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# The Treatment For Malpractice – Physician, Enhance Thyself The Impact of Neuroenhancements For Medical Malpractice

Harvey L. Fiser<sup>1</sup>

## I. Introduction

Twenty-four hours into his shift, Dr. Burns was walking his rounds like a zombie. Going through the motions, dispensing orders for meds and making calls on patients he could barely think about, he was covering rounds for another doctor who called in sick. These days were routine, much like his internship and residency, in which thirty hour shifts were common. And he had seen it all before—pain after surgery, a pulled suture or two, resetting a problem port in the chest, and the occasional abdominal pain, likely due to constipation caused by pain meds. Give them the normal course of action, a laxative, chart that for the next doctor, and give it time to work. Only this time, the stomach pain happened not to be constipation. The pain was caused by an infection made possible by a nick in the colon gone unnoticed during surgery. And Dr. Burns’ fatigue made him choose the easier course of action and the most likely and intuitive response to these symptoms. It was also the decision that took less time and mental energy to dispense.<sup>2</sup>

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2. See, e.g., Shai Danziger et al., *Extraneous Factors in Judicial Decisions*, 108 PROC. NAT’L ACAD. SCI. 6889 (2011) (noting that “research suggests that making repeated judgments or decisions depletes individuals’ executive function and mental resources, which can, in turn, influence their subsequent decisions. . . . Sequential choices and the apparent mental depletion that they evoke also increase people’s tendency to simplify decisions by accepting the

The problem here is likely manifold—too few doctors making the rounds, too many work hours, too many patients, and increasing pressure at the intersection of insurance and medicine to move quicker and lower costs. But one certain issue is that Dr. Burns simply doesn't work well fatigued. In fact, he is not alone. Studies indicate that fatigue, stress, and anxiety are significant causes of medical errors.<sup>3</sup>

So, clearly, a simple solution is just to limit the number of hours Dr. Burns can work, say to sixteen. That should fix it. Unfortunately, studies also show that another potential place for error is the passing off or transfer, from one doctor to another during shift changes, a problem which increases when limiting the number of hours a doctor may work in a shift.<sup>4</sup> As more shift changes are needed, there are more changes in medical providers for each patient, increasing the chances of error.

So what is a doctor or hospital to do? Should they make a supply of Red Bull or more coffee available? Or what if there were a simpler and more effective way? What if we could give Dr. Burns a pill that would make him alert, attentive, and responsive during his entire shift—something different from mere caffeine, something that would enhance Dr. Burns'

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status quo."); see also Sallie J. Weaver et al., *Reducing Cognitive Skill Decay and Diagnostic Error: Theory-Based Practices for Continuing Education in Health Care*, 32 J. CONT. EDUC. HEALTH PROF. 269, 270 (2012) (explaining the dual-process theories related to diagnostic reasoning and decision making where experienced clinicians engage efficient Type 1 processes when a pattern of symptoms are recognized).

3. See Weaver, *supra* note 2; see also *Working Hours, Fatigue, and Medical Malpractice*, 14 MEDSURG NURSING 218, 218 (2005); Barron H. Lerner, *A Case that Shook Medicine*, WASH. POST, (Nov. 28, 2006), <http://www.washingtonpost.com/wp-dyn/content/article/2006/11/24/AR2006112400985.html> (detailing one of the more infamous examples of malpractice resulting from fatigue and overwork is the 1984 case of eighteen year old Libby Zion who died from a dosing error under the care of medical students working a thirty-six hour shift). See Danielle M. Scavuzzo, Comment, *The Resident Remedy: A Judicial Solution to the Problem of Sleep Deprivation in Medicine*, 78 U. MO. KAN. CITY L. REV. 263 (2009) for further discussion of sleep deprivation during residency programs and on malpractice cases.

4. Genevra Pittman, *Resident Work Hour Limits Introduce New Concerns*, REUTERS (Mar. 25, 2013), <http://www.reuters.com/article/2013/03/25/us-resident-work-hour-limits-idUSBRE92O0XN20130325> (discussing a study of 2300 first-year resident students in fifty-one programs, which was conducted by Dr. Srijan Sen at the University of Michigan in Ann Arbor).

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cognitive functioning, be non-addictive, and allow him super-human attributes? Adderall is just the tip of the iceberg!

Coming to a hospital near you, the medically enhanced doctor, a doctor who thinks faster, is better with short and long term memory, is calmer during surgery, can work double shifts with little cognitive fatigue, and one day may have the memories of years of experience without actually having had them. In the words of the 1970's television series *The Six Million Dollar Man*, "We can rebuild him. We have the technology. We can make him better than he was. Better, stronger, faster."<sup>5</sup>

So, if we can "make" this doctor, then why shouldn't we? And if we do, what happens to the standard of care in medical malpractice cases? What will be the effect on all of those other doctors who choose to remain "normally unenhanced," or to the practice in general? Will these "super docs" increase the standard of care for all doctors, or will we hold those enhanced doctors to a different standard than other doctors? Perhaps the invisible hand of the marketplace will make doctors who refuse to enhance themselves obsolete. And, if these enhancements can be shown to improve patient care, then should we mandate them for all physicians who would benefit?

This article will introduce some of these issues and offer some possible guidelines which may eventually guide cases of medical malpractice and medical care in the face of neurointerventions. First, I will briefly address the standard of care in medical malpractice cases in general. Second, I will discuss some of the existing and potential physical and neurological enhancements available for physicians. Finally, I will explore how these neurointerventions could alter the standards for medical malpractice for both the enhanced doctors and the entire medical profession.

## II. Causes of Medical Malpractice

Of course, there are many different categories of medical malpractice cases, and within each category there are many different causes. One of the major categories is misdiagnosis,

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5. *The Six Million Dollar Man* (Harve Bennett Productions, Silverton Productions & Universal Television 1974-1978).

accounting for between 10% and 20%<sup>6</sup> in some studies and up to 29% in others.<sup>7</sup> In addition to misdiagnoses, other categories include “treatment errors (27[%]), surgical mishaps (24[%]), obstetrical problems (7[%]), medication errors (5[%]), anesthesia disasters (3[%]) and several smaller groups.”<sup>8</sup>

In examining the diagnostic errors, one Harvard Medical Practice Study found that 7% of misdiagnoses involved negligence, such as a failure to follow up on test results.<sup>9</sup> Another study from doctors at Johns Hopkins found that preventable diagnostic errors resulting in injury or death range annually from 80,000 to 160,000.<sup>10</sup>

So what causes these errors? Specifically for diagnostic errors, research points to the decay in cognitive skills<sup>11</sup> and

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6. Mark L. Graber et al., *Bringing Diagnosis into the Quality and Safety Equations*, 308 J. AM. MED. ASS'N 1211, 1211 (2012); Sandra G. Boodman, *Misdiagnosis is More Common than Drug Errors or Wrong-Site Surgery*, WASH. POST, (May 6, 2013), [https://www.washingtonpost.com/national/health-science/misdiagnosis-is-more-common-than-drug-errors-or-wrong-site-surgery/2013/05/03/5d71a374-9af4-11e2-a941-a19bce7af755\\_story.html](https://www.washingtonpost.com/national/health-science/misdiagnosis-is-more-common-than-drug-errors-or-wrong-site-surgery/2013/05/03/5d71a374-9af4-11e2-a941-a19bce7af755_story.html).

7. David Brown, *Diagnostic Errors Are Leading Cause of Successful Malpractice Claims*, WASH. POST, (April 22, 2013), [https://www.washingtonpost.com/national/health-science/diagnostic-errors-are-leading-cause-of-successful-malpractice-claims/2013/04/22/e9194154-ab7d-11e2-b6fd-ba6f5f26d70e\\_story.html](https://www.washingtonpost.com/national/health-science/diagnostic-errors-are-leading-cause-of-successful-malpractice-claims/2013/04/22/e9194154-ab7d-11e2-b6fd-ba6f5f26d70e_story.html) (discussing Ali S. Saber Tehrani et al., *25-Year Summary of US Malpractice Claims for Diagnostic Errors 1985-2010: An Analysis from the National Practitioner Data Bank*, 22 BRIT. MED. J. QUALITY & SAFETY 672 (2013)).

8. *Id.*

9. Lucian L. Leape et al., *The Nature of Adverse Events in Hospitalized Patients —Results of the Harvard Medical Practice Study II*, 324 N. ENGL. J. MED. 377, 380 (1991); *see also* sources cited *supra* note 6.

10. *See* sources cited *supra* note 7.

11. Weaver, *supra* note 2, at 271.

The human performance literature defines *skill decay* as loss or decline in the quality of acquired knowledge or skills over time due to nonpractice and nonuse. This differs from cognitive decline associated with disease or aging. Diagnostic skill decay can thus be defined in terms of breakdowns in the diagnostic reasoning process. More specifically, *absolute skill decay* is defined as loss of skills from a prior base-line and is differentiated from *relative skill decay*, defined as skills stasis in the face of changing scientific knowledge and diagnostic standards over time.

