REALITY CHECK: HOW MALPRACTICE FACTS CHANGED MALPRACTICE LIABILITY THEORY

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REALITY CHECK:*  
HOW MALPRACTICE FACTS CHANGED MALPRACTICE LIABILITY THEORY  

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I. Introduction

States impose malpractice liability for medical negligence in order to induce medical providers to invest adequately in patient safety. The central challenge is how to structure liability to induce physicians and medical institutions to invest optimally in patient safety.

Scholars specializing in the economic analysis of law have long been at the forefront of efforts to analyze and reform medical malpractice liability. Initial efforts relied on the classic model of accidents. This produced a narrow and skeptical view of the role of malpractice liability and lent support to numerous efforts to curtail liability. Empirical legal studies has transformed the economic analysis of medical malpractice liability by altering our understanding of the central problems facing health care markets, and, in turn, has spurred theorists to develop a new model of malpractice liability. This new model, combined with the results of empirical analysis, has altered our understanding of the purposes of malpractice liability and reveals that many politically-popular efforts to reform malpractice liability harm the people their purported intended beneficiaries, namely the patients and medical providers.

The traditional economic analysis of malpractice liability relies on the classic model of accidents. In this model, one party (here physicians) undertakes an activity that may injure another party (here patients). The injurer can reduce the risk of injury by investing in “care” (here treatment). Society wants potential injurers to make all cost-effective investments in care, and thus wants the injurer to select the level of care that maximizes social welfare. Liability is needed because injurers select the level of care that maximizes their own welfare. They thus take too
little care when they bear the cost of care, but do not bear the cost of medical negligence. When properly designed, liability can remedy this problem by forcing injurers to pay for any injuries resulting from their failure to take optimal care.¹

Scholars embracing this framework naturally are skeptical of malpractice liability. In this framework, liability is needed when physicians bear the cost of treatment, but is not needed when providers care about patients and do not bear the costs of “care”—as when patients are insured and medical providers can actually profit by providing higher quality treatment (care). Thus, in the case of patients with fee-for-service insurance, it would seem that the state need not intervene, except in the case of incompetent (“bad apple”) physicians. Moreover, when malpractice is caused entirely by incompetent physicians, liability may not be needed if the state can adequately address the incompetent physician problem through licensing and regulation.²

Beyond this, the classic model promotes a skeptical view of malpractice liability because it implies that a well-functioning system will not generate successful malpractice cases in equilibrium. In the classic model, competent physicians should never be found negligent if the tort system functions properly because they are assumed to know when they are providing optimal care and providers facing optimal malpractice liability will never select negligent care if courts correctly apply the standard of care and impose the correct level of damages.³ Yet,

¹ See Steven Shavell, Strict Liability Versus Negligence, 9 J. LEGAL STUD. 1 (1980).
² For a discussion of evidence suggesting that we cannot rely entirely on licensing and regulation to adequately address the problem of incompetent physicians, see Jennifer Arlen & W. Bentley MacLeod, Malpractice Liability for Physicians and Managed Care Organizations, 78 N.Y.U. L. REV. 1929, 1960 n.108-09 (2003).
³ See Shavell, supra note 1 (reaching this result in the context of torts generally).
competent physicians are regularly held liable for medical malpractice. This discrepancy would appear to suggest that malpractice is not functioning effectively and that most malpractice claims may be frivolous, brought by plaintiffs hoping to obtain large awards from pro-plaintiff, error-prone juries.\(^4\)

Scholars adopting the traditional framework have naturally tended to embrace a skeptical view of the optimal scope of malpractice liability. In response, they have pushed for reforms designed to restrict the scope of malpractice liability, focusing on proposals designed to indirectly limit malpractice liability by allowing medical providers to offer patients contracts that restrict or eliminate patients’ right to sue providers for medical negligence.\(^5\) Similarly, state legislatures have embraced the idea that frivolous litigation and pro-plaintiff juries are the leading problems plaguing malpractice liability.\(^6\) In response, state after state

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\(^4\) This conclusion is consistent with the classic model of accidents. Some scholars have extended this analysis to allow for the possibility that courts err in the standard of care. It has been shown that under reasonable assumptions about error, error in determining “due care” can lead to an equilibrium in which defendants take excessive care but are found liable nonetheless. See John E. Calfee & Richard Craswell, *Deterrence and Uncertain Legal Standards*, 2 J.L. ECON. & ORG 279 (1986). As is discussed later, this equilibrium also is inconsistent with the evidence that genuine medical error occurs regularly.


\(^6\) Concerns also arise about high malpractice liability insurance premiums. Nevertheless, efforts to address this problem through measures that reduce recovery and litigation—such as non-economic damage caps and collateral source rule reform—suggest that
has adopted reforms to curtail damages or to otherwise restrict suits.  

Empirical analysis has turned most of this conventional wisdom on its head. In so doing, it has demonstrated that many reforms favored by politicians and traditional scholars make patients and providers worse off.

Empirical analysis of medical error shows that the core premises underlying the traditional approach to malpractice liability are incorrect. Specifically, empirical analysis reveals that the traditional model of accidents does not capture the root causes of most medical error. The traditional model assumes that negligence results when an individual injurer knowingly decides to take suboptimal care. As applied to medicine, this framework assumes that medical negligence results from a decision by a medical provider to knowingly select a suboptimal treatment. Such a doctor is reasonably viewed as a “bad apple.” By

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7 State legislatures have restricted damage awards directly by adopting caps on noneconomic damages and wrongful death awards. See Catherine M. Sharkey, *Unintended Consequences of Medical Malpractice Damages Caps*, 80 N.Y.U. L. REV. 391 (2005). They have limited damages indirectly through measures such as collateral source rule reform (under which patients injured by medical negligence cannot recover compensatory damages for damages covered by their first-party insurance, such as health insurance), joint and several liability reform, and measures that increase physicians’ ability to shelter assets from patients. Early reforms include shortened statute of limitations and requirements that patients submit claims to a physician review board with authority to assess the validity of the claim. More recent indirect efforts include limitations on contingency fees. For a survey of reforms, see Ronen Avraham, *An Empirical Study of the Impact of Tort Reforms on Medical Malpractice Settlement Payments*, 36 J. LEGAL STUD. S183 (2007).

8 See Shavell, * supra* note 1. In the traditional model, injurers know the cost and benefits of care, the level of care that they take, and the standard of care. Thus, an injurer who decides to take suboptimal care \((x < x^*\text{, where } x^* \text{ is due care})\) does so knowingly. The injurer does not knowingly cause harm; harm happens with probability \(p(x)\). Yet the injurer does know he is being negligent. *See infra* Section II. A.
contrast, empirical analysis reveals that patients regularly are injured by medical errors, and that most medical errors are caused by otherwise competent medical providers. Moreover, medical errors generally are accidental, in the sense that the provider did not knowingly select an erroneous treatment.\(^9\) They occur because the physician accidentally misdiagnosed the patient, selected the wrong treatment, or provided the treatment incorrectly, often believing that he was providing appropriate care.\(^10\) These accidental errors nevertheless warrant intervention because they are not inevitable. Instead they often result from doctors’ (and medical institutions’) failure to invest adequately in “expertise” (or “preventative interventions”)—defined as investments by the physician or medical institution in the provider’s capacity to correctly diagnose the patient, identify the correct treatment, and provide treatment without accidental preventable error.\(^11\) These preventative interventions include investment by physicians and medical care institutions (hospitals) in medical expertise, procedures, supervision, and health care technology. This suggests that in order to optimally protect patients, malpractice liability must be designed to induce optimal investment by providers and medical institutions in expertise and various preventative interventions (including supervision, error detection/prevention systems—such as

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9 Thus, while there is evidence that patients often receive negligent care, see sources cited infra note 10, this negligent care does not appear to be the result of a knowing decision to provide suboptimal care \((x < x^*)\) in the way depicted in the classic model of accidents.


