

ASSESSING MEDICAL MALPRACTICE JURY VERDICTS: A CASE STUDY OF AN ANESTHESIOLOGY DEPARTMENT

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I. INTRODUCTION

The medical malpractice tort system plays a major role in defining the acceptable level of injury in health care delivered in the United States.¹ Prevention and reduction of medical malpractice from this legal perspective is predicated upon an ideal of deterrence. By punishing physicians for falling short of a pre-established socially optimal level of care, the judicial system can theoretically induce physicians to practice medicine at an acceptable and expected level of error.² In other words, by taking into account the relative costs and benefits of avoiding error, the legal system should be able to provide an encompassing incentive structure that induces physicians to prevent malpractice and reduce injury to socially-acceptable, and implicitly, cost-effective and efficient levels.³ Thus, the legal system should provide physicians with a powerful sense of duty to monitor their actions and to give the requisite level of

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¹ “[M]edical malpractice litigation rates in the United States are the highest in the world” John D. Blum, *Introduction: Comparative Health Law*, 3 ANN. HEALTH LAW 103, 103 (1994).

² See Bryan A. Liang, *Medical Malpractice: Do Physicians Have Knowledge of Legal Standards and Assess Cases as Juries Do?*, 3 U. CHI. L. SCH. ROUNDTABLE 59, 60 (1996).

³ This is consistent with Learned Hand’s well known $B < PL$ formula, where liability depends on whether the burden (B) of taking precautions, i.e., the cost of an accident prevention, is less than the cost of the expected injury (L) if the accident occurs, discounted by the probability (P) of its occurrence. *United States v. Carroll Towing Co.*, 159 F.2d 169, 173 (2d Cir. 1947).

care in an effort to reduce and/or prevent injury to patients.⁴ Indeed, as Prosser notes:

The 'prophylactic' factor of preventing future harm has been quite important in the field of torts. . . . When the decisions of the courts become known, and [potential] defendants realize that they may be held liable, there is of course a *strong incentive* to prevent the occurrence of the harm. Not infrequently one reason for imposing liability is the deliberate purpose of *providing that incentive*.⁵

Through imposition of liability, this deterrent effect is a prominent rationale and justification for the existing system.

In addition to providing this overall incentive structure for physician care, the tort system has another theoretical benefit. The system, through its "teaching" role as communicated in the case law, can function dynamically by specifying its standards across time as to what constitutes socially acceptable (nonnegligent) behavior. The case law can thus provide physicians with ongoing rules of conduct that delineate what care is socially acceptable (nonnegligent) and socially unacceptable (negligent) for fact-specific clinical circumstances.

Note, however, that the tort system's deterrence structure is predicated on two extremely important assumptions. The first is actor knowledge: physicians are assumed to be knowledgeable about the malpractice system and its deterrence structure. Presumably, actors must have knowledge of a deterrence structure in order to be affected by it. Secondly, the incentive system mandates and assumes that the lay agents of the adjudicatory structure assess physician action using the same standard that the actors themselves use to make the care decisions, i.e., medical appropriateness. Because physicians acquire this knowledge through their medical training and lay agents of the legal system are educated about this standard during the adjudicatory process, theoretically both should make the same assessment as to the relative negligence of the physician in question (the former *ex ante*, the latter *ex post*). Indeed, assessments and standards of reasonable behavior must be constant

⁴ This deterrence effect has been described in the medical literature in the context of the B < PL formula. See, e.g., William B. Schwartz & Neil K. Komisar, *Doctors, Damages, and Deterrence: An Economic View of Medical Malpractice*, 298 NEW ENG. J. MED. 1282 (1978). However, note that maintaining this deterrence effect may not be the sole driving force behind adjudication of these cases; for example, it has been reported that an excessive number of lawyers in a particular market can account for an increase in malpractice claim filings. See Lawrence Southwick, Jr. & Gary J. Young, *Lawyers and Medical Torts: Medical Malpractice Litigation as a Residual Option*, 24 APPLIED ECON. 989 (1992).

⁵ W. PAGE KEETON ET AL., PROSSER AND KEETON ON THE LAW OF TORTS §4, at 25 (5th ed. 1984) (emphasis added).

across physicians and juries to accomplish the optimal desired effect on the physician-actor's behavior.⁶

However, this set of fundamental assumptions, the foundation of the malpractice tort system and premise of the deterrence structure, has not been studied in the context of what actual physicians know or what they can access. Some studies have assessed how specific, well-known cases affect physician practice, while others have performed retrospective reviews to determine the agreement between jury verdicts and the relative negligence of a physician by using extensive insurance claims records or the specific patients' medical charts.⁷ But famous cases, insurance company claims records, and detailed chart reviews, besides being subject to significant hindsight bias,⁸ are not the kind of materials typical physi-

⁶ If the actors within the incentive structure and the lay agents who assess their behavior are under different understandings regarding appropriate versus inappropriate care, it is unlikely that the incentive structure goals of optimal deterrence and cost-effective provision of care will be fulfilled in any meaningful way. *See also infra* note 41 and accompanying text.

⁷ *See, e.g.,* Daniel J. Givelber et al., *Tarasoff, Myth and Reality: An Empirical Study of Private Law in Action*, 1984 WIS. L. REV. 443; Jerry Wiley, *The Impact of Judicial Decisions on Professional Conduct: An Empirical Study*, 55 S. CAL. L. REV. 345 (1981) (assessing whether particular cases have had an effect on physician practice). However, these studies, which assert that the common law standard of malpractice is known to physicians, are based upon analysis of two extraordinary cases: *Tarasoff v. Regents of the Univ. of California*, 551 P.2d 334 (Cal. 1976) (holding that a mental health provider had a duty to exercise reasonable care to protect third parties whose well-being was threatened by a patient); and *Helling v. Carey*, 519 P.2d 981 (Wash. 1974) (holding that a court could change the medical standard of practice and impose liability even though the customary standard of care was provided and followed). Clearly these cases had such an impact and changed the law so dramatically that providers would be expected to have some knowledge of them. However, these studies did not assess the impact of general case law, available reports of malpractice decisions, nor determine knowledge of the legal rule of malpractice (negligence). These studies also used closed-ended multiple choice questions that identified the relevant cases as a potential source of change in practice and thus, possibly signaled the physicians to this response. *See also* Michelle J. White, *The Value of Liability in Medical Malpractice*, 13 HEALTH AFF. 75 (1994) (concluding that the medical malpractice system sends providers a "clear" signal that they should avoid providing substandard care); Ann G. Lawthers et al., *Physicians' Perceptions of the Risk of Being Sued*, 17 J. HEALTH POL. POL'Y L. 463, n479 (1992) (finding that physicians take actions to reduce patient injuries in response to potential tort liability); Mark I. Taragin et al., *The Influence of Standard of Care and Severity of Injury on the Resolution of Medical Malpractice Claims*, 117 ANN. INT. MED. 780 (1992) (indicating a positive relationship between negligent care and jury-awarded compensation); Frederick W. Cheney et al., *Standard of Care and Anesthesia Liability*, 261 JAMA 1599 (1989) (also indicating a positive relation between negligent care and jury-awarded compensation). These studies were based upon retrospective reviews of insurance company claims records. *See also* FRANK A. SLOAN ET AL., *SUING FOR MEDICAL MALPRACTICE* (1993) (finding that the malpractice system screens out non-meritorious claims, and its results are consistent with independent physician assessments of cases). This study relied on evaluation by a panel of expert physicians using medical records and charts. Thus, these latter studies which use insurance company records and patient charts do not measure the *ex ante* effect of the tort system's adjudications and once again do not assess the impact of the case law, available malpractice decisions, or knowledge of negligence.

⁸ *See* Kim A. Kamin & Jeffrey J. Rachlinski, *Ex Post ≠ Ex Ante: Determining Liability in Hindsight*, 19 LAW & HUM. BEHAV. 89 (1995); *see also* Susan J. LaBine & Gary LaBine,

cians can access when trying to discover “the decisions of the courts.”⁹ Indeed, Prosser contemplates that it is the reported judgments in these liability cases (and presumably their facts) that will provide the incentive structure to guide future physician behavior in fact-specific circumstances, not detailed records and information available only on an academic research basis.¹⁰

Furthermore, most studies have not assessed whether physicians have objective knowledge of negligence—the standard by which they are being judged.¹¹ This is an important component that should be evaluated when determining whether knowledge of the legal rule is connected with a physician’s ability to spot negligence in medical care when he or she sees it.

In addition to these theoretical incentive structure considerations, two other important points require attention when studying the malpractice system. First, physicians may know nothing (or, in fact, have incorrect knowledge) of the legal system and this may affect their behavior in a manner which is inconsistent with the goals of the incentive structure. Second, juries may use alternative standards and/or lack understanding of the correct medical appropriateness rule used in assessing physician actions. These pragmatic concerns have generally been ignored in previous work.¹²

However, beyond these factors, by its mere existence the malpractice system could still function as an effective (but perhaps not optimally efficient) deterrence structure. If physicians had the ability to predict jury verdicts correctly, and act on this knowledge *ex ante*, an effective deterrence structure could still result. The degree to which the care provided is optimally efficient would, of course, depend on how juries spe-

Determinations of Negligence and the Hindsight Bias, 20 LAW & HUM. BEHAV. 501 (1996) (finding that negligence adjudications by mock jurors are significantly increased when an adverse result is present in *Tarasoff* cases); Norman G. Poythress et al., *Reframing the Medical Malpractice Tort Reform Debate: Social Science Research Implications for Non-Economic Reforms*, 16 LAW & PSYCHOL. REV. 65 (1992) (criticizing the medical malpractice tort system as ineffective in deterring negligent care on the basis of psychological learning theory analysis and hindsight bias). Indeed, this effect may be magnified rather than reduced by additional information such as expert testimony. See Scott A. Hawkins & Reid Hastie, *Hindsight: Biased Judgments of Past Events After the Outcomes Are Known*, 107 PSYCHOL. BULL. 311 (1990); see also Stephen J. Hoch & George F. Loewenstein, *Outcome Feedback: Hindsight and Information*, 15 J. EXP. PSYCHOL. 605 (1989) (when recalling past events, individuals selectively remember “preferable” results). In addition, beyond differential assessments of care on the basis of hindsight, there may indeed be different standards of care that go unrecognized by the adjudicatory process. See Liang, *supra* note 2, at 65-66.

⁹ See KEETON ET AL., *supra* note 5, at 25.

¹⁰ See *id.* at 25-26.

¹¹ See, e.g., *supra* note 7 for empirical studies that do not assess physician knowledge of negligence; see also Liang, *supra* note 2 for a study which has assessed this knowledge.

¹² But see Liang, *supra* note 2.

cifically adjudicate cases and allocate the relative costs. This alternate model of deterrence has yet to be studied and its applicability to the medical malpractice system is not known.

Hence, it appears that there has been very little research conducted on assessing the crucial deterrence assumptions of the malpractice system under the Prosser or alternate model in the context of what could be expected in typical practice. This work represents an effort to assess those assumptions through a case study of a high risk medical specialty: anesthesiology. This specialty is particularly interesting because it has traditionally been a source for costly malpractice claims;¹³ thus, physicians in this specialty would be expected to be particularly sensitive to issues of medical malpractice.

II. METHODS

The focus of this case study is a qualitative examination of three important aspects related to the malpractice system: physician knowledge of the system, physician-jury agreement on accessible jury verdict malpractice decisions, and physician ability to correctly predict jury verdicts. The first aspect, physician knowledge, was examined using the study question: Do physicians have knowledge of the tort system through an understanding of the definition of negligence¹⁴ (the standard by which they are being judged) and the case law (the formal communication method between the legal system and society including physicians)? The second aspect, physician-jury agreement on jury verdict cases, was tested with the study question: Do physicians assess defendant physician behavior in accessible malpractice case decisions the same way juries do? Related to this, can nonphysicians, without medical or legal knowledge, perform as well in assessing these cases as physicians? Finally, the last aspect, physician ability to predict jury verdicts, was evaluated using the question: What is the accuracy of verdict prediction by physicians for cases where they deem they have enough information to assess the clinical circumstance and cases where they believe they do not?

The sample of physicians for this case study was drawn from the anesthesiology department of a primary teaching hospital of Harvard Medical School. It was thought that anesthesiologists at an academic medical center of a medical school would be the most informed regard-

¹³ Administration of general anesthesia represents one of the costliest areas of malpractice claims in total volume. See Bill Clements, *Don't Get Sued*, AM. MED. NEWS, July 11, 1994, at 18.

¹⁴ The traditional definition of negligence is based upon four factors: a pre-existing duty, breach of that duty, that causes, damages. See RICHARD A. EPSTEIN, *CASES AND MATERIALS ON TORTS* 128 (5th ed. 1990). In the malpractice context, there is a pre-existing duty to provide medically appropriate care that a practitioner in good standing would provide; a breach of that duty may cause patient injury.

ing medically appropriate practice and/or would be the physicians setting the medical appropriateness standard (e.g., through expert testimony, publications in the field, etc.). All physicians in this study were anesthesiologists (AAs;¹⁵ n = 11) and all jury verdict cases were anesthesia cases.

A survey method was utilized to ascertain the answers to the study questions. The survey was composed of two parts. Part I consisted of collecting information on physician demographics (i.e., years of experience, academic title, board certification, residency training site), the presence of any formal medical malpractice programs at the hospital, the legal definition of negligence as understood by the physicians,¹⁶ as well as physician sources for medical malpractice information. Part I utilized an open-ended question format so as not to signal to the physicians a particular response that a set of supplied answers might induce.

