

COMMUNICATING WITH VEGETATIVE
STATE PATIENTS: THE ROLE OF
NEUROIMAGING IN AMERICAN
DISABILITY LAW

Dalia B. Taylor*

Patients in vegetative states appear to be awake but unconscious. If they have been in a vegetative state for more than one year, they have little chance of ever recovering. Additionally, no one can communicate with them, including physicians, loved ones, and families. However, new scientific evidence has challenged our understanding of this bleak reality. In particular, recent neuroscience research has shown that a substantial number of patients in vegetative states may actually be conscious and able to communicate through the use of brain-scanning technology. This exciting development poses many difficult questions, including the one analyzed here: now that we know neuroimaging may be the only way to communicate with these patients, will health care facilities be required to provide brain-scanning equipment under American disability law? This Note argues that lawsuits seeking neuroimaging technology from hospitals have a significant chance of success. The main challenge for plaintiffs will be convincing judges that existing scientific evidence actually shows that neuroimaging can facilitate communication with patients. Ultimately, if the appropriate legal framework develops, brain-scanning technology could permit patients in vegetative states to make decisions regarding their own medical care and allow families to communicate with their loved ones.

INTRODUCTION.....1452

I. THE SCIENCE BEHIND BRAIN SCANNING1455

 A. *Brain-Scanning Studies*1455

 B. *Critical Responses to the Studies*1456

 1. *Challenges to the theory underlying fMRI*1457

 2. *Sensitivity and specificity of brain scans*.....1458

 a. *Sensitivity*.....1458

 b. *Specificity*1460

* J.D. Candidate, Stanford Law School, 2014. I am especially grateful to Hank Greely and thank him for his insightful feedback and guidance.

II. FEDERAL REQUIREMENTS FOR AUXILIARY AIDS	1462
A. <i>The Americans with Disabilities Act and the Rehabilitation Act of 1973</i>	1463
B. <i>Auxiliary Aid Provisions</i>	1467
III. HOW COURTS DETERMINE WHAT AUXILIARY AID IS REQUIRED	1468
A. <i>The Traditional Analysis</i>	1468
B. <i>Brain Scanning as an Auxiliary Aid</i>	1471
1. <i>Chance of communication</i>	1473
2. <i>Lack of alternatives</i>	1475
3. <i>Scientific support</i>	1475
IV. DEFENSES TO THE AUXILIARY AID REQUIREMENTS	1476
A. <i>The Fundamental Alteration Defense</i>	1476
B. <i>The Undue Burden Defense</i>	1480
V. POLICY CONCERNS	1484
CONCLUSION	1484

INTRODUCTION

Fourteen years ago, Scott Routley was crossing an intersection when he was hit by a police car.¹ Scott survived the collision but suffered a traumatic brain injury and entered into what is known as a vegetative state: a condition in which a patient appears awake at times, sleeps in regular cycles, and retains some reflexes such as yawning or swallowing, but shows no signs of awareness and cannot interact with his environment in any meaningful way.² Patients in vegetative states caused by traumatic brain injury rarely recover consciousness after one year.³ Most die within two to five years from infection, organ failure, an underlying disease, or an unknown cause.⁴ Some vegetative state patients progress to a minimally conscious state, a condition in which they appear to experience intermittent periods of awareness.⁵ Yet even in this state, they are able to react only to select stimuli in a limited, irregular, and ambiguous manner.⁶

For over a decade, every medical test Scott Routley underwent concluded he was vegetative.⁷ He was “the clinical picture of a . . . vegetative patient: no emotional response, no fixation or following with his eyes, [and] he didn’t [dis-

1. *Panorama: The Mind Reader; Unlocking My Voice* (BBC One television broadcast Nov. 13, 2012).

2. DAVID A. GREENBERG ET AL., CLINICAL NEUROLOGY 61 (8th ed. 2012); Gerald L. Weinhouse & G. Bryan Young, *Hypoxic-Ischemic Brain Injury: Evaluation and Prognosis*, UPTODATE, <http://www.uptodate.com/contents/hypoxic-ischemic-brain-injury-evaluation-and-prognosis> (last updated Aug. 29, 2013).

3. GREENBERG ET AL., *supra* note 2, at 61; Weinhouse & Young, *supra* note 2.

4. Weinhouse & Young, *supra* note 2.

5. GREENBERG ET AL., *supra* note 2, at 61.

6. *See* Weinhouse & Young, *supra* note 2.

7. *Panorama: The Mind Reader; Unlocking My Voice*, *supra* note 1.

play] any spontaneous movements that looked meaningful.”⁸ Despite this bleak diagnosis, Scott’s parents believed he was conscious and able to communicate with them through thumb and eye movements.⁹ They took Scott to Dr. Adrian Owen, a researcher at the University of Western Ontario who focuses on studying the neural activity of vegetative state patients using a type of brain scanning called functional magnetic resonance imaging (fMRI).¹⁰

As part of his studies, Dr. Owen took advantage of the fact that an fMRI scan can allow researchers to detect neural activation in different regions of the brain. He designed an experiment in which participants would imagine playing tennis, a task that would normally lead to activity in the premotor cortex.¹¹ Participants would also imagine navigating through rooms in a house, leading to activity in the parahippocampal gyrus.¹² After establishing that Scott could display these patterns of brain activity, Dr. Owen asked Scott to imagine playing tennis as a “no” response to a series of questions and to imagine walking through rooms in his home as a “yes” response.¹³ During this process, Dr. Owen conducted fMRI scans to analyze Scott’s answers.¹⁴ Upon performing further diagnostic testing to confirm Scott’s ability to respond to questions, Dr. Owen then asked Scott a question he had been hoping to ask a vegetative state patient for a long time: “Are you in any pain?”¹⁵ Using the fMRI scans, Dr. Owen was able to interpret Scott’s response immediately.¹⁶ Scott had imagined playing tennis and had thus become the first severely brain-damaged, “uncommunicative” patient ever to tell researchers he was not experiencing any pain.¹⁷

The media exploded with articles detailing Scott’s story.¹⁸ His scans convinced researchers he was “clearly choosing to answer [their] questions” and

8. *Id.*

9. Fergus Walsh, *Vegetative Patient Scott Routley Says “I’m Not in Pain,”* BBC NEWS (Nov. 12, 2012, 7:47 PM ET), <http://www.bbc.co.uk/news/health-20268044>.

10. Sophie Borland & Claire Bates, “*I’m in No Pain*”: *Miracle of Man in Permanent Vegetative State Who Can Communicate with Doctors Using the Power of Thought*, DAILY MAIL (Nov. 15, 2012, 11:26 PM EST), <http://www.dailymail.co.uk/health/article-2232064/Man-vegetative-state-communicates-using-power-thought.html>.

11. *Id.*

12. *Id.*

13. Sydney Lupkin, *Man in Supposed Vegetative State Communicates*, ABC NEWS (Nov. 14, 2012), <http://abcnews.go.com/Health/man-supposed-vegetative-state-communicates/story?id=17716726>.

14. *Id.*

15. *See id.*; *Panorama: The Mind Reader; Unlocking My Voice*, *supra* note 1.

16. *Id.*

17. Walsh, *supra* note 9.

18. *See, e.g.*, Tom Blackwell, *Doctors Shocked as Neuroscientist “Talks” with Man in Vegetative State*, NAT’L POST (Toronto, Can.) (Nov. 13, 2012, 9:21 PM ET), <http://news.nationalpost.com/2012/11/13/doctors-shocked-as-neuroscientist-talks-with-man-in-vegetative-state>; Borland & Bates, *supra* note 10; Richard J. Brennan, *Vegetative Ontario Man Scott Routley “Talks” to Researchers Through Brain Scans*, TORONTO STAR (Nov. 13,

had some previously undetected consciousness, “overturn[ing] all the behavioural assessments that had been made over the years” regarding Scott’s condition.¹⁹ Dr. Bryan Young, Scott’s neurologist, concluded that “we can no longer just rely on behavioral responses to tell if a person is vegetative or not.”²⁰ It is estimated that there are between 10,000 and 25,000 adult vegetative state patients in the United States alone, creating medical costs of up to seven billion dollars annually.²¹ Studies like Dr. Owen’s have shown that a significant number of these patients may possess some previously undetected level of awareness.²²

The legal implications of these findings are enormous, and many have yet to be touched upon in the literature. Particularly, legal scholarship has yet to address the consequences of these findings for health care providers under the Americans with Disabilities Act and the Rehabilitation Act of 1973. Both the Americans with Disabilities Act and the Rehabilitation Act contain requirements that health care facilities provide auxiliary aids when necessary to establish successful communication with disabled individuals. Courts may have to determine whether these federal auxiliary aid requirements obligate hospitals and other health care facilities to provide neuroimaging technology as a mode of communication for otherwise uncommunicative or vegetative state patients.

As this question surfaces in the legal system, a host of complicated and daunting concerns will emerge for health care practitioners, the families of patients, patients themselves, judges, and policymakers. Someday, neuroimaging could become many families’ only hope of communicating with their loved ones. Yet in many cases, this hope will be false; imaging techniques cannot enable communication with patients who are truly unconscious. Furthermore, consciousness that falls below certain levels may still be undetectable by the technology available today. Brain scanning will introduce new costs into the health care system, which judges and policymakers will have to weigh carefully

2012), http://www.thestar.com/news/canada/2012/11/13/vegetative_ontario_man_scott_routley_talks_to_researchers_through_brain_scans.html; David Cyranoski, *Vegetative Patient Free of Pain*, NATURE NEWS BLOG (Nov. 13, 2012, 12:45 BST), <http://blogs.nature.com/news/2012/11/vegetative-patient-free-of-pain.html>; Ryan Grenoble, *Scott Routley, Canadian Patient in “Vegetative” State, Answers “Yes” and “No” Questions via fMRI Machine*, HUFFINGTON POST (Nov. 14, 2012, 10:24 AM EST), http://www.huffingtonpost.com/2012/11/14/scott-routley-vegetative-patient-yes-no_n_2125481.html; Lupkin, *supra* note 13; Eric Pfeiffer, *Vegetative Man Tells Doctors “I’m Not in Pain” via MRI Communication*, YAHOO! NEWS (Nov. 13, 2012, 9:08 PM), <http://news.yahoo.com/blogs/sideshow/vegetative-man-tells-doctors-m-not-pain-via-020801923.html>; Walsh, *supra* note 9.

19. Walsh, *supra* note 9.

20. *Panorama: The Mind Reader; Unlocking My Voice*, *supra* note 1.

21. Weinhouse & Young, *supra* note 2. This estimate pertains to patients in a *persistent* vegetative state—a vegetative state that has continued for at least one month. GREENBERG ET AL., *supra* note 2, at 61.

22. See Blackwell, *supra* note 18.

against the chances of success. When and if truly conscious patients are discovered, it is also unclear how we will assess their capacity to make medical decisions.