11 See Arlen & MacLeod, supra note 2.
check lists—and health care technology).

Accordingly, in order to determine the proper scope of liability, we need a model of malpractice liability that recognizes that medical providers can err accidentally and can reduce the probability of error through investments in expertise and other forms of prevention.

Responding to empirical analysis, scholars have developed a model of medical negligence that explicitly recognizes that medical providers can affect patient welfare both through decisions about how much to invest in expertise (and other forms of prevention), as well as through decisions about whether to try to provide the optimal treatment. The latter decision determines whether the provider knowingly provides suboptimal care. The former investment determines the likelihood that the provider will err accidentally.

Analysis of medical care markets employing this model reveals that optimal malpractice liability serves multiple goals: operating to regulate both investments in expertise and treatment choice. When patients are insured and medical providers are compassionate—in that they want to provide the right treatment—then providers will not deliberately provide suboptimal care, just as in the classic model. Nevertheless, unlike in the classic model, malpractice liability is still needed. Malpractice liability is

12 See id.

13 See Jennifer Arlen & W. Bentley MacLeod, *Torts, Expertise, and Authority: Liability of Physicians and Managed Care Organizations*, 36 RAND J. ECON. 494 (2005). This framework actually employed assumes that doctors are compassionate and thus want to provide medically appropriate care. Nevertheless, the model is structured to permit analysis of situations where physicians might benefit from knowingly providing suboptimal care. This can happen under capitation insurance plans that give physicians a flat payment per patient and require physicians to pay all or most of the cost of any treatment provided.

14 See Arlen & MacLeod, *supra* note 2; id.
needed, even if all physicians would happily provide the optimal treatment if they are able to correctly diagnose the patient and identify the optimal treatment, to ensure that physicians and institutions invest adequately in the expertise needed to enable them to determine and provide optimal treatment. Absent liability, physicians will not invest as much in expertise as patients want them to because physicians bear the full cost of expertise but do not obtain the full benefit. This result holds even when doctors are other-regarding and care about patients’ welfare—assuming, as is reasonable, that patients injured by medical error suffer more than their physicians (and thus have a higher willingness to pay to avoid error). This analysis also shows that medical care is more sensitive to the magnitude of expected damage awards than is implied by the classic model of torts.

Empirical analysis not only has transformed malpractice liability scholarship by inducing a revision in the model of negligence, it also has dramatically altered the debate over optimal malpractice liability reform. Scholars embracing the traditional analysis tended to assume that there is too much malpractice liability, and thus promote reforms designed to reduce the scope and magnitude of liability. Empirical analysis undermines the core premises of this reform effort in two ways. First, the empirically-grounded model reveals that regular malpractice litigation does not signal that the malpractice liability system is broken. Even in

15 Id.
16 Id.
17 Compare Arlen & MacLeod, supra note 2, with Shavell, supra note 1, and Marcel Kahan, Causation and Incentives to Take Care under the Negligence Rule, 18 J. LEGAL STUD. 427 (1989).
18 Nevertheless, it is likely that we see regular error and litigation because malpractice liability is not optimally designed. Yet the core problem is not that there are too many settlements, but rather that the system does not impose sufficiently large expected
a well-functioning tort system, competent medical providers will provide negligent care accidentally because doctors cannot eliminate the risk of error by investing optimally in expertise. Thus, evidence that competent physicians are found liable does not mean that malpractice liability is functioning suboptimally. This undermines a core theoretical motivation for efforts to restrict malpractice liability.

Second, empirical analysis has provided evidence that directly undermines a central premise of many liability-constraining reform proposals: that many settled malpractice cases are frivolous, with liability falling randomly on negligent and non-negligent providers. To the contrary, empirical analysis reveals that patients face a substantial risk of being injured by genuine medical error. Moreover, the vast majority of malpractice settlements involve patients whose injuries were caused by actual, genuine provider error. While not all cases are

liability on negligent providers and on the institutions responsible for patient safety to induce optimal investments in patient safety. See Jennifer Arlen, Contracting Over Liability: Medical Malpractice and the Cost of Choice, 158 U. PA. L. REV. 957 (2010); see also Michelle M. Mello & Troyan A. Brennan, Deterrence of Medical Errors: Theory and Evidence for Malpractice Reform, 80 TEX. L. REV. 1595 (2002).

19 See Arlen & MacLeod, supra note 2; Arlen & MacLeod, supra note 13.
20 See Arlen & MacLeod, supra note 13.
21 This empirically-grounded model also reveals why we should not embrace contractual liability—which is a reform proposal favored by many scholars. See, e.g., Epstein, supra note 5; Epstein & Sykes, supra note 5; Clark C. Havighurst, Vicarious Liability: Relocating Responsibility for the Quality of Medical Care, 26 AM. J.L. & MED. 7 (2000); Robinson, supra note 5; THALER & SUNSTEIN, supra note 5. This model reveals that liability imposed automatically by the state, on all patients, across all providers, benefits patients more, at lower cost, than liability imposed by contract, even when the precise liability rule is the same. Thus, states shifting to contractual liability would reduce many patients’ welfare and would induce many patients to contract out of liability even when they would have been better off were liability imposed by fiat. See Arlen, supra note 18.
22 See David M. Studdert et al., Claims, Errors, and Compensation Payments in Medical Malpractice Litigation, 354 NEW ENG. J. MED. 2024 (2006).
resolved correctly, the evidence does not support the view that most errors in imposing liability favor patients. Instead, more than half of the erroneously decided cases resulted in negligent providers escaping liability; evidence suggests jury errors are particularly likely to favor providers. These results undermine the premise that there is too much malpractice liability. Indeed, empirical analysis reveals that the core problems plaguing the malpractice system include under-claiming by patients injured by medical negligence and restricted liability for the parties with the most indirect and direct ability to affect medical error—hospitals and Managed Care Organizations (MCOs).

Beyond this, the empirically-grounded analysis of malpractice liability reveals that states should reject proposals to allow medical providers to contract over liability with their patients. The empirically-grounded model reveals that even informed patients who value liability would be worse off under contractual liability than under well-designed malpractice liability because, among other reasons, malpractice liability provides a collective good. This undermines the claim that informed contracting would produce optimal decisions about when to impose liability because individual contracting over collective goods is plagued by coordination and free-rider problems, and thus generally does not result in the efficient provision of collective goods.

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23 See id.
24 See Arlen, supra note 18.
25 See Epstein, supra note 5; Robinson, supra note 5; Thaler & Sunstein, supra note 5; Havighurst, supra note 5; Havighurst, supra note 21; Patricia M. Danzon, Tort Liability: A Minefield for Managed Care?, 26 J. Legal Stud. 491, (1997); see also Keith N. Hylton, Agreements to Waive or to Arbitrate Legal Claims: An Economic Analysis, 8 Sup. Ct. Econ. Rev. 209 (2000).
26 This is not the only reason why contracting over liability is inefficient. See, e.g., Arlen, supra note 18; Jennifer Arlen, Private Contractual Alternatives to Malpractice Liability, in Medical Malpractice and the U.S. Health Care System: New
Finally, empirical analysis, in concert with the empirically-grounded model of medical negligence, reveals that rather than curtailing liability, malpractice liability reforms should be designed to expand liability to ensure that medical institutions bear liability for medical errors resulting from either their own decisions or those of the medical providers with whom they contract. Empirical analysis reveals that medical institutions disproportionately affect the probability of medical error through their control over the systems, health care technology, and personnel. Some institutions, such as MCOs, even exert direct authority over treatment. Empirical analysis also reveals that medical institutions face too little incentive to implement optimal systems, technology, and other practices. Thus, states genuinely interested in patient welfare should focus on how best to use liability to provide optimal incentives to hospitals and MCOs, instead of embracing empirically-questionable efforts to reduce malpractice liability.

