Ethics & Medics

December 2020 Volume 45, Number 12

A Commentary of The National Catholic Bioethics Center on Health Care and the Life Sciences

Also in this issue: "Aquinas on Consciousness and the Human Soul," by Edward J. Furton

Disorders of Consciousness: Terminology and Prognosis

Gerald J. Nora, MD

Patients with disorders of consciousness have been at the heart of some of the most heated debates on so-called right-to-die cases such as the Terri Schiavo case. People with DOCs occupy a spectrum of disorders from coma to the minimally conscious state. Recent advances in neuroscience have led to insights on the mechanism of these disorders as well as to the revelation that some patients might have a greater degree of awareness than previously believed. These scientific developments have paralleled long-term clinical follow-ups, which have also shown more positive outcomes than expected.

Nomenclature and Mechanisms of Disorders of Consciousness

Consciousness is medically defined as "the state of full awareness of the self and one's relationship with the environment."[1] Consciousness is further broken down into the components of arousal and awareness, or content. Arousal is simply defined as the opposite of sleep and in the clinical sense is usually correlated with the eyes' being open, although this is not accurate in all cases. Awareness requires the presence of arousal and encompasses the full array of cortical functions, including cognition and affect.[2]

A disorder of consciousness is typically caused by (1) disruption of midbrain and thalamocortical excitatory pathways that support alertness and higher cognitive function or (2) diffuse damage to frontal structures that receive the thalamocortical input. The lowest DOC is coma, which is a disorder of arousal. Without arousal there cannot be awareness. Coma can be due to a variety of traumatic or nontraumatic (e.g., anoxic brain injury, stroke, infection) causes. Coma typically lasts for only two to four weeks at the longest.[3]

The next lowest level of DOC is the unresponsive wakefulness state (UWS), which is a term recently proposed to replace the term *vegetative state* (VS).[4] Patients in UWS will open their eyes and demonstrate *inconsistent* responses to their environment. Previously, being in UWS/VS for more than twelve months after a traumatic injury or three months after a nontraumatic event (e.g., cardiac arrest) led to a diagnosis of the patient's being in a permanent VS or UWS.[5] Traditionally, the prognosis was considered to be almost universally grim, but this has been reconsidered, as discussed further below.

Patients in the highest level of DOC, a minimally conscious state, begin to show intermittent signs of awareness with consistent, nonreflexive behaviors such as visually tracking or fixating on objects.[6] MCS is now divided in *minus* and *plus* levels, with the plus-level patients demonstrating some language capability (e.g., vocalizing or following commands) and the minus-level patients displaying lower-level but nonreflexive behaviors such as visually fixating or reaching toward a noxious stimulus (localizing).[7]

Given that patients in MCS fluctuate or have relatively subtle signs of awareness, as many as 41 percent of patients diagnosed with UWS may actually be minimally conscious.[8] Research has shown that functional magnetic resonance imaging may be able to pinpoint changes in cortical activity in response to commands such as "imagine playing tennis," indicating consciousness even in patients who are unable to move their limbs on command.[9]

However, a patient who has emerged from MCS may still be in a confusional state and still require comprehensive assistance for mobility and activities of daily living (e.g., dressing, eating, toileting).[10]

Prognosis in Disorders of Consciousness

Prognosis in DOCs is fraught, given the high costs of care (financial and emotional) and the severity of the illness. This is hardly helped when even clinicians have very negative perceptions of DOC.[11]

In the past decade, several studies have shown long-term outcomes of patients with DOCs. In a recent systematic review, among patients who remained in a DOC for at least twenty-eight days, 67 percent of patients in a posttraumatic UWS emerged into a conscious (though possibly still confused) state by six months, while 78 percent did so by twelve months. Among patients in a nontraumatic UWS, 17 percent recovered consciousness by six months, and an additional 7.5 percent recovered after twenty-four months.[12] While a person in UWS for three months after a cardiac arrest may not definitively be in a permanent DOC, as according to past definitions, the prognosis for emergence from DOC is still relatively poor.

Poor expectations may therefore create a self-fulfilling prophecy; that is, minimizing or even withdrawing care from seriously ill patients will inevitably lead to a bad outcome. A retrospective multicenter study of Canadian trauma patients found that 70 percent of deaths occurred after withdrawal of care, half of which were

done within three days of admission.[13] A study of hemorrhagic strokes found that of the patients who died, 76.7 percent had care withdrawn because of a perceived poor prognosis, with an average hospitalization stay of just two days, implying that this decision was made quickly. By contrast, six of the nine patients with the gravest clinical characteristics (bleed volume of over 60 cm^3 and Glasgow Coma Scale ≥8) who had full care were able to do intensive rehabilitation.[14] While such patients were still gravely ill and had a high risk of mortality, their cases caution against overly swift judgment for a critically ill patient.