*Id.* (emphasis in original) (citations omitted).

faulty clinical reasoning as significant.<sup>12</sup> Central to the focus of this article, factors that may influence diagnostic performance include stress, anxiety, fatigue, emotion regulation, self-efficacy, prior experience, and the physician's baseline of skills or expertise.<sup>13</sup>

Many believe that time and experience can help in the diagnostic phase, reducing medical errors with the more experience a doctor has in practice. However, experience also means age, raising another malpractice issue—declining physical and cognitive skills.<sup>14</sup>

Some studies on aging physicians attempt to connect the specific cognitive and physical declines of aging to incidents of malpractice, but even the author notes that this problem has attracted only scant interest and little study.<sup>15</sup> With these limitations, studies do offer some evidence of a link in cognitive and physical decline of the doctor to malpractice cases and are illustrative of other malpractice cases. One issue is the changes in medical education over time. The older the doctor, the more outdated the information taught in medical school and the more remote the training.<sup>16</sup> While doctors must continue their education to remain current in the field, cognitive skill and knowledge decay will continue.<sup>17</sup> As cognitive skills and knowledge decline, faulty clinical reasoning becomes more prevalent.<sup>18</sup>

One group of medical leaders suggests that another part of the problem is the “increasing fragmentation of the health-care system, as well as relentless time pressures squeezing doctors and the overuse of expensive, high-tech tests that have supplanted traditional hands-on skills of physical diagnosis.”<sup>19</sup> These researchers seem to suggest that altering the practice of medicine may solve some of the malpractice issues associated

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12. *Id.* at 269.

13. *Id.* at 271.

14. Symposium, *The Problem of the Aging Surgeon: When Surgeon Age Becomes a Surgical Risk Factor*, 467 CLINICAL ORTHOPAEDICS & RELATED RES. 402, 403 (2008) [hereinafter *Problem of the Aging Surgeon*].

15. *Id.*

16. *Id.*

17. See Weaver, *supra* note 2.

18. *Id.* See also n. 11.

19. Boodman, *supra* note 6.

with the identified issues. While “relentless time pressures” and other administratively based “problems” may be some of the “causes,” perhaps the real issue is the doctor’s physical or mental inability to work through these pressures.<sup>20</sup>

Some of the suggested solutions involve administrative changes, such as electronic medicine cross-checking, electronic charting, and other safeguards on physician decision making.<sup>21</sup> These solutions, however, are merely checks for physician error rather than treatments for the root causes of the potential mistakes. While these checks on performance are likely valuable, prevention of the physicians’ physical or cognitive deficiencies that cause the mistakes may be equally helpful.

### III. Standard/Duty of Care

While studies have attempted to categorize the causes of malpractice errors in medicine, of more importance to this discussion are the legal standards in a malpractice case and whether those cases would change with the introduction of neurointerventions.

In general, medical malpractice cases track general negligence actions. In each of these claims, the plaintiff must show: there was a duty of care owed to the plaintiff, a breach of that duty by the defendant, harm to the plaintiff, and that the actions of the defendant caused the harm to the plaintiff.<sup>22</sup> This paper focuses on the duty of care and the breach of that duty. To determine if a breach has taken place, one must look to the standard of care.<sup>23</sup> The core part of the standard of care discussion in all medical malpractice is to establish a baseline for comparison to the medical standards and practices in the “field.”<sup>24</sup> This is typically done by eliciting testimony from other

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20. *Id.*

21. See Hardeep Singh, *The Battle Against Misdiagnosis*, WALL ST. J. (Aug. 7, 2014, 7:16 AM), <http://www.wsj.com/articles/hardeep-singh-the-battle-against-misdiagnosis-1407453373>.

22. WERDNER PAGE KEETON ET AL., PROSSER AND KEETON ON THE LAW OF TORTS § 30, at 164-65 (W. Page Keeton ed., 5th ed. 1984).

23. Michael D. Greenberg, *Medical Malpractice and New Devices: Defining an Elusive Standard of Care*, 19 HEALTH MATRIX 423, 427 (2009).

24. *Id.* at 428.

physicians.<sup>25</sup> However, far less established is defining the field of standards against which medical care is compared.

A. *Skills:*

In general, doctors must use care which is reasonable in light of their superior learning and knowledge, and any special skills or training they may have.<sup>26</sup> A doctor will ordinarily be understood to have the standard professional skill and knowledge of those in good standing in the medical profession.<sup>27</sup> While some may call this an average physician, that is not quite accurate. It is only those doctors in good standing who are considered for comparison.<sup>28</sup> Within those of good standing, it is not the average of all of those doctors, but only the minimum standard of that group.<sup>29</sup> However, a doctor may voluntarily raise his own standard of care to which he will be compared.<sup>30</sup> For example, if a doctor makes assertions about his own abilities or the outcome of a case beyond mere promises, possibly in contract, then that doctor is held to his stated standard.<sup>31</sup> Further, if a doctor holds himself out to have a specialty or greater skill, then the doctor is held to that higher standard of his cohort group.<sup>32</sup>

B. *Comparative Skills*

To determine what the comparative norm is for a doctor, courts will often consider a standard of care using the “degree of care and skill employed by qualified physicians in the same ‘school’ as the defendant physician.”<sup>33</sup> This “school” was

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25. *Id.* at 427.

26. KEETON ET AL., *supra* note 22, § 32 at 187.

27. *Id.*

28. *Id.*

29. *Id.*

30. *Id.*

31. *Id.* at 186.

32. *Id.* at 187.

33. Sam A. McConkey, IV, Note, *Simplifying the Law in Medical Malpractice: The Use of Practice Guidelines as the Standard of Care in Medical Malpractice Litigation*, 97 W. VA. L. REV. 491, 497 (1995); *see also* KEETON ET AL., *supra* note 22, § 32 at 187.



historically based on a physician's locality.<sup>34</sup> This standard was later expanded to include "similar localities"<sup>35</sup> and, more recently, included a comparison to those in "the defendant physician's field of specialization."<sup>36</sup> These locality and specialization comparatives often made medical malpractice cases difficult for the plaintiff to win.<sup>37</sup> To establish the locality standard, the plaintiff would need a local doctor willing to testify against the defendant doctor.<sup>38</sup> This often proved difficult when doctors refused to testify against one another, creating a potential "conspiracy of silence in the plaintiff's locality, which precludes the possibility of obtaining expert testimony[.]"<sup>39</sup>

These local standards are now giving way to a more modern global approach to medical comparative standards. "The potential for unjustifiable divergence in standards of medical care based solely on geography, particularly given modern access to technology in almost all communities, led most states to rethink their strict approach to the locality rule."<sup>40</sup> "At least twenty-nine states and the District of Columbia have adopted a national standard of care for medical negligence litigation[.]"<sup>41</sup>

Regardless of whether the measure is locality, discipline, or even to practice guidelines, the standard of what counts as malpractice remains mostly linked to norm-referenced standards as opposed to criterion-referenced standards.<sup>42</sup> In

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34. McConkey, *supra* note 33, at 498.

35. *Id.*

36. *Id.*

37. *Id.*

38. *Id.*

39. E. Lee Schlender, *Malpractice and the Idaho Locality Rule: Stuck in the Nineteenth Century*, 44 IDAHO L. REV. 361, 367 (2008) (citing *Sheeley v. Mem'l Hosp.*, 710 A.2d 161, 165-66 (R.I. 1998) (citations omitted)).

40. McConkey, *supra* note 33, at 498.

41. Robert Jenkins, *Chaos in the Community: Unraveling the Mess that is North Carolina's "Same or Similar Community" Standard of Care*, 6 CHARLOTTE L. REV. 63, 66 (2015) (citations omitted).

42. Carter L. Williams, *Evidence-Based Medicine in the Law Beyond Clinical Practice Guidelines: What Effect Will EBM Have on the Standard of Care?*, 61 WASH. & LEE L. REV. 479, 483 (2004) ("CPGs are systematically developed statements to assist the practitioner and patient decisions about appropriate health care for specific clinical circumstances." (citing INST. OF MED., GUIDELINES FOR CLINICAL PRACTICE: FROM DEVELOPMENT TO USE 27 (Marilyn J. Field & Kathleen N. Lohr eds., 1992) (ebook))). Even in light of CPG's and the fact that some jurisdictions are attempting to move away from

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other words, what makes a doctor negligent is not just that he failed to do “x” number of required things, but that he failed to do “x” number of required things *that other doctors would do*. This distinction becomes important when considering how we may alter a physician through neurointerventions and when the physician becomes *different* than his comparative group.

### C. *Conflicting and Shifting Standards of Care*

#### 1. Clinical Equipoise

So what happens in a case where there are two seemingly equal medical courses of action? In cases of two conflicting techniques and a lack of evidence on which is best, we must look to the standards in the locality, similar locality, or similar practice. But, if given two equally acceptable courses of action, physicians are given wide latitude. Through the “error of judgment rule,” “if two or more acceptable schools of thought exist on a particular course of medical treatment, a physician is not negligent for choosing one course over another. In theory, the error of judgment rule permits a physician to exercise alternative treatment methods by admitting evidence of an accepted course of treatment.”<sup>43</sup>

#### 2. Reasonable Care

Nearly half of the states have adopted a reasonable care” standard.<sup>44</sup> In theory, “[r]ather than being based on what the majority of medical practitioners actually do, this standard is

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custom based phraseology in their standard of care language, “the degree to which a medical practice is unique or generally accepted remains part of the evidentiary framework.” *Id.* at 504. From the use of testimony of expert witnesses, the standard of care is often based on comparative evidence. *Id.* “Thus, even when courts claim to employ a standard of care that is not based on custom, they nonetheless may allow evidence of custom to play a paramount role in the analysis.” *Id.*

43. McConkey, *supra* note 33, at 501 (citing Mark A. Hall, *The Defensive Effect of Medical Practice Policies in Malpractice Litigation*, 54 L. & CONTEMP. PROBS. 119, 126 (1991)); see Anna B. Laakmann, *When Should Physicians be Liable for Innovation*, 36 CARDOZO L. REV. 913, 925 (2015).