This chapter proceeds as follows. Section One describes the traditional view that there is too much malpractice liability. It begins by

28 See Arlen & MacLeod, supra note 2; Havighurst, supra note 5; William Sage, Regulating Through Information: Disclosure Laws and American Health Care, 99 Colum. L. Rev. 1701 (1999).
29 See Michelle M. Mello et al., Who Pays for Medical Errors? An Analysis of Adverse Event Costs, the Medical Liability System, and Incentives for Patient Safety Improvement, 4 J. Empirical Legal Stud. 835 (2007); Arlen & MacLeod, supra note 2; Epstein & Sykes, supra note 5; Havighurst, supra note 5.
presenting the classic model of accidents and its implications. Section Two presents the empirical challenge to the classic model of malpractice and its implications, and presents a model of malpractice liability that incorporates insights from empirical analysis. Section Three utilizes a combination of empirical analysis and the empirically-grounded model of malpractice liability to reexamine traditional malpractice reform proposals intended to directly or indirectly curtail malpractice liability. The section uses insights from the empirically-grounded model to reveal why one popular reform, contractual liability, would reduce many patients’ welfare. Section Four combines empirical evidence and theoretical analysis to show that the best way to reform malpractice liability is not to restrict it; rather, states should expand the scope of liability to include the medical institutions that directly influence the quality of care that patients receive.

II. Traditional View of Medical Malpractice and Its Limitations

This Section describes the traditional economic approach to malpractice liability and explains how this analysis, combined with a set of presumptions regarding the operation of the tort system, provides support for reforms designed to restrict malpractice liability.

Prior to empirical analysis of medical error, many people assumed that medical error was not a serious problem and was caused primarily by a small percentage of incompetent physicians—proverbial “bad
apples.” This “bad apple” view of medical error implies that most doctors can be relied upon to provide error-free medical care when treatment costs are borne by others. This would appear to suggest that malpractice liability is not needed to provide competent physicians adequate incentives to invest in patient safety.

This conclusion is consistent with the implications of the classic economic model of accidents as applied to situations where most patients purchase fee-for-service health insurance, as was the case during the height of the tort reform movement of the late 1980s. Classic economic analysis models negligent accidents as involving encounters between an “injurer” and a “victim.” The injurer is assumed to undertake an activity that creates a risk of harm to the victim; the probability of harm depends on the injurer’s level of care. Social welfare is maximized when the injurer invests in the level of care that minimizes the sum of care plus expected accident costs. Injurers will not invest in optimal care if they bear the costs of care but do not bear the costs of accidents. Tort liability can redress this problem by ensuring that injurers bear the expected cost of any failure to invest in optimal care. Yet tort liability is not needed if the injurer either does not bear the cost of care or otherwise bears expected accident costs. In standard analysis that views “treatment” as care, tort liability may not be needed to regulate medical care provided by competent physicians when patients were primarily insured by fee-for-service health insurers. First, reputation and physician compassion arguably ensure that physicians bear some cost of harms.

30 See John E. Rolph et al., Identifying Malpractice-Prone Physicians, 4 J. EMPIRICAL LEGAL STUD. 125 (2007).
31 See John Prather Brown, Toward an Economic Theory of Liability, 2 J. LEGAL STUD. 323 (1973); Shavell, supra note 1.
caused by medical error. Moreover, physicians treating insured patients often have no reason to avoid expenditures on costly treatments because the cost of care is borne by the fee-for-service health insurer, not the physician.32

This analysis predicts that, even when there is no liability and patients are not informed, physicians treating insured patients will not underinvest in care.33 Thus, this analysis suggests that even absent tort liability patients face little risk of receiving suboptimal treatment if treated by competent physicians. This economic framework provided support for the view that the numerous malpractice suits filed were the result of excessive claiming—a conclusion that supported reform

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32 Initial empirical analysis challenging the “bad apple” view of medical error appeared in the early 1990s, prior to the rise of Managed Care Organizations and associated institutions such as capitation. Thus, in discussing the traditional view we focus on the application of the traditional model to patients insured by fee-for-service insurers who cover all treatment costs (minus a deductible).

33 Of course, this situation can lead to excessive treatment, which can harm patients when higher cost care is also riskier. This Chapter does not focus on this issue because neither markets nor classic malpractice liability is particularly effective at addressing this problem. Classic malpractice liability does not effectively deter excessive treatment because the standard of negligence generally is based on medical custom, as measured by a national standard. Physicians tend to prevail if they can show adherence to an accepted custom, even if the plaintiff can get other physicians to testify that this is not the best practice. See, e.g., Gary Schwartz, Medical Malpractice, Tort, Contract, and Managed Care, 3 U. ILL. L. REV. 885, 894-95 (1998). But see Helling v. Carey, 519 P.2d 981 (Wash. 1974). If due care is based on “customary care” and if custom is developed under fee-for-service insurance, then providers can be expected to err on the side of providing too much care, rather than substandard care. See Danzon, supra note 25 (observing that the tort standard for due care, which is based on customary care, likely sets due care equal to excessive care since medical custom developed under fee-for-service health insurance); see Arlen & MacLeod, supra note 13 (providing formal proof that informed doctors select the care that maximizes the benefit of treatment to patients, and not the care that maximizes the net benefit of treatment (optimal care), when insurers, not doctors, bear all treatment costs).
proposals designed to limit malpractice liability.34

A. Classic Model of Accidents and its Implications

The traditional analysis of malpractice liability relies on the classic model of accidents. In the classic model of accidents one party (here physicians) undertakes activities that may injure another party (here patients). The potential injurer can reduce the risk of injury by investing in “care.” In this framework, the goal is to induce injurers to take the level of care (treatment choice) that maximizes social welfare. Thus, care should minimize the joint cost of care and expected accident costs. Injurers will take optimal care if they keep investing in care up to the point where the cost of the additional care just equals the social benefit of the resulting reduction in expected accident costs.35

Tort liability may be needed to induce optimal care because potential injurers select the level of care that maximizes their own expected welfare, not that of society. In the classic model, this implies

34 This view also led some to conclude that medical quality would be best addressed by licensing and similar regulations as these measures are targeted at controlling the few bad doctors who were assumed to be responsible for most medical errors. See Rolph et al., supra note 30. As it happens, licensing and quality regulation currently do not adequately protect patients from incompetent physicians. Hospitals are often slow to report problem physicians to state review boards. ATUL GAWANDE, COMPLICATIONS: A SURGEON’S NOTES ON AN IMPERFECT SCIENCE 88-106 (2003) (describing the slow response to problem physicians). State disciplinary review boards are reluctant to impose serious disciplinary sanctions (e.g., suspension, probation, or license revocation) on physicians. PUBLIC CITIZEN, HEALTH RESEARCH GROUP, RANKING OF STATE MEDICAL BOARD’S SERIOUS DISCIPLINARY ACTIONS IN 2001, PUBLICATION #1616 (2001), available at http://www.citizen.org/documents/1616table1.pdf (finding that, in 2001, review boards imposed fewer than two disciplinary actions per 1,000 physicians (2 percent) in District of Columbia, Hawaii, Delaware, South Dakota, Illinois, South Carolina, Wisconsin, Minnesota, Maryland, Rhode Island, Indiana, Connecticut, Maine, and Wyoming).