Part I of this Note describes relevant scientific studies, which have demonstrated the potential for communication with vegetative state and minimally conscious state patients.²³ Additionally, Part I lays out and addresses some critiques the scientific community has generated in response to these studies—critiques which may ultimately pose significant challenges to the science and theory underlying the use of brain imaging to speak with vegetative state patients. Part II introduces the federal auxiliary aid requirements and explains some important basic aspects of these laws. Part III discusses the context dependence of what auxiliary aid will be required. This Part also offers an analysis of whether the provision of brain-scanning technology can initially be mandated as necessary for communication in the health care context. Part IV presents the two defenses available to the auxiliary aid requirements and evaluates whether health care providers could use these defenses to escape potential obligations to furnish brain-scanning technology. Part V enumerates policy arguments both for and against requiring health care facilities to provide brain-scanning technology. In addition, Part V points out problems with the auxiliary aid requirements that are revealed when the laws are interpreted in response to the development of novel technologies.

I. THE SCIENCE BEHIND BRAIN SCANNING

A. *Brain-Scanning Studies*

Between November 2005 and January 2009, Martin Monti and six other researchers in the United Kingdom and Belgium conducted fMRI brain scans of fifty-four vegetative state and minimally conscious state patients.²⁴ Dr. Owen was among these researchers, and they used the same experimental paradigm Dr. Owen used years later on Scott Routley: asking patients to modulate their brain activity by imagining either playing tennis or navigating through a familiar location in response to prompts and questions.²⁵ Out of all the patients tested, the researchers found significant brain activity in four vegetative state patients and one minimally conscious state patient.²⁶ The researchers also asked

23. Throughout this Note, “hospital” and “health care facility” will be used interchangeably for ease of analysis. In addition, the term “vegetative state patient” is meant to refer to a patient who is diagnosed as and appears vegetative but may or may not retain consciousness and the ability to communicate.

24. Martin M. Monti et al., *Willful Modulation of Brain Activity in Disorders of Consciousness*, 362 NEW ENG. J. MED. 579, 579-80 (2010).

25. *Id.* at 581.

26. *Id.* at 583.

one of the vegetative state patients autobiographical questions by instructing him to think of tennis if he wished to answer “yes” to a question and to think of navigation to answer “no.”²⁷ The patient accurately responded to five of the six questions.²⁸ For example, he correctly answered “yes” when asked whether his father’s name was Alexander and “no” when asked whether his father’s name was Thomas.²⁹

The findings of this study were a landmark discovery and “potential game changer” for many in the scientific community.³⁰ They also spurred additional research, including a study by Damian Cruse et al. that attempted to use electroencephalography (EEG) as a brain-scanning technique in place of fMRI.³¹ During their study, Cruse et al. asked sixteen vegetative state patients to imagine either (1) wriggling their toes, causing increased brain activity in the medial premotor cortex, or (2) making hand movements, resulting in increased activity in the lateral premotor cortex.³² The experiment consisted of several blocks in which patients were asked to imagine the appropriate muscle movement upon hearing a tone and then instructed to relax.³³ EEG readings confirmed this pattern of brain activity in three of the sixteen vegetative state patients tested.³⁴ To complete the experiment successfully, patients had to be able to provide sustained attention to performance of a task, choose between performing one of two tasks in response to prompts, have “language comprehension” to understand the prompts, and have functional short-term memory “to remember which task to do for many trials within each block”—all of which are brain functions associated with consciousness.³⁵ Therefore, the ability of three vegetative state patients to complete the experiment strongly suggests that they experienced some level of awareness during the study.

B. *Critical Responses to the Studies*

These fMRI and EEG studies have provided considerable evidence that some vegetative state patients have a capacity to communicate that can only be

27. *Id.* at 584-85.

28. *Id.* at 585. The researchers did not detect any brain activity in this patient after they posed the sixth question and noted that the patient may have fallen asleep, lost consciousness, not heard the question, or chosen not to answer it for some reason. *Id.*

29. *Id.*

30. David Cyranoski, *Neuroscience: The Mind Reader*, 486 NATURE 178, 179 (2012) (quoting Joseph J. Fins & Nicholas D. Schiff, *In the Blink of the Mind’s Eye*, HASTINGS CENTER REP., May-June 2010, at 21, 21) (internal quotation mark omitted).

31. Damian Cruse et al., *Bedside Detection of Awareness in the Vegetative State: A Cohort Study*, 378 LANCET 2088, 2088 (2011).

32. *Id.* at 2088-89.

33. *Id.* at 2089.

34. *Id.* at 2091.

35. *Id.* at 2092-93.

reached through brain-scanning technology. Furthermore, the findings of these studies suggest that brain scanning may someday allow patients to communicate on a routine basis.³⁶ Patients may also be able to communicate in a more complex manner than through just providing yes-or-no responses to questions, potentially by using a system that pairs specific mental imagery with particular thoughts.³⁷ However, several caveats of this research must be considered and addressed before brain scanning can be utilized regularly for these patients.

1. *Challenges to the theory underlying fMRI*

One issue with performing brain scanning on otherwise uncommunicative patients applies exclusively to fMRI technology. Though fMRI is a widely accepted and popular neuroimaging technique that has been used for the last twenty years in cognitive neuroscience research,³⁸ it does not provide a direct measure of neural activity.³⁹ Instead, it measures changes in blood flow throughout the brain based on levels of oxygen in the blood.⁴⁰ These changes in blood flow are assumed to be “tightly coupled in both space and time” with brain activity.⁴¹ Scientists have questioned this assumption based on experimental findings that showed more oxygenated blood was transferred to an area of the brain than was metabolically required based on that region’s activity.⁴² Recent work has challenged this assumption even further by demonstrating that oxygenated blood may flow to an area of the brain that is almost completely neurologically inactive.⁴³ Given the popularity of fMRI in cognitive neuroscience, this evidence will likely prove only a minor challenge to the findings of studies such as those that were conducted on Scott Routley and other vegetative state patients. Still, these critiques underscore the obstacles fMRI will need to overcome before it can be used to communicate with patients or test the accuracy of vegetative state diagnoses in a clinical setting.

EEG technology could provide a viable alternative to fMRI scanning, as demonstrated by the Cruse et al. study. It evades the critiques that apply to fMRI technology because it directly measures the brain’s electrical activity and

36. *Id.* at 2093.

37. *Id.*

38. Elena Rusconi & Timothy Mitchener-Nissen, *Prospects of Functional Magnetic Resonance Imaging as Lie Detector*, FRONTIERS HUM. NEUROSCIENCE, Sept. 24, 2013, at 1, 2.

39. David A. Leopold, *Pre-Emptive Blood Flow*, 457 NATURE 387, 387 (2009).

40. See Nikos K. Logothetis, *The Neural Basis of the Blood-Oxygen-Level-Dependent Functional Magnetic Resonance Imaging Signal*, 357 PHIL. TRANSACTIONS ROYAL SOC’Y LONDON B 1003, 1009 (2002).

41. Leopold, *supra* note 39, at 387.

42. *See id.* at 388.

43. *See id.* at 387.

is already a widely accepted tool for clinical evaluation.⁴⁴ EEG equipment is also less expensive and more portable than fMRI machines.⁴⁵ However, EEG technology's major downfall is its low spatial resolution. It cannot pinpoint the exact location of brain activity with the same precision as fMRI.⁴⁶ Ultimately, these concerns will have to be delicately balanced when selecting the most appropriate technology for communicating with vegetative state patients.

2. *Sensitivity and specificity of brain scans*

On the other hand, objections to the sensitivity and specificity of brain-scanning studies strike at the very heart of any experimental design's ability to detect consciousness at all. Sensitivity measures a test's capacity to correctly identify those who have the characteristic being tested—in other words, a test's ability to eliminate false negatives. Alternatively, specificity measures a test's ability to properly exclude individuals without the characteristic in question. For example, a diagnostic test for disease *X* that had high sensitivity would accurately detect disease *X* in almost every affected individual. If the test had high specificity, it would also not falsely detect disease *X* in unaffected individuals.

a. *Sensitivity*

Unfortunately, a plethora of obstacles stand in the way of any brain-scanning test's ability to achieve a desirable sensitivity. Specifically, in experiments that instruct patients to imagine a movement or physical activity, a patient who is conscious but has only diminished capacity in an area of the brain necessary for imagining movement may not be able to complete the experiment successfully. The patient's consciousness would thus go undetected, making her a false negative. A new experimental design could be used to examine activity in another area of the brain. However, without additional tests revealing the patient's consciousness and identifying which regions of her brain retained functionality, researchers could not know how to alter the experiment or that it needed to be changed in the first place.

While some uncommunicative but conscious patients experience deficits in specific areas of the brain, others may have only intermittent periods of con-

44. Omkar N. Markand, *Pearls, Perils, and Pitfalls in the Use of the Electroencephalogram*, 23 SEMINARS NEUROLOGY 7, 8 (2003).

45. See Reed Abelson, *An M.R.I. Machine for Every Doctor? Someone Has to Pay*, N.Y. TIMES (Mar. 13, 2004), <http://www.nytimes.com/2004/03/13/business/an-mri-machine-for-every-doctor-someone-has-to-pay.html> (reporting the price of MRI machines, used to conduct fMRI scans, as \$1.4 million on average); Brennan, *supra* note 18 (providing an estimated price of \$75,000 for EEG machines); see also Cyranoski, *supra* note 30, at 180 (commenting on the portability of EEG machines).

46. Cyranoski, *supra* note 30, at 180.

sciousness but no behavioral way to demonstrate this sporadic or irregular awareness.⁴⁷ If these patients are tested during a period of unconsciousness, no brain activity will be detected, and they will be incorrectly recorded as negatives. Additionally, some experimental tasks may place too much of a burden on the limited mental capacity of a brain-damaged patient, resulting in resource allocation problems.⁴⁸ For instance, if a patient is instructed to imagine playing tennis, they need working memory to remember the instructions they were just given (“imagine playing tennis”) and working memory to remember what playing tennis is like.⁴⁹ Any patient could become a false negative if he did not have enough working memory available to satisfy the cognitive demands of such an experiment.

Experimental evidence has corroborated the presence of false negatives in fMRI studies that instruct patients to imagine taking part in some physical activity. Notably, researchers at Weill Cornell Medical College performed fMRI scans of several brain-damaged patients while asking them first to imagine either swimming or playing tennis for several seconds after hearing an instruction to do so and, later, to imagine playing tennis or swimming if the answer to a question they were asked was “yes.”⁵⁰ In one minimally conscious state patient, there was no detection of significant brain activity corresponding to completion of the first task even though she “demonstrate[d] fluent verbal communication” and orally confirmed she was trying to complete the task.⁵¹ The researchers also did not find any significant brain activity corresponding to successful completion of the second task in two patients who behaviorally demonstrated their awareness, had a consistent ability to communicate, and confirmed their attempts to complete the task.⁵²

To resolve these concerns, researchers have created new experiments intended to lower the cognitive demands necessary for identifying consciousness. One group of scientists attempted to detect consciousness by using EEG in conjunction with transcranial magnetic stimulation (TMS) on vegetative state, minimally conscious state, and locked-in patients.⁵³ In these patients, researchers

47. See Monti et al., *supra* note 24, at 588-89.

48. Jonathan C. Bardin et al., *Dissociations Between Behavioural and Functional Magnetic Resonance Imaging-Based Evaluations of Cognitive Function After Brain Injury*, 134 BRAIN 769, 780 (2011).

49. Cyranoski, *supra* note 30, at 179-80.

50. Bardin et al., *supra* note 48, at 770-71.

51. *Id.* at 778.