44. Greenberg, *supra* note 23, at 429.

based on what is reasonable to expect of a professional given the state of medical knowledge at the time of the treatment in issue.”<sup>45</sup> This reasonable care standard may allow courts “more latitude in reviewing medical knowledge and customs.”<sup>46</sup> As dramatic a shift as this may seem, the standard of care remains comparative, as there is just a widening of the comparative information. Juries would be allowed to hear what other doctors in other locations do in similar circumstances and to hear about medical advances and changes in practice. In reality, this change has little effect on the comparative nature of the standard of care, particularly since most information presented in court would be from medical experts who will testify as to what could or should be done.<sup>47</sup>

### 3. Staying Up-to-Date and Medical Advances

If the standard is measured by comparative standards, then how could a doctor implement a new technique or an experimental treatment? Since the standards are in one way or another based on a comparative standard, a new technique would, by definition, be outside the normal standard of care.<sup>48</sup> Courts have addressed these issues and have found that “delivering experimental treatment in a clinical trial does not of itself constitute malpractice, even though such trials might otherwise be viewed as a departure from customary care.”<sup>49</sup>

Perhaps more difficult would be the use of a new medical device or drug approved by the FDA. While the comparative standards discussed above would still apply, it would be more difficult to find other physicians who had used the new techniques or drugs. One commentator contemplates that courts may compare the risks of the new device or drug with the risks of the status quo. If the risks are similar or less than the standard treatment and the new treatment offers benefits, then comparative testimony may be favorable—finding that it was reasonable to take the new course of action. However, if the

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45. *Id.*

46. *Id.*

47. *Id.*

48. Laakmann, *supra* note 43, at 916.

49. Greenberg, *supra* note 23, at 429-30.

risks are greater, then the comparison testimony may not be as favorable to the doctor. The greater the unknown or the greater the risk of the new procedure, the more likely a successful plaintiff malpractice case will be.<sup>50</sup> These shifting standards based on risk, reward, and potential outcome illustrate the difficulty in meeting patients' constantly expanding expectations and in meeting the shifting comparative standard of care.

Further, doctors have a "duty to stay abreast, which means that physicians have an obligation to be aware of evolving practices in medical care and to make appropriate use of new scientific knowledge in medicine as it emerges."<sup>51</sup> "A physician's duty to keep current on the latest medical developments is an integral component of the standard of care."<sup>52</sup> For example, in *Nowatske v. Osterloh* the court noted that the skill and judgment to which the medical professional should be held is not necessarily that of "customary practice," but rather "the practice of physicians who keep abreast of advances in medical knowledge."<sup>53</sup>

New technologies also affect the standard of care.<sup>54</sup> In fact, there have been several notable cases in which doctors have been held liable for malpractice when they failed to adopt new methods of technology that had not yet become industry standard.<sup>55</sup> Malpractice has been found in cases, including such actions as a failure to perform glaucoma tests on patients under forty when not standard practice, failure to use the newest techniques for oxygen delivery of newborns when other methods were common, and failure to use a database of adverse medication effects at the dawn of such technologies have all been found to be malpractice.<sup>56</sup> These types of cases clearly show that

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50. *Id.* at 431-32.

51. *Id.* at 430.

52. Amy Jurevic Sokol & Christopher J. Molzen, *The Changing Standard of Care in Medicine E-Health, Medical Errors, and Technology Add New Obstacles*, 23 J. LEGAL MED. 449, 480 (2002).

53. 543 N.W.2d 265, 272-73 (Wis. 1996).

54. Greenberg, *supra* note 23; Laakmann, *supra* note 43; Sokol & Molzen, *supra* note 52.

55. See Greenberg, *supra* note 23, at 432-33; see also Sokol & Molzen, *supra* note 52.

56. See generally *Oelling v. Rao*, 593 N.E.2d 189 (Ind. 1992); *Helling v.*

the legal duty of care shifts and is often difficult to determine when new technology becomes available.<sup>57</sup> While these cases are related to the care delivered by the physician during practice, the same may be true in the decision to enhance the doctor herself. While availability of an internet database is not a direct enhancement to the doctor, the failure to avail herself of the information during treatment of a patient could be malpractice.<sup>58</sup> Similarly, an accident caused by poor eyesight due to the failure to wear prescribed corrective lenses during a surgical procedure would almost certainly be malpractice. While these are external interventions, as other forms of enhancing become standard in the practice and are shown to be effective, at what point does a practitioner commit malpractice by being unenhanced?

These issues raise an interesting side dilemma for medical professionals. With widely available information, when patients search to determine the appropriateness of what their doctors should have done, they may find there is a potentially better treatment. They, of course, want their doctor to have used that treatment, even if other doctors do not currently use it. This places doctors in the middle of two conflicting desires of the patient: 1) do not expect unusual medical treatment, and 2) expect the doctor to do whatever works. Doctors may feel anxiety over these decisions, as they cannot tell ahead of time which would count as the effective treatment and may be pressured to push newer developments to please patients and provide the best services.

#### 4. What Does the Doctor Say He Can Do?

Finally, doctors will be held not only to community standards, but also to their own standards. If a doctor makes an affirmative statement of what he can do, that could be a contract

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Carey, 519 P.2d 981 (Wash. 1974) (holding that a failure to perform glaucoma pressure test on a patient under age forty, while not customary practice, was malpractice); Sokol & Molzen, *supra* note 52 (explaining that a failure to perform a literature search on the adverse effects of Dilantin resulted in malpractice liability for wrongful death (discussing *Harbeson v. Parke-Davis, Inc.* 656 P.2d 483 (Wash. 1983)(en banc))).

57. See Laakman, *supra* note 43.

58. See *Harbeson*, 656 P.2d at 486.

of performance. There are numerous examples of contracts between doctors and patients, many of which have been found enforceable and involve some assertions of a cure or remedy. For example, in *Gill v. Schneider*, a doctor had business cards that stated, “[c]an cure any and all chronic diseases, also remove cancers and tumors without operation or drugs.”<sup>59</sup> In its instructions to the jury, the court noted that this case was for a breach of contract and that the tumors had not been cured.<sup>60</sup> There are significant other examples, including many promises of failed sterilizations after vasectomies or tubal ligations.<sup>61</sup>

In addition to contract type promises, a doctor could raise his own standard of care by his training and specialty. Any doctor who holds himself out to have a specialty or greater skill is held to that higher standard.<sup>62</sup> In fact, some have argued that common jury instructions “that the physician must use her ‘best judgment’ by relying on any superior knowledge or skill that she possesses” actually creates a standard of care greater than the “average reasonable practitioner.”<sup>63</sup>

##### 5. Comparison Age, Gender or Other Categories of Comparison

While it may seem obvious, given the discussion of the standards of care above, that there would be none, it is important to note for this article that there appears to be no shift in the standard of care for doctors with faltering abilities due to age or other issues. In other words, the standards do not seem to decrease or increase over time for aging doctors. They are not compared to doctors of the same age or physical capabilities, only those in the same specialty, locality, or comparative standards, depending on the jurisdiction’s standard of care. Essentially, however, this pushes medical professionals to make sure they

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59. 110 P. 62, 63 (Colo. 1910).

60. *Id.*

61. See generally Jack W. Shaw, Annotation, *Recovery Against Physician on Basis of Breach of Contract to Achieve Particular Result or Cure*, 43 A.L.R. 3d 1221 (1972).

62. See KEETON ET AL., *supra* note 22, § 32 at 185; see also R.E. LaG, Annotation, *Physician’s or Surgeon’s Warranty of Success of Treatment or Operation*, 27 A.L.R. 1250 (1923).

63. Laakman, *supra* note 43, at 926-27.

are at least as skilled as everyone else—perhaps pressuring them to make sure they were always slightly better than others. If the standard of care requires certain physical or mental abilities of our doctors, then falling below the abilities required would mean the doctor could no longer meet her standard of care. This certainly creates an affirmative duty to enhance education and to remedy such common ailments as eyesight or high blood pressure. It could also mean correcting other age related declines or physical and mental deficiencies. However, in the near future, it could also mean enhancing to keep up with others who are physically and mentally superior, either through the natural lottery or through neuroenhancements.

Looking specifically at aging physicians, they have their own set of issues. For example:

a. *Physical*

The first items to go are typically strength and eyesight and are soon followed by dexterity, and finally cognitive abilities.<sup>64</sup> While knowledge and experience can be factors that increase with time and age, those factors may not be enough to compensate for the loss of physical and mental decline.<sup>65</sup> Although physical skills begin to decline around age twenty-eight, “it is widely agreed that most surgeons reach their peak of overall performance around the second half of the fifth decade (forty-five [to] fifty years of age). What appears to be happening is that, for more than two decades, growing experience can and does more than compensate for diminishing physical skills.”<sup>66</sup>

b. *Cognitive Decline*

Studies on the effects of aging have shown declines in “reactivity, attention, numeric recall, verbal memory, visuospatial facility, reasoning and mental calculation.”<sup>67</sup> By age seventy-five, physicians “lose [approximately] 25% of their

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64. See *Problem of the Aging Surgeon*, *supra* note 14, at 403.

65. *Id.*

66. *Id.* at 404.