35 E.g., Brown, supra note 31; Shavell, supra note 1.
that absent either liability or market forces that internalize accident costs, each injurer selects minimal care because he bears the cost of care and does not bear expected accident costs. The state can use negligence liability to induce optimal care. In a well-functioning tort system, injurers who are held liable for accidents resulting from a failure to take optimal care minimize their expected costs by taking optimal care. Accordingly, informed injurers subject to optimal negligence liability should always take due care, so long as due care equals optimal care, liability is accurately imposed,\textsuperscript{36} and expected damages are optimal.\textsuperscript{37}

The classic model expresses these ideas more formally using the following framework, which we apply here to medical care. In the classic model, each doctor provides a valuable service (medical care) to patients. Treatment confers a benefit, $b$, if it is the correct treatment and is done properly. Yet treatment also may injure the patient, causing a harm of $H$. The doctor can reduce the probability of harming the patient, given by $p(x)$, by investing in care, $x$, at a cost of $t(x)$, which we can think of as the cost of providing treatment. In this model, a high level of care results in a small risk of medical error; low-cost care produces a higher risk of harm.\textsuperscript{38}

Social welfare is maximized when the doctor invests in the level of

\textsuperscript{36} See Shavell, supra note 1; see supra note 33.
\textsuperscript{37} See Jennifer Arlen, Note, An Economic Analysis of Tort Damages for Wrongful Death, 60 N.Y.U. L. Rev. 1113 (1985) (explaining that negligence liability does not provide adequate incentives to take care if damages for death and serious permanent injury are below the social costs imposed by the injurer, as they are at present).
\textsuperscript{38} In the classic economic model, injurers cannot both over-invest in care and produce an excessive risk of medical error. By contrast, with medical care, one can have over-investment in treatment and excessive risk. This possibility is relevant to the design of an optimal malpractice liability, but is not relevant to the issues explored in this Chapter. See also supra note 33.
care that minimizes the total social costs of care and expected accidents: $t(x) + p(x)H$.\textsuperscript{39} This level of care is also the level that maximizes the welfare of patients who expect to bear the full cost of both medical error and care, either directly or through insurance premiums. The goal of tort law is to ensure that physicians want to invest in the optimal level of care. In the classic framework, malpractice liability is needed when physicians do not have optimal incentives to invest in care because they bear the full cost of care but do not obtain the full benefit of providing higher quality treatment.

1. Physicians Do Not Bear Treatment Costs

In this model, malpractice liability is not needed to induce doctors to avoid low-cost suboptimal treatments when they do not bear the cost of care, as arguably is the case when patients are insured by a fee-for-service health insurer that pays for all treatment costs. Thus, if we stay within the classic model—in which negligence involves a knowing decision to select suboptimal care—it would seem that negligence liability is not needed since physicians have no reason to avoid high quality treatments even if they are costly. The incentive to avoid suboptimal treatment is enhanced to the extent that individual providers feel compassion for their patients, and thus suffer some cost when they injure a patient.\textsuperscript{40} In this situation, physicians have incentives to avoid providing inexpensive negligent care.\textsuperscript{41}

\textsuperscript{39} See Shavell, supra note 1.
\textsuperscript{40} See Arlen & MacLeod, supra note 2.
\textsuperscript{41} Indeed, they arguably have incentives to provide excessive treatment (that maximizes patient benefit without regard to cost) if insured patients do not internalize the cost of treatment decisions but do obtain the benefits. See Arlen & MacLeod, supra note 13. If courts can distinguish excessive treatment that is risky from that which is not, then malpractice liability may be needed to deter physicians from selecting treatments that
Thus, the classic model of accidents predicts that doctors treating patients covered by fee-for-service insurance generally will not provide insufficient, negligent treatment—even absent liability.42

Evidence of the high cost of care in the U.S. would appear to support the idea that most patients do not face a serious risk of receiving insufficient treatment because expenditures on care, $t(x)$, are high. Thus, this framework suggests that the problem of medical negligence (in the sense of insufficient care) should be limited to doctors who treat uninsured patients—and even then should not be extreme unless the doctor is a “bad apple” who does not care about patient welfare (or has a deficiency that renders him unable to take due care). States could control this problem through more careful regulation of the quality of care provided to the uninsured and by identifying “bad apples” and forbidding them to practice medicine.

2. Physicians Bear the Costs of Higher Quality Treatment

Physicians do not select optimal treatment if they bear the costs of providing higher quality treatment instead of low quality treatment, as is particularly likely to be the case with certain forms of health insurance. In this case, the classic model predicts that, absent liability, physicians will select suboptimal treatment because they bear the cost of care but do not obtain the full benefit of the increase in patients’ expected welfare resulting from higher quality treatment.

It might seem that market forces could ensure that physicians obtain the full benefit of providing due care instead of negligent care. Yet this is

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42 See supra note 41 (this conclusion changes when treatments can be both expensive and risky).
not the case. Reputational penalties do not ensure that physicians internalize the cost of negligence because patients cannot observe the providers’ investments in care at the moment they contract for care. Nor do patients have good information on the expected outcomes of their individual provider. Thus, each patient’s willingness to pay to receive care from a particular provider does not depend on a provider’s actual or expected investment in care. Consequently, providers who invest optimally in care cannot increase their prices accordingly. In turn, those who under-invest do not bear the full consequences of their neglect. Accordingly, the classic model predicts that if patients cannot observe provider quality, then medical providers will not take care absent tort

43 See Arlen & MacLeod, supra note 13; Sherry Glied, Managed Care, in 1A HANDBOOK OF HEALTH ECONOMICS 707 (Anthony J. Culver & Joseph P. Newhouse eds., 2000). This is because ex ante investments in care are unobservable and because many investments in medical quality occur after the patient contracts with the medical provider. See Arlen & MacLeod, supra note 13; Arlen, supra note 18 (discussing the empirical evidence that patients do not know the expected quality of the physicians or hospitals that provide them care). Indeed, most patients believe that health care regulation is sufficiently strong to eliminate any significant differences in physician or hospital quality. See Jacquelyn J. Jewett & Judith H. Hibbard, Comprehension of Quality Care Indicators: Differences among Privately Insured, Publicly Insured, and Uninsured, 18 HEALTH CARE FIN. REV. 75 (1996); KAI SER FAMILY FOUNDATION & AGENCY FOR HEALTHCARE RESEARCH & QUALITY, AMERICANS AS HEALTH CARE CONSUMERS: AN UPDATE ON THE ROLE OF QUALITY INFORMATION 12, 15 (2000). Patients persist in this belief even though licensed medical providers differ dramatically in the expected quality of care they deliver. See PAUL C. WEILER ET AL., A MEASURE OF MEDICAL MALPRACTICE: MEDICAL INJURY, MALPRACTICE LITIGATION, AND PATIENT COMPENSATION (1993) (providing evidence on quality disparity); accord Mello et al., supra note 29; Mark R. Chassin, Benefits and Hazards of Reporting Medical Outcomes Publicly, 334 NEW ENG. J. MED. 394, 394-97 (1996).