Bioethical Considerations in Disorders of Consciousness

In a companion article to the consensus statements on the science and clinical management of persons with a DOC, two bioethicists revisited the practicalities of clinical decision making according to this framework and called attention to the need for better pain control in patients who were previously dismissed as not being able to feel pain.[15] One of the bioethicists, Joseph Fins, acknowledged that mainstream bioethics, which predicated the withdrawal of care from patients with long-term UWS on the grounds of its permanence, will have to revisit some of its assumptions.[16] However, the assumptions in question are the particulars about diagnosis and prognosis.

Catholic bioethicists have sometimes simultaneously contested both the diagnosis as well as the care (or withdrawal thereof) in notorious cases such as Terri Schiavo's.[17] However, regardless of the diagnosis or prognosis, Catholic bioethics considers food and nutrition to be ordinary care. Pope St. John Paul II explicitly stated, "The administration of water and food, even when provided by artificial means, always represents a *natural means* of preserving life, not a *medical act*."[18] Therefore, while current developments promise better insights into DOCs and improved outcomes for a broader range of patients than previously possible, fundamental bioethical differences persist regarding patients with DOC.

Gerald J. Nora, MD, PhD, is the medical director at Ascension Sacred Heart Rehabilitation Hospital in Milwaukee.

Notes

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Aquinas on Consciousness and the Human Soul

Edward J. Furton

We live in an age of scientific materialism. One of the signs of this philosophy is how the traditional Western idea of the soul has been submerged beneath the materialist premise that matter is the cause of life. Matter somehow brings life into being. We see this claim, for example, in the standard description of the origin of life given in biology textbooks. They assume that RNA and DNA appeared spontaneously, giving rise to the most primitive forms of living creatures. What caused RNA to suddenly appear they cannot say.

The view that life is caused by matter is a hypothesis. Although never proven, the theory permeates contemporary culture. For example, a staple theme of the science fiction genre is that machines, equipped with sophisticated computer processing powers, will eventually become conscious. This is thought to be plausible even though matter has never been brought to life, much less made conscious. Mary Shelley, author of the gothic novel *Frankenstein*, understood that if a new creature were to become conscious, it would first have to be endowed with life. So, she had Victor Frankenstein begin his experiments by regenerating dead tissue.

A more practical example of the prevalence of the materialist premise is seen in the claim that human consciousness reduces to electrochemical activity within the brain. When this activity diminishes, the mind begins to flicker and tends toward nonexistence. Although the patient is not brain dead, when electrochemical activity diminishes sufficiently, the patient is as good as dead.

The Catholic philosophical tradition rejects this view and contradicts the materialist premise. Life is not caused by matter; instead, the soul gives life to the body. The life of the body is not reducible to matter but exists as an immaterial (spiritual) entity that has its own inherent powers. St. Thomas Aquinas holds that the human soul is unique among forms of life because it has its own act of existence given directly by God.[1]

On this view, the soul remains within the body despite the absence of any vibrant electrochemical activity. The inability of the injured person to communicate is not the result of the flickering out of the mind. To the contrary, the injured brain makes it impossible for the soul to display its fundamental powers of will and intellect. The soul is not material, so it is not affected by injuries to the body. This general immunity from physical harm is why Catholic philosophers such as Aquinas conclude that the soul survives death. A patient with brain injury who gives no externally measurable signs of consciousness therefore remains a person in the full sense of the word.

The clinical approach to patients with disorders of consciousness will be very different under these two understandings. Given the materialistic premise, the near absence of electrochemical activity in the brain is a sign that the patient either no longer exists or has a life that is equivalent to nonexistence. Such persons are empty shells. They can be disregarded. There is nothing within them that merits our consideration or care.

On the Catholic view, the soul of such a person continues to endow the body with life, but unfortunately the body is so profoundly injured that it prevents the soul from readily displaying its presence and spiritual powers. Nevertheless, this patient cannot be treated with disregard, because the substantial union of body and rational soul continues. The family and medical staff therefore have an obligation to treat this patient with the same measure of respect as they would any other person.

Spirituality of the Soul

Indeed, an interesting question is whether thought in its highest function produces any activity in the brain at all. Since the soul is a spiritual entity, its powers of intellect and will transcend matter. When we apply Aquinas's theory of cognition to the contemporary setting of science and medicine, it is preferable to say that the observable activity within the brain corresponds to the lower operation of the senses and the imagination.

For Aquinas, the word *imagination* refers not to creative thinking, but to the images that are stored within the mind through previous sensation (I.85.1). For example, one can draw up a mental picture of an apple even though there are none in the room. Similarly, we can imagine its taste or how it might sound if it drops to the floor. We can draw from memory a picture not only of the green color of the Granny Smith apple but also of its taste. These images, Aquinas says, are the source of our ideas.

Interestingly, no picture corresponds to our most abstract ideas. Each mental image of an apple represents a particular shape and color and therefore a particular type, but the concept of apple in general cannot come before the mind in an image. Any mental picture that we might draw up would be particular and not universal. To take another example, consider the idea of two. We can certainly picture the numeral that represents this number. We can also recall the sound of the word. I can picture two dots or two circles or two apples, but the notion of two does not correspond to any of these particular examples. The mathematical concept, considered in itself, is completely abstract.