67. *Id.* at 405.

starting score[s]”<sup>68</sup> on tests “designed to detect impaired competence occurring late in a physician’s career.”<sup>69</sup> Specifically, “the tests measure reactivity, attention, numeric recall, verbal memory, visiospatial facility, reasoning, and mental calculation.”<sup>70</sup> “The decline is very rapid among those over [sixty].”<sup>71</sup> One New Zealand study of practicing psychiatrists over the age of fifty-five found that 49% reported greater confidence and competence, 21% reported a more mature life perspective, and 22% reported that age conferred greater credibility and respect.<sup>72</sup> “However, 27% reported fatigue interfering with work, 12 % [had] difficulty keeping up with advances in knowledge, and 10% [reported] poor memory.”<sup>73</sup>

c. *American Medical Association’s Position on Physician Competence*

The American Medical Association (“AMA”) recognizes that aging and its complications can have a significant impact on the practice of medicine. The AMA’s ethical guidelines state:

To preserve the quality of their performance, physicians have a responsibility to maintain their health and wellness, construed broadly as preventing or treating acute or chronic diseases, including mental illness, disabilities, and occupational stress. When health or wellness is compromised, so may the safety and effectiveness of the medical care provided.<sup>74</sup>

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68. *Id.*

69. *Id.* (citations omitted) (“Trunkey and Botney have developed a series of tests, together named the Micorcog ...”).

70. *Id.*

71. *Id.* (citing D.D. Trunkey & R. Botney, *Assessing Competency: A Tale of Two Professions*, 192 J. AM. C. SURG. 385 (2001)).

72. *Id.* (citations omitted).

73. *Id.* (citations omitted).

74. Stuart A. Green, *Clinical Competence and the Aging Surgeon*, AM. ACAD. ORTHOPAEDIC SURGEONS (Sept. 2008), (quoting CODE OF MEDICAL ETHICS, Formal Op. 9.0305 (AM. MED. ASS’N 2003)). <http://www.aaos.org/news/aaosnow/sep08/managing3.asp>.



Clearly the AMA statement is an affirmative call for doctors to be at their healthy physical and mental capacity. Likely, this includes correcting and treating illnesses and age related declines to the extent possible even absent a malpractice mandate.<sup>75</sup>

#### IV. Neuroenhancements for Medical Providers

There are several pressures that could cause malpractice standards to shift, from new technology to shifting comparative standards. Further, there are many circumstances that may factor in a malpractice case, including stress, anxiety, fatigue, emotion regulation, self-efficacy, prior experience, reactivity, attention, memory, and the physician's baseline skills or expertise.<sup>76</sup> The recommendations for reducing malpractice cases are varied but include continuing education to boost skills and improve diagnostic efficiency;<sup>77</sup> treating cognitive or physical declines/illnesses in physicians;<sup>78</sup> and even retirement for aging physicians.<sup>79</sup> But what if, in addition to all of the efforts by providers to reduce malpractice cases, we could also physically or cognitively enhance our doctors, making them less prone to the malpractice pitfalls in the first place? Beyond continuing education or mandatory retirement, there may be a more direct physical or neurological intervention method to create a better doctor—enter neurointerventions.

##### A. *What is a Neurointervention?*

Neurointervention describes modifications, cognitive enhancers, which cover nearly any use of a neuroscientific or neurotechnological technique to alter what has previously been

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75. *See id.* (discussing aging physicians and the need for maintaining healthy lifestyles and taking measures to mitigate any health or wellness problems).

76. Weaver, *supra* note 2, at 271; *see also Problem of the Aging Surgeon*, *supra* note 14, at 405 (citing Trunkey & Botney, *supra* note 71).

77. *See generally* Weaver, *supra* note 2.

78. *See generally* Green, *supra* note 74.

79. *See Problem of the Aging Surgeon*, *supra* note 14, at 405-06.

the limits of human abilities or capabilities.<sup>80</sup> There are numerous categories of possible neurointerventions, many of which have been used for years, such as psychological interventions including education, therapy, environmental stimulation, subliminal suggestion, or biofeedback.<sup>81</sup> Another category is wearable technology, which, while not typically thought of when discussing neurointerventions, is often some of the most used. Traditionally, these items include prescription glasses, protective clothing, magnifying lenses, or gloves. These items are also going through a technological renaissance. For example, Polo stress shirts, activity trackers, the Apple Watch, RFID tags and EEG controllers are technologies that can alter the behavior of people.<sup>82</sup> But more in line with the discussion of the neurointerventions in this paper are the pharmacological, the radiological, and the mechanical and physiological.

Pharmacological interventions are probably the most commonly recognized type of intervention. These include widely adopted enhancements such as caffeine, the well-publicized Adderall, and hosts of other pharmacological substances that can boost alertness, reduce anxiety, change social attitudes, alter memory and affect emotional attachment.<sup>83</sup>

Radiological enhancements can also be used to diagnose, test or alter cognitive functioning. These include the well-known Functional Magnetic Resonance Imaging (“fMRI”)<sup>84</sup> and Positron Emission Tomography (“PET”)<sup>85</sup> scans for acquiring information about the brain. But more relevant to neuroenhancements are Transcranial Magnetic Stimulation

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80. Patrick D. Hopkins & Harvey L. Fiser, *This Position Requires Some Alteration of Your Brain: On the Moral and Legal Issues of Using Neurotechnology to Modify Employees*, JOURNAL OF BUSINESS ETHICS (conditionally accepted).

81. *Id.*

82. *Id.*

83. See Andy Smith, *Effects of Caffeine on Human Behavior*, 40 FOOD & CHEM. TOXICOLOGY 1243 (2002); see also Hopkins & Fiser, *supra* note 80.

84. See David Shin, *What is an fMRI?*, U.C. SAN DIEGO SCH. OF MED. (2015), <http://fmri.ucsd.edu/Research/whatisfmri.html>.

85. See Mayo Clinic Staff, *Positron Emission Tomography (PET) Scan*, MAYO CLINIC (2015), <http://www.mayoclinic.org/tests-procedures/pet-scan/basics/definition/prc-20014301>.

(“TMS”)<sup>86</sup> or Transcranial Direct Current Stimulation (“tDCS”)<sup>87</sup> which can alter mood, memory, dexterity or moral judgment.

Finally, the most invasive neurointerventions would include mechanical and physiological interventions. Brain implants such as artificial sensory organs or deep brain stimulators may also be used as neurointerventions. Also, changes to the brain itself, through processes such as lesioning of the brain tissue or surgery, can alter cognitive functioning.<sup>88</sup>

### 1. Ameliorations versus Enhancements

Neurointerventions are used for both corrective and enhancing purposes. There is a difference between ameliorating a problem that exists and enhancing a person who functions at a *normal* basis. For example, an aging doctor with Alzheimer’s may take Aricept to temporarily reduce the effects of the disease.<sup>89</sup> That would be considered an ameliorative intervention—one that is restoring a person’s cognitive and physical abilities to what would be considered normal. These would be to bring that person up to the best al he or she could be. Other ameliorative examples may be cholesterol drugs, drugs to slow the onset of macular degeneration, arthritis medications, etc. For the purposes of this discussion, these interventions are intended to bring a person back to the “norm” of the population or medical profession—to correct an advancing age issue or other medical decline, illness or defect. They may also be considered ameliorations in normal, healthy individuals where their normal abilities have been taxed or depleted. For example, consider a doctor who has worked a day shift and is

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86. See Walter Glannon, *Psychopharmacology and Memory*, 32 J. MED. ETHICS 74 (2006); see also Hopkins & Fiser, *supra* note 80; Sébastien Tassy et al., *Disrupting the Right Prefrontal Cortex Alters Moral Judgment*, 7 SOC. COGNITIVE & AFFECTIVE NEUROSCIENCE 282 (2012); Liane Young et al., *Disruption of the Right Temporoparietal Junction with Transcranial Magnetic Stimulation Reduces the Role of Beliefs in Moral Judgments*, 107 PROCEEDINGS NAT’L. ACAD. SCI. 6753 (2010).

87. See Hopkins & Fiser, *supra* note 80; see also Ahmed Karim et al., *The Truth About Lying: Inhibition of the Anterior Prefrontal Cortex Improves Deceptive Behavior*, 20 CEREBRAL CORTEX 205 (2010);

88. Hopkins & Fiser, *supra* note 80.

89. See generally ARICEPT, <http://www.aricept.com> (last visited October 30, 2015).

switching to a night shift less than twenty-four hours later. Taking a drug to alleviate the fatigue associated with over work and schedule changes would be considered amelioration, not enhancement. These would merely raise these doctors to the abilities they would normally have during a workday in which they have had sufficient rest. Finally, enhancements are those interventions which are not prescribed to bring up to the *norm* of functioning, but are used for the purpose of going beyond the norm, or even altering the norm.<sup>90</sup> Neuroenhancements may therefore be categorized into three situations: 1) making defective people normal; 2) making normal, but temporarily impaired people abnormally unimpaired; and 3) making normal people supernormal.

### B. *Examples of Enhancement*

- **Alertness or Sleep Reduction:** Modafinil d-amphetamine (“Provigil”) and Armodafinil (“Nuvigil”) are specifically marketed to include the treatment for “shift work sleep disorder, also known as shift work disorder.”<sup>91</sup> While marketed to those who are unable to switch from night to day work shifts, a physician would find this enhancement useful during long surgery or a long night on call.
- **Memory Enhancement:** The use of Transcranial Magnetic Stimulation (“TMS”) has been shown to improve associative memory,<sup>92</sup> and general memory has shown enhancement with CREB-cycle

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90. See Emma A. Jane & Nicole A. Vincent, *The Rise of Cognitive Enhancers is a Mass Social Experiment*, THE CONVERSATION (June 15, 2015, 1:11 AM), <https://theconversation.com/the-rise-of-cognitive-enhancers-is-a-mass-social-experiment-40072>.