Moreover, hospitals not only do not bear the full cost of errors they could prevent, they can even profit from them. Evidence suggests that medical error substantially increases the expected costs of hospitalized patients. Yet hospitals are able to pass on to insurers or patients almost 80 percent of these costs, bearing only 22 percent of the increased health care costs occasioned by their error. Mello et al., supra note 29, at 835. While recent reforms have reduced this problem, it nevertheless persists.
liability. Moreover, they will deliver substandard care knowingly, not accidentally.44

In this framework, negligence liability can eliminate the risk of medical error if courts set the standard of care at the optimal level and hold physicians liable for the full cost of any neglect.45 The fact that optimal care minimizes the joint cost of care and expected accident costs implies that each physician subject to malpractice liability minimizes his expected costs when he provides optimal care and avoids the risk of liability.46 In this model, therefore, optimal liability eliminates doctors’ incentives to select a low cost, suboptimal treatment. Indeed, in this model, when “care” is defined as treatment choice, a well-designed negligence rule eliminates the risk of medical negligence.47

Several characteristics of the classic model and the equilibrium it produces are worth noting. First, under the classic model, injurers (doctors) are never negligent by accident: all negligence involves doctors who intentionally provided suboptimal care. Thus, doctors have little to fear from tort liability—even if damages are high—so long as the tort system is accurate: doctors can simply avoid all risk of negligence liability, and all risk of damages, by deciding to provide optimal care.48 Moreover, if the standard of care is set too high, doctors can avoid liability by conforming to the standard of (customary) care, passing the

44 See Shavell, supra note 1 (obtaining this result in a general model).
45 Id. While traditionally customary care probably was not optimal, see supra note 33 (discussing whether a customary standard of care equals optimal care when custom evolved under fee-for-service insurance), there are reasons to hope that the rise of evidence-based medicine and Managed Care has muted some of the distorting effects of fee-for-service insurance.
46 Id.
47 See Shavell, supra note 1 (obtaining this result in a general model).
costs on to patients or insurers. Thus, as long as the standard of care is predictable, doctors can generally avoid liability for medical negligence.49

Second, under the classic model, there should be no medical negligence in equilibrium if courts impose optimal negligence liability, with due care set equal to optimal care and optimal damages. As previously noted, the classic model assumes that providers know the costs and benefits of care.50 Accordingly, malpractice liability should deter all medical negligence if courts set and apply the standard of care correctly and impose the correct level of damages.51 Thus, physicians will only provide negligent care if either they are unable to live up to the standard of the care (i.e., incompetent), or if they face too little expected liability for negligence.52 In turn, this framework suggests that competent physicians should not face legitimate suits for medical malpractice if courts set the standard of care correctly (or at least not too

49 See Calfee & Craswell, supra note 4.
50 Specifically, the classic model of accidents assumes that injurers not only know the expected equilibrium levels of care for themselves and victims (when relevant), but also know the actual costs and benefits of care, thereby enabling them to precisely determine that marginal cost and benefit of any change in their care-taking. Injurers also have perfect control over their own actions. Thus, injurers can control whether they are negligent and are never negligent accidentally. See Shavell, supra note 1.
51 Id.
52 The possibility that due care may be set too high, see supra note 33, generally should not result in doctors being negligent in the sense of knowingly selecting the wrong treatment to avoid excessive costs. The reason for this is that doctors can recommend the non-negligent treatment, even though it is excessively expensive, without bearing the extra cost when patients are insured. Moreover, even when patients are not insured, doctors would not risk negligence liability to avoid treatment costs when the patient is competent (and not indigent). Doctors generally have a duty to recommend the correct treatment, not to pay for it. A doctor can avoid liability by recommending the treatment that satisfies the legal standard; he need not provide it if a non-indigent patient does not want to pay for it (in a non-emergency context).
high) and physicians bear sufficient expected liability for medical error.

3. Conclusion

Accordingly, the classic model of accidents appears to imply that malpractice liability should either serve a relatively limited role or should not be experienced in practice. The traditional model implies that malpractice liability is not needed if insurers, not physicians, bear treatment costs. This is especially the case if physicians care about their patients. Beyond this, even when liability is needed to induce care, if the standard of care is clear and based on custom, and damages are optimal, the model predicts that malpractice liability should generate little litigation in practice. Informed physicians should avoid any risk of liability by selecting the optimal treatment. This suggests that we should not see any genuine instances of medical negligence under an effective regime unless a physician is incompetent and unable to live up to the standard of the profession. This prediction supports the view that medical error is caused by “bad apple” physicians and that competent physicians should not be subject to malpractice litigation if the system is well designed.

B. Implications of the Classic Model for Malpractice Reform

The classic model of accidents has implications for malpractice liability reform, especially when viewed in concert with the fact that doctors are regularly found liable for malpractice. The conclusion of the model that good doctors have no reason to select suboptimal treatment when patients are insured leads naturally to the conclusion that if we see a large number of malpractice lawsuits claiming suboptimal treatment by otherwise competent physicians, it is likely that these suits are not the result of genuine medical negligence. It is more likely that these are
frivolous lawsuits, filed by patients hoping to win the malpractice lottery and obtain an enormous damage award from a pro-plaintiff jury. These frivolous suits would not occur were malpractice imposed optimally. But in fact malpractice liability is not imposed optimally: indeed, it is often imposed on negligent and non-negligent providers.\footnote{See Epstein & Sykes, supra note 5, at 642 (citing the Harvard Medical Practice Study for the claim that “courts are rather poor at identifying malpractice … lawsuits often focus on cases where the physician did nothing wrong”).} As a result, patients (and their lawyers) often can expect a positive payoff if they file frivolous suits. These frivolous suits are a problem for physicians and patients, as frivolous suits impose a burden on all physicians, who pass the costs on to patients in the form of higher health care costs. In this view, malpractice liability does not provide its promised deterrence benefits, but instead imposes a net cost on providers and many patients.\footnote{This extra cost does not inure to the benefit of most patients, in this view, since most patients seek care from competent physicians who, in this model, have no reason not to provide good quality care to insured patients.}

Scholars and policymakers operating within this framework have embraced proposals to reform malpractice liability by directly or indirectly reducing the scope or magnitude of liability. Politicians tend to favor reforms that would directly reduce patients’ incentives to sue by reducing expected damages.\footnote{Thus, states have focused on adopting reforms that curtail liability in general, and malpractice liability in particular, including damage caps, collateral source rule reform, joint and several liability reform, and limitations on damages that can be imposed on charitable organizations, such as many hospitals. See generally Avraham, supra note 7 (discussing malpractice liability reforms adopted from 1991–1998 and finding that they reduced the total number of malpractice cases but not the state-level average award or total payments).} These reforms include caps on noneconomic damages and wrongful death damages, collateral sources rule reform (which eliminates patients’ ability to recover compensatory

\section*{Footnotes}

\footnotetext{53}{See Epstein & Sykes, supra note 5, at 642 (citing the Harvard Medical Practice Study for the claim that “courts are rather poor at identifying malpractice … lawsuits often focus on cases where the physician did nothing wrong”).}

\footnotetext{54}{This extra cost does not inure to the benefit of most patients, in this view, since most patients seek care from competent physicians who, in this model, have no reason not to provide good quality care to insured patients.}

\footnotetext{55}{Thus, states have focused on adopting reforms that curtail liability in general, and malpractice liability in particular, including damage caps, collateral source rule reform, joint and several liability reform, and limitations on damages that can be imposed on charitable organizations, such as many hospitals. See generally Avraham, supra note 7 (discussing malpractice liability reforms adopted from 1991–1998 and finding that they reduced the total number of malpractice cases but not the state-level average award or total payments).}
By contrast, leading economic analysis of law scholars tend to favor a different approach to reducing the threat of liability: changing the law to permit medical providers to contract with patients over the scope of malpractice liability. This reform would permit medical providers or health insurers to require patients to sign exculpatory clauses waiving their right to sue for medical negligence as a condition for seeing certain providers.56 According to proponents, as long as patients are informed about the expected costs and benefits of liability, and contracting is voluntary, any patient who would have benefited from tort liability imposed by fiat will insist on imposing liability if given the right to contract over it. The only patients who will waive liability are those who are better off without it. Accordingly, proponents assert that contractual liability can only benefit patients by enabling those patients who do not benefit from liability to contract out of it, without reducing the expected benefit of liability to those who value state-imposed malpractice liability. Proponents argue that this reform will enhance the welfare of patients who do not obtain a net benefit from malpractice liability without hurting patients who do benefit from malpractice liability.57 Thus, proponents of this reform contend that contractual liability should be attractive to supporters and opponents of malpractice liability alike.