Part II of the survey is comprised of twelve actual jury verdict cases for physician assessment. Cases were selected through a search in the LEXIS, Verdict Library, ALLVER file; WESTLAW, LRP-JV database; and a review of the *National Jury Verdict Review and Analysis Newsletter*. These case decisions have been deemed accessible to physicians because they are publicly available if physicians want to review (and thus learn from) them, in contrast to the unavailable insurance company claims records and medical charts relied on by previous studies. After initial collection, the cases were then narrowed to the study cases¹⁷ in consultation with a physician anesthesiologist.¹⁸ The cases chosen were those deemed to have enough relevant clinical information for physician assessment. Note that none of the cases selected had any requirement for a pre-existing duty (each case had an established physician-patient relationship) nor damages (each case involved some patient injury). Thus, the only assessments to be made were breach of duty and causation, the two negligence factors that generally require expert testimony on medical appropriateness.¹⁹ The physicians were asked to assess whether the care provided by the defendant physician was "Negligent," "Most Likely

¹⁵ "AA" is defined as Academic Anesthesiologist.

¹⁶ Note that physicians were not asked to provide a list of the factors that constitute negligence. Instead, the contents of their responses were assessed to determine if they included any of the factors. Thus, for example, a response of "not giving the right care" was considered a breach of duty.

¹⁷ Refer to Appendix 2 for the text of the study cases.

¹⁸ The anesthesiologist was an attending physician at Harvard Medical School at the time of the study.

¹⁹ See *Amsler v. Verrilli*, 501 N.Y.S.2d 411 (App. Div. 1986) (malpractice verdict finding liability can be sustained only if departure from the standard of care is the proximate cause as established by expert testimony). Thus, because physicians were required to assess the cases using only their knowledge of medical appropriateness, their assessments as to negligence should match the actual jury verdicts.

Negligent,” “Can’t Tell,” “Most Likely Not Negligent,” or “Not Negligent.” A “Can’t Tell” response option was provided so that physicians who did not feel comfortable assessing a particular case did not have to. These responses were assigned a Likert value (5, 4, 3, 2, 1, respectively).²⁰

Physicians were interviewed once in person by the author for Part I and II of the study; physicians were explicitly told (at this stage) *not* to predict what they thought the juries might have concluded, but to evaluate the cases on the basis of their own professional training as to medically appropriate care. At least three months later, physicians were mailed the cases from Part II and again asked to evaluate them; at this point, physicians were *also* asked to predict what they believed to be the actual jury verdicts. Note that on the second administration, the order of the cases was reversed in an attempt to ameliorate case order bias. A set of non-physicians / non-lawyers (hereinafter “NPNLs”) (n = 12) were also asked to evaluate the cases and predict jury verdicts in the same fashion as physicians in the second administration of Part II.²¹ The survey is reproduced in the Appendix.

Statistical significance was based on Student t-test analysis (two-tailed) and calculations were made utilizing Microsoft Excel 3.0 for the Macintosh; p values less than 0.05 were considered significant.

III. RESULTS

A. PHYSICIANS

1. *Part I Survey Results*

The demographic information and answers to the open-ended questions from Part I of the survey are summarized in Table 1. As expected of physicians at an academic medical center, most were board certified anesthesiologists at the time of the study, with the exception of one, who was taking the anesthesia specialty boards two months after the survey was completed. Further, as expected at an academic center, all physicians had some academic title. It is interesting to note that this academic medical center did not have a formal program concerning medical malpractice even though anesthesiology is a high risk specialty; however, this is consistent with findings from previous work on medical malpractice.²²

²⁰ Likert Values are numerical values assigned to categorical variable responses for data evaluation purposes.

²¹ These respondents were individuals who responded to a request for nonphysician, nonlawyer volunteers to fill out a medical malpractice survey posted at a university and an elementary school teachers' lounge.

²² See Liang, *supra* note 2, at 64.

The results of Part I of the survey suggest that physicians appeared to have little if any knowledge of the medical malpractice system from the perspective of the legal standard of negligence or its communicatory method—the case law. Physicians identified, on average, only 1.55 of four factors of negligence (standard deviation 0.66) (see Table 1). Although one physician (AA10) had a law degree as well as an advanced law degree, even she did not identify all four factors of negligence. There appeared to be no relationship between number of negligence factors identified and years of experience ($p = 0.21$).

In addition to these physicians' incomplete understanding of the legal definition of negligence, they also had affirmatively incorrect perceptions of the legal standard. For example, physicians reported that a finding of negligence required a willful act, an act below the standards in the locality,²³ an act of omission, an act of commission, and a contractual relationship. Finally, these physicians reported no knowledge of the case law in response to the Part I question regarding their source of medical malpractice knowledge.

2. Part II Survey Results

Of the 132 total physician encounters²⁴ in the first administration of Part II, 19% of the encounters were not evaluated as “Negligent,” “Most Likely Negligent,” “Most Likely Not Negligent,” or “Not Negligent” (i.e., “Can’t Tell” response, $n = 25$), while a total of 81% of the encounters were evaluated as one category of negligent or not negligent ($n = 107$). In the second administration of Part II, of the 120 total physician encounters, 17% of the encounters were not evaluated (i.e., “Can’t Tell” response, $n = 20$), while 83% were evaluated ($n = 100$) (one physician did not return the second survey which accounts for fewer total encounters on the second administration).

There was a wide range of physician assessment agreement with jury verdicts by case (range 0.00-1.00) (see Table 2, which includes results from both first and second administrations of Part II of the survey). Physician assessment agreement with jury verdicts was defined as follows: if a jury verdict was rendered for the plaintiff patient, a response of “Negligent” or “Most Likely Negligent” was considered “agreement” and assigned a value of one; if a response for the case was “Most Likely Not Negligent” or “Not Negligent,” then the response was considered “not in agreement” and assigned a value of zero. Thus, the closer the agreement value is to one, the greater the physician agreement is with the

²³ National standards are in fact the generally applicable standard, particularly for board certified specialties such as anesthesiology. See EPSTEIN, *supra* note 14, at 182-83.

²⁴ An encounter is defined as a physician or NPNL case evaluation cell, i.e., a physician or NPNL opportunity to evaluate a particular case scenario.

actual jury verdict. A similar method was used for jury verdicts for defendant physicians.

Combining all cases, physician assessment agreement with jury verdicts was 58% for the first survey administration and 56% for the second (see Table 3, which summarizes data on physician agreement, Likert values, and prediction values for Part II of the survey). Further, these agreement values across survey administrations were not significantly different (matched pairs, $p = 0.16$).²⁵ Consistent with their agreement values, physician mean Likert values also did not differ between the administration of the surveys by case (p range: 0.11-1.00)²⁶ or by physician (p range: 0.21-1.00).²⁷

However, at only 0.58 and 0.56 concordance, both these physician agreement values were significantly different from actual jury verdicts (by physician $p = 0.018$ for the first and $p = 0.021$ for the second administration). And, as might be expected by their overall low level of agreement with the actual jury verdicts, there was significant physician disagreement with the actual jury verdicts for five of the twelve case scenarios; four of these five were disagreements going against the physician defendant (i.e., actual verdict was for physician defendant and study physicians erred and deemed the physician defendant negligent).²⁸

When physicians were asked to predict what the juries found in each case, they predicted verdicts correctly 57% of the time; this low success rate was significantly different from the actual jury verdicts (over all cases, $p < 0.001$; by physician, $p = 0.017$) (see Table 3). Interestingly, in the circumstances where physicians evaluated a case (i.e., gave a response other than "Can't Tell"), physicians predicted jury verdicts completely in concert with their own assessments of the case (i.e., if a physician felt that the defendant physician in the case was negligent, the physician prediction of the actual jury verdict would be guilty). Thus, these physicians may not believe that the malpractice system assesses physician negligence inappropriately; otherwise, they would predict jury

²⁵ Recall that the order of the cases on the second administration was reversed. Thus, physician case evaluations are most likely independent of any significant order bias.

²⁶ The corresponding cases and p values are: case 1, $p = 0.20$; case 2, $p = 0.16$; case 3, $p = 1.0$; case 4, $p = 0.86$; case 5, $p = 0.76$; case 6, $p = 0.11$; case 7, $p = 0.16$; case 8, $p = 0.61$; case 9, $p = 0.27$; case 10, $p = 0.52$; case 11, $p = 0.67$; and case 12, $p = 0.93$.

²⁷ The corresponding physicians and p values are: AA1: 0.52; AA2: 0.48; AA3 did not return the second survey; AA4: 0.88; AA5: 0.71; AA6: 0.70; AA7: 1.00; AA8: 0.21; AA9: 0.73; AA10: 0.38; and AA11: 0.42.

²⁸ Cases which were statistically different were case 2 (for both first and second administrations, $p < 0.001$); case 8 (for both first and second administrations, $p < 0.001$); case 9 (for both first and second administrations, $p < 0.001$); case 11 (for both first and second administrations, $p = 0.002$); and case 12 (for the first administration, $p < 0.001$; for the second administration, $p = 0.003$).

verdicts to be relatively more negligent than their clinical assessments of the cases.

For those cases in which the physicians gave a “Can’t Tell” response, i.e., “gray area” cases, physicians correctly predicted actual jury verdicts only 55% of the time (see Table 6). Again, this low prediction success rate was a statistically significant difference from actual jury verdicts ($p < 0.001$).

3. *Negligence Knowledge and Assessment Agreement*

Two findings in Part I were related to Part II. Physicians in Part I had varying degrees of incomplete knowledge as to the definition of negligence as well as affirmatively incorrect perceptions of the legal standard. However, the number of negligence factors identified in Part I did not appear to be correlated with the relative physician assessment agreement with jury verdicts (first survey, $r = -0.160$, $p = 0.64$, second survey, $r = -0.145$, $p = 0.67$) or years of experience (first survey, $r = -0.084$, $p = 0.81$; second survey, $r = 0.145$, $p = 0.67$). Similarly, the presence of physician misperceptions of the legal standard of negligence was not correlated to their relative assessment agreement with juries in Part II of the survey (first administration, $p = 0.79$; second administration, $p = 0.80$).

B. NPNLs

NPNLs evaluated 84% of the encounters ($n = 121$) and answered “Can’t Tell” on 16% ($n = 23$). Similar to physicians, there was a wide range of agreement with jury verdicts by case (range 0.00-1.00) (see Table 4). NPNLs agreed with jury verdicts 59% of the time.²⁹ This result was significantly different from that of juries (by NPNL, $p = 0.014$) (see Table 5). However, this figure was not significantly different from that of physicians (by respondents, first survey, $p = 0.78$, second survey, $p = 0.72$).

NPNLs’ predictions of jury verdicts for each case, combining all cases, were correct 64% of the time. As with physicians, this level was significantly different from that of juries (by NPNL, $p = 0.025$) (see Table 5). Although this 64% figure was higher than physician prediction success (at 57%), the difference was not statistically significant ($p = 0.25$). NPNLs acted similarly to physicians and predicted jury verdicts completely in concert with their own assessments of negligence.

However, for gray area cases, NPNLs made correct predictions of the actual jury verdicts a remarkable 96% of the time. This value was *not* significantly different from the actual jury verdicts ($p = 0.37$), but it was significantly different from physician predictive success (at 55%) in

²⁹ Agreement was calculated as in *supra* Part III.A.2.

these cases ($p = 0.003$) (see Table 6). Likert values were significantly different between physicians and NPNs in case 1, second survey (1.6 versus 2.58, respectively); case 2, second survey (4.5 versus 3.5, respectively); case 6, second survey (3.7 versus 4.5, respectively); and case 8, first and second surveys (3.82/3.60 versus 2.58, respectively).

IV. DISCUSSION

A. DO PHYSICIANS KNOW ABOUT THE TORT SYSTEM THROUGH KNOWLEDGE OF NEGLIGENCE AND THE CASE LAW?

The Prosser model of deterrence theorizes that an actor that is to be affected by an incentive structure must theoretically know of that structure so as to be impacted by it.³⁰ The results of this case study raise the issue that physicians may lack this critical knowledge. Thus, if these results are applicable beyond the anesthesiology context, the tort deterrence structure may not be having its theoretically assumed effect on physician behavior.³¹

Physicians in this study were found to have incomplete knowledge of negligence. In other words, the actors within the incentive system were generally uninformed regarding the rule by which their activities were being assessed. In addition to their incomplete knowledge, the physicians in this study also exhibited affirmatively incorrect conceptions of the legal rule. Alas, this ignorance and misperception appears to be more widespread than just the physicians in this study. Previous work has also reported that physicians have an incorrect understanding of the legal rule.³² For example, radiologists indicated that legally negligent care required a willful, deliberate act; an unintentional act; an act of commission rather than omission; and treatment resulting in a long term, permanent injury.³³ Radiologists also reported that a poor medical outcome alone was adequate for a finding of negligence.³⁴ Physician misinformation is significant because it illustrates not only an incomplete understanding of the incentive structure, potentially resulting in less than optimal behavior, but also an incorrect one, potentially *inducing* improper behavior. Thus, the actual effect of the incentive structure as currently understood by physicians may depart substantially from the theoretical ideal.

³⁰ See KEETON ET AL., *supra* note 5, at 25.