52. See *id.*

53. Mario Rosanova et al., *Recovery of Cortical Effective Connectivity and Recovery of Consciousness in Vegetative Patients*, 135 BRAIN 1308, 1309-10 (2012). Patients diagnosed as “locked-in” are considered conscious but almost completely paralyzed. See Steven Laureys et al., *The Locked-In Syndrome: What Is It Like to Be Conscious but Paralyzed and Voiceless?*, 150 PROGRESS BRAIN RES. 495, 497-98 (2005). They can only communicate

used TMS to excite neurons in a region of the brain known as the thalamocortical system and then measured the spread of that excitation to other areas of the brain using EEG.⁵⁴ Previous studies conducted on healthy subjects who were either sleeping, anesthetized, or awake showed that neuronal excitation from TMS remained confined to the original region of the brain stimulated by TMS when subjects were unconscious. In contrast, when patients were conscious and awake, neuronal excitation from TMS spread out and created a “complex pattern of [brain] activation.”⁵⁵ Using this technique, the researchers were able to detect only localized neuronal activity in vegetative state patients, suggesting these patients were likely unconscious. More complex activation patterns indicating some level of awareness were observed in minimally conscious state and locked-in patients.⁵⁶ This study will need to be repeated with a larger subject pool to verify the results. Researchers may also have to confirm that patients who are diagnosed as vegetative but still demonstrate some level of consciousness in fMRI or EEG are not improperly categorized as unconscious using this test. Nonetheless, this experimental technique shows considerable promise toward allowing researchers to more accurately detect awareness and then subsequently perform more mentally taxing fMRI or EEG tests to facilitate communication with patients identified as conscious.

b. *Specificity*

Though experimental designs that lower cognitive demands for identifying consciousness may have increased sensitivity, they frequently sacrifice specificity.⁵⁷ Consequently, they suffer from an increased risk of falsely identifying awareness in truly unconscious vegetative state patients. In fact, scientists have criticized the Monti et al. tennis-or-navigation fMRI study for lacking specificity.⁵⁸ One particular issue critics pointed out is that when patients were supposed to imagine playing tennis, they were read the instruction: “imagine playing tennis,” and when they were supposed to stop imagining any physical

through eye movements and are unable to move any other part of their bodies. *See id.* at 497-98, 501-02.

54. Rosanova et al., *supra* note 53, at 1309.

55. *Id.*

56. *Id.* at 1312.

57. In order to manufacture tests with high sensitivity, specificity must frequently be sacrificed, and vice versa. Returning to the example of a diagnostic test for disease *X*, a test for disease *X* that always identified individuals who had contracted disease *X* (100% sensitivity) would also be likely to inaccurately detect disease *X* in healthy individuals (less than 100% specificity). On the other hand, a test that never inaccurately detected disease *X* in healthy individuals (100% specificity) would be more likely to miss disease *X* in individuals with the disease (less than 100% sensitivity).

58. *See, e.g.,* Allan H. Ropper, Editorial, *Cogito Ergo Sum by MRI*, 362 *NEW ENG. J. MED.* 648, 648-49 (2010).

activity, they heard the word “relax.”⁵⁹ As a result, patients with no true level of awareness may have simply been able to subconsciously process words in the instructions and activate the area of their brain responsible for motor imagery at the appropriate times, causing the researchers to mistake subconscious brain activity for consciousness.⁶⁰

Studies have confirmed that some neural activity detected in vegetative state patients and required for higher-level processing does not indicate awareness even if it mirrors the patterns of brain activity in healthy individuals. In one such study, vegetative state patients were either read sentences with homophones (such as “the *creak/creek* came from a *beam* in the *ceiling/sealing*”⁶¹), read sentences that did not contain homophones, or exposed to noise. The results showed that the patients displayed a pattern of neural activity suggesting their brains were appropriately differentiating speech from noise.⁶² However, healthy subjects exposed to the same stimuli when they were deeply sedated and thus completely unconscious exhibited an identical pattern of brain activity, effectively ruling it out as evidence of consciousness.⁶³ While this study “suggests that extreme caution needs to be exercised when interpreting normal responses . . . in patients who are diagnosed as vegetative,”⁶⁴ it could also provide a way to assuage critics’ doubts. For example, to further investigate whether the ability to follow the commands “imagine playing tennis” or “relax” can be completed by the subconscious brain, researchers could anesthetize healthy individuals, read them these same instructions, and record their brain activity to determine if they were imagining physical activity subconsciously in response to the prompts.

Another proposed method to improve specificity is to require a higher threshold of neural activity from patients for successful performance of an experimental task. Cruse et al. took this approach when they used EEG to measure the brain activity of patients asked to imagine wriggling their toes or making hand movements.⁶⁵ Their experiment avoided the potential for triggering subconscious processing of instructions by separating the instructions in time from a prompt to actually follow the instructions.⁶⁶ Specifically, patients were asked to imagine either toe wriggling or hand movements and then relax, but to

59. *Id.* at 649 (quoting Parashkev Nachev & Masud Husain, *Comment on “Detecting Awareness in the Vegetative State,”* 315 SCIENCE 1221, 1221 (2007)) (internal quotation marks omitted).

60. Adrian M. Owen, *Detecting Consciousness: A Unique Role for Neuroimaging*, 64 ANN. REV. PSYCHOL. 109, 115 (2013).

61. *Id.* at 114 (internal quotation marks omitted).

62. *Id.* at 115.

63. *Id.*

64. *Id.*

65. Cruse et al., *supra* note 31, at 2089; *see supra* Part I.A.

66. Cruse et al., *supra* note 31, at 2092.

do so only after they heard a tone.⁶⁷ The patients were tested over several blocks that each included an instruction at the beginning followed by fifteen tones played at roughly five- to ten-second intervals.⁶⁸ Successful completion of the experiment required patients to modulate their brain activity concurrently with the tones, exhibit appropriate brain activity at the right time (activation of the premotor cortex after instructions to imagine hand movements, activation of the lateral premotor cortex after instructions to imagine toe wriggling, and no activity in either region when instructed to rest), and display neural activity that met conditions for statistical significance.⁶⁹ Moreover, the researchers confirmed that healthy individuals instructed not to follow the instructions did not subconsciously process the instructions or display activation in their premotor cortices.⁷⁰ Despite all of these challenges, three vegetative state patients successfully completed the experiment, providing convincing evidence of their awareness. On the other hand, only nine of twelve healthy controls were able to complete the tasks precisely enough to meet the experimental parameters for success.⁷¹ Thus, while the likelihood of falsely detecting awareness was greatly reduced in this experiment, the chance of failing to detect consciousness in individuals who were aware increased considerably. In other words, as is so often the case, high specificity was achieved at the expense of sensitivity.

As all of these experiments demonstrate, it will be difficult to determine the appropriate balance between sensitivity and specificity in testing for consciousness among vegetative state patients. Using a highly sensitive test to first screen for potential awareness in patients and subsequently testing these patients with experimental parameters designed to achieve high specificity may be one way to ensure that consciousness is accurately detected. Yet these procedures could prove both time-consuming and expensive. Future research may provide a more optimal solution, but if brain scanning is utilized in the meantime, the legal world, medical community, and families of patients will have to accept a mode of communication that is expensive and not scientifically proven to reflect conscious thought.

II. FEDERAL REQUIREMENTS FOR AUXILIARY AIDS

Federal regulations mandating that health care providers furnish auxiliary aids to the disabled in order to establish “effective communication” or provide equal access to services have been issued pursuant to both the Americans with Disabilities Act (ADA)⁷² and the Rehabilitation Act of 1973.⁷³ This Part dis-

67. *Id.* at 2089.

68. *Id.*

69. *Id.* at 2092.

70. *Id.*

71. *Id.* at 2091.

72. 28 C.F.R. §§ 35.160(b), 36.303(c) (2013).

cusses the basic elements of these federal requirements, including the types of entities and facilities to which the Acts apply, the relationships between the various provisions of these Acts, and the meaning of the terms “auxiliary aid” and “effective communication” within the Acts.

A. *The Americans with Disabilities Act and the Rehabilitation Act of 1973*

Section 504 of the Rehabilitation Act⁷⁴ embodies Congress’s first major attempt to address “a long history of discrimination against people with disabilities” in the United States.⁷⁵ In line with this goal, the Rehabilitation Act prohibits the denial of services, aids, and benefits to any “qualified handicapped person.”⁷⁶ Yet the Act’s enactment was only an initial step toward eliminating disability discrimination; its scope was limited to entities with at least fifteen employees that receive federal assistance from the Department of Health and Human Services,⁷⁷ leaving “discrimination in the wider society . . . untouched.”⁷⁸ Moreover, courts were reluctant to apply the Rehabilitation Act to health care decisionmaking.⁷⁹

When the ADA was passed in 1990, its goals were sweeping and comprehensive. The Act brought many entities, including those that section 504 of the Rehabilitation Act had been unable to reach, under the dominion of federal antidiscrimination law.⁸⁰ The ADA was split into five titles: Title I addresses discrimination against disabled individuals in employment;⁸¹ Title II places

73. 45 C.F.R. § 84.52(d) (2013).

74. 29 U.S.C. § 794 (2012). Section 504’s implementing regulations can be found at 45 C.F.R. pt. 84.

75. Michael A. Schwartz, *Deaf Patients, Doctors, and the Law: Compelling a Conversation About Communication*, 35 FLA. ST. U. L. REV. 947, 969 (2008).

76. 45 C.F.R. § 84.4.

77. *Id.* §§ 84.2, .4. Recipients are bound by section 504 regardless of whether they are a public or private entity as long as they obtain any manner of support from the Department of Health and Human Services, including funding, “[s]ervices of [f]ederal personnel,” or interest in real or personal property. *Id.* § 84.3(h); see also *id.* § 84.3(f) (“Recipient means any state or its political subdivision, any instrumentality of a state or its political subdivision, any public or private agency, institution, organization, or other entity, or any person to which Federal financial assistance is extended directly or through another recipient, including any successor, assignee, or transferee of a recipient, but excluding the ultimate beneficiary of the assistance.”).

The Department of Health and Human Services may also “require recipients with fewer than fifteen employees to provide auxiliary aids where the provision of aids would not significantly impair the ability of the recipient to provide its benefits or services.” *Id.* § 84.52.

78. Schwartz, *supra* note 75, at 969.

79. Mary Crossley, *Becoming Visible: The ADA’s Impact on Health Care for Persons with Disabilities*, 52 ALA. L. REV. 51, 53-55 (2000).

80. Schwartz, *supra* note 75, at 970.

81. 42 U.S.C. §§ 12111-12117 (2012); see *id.* § 12112(a) (“No covered entity shall discriminate against a qualified individual on the basis of disability in regard to job applica-

antidiscrimination constraints on all state and local government entities;⁸² Title III bars discrimination on the basis of disability by privately owned businesses with operations affecting commerce (“public accommodations”);⁸³ Title IV deals with telecommunications for the hearing and speech impaired;⁸⁴ and Title V contains miscellaneous provisions and states that the ADA is not meant to be “construed to apply a lesser standard than the standards applied under . . . the Rehabilitation Act of 1973.”⁸⁵

The ADA itself was “modeled in part” on the Rehabilitation Act,⁸⁶ and courts regularly consider claims under the ADA and the Rehabilitation Act together due to the general uniformity of requirements under the two Acts.⁸⁷ Courts also implicitly and explicitly apply the same defenses provided for in the ADA to the Rehabilitation Act requirements.⁸⁸ Consequently, the Rehabili-

tion procedures, the hiring, advancement, or discharge of employees, employee compensation, job training, and other terms, conditions, and privileges of employment.”).