91. Carla Friedman, *FDA Approves Cephalon’s Provigil*, WORLD HISTORY PROJECT (Dec. 24, 1998), <https://worldhistoryproject.org/1998/12/24/fda-approves-cephalons-provigil>; see also PROVIGIL, <http://www.provigil.com> (last visited Oct. 30, 2015); Nancy Wesensten et al., *Performance and Alertness Effects of Caffeine, Dextroamphetamine, and Modafinil During Sleep Deprivation*, 14 J. SLEEP RES. 255 (2005).

92. See generally Jane X. Wang et al., *Targeted Enhancement of Cortical-Hippocampal Brain Networks and Associative Memory*, 345 SCIENCE 1054 (2005).

activators.<sup>93</sup> Strychnine has also been shown to improve task memory in animal studies.<sup>94</sup>

- **Memory Insertion:** Scientists have shown that memory insertion is possible by creating specific false spacial memories.<sup>95</sup>
- **Empathy:** “Oxytocin, the so-called love hormone . . . increases feelings of social bonding and empathy while reducing anxiety . . . .”<sup>96</sup> Could a heightened sense of empathy assist a doctor in relating to his patient or to the family during a difficult situation?
- **Problem Solving:** The chemical methylphenidate had been shown to improve problem-solving skills in healthy subjects.<sup>97</sup> If called upon to consult in a particularly puzzling medical diagnosis, this could be helpful to the doctor in preparing to work through the possible causes of ailments.
- **Utilitarian Moral Judgment:** The use of Transcranial Magnetic Stimulation (“TMS”) has been shown to lead subjects to make moral judgments based more on consequences and less on mental states.<sup>98</sup>
- **Dexterity and Fine Motor Control:** It is a poorly kept

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93. Glannon, *supra* note 86, at 76-77.

94. See James L. McGaugh & Benno Roozendaal, *Drug Enhancement of Memory Consolidation: Historical Perspective and Neurobiological Implications*, 202 PSYCHOPHARMACOLOGY 3 (2008).

95. See Gaetan de Lavilléon et al., *Explicit Memory Creation During Sleep Demonstrates a Causal Role of Place Cells in Navigation*, 18 NATURE NEUROSCI. 493 (2015).

96. Amelia Hill, *Manipulating Morals: Scientists Target Drugs that Improve Behavior*, THE GUARDIAN (Apr. 4, 2011), <http://www.theguardian.com/science/2011/apr/04/morality-drugs-improve-ethical-behaviour>; see also Carsten K. W. De Dreu et al., *Oxytocin Promotes Human Ethnocentrism*, 108 PROCEEDINGS NAT'L. ACAD. SCI. 1262 (2011).

97. See Mitul A. Mehta, et al., *Methylphenidate Enhances Working Memory by Modulating Discrete Frontal and Parietal Lobe Regions in the Human Brain*, 20 J. NEUROSCI. RC65 (2000).

98. See Young et al., *surpa* note 86.

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secret that orchestra musicians routinely use beta blockers to control stage fright and calm nerves before a performance.<sup>99</sup>

- **Physical Surgical Enhancements:** For example, Tommy John surgery is the term known in baseball for the repair of a damaged “ulnar collateral ligament in the elbow.”<sup>100</sup> This surgery is named after the first patient, Dodger’s pitcher Tommy John.<sup>101</sup> At age thirty-one he underwent surgery to repair the damaged ligament, and after approximately eighteen months of rehabilitation, he was able to return to baseball.<sup>102</sup> This surgery has become quite common with statistics of one in seven major league pitchers using this technique to extend their pitching careers.<sup>103</sup> Others argue that this procedure makes a player even better than before the surgery.
- **Corrective Vision Surgery:** Millions of Lasik type procedures have been performed to give those with failing eyesight better vision. Tiger Woods, for example, had Lasik surgery performed.<sup>104</sup> He had vision of 20/15 with contacts prior to surgery, but complained of the wind and weather effects on them.<sup>105</sup> After surgery he reports an unassisted 20/15 vision, stating that the “the hole looks bigger

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99. See *Musicians Use Beta Blockers as Performance Enabling Drugs*, WQXR (August 16, 2013) [hereinafter *Musicians Use Beta Blockers*], <http://www.wqxr.org/#/story/312920-musicians-use-beta-blockers-relieve-stage-fright>.

100. Lindsay Berra, *Force of Habit*, ESPN (Mar. 23, 2012), [http://espn.go.com/mlb/story/\\_id/7712916/tommy-john-surgery-keeps-pitchers-game-address-underlying-biomechanical-flaw-espn-magazine](http://espn.go.com/mlb/story/_id/7712916/tommy-john-surgery-keeps-pitchers-game-address-underlying-biomechanical-flaw-espn-magazine).

101. *Id.*

102. *Id.*

103. *Id.*

104. See Craig Bestrom & John Strege, *Eyes of the Tiger: Tiger Woods – LASIK Laser Eye Surgery*, EYESURGERYUSA.COM, <http://www.eyesurgeryusa.com/eye-surgery-articles/tiger-woods-lasik-laser-eye-surgery.htm>.

105. *Id.*

and his ability to read greens has improved dramatically.”<sup>106</sup> Better than 20/20 would certainly aid a doctor who needed the ability to see small blood vessels or nerves during surgery.

C. *Neuroenhancements and Neurointerventions in Medical Care*

So how can these enhancements change medical care and what might those changes affect? While these technologies are still in their infancy, a few examples of currently available possibilities come to mind. Recall that neurointerventions may be categorized into three situations: 1) making defective people normal; 2) making normal but temporarily impaired people abnormally unimpaired; and 3) making normal people supernormal. As part of each of these categories, we must determine what is “normal.” Merriam-Webster includes many definitions of normal, each with a slightly different nuance. One defines normal as “occurring naturally.”<sup>107</sup> Another definition in the same dictionary defines normal as “of, relating to, or characterized by average intelligence or development.”<sup>108</sup> Equally instructive is the definition, “according with, constituting, or not deviating from a norm, rule or principle.”<sup>109</sup> Yes, this is basic, but it is also informative of the medical profession and medical malpractice standards. For example, “naturally occurring” mental or physical abilities might be normal for the overall population, but when compared to the population in the medical field, these may be below the average. After all, we are not talking about your average population—this is a subset (graduates of medical school) of a subset (graduates of college) of a subset (typically majors in chemistry, biology or the like) of a subset (high school graduates) of substantial achievers. Additionally, when thinking of aging, a naturally occurring phenomenon, a doctor may actually fall below the *average intelligence or development* of the comparative medical

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106. *Id.*

107. *Normal*, MERRIAM-WEBSTER.COM, <http://www.merriam-webster.com/dictionary/normal> (last visited Oct. 30, 2015).

108. *Id.*

109. *Id.*

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professional group by simply allowing nature to run its course. As closely as the term can be tracked to the medical malpractice standards set forth in the pages above, *normal* in this context refers to the mental and physical abilities of the average comparative cohort doctors in the similar fields and localities of practice. In addition to normal, I will refer to and define the terms “optinormal” and the “supernormal” in the following discussions.

### 1. Making “Defective” People Normal

One of the more straightforward ameliorative enhancements would be if we could make doctors stop aging—or at least slow the aging process. Studies show that doctors improve as they age, with their peak extending to 50 years of age.<sup>110</sup> From that date forward, age related decline seems to begin to chip away at the gains in experience.<sup>111</sup> Obviously, correcting physical issues would be one part of the corrective process. Declining eyesight could be corrected with the more traditional and well-known LASIK<sup>112</sup> surgery, to gene therapy showing promise for regeneration of eye tissues.<sup>113</sup> Doctors could begin TMS therapy<sup>114</sup> for memory enhancements and start Modafinil for alertness.<sup>115</sup> For Alzheimer’s patients, solanezumab, the first drug that appears to slow the damage Alzheimer’s does to the brain, would be the next step.<sup>116</sup> Most recently, studies are showing that a transfusion of the blood of a younger person to an older person may improve age related decline—potentially rejuvenating the brain.<sup>117</sup> Through these

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110. *Problem of the Aging Surgeon*, *supra* note 144, at 404.

111. *Id.*

112. *See generally* LASIK.COM, [www.lasik.com](http://www.lasik.com) (last visited Oct. 30, 2015).

113. *See* James Gallagher, *Human Stem Cells ‘Help Blind Rats,’* BRITISH BROADCASTING CORP. (Mar. 7, 2012), <http://www.bbc.com/news/health-17258098>.

114. *See supra* p. 20.

115. *See supra* p. 21.

116. *See* Hannah Devlin, *Scientists Find First Drug that Appears to Slow Alzheimer’s Disease*, THE GUARDIAN, (July 22, 2015), <http://www.theguardian.com/science/2015/jul/22/scientists-find-first-drug-slow-alzheimers-disease>.

117. *See* Ian Sample, *Can We Reverse the Ageing Process by Putting Young*



and other future developments, doctors may be able to work for more years, utilizing that experience factor that comes with age, but without the decline associated.