³¹ Shuman has questioned the effectiveness of the deterrence structure in the tort system because it is not consistent with any psychiatric or psychological theory of human behavior. Daniel W. Shuman, *The Psychology of Deterrence in Tort Law*, 42 U. KAN. L. REV. 115, 128 (1993). However, his work did not report any empirical data nor focus upon medical malpractice; see also Poythress et al., *supra* note 8; Hawkins & Hastie, *supra* note 8.

³² See Liang, *supra* note 2, at 65.

³³ See *id.*

³⁴ See *id.*

In addition, not only were legal rules incompletely and incorrectly assessed and understood, but physicians also had no knowledge of the case law—the formal method whereby the dictates of the legal system are pronounced to the general public, including physicians.³⁵ Thus, if these results are generalizable, the key communicatory method between the law and the actors to be affected by the system (i.e., physicians) was unknown to the actors themselves. Hence the dynamic role of the case law to “teach” the actors within the system the appropriate (socially acceptable, i.e., nonnegligent) actions and deter the inappropriate (socially unacceptable, i.e., negligent) actions may not be as effectively accomplished as is theoretically supposed.

From one perspective, these results are somewhat unexpected since the state in which all of these physicians are practicing and have their medical licenses requires ten hours of “risk management” continuing medical education credit annually.³⁶ This “risk management” information is generally focused on medical malpractice. However, realistically, these results are not surprising at all. Although the legal system’s incentive structure assumes actor knowledge of its pronouncements, fact-specific cases on the trial level such as jury verdict cases are not, as a rule, published for general dissemination. Cases are published solely if they have some independent, legal significance and usually have little relevance to clinical practice.³⁷ Thus, without a ready source of information, it would appear difficult for physicians to “learn” from the legal system’s formal and available case law “teaching.”

Only if physicians were to take the initiative and subscribe to unofficial newsletters or electronic databases would this information become readily available. Thus, ignorance of the incentive structure’s official communication method would be a likely finding since this method provides virtually no relevant information to physicians as to appropriate clinical behavior.

From the physicians’ perspective, it would not be surprising that most physicians lack knowledge regarding the law as a guiding source on medical behavior. Because of the extensive degree of medical informa-

³⁵ This finding is also consistent with previous work. *See id.*

³⁶ All states require that physicians complete a certain number of continuing medical education (CME) credit hours annually in an attempt to assure competence in the field and to inform physicians of the most recent developments in their specified area of practice. For example, Massachusetts and Hawaii both require fifty CME credits per year in order for a physician to maintain his or her medical license in those states.

³⁷ *See, e.g.,* *Harding v. Noble Taxi Corp.*, 582 N.Y.S.2d 1003 (N.Y. Sup. Ct. 1992) (error for trial court to advise jury at length for its reasons for dismissing claims against two defendants in a multi-party malpractice suit); *Foflygen v. Zemel*, 615 A.2d 1345 (Pa. Super. Ct. 1992) (unfair trade practices and consumer protection laws do not apply to medical providers in informed consent cases). These examples give physicians little guidance as to medically appropriate care for specific clinical scenarios.

tion that must be assimilated to maintain professional competence, it would be unlikely for a physician to access non-medical sources for insight as to medically appropriate, nonnegligent care.³⁸

In addition to general ignorance of the legal incentive structure, the finding that physician years of experience did not relate to the number of negligence factors identified was particularly troubling. This implies that even with increasing experience in the profession and continuing medical education, there is no corresponding increase in aggregate knowledge stemming from a transfer of information from the legal to the medical system, i.e., from the source of the incentive structure to the community of actors to be affected.

Hence, there appears to be little in the way of legal "teaching" in terms of the legal rule or clinically appropriate action for fact-specific medical circumstances over time for these physicians. Indeed, communication between the legal and medical professions seems limited if not nonexistent.

Overall, physicians in this case study exhibited incomplete and, in some cases, incorrect knowledge of the tort system's standard of behavior assessment which is not improved by experience. This fact, coupled with the finding that physicians have no knowledge of the mode by which the legal system communicates to the actors that are to be affected,

³⁸ Of course it could be argued that physicians have an incentive to learn about the medical malpractice system due to its significant effect upon potential pecuniary loss. However, structurally, the tort system may not act as an effective deterrence structure for physicians. See Shuman, *supra* note 31, at 128. In addition, physicians may simply be limited as to their resources in terms of time or attention span due to their medical system efforts to maintain professional competence. See generally HERBERT A. SIMON, THEORIES OF BOUNDED RATIONALITY IN DECISIONS AND ORGANIZATION 161 (C.B. McGuire & Roy Radner eds., 1972). Professional cultural differences may also preclude nonmedical sources from being effective communicatory modes. See *infra* note 72 and accompanying text.

On the other hand, it could be argued that physicians do not have any incentive to learn about the medical malpractice system due to the availability of malpractice insurance. Because there may be no pecuniary loss or exposure, physicians may be indifferent to malpractice judgments. However, malpractice insurance may not cover all pecuniary losses; physicians may also have nonpecuniary costs associated with malpractice adjudications; and there are significant costs associated with a malpractice judgment or settlement if payment is made on behalf of the physicians, e.g., a mandated report to the National Practitioner Data Bank. See 45 C.F.R. §60 (1994); Liang, *supra* note 2, at 69 n.32. Finally, another possible argument that would appear to militate against learning about the malpractice system is the advent of managed care; since the managed care organization may shoulder liability for the physician's action, he or she can be indifferent to a malpractice judgment. However, physicians are usually considered to be independent contractors and thus, ostensible agency or *respondeat superior* liability of the managed care organization would generally not apply; hence, physicians would assume all liability for patient injury. See *id.*; see also Bryan A. Liang, *Deselection Under Harper v. Healthsource: A Blow for Maintaining Patient—Physician Relationships in the Era of Managed Care?*, 72 NOTRE DAME L. REV. 799 (1997) (arguing that physicians in the current health care climate are not traditional independent contractors or employees and thus another legal standard may need to be crafted to encompass their unique status).

presents an incentive structure that could significantly depart from the theoretical one assumed by legal and economic researchers.

An important implication of incomplete, incorrect, and static physician information regarding the legal system is the practice of defensive medicine.³⁹ For example, physician misperceptions of the legal standard such as a belief that malpractice “requires” an act of omission may induce the physician to perform an excess of tests and procedures in an effort to avoid any such adjudication, a classic form of defensive medicine. Of course, this circumstance is not optimal since this additional treatment of the patient imposes risks of injury upon the patient that would not be incurred but for the incorrect understanding of the legal rule.⁴⁰

Hence, one of the malpractice system’s important theoretical functions, to provide an incentive structure to reduce patient injury to minimal (socially acceptable) levels, may actually induce the actors within it to behave nonoptimally. For example, physicians may expose patients to increasing levels of injury. Thus, the structure’s departure from the assumed precept of actor knowledge of its judgment and communication tenets has patient care implications and hence is an important consideration to address in the future study of malpractice.

B. DO PHYSICIANS ASSESS MALPRACTICE CASES THE SAME WAY JURIES DO?

The tort incentive structure assumes that a physician will determine the appropriate action in a specific clinical circumstance based on the standard of medical appropriateness. Physicians define this standard themselves.⁴¹ Theoretically, the lay agents of the legal system, juries, use this same standard to assess whether the physician in question has acted negligently or nonnegligently. Thus, if two groups are given the same medical facts and circumstances and utilize the same standard of

³⁹ Defensive medicine can lead to either an excessive provision or an underprovision of care, rendered in response to legal considerations rather than in response to actual medical indications. See, e.g., OFFICE OF TECHNOLOGY ASSESSMENT, DEFENSIVE MEDICINE AND MEDICAL MALPRACTICE, OTA-H-602 2 (July 1994); Roger A. Reynolds et al., *The Cost of Medical Malpractice: Professional Liability*, 257 JAMA 2776 (1987); Steven Zuckerman, *Medical Malpractice: Claims, Legal Costs, and the Practice of Defensive Medicine*, 3 HEALTH AFF. 128 (1984); Steven Shavell, *Theoretical Issues in Medical Malpractice*, in THE ECONOMICS OF MEDICAL MALPRACTICE 35 (Simon Rottenberg ed., 1978). It has been estimated that defensive medicine practice will add \$40 billion to U.S. medical costs by the year 2000. Daniel N. Mendelson, *Why Malpractice Reform is Risky Business*, BUS. & HEALTH, June 1995, at 38.

⁴⁰ Note that misperceptions can lead to an inappropriate avoidance of care resulting in patient harm. See *infra* notes 70, 71, and accompanying text.

⁴¹ Physicians, like other professionals, define their own appropriate level of care. The level of care required, theoretically, to avoid an adjudication of negligence is that level of care “ordinarily possessed and employed by members of the profession in good standing.” See KEETON ET AL., *supra* note 5, §32 at 187; see also *supra* note 6 and accompanying text.

assessment, theoretically, these two groups should assess cases similarly at least most of the time. However, this study found that physicians' assessments of the defendant physicians differed markedly from those of the actual juries.

If the significant divergence between physician assessments of the cases and actual jury verdicts found in this case study is generally prevalent, then there may be some question as to the use or understanding of the standard of medical appropriateness by these two groups. Thus, determining the source of this divergence is critical in order to understand how and why the incentive system departs from its theoretical ideal, and what the implications are for the system as it is currently structured.

On the one hand, potential sources of divergence could be from the physician side.⁴² On a basic level, physicians in this study could simply be categorically uninformed regarding the medically appropriate care in anesthesia. Yet this is unlikely since these physicians were all highly trained and practicing at a major academic medical center. In fact, it would be expected that these physicians would be more informed regarding clinical appropriateness in the specialty rather than less. Another possibility is that, rather than being categorically ignorant, the physicians in this study could be categorically biased to a single medical viewpoint due to their academic homogeneity. But militating against this possibility is the fact that approximately half of the time study physicians agreed with the actual jury verdicts.

Another source of divergence could be that the study physicians were simply favoring the defendant physicians over plaintiffs when assessing the cases. However, an interesting and relevant sociological phenomena that was encountered during the physician interviews is worthy of note. Specifically, although it might very well be expected that physicians would hesitate to find other physicians negligent, during interviews with the anesthesiologists in this case study there was a significant propensity for the study physicians to be extremely critical of the defendant anesthesiologists in the cases. Perhaps because these were academic physicians, they had a lower threshold for noting and commenting upon the perceived deficiency in the care by others; indeed in another empirical study, academic physicians (radiologists) also heavily criticized the defendant physicians in the cases.⁴³

⁴² Note that the lack of knowledge of the legal standard of negligence should not play any role in this divergence since physicians were told to base their assessments of the cases on their own clinical training, which should theoretically provide the same results as jury assessments. See *supra* note 19 and accompanying text.

⁴³ Unpublished information from the study is reported in Liang, *supra* note 2, at 73-74 nn.39-40.

Beyond these considerations, physicians in this study did not uniformly disagree with juries in favor of the anesthesiologist defendants. Recall that of the five cases that these physicians deemed significantly different from actual verdicts, four of them were in fact *defendant* verdicts, so physicians were erring on the side of plaintiffs and deeming the defendant physicians *more* negligent rather than less.

In addition, in the four cases where there were significant Likert value differences between physicians and NPNLs, study physicians provided values that were relatively more negligent (i.e., higher Likert values) half the time. If the study physicians were systematically biased for the defendant physicians, it would be expected that study physicians would rate all defendant physician actions relatively less negligent (i.e., lower Likert values) all of the time, which they did not.⁴⁴

On the other hand, the source of divergence may not rest with physicians but with the juries themselves. It could be that juries may misunderstand the legal standard by which they are to assess medical behavior⁴⁵ or that they assess medical behavior on the basis of something

⁴⁴ Note that in a previous study, *nonphysicians* appeared to be the parties who were biased; they categorically gave statistically higher (i.e., relatively more negligent) Likert value assessments as compared with physicians. See Liang, *supra* note 2, at 66.