82. *Id.* §§ 12131-12134; *see id.* § 12132 (“[N]o qualified individual with a disability shall, by reason of such disability, be excluded from participation in or be denied the benefits of the services, programs, or activities of a public entity, or be subjected to discrimination by any such entity.”).

83. *Id.* §§ 12181-12189; *see id.* § 12182(a) (“No individual shall be discriminated against on the basis of disability in the full and equal enjoyment of the goods, services, facilities, privileges, advantages, or accommodations of any place of public accommodation by any person who owns, leases (or leases to), or operates a place of public accommodation.”).

84. 47 U.S.C. § 225 (2011).

85. 42 U.S.C. § 12201(a). Title V is codified as amended at 42 U.S.C. §§ 12201-12213.

86. *Abbasi v. Herzfeld & Rubin, P.C.*, 863 F. Supp. 144, 146 n.1 (S.D.N.Y. 1994).

87. *See Powell v. Nat’l Bd. of Med. Exam’rs*, 364 F.3d 79, 85 (2d Cir.) (“Since the standards adopted by Titles II and III of the ADA are, in most cases, the same as those required under the Rehabilitation Act, we consider the merits of these claims together.” (citation omitted)), *corrected by* 511 F.3d 238 (2d Cir. 2004); *Birmingham v. Omaha Sch. Dist.*, 220 F.3d 850, 856 (8th Cir. 2000) (“We have held that the enforcement, remedies, and rights are the same under both Title II of the ADA and § 504 of the Rehabilitation Act.”); *Abbasi*, 863 F. Supp. at 146 n.1 (“[C]ases brought under the Rehabilitation Act are instructive with respect to the ADA.”).

88. Courts regularly apply the ADA’s fundamental alteration and undue burden defenses in Rehabilitation Act cases. *See, e.g., Sch. Bd. v. Arline*, 480 U.S. 273, 288 n.17 (1987) (“Accommodation [under the Rehabilitation Act] is not reasonable if it either imposes ‘undue financial and administrative burdens’ on a grantee or requires ‘a fundamental alteration in the nature of [the] program.’” (alteration in original) (citation omitted) (quoting *Se. Cmty. Coll. v. Davis*, 442 U.S. 397, 412 (1979))); *Davis*, 442 U.S. at 410 (“Such a fundamental alteration in the nature of a program is far more than the ‘modification’ the [Rehabilitation Act] regulation requires.”); *Gorman v. Bartch*, 152 F.3d 907, 911 (8th Cir. 1998) (explaining that, in a Rehabilitation Act case, “[d]efendants may demonstrate as an affirmative defense that a requested accommodation would constitute an undue burden”); *Sandison v. Mich. High Sch. Athletic Ass’n*, 64 F.3d 1026, 1031 (6th Cir. 1995) (“[S]ection 504 does not require ‘affirmative action,’ that is, ‘substantial changes,’ such as a ‘fundamental alteration in the nature of a program’ or changes ‘imposing undue financial and administrative burdens.’” (citations omitted) (quoting *Davis*, 442 U.S. at 410, 411 n.10, 412)); *Pottgen v. Mo.*

tation Act will be considered along with the ADA throughout the rest of this Note.

Today, a disabled individual denied the equal treatment required by the ADA or the Rehabilitation Act may sue to obtain injunctive relief.⁸⁹ Some courts have also allowed for recovery of compensatory damages under the Rehabilitation Act in addition to injunctive relief.⁹⁰ Representatives of vegetative state or minimally conscious state patients could one day take advantage of these Acts to sue for injunctions mandating that health care facilities provide brain-scanning technology as a means of communication. Nonetheless, in order

State High Sch. Activities Ass'n, 40 F.3d 926, 930 (8th Cir. 1994) (interpreting *Arline* to provide undue burden and fundamental alteration defenses in Rehabilitation Act cases); *Wynne v. Tufts Univ. Sch. of Med.*, 976 F.2d 791, 795 (1st Cir. 1992) (finding that the defendant's claim of "substantial program alterations" was a defense to Rehabilitation Act requirements); *N.M. Ass'n for Retarded Citizens v. New Mexico*, 678 F.2d 847, 854 (10th Cir. 1982) ("[A]lthough Section 504 regulations may sometimes impose a duty to modify federally-funded programs to provide for the handicapped, . . . [s]uch accommodation is required only when it does not generate undue financial or administrative hardship."); *Mohamed v. Marriott Int'l, Inc.*, 905 F. Supp. 141, 152 (S.D.N.Y. 1995) ("[T]he ADA's definitions of reasonable accommodation and undue hardship are 'borrowed from' the regulations promulgated . . . under the Rehabilitation Act." (quoting *Vande Zande v. Wis. Dep't of Admin.*, 44 F.3d 538, 542 (7th Cir. 1995))); see also *Deborah Rebore & Perry A. Zirkel, The Supreme Court's Latest Special Education Ruling: A Costly Decision?*, 135 EDUC. L. REP. 331, 336 n.45 (1999) ("Although not acknowledged by the [Supreme] Court, an undue burden test is commonly understood to be a defense under § 504 of the Rehabilitation Act of 1973 . . .").

Interestingly, at least one court has found that the Rehabilitation Act does not provide any "'undue burden' defense to the provision of auxiliary aids." *Davis v. Flexman*, 109 F. Supp. 2d 776, 788 (S.D. Ohio 1999). However, in light of the confluence of opinion to the contrary, supported by the Supreme Court and federal circuit court decisions cited above, this case is likely an outlier, misinterpreting the law.

89. 42 U.S.C. § 12188(a)(2) (setting forth the remedies available to those suing a private entity under Title III of the ADA); *Barnes v. Gorman*, 536 U.S. 181 (2002) (discussing the scope of remedies available under the Rehabilitation Act); Mary L. Toppliff, Annotation, *Remedies Available Under Americans with Disabilities Act*, 136 A.L.R. FED. 63 (1997); see also 42 U.S.C. § 12133 (permitting plaintiffs suing a place of public accommodation under Title II of the ADA to seek the same remedies as those available under the Rehabilitation Act). Note that the Attorney General may also sue a privately owned health care facility under Title III of the ADA for compensatory damages in addition to injunctive relief. Toppliff, *supra*. Under Title II, a plaintiff suing a publicly owned health care facility may also be able to obtain attorneys' fees and compensatory damages. *Id.* However, compensatory damages are only available if the plaintiff can make a showing of intentional discrimination. *Meagley v. City of Little Rock*, 639 F.3d 384, 389 (8th Cir. 2011) ("All circuits to decide the question have held that to recover compensatory damages under either the ADA or the Rehabilitation Act, a plaintiff must establish that the agency's discrimination was intentional.").

90. See *Rodgers v. Magnet Cove Pub. Sch.*, 34 F.3d 642, 644 (8th Cir. 1994) (holding that "all legal and equitable remedies are available under . . . Section 504"); *Aikins v. St. Helena Hosp.*, 843 F. Supp. 1329, 1339 (N.D. Cal. 1994) ("The settled interpretation of [29 U.S.C. § 794(a)] in the Ninth Circuit is that money damages are available for violations of section 504 of the Rehabilitation Act . . ."). See 29 U.S.C. § 794(a) for the codification of remedies available in Rehabilitation Act actions.

to prevail, an individual's claim must survive potential uses of a "fundamental alteration" or "undue burden" defense, both discussed in Part IV below. A plaintiff must also establish her standing to seek relief.

To establish standing to seek injunctive relief, an individual must show three things. First, the individual must demonstrate that she has "suffered an 'injury in fact'—an invasion of a legally protected interest which is (a) concrete and particularized, and (b) 'actual or imminent, not conjectural or hypothetical.'"⁹¹ Moreover, a plaintiff alleging harms that occurred in the past must demonstrate that there is a "real or immediate threat that [she] will be wronged again."⁹² Second, the individual must establish that there is "a causal connection between the injury and the conduct complained of—the injury has to be 'fairly . . . trace[able] to the challenged action of the defendant, and not . . . th[e] result [of] the independent action of some third party not before the court.'"⁹³ Third, the individual must show it is "'likely,' as opposed to merely 'speculative,' that the injury will be 'redressed by a favorable decision.'"⁹⁴

Demonstrating standing has presented a significant challenge for many disabled individuals denied auxiliary aids who sue for injunctive relief under the ADA.⁹⁵ Specifically, numerous plaintiffs have failed to satisfy the injury-in-fact prong because they cannot show that the alleged past harm is likely to recur in the future.⁹⁶ Vegetative state or minimally conscious state patients could sue for harms stemming from their inability to communicate. These claims could presumably overcome the injury-in-fact barrier that has stymied other plaintiffs, because it would be easy to demonstrate that the harm is likely to recur. Vegetative state or minimally conscious state patients are largely confined to a particular hospital and require ongoing care. Their chances of recovery are also limited. Instead, these patients may have difficulty establishing that their injury can be redressed by brain-scanning technology under the final standing prong. It all comes down to whether courts are persuaded by the scientific evidence supporting brain scanning.

In order to obtain relief under the ADA, a plaintiff must also establish (1) that she is a disabled individual under the ADA, (2) that the defendant is subject to ADA requirements, and (3) that she was unable to receive equal access or equal participation in the defendant's services as a result of her disabil-

91. *Lujan v. Defenders of Wildlife*, 504 U.S. 555, 560 (1992) (citations omitted) (quoting *Whitmore v. Arkansas*, 495 U.S. 149, 155 (1990)) (some internal quotation marks omitted).

92. *City of L.A. v. Lyons*, 461 U.S. 95, 111 (1983).

93. *Lujan*, 504 U.S. at 560 (alterations in original) (quoting *Simon v. E. Ky. Welfare Rights Org.*, 426 U.S. 26, 41-42 (1976)).

94. *Id.* at 561 (quoting *Simon*, 426 U.S. at 38, 43).

95. Crossley, *supra* note 79, at 62.

96. *Id.*

ity.⁹⁷ Meeting these conditions will be relatively easy for vegetative state or minimally conscious state patients receiving treatment in government or privately owned health care facilities. The ADA's definition of disability encompasses any "physical or mental impairment that substantially limits one or more major life activities of [an] individual."⁹⁸ Vegetative state and minimally conscious state patients clearly suffer impairment that falls within the bounds of this description. Any public or private entity will be subject to the ADA as long as the plaintiff can show that they operate the health care facility at issue. Finally, the significant debilitation vegetative state and minimally conscious state patients suffer currently precludes them from participating in health care decisions to the same extent as nondisabled individuals.