The higher studies, including theology, all travel in this purely intelligible realm. God cannot be pictured. Obviously, the image of God the Father seated on a throne with a flowing white beard is just an artistic representation. No theologian thinks God truly looks that way. When we turn our minds to the attributes of the Divinity, such as omniscience, omnipotence, and supreme goodness, we quickly realize that none of these can be captured in any pictorial representation. The human mind grasps these ideas independent of matter. As ideas, they possess a purely intelligible content.

Most people have a vague idea of the spiritual, but for Aquinas we need only look inward to the exercise of intellect and will. These activities are not reducible to the motion of atomic particles or any other physical substrate, as the materialists suppose. We can know this by reflecting on our own ideas. Of course, the materialist will say that in reality, the electrochemical activity of the brain is producing the illusion of a spiritual phenomenon that has no more substance than does a puff of air. Thoughts are reducible to matter and so will cease at death. Aquinas takes the opposite view. At death, the body dies, but the soul does not. The death of the body is

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DECEMBER 2020

caused by the separation of the soul from the body. The separation continues until the resurrection.

In the theory of cognition offered by Aquinas, the operation of the intellect and will may occur without any easily observable external signs. The activity of the brain reflects the work of the lower parts of the soul. In order to think, we must be in possession of imagery derived from the senses. These data have their material correlates within the brain because they remain connected to the natural world as representations of what has been experienced through sensation. The distinctively human function of abstracting intelligible content from these images exists as a distinct and higher spiritual activity.

The Act of Understanding

Aquinas further holds that God plays a vital role in the process of abstraction. While still relying on Aristotle's *De anima*, the medieval philosopher revises, deepens, and corrects this ancient thinker's intriguing reference to a divine influence. For the mind to form a concept, Aquinas says it must receive an infusion of intelligible light from God. He describes this as the work of the Active Intellect, yet another of the many names he uses for God (I.79). This light enables us to understand a concept just as visible light enables us to see a color.

In advancing this view, Aquinas is describing not a mystical event, but what occurs in the ordinary process of thinking. This divine infusion of light occurs routinely as we go about our day and think about the world around us. He holds that our minds are completely dependent on God for understanding. In modern terms, we might describe this process of divine illumination as a subconscious source that generally goes without our notice. Aquinas insists that a deeper analysis of mental function reveals its presence.

He denies that any content is infused into the mind by God. What we know derives entirely from the imagery that has been acquired through sensation. There is no other source of knowledge in this life. The content of what we know comes from this world—but our ability to know it depends on the light provided by the Active Intellect. Everything that we could want to know about our world would be hidden in darkness were it not for God's illuminating light.

In this life, we have knowledge only through sensation, but that will not be the case in the life to come. There we will enjoy a direct vision of the Divinity through a body that has been reunited with the soul and spiritualized.[2] Death is a transition from a manner of knowing that depends on contact with material objects to one in which there is an immediate vision of intelligible truth. We no longer know through ideas that we represent to ourselves through the mediation of images, but we know through ideas that are infused directly into the mind by God (I.89).

In the life to come, the Active Agent will provide not only the light of illumination but also the content of what is known. That is not possible at present. Aquinas denies that we can have any knowledge of spiritual beings during the mortal part of our existence (I.88.1 and 88.3). We can know only through mental representations. Thus, we can know with demonstrative certitude that God exists, but this does not give us a direct vision of the Divinity. Instead, we know of God's existence as a fact through a deductive process of reasoning. As the Scriptures teach us, in this life no one can see God and live (Exod. 33:20).

So, here is yet another reason why we must show profound respect for the dying. So long as the body continues to show evidence of organized life, regardless of the diminishment of observable activity in the brain, the person may be actively engaged in the work of prayer and the process of salvation. The dying person is entering into a transitional state in which the mind sets aside knowledge of God through abstract ideas and encounters him as He exists in himself.

Edward J. Furton, MA, PhD, is a staff ethicist and the director of publications at The National Catholic Bioethics Center.

Notes

1. Thomas Aquinas, *Summa theologiae* I.75.2. All subsequent citations appear in the text.
2. Thomas Aquinas, *Summa contra gentiles* IV.86. See also 1 Cor. 15.

Ethics & Medics is a publication of The National Catholic Bioethics Center. Regular annual subscription rates for twelve issues include both the print version by mail and online access at www.ncbcenter.org/em: United States, $28; foreign $38; institutional $55. Individual copies are available for $3 each. To subscribe, please write to The National Catholic Bioethics Center, PO Box 596, Wynnewood, PA 19096, e-mail orders@ncbcenter.org, or phone (215) 877–2660. Publisher: Joseph Meaney, PhD. Editor: Edward J. Furton, MA, PhD. ISSN 1071–3778 (print), ISSN 1938–1638 (online). To submit an essay or request submission guidelines, please e-mail submissions@ncbcenter.org.