Should the Criterion for Brain Death Require Irreversible or Permanent Cessation of Function? Irreversible

The UDDA Revision Series

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Abstract

I argue that death is irreversible and not merely permanent. Irreversible means a state *cannot* be reversed and entails permanence. Permanent means a state *will not* be reversed and includes cases where the state could still be reversed though a decision has been made not to attempt this reversal. This distinction is important, as we shall see. Four reasons are given for why death must be irreversible and not merely permanent: no mortal can return from the state of death; unacceptable implications regarding culpability for actions and omissions; death is a physiologic state; and irreversibility is inherent in the standards to diagnose brain death. Four objections are considered including the following: permanence is the medical standard, permanence was the intent of the President's Commission on defining death, irreversible requires many hours to occur, and we should change terminology to reflect our case intuition. These objections are discussed and rejected. Finally, I clarify my views to conclude that the criterion for biological death is irreversible loss of circulation.

Introduction

Death is a biological, unidirectional, ontological, physiologic event.[1] Being dead is a state of an organism, an existential reality, not a social contrivance or a normative concept.[1] A living organism is "an integrated functioning organism as a whole, a localized pocket of antientropy achieved by maintaining internal homeostasis while resisting chemical and thermal equilibrium with the external environment."[1,p.2] A dead organism has had "irreversible cessation of the integrated functioning of the organism as a whole, such that the organism no longer has the capacity to restore homeostasis and thereby resist entropy."[1]

In this essay, I will argue that death is irreversible and not merely permanent. Irreversible means a state *cannot* be reversed and entails permanence. Permanent means a state *will not* be reversed and includes cases where the state could still be reversed though a decision has been made not to attempt this reversal. This distinction is important, as we shall see.

Why Death Is Irreversible, Not Merely Permanent

First, a common usage and understanding of the term "death" entails that death is final such that no mortal can return from being dead.[2] Resuscitation interrupts the process of dying and is not a miraculous (supernatural) resurrection from the state of death. One cannot retroactively negate a diagnosis of death (i.e., death is not capable of being reversed). If death were merely permanent cessation of functioning, one could retroactively negate its diagnosis (i.e., the body is not beyond the possibility of resuscitation). In other words, the permanent state is a *prognosis* of death that depends on a predicted (more or less) certain future event (or lack thereof).[2] If a certain prognosis was sufficient to diagnose death, then other patients who could be considered

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Glossary

BD = brain death; **E-CPR** = extracorporeal cardiopulmonary resuscitation; **EPR** = emergency preservation and resuscitation.

already dead include patients at the exact time of voluntary withdrawal of life support (e.g., a spinal cord–injured quadriplegic having ventilation withdrawn or a patient without cardiac activity having extracorporeal membrane oxygenation withdrawn) or the drowning man when no one will swim out to save him.[3]

Second, if death were merely a permanent state, there are unacceptable implications regarding culpability for actions or omissions.[4] The obligation to resuscitate (or not) is owed to a patient when they are still alive.[2-4] Once in a permanent state of loss of functioning, if this were to already be the state of death, there would be no obligation to attempt (or not) resuscitation. For example, if you were to suddenly collapse due to a nonperfusing arrhythmia, this state was permanent, and a duty to attempt resuscitation by capable bystanders (who did not like you) was absent and culpability for ignoring you (you were already dead) was also absent. As another example, suppose you fall and sustain an expanding epidural hematoma with sudden loss of brain functioning, and interventions (e.g., intubation, hyperventilation, mannitol, and surgery) could reverse that state. Withholding these would not be a culpable omission if you were considered already dead in your permanent brain death (BD) state.

Third, death is a physiologic state, and physiologic states do not depend on whether resuscitation will (or will not) be attempted.[4] Patients in identical physiologic states cannot be considered dead in 1 case and alive in another based on whether one intends (or not) to perform resuscitation. This point is recognized in other physiologic states, for example, a patient who refuses (or cannot obtain) medication is not considered to have an irreversible (though permanent) diagnosis of hypertension.[3]

Finally, that permanent is not sufficient to diagnose BD is inherent in the standards for BD diagnosis. Guidelines require that potentially reversible conditions that might confound or mimic the state must be ruled out.[1,5,6] In other words, if the state is merely permanent (i.e., potentially reversible), it cannot be death. There must be "no biological potential in the brain to reinstate sufficient cell function required to achieve emergence to consciousness [and presumably other brain functions]."[7]