B. *Auxiliary Aid Provisions*

The Rehabilitation Act, along with Titles II and III of the ADA, requires auxiliary aids to be provided to disabled individuals so they may gain equal access to services and programs.⁹⁹ An auxiliary aid is "an additional and different service that establishments must offer the disabled."¹⁰⁰ For instance, wheelchair ramps created to give wheelchair-bound individuals access to buildings,¹⁰¹ captioning of movies for the deaf,¹⁰² and Braille numbering on elevator buttons for the blind¹⁰³ are all auxiliary aids. Under Title III of the ADA and its implementing regulations, all places of "public accommodation" are required to provide auxiliary aids to disabled individuals.¹⁰⁴ Title II of the ADA and its implementing regulations provide a nearly equivalent requirement for "public entit[ies]."¹⁰⁵ Thus, these two titles of the ADA effectively obligate hospitals, health care providers' offices, medical clinics, and other "service establishment[s]" owned by private entities (places of public accommodation),¹⁰⁶ as well as health care facilities owned by state or local governments (public entities),¹⁰⁷ to furnish auxiliary aids to disabled individuals. The Rehabilitation Act

97. See *Molski v. M.J. Cable, Inc.*, 481 F.3d 724, 730 (9th Cir. 2007); *Powell v. Nat'l Bd. of Med. Exam'rs*, 364 F.3d 79, 85 (2d Cir.), *corrected by* 511 F.3d 238 (2d Cir. 2004).

98. 42 U.S.C. § 12102(1) (2012).

99. See 28 C.F.R. §§ 35.160(b), 36.303(a) (2013); 45 C.F.R. § 84.52(d) (2013).

100. *Arizona ex rel. Goddard v. Harkins Amusement Enters.*, 603 F.3d 666, 672 (9th Cir. 2010).

101. See *id.*

102. 28 C.F.R. § 36.303(b)(1).

103. See *Harkins*, 603 F.3d at 672.

104. 42 U.S.C. § 12182(a), (b)(2)(A)(iii) (2011); 28 C.F.R. § 36.303(c).

105. 42 U.S.C. §§ 12132, 12134(a); 28 C.F.R. § 35.160(b).

106. 28 C.F.R. § 36.104.

107. *Id.* § 35.104.

auxiliary aid requirement will also kick in whenever a health care facility receives federal funding.¹⁰⁸

The ADA's implementing regulations call for auxiliary aids to be furnished where necessary to establish "effective communication" with disabled individuals¹⁰⁹ in order to guarantee "that no individual with a disability is excluded, denied services, segregated or otherwise treated differently than other individuals"¹¹⁰ and ensure an "equal opportunity" for disabled individuals to "participate in, and enjoy the benefits of," a hospital's services.¹¹¹ To meet the standards for effective communication, the auxiliary aids furnished must be accessible to the disabled individual, and their provision must be timely.¹¹² They must also be provided in a manner that "protect[s] the privacy and independence of the individual with a disability."¹¹³ Nevertheless, the aids provided do not have to be the most technologically advanced if effective communication can be established through other means.¹¹⁴

III. HOW COURTS DETERMINE WHAT AUXILIARY AID IS REQUIRED

This Part examines the factors courts use in individual cases to assess the type of auxiliary aid mandated by the ADA and the Rehabilitation Act. Past cases shed light on the degree to which viable communication must be established through auxiliary aids and on what communication is important in a medical context. Still, the case law and the regulations implementing the ADA reveal that any court's assessment will be narrowly limited to the facts of the case before it. Thus, a determination of whether brain-scanning technology will be required as an auxiliary aid will likely rest on factors the courts have yet to examine. These factors and those customarily used by courts in auxiliary aid cases are discussed below.

A. *The Traditional Analysis*

The type of auxiliary aid required to establish effective communication is context dependent¹¹⁵ and a question of fact.¹¹⁶ Courts may examine several criteria to determine what type of auxiliary aid is necessary, including "the method of communication used by the individual; the nature, length, and complexity

108. 45 C.F.R. § 84.52(d) (2013).

109. 28 C.F.R. §§ 35.160(b)(2), 36.303(c)(1).

110. 42 U.S.C. § 12182(b)(2)(A)(iii).

111. 28 C.F.R. § 35.160(b)(1).

112. *Id.* §§ 35.160(b)(2), 36.303(c)(1)(ii).

113. *Id.*

114. *Id.* pt. 35 app. B, pt. 36 app. C.

115. *Id.* §§ 35.160(b)(2), 36.303(c)(1)(ii).

116. Crossley, *supra* note 79, at 61.

of the communication involved; and the context in which the communication is taking place.”¹¹⁷

Several cases involving communication with deaf individuals provide illuminating examples of the variety of appropriate auxiliary aids. In one such case, a deaf man with some ability to lip-read was arrested for driving under the influence and provided with a consent form to take a breathalyzer test.¹¹⁸ In regards to his communication with the police, the court noted that the deaf man had opportunities to lip-read in a well-lit environment, that he had prior knowledge of some of the information the police tried to communicate to him, that much of the communication was “short and not complex,” and that the deaf man could read English and therefore had the capacity to understand written materials the police provided to him.¹¹⁹ The court thus concluded that, under the ADA, the police station was not required to provide any auxiliary aid beyond basic oral communication, gesturing, and note writing, since the police had been able to establish effective communication with the deaf arrestee using these tools.¹²⁰

In an appendix to the ADA’s implementing regulations, the Department of Justice explains that where a notepad and paper are ineffective due to the complexity or lengthiness of the communication taking place, sign language interpreters may act as appropriate auxiliary aids.¹²¹ As per this recommendation, some courts have called for the use of interpreters in place of note writing and other simpler forms of correspondence in circumstances demanding more involved communication with deaf individuals. In one such case, a deaf patient claimed her physician’s “refus[al] to provide interpreter services . . . and [termination of the patient’s] medical care, amount[ed] to discrimination” that violated the ADA and the Rehabilitation Act.¹²² She sought injunctive relief that would require the physician to provide a sign language interpreter.¹²³ Upon hearing evidence that there was “poor communication” between the patient and the family physician without an interpreter’s presence and that the physician had misunderstood some aspects of the patient’s symptoms as a result, the court held that both of the patient’s claims could survive a summary judgment challenge.¹²⁴ In another case, a deaf patient requested but was denied the services of a sign language interpreter over the course of multiple visits to a medical

117. 28 C.F.R. §§ 35.160(b)(2), 36.303(c)(1)(ii).

118. *Bircoll v. Miami-Dade Cnty.*, 480 F.3d 1072, 1078 (11th Cir. 2007).

119. *Id.* at 1087-88.

120. *Id.* at 1088.

121. 28 C.F.R. pt. 36 app. C.

122. *Mayberry v. Von Valtier*, 843 F. Supp. 1160, 1163 (E.D. Mich. 1994) (punctuation altered).

123. *Id.*

124. *Id.* at 1166-67.

center.¹²⁵ The patient claimed that he was discriminated against under the ADA because the medical center's failure to provide a sign language interpreter had effectively excluded him from participating in his own medical treatment.¹²⁶ Affirming the potential necessity of sign language interpreters in some circumstances, the court held that the patient had appropriately stated a claim under the ADA.¹²⁷

Alternatively, even sign language interpreters have been found to be inadequate auxiliary aids in special situations. In *Tugg v. Towey*, the court granted a preliminary injunction based on its finding that a sign language interpreter was an insufficient auxiliary aid for deaf patients receiving mental health counseling.¹²⁸ Here, the court agreed with the suing patients that mental health counselors who did not have sign language abilities or an "understanding of the deaf community"¹²⁹ could not provide patients with mental health services equivalent to those received by the general public even when accompanied by a sign language interpreter.¹³⁰ As such, the court granted the patients' request for a preliminary injunction mandating the provision of counselors with sign language ability and "an understanding of the mental health needs of the deaf community" in order to fulfill the ADA's antidiscrimination requirement.¹³¹ Thus, the appropriateness of particular auxiliary aids varies widely depending on the nature and circumstances of the case at hand.

In health care settings, courts have held that providing effective treatment to disabled patients does not alone fulfill antidiscrimination obligations.¹³² Disabled patients must be given auxiliary aids that enable them to participate in health care decisions related to their treatment in order to achieve the effective communication that the ADA requires.¹³³ Moreover, disabled family members, friends, and associates of patients being treated must also be provided with auxiliary aids where appropriate and necessary to establish effective communication.¹³⁴ This requirement directly addresses the imperative for adequate com-

125. *Naiman v. N.Y. Univ.*, No. 95 CIV. 6469(LMM), 1997 WL 249970, at *1 (S.D.N.Y. May 13, 1997).

126. *Id.*

127. *Id.* at *2.

128. 864 F. Supp. 1201, 1211 (S.D. Fla. 1994).

129. *Id.* at 1204.

130. *Id.* at 1208.

131. *Id.* at 1211.

132. *See, e.g., Naiman*, 1997 WL 249970, at *2 (holding that the disabled patient had a discrimination claim under the ADA whether or not he received adequate medical care because he was "exclu[ded] from participation in his medical treatment").

133. *See id.*

134. *See* 28 C.F.R. § 35.160(a) (2013) (defining "companion" as "a family member, friend, or associate of an individual seeking access to a service, program, or activity of a public entity, who, along with such individual, is an appropriate person with whom the public entity should communicate" and requiring public entities to "take appropriate steps" to establish effective communication with disabled companions (internal quotation marks omit-

munication to enable health care staff to properly treat patients.¹³⁵ Indeed, failure to provide auxiliary aids when necessary to establish effective communication with patients or their families can have dire consequences. In *Aikins v. St. Helena Hospital*, for example, a deaf woman could not adequately communicate with hospital staff due to their failure to provide a sign language interpreter in spite of the ADA's auxiliary aid requirement.¹³⁶ As a result, the woman was unable to relay patient history necessary for effectively treating her husband, which likely contributed to his death.¹³⁷

B. Brain Scanning as an Auxiliary Aid

While the case law does provide some overall guidance on what types of auxiliary aids must be furnished to establish effective communication, the inquiry is still highly individualized and context dependent.¹³⁸ Furthermore, the three factors courts regularly consider in analyzing the appropriateness of an auxiliary aid, discussed below, are unlikely to be conclusive in cases involving brain-scanning technology. Instead, three questions that the case law has fallen short of addressing will prove influential: (1) can an auxiliary aid still be required even if there is a significant chance the aid won't facilitate any communication whatsoever? (2) does the definition of "effective communication" change in circumstances in which the choice is not between types of auxiliary aids but rather between a chance for communication and no communication at all? and (3) how established does the scientific support for an auxiliary aid's effectiveness need to be when the auxiliary aid is a newer technology?

Courts usually evaluate three criteria to determine the type of auxiliary aid required: "[1] the method of communication used by the individual; [2] the nature, length, and complexity of the communication involved; and [3] and the context in which the communication is taking place."¹³⁹ These factors are important when the choice is between multiple modes of communication, such as note writing and providing sign language interpreters. However, they will be of little help in a case that presents only one potential mode of communication:

ted)); *id.* § 36.303(c)(1) (explaining that auxiliary aids must be provided to establish effective communication with friends, family, and associates "of an individual seeking access to, or participating in, the goods, services, facilities, privileges, advantages, or accommodations of a public accommodation, who, along with such individual, is an appropriate person with whom the public accommodation should communicate").

135. See Crossley, *supra* note 79, at 60-61.

136. 843 F. Supp. 1329, 1332, 1336 (N.D. Cal. 1994).

137. See *id.* at 1332 (noting that the patient's deaf wife was unable to adequately communicate to the treating physician the amount of time that had elapsed between her husband's heart attack and the performance of CPR).