⁴⁵ Shavell has indicated that "the standard of care . . . may not be correctly chosen or consistently applied Therefore, the opportunities for error and for inconsistent application of standards by the agents [juries] of the incentive system [the malpractice system] are probably substantial." Shavell, *supra* note 39, at 47-48. Further, it has been reported that "[s]tudy after study has shown that jurors do not understand the law they are given, often performing at no better than chance level on objective tests of [legal] comprehension." Alan Reifman et al., *Real Jurors' Understanding of the Law in Real Cases*, 16 LAW & HUM. BEHAV. 539, 540 (1992) (citing Robert P. Charrow & Veda R. Charrow, *Making Legal Language Understandable: A Psycholinguistic Study of Jury Instructions*, 79 COLUM. L. REV. 1306 (1979); Phoebe C. Ellsworth, *Are Twelve Heads Better Than One?* 52 LAW & CONTEMP. PROBS., Autumn 1989, at 205; Amiram Elwork et al., *Juridic Decisions: In Ignorance of the Law or in Light of It?*, 1 LAW & HUM. BEHAV. 163 (1977); AMIRAM ELWORK ET AL., MAKING JURY INSTRUCTIONS UNDERSTANDABLE (1982); Robert F. Forston, *Sense and No-sense: Jury Trial Communication*, 1975 BYU L. REV. 601; REID HASTIE ET AL., INSIDE THE JURY (1983); Martin F. Kaplan & Gwen DeArment Kemmerick, *Juror Judgment as Information Integration: Combining Evidential and Nonevidential Information*, 30 J. PERS. & SOC. PSYCHOL. 493 (1974); Saul M. Kassin & Lawrence S. Wrightman, *On the Requirements of Proof: The Timing of Judicial Instruction and Mock Juror Verdicts*, 37 J. PERS. & SOC. PSYCHOL. 1877 (1979); Nobert L. Kerr et al., *Guilt Beyond a Reasonable Doubt: Effects of Concept Definition and Assigned Decision Rule on the Judgments of Mock Jurors*, 34 J. PERS. & SOC. PSYCHOL. 282 (1976); Lawrence J. Severance & Elizabeth F. Loftus, *Improving the Ability of Jurors to Comprehend and Apply Criminal Jury Instructions*, 17 LAW & SOC. REV. 153 (1982); and V. L. Smith, *The Psychological and Legal Implications of Pre-trial Instructions in the Law*, (1987) (unpublished Ph.D. dissertation, Stanford University)). This misunderstanding extends both to procedural law as well as to substantive law. Further, although understanding improves for procedural knowledge when assisted by judicial instruction, on an absolute level it remains quite poor (less than 50% correct); and for knowledge of the substantive law, it stays poor even after such instructions. See Reifman et al., *supra* at 546-47; see also Dorothy K. Kegehiro, *Defining the Standards of Proof in Jury Instructions*, 1 PSYCHOL. SCI. 194 (1990) (reviewing juror comprehension studies which report that levels of 50% or less have been found for mock

other than or in addition to the legal standard.⁴⁶ Supporting this contention is the finding that NPNs, without medical or legal training, were able to assess the cases as well as physicians.⁴⁷ It would be expected that individuals without medical or legal training would assess the cases in a worse fashion (i.e., with less concordance) than those who have knowledge of medical appropriateness through medical training. Thus, this relatively high level of agreement may reflect the expression of some factor other than legal or medical knowledge that is shared by these individuals and juries. However, against this proposition is the fact that at least some physicians agreed with the actual jury verdicts and thus juries may have based their findings of negligence or nonnegligence on some appropriate standard of care. Of course, if juries use other factors in their negligence assessments that result in similar assessments of that care by physicians, the results may be simply coincidental to the appropriate use of the standard of care itself. On the basis of the results in this case study, it appears that, at best, medical knowledge is not helpful in determining what care is deemed negligent by juries. At worst, on the basis of previous work, this knowledge may be a disadvantage in these assessments.⁴⁸

Also supporting the possibility of a predominantly juror-based explanation for physician-jury assessment divergence is an evaluation of

jurors and representative samples of jurors from Arizona, California, Florida, Michigan, Nevada, and Washington). In the criminal context, it has been reported that after seeing and hearing video instructions, "only 50% of the instructed jurors understood that the defendant did not have to present any evidence of his innocence, and that the state had to establish guilt, with evidence beyond a reasonable doubt." David U. Strawn & Raymond W. Buchanan, *Jury Confusion: A Threat to Justice*, 59 JUDICATURE 478, 481 (1976). However, even with these studies, "[m]ost of the [] recommendations [to address these legal system weaknesses, although] well received by law commissions, [have been] largely disregarded by legislatures, and rejected by courts." William S. Laufer, *The Rhetoric of Innocence*, 70 WASH. L. REV. 329, 367 (1995). Indeed, even if several jurors are noted to be sleeping during the trial, a new trial is not warranted because it is a common occurrence. See *Stahnke v. Lontok*, No. 95-2078, slip op. at 5-6 (Wis. Ct. App. July 23, 1996).

⁴⁶ See, e.g., Mark I. Taragin et al., *Does Physician Performance Explain Interspeciality Differences in Malpractice Claim Rates?*, 32 MED. CARE 661 (1994) (finding that variation in malpractice rates results from factors other than substantive differences in physician performance); Mark I. Taragin et al., *Physician Demographics and the Risk of Medical Malpractice*, 93 AM. J. MED. 537 (1992) (speculating that the higher malpractice claims rate for male physicians is attributable to more effective interactions with patients by women); SLOAN ET AL., *supra* note 7, at 59-60, 64-65 (finding that poor physician communication with patients is correlated with malpractice claims and incidence); Marvin Cornblath & Russell L. Clark, *Neonatal "Brain Damage": An Analysis of 250 Claims*, 140 W. J. MED. 298 (1984) (finding poor legal concordance with medical assessment of infant brain damage cases).

⁴⁷ NPNs' prediction rate for all cases was higher than that of physicians (64% versus 57%, respectively), although this did not rise to the level of statistical significance. However, in a previous study of malpractice, nonphysicians were statistically in agreement more often with actual jury verdicts than physicians ($p < 0.009$). See Liang, *supra* note 2, at 66 n.22.

⁴⁸ See *id.*

the “gray area” cases. These circumstances are arguably the most relevant for physicians and actual juries. For physicians, these gray-area cases illustrate typical clinical scenarios encountered regularly in medical practice. *Ex ante*, since medical practice is so broadly variable⁴⁹ and not subject to a simple and single correct approach,⁵⁰ physicians must often make care decisions based on incomplete information and/or in circumstances where no specific clinical approach is readily apparent. Indeed, these are also the circumstances most relevant to physicians in their interface with the legal system since it is the unclear cases that may result in a questionable action, potential patient injury, and thus a malpractice suit.⁵¹

For juries, these circumstances are the most relevant because the often complex and technical aspects of human physiology, diagnosis, treatment, disease, and variations in medical practice may require lay juries with no medical and/or scientific background to make adjudicatory assessments based on an incomplete or actual misunderstanding of the medical and scientific facts and circumstances of the case. But beyond the difficulties associated with medical and scientific assessments, this concern also applies to jurors’ understanding of the law, i.e., the legal rule of negligence and its appropriate application to the particular case at hand.⁵²

However, in these gray-area encounters, NPNLs were quite significantly able to predict the actual jury verdicts, exhibiting an astounding 96% correct prediction rate—clearly better than physicians and statistically indistinguishable from juries. Thus, the NPNLs’ extremely high predictive ability may again be based upon some other characteristic(s) that they share with juries, apart from a knowledge of medicine or law, which results in similar assessments of a physician’s action. For example, they may be using the presence or severity of injury as a proxy for negligence, or they may simply be deeming causation as negligence.⁵³

⁴⁹ See *infra* note 63.

⁵⁰ See *infra* note 62.

⁵¹ If the results of this study can be generalized, physicians will take the wrong action (from the point of view of legal liability) almost 50% of the time, certainly not reflecting behavior optimally affected by the tort system’s deterrence structure. See also *infra* note 53.

⁵² See *supra* note 8 and *supra* note 45.

⁵³ Severity of injury, not the presence of an adverse event or negligence, has been reported to be predictive of a plaintiff verdict. See Troyen A. Brennan et al., *Relation Between Negligent Adverse Events and the Outcomes of Medical-Malpractice Litigation*, 335 *NEW ENG. J. MED.* 1963 (1996). See also White, *supra* note 7 (inferring that as severity of injury of the plaintiff increases, there is an increased possibility of malpractice litigation and awards). This was true for both care that was deemed “negligent” or “nonnegligent” by White and thus raises the possibility that juries may be using presence or severity of injury as a proxy for negligence. See Liang, *supra* note 2, at 76 n.43. Indeed, for anesthesiologists, it has been reported that even when the physician provides “nonnegligent” care, liability is still imposed 42% of the time. See Cheney et al., *supra* note 7, at 1601. Note also that it has been reported

This problem is complicated by hindsight bias. In fact, the presence of injury and an *ex post* adjudication of liability has been described as an illustration of juror hindsight bias: “[s]ince a failure to diagnose a disorder will look much more culpable after discovering the true nature of an illness, doctors may be subject to liability even for reasonable diagnostic procedures that turn out badly.”⁵⁴ Experimentally, researchers have found that “outcome knowledge [of injury] deeply affect[s] [mock jurors’] interpretation of a complex story. . . . [And a] good faith effort to determine a reasonable level of precautions in foresight may receive harsh judgment when viewed in hindsight.”⁵⁵ Unfortunately, these researchers also report that this hindsight bias is not corrected by specific jury instructions regarding it; indeed, these instructions may have a counterproductive effect.⁵⁶ Thus,

[w]hen making determinations of negligence, it is important to consider only whether the therapist acted according to professional standards, not [simply] whether damages occurred. As Beck . . . noted, “In general, there is no malpractice if it can be shown that the defendant used due care—i.e., practiced according to a usual or average [sic] standard of care. Even if someone is badly hurt or killed, the law says that the injured party cannot recover from the doctor if the doctor met this standard.” . . . [H]owever, [it appears] that the determination of negligence is influenced by the report of damages or harm.⁵⁷

In addition to physicians or juries serving as independent sources of the assessment divergence found in this study, other sources could exist. For example, the case decisions used in this study could be flawed. However, if this is the situation, then the very existence of a Prosser-type

that a judge or jury in a malpractice case may simply be more likely to deem a physician negligent if his or her actions caused injury. See John E. Calfee & Richard Craswell, *Some Effects of Uncertainty on Compliance with Legal Standards*, 70 VA. L. REV. 965, 987 n.50 (1984). Other studies have indicated the weakness of the jury adjudicatory method in assessing malpractice. See, e.g., M. Roy Schwarz, *Liability Crisis: The Physician’s Viewpoint*, in MEDICAL MALPRACTICE—TORT REFORM 16 (James Hamner & B.R. Jennings eds., 1987). In fact, juries may award malpractice plaintiffs greater amounts as compared with plaintiffs with similar injuries resulting from other causes. See Randall R. Bovbjerg et al., *Juries and Justice: Are Malpractice and Other Personal Injuries Created Equal?*, 54 LAW & CONTEMP. PROBS., Winter & Spring 1991, at 5, 24-28, 36. Thus, Metzloff has called for close observation of the jury system because of the highly significant and complex role it plays. See Thomas B. Metzloff, *Resolving Medical Malpractice Disputes: Imaging the Jury’s Shadow*, 54 LAW & CONTEMP. PROBS., Winter & Spring 1991, at 43.

⁵⁴ Kamin & Rachlinski, *supra* note 8, at 91.

⁵⁵ *Id.* at 99.

⁵⁶ See *id.*

⁵⁷ LaBine & LaBine, *supra* note 8, at 510.

incentive structure is called into question. Since trial court decisions are often not published, the case decision descriptions provided here represent the only available sources of trial court decisions available to physicians. Thus, these descriptions are, in fact, the theoretical bases for physician "learning" from the medical malpractice system and most relevant in assessing the tort signal. If these case scenarios are deficient in effectively portraying the cases for physician "learning," then the legal incentive structure is not providing *any* appropriate mode or forum for physicians to learn *ex ante* just what is considered socially acceptable medical care. In that case, there is no official or unofficial tort signal that can guide physician behavior in an appropriate manner.

But aside from the accuracy of the case descriptions as related to the actual cases themselves, the results of physician evaluations of these case scenarios raise another difficulty for the malpractice system. In this study, the participating group of academically trained physicians would be expected to have significant insight as to the standard of medically appropriate care. Further, the physicians in this case study were either trained at the academic medical center or have over twenty years of experience there;⁵⁸ this group as a whole would thus be expected to assess clinical cases similarly. Yet the roughly 50% physician assessment divergence within this group implies that approximately half of this academically trained, academically practicing physician group has an understanding of medically appropriate care that is different from the other, regardless of the accuracy of the case descriptions, raising the possibility that more than one acceptable standard of care exists.

However, assuming that the case descriptions provide some reasonable depiction of the actual cases, on the basis of the results in this study, half of the physicians must have a different interpretation of medical appropriateness than the actual juries. This finding again presents the possibility that another acceptable standard of medically appropriate care exists to which juries were not exposed or did not recognize, calling into question the effectiveness of the adjudicatory process itself. The nature of proving medical malpractice claims may provide for such a possibility through the required use of expert testimony.⁵⁹ This problem is further exacerbated by the frequent medical circumstance under which there is no clear standard of care.⁶⁰ As a result, some physicians may be consid-

⁵⁸ Program A in Table 1 is the case study site hospital's anesthesiology residency program.

⁵⁹ See Richard L. Wiener, *A Psychological and Empirical Approach to the Medical Standard of Care*, 69 NEB. L. REV. 112 (1990) (discussing potential for experts to give opinions not representative of the standard practice in the field); see also Hock & Lowenstein, *supra* note 8 (hindsight bias results in reporting "preferred" results).

⁶⁰ See William Meadow et al., *What is the Legal 'Standard of Medical Care' When There Is No Standard Medical Care? A Survey of the Use of Home Apnea Monitoring by*

ered negligent even though their care is in fact consistent with some arguably reliable physician conception of medical appropriateness. This result would send conflicting signals to physicians who are attempting to provide medically appropriate care.

Other factors may also have a role in the divergence between physician assessments and actual jury verdicts. For example, this case study's results showed a clear lack of correlation between physician agreement with actual jury verdicts and knowledge of negligence. This independence between how well physicians assess the cases (in terms of assessment agreement) and knowledge of the law raises the possibility that legal knowledge does not relate to effective prediction of legal adjudicatory results. If generally applicable, this raises the concern of whether the malpractice deterrence structure is providing appropriately consistent results using the legal rule and whether it would be fruitful to in fact have knowledge of it.⁶¹

Neonatology Fellowship Training Programs in the United States, 89 PEDIATRICS 1083 (1992) (describing the weakness of expert testimony based on an expert's personal experience in establishing a standard of care).