Beyond age, other defects may be corrected with neurointerventions, which may bring doctors back to normal standards. For example, a diagnosed case of ADHD may be treated with Adderall or certain cases of narcolepsy may be treated with Modafinil. Antidepressants and anti-anxiety drugs prescribed for doctors who show abnormal levels of depression or anxiety would also fit this category. Each of these would be considered as ameliorating diagnosed conditions which effectively have placed the doctor in an abnormal condition relative to his comparative groups. Taking these neurointerventions is corrective, meant to bring that doctor to the status of other normally functioning physicians—that is, back to normal. Not only does simple logic support this use of neurointerventions, but the AMA ethical guidelines seem to also support the use of such normative interventions.<sup>118</sup>

## 2. Making Temporarily Impaired People Abnormally Unimpaired

Going beyond ameliorating declines due to normal, but not temporary, aging or other physical and mental impairments, doctors may use enhancements to continue to perform when their abilities have been taxed or depleted. For example, consider a doctor who has been on-call from Friday afternoon through early Monday morning. Perhaps because it is a holiday weekend, the number of calls has been particularly high and beyond what is expected of one person, but all other available doctors are out of town and the doctor must press on. As a surgeon, she has been called in time and time again, causing her to sleep little or not at all in a thirty-six hour period. To help alleviate the fatigue associated with over work, she takes Provigil to remain alert and awake during the remainder of her work through the weekend. She may not have a prescription for

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*Blood into Older People?*, THE GUARDIAN (Aug. 4, 2015), <http://www.theguardian.com/science/2015/aug/04/can-we-reverse-ageing-process-young-blood-older-people>.

118. See discussion *supra* Section III.C. 5(C).

Provigil, as she has no diagnosis of narcolepsy or shift work sleep disorder, but she is aware that taking this medication will assist her in performing her job and retaining her normal cognitive abilities.<sup>119</sup> This use of neuroenhancements would be categorized as simply bringing that doctor to a normal cognitive state from her sleep deprived and mentally exhausted state—bringing her to *optinormal*.

Similarly, a cardiac surgeon faced with an unusually complicated and risky surgery is, not surprisingly, experiencing quite normal anxiety. “Originally prescribed to treat high blood pressure, [propranolol] became performance enablers when it became clear that Inderal (the brand name) controlled stage fright.”<sup>120</sup> No less intense than a performance on stage is a critical surgical procedure. Reports are that cardiac surgeons and OB/Gyn surgeons often take propranolol to cut anxiety and stop anxiety hand tremors.<sup>121</sup> However, none of these uses of neurointerventions would be considered to be bringing a person to a state of above average abilities or correcting a defect. These neurointerventions would bring the doctor to a state of optimum normal performance even in the face of real life, but somewhat less normal conditions. To enhance in these situations would be to create the *temporarily abnormally unimpaired* doctor or would bring him to *optinormal*.

### 3. Making Normal People “Supernormal”

Finally, neurointerventions may be used to enhance doctors to something more than the *normal* doctor. What if your transplant surgeon could reduce his need for sleep and improve his concentration by taking Modafinil knowing he is facing a fifteen hour surgery. While this borders on the category of

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119. See Amanda L. Chan, *Provigil: Narcolepsy Drug Being Taken by People Without the Sleep Disorder*, THE HUFFINGTON POST (July 18, 2012), [http://www.huffingtonpost.com/2012/07/18/provigil-narcolepsy-drug-modafinil\\_n\\_1682921.html](http://www.huffingtonpost.com/2012/07/18/provigil-narcolepsy-drug-modafinil_n_1682921.html).

120. See *Musicians Use Beta Blockers*, *supra* note 99 (“[a]s long ago as 1987, a study of the 51 largest orchestras in the U.S. found one in four musicians using them to improve their live performances, with 70 percent of those getting their pills illicitly.”)

121. Personal interview by author with medical school/hospital administrator, names withheld.

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*optinormal*, there is a difference when doctors preemptively enhance for superior abilities. Our doctor is taking Modafinil to begin the surgery with hyper alertness, above normal acuity, and is able to maintain that beyond normal state during the entire event. The doctor is going beyond the *normal* capacity and into the *supernormal*.

Other neuroenhancements may prove valuable for the medical profession. If called in to consult on a complicated and perplexing diagnosis, the physician could take methylphenidate, a substance shown to improve problem solving, thus making her a more effective diagnostician.<sup>122</sup> Just before the pre-surgery consult, our surgeon takes Oxytocin to help him be more empathetic to the patient and the family for what they are going through, even though the surgeon has been through the procedure hundreds of times.<sup>123</sup> When asked for an opinion on ending sustaining life support, a doctor could provide two consults: one as he currently is mentally, a normal doctor considering a difficult moral advisory position, and a second after using Transcranial Magnetic Stimulation on himself, enhancing his ability to make moral judgments based more on consequences and less on his own current mental state.<sup>124</sup> This alteration of his moral emotional state could, in effect, give the doctor his own check on decision making from two moral perspectives.

There are countless other possible interventions available today and, more are on the way. While those mentioned above could have some impact on medical care, soon, advances could have an even greater impact on the practice of medicine. It may be possible to implant memories and other information into the brain, giving a surgeon the experience of having performed a particular surgery multiple times without ever having performed it.<sup>125</sup> Memory enhancements will be more effective. Emotion and mood altering substances will become more targeted. Researchers are constantly finding ways of making our eyesight more acute and our bodies younger. Doctors may have super-dexterity, able to perform micro-surgery with less

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122. See Mehta, *supra* note 97.

123. See De Dreu, *supra* note 96.

124. See Young, *surpa* note 86.

125. See Lavilleon, *supra* note 95.

external aids. They may have super-haptic sensitivity, able to detect the smallest skin imperfections or internal abnormalities by touch alone. In short, neuroenhancements are poised to create a new class of the “supernormal.”

#### 4. The Artificially Loveable Physician – A Category All Its Own

When asked what is the single best thing that could be done to lower the risk of being sued for malpractice, one leading medical malpractice defense attorney replied, “[d]o they make an anti-asshole pill?”<sup>126</sup> This attorney is not alone in his assessment. According to the Vice President of Risk Management at the Texas Medical Liability Trust, “[p]atients do not necessarily file lawsuits because they believe they were harmed by a medical error. They sue because they believe they were harmed by a medical error and something else happened during their care.”<sup>127</sup> One of the suggested causes of malpractice claims is “[f]ailing to listen to patients, spend adequate time with them, and communicate empathetically with them.”<sup>128</sup>

So do they make an anti-asshole pill? Well, sort of. It may be highly addictive. However, a Parkinson’s drug, called tolcapone, has been shown to make people “nicer” and care more for one another, likely because of the increased dopamine response.<sup>129</sup> Perhaps being nicer and more empathetic to the patient and family could help in relationship building, which could not only draw out important information from the patient and family, resulting in better diagnoses, but could also reduce the resentment toward the physician in the event that

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126. Personal interview with licensed attorney primarily engaged in the practice of medical malpractice litigation and the author, name of the attorney withheld.

127. TEX. MEDICAL LIAB. TR., 10 THINGS THAT GET PHYSICIANS SUED 4 (2009) [hereinafter TEX. MEDICAL LIAB. TR.], <http://impertinentremarks.com/wp-content/uploads/2012/10/Ten-things.pdf>.

128. *Id.*

129. See U.C. Berkeley, *Altering Brain Chemistry Makes us More Sensitive to Inequality*, SCI. DAILY (Mar. 19, 2015) (citing Ignacio S  ez et al., *Dopamine Modulates Egalitarian Behavior in Humans*, 25 CURRENT BIOLOGY 912 (2015)), [www.sciencedaily.com/releases/2015/03/150319143414.htm](http://www.sciencedaily.com/releases/2015/03/150319143414.htm).

circumstances do not go as planned.<sup>130</sup> This type of attitude adjustment could be considered in any of the other three categories outlined above. For those doctors who find their normal bedside manner more abrasive, this might be preventative or ameliorative, falling into the *optinormal* category. For those who may have a personality disorder, these may be merely to make our doctor normal. For those who already have an excellent rapport with families, however, this may be an enhancement. While these may not be officially part of the skills as a surgeon, and only related to error prevention, it is still relevant to the practice of medicine. As discussed above, rapport with patients may be an integral part of patient care, or this may just be in the line of malpractice lawsuit prevention. This is better described in the category of, “I make just as many mistakes as other doctors, but you will never sue me because I am artificially lovable.”<sup>131</sup>

#### V. Possible Standard of Care Changes with Enhancers

While there have been significant changes in the measure of the standard of care in medical malpractice, the standard of care remains comparative, whether that comparison is based on similar specialties, the community, the nation, or other comparative factors. If we are comparing doctors to others, then what will be the effect of our *optinormally* and *supernormally* enhanced doctors on the standard of care in the medical field? If at all, how will the standard of care shift? There are likely three options: 1) the standard of care does not increase for anyone, remaining unaffected by neurointerventions; 2) the standard of care would increase for those doctors who are enhanced and is now comparable to the community of doctors who are enhanced; and 3) the standard of care would increase for all doctors, enhanced or not, creating the “[n]ew [n]ormal”<sup>132</sup> for all doctors.

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130. See TEX. MEDICAL LIAB. TR., *supra* note 125.