138. See 28 C.F.R. §§ 35.160(b)(2), 36.303(c)(1)(ii).

139. See *id.* §§ 35.160(b)(2), 36.303(c)(1)(ii); see also *supra* text accompanying note 117.

brain-scanning technology. Nevertheless, these factors will be touched upon briefly to demonstrate why they will be inconclusive in the brain-scanning context and to put the decision courts will face into perspective.

At the outset, the first factor that courts consider—"the method of communication used by the individual"—is inapplicable to vegetative state patients, as there is currently no method of communication regularly available to these patients.¹⁴⁰ In the case of vegetative state patients, the second factor—"the context in which the communication is taking place"—is a health care setting, which implies that auxiliary aids must be provided to allow patients to participate in decisions related to their own medical treatment. Only the third factor—"the nature, length, and complexity of the communication involved"—requires a more involved assessment.

In regards to the first component of the third factor—the "nature" of the communication at issue—the ADA and the Rehabilitation Act require health care facilities to supply auxiliary aids to enable effective communication between the disabled individual and the health care facility itself.¹⁴¹ Therefore, the communication courts will consider is communication that could take place between health care staff and vegetative state patients, not between vegetative state patients and their families, friends, or colleagues. Additionally, because the communication at issue is between health care staff and patients, it will revolve around various care-related concerns. These concerns could include whether a patient is in pain and requires medication as well as even simpler aspects of the patient's care, such as whether he wants his bed adjusted or wishes to be bathed at a particular time. Furthermore, if brain-scanning technology allows for more complicated forms of communication, patients may be able to explain parts of their medical history or, when they are experiencing discomfort, answer questions about which part of their body is in pain or how the pain feels.

Moving on to the second component, the "length" of any such communication will vary depending on the complexity of interaction allowed by the available brain-scanning technology and the patient's ability to communicate over a

140. The only vegetative state patients who have experienced any chance to communicate are Scott Routley and the few other patients who took part in scientific studies, were found able to communicate through brain scanning, and were given the chance to answer questions. Even for these patients, it is not clear whether such an infrequent opportunity to communicate could count as their "method of communication."

141. See 28 C.F.R. § 35.160(a)(1) ("A public entity shall take appropriate steps to ensure that communications with applicants, participants, members of the public, and companions with disabilities are as effective as communications with others."); *id.* § 36.303(c)(1) ("A public accommodation shall furnish appropriate auxiliary aids and services where necessary to ensure effective communication with individuals with disabilities.").

length of time.¹⁴² Similarly, the “complexity” of any communication will also depend on these two considerations. Unfortunately, it is difficult to imagine any means through which current brain-scanning devices will allow for intricate communication that is not arduous and time-consuming. At present, brain scanning can provide ways for patients to answer yes-or-no questions and may allow them to communicate a set of predetermined, encoded expressions such as “I am in pain” or “I am tired,” but there is not yet a way for patients to say anything they want. One might imagine that a patient could create sentences using a preencoded alphabet by, for example, creating activity in her parahippocampal gyrus by imagining that she is navigating through her home to signal the letter *n*. Depending on the spatial resolution of the scan, however, it is not clear that twenty-six separate areas of the brain could be uniquely detectable through brain scanning. Even if an algorithm could be developed to interpret the results, having a patient communicate just one sentence in this way would take a lot of time.

In conclusion, the factors typically considered by courts are certainly relevant to auxiliary aid decisions concerning brain scanning. They are overshadowed, however, by the following issues: (1) the likelihood of any communication with patients; (2) the lack of other potential methods of communication; and (3) the arguably incomplete scientific support for brain scanning.

1. *Chance of communication*

Though an unknown number of vegetative state patients may be able to communicate through brain scanning, many, if not the majority, are likely unconscious and incapable of any form of communication. Moreover, even patients found capable of communicating may only be able to do so at certain times. Hence, there is a substantial possibility that supplying brain-scanning technology to a vegetative state patient will not enable her to communicate, because she lacks the capacity to do so.¹⁴³ Yet this argument is unlikely to convince courts to find against requiring hospitals to provide brain-scanning technology for several reasons.

The language of the ADA implicitly places a burden on both private and public entities to attempt communication through the provision of auxiliary aids. The regulations implementing ADA requirements for private entities specifically state that “[a] public accommodation shall take those steps that may be necessary to ensure that no individual with a disability is . . . treated differently

142. Some patients may have difficulty communicating for long periods of time because they go in and out of conscious states, do not have the mental resources to communicate for long periods of time, fall asleep, or otherwise become distracted.

143. The patient may also have the capacity to communicate but still be unable to do so given the method of brain scanning employed. *See supra* Part I.B.2.

than other individuals because of the absence of auxiliary aids.”¹⁴⁴ The “may be” language in particular implies that auxiliary aids must be provided even if there is only a chance they are necessary (perhaps because there is only a chance they will actually work). In addition, since the implementing regulations of the ADA that are applicable to public entities contain parallel language and are motivated by parallel purposes, the intent expressed by the use of “may be” more than likely also applies to public entities.¹⁴⁵ This interpretation would exempt a public or private entity from providing an auxiliary aid only if it was clear the aid would not permit communication. This is because the provision of such aid would not fall within the category of actions that “may be” necessary; it would simply not be necessary.

Beyond the language of the ADA, a logical interpretation of the Act still mandates that auxiliary aids be provided as long as there is any chance they will work. In the familiar case of deaf individuals,¹⁴⁶ public and private entities must first attempt communication through note writing, oral communication, and gesturing.¹⁴⁷ If that does not establish effective communication, a sign language interpreter must be provided.¹⁴⁸ If effective communication is still not attained, any other available auxiliary aids must be provided.¹⁴⁹ If courts were to adopt a less expansive interpretation of the auxiliary aid requirement in the context of brain scanning, they would have to second-guess these decisions. Furthermore, many disabled individuals would be unfairly deprived of the chance to communicate if entities were allowed to stop along the way because they thought that providing an additional auxiliary aid might not work.

This logic also supports the conclusion that auxiliary aids do not have to be furnished when there is *no* chance they will work. For instance, a public or private entity would not be required to provide a sign language interpreter for communication with a deaf individual if that individual had no understanding of sign language. Therefore, given that brain-scanning technology does indeed

144. 28 C.F.R. § 36.303(a).

145. *Id.* § 35.160(a).

146. For a discussion detailing the ADA’s treatment of auxiliary aids for deaf individuals, see notes 118-31 above and accompanying text.

147. *See, e.g., Bircoll v. Miami-Dade Cnty.*, 480 F.3d 1072, 1088 (11th Cir. 2007) (holding that providing written materials and communicating both orally and through gestures with a deaf individual fulfilled a police station’s ADA requirements).

148. *See, e.g., Naiman v. N.Y. Univ.*, No. 95 CIV. 6469(LMM), 1997 WL 249970, at *2 (S.D.N.Y. May 13, 1997) (establishing that a deaf patient had a claim under the ADA stemming from a medical center’s failure to provide a sign language interpreter); *Mayberry v. Von Valtier*, 843 F. Supp. 1160, 1167 (E.D. Mich. 1994) (establishing that a deaf patient had an ADA claim based on her doctor’s failure to furnish a sign language interpreter to aid in communication with the patient).

149. *See, e.g., Tugg v. Towey*, 864 F. Supp. 1201, 1211 (S.D. Fla. 1994) (granting an injunction requiring a public entity to provide mental health counselors with sign language abilities and “an understanding of the mental health needs of the deaf community”).

have a chance of working for any vegetative state patient, courts can require health care facilities to provide it under the ADA or the Rehabilitation Act.

2. *Lack of alternatives*

Communication through brain scanning may not be “effective” compared to communication achievable with individuals suffering from other disabilities. In particular, vegetative state patients may not be able to communicate for long periods of time, may not always be communicative when scanned, and will only be able to express simple thoughts or responses to questions through brain scanning. However, vegetative state patients who can communicate will likely only be able to do so through brain scanning and otherwise not at all. This unique circumstance will have a large impact on any court decision analyzing whether to require the provision of brain-scanning technology for these patients. Specifically, where the choice is between no communication and the potential for somewhat effective communication, courts will likely interpret the ADA and the Rehabilitation Act to require that a disabled individual is afforded the best chance he has at communicating.

3. *Scientific support*

Courts have never previously considered how federal auxiliary aid requirements apply to new technology that has not been conclusively established as a reliable mode of communication. Because courts have yet to face such a challenge, there is no standard for determining when or if an auxiliary aid has enough scientific support.¹⁵⁰ While considerable evidence suggests that brain-scanning technology can detect conscious thought in vegetative state patients, many studies still need to be conducted and the results of previous studies need to be confirmed before this finding is uniformly accepted by the scientific community.¹⁵¹ As a result, it is unclear how courts will evaluate the strength of brain scanning’s scientific underpinnings. Ultimately, there are two clear choices: (1) courts can require more scientific support for brain scanning as a means of communication, or (2) courts can accept the current body of scientific literature on brain scanning as sufficiently strong evidence for requiring health care facilities to provide this technology.

The responsibility entities have to provide any auxiliary aid that might establish effective communication and the lack of alternative means of communi-

150. Courts may choose to adopt the standard for scientific evidence elucidated in *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 509 U.S. 579, 597 (1993), in determining the necessary level of reliability for an auxiliary aid to be required under federal auxiliary aid provisions. However, the questions of what standard courts will ultimately adopt and whether brain scanning could meet the *Daubert* standard are beyond the scope of this Note.

151. See *supra* Part I.

cation for vegetative state patients point toward an initial finding requiring brain-scanning technology to be provided under the ADA and the Rehabilitation Act. Even so, vegetative state patients may have to wait for more scientific evidence to confirm that brain scanning can detect conscious thought before any such requirement is imposed. Moreover, even if courts are satisfied with the current scientific support for brain scanning, health care facilities may still be able to evade ADA and Rehabilitation Act requirements through a fundamental alteration or undue burden defense.

IV. DEFENSES TO THE AUXILIARY AID REQUIREMENTS

Any disabled individual who is denied the use of an appropriate auxiliary aid by a hospital or health care facility may sue under the ADA and, if the facility is a federal aid recipient, under the Rehabilitation Act as well. Yet health care facility defendants in these cases can still elude ADA and Rehabilitation Act requirements through the safety valve of a “fundamental alteration” or “undue burden” defense.¹⁵² A defendant seeking to raise a fundamental alteration or undue burden defense has the burden of proof,¹⁵³ and courts must evaluate these defenses on a case-by-case basis.¹⁵⁴ This Part examines how courts analyze these defenses and discusses the potential for health care facilities to use them in resisting any requirement to provide brain-scanning technology.

A. *The Fundamental Alteration Defense*

Under the fundamental alteration defense found in Title III of the ADA, any privately owned health care facility does not have to provide an auxiliary aid if doing so “would result in a fundamental alteration in the nature of the goods, services, facilities, privileges, advantages, or accommodations being offered.”¹⁵⁵ Title II of the ADA likewise provides a fundamental alteration defense for health care facilities owned by public entities when providing an auxiliary aid would cause “a fundamental alteration in the nature of a service,

152. See 28 C.F.R. § 35.164 (2013) (noting that a public entity does not have to “take any action that it can demonstrate would result in a fundamental alteration in the nature of a service, program, or activity or in undue financial and administrative burdens”); *id.* § 36.303(a) (explaining that a public accommodation must provide auxiliary aids “unless the public accommodation can demonstrate that taking those steps would fundamentally alter the nature of the goods, services, facilities, privileges, advantages, or accommodations being offered or would result in an undue burden, i.e., significant difficulty or expense”).