Some Objections Considered

Some assert that the medical standard in diagnosing death is based on permanence. This is not the case for BD, where reversible conditions must be ruled out before making the diagnosis.[6] This only seems to be the case for loss of circulation because, in ordinary circumstances, there remains the retrospective ability to confirm irreversibility over time; in the case of organ donation procedures, this retrospective ability is taken away. For example, on withdrawal of life support and cessation of circulation and respiration, in ordinary circumstances, a family may be told their loved is dead; however, if the family suddenly changed their mind and resuscitation was then started and successful, we would not say their loved one was dead and then resurrected, rather, we would say we were wrong, and they were not yet dead when resuscitation was started. Medical standards are acceptable only as much as they are supported by evidence and critical scrutiny.

Some claim that the intent of the President's Commission on defining death (and the resulting Uniform Determination of Death Act) was a permanence standard. Based on earlier statements made by the Executive Director of the Commission (Alexander Capron), leaders in this debate (James Bernat), the President's Council on Bioethics, and other members of the Commission, this is evidently false.[2,pp.S30,S31,3,pp.5,6]

Some point out that exactly when loss of integration of the organism is irreversible is unknown. Cases of extracorporeal cardiopulmonary resuscitation (E-CPR), emergency preservation and resuscitation (EPR), and experimental novel resuscitation techniques are said to suggest a warm ischemia time interval of hours. For one, this is an epistemic problem, not a metaphysical one, so not relevant here. In addition, the relevant time interval is until interventions must begin that then allow subsequent prolonged intervals until irreversibility. For example, CPR must start within minutes of cardiac arrest to enable later E-CPR, cold flush into the aorta must occur within minutes of exsanguinating cardiac arrest to enable later EPR, exsanguination followed by flushing of cerebral vessels with heparinized 20°C solution starting at 10 minutes must occur to enable later BrainEx resuscitation, and systemic heparinization at time zero and exsanguination (of more than half the blood volume) at 30 minutes must occur to enable later OrganEx resuscitation.[8-10] A related objection would assert that one should prove irreversibility of circulation, requiring a failed trial of E-CPR. This is a misunderstanding because the relevant time interval is that from loss of circulation until the E-CPR process would need to begin, which does not require a failed trial of E-CPR to determine. Finally, if the time interval to irreversibility, using the very best future technology, is prolonged, that would be reality, and we would have been wrong in considering death to have occurred at earlier time points.

Fourth, Shewmon[11] suggested the term "passed away" or "deceased" to describe the permanent sociolegal ceasing-to-be, a proposed civil end in relation to others, occurring at the moment of cessation of circulation. This was based on his case intuition on euthanasia of his beloved dog Soran.[11] The test for diagnosis of "passed away" is a retrospective observation that circulation did not resume.[11] This language does not solve the

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problems with the permanence standard. First, a retrospective diagnosis is, in prospect, only a prognosis. Second, "deceased" can be retroactively negated by backward in time physical causation (i.e., later resuscitation) or can be retroactively caused by backward in-time physical causation (i.e., later omission of resuscitation causes the "passing away" that occurred before the cause). Third, a culpable act (ignoring an obligation not to resuscitate) or omission (ignoring the obligation to resuscitate) is owed to the already "deceased." Fourth, the civil end is based on a moral decision and not the physiologic state of the body. The intuition was not "a sure sign that a fundamental paradigm shift is required"[11]; rather, it was a raw intuition that does not withstand critical scrutiny.

Some Clarification of My Views

There are 2 problems with accepting even irreversible BD as death. The metaphysical problem: irreversible BD is not the state of death because ongoing integrative functioning of the organism as a whole often continues.[1] The epistemic problem: we cannot make the diagnosis of either permanent or irreversible BD because potentially reversible confounders or mimics are almost always present (e.g., central thyroid and/or adrenal deficiency, high cervical cord injury from brain herniation, global ischemic penumbra, and, with primary brainstem injury, total locked-in state).[1,5,12] At least 6 published cases of false-positive diagnoses of BD attest to these epistemic problems.[1,12] I conclude that the criterion for biological death is irreversible loss of circulation.[2]

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Ari R. Joffe, MD	Division of Critical Care Medicine, Department of Pediatrics, and John Dossetor Health Ethics Center, University of Alberta, Edmonton, Canada	Drafting/revision of the article for content, including medical writing for content; major role in the acquisition of data; study concept or design; and analysis or interpretation of data

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