56 See Thaler & Sunstein, supra note 5; Epstein, supra note 5; Havighurst, supra note 5; Robinson, supra note 5.
57 E.g., Thaler & Sunstein, supra note 5; Epstein, supra note 5; Richard A. Epstein, Contractual Principle Versus Legislative Fixes: Coming to Closure on the Unending Travails of Medical Malpractice, 54 DePaul L. Rev. 503 (2005); Epstein & Sykes, supra note 5; Havighurst, supra note 21; Clark C. Havighurst, Doctors and Hospitals: An Antitrust Perspective on Traditional Relationships, 33 Duke L.J. 1071 (1984); Robinson, supra note 5; see Danzon, supra note 25.
III. Challenge Posed by Empirical Analysis for the Traditional View

Empirical scholarship has provided a wealth of evidence on the causes of medical error and the operation of the medical malpractice liability system. As this Section shows, this scholarship provides evidence about the causes and frequency of medical error that are inconsistent with the structure of, and equilibrium produced by, the classic economic model of accidents. Empirical scholarship reveals that patients face a significant risk of being injured by medical error; the problem is not limited to a few “bad apple” doctors. Moreover, medical error generally does not result from the type of negligence captured by the classic model of accidents: a knowing decision to provide suboptimal care (to select less than due care, $x<x^*$). Instead, most medical error results from insufficient investment in expertise and other preventative measures by physicians and medical institutions—which is defined as a physician’s investment in the information needed to properly diagnose the patient and select treatment and the systems needed to deliver error-free care and medical institutions investment in supervision, health care technology, and administrative systems.

Recognition of the critical role played by expertise and preventative measures reveals that we cannot rely on the classic economic model of accidents to evaluate optimal medical malpractice liability because the technology and timing of care—and causes of error—are materially different from the factors explored by the traditional framework. This Section discusses an alternative model of malpractice, highlighting the role of expertise that was developed in response to empirical analysis on the causes of medical error. This model shows that malpractice liability
is vital to the effective functioning of the medical care system, regulating the quality of care provided by competent and incompetent (or ill-meaning) physicians alike.58

As shown in the next Section, the results of this empirically-grounded model present a challenge to the view that the best way to reform malpractice liability is to reduce it. Specifically, analysis of this model reveals reasons why we should reject both the overall goal of reforms designed to dramatically curtail malpractice liability as well as the specific exhortation that legislatures and courts substitute liability created or limited by contract for standard malpractice liability.

A. Evidence on the Causes of Medical Error

Empirical analyses reveal that, contrary to the classic model, medical error is not a problem limited to “bad apple” physicians. Instead, patients seeking medical treatment face a serious risk that they will be severely injured or killed, instead of saved, by the medical treatment they receive.59 Studies suggest that four to eighteen percent of patients seeking care in hospitals are injured by the medical care they receive, with many patients suffering serious injury.60 In addition, patients

58 See Arlen & MacLeod, supra note 2.
59 Moreover, evidence discussed later shows that the tort system is able to sort frivolous litigation from genuine negligence with sufficient accuracy that it could be employed to ensure that providers who deliver substandard care face substantially higher costs than those who do not, particularly if certain reforms were implemented. See infra notes 107-115 (discussing empirical evidence on malpractice liability litigation and settlements).
60 The low estimate (4 percent) comes from the Harvard Medical Malpractice Study, which reviewed written hospital records and found that 3.7 percent of the patients were victims of an error that caused significant harm. Weiler et al., supra note 43, at 42-44, 137-39. The higher estimate (17.7 percent) is from a study involving on-site observation of hospital error. Most of the errors detected by on-site observation were not recorded in the hospital’s written records. Andrews, supra note 10, at 362. Other
seeking care outside of hospitals are also regularly injured by medical error in that they do not receive the proper (medically-recommended) treatment for their conditions. Studies also show that approximately forty-five percent of patients with chronic diseases do not receive the care that is recommended for their conditions.61 Twenty percent of patients receive care that is contraindicated by the medical literature.62

These medical errors cause enormous suffering to both patients and their loved ones (“nonpecuniary losses”). They also impose substantial

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61 Elizabeth A. McGlynn et al., The Quality of Health Care Delivered to Adults in the United States, 348 NEW ENG. J. MED. 2635, 2641 (2003).

monetary losses on the system, in the form of lost man-hours and increased medical costs associated with the treatments needed to remedy avoidable medical error. Studies place the direct monetary cost of preventable medical error at approximately $17–29 billion per year.63 Adverse events in hospitals alone impose costs of $2013 per patient admission (in 2005 dollars); injuries to hospital patients resulting from medical negligence increase costs by about $1246 per patient admission.64 Moreover, recent evidence confirms that medical error remains a serious problem. A recent study of hospitalized Medicare patients found that one in seven experienced one or more adverse events.65

Beyond this, the causes and nature of medical error is not consistent with the core structure of the classic economic model of accidents. The classic economic model of accidents assumes that injurers (here doctors) know the costs and benefits of care and select the level of care, given by \(x\), that minimizes \(c(x) + p(x)D\), where \(c(x)\) is the cost of care, \(p(x)\) is the probability of an accident (given care), and \(D\), the level of damages

63 INSTITUTE OF MEDICINE, TO ERR IS HUMAN: BUILDING A SAFER HEALTH SYSTEM 26 (Linda T. Kohn, Janet M. Corrigan & Molla S. Donaldson eds., 2000). This probably underestimates the total cost of the medical “error” because it does not include many infections which probably result from poor hospital practices, but nevertheless generally cannot be treated as “medical error” because it is difficult to distinguish infections caused by substandard care from infections that are a background risk of the procedure. Nevertheless, it appears that preventable infections increase the overall cost of medical care by billions of dollars.

64 See Mello et al., supra note 29. Another study found that patient safety events in hospitals result in excess hospital charges of almost $5 billion per year, in addition to the other costs they impose on victims. See Chunliu Zhan & Marlene R. Miller, Excess Length of Stay, Charges and Mortality Attributable to Medical Injuries During Hospitalization, 209 J. AMER. MED. ASSOC. 1868 (2003).

(which is set equal to harm when \( x \) is less than due care and equals zero when care at least equals due care). In this framework, doctors who provide negligent treatment decide to do so by underinvesting in care; they are not accidentally negligent. Nor does this model produce an equilibrium with regular negligence when expenditures on care are too high. Yet, in contrast with the traditional model of accidents, empirical evidence shows that negligence is not limited to incompetent physicians and moreover usually does not result from an informed decision to select suboptimal treatment. Instead, most medical errors are caused by technically competent providers who err accidentally, often as a result of failures of systems and health care technology under the control of medical institutions.

The fact that error is accidental is important to efforts to regulate medical care quality because evidence reveals that most of this accidental error is also preventable. Specifically, a recent study of settled medical malpractice claims found that almost half of all the errors were caused, at least in part, by inadequate physician knowledge or technical competence. Providers could have prevented many of these errors by investing more in expertise—knowledge, training, supervision, or the use of adequate health care technology or administrative systems.