⁶¹ Note that it may not be in society's best interest to have physicians learn about the legal system. Socially, the highest benefit could be for physicians to focus upon medical study in their respective fields. See Liang, *supra* note 2, at 67 n.27. However, there may be some argument that physicians should in fact assess the harm that may occur in practice so that they will behave in a fashion *ex ante* that will reflect this expected cost; this is the traditional rationale for accurate assessment of damages in civil liability cases. See Louis Kaplow & Steven Shavell, *Accuracy in the Assessment of Damages*, 39 J.L. & ECON. 191 *passim* (1996). Theoretically, this ideal is imbued within the malpractice system under the Hand formula. See the discussion of Learned Hand's formula cited in note 3, *supra*. In contrast, if this *ex post* damage level would not have been known to the potential injurer *ex ante*, it has no social value since the assessment of the specific level of harm could not have been made. See Kaplow & Shavell, *supra* at 192. Although Kaplow and Shavell discuss this consideration under the rubric of physical harm of the victim/plaintiff, extension can be made on the basis of not only potential physical harm, which would be unknown to potential injurers, but also to *ex ante* determinations of liability probability in the malpractice system. Indeed, the varying medical practice standards that appear apparent, as well as possible jury decisionmaking on the basis of factors departing from the medical appropriateness standard, make determinations of expected liability by potential injurers a haphazard exercise at best. Thus, a source of potential resource waste in the adjudicatory process may result from *ex post* assessment of the magnitude of harm when the harm is not determinable *ex ante*; and, an analysis of the malpractice system indicates that another source—inability of its actors to accurately predict the probability of liability—may also contribute to this waste. Further, if physicians have no *ex ante* knowledge of either the formal legal standards and rules or the other methods that juries utilize in their assessment of liability, optimal *ex ante* behavior will most likely not be effected, and *ex post* accurate assessment of damages would be likely to be socially wasteful. Finally, accurate assessment of damages may be further limited. For example, use by a court of some information that is not available to a party *ex ante* will distort that party's incentives if he or she knows that there is some information that will affect liability. Thus, it would be socially beneficial for the court to ignore information that the party lacked *ex ante*. See Omri Ben-Shahar, *Informed Courts, Uninformed Individuals and the Economics of Judicial Hindsight*, 4 J. INSTITUTIONAL & THEORETICAL ECON. 613 (1995).

Finally, although they diverged from actual jury verdicts, an interesting finding is that the physicians in this study were surprisingly consistent in their case assessments over time. Substantively for malpractice, the standard of care as understood by physicians could be thought to change from circumstance to circumstance, i.e., physicians vary across time in their approach to the same clinical circumstance, independent of changes in medical knowledge, due to the nature of medical practice.⁶² This could be a source of physician disagreement with jury verdicts. Indeed, it has been reported that medical practice patterns vary significantly across physicians.⁶³ Thus, it would appear possible that a physician could have differing viewpoints regarding the appropriate care for the patient and the same clinical scenario presented at different times.⁶⁴ However, the physicians in this study exhibited highly similar responses over time, both in terms of relative agreement as well as in Likert values. Hence, although there may be significant interphysician variation as to medical practice, intraphysician variation at least for these physicians seems minimal, and physicians would seem to be quite consistent in their assessments of specific clinical scenarios.⁶⁵ This consis-

⁶² The nature of medical practice dictates that the method of approaching a particular clinical scenario is not necessarily constant, i.e., there is not one "right" way of evaluating, diagnosing, and treating a patient in most clinical circumstances. Medical actions are primarily a function of uncertainty as to the "best" management options, patient preferences, physician preferences, and other factors. See Eric M. Wall, *Practice Guidelines: Promises or Panacea?*, 37 J. FAM. PRAC. 17 (1993).

⁶³ See JOHN M. EISENBERG, *DOCTORS' DECISIONS AND THE COST OF MEDICAL CARE: THE REASONS FOR DOCTORS' PRACTICE PATTERNS AND THE WAYS TO CHANGE THEM* (1986) (outlining variations in cardiac angiogram interpretation); A.O. Berg, *Variations Among Family Physicians' Management Strategies for Lower Urinary Tract Infection in Women: A Report from the Washington Family Physicians' Collaborative Research Network*, 4 J. AM. BOARD FAM. PRAC. 327 (1991) (indicating variations in urinary tract infection management in women); Joann G. Elmore et al., *Variability in Radiologists' Interpretations of Mammograms*, 331 NEW ENG. J. MED. 1493 (1994) (showing variations in interpretation and recommendations for management between radiologists); Bryan A. Liang et al., *Analysis of the Resource-Based Relative Value Scale for Medicare Reimbursements to Academic and Community Hospital Radiology Departments*, 179 RADIOLOGY 751 (1991) (indicating differences in assessment of radiologic work between community hospitals and academic medical centers); Jack E. Meyer et al., *Biopsy of Occult Breast Lesions: Analysis of 1261 Abnormalities*, 263 JAMA 2341 (1990) (indicating community-based radiologists may be more aggressive in their recommendations than academic radiologists in the context of suspicious mammograms); John E. Wennberg & Alan Gittlesohn, *Variations in Medical Care Among Small Areas*, 246 SCI. AM. 120 (1982) (reviewing variation in assessing indications for prostate, thyroid, or coronary bypass surgery). However, none of these studies assessed the consistency of physician assessments over time.

⁶⁴ This again implies that there may be multiple standards of medical appropriateness. See Liang, *supra* note 2, at 91; *supra* notes 58-60 and accompanying text.

⁶⁵ This finding should give some comfort to those physicians and nonphysicians who anecdotally believe that physician practice is somewhat whimsical where actions are based on random factors. Although there is a great deal of variation, physicians appear to have a consistent approach, at least independently, in their assessments of medical facts.

tency may have significant implications for malpractice. If certain consistent practices and approaches are considered to be definitely negligent, they should be identifiable and thus communicated as such to physicians in the field and lay agents of the legal system. On the other hand, if multiple practices and approaches are considered to be within the scope of reasonable practice, the same consistency should make these approaches identifiable as nonnegligent to physicians and to lay agents of the legal system.⁶⁶ However, assuming that it becomes known to the court, this identification and communication of appropriate and inappropriate practice may still not result in an effective and efficient system if juries use non-legal alternative rules or standards to assess physician behavior. Additionally, the system will not be effective in the large number of cases where no appropriate clinical studies have established one or more acceptable standards of medical care.⁶⁷

C. CAN PHYSICIANS ACCURATELY PREDICT JURY VERDICTS?

Recall that if physicians could predict what the results of the tort system's adjudications would be (regardless of their legal knowledge and jury judgment standards), and act on the basis of those predictions, knowledge of the incentive structure's rules, methods, pronouncements, and factors used in negligence determinations would all be irrelevant, at least with regard to effective deterrence. However, physicians did not have good success in predicting jury verdicts overall and in fact disagreed strongly in their assessment of several of the cases.⁶⁸ Further, in the important gray area cases, physicians fared quite poorly in their efforts as compared with the stellar performance of NPNLs who were indistinguishable from juries. Thus, even under this less stringent model of the tort system's deterrence structure, the tort signal appears to be limited in its effect at least for these physicians. Further, NPNLs once again may be exhibiting some characteristic that allows them better predictive ability than physicians, unrelated to legal or medical knowledge.

⁶⁶ However, identification and communication of these specific practices require much more work on medical effectiveness. See *infra* note 72 and accompanying text. Note that the described method is actually how the legal system in tort is supposed to function. When there are different schools of thought regarding medical practice, physicians under hornbook law are to be assessed by the tenets of that school, assuming that there is a "respectable minority" adhering to that practice. See KEETON ET AL., *supra* note 5, at 187. Thus, differing methods of treatment are not to be excluded by juries in their care assessments simply because there is interphysician disagreement. If they are being so excluded, this represents another departure of the legal system from its theoretical bases and thus more difficulties that require assessment in an effort to provide physicians with an efficient and consistent deterrence structure. See also *supra* notes 59-60 (describing the concerns regarding expert witnesses and standards of care).

⁶⁷ See Meadow et al., *supra* note 60 and accompanying text.

⁶⁸ See *supra* note 28 and accompanying text.

This inability to predict jury verdicts is extremely important. If physicians are not knowledgeable about the malpractice system, diverge from juries in their case assessments (potentially reflecting the use of different standards of adjudication), and cannot accurately predict jury verdicts, then neither the Prosser model nor this alternate model would appear to apply. If neither model applies, then there is a significant question of whether the tort system is providing any consistent and/or useful signal to physicians regarding what care is appropriate and what care is not.

D. POTENTIAL INCENTIVES

If the results found in this case study are true on a broader scale, the wide discordance between what the system assumes and what is actually true may have significant implications. If physicians have *ex ante* knowledge that some of their assessments of medically appropriate care will concord with jury verdicts and some will not, physicians may be unable to determine for a specific clinical scenario which care will be deemed negligent and which care will not. Thus, if physicians are risk averse, they may overestimate the probability of suit.⁶⁹

Similarly, if juries consider other factors in their deliberations regarding the negligence or nonnegligence of individual physicians for a particular case, and return negligent verdicts in some circumstances and nonnegligent verdicts in others, a highly unclear incentive structure will result.⁷⁰ Physicians will have the incentive to provide only care that is considered by juries, or which they themselves consider "nonnegligent," all of the time, resulting in inappropriate levels of care being rendered. This is the specter of defensive medicine rising again.⁷¹ Thus, the system, purportedly in place to provide incentives for physicians to render optimal levels of care, may instead give the actors within the system an incentive to provide either too much or too little care.

It bears noting that there are practical patient care ramifications that result. On the one hand, physicians may provide excessive levels of care to patients. This excess of care is not without cost. In addition to the pecuniary cost of providing such care, it increases the patient's risk of iatrogenic injury. Indeed, these risks and potential harms from excessive treatment may not be large enough to counter the defensive medicine tendencies if the primary disease state to be diagnosed or treated is very serious (e.g., cancer), whereas the potential loss from the excess treat-

⁶⁹ Physicians have been reported to overestimate the likelihood of suit by a factor of three. See PAUL C. WEILER ET AL., *A MEASURE OF MALPRACTICE: MEDICAL INJURY, MALPRACTICE LITIGATION, AND PATIENT COMPENSATION* 124 (1993).

⁷⁰ See Liang, *supra* note 2, at 77.

⁷¹ See *supra* note 39 and accompanying text.

ment is relatively small. On the other hand, physicians may fail to provide necessary but risky treatment. This form of defensive medicine is also not without cost; patients who require this care will suffer harm due to their inability to access such care because physicians acting under an uncertain legal system are attempting to avoid liability. Thus, although physicians may be affected by the tort system in some fashion, the actual circumstances may in fact result in socially detrimental levels of excess or insufficient care, rather than the cost-effective, socially beneficial levels desired. Indeed, the malpractice system, which theoretically is in place to minimize the risk of patient injury, may instead paradoxically increase that risk in its current operational state.

Finally, due to potentially unclear adjudication standards, inconsistent adjudicatory results, and unclear communications between the legal system and physicians, physicians may simply have no incentive at all to learn about the deterrence structure. Without the desire to learn or the ability to predict the system's results, significant departures from the theoretical ideal can occur, which could render wasteful the extensive societal resources allocated to the medical malpractice tort system's deterrence structure.

V. CONCLUDING REMARKS

Ignorance and incorrect conceptions regarding the standard by which physicians are being judged alone indicate that the effectiveness of the medical malpractice incentive structure is questionable. In addition, divergence of physician and jury assessments, NPNL equal ability to assess cases as physicians, and NPNL superiority in predicting jury verdicts in gray area cases, point to a system whose incentive structure may be, in reality, very far from its theoretical ideal.

If these case study findings are generally applicable, remedying this situation is problematic. Assuming that jury verdict cases were available, published, and easily accessible (and that physicians had time to read and understand them), the divergence of physician assessments of jury verdict cases (due to differences in the application of the medical appropriateness standard, lack of understanding of that standard, juries using other factors alone or in combination with the legal standard, or other reasons) would still render the case decisions, or even knowledge of the legal rule, of little assistance in "teaching" physicians what constitutes socially acceptable, nonnegligent care.

Alternatively, knowledge of the legal communicatory mode, and the potential "teaching" and "learning" thereof, will not compensate for physicians' lack of knowledge of the legal standard, nor for the practical difficulties of gaining access to these decisions, even assuming consistent adjudication and strict (and sole) application of the legal rule to the case

by juries. However, without knowledge, assessment consistency, or access, there are significant impediments to making the medical malpractice tort system the theoretically effective and efficient incentive structure it is often assumed to be.

In addition, beyond these factors, cultural differences in communication, education, and approach between the medical and legal professions may make any effort to use the structure and concomitant results of one (the law) to "dictate" the acceptable behavior of members within the other (physicians) an extremely challenging endeavor. Indeed, the legitimacy to physicians of a legal conclusion defining appropriate medical care may be limited. Thus, utilization of findings such as intertemporal consistency of physician assessments of clinical scenarios may be better able to change physician behavior since these practices and approaches emanate from the medical profession itself.⁷² However, even using these techniques and assuming that the legal system will continue to be the final arbiter of malpractice claims and disputes, a binary liable/not liable approach may simply not be appropriate to a field such as medicine where there is no bright line rule in the ever changing gray of daily practice.

