors declare that there is no conflict of interest.

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10.0 References

Byrne, P. A., & Nilges, R. G. (1993). The brain stem in brain death: A critical review. *Issues in Law & Medicine, 9* (3).

Beachey, W. (2022). *Respiratory care anatomy and physiology E-book: Foundations for clinical practice*. Elsevier Health Sciences.

Bernat, J. L. (1998). A defense of the whole-brain concept of death. *Hastings Center Report, 28*(2), 14–23.

De Hert, M., Detraux, J., Van Winkel, R., Yu, W., & Correll, C. U. (2012). Metabolic and cardiovascular adverse effects associated with antipsychotic drugs. *Nature Reviews Endocrinology, 8* (2), 114–126.

De Tanti, A., Saviola, D., Basagni, B., Cavatorta, S., Chiari, M., Casalino, S., De Bernardi, D., & Galvani, R. (2016). Recovery of consciousness after 7 years in vegetative state of non-traumatic origin: A single case study. *Brain Injury, 30*(8), 1029–1034.

Fishman, J. A. (2017). Infection in organ transplantation. *American Journal of Transplantation, 17* (4), 856–879.

Ganapathy, K. (2018). Brain death revisited. *Neurology India, 66* (2), 308–315.

Hameed, S. M., Aird, W. C., & Cohn, S. M. (2003). Oxygen delivery. *Critical Care Medicine, 31*(12), S658–S667.

Lewis, A., & Greer, D. (2017). Current controversies in brain death determination. *Nature Reviews Neurology, 13* (8), 505–509.

Liotti, M., Brannan, S., Egan, G., Shade, R., Madden, L., Abplanalp, B., Robillard, R., Lancaster, J., Zamarripa, F. E., Fox, P. T., & Denton, D. (2001). Brain responses associated with consciousness of breathlessness (air hunger). *Proceedings of the National Academy of Sciences, 98* (4), 2035–2040.

Laureys, S., Celesia, G. G., Cohadon, F., Lavrijsen, J., León-Carrión, J., Sannita, W. G., Sazbon, L., Schmutzhard, E., von Wild, K. R., Zeman, A., & Dolce, G. (2010). Unresponsive wakefulness syndrome: A new name for the vegetative state or apallic syndrome. *BMC Medicine, 8*, 1–4.

Langner, R., & Eickhoff, S. B. (2013). Sustaining attention to simple tasks: A meta-analytic review of the neural mechanisms of vigilant attention. *Psychological Bulletin, 139* (4), 870–896.

Lock, M. M. (2002). *Twice dead: Organ transplants and the reinvention of death*. University of California Press.

Manookian, A., Cheraghi, M. A., & Nasrabadi, A. N. (2014). Factors influencing patients' dignity: A qualitative study. *Nursing Ethics, 21* (3), 323–334.

McCloskey, T. H. (2012). The death penalty and the right to life. *Commonwealth Law Bulletin, 38* (3), 485–508.

Morenski, J. D., Oro, J. J., Tobias, J. D., & Singh, A. (2003). Determination of death by neurological criteria. *Journal of Intensive Care Medicine, 18* (4), 211–221.

Prescott, P. A., Dennis, K. E., & Jacox, A. K. (1987). Clinical decision making of staff nurses. *Image: The Journal of Nursing Scholarship, 19* (2), 56–62.

Panna, M. S. (2021). Determination of death: Ethical and biomedical update with international consensus. In *Bioethical issues in healthcare* (Vol. 18). Intech Open.

Purnell, D. (2013). Breathing back my life. *Journal of Loss and Trauma, 18* (2), 91–102.

Shibasaki, H., & Hallett, M. (2022). *The neurologic examination: Scientific basis for clinical diagnosis*. Oxford University Press.

Sharma, A., Menon, P. F., Muresanu, D., Ozkizilcik, A., Ryan Tian, Z. V., Lafuente, J. S., & Sharma, H. (2016). Nanowired drug delivery across the blood-brain barrier in central nervous system injury and repair. *CNS & Neurological Disorders - Drug Targets, 15* (9), 1092–1117.

Timmermans, S. (1999). *Sudden death and the myth of CPR*. Temple University Press.

World Health Organization. (2013). *Pocket book of hospital care for children: Guidelines for the management of common childhood illnesses*. https://www.who.int/publications/i/item/978-92-4-154837-3