66 See Shavell, supra note 1.
67 See Rolph, supra note 30.
68 See Mello & Studdert, supra note 10.
69 Id.; see also Lori B. Andrews et al., An Alternative Strategy for Studying Adverse Events in Medical Care, 349 LANCET 309 (1997) (analyzing medical errors in three surgical units based on on-site observation of error and finding that many errors are attributable to lack of knowledge, often related to lack of adequate supervision); accord Thomas J. Krizek, Surgical Error: Ethical Issues of Adverse Events, 135 ARCHIVES OF SURGERY 1359, 1360-61 (2000).
70 See WEILER ET AL., supra note 43, at 42-44, 137-39; Andrews, supra note 10; Andrews et al., supra note 69; INSTITUTE OF MEDICINE, supra note 63; Mello &
Thus, we see that medical error is not primarily the result of a knowing decision to deliver suboptimal care, but rather generally results from providers’ failure to invest adequately in the capacity to provide good quality care (i.e., their expertise).\footnote{\textit{Studdert, supra} note 10.}

Empirical analysis thus reveals that we must revise our economic model of medical malpractice liability in order to design liability rules that optimally deter accidental, but preventable, negligence by individual providers by inducing them to invest in their \textit{capacity} to select and provide optimal care. To do so, it is important to employ a model that incorporates the fact that medical error can be, and regularly is, accidental, in that it is caused by competent, well-meaning physicians who want to provide good quality care and do not know they are erring. The model also should incorporate the fact that providers can reduce the risk of error both through deliberate decisions made when they are informed and through ex ante and ex post investment in their capacity to provide care: specifically, in expertise, technology and systems (hereinafter “expertise”) needed to give providers sufficient information and quality control to correctly diagnose the patient, select the right treatment, and deliver error-free care.\footnote{\textit{See Arlen & MacLeod, supra} note 2.}

\section*{B. Revising the Economic Model of Malpractice Liability}

Scholars of theoretical law and economics responded to the challenge posed by empirical analysis by developing a new model of malpractice liability. This model incorporates the central insights of

\footnote{\textit{See Studdert, supra} note 10; Arlen & MacLeod, \textit{supra} note 2; see \textit{Andrews et al., supra} note 69; \textit{Mello \\& Studdert, supra} note 10; \textit{Institute of Medicine, supra} note 63.}

\footnote{\textit{See Arlen \\& MacLeod, supra} note 2.}
empirical analysis that doctors often err accidentally as a result of inadequate knowledge of the patients’ condition or the proper treatment, and that this error is preventable through investments in expertise that are largely unobservable, and can occur ex ante or ex post. The model also reflects the empirical reality that most patients have their health care costs covered by insurance, thus enabling doctors to increase their level of care—in the sense of treatment—without much (if any) private cost. Finally, the model incorporates the observation that many, if not most, doctors derive positive benefits from good patient outcomes and are unhappy when they kill or injure a patient. This part lays out a simple version of this model and presents its core results. It then shows malpractice liability serves an important function even when doctors want to (and can costlessly) provide optimal treatment. Indeed, this model helps us understand why malpractice liability is needed even when medical error is accidental: liability for accidental error helps induce investments in expertise (including health care technology, systems and supervision) that reduces the risk of error. This model also reveals that, although a well-functioning malpractice system could dramatically reduce physician negligence, some amount of physician negligence would still occur even if courts do not err. Thus, regular malpractice settlements are not enough, in and of themselves, to suggest that either the malpractice system is broken or that doctors are venal or incompetent.

1. Economic Model of Accidental Medical Error

This Part describes an empirically-grounded model of malpractice liability based on Arlen & MacLeod. In this model, an insured patient

73 See id.; Arlen & MacLeod, supra note 13.
seeks treatment from a medical provider, and relies on the provider for proper diagnosis, treatment selection and treatment provision. The patient does not have sufficient expertise to oversee the care provided and does not know the quality of care that the provider has selected in the past.

The physician can provide any one of a number of treatments that differ in their net expected benefit for the patient. The expected benefit of a treatment to the patient is given by $b_t$, where $t$ is an index of treatment options and $b$ is the ex ante expected benefit of treatment (taking into account the risks of treatment). For purposes of this chapter, it is assumed that $b_t$ is the net benefit of treatment net of treatment costs, which are assumed to be borne by the patient (ex ante or ex post through insurance premiums).74

It is assumed that the physician genuinely cares about patients’ welfare, benefiting directly from good patient outcomes and feeling loss when patients fare badly. We express physician compassion by assuming that the expected benefit to a physician of treatment is $\alpha b_t$, where $\alpha < 1$. Thus, it is assumed that the benefit to the physician of treatment is proportionate to the net expected benefit of treatment to the patient. Physicians thus prefer good outcomes to bad outcomes, even when liability is not imposed, but do not bear the full social cost of bad outcomes. Accordingly, for purposes of this chapter, the joint welfare of patients and providers is given by $(1 + \alpha)b_t$. Joint welfare thus is

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74 We make this assumption to simplify the analysis for purposes of this chapter. The full presentation of the model assumes that patients are insured and considers the effect of insurance on incentives to select treatment. See Arlen & MacLeod, supra note 13. We employ this simplifying assumption here to enable us to analyze the way liability affects patients’ risk of being accidentally injured by their medical care, without the complexities introduced by health insurance markets.
maximized when the provider selects the treatment that maximizes the expected net benefit of treatment to patients.75 We also restrict our analysis to the situation where the provider can either select a treatment that cures the patient, yielding expected benefit, \( b^* \), or can provide erroneous care that seriously injures the patient, producing an expected outcome of \( b_0 \), where \( b_0 < b^* \). Patients would be willing to pay \( b^*-b_0 \) not to receive erroneous treatment. The direct benefit to providers of delivering appropriate care is given by \( \alpha(b^*-b_0) < b^*-b_0 \).

Observe that physicians who are fully informed about the expected benefit of treatment, \( b_n \), select the treatment that maximizes \( ab_n \), which implies that they always select the treatment that maximizes the net benefit of treatment to society, and also the treatment that maximizes the net benefit of treatment to the patient. Thus, informed physicians always select the optimal treatment (\( b^* \)) when they are correctly informed about the expected benefit of each treatment. This structure enables us to examine whether malpractice liability is needed when physicians want to provide optimal care and never knowingly deliver suboptimal care.76

Although in this model physicians want to provide optimal care,

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75 See Arlen & MacLeod, supra note 2.
76 See Arlen & MacLeod, supra note 13, which considers the situation where patients are insured and thus bear expected treatment costs ex ante, but do not bear actual treatment costs ex post. In this situation, ex ante the patient wants the physician to maximize the net benefit of treatment, including costs, but ex post (after the patient is insured) the patient wants the physician to maximize the expected benefit of treatment excluding cost considerations. If the insurer, not the physician, bears treatment costs, the physician selects the treatment that maximizes the expected benefit of treatment excluding costs. This implies that the physician can provide more intensive treatment than the patient would prefer ex ante, and more intensive than is optimal. Id. A standard of care based on physician custom will thus push physicians to provide excessive care. See Danzon, supra note 25. We abstract away from this issue in this chapter but it is addressed in Arlen & MacLeod, supra note 13.
they do not always have the ability to do so. In particular, it is assumed that physicians provide erroneous care, accidentally and unknowingly, when they do not have sufficient expertise to properly diagnose the patient or select the right treatment. For simplicity, it is assumed that this error results in the patient suffering an expected injury, $b^*-b_0$, relative to expected outcomes if the physician selected the correct treatment. Consistent with empirical evidence, we assume physicians can prevent many of these accidental errors by investing in expertise. We capture this formally by assuming that the physician can undertake investments in expertise at a cost, $C(e)$; these investments determine the probability, $e$, that the physician has sufficient information to correctly diagnose the patient and determine the correct treatment. Thus, $e$ is the probability that the physician who wants to deliver optimal care can actually do so. Consistent with the evidence, it is assumed that patients cannot observe either the amount the physician invests in expertise or the probability he provides erroneous care.