153. *Id.* §§ 35.164, 36.303(a). For a public entity to raise a fundamental alteration or undue burden defense, the head of the public entity or her designee must make the decision to raise such a defense “after considering all resources available for use in the funding and operation of the service, program, or activity,” and the decision “must be accompanied by a written statement of the reasons for reaching that conclusion.” *Id.* § 35.164.

154. *Id.* pt. 36 app. C.

155. *Id.* § 36.303(g).

program, or activity.”¹⁵⁶ As can be seen from these passages, the language applicable to public entities under Title II of the ADA once again closely mirrors the language applicable to privately owned places of public accommodation under Title III. However, even if a public entity or privately owned place of public accommodation successfully raises a fundamental alteration defense in regards to a particular auxiliary aid, both titles of the ADA still require that entity to take any other possible course of actions available to ensure equal treatment, benefits, and services for disabled individuals.¹⁵⁷

Although relatively few cases have dealt with the specific issue of whether furnishing a particular auxiliary aid would constitute a fundamental alteration under the auxiliary aid provisions of the ADA, many courts have evaluated the meaning of “fundamental alteration” under other ADA provisions. In general, courts have held that a fundamental alteration occurs when a public or private entity is required to take actions that alter an “essential aspect” of the service or program being offered or directly affect the ability of other participants to fully partake in or enjoy the benefits of the service or program. For example, in *PGA Tour, Inc. v. Martin*,¹⁵⁸ the Supreme Court held that allowing a disabled player to use a golf cart for transportation in a walking-only tournament would not fundamentally alter the nature of the competition.¹⁵⁹ The Court explained that a fundamental alteration of the competition could have arisen in two different situations: (1) where an alteration affected all competitors equally but nevertheless changed such an “essential aspect” of the tournament that it would still be unacceptable (such as an alteration requiring the tournament organizers to double the diameter of the holes on the golf course), or (2) where an alteration would have given the disabled individual a competitive advantage over others, thus transforming the nature of the competition.¹⁶⁰ The Court declined to find either type of fundamental alteration, because the use of golf carts in general did not change “the essence of the game”—“shotmaking”¹⁶¹—and because the disabled player would not gain any substantial competitive advantage from the use of a golf cart due to his condition.¹⁶²

Similarly, in *Tugg v. Towey*, the court held that requiring Florida to provide mental health counselors with sign language abilities as part of a state-funded health counseling program for the deaf would not result in a fundamental al-

156. *Id.* § 35.164.

157. *Id.* §§ 35.164, 36.303(g).

158. 532 U.S. 661 (2001).

159. *See id.* at 682-85.

160. *Id.* at 682-83.

161. *Id.* at 683.

162. *See id.* at 690. In particular, the Court found that allowing the disabled player to use a golf cart would not give him a significant advantage over other players, as his disability would cause him to experience “greater fatigue even with a cart than his able-bodied competitors [would endure from] walking.” *Id.* (quoting *Martin v. PGA Tour, Inc.*, 994 F. Supp. 1242, 1252 (D. Or. 1998)).

teration of the service being provided.¹⁶³ The court noted that “[t]he nature of the service is mental health counseling” and that a requirement that the state ensure counselors have sign language abilities “simply sets forth specific qualifications for individuals providing that service and does not fundamentally alter the nature of the service provided.”¹⁶⁴

By contrast, fundamental alteration defenses were successful in *Larsen v. Carnival Corp.*¹⁶⁵ and *Roberts v. KinderCare Learning Centers, Inc.*¹⁶⁶ In *Larsen*, a disabled cruise ship passenger whose medical device malfunctioned shortly after he boarded claimed that the cruise ship should have allowed him to call a medical supplier for a replacement and then waited at port until the replacement arrived.¹⁶⁷ The court agreed with the defendants that the ship was not required to wait indefinitely under the ADA because “delaying the ship potentially would have interfered with scheduled port stops on the cruise and the plans of other passengers for those port stops,” resulting in a fundamental alteration of the service being provided.¹⁶⁸ The *KinderCare* court also found a fundamental alteration where parents of a disabled child claimed that a daycare facility was required to provide one-on-one care for their child under the ADA.¹⁶⁹ In finding a fundamental alteration, the court distinguished between group and individual child care, explaining that the daycare facility was “in the group child care business” and that requiring it to provide one-on-one care would “essentially place[] it into a child care market it did not intend to enter.”¹⁷⁰

The use of a fundamental alteration defense by a hospital or other health care facility will almost certainly fail in a brain-scanning case. Under the first prong of the fundamental alteration analysis, the ability of other individuals to enjoy the health care facility’s services will not be directly affected by a court order mandating that brain-scanning technology be furnished to vegetative state patients. If anything, it will provide other patients with improved access to brain-scanning technology that can potentially be used to assess or monitor their conditions. Though hospitals may argue that the cost of purchasing and maintaining brain-scanning equipment will divert resources from other patients, this is an indirect effect that factors into an undue burden defense, not a fundamental alteration defense.

Furthermore, unlike in *Larsen* or *KinderCare*, an “essential aspect” of the services being provided will not be altered. Courts have confirmed that under

163. 864 F. Supp. 1201, 1210 (S.D. Fla. 1994).

164. *Id.*

165. 242 F. Supp. 2d 1333 (S.D. Fla. 2003).

166. 896 F. Supp. 921 (D. Minn. 1995), *aff’d*, 86 F.3d 844 (8th Cir. 1996).

167. 242 F. Supp. 2d at 1344.

168. *Id.*

169. 896 F. Supp. at 925-26.

170. *Id.* at 926.

the ADA, health care facilities are required to supply auxiliary aids where necessary to enable a patient to make medical decisions.¹⁷¹ Additionally, health care facilities are in the business of treating patients, and brain-scanning technology has the potential to significantly improve the care vegetative state patients receive. Through brain scanning, vegetative state patients may gain the opportunity to regularly answer questions critical to their treatment and make decisions that improve their quality of life. For example, studies have already established the possibility of using brain scanning to ask patients if they are in any pain.¹⁷² Further questioning of vegetative state patients that are in pain could uncover the source of the pain, the type of pain, and what course of action the patient would like to take so that the pain can be treated appropriately. Moreover, brain scanning may someday allow patients to make end-of-life decisions, though this is still an extremely controversial possibility that would require future scientific studies and the development of new ethical and legal frameworks.¹⁷³

Another part of any health care facility's job in providing medical treatment is diagnosing diseases. Hospitals already employ medical teams to scan for signs of awareness and grade consciousness in comatose, minimally conscious state, and vegetative state patients.¹⁷⁴ Brain-scanning equipment is also regularly used to help diagnose, treat, and monitor certain medical conditions. Specifically, hospitals utilize EEG devices to diagnose and examine epilepsy, monitor anesthetized patients, evaluate patients suffering from altered mental states (usually referred to as encephalopathy) or cerebral disorders, and, notably, confirm brain death or coma in patients who appear comatose and could progress into a vegetative state.¹⁷⁵ MRI machines are also used to detect epilep-

171. See *Naiman v. N.Y. Univ.*, No. 95 CIV. 6469(LMM), 1997 WL 249970, at *2 (S.D.N.Y. May 13, 1997).

172. See *Panorama: The Mind Reader; Unlocking My Voice*, *supra* note 1 (depicting an fMRI study in which a vegetative state patient was asked if he was in any pain and responded through the use of mental imagery).

173. See Owen, *supra* note 60, at 125-26.

174. See Monti et al., *supra* note 24, at 580 (explaining how doctors clinically assess vegetative state and minimally conscious state patients); Weinhouse & Young, *supra* note 2 (detailing assessment techniques used to diagnose vegetative state patients and differentiate them from minimally conscious state patients); G. Bryan Young, *Stupor and Coma in Adults*, UPTODATE, <http://www.uptodate.com/contents/stupor-and-coma-in-adults> (last updated Oct. 29, 2013) (describing a scale for grading consciousness and diagnostic procedures for comatose patients).

175. See BASSEL ABOU-KHALIL & KARL E. MISULIS, *ATLAS OF EEG & SEIZURE SEMIOLOGY* 125 (2006) ("The EEG provides support for the clinical diagnosis of epilepsy . . ."); Guy A. Dumont, *Monitoring the EEG for Assessing Depth of Anesthesia*, in *MONITORING TECHNOLOGIES IN ACUTE CARE ENVIRONMENTS* 255, 255 (Jesse M. Ehrenfeld & Maxime Cannesson eds., 2014); Markand, *supra* note 44, at 7-8 ("[The EEG] is an extremely valuable test in patients suspected of epilepsy and in patients with altered mental status and coma.").

tic seizures, breast cancer, chest wall tumors or infections, and diseases affecting the heart, lungs, and blood vessels.¹⁷⁶

Overall, supplying brain-scanning technology to facilitate communication for vegetative state patients clearly falls among the services hospitals regularly provide to patients: diagnosing medical conditions, offering patient care and treatment, and helping patients participate in medical decisionmaking. Moreover, brain-scanning technology is already commonly utilized to carry out these services. Therefore, health care facilities will have a very difficult time escaping a requirement to furnish brain-scanning technology through the use of a fundamental alteration defense.

B. *The Undue Burden Defense*

Public entities and privately owned places of public accommodation do not have to provide a particular auxiliary aid if doing so would cause “undue financial and administrative burdens.”¹⁷⁷ The Department of Justice has defined an undue burden as a “significant difficulty or expense” and explained that determining whether an action will impose an undue burden involves an analysis of several factors, including “[t]he nature and cost of the action,” “[t]he overall financial resources of the [entity],” and “the effect [of the action] on expenses and resources.”¹⁷⁸ Like the fundamental alteration doctrine, the undue burden doctrine still obligates defendants that successfully raise such a defense to satisfy ADA requirements “to the maximum extent possible” by taking alternative actions that will not impose undue burdens.¹⁷⁹

Again, as was the case with the fundamental alteration defense, there is a dearth of case law examining the undue burden defense within the context of the ADA’s auxiliary aid requirements. Cases examining other ADA provisions must therefore be used to predict how courts might interpret “undue burden” under the auxiliary aid provision of the ADA. In *KinderCare*, the court found not only that requiring a daycare center to provide one-on-one care for a disabled child under the ADA would constitute a fundamental alteration but also

176. See Daniel Chernoff & Paul Stark, *Magnetic Resonance Imaging of the Thorax*, UPtODATE, <http://www.uptodate.com/contents/magnetic-resonance-imaging-of-the-thorax> (last updated Jan. 23, 2014); Anthon R. Fuisz & Gerald M. Pohost, *Clinical Utility of Cardiovascular Magnetic Resonance Imaging*, UPtODATE, <http://www.uptodate.com/contents/clinical-utility-of-cardiovascular-magnetic-resonance-imaging> (last updated July 11, 2013); Lawrence J. Hirsch & Hiba Arif, *Neuroimaging in the Evaluation of Seizures and Epilepsy*, UPtODATE, <http://www.uptodate.com/contents/neuroimaging-in-the-evaluation-of-seizures-and-epilepsy> (last updated Oct. 4, 2013); Priscilla J. Slanetz, *MRI of the Breast and Emerging Technologies*, UPtODATE, <http://www.uptodate.com/contents/mri-of-the-breast-and-emerging-technologies> (last updated Feb. 27, 2014).