131. Patrick D. Hopkins, Dr., Professor Philosophy, Millsaps College, Jackson, Mississippi.

132. See Nicole A. Vincent & Emma A. Jane, “Should we Fear the ‘New Normal’?”, ATLANTA NEUROETHICS CONSORTIUM, <http://atlneuroethics.org/?p=478> (discussing the ‘New Normal,’ a term coined

A. *Standard of Care Remains the Same for All*

Recall that the standard of care is based on the “degree of care and skill employed by qualified physicians in the same ‘school’ as the defendant physician.”<sup>133</sup> This “school” is often based on “similar localities”<sup>134</sup> or “the defendant physician’s field of specialization.”<sup>135</sup> So, each doctor’s performance is typically measured against other doctors in similar situations. Assuming that a standard of care does not change when a doctor chooses to better himself through neurointerventions, then any doctor, regardless of any enhancement he chooses to undertake, will be subject to the standard of care at a static point. Of course, a difficulty would be setting that static point. The law already uses a baseline for the standard of care and not the aspiration or perfect doctor standard. As one commentator put it,

[T]here are doctors who strive beyond what is considered ‘average’ in their profession. . . . While doctors with exceptionally high skills are to be applauded, the appropriate inquiry is how the average doctor practicing in that particular field of medicine would have reacted under the same set of circumstances. A doctor will be held liable only if he fails to meet the standard applied to all doctors in the given field, but will not be held liable for failing to achieve above average results in his practice.<sup>136</sup>

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by Dr. Nicole Vincent, Associate Professor of Philosophy, Law, and Neuroscience, Georgia State University and Dr. Emma A. Jane, Senior Lecturer in Media, Journalism and Communication at the University of New South Wales); see also Nicole A. Vincent & Emma A. Jane, *Put Down the Smart Drugs – Cognitive Enhancement is Ethically Risky Business*, THE CONVERSATION (June 16, 2014), <http://theconversation.com/put-down-the-smart-drugs-cognitive-enhancement-is-ethically-risky-business-27463>; Nicole A. Vincent, *Enhancement: the New “Normal”?*, NICOLE VINCENT (Apr. 26, 2014), <http://nicolevincent.net/?p=551>.

133. McConkey, *supra* note 33, at 497 (citations omitted).

134. *Id.* at 502.

135. *Id.* at 498.

136. Matthew Pillsbury, *Say Sorry and Save: A Practical Argument for a Greater Role for Apologies in Medical Malpractice Law*, 1 S. NEW ENG.

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So, if doctors are to be measured against the average in their profession, then enhanced doctors would be seen as excelling above the pack in both performance and potentially in defending medical malpractice claims. They may be more attentive and more alert than the average doctor to whom they are compared.

To keep the standard of care the same, or to fix the standard to a particular time, the purpose of much of medical treatment research or advancements could become wasteful. Why innovate, why create new procedures if the old procedures are always fine? Aside from the human goal to improve or to make money on new advances, there would be no legal incentive for improvement. However, the liberty interests of doctors may be advanced by this approach, since there would likely be less pressure to take neuroenhancements for doctors who didn't want to enhance. If the standards remained the same, then doctors would have no legal need to improve beyond that comparative average practitioner.

Even if we somehow adopted a fixed standard of care, chances are the invisible hand of the market place will increase the standard of care even without other shifts. As information about doctors is more readily available through social media and other information and rank sharing technologies become available, more will become known about each doctor.<sup>137</sup> Enhanced doctors could have a very strong advantage in the medical marketplace in both income, being able to see more patients through the use of neuroenhancements to stay awake longer and be more alert, and in malpractice, being better at their jobs through cognitive and physical enhancements, resulting in their seeing more patients because they are more sought after and have made more time for patients.

The above discussion provides what may be possible for enhancements when used to reach a level of *supernormal*. Similar issues may occur when neuroenhancements are used for ameliorative effects. Older doctors will be able to work more years with less cognitive and physical loss. Whether they choose to do so will be up to them, not as a result of decline. In the case

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ROUNDTABLE SYMP. L.J. 171, 188 (2006).

137. See, e.g., *How America Finds a Doctor*, HEALTHGRADES, <http://www.healthgrades.com> (last visited Oct. 30, 2015).

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of remaining normal, older doctors may, as a group, raise the standards of performance of all doctors. With more experience, without the aging declines, our older doctors could be the better doctors.

However, probably the most difficult issue with an argument for a static standard of care would be that the current standard of care is relative to those in the industry. Therefore, it cannot stay the same in the face of new techniques or changes in practice. If all doctors adopt a new procedure shown to be more effective or safer, then the doctors who choose not to do so are already risking malpractice for falling below the standard of care because they are compared to their cohort.<sup>138</sup> When a new technology comes along, the standard of care raises ultimately forcing all to adopt it.<sup>139</sup> If the standard of care didn't shift, wouldn't we arbitrarily have to fix the standard of care to a certain level of care, i.e. this technology, this technique, etc.? So too will follow the standard of care as doctors choose more and more enhancements.

*B. Standard of Care for Those Choosing Enhancements Increases for Only the Enhanced*

Another option for the standard of care would be a sliding scale based on enhancement use. If a doctor enhances herself to *supernormal*, then she may be held to a higher standard. Of course, there are many problems with this approach, but the legal precedence does exist to increase the liability standards for only the enhanced. First, courts treat cases involving medical specialties differently than other specialties—comparing doctors within specialties for the cohort comparative. For example, courts would hold a heart surgeon to those standards of a heart surgeon, not to a neurosurgeon's techniques doing heart surgery.<sup>140</sup> An ophthalmologist would be held to the standards of an ophthalmologist, not to those of an optometrist. Further, recall one of the basic rules of malpractice—if a doctor holds himself out to have a specialty or greater skill, then the doctor

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138. See discussion *supra* Section 0.

139. See discussion *supra* Section 0.

140. See KEETON ET AL., *supra* note 22, § 32 at 185.



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is held to that standard.<sup>141</sup>

Similar to the comparison in specialty or practice, doctors are held to varying, often increasing, standards when advances in medical care are available to them.<sup>142</sup> Should there be a difference when the advance in medical care is not an MRI or a new cancer treatment, but an enhancement to the doctor himself? Couldn't he be judged at the same level as those who are also enhanced?

Obviously this creates a problem in that the standard of care within specialties would change depending on whether the doctor is enhanced or not, but this isn't a new problem. The law already compares doctors within the specialties they practice. Why not add the category of enhanced or not? Perhaps a more difficult question is how do we establish the cohort against which the doctor is measured? Do we individually test the doctors for enhancements prior to procedures or do we keep a Board Certification of Enhanced Physicians? And what if one physician has enhanced eyesight while another chooses to be alert and attentive for twenty-four hours? Are they compared to one another, or do we compare enhancements?

Perhaps the easier course is to allow the market to weigh in. The population will choose those doctors who are best at their practice, whether that is because of enhancement or not. If enhancements are eventually shown to reduce malpractice incidents, then this choice may be based on reported malpractice cases rather than enhancement although the two may be tied. Is this significantly different than the draw of some of the major medical centers across the United States? Traveling for the best medicine has become common. The Cleveland Clinic and the Mayo Clinic for cardiology or the Memorial Sloan Kettering Cancer Center and the University of Texas MD Anderson Cancer Center for cancer treatment are common destinations well-known for advances in medical treatment.<sup>143</sup> Current law

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141. *Id.* at 187.

142. *See, e.g.*, *Heinrich v. Sweet*, 308 F.3d 48, 63 (1st Cir. 2002) (quoting *Brune v. Belinkoff*, 235 N.E.2d 793, 798 (Mass. 1968)); *see also* discussion *supra* Section 0.

143. *See U.S. News Best Hospitals 2015-16*, U.S. NEWS & WORLD REP.: HEALTH, <http://health.usnews.com/best-hospitals/rankings> (last visited Oct. 30, 2015).

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may hold these clinics and their doctors to a national standard for treatment or, more similar to the enhanced physician, would they hold their treatment to a national standard among only elite institutions?

“Some courts allow jury instructions stating that the physician must use her ‘best judgment’ by relying on any superior knowledge or skill that she possesses, which might dictate a higher standard of care than that of the average reasonable practitioner.”<sup>144</sup> “General negligence principles commonly require that a person not only exercise reasonable care, but also apply any superior knowledge or skills that he may possess.”<sup>145</sup> “In other words, [t]he standard becomes . . . that of a reasonable man with such superior attributes.”<sup>146</sup> As one commentator noted, in the context of medical malpractice, this could be seen from two different sides: 1) that the physician is compared to those of the “learned profession” and the attributes of those experts, or 2) more specifically to the attributes of a particular physician and his superior knowledge or skill.<sup>147</sup> For example, in *Toth v. Community Hospital at Glen Cove*,<sup>148</sup> a case involving oxygen delivery to premature infants, the appellate court held that a physician “should use his best judgment and whatever superior knowledge, skill and intelligence he has” even if that is different than community standards.<sup>149</sup> In this case, we see an example of how courts may be willing to hold physicians to a higher individual standard of care due to their superior knowledge. Why not then hold enhanced doctors to a higher standard of care than other doctors?

Just as we currently have premier health clinics in the United States, we could see premier and enhanced physicians—the *supernormal*. Those enhanced doctors could possibly have higher charges than others, could possibly advertise their better, enhanced services, but they may also have a correspondingly

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144. Laakmann, *supra* note 43, at 926-27 (citation omitted).

145. Joseph King, Jr., *Reconciling the Exercise of Judgment and the Objective Standard of Care in Medical Malpractice*, 52 OKLA. L. REV. 49, 70 (1999).

146. *Id.* (citing RESTATEMENT (SECOND) OF TORTS § 289(b) cmt. m (1965)).

147. *Id.*

148. 239 N.E.2d 368 (N.Y. 1968).

149. *Id.* at 372-73.

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higher standard of care—good for the patient, bad for the doctor.

But do the *supernormal* really raise the standard of care for themselves, increasing the potential for being held liable just because they have supernormal abilities? They are no more likely to make errors than the unenhanced, and perhaps less so. But what counts as a breach of care could now be different. Knowing more about the practice of medicine, having more skilled hands and better eyesight, being more empathetic, more calm, more alert, and able to stay with one patient for longer hours could all enhance the physician. The physician would now be held to those enhanced standards. If she holds herself out as able to stay alert and attentive to a patient's needs for twenty-four hours during that difficult delivery, then she should be held to that standard. She should have had the ability to do the microsurgery with tremor free hands and eagle eye sharpness, because other enhanced physicians can do it and she is now enhanced so that she can do it. She may not be error free, but that is not the standard of care. She may be more error free than her unenhanced comparative cohort, but when determining what a reasonable doctor in the same circumstances is able to do, we must compare her to the supernormal group, not the normal.