There is much to be learned about physician and jury behavior to bring to fruition the goal of appropriate and efficient deterrence in the health care system. This case study has attempted to contribute to that effort. Of course, there are significant limitations to the assessment done here. Although the results obtained are consistent with other work in the field, this is a case study of a single anesthesiology department with a small number of homogeneous academic physicians; thus, its results are only suggestive and its discussion and interpretations may have limited applicability. Indeed, its primary contribution is to assist in identifying and verifying issues that need further attention when researching the important question of medical malpractice and the system's efforts at

⁷² This is the hope of clinical practice guidelines for medical care. Clinical practice guidelines are systematically developed guides to practice for particular clinical situations. See Deborah W. Hong & Bryan A. Liang, *The Scope of Clinical Practice Guidelines*, *HOSP. PHYSICIAN*, May 1996, at 46. However, clinical practice guidelines as a source of a legal standard of care are weak. First, clinical guidelines reflect only *one* perspective as to the medically appropriate action in a specific clinical scenario. As seen here and noted above, there is significant variation as to medical practice that does not reflect inappropriate care. See *supra* notes 62-63. Second, clinical practice guidelines are not all developed using rigorous, double blind studies; informal consensus, formal consensus, and other approaches are also used. See Hong & Liang, *supra*, at 46-47. In addition, the relevance of guidelines may be inappropriate to community and other practitioners due to the source that guidelines emanate from (e.g., a medical specialty society or academic medical center). See *id.* at 48-49. Finally, clinical practice guidelines are not simply evidence-based, scientific pronouncements that leave little room for debate. These guidelines reflect the value judgments of those who participated in their formulation, including physicians and patients. See *id.* at 49.

changing physician behavior. However, these empirical efforts need to be continued. It is imperative that:

in order to effectively examine the tort system and to assess its impact on physician behavior, researchers [] build on empirical determinations of how actors in the system actually perform—rather than assert as self-evident, or hope with childlike simplicity, that their fundamental assumptions regarding the medical malpractice system are true.⁷³

Thus, because “[t]he role of the malpractice system as a deterrent against too little or poor-quality care—one of its intended purposes—has not been carefully studied,”⁷⁴ an empirical analysis of additional physicians, specialties, and clinical circumstances using physician accessible materials is necessary to assess the assumptions of the current medical malpractice incentive system and its *ex ante* impact on physician behavior. In this fashion, development of a more thorough understanding of the workings of the legal system may emerge and provide the potential to fulfill the social goal of the medical malpractice tort system: to furnish an effective incentive structure which results in maximum patient benefit and minimal patient harm in a world of limited social resources.

⁷³ Liang, *supra* note 2, at 93.

⁷⁴ OFFICE OF TECHNOLOGY ASSESSMENT, DEFENSIVE MEDICINE AND MEDICAL MALPRACTICE, *supra* note 39, at 2.

APPENDIX 1. PART I SURVEY QUESTIONS

NEGLIGENCE AND MEDICAL MALPRACTICE:
THE KNOWLEDGE BASE OF PHYSICIANS OF
THE LEGAL SYSTEM AND THE ABILITY
TO DIFFERENTIATE NEGLIGENT CARE

1. How many years are you post residency/fellowship?
2. Do you have an academic title and if so, what is it?
3. Are you Board Certified?
4. Is there a formal program here about law or legal issues?
5. Have you ever been an expert witness?
6. Where do you get information about malpractice?
7. What is the definition of "negligence"?
8. Do you have any legal background (e.g., degree in law, previous study of law, spouse/relative in law)?

APPENDIX 2. JURY VERDICT CASES¹

FACTS: 2/17/89: Plaintiff, a 42 year-old nurse, was admitted to [Hospital] to undergo a lumbar laminectomy. [Defendant] was the anesthesiologist and met the Plaintiff for the first time 1/2 hour prior to the scheduled surgery. In the course of preparing the patient for anesthesia, [Defendant] attempted to start an IV in the Plaintiff's left wrist area. Immediately upon insertion of the needle, the Plaintiff felt tingling and pain. [Defendant] discontinued the IV attempt and switched to inside of elbow of Plaintiff's right arm.

PLAINTIFF claimed [Defendant] hit the median nerve, and to do so, [Defendant] would have had to place the needle deep into the wrist. [Defendant] was hurried and did not exhibit care in attempting to place the IV needle. The Plaintiff was cold and should have been warmed up prior to attempting to place the IV. The IV should not have been attempted at the left wrist but that another more appropriate site such as the forearm or back of hand should have been utilized.

DEFENDANT argued his treatment did not violate the standard of care. Nerve injury is a risk anytime one attempts to place an IV. [Defendant] did not violate the standard of care. The standard does not require warming of the patient if one can find an appropriate IV site. [Defendant] acknowledged that the wrist area was not a location of first choice but it was an adequate location and one routinely utilized by anesthesiologists. He did not hit the median nerve but rather a superficial branch of the median nerve.

¹ The actual jury verdict cases are reproduced in the following pages. The cases were sent to the surveyed physicians twice. The first time they were sent, the following appeared at the end of each case:

CIRCLE ONE:

Negligent	Most Likely Negligent	Can't Tell*	Most Likely Not Negligent	Not Negligent
5	4	3	2	1

*Please indicate why:

In the surveys sent to the physicians the second time, and in the surveys sent to the NP/NLs, the order of the cases was reversed, and each case was followed by the following:

CIRCLE ONE:

Negligent	Most Likely Negligent	Can't Tell*	Most Likely Not Negligent	Not Negligent
5	4	3	2	1

*Please indicate why:

What do you think the jury found (circle one): Guilty Not Guilty

FACTS: 4-89: Plaintiff, a 69 year old retired man, was seen by defendants in April and May 1989 for treatment of shingles. On 4-12-89 plaintiff was admitted to defendant [Hospital] by defendant Dr. A. During admission defendant Dr. C, defendant anesthesiologist, inserted an indwelling epidural catheter at T-7 for management of plaintiff's intractable pain. Plaintiff was seen at defendant hospital emergency room over the next two weeks for injections through the catheter for pain management. The week following the initial insertion, the catheter came out and a new catheter was reinserted in the same space by defendant Dr. C. Plaintiff was readmitted to the hospital on 4-24-89 by Dr. A for treatment of fever, vomiting and dehydration. WBC count was 24,000. Plaintiff's epidural catheter was removed and Dr. C performed cryorhizotomy on 4-26. Plaintiff was discharged the next day with WBC count of 19,000. Six weeks later plaintiff became acutely paraplegic due to spinal collapse at T-7 secondary to osteomyelitis.

PLAINTIFF contends Defendants failed to diagnose and treat epidural space infection caused by the insertion of the epidural catheter at T-7 which led to osteomyelitis at same level. Defendants should have ordered blood cultures, CT scans and other diagnostic tests to determine cause of elevated WBC count.

DEFENSE claimed no negligence in their care and treatment. Elevated WBC count was secondary to administration of steroids to treat shingles. Osteomyelitis was not seeded by epidural catheter although exact cause is unknown.

FACTS: Plaintiff, a 21 year old woman cashier, was taken to defendant [Medical Center] to deliver her term baby. She was given a trial of labor, but it was decided by her OB/GYN, defendant Dr. H, that she would undergo an emergency C-section because of CPD. Defendant Dr. S was the anesthesiologist. About half way through the procedure it was evident that plaintiff was losing an excessive amount of blood and the preliminary work for a transfusion was ordered. The procedure was complicated by uterine atony (a failure of the uterus to contract after delivery), which allowed for a continuation of the abnormal blood loss. Finally the administration of Pitocin and Methergine controlled the bleeding. The best estimate is that plaintiff lost between 1,800 and 2,500 ccs. of blood which was inadequately replaced by 2,300 cc's of Crystalloid with no blood transfusion. Plaintiff was then transferred across the hall to the recovery room with a B/P of 137/97 and pulse rate of 135. Defendant Dr. S, who had accompanied plaintiff to the recovery room, left within five minutes and Nurse was alone with plaintiff. Within 7 - 8 minutes of her arrival in the recovery room, plaintiff sat up and began wheezing and gasping for breath. Nurse called for help and both defend-

ant Dr. S and defendant Dr. H came to the recovery room. Plaintiff was placed in a semisitting position and given a broncho dilator by defendant Dr. S. Plaintiff was then returned to a reclining position where she immediately suffered a respiratory arrest. The "code blue" team was then called. Defendant Dr. S attempted to intubate the plaintiff at that point, but was not provided with a properly functioning laryngoscope from the recovery room "crash cart". After an approximate 2 - 4 minute delay, the proper equipment was provided and the intubation was completed. By that time, the plaintiff had suffered a cardiac arrest. Resuscitation was continued and plaintiff's vital signs returned, but she was in a deep coma. Upon awakening from the coma, it was evident that she had suffered neurological deficits.

PLAINTIFF contends that defendants failure to properly monitor her while in critical condition and failure to replace and maintain equipment available in recovery room led to her injury.

DEFENDANT contended there was no breach of standard of practice and no causation since plaintiff suffered an amniotic fluid embolus which resulted in respiratory and then cardiac arrest. Defendant Dr. S also claimed that defendant Dr. H was negligent in the amount of Pitocin given and that this had caused the amniotic fluid embolus.

FACTS: On May 23, 1989, a 30-year-old registered nurse was given an epidural anesthetic while she was in labor. Forty minutes later, severe fetal distress was noted on the fetal monitor. The obstetrician ordered a crash cesarean section. Through an existing epidural catheter, another faster acting anesthetic was added, and the cesarean section incision was made two minutes later. Shortly after delivering the child, the mother vomited, was short of breath, and seized. She was intubated and ventilated but went into a full arrest. Closed chest compression was started. Within four minutes, blood pressure and heart rate were restored, but the mother incurred brain damage. The child was born severely depressed, but was successfully resuscitated and is healthy.

PLAINTIFF contended that the anesthesiologist inadvertently gave a high spinal through a migrated epidural catheter. It was further alleged that CPR and chest compressions were not instituted soon enough, and that earlier CPR would have resulted in a complete recovery. Finally, plaintiff contended that a general anesthetic should have been given.

DEFENDANT position was that plaintiff was injured by an amniotic fluid embolism, which is unpredictable, unpreventable and untreatable.

FACTS: On March 31, 1985, a 28-year-old woman presented to the emergency room of [Hospital]. She was 28 weeks pregnant, and she complained of abdominal pain. She was assessed by an obstetrical nurse and an obstetrician, who diagnosed severe placental abruption and fetal

distress. The obstetrician ordered an emergency cesarean section. Defendant-anesthesiologist and another obstetrician were performing an emergency cesarean section at the time. They were notified of plaintiff's situation and responded immediately. Defendant-anesthesiologist and the other obstetrician examined the patient briefly. She was in shock. The patient was taken to the operating room where the child was delivered by emergency cesarean section. Following the delivery, and while the uterus was being closed, the patient had a cardiac arrest.

PLAINTIFF contended that the anesthesiologist should have started a second IV line and administered additional fluids, including blood, prior to the induction of anesthesia. Plaintiffs also alleged that defendant should have used Ketamine instead of Thiopental for the induction of anesthesia and that a combination of the inadequate fluids and Thiopental caused asphyxia to the fetus and cardiac arrest.

DEFENDANT contended that since the obstetricians ordered an emergency cesarean section, there was not enough time to start a second IV line, and Ketamine was not available on the anesthesia craftsman in either operating room. Under the circumstances, it was appropriate to give the patient a reduced dose of Thiopental, defendant contended. Neither the fluid resuscitation nor the Thiopental caused asphyxia to the fetus or the cardiac arrest, defendant argued.

FACTS: On January 20, 1986, a pregnant woman received an epidural block during the delivery of her child, and was left paraplegic. On January 18, 1986, a 21-year-old secretary went to the hospital to deliver her second child. On the morning of January 20, anesthesia was provided by the placement of an epidural block and the administration of drugs by a continuous lumbar epidural catheter. During the procedure, plaintiff complained of a severe shock-like sensation, which caused her arms and legs to shoot out, and of burning pain in her legs. The procedure was continued and the anesthetic drug was injected. Additional drugs were injected three separate times. The child was delivered by cesarean section. Plaintiff was left permanently paraplegic in her lower extremities. A medical malpractice action was brought against the anesthesiologist and against the hospital.

PLAINTIFF alleged that an injury to the spinal cord or the spinal cord's blood supply was caused by the placement of the epidural needle or the catheter and that defendants negligently failed to identify and treat the resulting harm for 24 hours. Plaintiff contended that the doctrine of *res ipsa loquitur* applied.

DEFENDANTS argued that plaintiff had a low lying spinal cord, that spinal cord ischemia was unrelated to the placement of the epidural needle or catheter, that it was impossible for the needle to reach the spinal

cord, that it was impossible for the catheter to cause trauma to the spinal cord, and that the injury was an unpreventable vascular accident.

FACTS: On July 14, 1983, a retired sheet metal worker entered the hospital for an operation to repair a small umbilical hernia and to remove a small growth from his lip. The defendant anesthesiologist elected to perform spinal anesthesia. During the operation, the patient was placed in a Trendelenburg position (head down and feet up), which allowed the level of spinal anesthesia to reach C7. The patient's blood pressure dropped fifty percent. No oxygen or other treatment was given during the procedure. As a result, the patient suffered from ischemia to the tip of his spinal cord.