177. 28 C.F.R. § 35.164 (2013); see also *id.* § 36.303(a).

178. *Id.* § 36.104.

179. *Id.* §§ 35.164, 36.303(g).

that doing so would result in an undue burden.¹⁸⁰ Specifically, the court pointed to the fact that the daycare facility would suffer a loss of \$95 per week by providing this care, an amount that would be “a substantial financial detriment” for a facility that operated “on a shoestring budget” and had just “recently emerged from bankruptcy.”¹⁸¹

On the other hand, when a disabled student requested the installation of special software as an accommodation for taking the Multistate Professional Responsibility Examination, a district court in Vermont found that requiring the software installation would not impose an undue burden.¹⁸² The defendant claimed that allowing this one accommodation would cause other students to ask for it as well, resulting in significant expense and a complete alteration of the defendant’s business structure. In spite of this argument, the court ruled against the defendant’s undue burden defense, noting the “[d]efendant’s significant financial resources” and the fact that the defendant had previously allowed “nearly identical” accommodations on its exam.¹⁸³ In a very similar case, an undue burden defense was once again defeated when a student requested testing accommodations for the California Bar Exam.¹⁸⁴ In reaching its decision, the court explained that the defendant failed to demonstrate that an undue financial burden would arise because the extra costs of providing the accommodation to this individual, and others who might request it, could be offset by raising the price the defendant charged for the exam.¹⁸⁵ Although the court acknowledged that providing the accommodation would cause “some administrative burden,” it explained that the defendant could possibly hire independent contractors to complete some of the work.¹⁸⁶

Some health care facilities will face an undue burden if they are forced to provide brain-scanning equipment, and others will not. Since every undue burden defense must be analyzed on a case-by-case basis,¹⁸⁷ the success of any particular defense will depend on the resources of the health care facility involved. Many potential financial and administrative costs will need to be balanced against these resources, including the cost of purchasing any new brain-scanning equipment, the cost of maintaining that equipment, and the time spent by technicians and radiologists running the scanning machinery and interpreting resulting scans. Other factors may allay these costs. If a health care facility

180. *Roberts v. KinderCare Learning Ctrs., Inc.*, 896 F. Supp. 921, 926-27 (D. Minn. 1995), *aff’d*, 86 F.3d 844 (8th Cir. 1996).

181. *Id.* at 927 (internal quotation marks omitted).

182. *Jones v. Nat’l Conference of Bar Exam’rs*, 801 F. Supp. 2d 270, 290 (D. Vt. 2011), *appeal dismissed as moot*, 476 F. App’x 957 (2d Cir. 2012).

183. *Id.*

184. *Enyart v. Nat’l Conference of Bar Exam’rs, Inc.*, 823 F. Supp. 2d 995, 1014 (N.D. Cal. 2011).

185. *Id.* at 1013.

186. *Id.*

187. 28 C.F.R. pt. 36 app. C (2013).

already has brain-scanning equipment available, can charge patients additional fees to undergo scanning, or will be able to use brain scanning as a replacement diagnostic tool for some patients, the burden of providing brain-scanning devices to vegetative state patients will be lightened.

The cost of acquiring brain-scanning equipment can be substantial. An MRI machine typically costs \$1.4 million, while individual scans generally cost between \$700 and \$900.¹⁸⁸ The price of an EEG machine is roughly \$75,000.¹⁸⁹ To run the equipment and interpret resulting scans, health care facilities also need to keep trained technicians on staff and pay them for their time. In addition, fMRI machines impose other burdens on hospitals: they are costly to maintain, patients must be transported to the machines, and hospitals have to provide care to mitigate the considerable stress patients undergo during this transportation.¹⁹⁰ Conversely, EEG devices are portable,¹⁹¹ can be used at the patient's bedside,¹⁹² and can perform faster than fMRI machines.¹⁹³ However, fMRI offers greater precision in detecting the location of neural activity and, as a result, may permit more complex communication between vegetative state patients and medical staff.¹⁹⁴

Aside from the cost of purchasing and maintaining equipment, hospitals may also face administrative burdens if they have to perform repeat brain scanning of any patient. Two separate circumstances could necessitate repeat scanning. First, if a patient appears communicative, he will need repeated scanning to answer medically relevant questions and participate in decisions related to his care. Second, for patients deemed uncommunicative based on the results of brain scans, retesting will ensure that the patient was not just momentarily unable to communicate during any previous scans and confirm that the patient has not newly gained the ability to communicate through a progression of his medical condition. Alternatively, if further scientific studies confirm that EEG can be used in conjunction with TMS to accurately detect the capacity for consciousness,¹⁹⁵ medical staff may be able to rule out patients who are uncommunicative after a single scanning session. This approach will, however, cause hospitals to bear the cost of purchasing TMS equipment (approximately

188. Abelson, *supra* note 45.

189. Brennan, *supra* note 18.

190. See Cruse et al., *supra* note 31, at 2088.

191. Cyranoski, *supra* note 30, at 180.

192. Cruse et al., *supra* note 31, at 2088-89.

193. Cyranoski, *supra* note 30, 180.

194. See *id.*

195. See Rosanova et al., *supra* note 53 (finding that the use of TMS in conjunction with EEG can allow scientists to distinguish between locked-in, minimally conscious state, and vegetative state patients).

\$100,000 per device¹⁹⁶) and configuring the equipment to be used in combination with EEG machines.¹⁹⁷

Though all of the aforementioned costs are significant and could prove too much for any one health care facility, some of this burden can be alleviated. In particular, health care facilities may be able to offset the price of brain-scanning technology by purchasing used equipment, borrowing money, or leasing devices instead of buying them.¹⁹⁸ Furthermore, health care facilities that already have brain-scanning technology may not need to obtain additional equipment or technicians. One brain-scanning device can be used on multiple patients, so the equipment that a health care facility already owns may be sufficient to satisfy the needs of its vegetative state patients. Also, though the ADA specifically forbids public and private entities from charging “a particular individual with a disability or any group of individuals with disabilities” for the provision of an auxiliary aid,¹⁹⁹ health care facilities can raise prices for all of their patients to alleviate financial burdens. Health care facilities that qualify as small businesses under § 44 of the Internal Revenue Code can also receive tax credits for expenditures on auxiliary aids.²⁰⁰ Finally, once the science behind using brain scanning to detect consciousness is supported by adequate data, brain scanning may replace current diagnostic techniques for assessing vegetative and minimally conscious state patients. If this occurs, hospitals could eliminate the costs of using medical teams to regularly assess vegetative state patients while increasing the accuracy of diagnoses.

Even if the burdens of supplying brain-scanning technology still outweigh a health care facility’s resources, courts may be able to fashion equitable remedies. For example, a court might issue an injunction requiring a hospital to perform EEG scanning of vegetative state patients but not more costly fMRI scanning. Additionally, if the burdens of repeatedly testing vegetative state patients are too high, courts can require that patients be scanned weekly instead of daily, or monthly instead of weekly. In contrast, health care facilities with more resources might have to dedicate machines to patients who are found to be communicative so that these patients can immediately signal medical staff when they are in pain or require care.

196. Tom Wilemon, *Magnets Zap Blues for Some with Depression*, USA TODAY (Dec. 1, 2012, 8:40 AM EST), <http://www.usatoday.com/story/news/2012/11/30/magnets-zap-depression/1738621>.

197. See Rosanova et al., *supra* note 53, at 1318.

198. Abelson, *supra* note 45.

199. 28 C.F.R. §§ 35.130(f), 36.301(c) (2013).

200. A health care facility will qualify as a small business for the purposes of § 44 if its gross receipts “for the preceding taxable year did not exceed \$1,000,000, or . . . [it] employed not more than 30 full-time employees during the preceding taxable year.” I.R.C. § 44(b)(1) (2012).

V. POLICY CONCERNS

Vegetative state patients who experience consciousness likely endure considerable frustration and suffering. They cannot take part in decisions relating to the discontinuation or continuation of their own life support, express when or if they are in pain, request medication or treatment, exert any control over their exterior environment, or communicate with family, friends, or medical staff caring for them.²⁰¹ Allowing these patients any means of communication, whether fully effective or not, will have a huge impact on their lives and goes straight to the principle at the heart of the ADA and the Rehabilitation Act: putting disabled individuals on a more equal footing with everyone else.

Unfortunately, if courts hold that health care facilities must provide brain-scanning equipment, the significant costs of the technology may cause undesirable results. Hospitals may have to lower the quality of treatment they provide to other patients or increase the cost of medical care for all of their patients. These problems might be avoided if courts accurately assess whether any particular health care facility has the resources to supply brain-scanning equipment under an undue burden defense. Even so, it may not be socially advantageous to have hospitals invest in performing brain scans of vegetative state patients when the majority of these patients will remain uncommunicative and there is no definitive proof that those who can communicate are consciously doing so.

As this Note illustrates, there are many gaps in the ADA and Rehabilitation Act auxiliary aid requirements that will become increasingly apparent as technological advances create novel prospective auxiliary aids. It will be up to the court system and Congress to fill these gaps by resolving questions such as the following: What threshold of evidence is needed to establish an auxiliary aid's reliability? How likely does it need to be that an auxiliary aid will enable effective communication before its provision is required? What impact should a lack of alternatives have on a court's decision to require an auxiliary aid? What do "fundamental alteration" and "undue burden" mean in the context of the auxiliary aid provisions? And finally, should courts fashion equitable remedies when the use of an auxiliary aid allows for flexibility?

CONCLUSION

The issues that brain-scanning cases will force courts and lawmakers to grapple with are multifaceted and challenging. Most significantly, the courts and Congress will need to address how the federal auxiliary aid requirements should respond to developing technologies that could offer novel platforms for

201. The ADA and the Rehabilitation Act are not concerned with improving communication between disabled patients and family or friends but rather with facilitating communication between patients and health care staff. Therefore, health care facilities will not have to allow vegetative state patients to use brain-scanning technology to communicate with loved ones, although they can choose to do so.

communication. Though neuroimaging has yet to be considered in this context, some aspects of the ADA and the Rehabilitation Act offer guidance as to how courts will decide. Common-sense arguments and the language of the ADA cut against any claim that brain scanning cannot be required because it might not work. Courts may also be swayed toward requiring brain-scanning technology by the fact that it is the only possible means of communication for vegetative state patients. Fundamental alteration defenses and many undue burden defenses will fail, because costs can be alleviated and brain scanning is already a regular part of medical care. Though these factors seem to tip in the favor of plaintiffs seeking neuroimaging technology, the courts or Congress could still decide that conclusive scientific evidence proving that brain-scanning technology enables conscious communication is necessary. Whether such a decision would be good or bad is another formidable question. Conducting brain scans on vegetative state patients could be a wasteful investment for health care facilities if the results are often negative or inconclusive. However, the use of brain-scanning technology could ultimately bring renewed hope to many families and drastically improve vegetative state patients' lives.