*C. Standard of Care Increases for All Doctors Given That These Enhancements are Readily Available*

As more doctors become *supernormal*, the comparative standards will likely increase for those doctors, particularly if they are in specialties that include doctors who are early adopters. For example, anecdotal evidence indicates that cardiac surgeons routinely use beta-blockers to reduce anxiety and tremors during surgery.<sup>150</sup> As more and more of these surgeons take advantage of beta-blockers, just as concert musicians, the practice will become the norm. As it becomes the norm, the standard of care likely increases in that particular specialty—expecting anxiety free-surgeons. As drugs or other alterations spread through the medical community and as

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150. Personal interview by author with medical school/hospital administrator, names withheld.

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enhanced doctors enhance the standard of care, then the standard of care for all doctors will begin to increase.

The raising of the standard of care is the norm when advances in medical care are used. The adoption of technology often proceeds on a curve, with widespread adoption becoming the norm.<sup>151</sup> Once there is widespread adoption of new technology or techniques, it becomes the standard for all practices.<sup>152</sup> For example, see the cases referred to above on oxygen delivery to premature infants.<sup>153</sup> On at least two occasions, following the current standard of care was found to be malpractice.<sup>154</sup> Having superior knowledge and the ability to use new techniques—which were believed to cause fewer problems—the failure to use these techniques was malpractice. So too could the use of neurointerventions increase the standards. Doctors who regularly work double shifts or are on call during late hours may be more alert and work better with the drug Provigil. This drug has been shown to reduce mental fatigue and increase alertness, particularly in shift work, and actually can be prescribed for that purpose.<sup>155</sup> Would an alert doctor function better than a doctor who is mentally fatigued by the rigors of a long shift? Would a neurosurgeon with anxiety tremors be as good at his job as an enhanced physician who took his propranolol and was tremor free? Soon, the standard could be an alert surgeon with perfect eyesight and no anxiety, the supernormal physician and a supernormal standard of care.

## VI. Should We Mandate Neurointerventions?

If the *supernormal* physician is, in fact, better for overall care of patients, why not ask all doctors who could benefit from such enhancements to take them? We already expect doctors to use the latest technical advances in medicine on patients.<sup>156</sup> We ask doctors to read the latest studies on treatment and care and expect them to use that knowledge on us as we are treated. So

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151. *See generally* Laakmann, *supra* note 43.

152. *Id.*

153. *See supra* p. 12 and note 56.

154. *Id.*

155. *See supra* p. 20.

156. *See supra* p. 12.

why not improve the provider in addition to what is provided? Should we not adopt, or even mandate, neurointerventions for all of our doctors? Of course, a mandate brings with it questions of liberty, privacy and even safety. So how does the medical profession proceed in this new era?

A. *Situation 1, Doctor's Choice*

Of course, allowing doctors to choose whether to enhance is the easiest course of action. Doctors could voluntarily choose to enhance themselves, and in fact, they already do. Beginning in medical school, and likely earlier, doctors are experimenting with neurointerventions for performance enhancement.<sup>157</sup> Adderall and Provigil are becoming the performance enhancers for getting through medical school already and are likely becoming more prolific and accepted in the medical profession as students who are used to enhancing continue through into the profession.<sup>158</sup> As these supernormal doctors enter the medical field and make up a higher percentage of the medical profession, the questions of the standard of care will become more real.

Aside from the standard of care issues, ethical issues also abound. From the potential side effects to the pressure of falling behind peers, doctors may face difficult choices. The issues to consider are financial, physical, and could even be legal. While a doctor currently has the freedom to choose, his freedom of choice could be made by the marketplace and by malpractice standards. If he remains unenhanced, a physician could see his business decline in favor of the enhanced doctors. Secondly, a failure to enhance may result in her performance level falling below those of her peers of supernormal doctors and therefore her "normal" performance is no longer acceptable. In effect, a "new normal" has been created.<sup>159</sup> So, even if a doctor is given a freedom of choice, as we currently have today, her choices are

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157. Jadon R. Webb, et al., *Prevalence of Stimulant Use in a Sample of U.S. Medical Students*, 25 ANNALS OF CLINIC. PSYCHIATRY 27, 27 (2013) (finding that as many as 15% of medical students were currently using performance enhancing stimulants, 83% of whom used them specifically for cognitive performance enhancement).

158. *Id.*

159. Vincent & Jane, *supra* note 132 and accompanying text.

not completely without consequence.

B. *Situation 2, Licensure Mandate or Hospital Policy*

In the future, we may find that enhancements are so effective that it would be hard to imagine a doctor performing without them. Enhancements might be seen as so effective that licensure may require doctors to take them.

For example, medical residents are often called upon to work long hours. After calls for reductions in work hours to reduce fatigue in the medical training programs, the Accreditation Council for Graduate Medical Education (“ACGME”) introduced restrictions on work hours in 2003 and again in 2011.<sup>160</sup> Under the 2003 guidelines, trainees were allowed to work shifts of up to thirty hours.<sup>161</sup> So the ACGME introduced intern restrictions to sixteen hour work periods.<sup>162</sup> However, one study suggests that limiting the hours of interns means that interns “spend less time in the hospital during the day, when they have the most opportunity to learn from attending doctors, and could increase the number of times a patient’s care is passed between residents[.]”<sup>163</sup> The study found that a reduction in hours may have led to more sleep, although there was no reported improvement in sleep and general wellbeing of the trainees, but the hand-offs actually reduced the quality of patient care. The reported error rate went up from 20% to 23%.<sup>164</sup> While there were other suggestions from the study and many other questions raised about why these changes occurred, researchers may determine that working twenty-four hours straight may actually be better for intern training. So why not allow them, or even mandate it? And better yet, enhance them so that the twenty-four hours remain productive and the intern remains attentive to patient care and receives a continuous learning experience.

Obviously one of the major issues would be mandating that anyone take a drug against their wishes. However, particularly

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160. Pittman, *supra* note 4.

161. *Id.*

162. *Id.*

163. *Id.*

164. *Id.*

in the medical field, we already do this. Medical facilities regularly require inoculations of workers against the flu, pneumonia or hepatitis.<sup>165</sup> Each of these interventions is not meant for the wellbeing of the medical worker necessarily, but for patient care and overall hospital safety. Is it a stretch to see interns be required to take a pill to make them be alert and attentive in order to increase patient outcome care?

But this mandate is not without physical, financial, and ethical costs. The financial cost of enhancements would be an increase for either the physician or their employer. More concerning would likely be the potential side effects of these interventions. While side effects may be an issue, mild side effects should not be a barrier to implementation. Vaccines are mandated despite their potential side effects, but society, and employers, have balanced those interests with the benefits to patient care and often found them to be appropriate.<sup>166</sup> And yes, we may feel this is an intrusion on the liberty interests of the physician, but the precedent is there if we find that patient care would outweigh the side effects and liberty interests of the physician.

## VII. Conclusion

Whether Dr. Burns wants to or not, he may eventually be called upon to take advantage of neurointerventions. Whether through mandate for the benefit of patient care, through rising medical malpractice standards, the inability to compete, or through the invisible hand of the marketplace, neuroenhancements are changing medical practice. Already in medical schools, colleges and even high schools, competition is bringing Adderall and similar drugs to the forefront and to widespread use.<sup>167</sup> Already highly competitive places like

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165. See generally Lena J. Weiner, *Hospitals Battle Unions Over Mandatory Flu Shots for Nurses*, HEALTH LEADERS MEDIA, (Oct. 10, 2014), <http://healthleadersmedia.com/content/NRS-309245/Hospitals-Battle-Unions-Over-Mandatory-Flu-Shots-for-Nurses>.

166. See generally *Recommended Vaccines for Healthcare Workers*, CTR. FOR DISEASE CONTROL & PREVENTION, <http://www.cdc.gov/vaccines/adults/recvac/hcw.html> (last visited October 13, 2015); see also Weiner, *supra* note 163.

167. See Webb, *supra* note 157, at 27-28.

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Silicon Valley are seeing employees using these neurointerventions to compete against other companies and probably against their supernormal co-employees.<sup>168</sup> The *new normal* is approaching the workplace, our educational institutions, and our medical profession.

The difference between many of these other scenarios and the medical profession is that doctors are not writing computer code to compete with other computer companies or co-employees. Doctors are responsible for providing patient care at standards accepted within the profession. A doctor's falling behind the standard of care can result in liability for malpractice and catastrophic consequences for the patient. If the goal of the medical profession is patient care, then the emphasis should be on providing that care in the best way reasonably possible. The medical profession already mandates that doctors use the latest technological advances and up-to-date research. We already ask our doctors to work extreme hours. Depending on the specialty, doctors must have excellent dexterity, memory, stamina, and calmness. Is it much more to ask them to be alert and awake during those long hours? Is it much more to ask them to enhance their memory or dexterity or attentiveness? If a pill or non-invasive brain stimulation can help them do these things better and provide better patient care in the process, then is it too difficult to ask our physicians to take their own medicine before dispensing ours? Physician, enhance thyself.

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168. *Provigil Alternative? The Rise of Modafinil Use in Silicon Valley*, PRLOG, (May 14, 2012), <http://www.prlog.org/11874585-provigil-alternative-the-rise-of-modafinil-use-in-silicon-valley.html>.