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Cardiac events and brain injury: Ethical implications

The collection of work on the interfaces of the heart and brain contains an incredibly rich set of implications and perspectives. Likewise, the set of ethics issues raised by, and as a result of, these research projects encompasses a wide array of topics. This article will explore some of these ethical questions, recognizing that the overarching themes involve bringing the heart and brain back together so that we talk about the *whole person* in health and function, a concept emphasized by Dr. Earl Bakken in his remarks at the opening of this Heart-Brain Summit. Notably, the whole person exists in a network of hearts and brains that compose social networks—a point we must not forget in our exuberance to gain new knowledge and help those who suffer.

BASIC UNDERLYING CONSIDERATIONS

Before approaching a selection of specific ethics questions, the following formulations of ethical points and questions should be kept in mind.

'Because we can' does not mean we should

This first consideration is a cautionary statement about the importance of understanding that some apparently heroic activities may, in fact, entail more harm and suffering than nonaction would. We are obligated to carefully reflect on our goals and practices at each step of innovation, research, and treatment.

How do we act in the face of great uncertainty?

Given the significant uncertainties regarding the complexities of human life—particularly regarding the heart, the brain, and the interaction between the two—we need to be clear about how we wish to act when there is great uncertainty.[1] This requires careful reflection on what valuable things are lost and gained by taking a more cautious or aggressive posture toward research and innovation.

At what cost, and to whom?

When thinking about the posture we take, we need to understand the cost of our endeavors in terms of suffering and harm as well as in terms of resources. This evaluation must take into account *to whom* the cost accrues. It is a matter of justice to assure that no population bears an undue burden in the development of therapies and the advancement of scientific understanding.

RECOGNIZING ASSUMPTIONS AND VALUES IS CENTRAL

The topic suggested for the current discussion was "cardiac events and brain injury: ethical issues." It was not "cardiac events *leading* to brain injury," although that topic will dominate these reflections. There are cases in which brain injuries also lead to cardiac events. The bidirectional importance of each organ creates the foundation for heart-brain research. In fact, these heart-brain research projects call into question many traditional assumptions about the (un)connectedness of the two systems. Since good ethics requires clear understanding of basic assumptions, these new ways of thinking rightfully should cause us to reflect carefully on our ethical balancing.

Two categories of dilemmas in heart-brain medicine

Numerous scenarios allow us to reflect on interesting ethical dilemmas; these fall into two general categories:

- Brain injury after a cardiac event
- Allowing cardiac events that lead to brain injury.

The first category typically involves neurological criteria for death, patients with chronic disorders of consciousness,[2] or patients with diminished motor function. The second category typically involves withdrawal of therapy and cardiac criteria for death.

A balancing of values

Ethical dilemmas exist when there are disagreements over whether one valuable thing must be sacrificed—and to what degree—to preserve another valuable thing. **Table 1** presents several valued things that everyone would likely agree are desirable

* Dr. Ford reported that he has no financial relationships that pose a potential conflict of interest with this article.

in as great a proportion as possible.

Each of these values plays an important role in enabling us to live our lives well. The goal of much heart-brain research should focus on helping people live their lives well by treating them as integrated systems and selves. That means treating the whole person, a concept that echoes a classic ethics issue dating back to Aristotle and well before.

RECENT CASES HIGHLIGHT KEY ISSUES

Several recent high-profile cases of brain-injured patients illustrate how a number of traditional medical ethics questions can be particularly relevant to heart-brain medicine and research.

The case of Terri Schiavo: Medical uncertainty cannot be eliminated entirely

Terri Schiavo and her family recently became central to a heated debate about life-preserving treatments for persons with severe brain damage. At age 25, Ms. Schiavo had a cardiac arrest that resulted in severe brain injury; she was eventually diagnosed as being in a permanent vegetative state. In this case there was a cardiac event leading to a brain injury and then possibly a subsequent cardiac event after the withdrawal of artificial nutrition and hydration many years after the initial events.

A brief look at a 2002 computed tomograph of Ms. Schiavo's brain (released by Ronald Cranford, MD,* with permission from Michael Schiavo and available at http://www.msnbc.msn.com/id/7328639/) is powerful in that it shows severe atrophy of the brain. In spite of the massive brain damage apparent on that scan, some kind of organic life had continued for many years even though there were no indications of a cognitive life. In spite of very aggressive and experimental therapy, including placement of a deep brain stimulator in 1990, Ms. Schiavo's condition did not improve.[3] In March 2005, artificial hydration and nutrition were removed and her heart eventually stopped.

This case involved a number of interesting ethically charged decisions. There is no clear explanation as to when the aim of care shifted from aggressively attempting treatment, such as placement of the deep brain stimulator, to focusing on a respect of Ms. Schiavo's past wishes of not living in a vegetative state. The case also underscores the need to think carefully about the implications of developing better predictors of neurologic outcomes after cardiac events. With better predictors, we might make different decisions at the time of a cardiac event. The case also raises questions of what the cost in human suffering was to those who surrounded Ms. Schiavo and had interacted with her.

To a great degree the troubling choices in this case, as in many cases, hinge on a degree of uncertainty that can never be removed completely. Questions about the cost of being wrong always persist. At the same time, physicians must act in the face of uncertainty.