PLAINTIFF alleged that the anesthesia was mismanaged in that the spinal reached the level of C7, resulting in a dramatic drop in blood pressure. This went untreated both during and after the operation. As a result, there was a lack of blood supply to the conus medularis, causing permanent damage to the S2 and S3 nerve roots.

DEFENDANTS argued that the injury to the spine occurred on the ward in an episode where plaintiff's blood pressure was recorded as 220/120. It was also suggested that plaintiff's excessive alcohol consumption and life-long cigarette smoking contributed to the result.

FACTS: A 78-year-old retired man suffered severe brain damage while recovering from coronary artery triple bypass surgery. On January 17, 1984, a thoracic surgeon, defendant anesthesiologist and cardiologist performed triple bypass surgery on plaintiff. During the immediate postoperative period, plaintiff showed appropriate signs of arousal from the anesthesia. However, he also experienced profound hypotension during which he was sometimes anemic and hypovolemic. Fourteen hours after surgery plaintiff was placed on a ventilator at the direction of the defendant anesthesiologist. Prior to this plaintiff had been breathing unassisted on 70% oxygen. The anesthesiologist ordered the inspired oxygen concentration to be reduced from 70% to 50%. Immediately before plaintiff was placed on the ventilator his PO₂ was 59, but after an hour on the ventilator plaintiff's PO₂ fell to 52. The surgeon was notified of the drop. When the surgeon corrected the oxygen concentration by increasing it to its former level, the PO₂ values improved.

PLAINTIFF alleged that the defendants should have made postoperative correction of plaintiff's metabolic acidosis, evolving respiratory acidosis and anemia. The first postoperative x-ray demonstrated marked atelectasis. In light of this result defendants allegedly failed to meet the standard of care which would have required the patient to be placed on a ventilator immediately after surgery. Defendant anesthesiologist's re-anesthesiologist argued that the standard of care did not require placing

plaintiff on a ventilator. In addition, defendant's clinical judgment to reduce the inspired oxygen concentration from 70% to 50% was medically justified by the presence of the absorption atelectasis phenomena. Defendant contended that plaintiff's respiratory status did not impair heart function or circulatory status and did not produce the periods of apnea or cardiac arrhythmias which plaintiff suffered. Defendant further DEFENDANT-anesthesiologist argued that the standard of care did not require placing plaintiff on a ventilator. In addition, defendant's clinical judgment to reduce the inspired oxygen concentration from 70% to 50% was medically justified by the presence of the absorption atelectasis phenomena. Defendant contended that plaintiff's respiratory status did not impair heart function or circulatory status and did not produce the periods of apnea or cardiac arrhythmias which plaintiff suffered. Defendant further contended that plaintiff's brain damage resulted from "post pump encephalopathy."

FACTS: On December 24, 1983, Plaintiff was admitted to the [Medical Center] with a diagnosis of acute cholecystitis and peritoneal symptoms, requiring immediate surgery for total cholecystectomy (removal of gall bladder). Upon induction of anesthesia by defendant anesthesiologist, the Plaintiff vomited, aspirated his gastric contents and developed a condition known as aspiration pneumonia. It was alleged that Plaintiff, a physician, repeatedly informed the doctors and staff that he had ingested foods and beverages prior to entering the emergency room.

PLAINTIFF contended and that defendant anesthesiologist was negligent in the administration of anesthesia in that: (1) he failed to administer medication designed to help empty the patient's stomach and alter the acidity level of its contents; (2) the intubation of the patient, which is usually done with the patient awake, was attempted while the patient was asleep, causing him to aspirate his vomit; (3) defendant did not keep the patient in a semi-elevated position but, instead, allowed him to lie flat on his back; and (4) defendant should have attempted the Sillich maneuver upon anesthesia induction to prevent the reflux of stomach contents into the pharynx.

DEFENDANT anesthesiologist argued that he had used routine procedures for the induction of general anesthesia to a heart patient. While an awake intubation and the use of the Sillich maneuver are proper in the normal patient, in the case of a heart patientsuch procedures are contraindicated as they could lead to a heart attack.

FACTS: On October 24, 1984, a 24 year old male plaintiff was admitted into the [Hospital] for minor outpatient surgery to effect the removal of hardware which had previously been placed in his ankle as treatment for a fracture. Plaintiff was placed under general anesthesia by defendant

anesthesiologist and approximately 10 minutes later, defendant noted PVCs on the heart monitor. According to defendant's testimony, he determined that the anesthesia mask was tightly fitted around plaintiff's nose and mouth, that the plaintiff's lips had good color and showed no sign of turning blue, and that appropriate resistance was achieved on squeezing the air bag, all of which led defendant to conclude that plaintiff was receiving adequate oxygenation and ventilation. Defendant then administered Lidocaine in an attempt to restore a normal heart beat. The PVCs continued and defendant administered a second injection of Lidocaine approximately 4 minutes after the first injection. Immediately thereafter, plaintiff went into ventricular tachycardia and then cardiac arrest. Plaintiff was intubated, CPR was started, and plaintiff was revived. The plaintiff received 100% oxygen for several minutes before arterial blood gases were taken, which indicated an abnormally low oxygen level and extremely high CO₂ level. The evidence indicated that approximately 8-9 minutes passed between the onset of PVCs and resuscitation of plaintiff.

PLAINTIFF contended that defendant deviated from the standard of care in failing to oxygenate and ventilate plaintiff while he was under general anesthesia and then in failing to recognize clear warning signs of inadequate oxygenation and ventilation, thereby causing the plaintiff to suffer anoxic brain damage and cardiac arrest.

DEFENDANT denied liability and asserted that the plaintiff was provided with adequate oxygenation and ventilation while under general anesthesia and was properly monitored at all times to ensure adequate oxygenation and ventilation. The defendant contended that the plaintiff's cardiac arrest was not the result of an anesthesiology oversight but was caused by one or more of a number of possible alternatives completely unrelated to the anesthesiology administered.

FACTS: On 11/21/85, a 12 year old male plaintiff was admitted to [Hospital] with a ruptured appendix. He underwent an appendectomy and was discharged on 11/28/85. On 1/9/86, plaintiff was readmitted through [Hospital] emergency room with a diagnosis of subacute bowel obstruction. He was discharged from [Hospital] on 1/12/86, as it was felt that the obstruction was resolved. On 1/16/86, the plaintiff was readmitted and an exploratory laparotomy was performed, at which time it was determined that the plaintiff's entire bowel was irritated. At the close of surgery, the defendant anesthesiologist introduced an internal jugular catheter to be used as a hyperalimentation line through which the patient could receive nutrition while the bowel recovered. On 1/17/86 and 1/18/86, chest x-rays were taken which the plaintiff contended were interpreted incorrectly by the defendant as showing that the catheter tip was located in the superior vena cava. On 1/18/86, both films were read by a radiologist

who found the catheter to be in the lower right atrium. On 1/21/86, the infusion rate of TPN fluid through the CVP line was high, resulting in an infusion of TPN fluid into the pericardial sac surrounding the heart.

PLAINTIFF contended that he suffered a cardiac tamponade, necessitating an emergency pericardiocentesis to restore the plaintiff's blood pressure and heart rate. The plaintiff maintained that the tip of the catheter pierced the right atrial wall of his heart, permitting the influx of fluid into the pericardial sac and that the defendant anesthesiologist deviated from the standard of care in misplacing the catheter tip into the low right atrium of the heart. The defendant further misinterpreted the x-ray which depicted the tip of the catheter in the low right atrium and plaintiff asserted that the defendant deviated in failing to timely withdraw the catheter tip from the heart. Finally, the plaintiff contended that he suffered trauma to his heart with a resulting depressive episode and post-traumatic stress disorder as a result of the defendant's negligence.

DEFENDANT asserted that the technique and manner of inserting the catheter were within the medically accepted standards of care. The defendant further maintained that his performance in inserting the catheter was not negligent and that the plaintiff did not suffer any injury as a result of the defendant's conduct.

FACTS: Plaintiff, 41-year-old male mechanic was disabled from his employment due to a back injury. Plaintiff underwent a lumbar laminectomy to treat the condition. After surgery, plaintiff suffered a nerve lesion and developed right ulnar neuropathy which left him without the use of his dominant hand. Defendant anesthesiologist provided anesthesia during the surgery. The plaintiff's case proceeded against the defendant anesthesiologist on the theory of *res ipsa loquitur*.

PLAINTIFF contended that the nerve lesion and damage was occasioned by the defendant's improper positioning of the plaintiff during surgery, and that ulnar neuropathy, a well-known risk of surgery when performed in the prone position, was not an acceptable result.

DEFENDANT contended that the plaintiff's injury was not documented until six days after the surgery, and asserted that the injury could have occurred after surgery. The defendant also argued that the plaintiff was already severely disabled from his pre-existing back injury and that he did not sustain any further lost wages as a result of the injury to his hand.

TABLE 1. DEMOGRAPHIC CHARACTERISTICS FOR
PHYSICIANS IN PART I OF THE SURVEY

Physician #	Residency Training	Years of Experience	Academic Title	Board Certified?	Formal Law Program?	Source of Info for Malpractice	Factors of Negligence (out of 4)	Any Legal Background?
AA1	Program B	24	Professor	1	0	Courses, seminars, expert witness roles	3	immediate family (X3)
AA2	Program A	6	Assistant in Anesthesia	1	0	throwaways	1	0
AA3	Program A	33	Associate Professor	1	0	throwaways, Health Affairs	2	0
AA4	Program A	1.5	Assistant in Anesthesia	0 (will be taking boards)	0	throwaways	2	0
AA5	Program A	7	Assistant in Anesthesia	1	0	literature	1	0
AA6	Program C	21	Assistant in Anesthesia	1	0	risk management courses	1	0
AA7	Program A	5	Assistant in Anesthesia	1	0	journals, newsletters	1	0
AA8	Program A	14	Associate in Anesthesia	1	0	case conferences	2	2
AA9	Program D	10	Assistant in Anesthesia	1	0	journals, 1 seminar	1	0
AA10	Program E	25	Assistant in Anesthesia	1	0	law newspaper, journals	2	J.D., LL.M.
AA11	Program F	23	Instructor in Anesthesia	1	0	risk management seminars	1	0
	mean	15.41				mean	1.55	
	standard deviation	10.28				standard deviation	0.66	
<p>0=No, 1=Yes Negligence Definition: 4 Factors: Preexisting duty, Breach of duty, Causation, Damages</p>								

TABLE 2A. PHYSICIAN PART II SURVEY RESULTS-
FIRST AND SECOND ADMINISTRATIONS

Physician #	Case 1-D		Second Survey Results-Case 1			Case 2-D		Second Survey Results-Case 2		
	Agreement	Likert Value	Agreement	Likert Value	MD Prediction	Agreement	Likert Value	Agreement	Likert Value	MD Prediction
AA1	1	2	1	2	1		3	0	4	1
AA2	1	1	1	1	1	0	4	0	4	0
AA3	1	2	*	*	*	0	4	*	*	*
AA4		3	1	1	1	0	5	0	5	0
AA5	1	2	1	2	1	0	4	0	4	0
AA6	1	2	1	2	1	0	4	0	5	0
AA7	1	2	1	2	1	0	4	0	4	0
AA8	1	1	1	2	1	0	5	0	5	0
AA9		3	1	1	1	0	5	0	5	0
AA10		3	1	1	1	0	4	0	5	0
AA11	1	1	1	2	1		3	0	4	0
Mean	1.00	2.00	1.00	1.60	1.00	0.00	4.09	0.00	4.50	0.10
Standard Deviation	0.00	0.77	0.00	0.52	0.00	0.00	0.70	0.00	0.53	0.32

Agreement With Jury: 0=No 1=Yes; comparing 4, 5 or 1, 2 v. Jury Verdict
Likert Scale: 5=Negligent, 4=Most likely negligent, 3=Can't Tell, 2=Most likely not negligent, 1=Not negligent
*AA3 did not return the second survey.

TABLE 2B. PHYSICIAN PART II SURVEY RESULTS-
FIRST AND SECOND ADMINISTRATIONS

Physician #	Case 3-P		Second Survey Results-Case 3			Case 4-D		Second Survey Results-Case 4		
	Agreement	Likert Value	Agreement	Likert Value	MD Prediction	Agreement	Likert Value	Agreement	Likert Value	MD Prediction
AA1	1	5	1	5	1	0	4	0	4	0
AA2		3	1	4	1	3	1	2	1	
AA3	1	5	*	*	*	*	3	*	*	*
AA4	1	4	1	4	1	1	2	1	2	0
AA5	1	4	1	4	1	1	2	1	2	0
AA6	1	4	1	4	1	1	2		3	1
AA7		3		3	1		3		3	1
AA8	1	5	1	5	1		3		3	1
AA9	1	4	1	5	1	0	5	0	5	0
AA10		3	0	2	1		3		3	0
AA11	1	4	1	4	1	1	1	1	2	1
Mean	1.00	4.00	0.89	4.00	1.00	0.67	2.82	0.67	2.90	0.50
Standard Deviation	0.00	0.77	0.33	0.94	0.00	0.52	1.08	0.52	0.99	0.53

Agreement With Jury: 0=No 1=Yes; comparing 4, 5 or 1, 2 v. Jury Verdict
Likert Scale: 5=Negligent, 4=Most likely negligent, 3=Can't Tell, 2=Most likely not negligent, 1=Not negligent
*AA3 did not return the second survey.