Much of the discussion about this case contained very deep value suppositions. Likewise, value suppositions were central to the family members' opposing positions up to the end, as revealed by the statement Ms. Schiavo's husband had inscribed on her grave marker:

SCHIAVO
THERESA MARIE

BELOVED WIFE

BORN DECEMBER 3, 1963
DEPARTED THIS EARTH
FEBRUARY 25, 1990
AT PEACE MARCH 31, 2005

I KEPT MY PROMISE

When discussing issues of brain injury we cannot avoid confronting these underlying value assumptions. We should take the wide variety of views about the world into account when we undertake the practice of heart-brain medicine. Reflectively understanding our assumptions will better allow us to understand the true costs of decisions in brain injury cases, particularly as perceived by patients and their families.

The case of Ariel Sharon: When to use innovative therapies, and in whom?

Different issues are raised by the case of former Israeli prime minister Ariel Sharon, who had a stroke related to a cardiac condition—patent foramen ovale (PFO).

TABLE 1
Ethical values at stake

Length of life
Quality of life: maximizing function
Quality of life: minimizing suffering
Fiduciary responsibility/respect for patients
Justice
Improvement of treatments and increase in knowledge (research)

* I am indebted to Dr. Cranford, who recently passed away, for his influence on a number of these points.

This was another well-publicized case, and there was much discussion about the role that Mr. Sharon's PFO played in his neurologic insult.[4] This debate highlights questions about the use of innovative medical therapies and interventions. Although the stroke occurred prior to Mr. Sharon's scheduled PFO closure, it is important to ask about the strength of the evidence concerning the causal connection between PFO and stroke. How strong of a connection must be proved before an innovative treatment is adopted as a standard?

This question is particularly important in light of the difficulties of performing randomized trials after patients begin to demand an innovation despite a lack of the degree of evidence that supports most other established medical therapies. We need to avoid the problems experienced in the 1990s when autologous bone marrow transplants were performed to treat breast cancer even though no proof of benefit existed.

In addition to ensuring that innovative therapies are sufficiently studied before being widely used, great care needs to be taken in considering to whom innovative therapies are applied and in whom they are studied. We need to be careful to balance justice issues for both the powerful and the powerless. The powerful should not be overtreated, and the powerless should not be experimented upon for convenience.

The case of Jean-Dominique Bauby: What makes a life worth living?

A final example involves the case of Jean-Dominique Bauby, the editor of a French fashion magazine who suffered a cerebral vascular event (pontine stroke) that left him with "locked-in" syndrome. This condition did not prevent Mr. Bauby from writing his autobiography, which he composed one letter at a time by blinking his left eye as an assistant pointed to a letterboard. In the resulting book, entitled *Le Scaphandre et le Papillon* (translated in English as *The Diving Bell and Butterfly*), Mr. Bauby describes his mind as being like a butterfly while his body is like a diving suit. After his stroke, he redefines himself in many ways that challenge our conception of which lives are worth living.[5]

Indeed, the diversities of lives that can become worth living must be kept in the forefront of our minds as we explore and develop heart-brain medicine. We must be sure to explore carefully the elements of life most valued by individual patients and research subjects.

DUELING DEFINITIONS OF DEATH

Death forms an implicit thread throughout this discussion, with questions raised about both physical and social death. It is important to point out that the indicators for death are again under debate, with the roles played by the heart and the brain in the declaration of death continuing to be controversial.

Neurological criteria for death appear to make the brain most central in the survival of the self and mind. This definition of death seems to hinge on understanding a person as primarily a thinking being. When properly applied, however, the neurological criteria are extremely reliable in predicting the cessation and permanent absence of a return to life. The increasing belief that death is defined as the failure of the brain has called into question the traditional cardiac criteria for death—ie, cessation of heart and lungs. We can see an interesting lack of consensus even among neurointensivists about cardiopulmonary death when discussing solid organ transplantation after cardiac death.[6] There is considerable discussion about when—ie, how long after the heart stops beating—a patient who has had life support withdrawn is "dead" in the way that allows organs to be harvested for donation. Perhaps current or future heart-brain research projects will result in a set of neuro-cardiac criteria for death that will be more integrative and thus more acceptable to all.

RESEARCH VALUES MAY DIFFER FROM CLINICAL VALUES

In undertaking the fascinating and complicated research of heart-brain interactions, we should make explicit the values underlying innovation and research. These values include good data, benefit to others who are similar to the subject (but not the subject himself or herself), and enhancement of the researcher's career (potential dual-role conflict of interest). These values are not necessarily the same as those espoused strictly for clinical care, and attempts to preserve some of these values of innovation and research can complicate patient treatment. Again, at each step we must consciously balance the risks and benefits for specific patients and subjects.

CONCLUSION

Good ethics starts with a clear understanding of assumptions and good knowledge. In many ways we have a moral obligation to strive for greater scientific understanding. However, this pursuit of knowledge always must be constrained by a careful evaluation of the costs to those around us, those we treat, and those who are willing to participate in research. We need to carefully assess issues as fundamental as even what counts as a harm or a benefit to particular individuals