TABLE 2C. PHYSICIAN PART II SURVEY RESULTS-
FIRST AND SECOND ADMINISTRATIONS

Physician #	Case 5-D		Second Survey Results-Case 5			Case 6-P		Second Survey Results-Case 6		
	Agreement	Likert Value	Agreement	Likert Value	MD Prediction	Agreement	Likert Value	Agreement	Likert Value	MD Prediction
AA1	1	2	1	2	1	1	4	1	4	1
AA2	1	2		3	0	1	4	0	2	1
AA3	1	2	*	*	*	1	5	*	*	*
AA4	1	2		3	0	1	4	1	4	1
AA5	1	2	1	1	1		3		3	1
AA6	0	4	0	4	0	1	5	1	4	1
AA7	1	1	1	2	1	1	4	1	4	1
AA8	0	4	1	2	1	1	5	1	5	1
AA9	0	4	0	4	0	1	4		3	1
AA10		3	1	2	0	1	4	1	4	1
AA11		3	1	2	1	1	5	1	4	1
Mean	0.67	2.64	0.75	2.50	0.50	1.00	4.27	0.88	3.70	1.00
Standard Deviation	0.50	1.03	0.46	0.97	0.53	0.00	0.65	0.35	0.82	0.00

Agreement With Jury: 0=No 1=Yes; comparing 4, 5 or 1,2 v. Jury Verdict
 Likert Scale: 5=Negligent, 4=Most likely negligent, 3=Can't Tell, 2=Most likely not negligent, 1=Not negligent
 *AA3 did not return the second survey.

TABLE 2D. PHYSICIAN PART II SURVEY RESULTS-
FIRST AND SECOND ADMINISTRATIONS

Physician #	Case 7-P		Second Survey Results-Case 7			Case 8-D		Second Survey Results-Case 8		
	Agreement	Likert Value	Agreement	Likert Value	MD Prediction	Agreement	Likert Value	Agreement	Likert Value	MD Prediction
AA1	1	5	1	5	1	0	4	0	4	1
AA2	1	4		3	0		3		3	0
AA3	1	5	*	*	*	0	4	*	*	*
AA4		3	0	2	1		3	0	4	1
AA5		3	1	4	1	0	4	0	4	0
AA6	1	4	1	4	1	0	5	0	4	0
AA7	1	4		3	0	1	2	1	2	1
AA8	1	5		3	1	0	5	0	4	0
AA9		3	1	4	1	0	4	0	5	0
AA10	1	4	1	4	1	0	4	0	4	0
AA11	1	4	1	2	1	0	4	1	2	0
Mean	1.00	4.00	0.86	3.40	0.80	0.11	3.82	0.22	3.60	0.30
Standard Deviation	0.00	0.77	0.38	0.97	0.42	0.33	0.87	0.44	0.97	0.48

Agreement With Jury: 0=No 1=Yes; comparing 4, 5 or 1,2 v. Jury Verdict
 Likert Scale: 5=Negligent, 4=Most likely negligent, 3=Can't Tell, 2=Most likely not negligent, 1=Not negligent
 *AA3 did not return the second survey.

TABLE 2E. PHYSICIAN PART II SURVEY RESULTS-
FIRST AND SECOND ADMINISTRATIONS

Physician #	Case 9-D		Second Survey Results-Case 9			Case 10-P		Second Survey Results-Case 10		
	Agreement	Likert Value	Agreement	Likert Value	MD Prediction	Agreement	Likert Value	Agreement	Likert Value	MD Prediction
AA1	0	5	0	5	0	1	4	1	5	1
AA2	0	5	0	4	0	1	4		3	1
AA3		3	*	*	*	1	5	*	*	*
AA4	0	5	0	4	1	1	5	1	4	1
AA5		3	0	4	0	1	4	1	4	1
AA6	0	5	0	4	0	1	5	1	5	1
AA7		3		3	1	1	4	1	4	1
AA8	0	5	0	4	0	1	5		3	0
AA9	0	4	0	5	0	1	4	1	5	1
AA10	0	4		3	1	1	4	1	4	1
AA11	0	5	1	2	0	0	2	0	2	0
Mean	0.00	4.27	0.12	3.80	0.30	0.91	4.18	0.88	3.90	0.80
Standard Deviation	0.00	0.90	0.35	0.92	0.48	0.30	0.87	0.35	0.99	0.42

Agreement With Jury: 0=No 1=Yes; comparing 4, 5 or 1,2 v. Jury Verdict
 Likert Scale: 5=Negligent, 4=Most likely negligent, 3=Can't Tell, 2=Most likely not negligent, 1=Not negligent
 *AA3 did not return the second survey.

TABLE 2F. PHYSICIAN PART II SURVEY RESULTS-
FIRST AND SECOND ADMINISTRATIONS

Physician #	Case 11-D		Second Survey Results-Case 11			Case 12-P		Second Survey Results-Case 12		
	Agreement	Likert Value	Agreement	Likert Value	MD Prediction	Agreement	Likert Value	Agreement	Likert Value	MD Prediction
AA1	0	4	0	5	0	0	2		3	0
AA2	0	4	0	4	0	0	2	0	2	0
AA3	1	1	*	*	*	0	2	*	*	*
AA4	0	4	0	5	0		3	1	4	0
AA5	1	2		3	0	0	2	0	2	0
AA6	0	5	0	4	0	1	4	1	4	1
AA7	1	2	1	2	0	0	2	0	2	0
AA8	0	5	0	4	0	0	2	0	1	0
AA9	0	4	1	2	1	1	4	0	2	0
AA10	0	4	0	4	0	1	4	1	4	1
AA11	1	2		3	1	0	2	0	2	1
Mean	0.36	3.36	0.25	3.60	0.20	0.30	2.64	0.33	2.60	0.30
Standard Deviation	0.50	1.36	0.46	1.07	0.42	0.48	0.92	0.50	1.07	0.48

Agreement With Jury: 0=No 1=Yes; comparing 4, 5 or 1,2 v. Jury Verdict
 Likert Scale: 5=Negligent, 4=Most likely negligent, 3=Can't Tell, 2=Most likely not negligent, 1=Not negligent
 *AA3 did not return the second survey.

**TABLE 3. PART II SURVEY RESULTS-
PHYSICIAN ASSESSMENT AGREEMENT, LIKERT VALUES, AND
PREDICTION VALUES FOR FIRST AND SECOND
ADMINISTRATION**

Physician#	MD Agreement Average		Likert Values		Prediction Average
	First Survey	Second Survey	First Survey	Second Survey	
AA1	0.55	0.55	3.67	4.00	0.67
AA2	0.56	0.38	3.25	2.92	0.42
AA3	0.70	*	3.42	*	*
AA4	0.63	0.55	3.58	3.50	0.58
AA5	0.67	0.60	2.92	3.08	0.50
AA6	0.58	0.55	4.08	3.92	0.58
AA7	0.78	0.75	2.83	2.83	0.67
AA8	0.45	0.44	4.17	3.42	0.50
AA9	0.40	0.45	4.00	3.83	0.50
AA10	0.50	0.60	3.67	3.33	0.58
AA11	0.60	0.73	3.00	2.58	0.67
Mean	0.58**	0.56**	3.52***	3.34***	0.57****
Standard Deviation	0.50	0.5	0.49	0.49	0.09

Agreement With Jury: 0=No 1=Yes; comparing 4, 5 or 1,2 v. Jury Verdict
 Likert Scale: 5=Negligent, 4=Most likely negligent, 3=Can't Tell, 2=Most likely not negligent, 1=Not negligent
 *AA3 did not return second survey.
 **Not significantly different across administrations (by physician, p=0.16); significantly different from jury verdicts (by physician, first survey, p=0.018; second survey, p=0.021).
 ***Not significantly different across administrations (by case, p range 0.11-1.00; by physician, p range 0.21-1.00).
 ****Significantly different from jury verdicts (over all cases, p<0.001; by physician, p=0.017).

TABLE 4A. NPNL CASE EVALUATION RESULTS

NPNL#	Case 1-D			Case 2-D			Case 3-P			Case 4-D		
	Agreement	Likert Value	NP Prediction									
NPNL1		3	1		3	1	1	4	1		3	1
NPNL2	1	2	1	0	5	0	1	5	1	1	2	1
NPNL3	0	4	0	0	4	0	1	4	1	1	2	1
NPNL4	0	4	0	0	4	0	1	5	1	1	2	1
NPNL5	0	4	0	0	4	0	1	5	1	1	2	1
NPNL6	1	2	1	0	4	0	1	4	1		3	1
NPNL7		3	1	0	5	0	1	5	1		3	1
NPNL8	1	2	1	1	2	1	1	4	1		3	1
NPNL9	1	2	1	1	1	1	1	5	1		3	1
NPNL10	1	2	1	0	4	0	0	2	0	0	4	0
NPNL11	1	2	1	1	2	1	1	4	1		3	1
NPNL12	1	1	1	0	4	0	0	1	0	0	5	0
Mean	0.70	2.58	0.75	0.27	3.50	0.33	0.83	4.00	0.83	0.67	2.92	0.83
Standard Deviation	0.48	1.00	0.45	0.47	1.24	0.49	0.39	1.28	0.39	0.52	0.90	0.39

TABLE 4B. NPNL CASE EVALUATION RESULTS

NPNL#	Case 5-D			Case 6-P			Case 7-P			Case 8-D		
	Agreement	Likert Value	NP Prediction									
NPNL1		3	1	1	5	1	1	4	1		3	1
NPNL2	1	2	1	1	5	1	1	5	1		3	1
NPNL3	0	4	0	1	4	1	1	4	1	1	1	1
NPNL4	0	4	0	1	4	1	1	4	1	1	2	1
NPNL5	0	4	0	1	4	1	1	4	1	1	1	1
NPNL6	1	2	1	1	5	1	0	2	0		3	1
NPNL7	0	4	0	1	5	1	1	5	1	1	2	1
NPNL8	1	2	1	1	5	1		3	1		3	1
NPNL9	1	2	1	1	5	1	1	5	1		3	1
NPNL10	1	2	1	1	4	1	1	4	1	1	2	1
NPNL11	1	2	1	1	4	1	1	4	1	0	4	0
NPNL12	1	1	1	1	4	1	0	2	0	0	4	0
Mean	0.64	2.67	0.67	1.00	4.50	1.00	0.82	3.83	0.83	0.71	2.58	0.83
Standard Deviation	0.50	1.07	0.49	0.00	0.52	0.00	0.40	1.03	0.39	0.49	1.00	0.39

TABLE 4C. NPNL CASE EVALUATION RESULTS

NPNL#	Case 9-D			Case 10-P			Case 11-D			Case 12-P		
	Agreement	Likert Value	NP Prediction									
NPNL1	1	2	1	1	4	1		3	1	0	2	0
NPNL2	0	5	0	0	1	0	0	5	0	0	1	0
NPNL3	0	5	0	1	4	1	0	4	0	1	2	0
NPNL4	0	4	0	1	5	1	0	4	0	0	2	0
NPNL5	0	5	0	1	5	1	0	4	0	0	2	0
NPNL6	0	4	0	1	5	1	0	4	0	0	1	0
NPNL7	0	5	0	1	4	1	0	5	0		3	1
NPNL8	1	5	1		3	1	0	4	0		3	0
NPNL9	0	4	0	1	5	1		3	1		3	1
NPNL10	1	4	1	0	2	0	0	4	0	1	2	1
NPNL11	0	4	0	1	4	1		3	1	0	2	0
NPNL12	0	4	0	1	5	1	0	5	0	0	1	0
Mean	0.25	4.25	0.25	0.82	3.92	0.83	0.00	4.00	0.25	0.22	2.00	0.25
Standard Deviation	0.45	0.87	0.45	0.40	1.31	0.39	0.00	0.74	0.45	0.44	0.74	0.45

TABLE 5. NPNL ASSESSMENT AGREEMENT VALUES, LIKERT VALUES, AND PREDICTION VALUES

NPNL0#	Agreement Average	Likert Average	Prediction Average
NP1	0.83	3.25	0.92
NP2	0.55	3.42	0.58
NP3	0.58	3.50	0.50
NP4	0.50	3.67	0.50
NP5	0.50	3.67	0.50
NP6	0.50	3.25	0.58
NP7	0.56	4.08	0.67
NP8	0.86	3.25	0.83
NP9	0.88	3.42	0.92
NP10	0.58	3.00	0.58
NP11	0.70	3.17	0.75
NP12	0.33	3.08	0.33
Mean	0.59*	3.40	0.64**
Standard Deviation	0.49	0.30	0.48

Agreement With Jury: 0=No 1=Yes; comparing 4, 5 or 1,2 v. Jury Verdict

Likert Scale: 5=Negligent, 4=Most likely negligent, 3=Can't Tell, 2=Most likely not negligent, 1=Not negligent

*Significantly different from jury verdicts (by NPNLs, $p=0.014$).

**Significantly different from jury verdicts (by NPNLs, $p=0.025$).

TABLE 6. PHYSICIAN AND NPNL
GRAY AREA CASE PREDICTION
OF JURY VERDICTS

	Physicians	NPNLs
N	20	23
Mean	0.55 ^{a,c}	0.96 ^{b,c}
Standard deviation	0.51	0.21

^a Significantly different from jury verdicts, $p < 0.001$.

^b Not significantly different from jury verdicts, $p = 0.37$.

^c Significantly different, $p = 0.003$.