This framework enables us to consider both informed decisions to provide optimal or suboptimal treatment, as well as the genuinely accidental provision of negligent care. Thus, this framework differs from the classic model of accidents in which injurers always know when they are negligent.77

2. Optimal vs. Private Incentives to Invest in Expertise

We now consider the level of expertise that maximizes the joint welfare of patients and providers and compare this with the level of expertise that the physician will select absent malpractice liability.

77 See Shavell, supra note 1.
Assuming that informed providers select the patients’ preferred treatment, and that uninformed providers provide erroneous care, we see that joint welfare is maximized when providers invest in the level of expertise that maximizes the expected benefit to patients and providers of medical care minus the cost of expertise:

\[(1 + \alpha)[eb^* + (1-e)b_0] - C(e)\]  \[1\]

This implies that the parties’ joint welfare is maximized when the provider selects the level of expertise at which the marginal benefit of expertise—which is the benefit to the patient and the provider of the patient receiving optimal instead of erroneous care—equals the marginal cost of expertise to the provider.\[78\]

\[(1 + \alpha)(b^*-b_0) = C'(e)\]  \[2\]

We now consider the physician’s expertise when he is not held liable for medical error, assuming as before that he selects the patients’ preferred treatment when informed and selects an erroneous treatment when he is not. Given the assumptions of the model, the physician’s expected welfare is given by:

\[\alpha[eb^* + (1-e)b_0] - C(e)\]

The physician thus will select the level of expertise where:

\[\alpha(b^*-b_0) = C'(e)\]  \[3\]

Comparing Equation (3) to Equation (2) we see that, absent liability, physicians under-invest in expertise because they bear the full cost of expertise, but do not internalize the full social benefit of expertise.

\[78\] See Arlen & MacLeod, supra note 13.
Specifically, physicians do not internalize the full benefit to the patient of receiving optimal rather than suboptimal treatment, even when they are compassionate. They thus are not willing to pay as much as the patient is to reduce the risk of medical error. Accordingly, we see that even when physicians are compassionate and want to provide patients with the best quality care, they nevertheless will deliver care of lower than optimal expected quality because physicians’ risk of error will be higher than is optimal.\footnote{Observe that, unlike the classic model—in which care is either too expensive or too high-risk, but not both—this model produces an equilibrium in which physicians select treatments for insured patients that are both excessively costly and of insufficient quality. Treatments are excessively costly when compared to the treatment choice that maximizes social welfare, because physicians endeavor to select the treatment that maximizes the patient’s expected outcome ($b$), instead of the treatment that maximizes the net benefit of treatment, taking into account treatment costs ($b-c$). Medical care is excessively risky because physicians under-invest in expertise, imposing on patients an excessive risk of injury from medical negligence. Arlen & MacLeod, supra note 2, at 1978. Observe also that if physicians invest in care post-contract, then physicians will under invest in expertise, even if patients accurately predict the quality of care \textit{ex ante}. This is because if actual expertise is noncontractable, providers who want to invest more in expertise cannot reap any benefit of doing so because patients will not be willing to pay more \textit{ex ante} for the hope that the provider will eventually invest more in expertise, if expertise is nonobservable and noncontractable. Thus, patients will expect providers not to invest optimally in expertise. This expectation will be correct because providers cannot cover the costs of the added expertise through higher prices. Thus, expertise will be suboptimal even though patients correctly anticipate providers’ care levels. \textit{Id.} at 1979.}

3. How Malpractice Liability Regulates Expertise

States can use negligence liability to optimally regulate both treatment choice and expertise. Moreover, negligence liability can be designed to ensure that medical providers select optimal expertise even when courts base the decision of whether to impose liability solely on whether the physician provided the optimal treatment, and not on the...
physician’s underlying level of expertise.\textsuperscript{80}

We can show this formally by considering a physician’s expected welfare when he selects optimal care when informed, but faces a risk of liability for accidental error when he is uninformed. In this case, his expected welfare is given by:

\[
\alpha eb^* + (1-e)(\alpha b_0-D) - C(e)
\]

This implies the physician selects the level of expertise at which:

\[
\alpha(b^*-b_0)+D= C'(e) \quad [4]
\]

A comparison of Equations (4) and (2) reveals that the physician will select the optimal level of expertise (that satisfies Equation (1)) if damages are set equal to $b^*-b_0$. Thus, the physician invests optimally in expertise if damages require him to bear the full expected cost to the patient of receiving erroneous care instead of optimal care.\textsuperscript{81}

Observe that in this framework malpractice liability serves a valuable role in regulating medical quality even when physicians never knowingly provide negligent care, even absent liability. This is because physicians who want to provide optimal care nevertheless face a probability that they will err unknowingly. This risk of liability for accidental errors occurs with probability, \((1-e)\). Physicians can reduce the threat of liability by investing in expertise. Thus, even when physicians are well-meaning, malpractice liability potentially serves a valuable function by providing physicians with needed additional incentives to invest in expertise.\textsuperscript{82}

\textsuperscript{80} See Arlen & MacLeod, supra note 13.
\textsuperscript{81} See Arlen & MacLeod, supra note 2; Arlen & MacLeod, supra note 13.
\textsuperscript{82} Id.
Observe further that negligence liability is able to induce optimal investment in expertise even when the state cannot observe expertise. Negligence liability based on physicians’ failure to provide optimal treatment can be used to induce both optimal treatment choice and optimal physician investment in expertise because physician liability for accidental errors operates as a form of strict liability for accidental errors, ensuring that physicians bear the full cost of their uninformed treatment decisions. States can use the zone of strict liability residing inside the negligence rule to regulate expertise optimally, so long as damages are set correctly. Specifically, providers erring accidentally must face expected liability costs equal to the net benefit of expertise—as given by the expected ex ante benefit to the patient of receiving optimal care instead of erroneous care.83

Nevertheless, even when tort liability and damage rules are set optimally, the resulting equilibrium does not eliminate the risk of patients receiving erroneous care, as long as optimal expertise is associated with a positive risk of error: i.e., $e^* < 1$. This contrasts with the classic model of accidents in which injurers are never negligent in equilibrium in a perfect world;84 it is consistent with the evidence that most errors are accidental and with our sense that it would not be optimal for physicians to invest in the expertise needed to eliminate all risk of medical error.

C. Summary

Accordingly, empirical evidence reveals that, in order to determine the optimal structure of medical malpractice liability, we need to adopt a

83 Id.
84 See Shavell, supra note 1.
new economic model of medical malpractice liability. This new model is needed because the core framework of negligence underlying the classic model is not consistent with the understanding of the root causes of medical negligence that emerges from empirical scholarship. First, we need a model that permits the examination of errors committed by providers who do not know that they are providing poor care—errors that nevertheless are regulable through providers’ ex ante investments in expertise, administrative systems, and other mechanisms to ensure that they have the capacity to diagnose accurately, select the right treatment, and provide the treatment without error. Second, the new model must recognize that physicians often care about their patients.85 Employing this new model, we can examine the optimal structure of medical malpractice liability and evaluate various reform proposals.

The empirically-grounded model of malpractice liability reveals that—contrary to the conclusions that emerge from the traditional law and economics view of medical malpractice—states seeking to optimally regulate health care markets cannot restrict their interventions to mechanisms designed to limit the practice of incompetent physicians. They need to intervene to ensure that competent licensed physicians have optimal incentives to invest in the expertise necessary to correctly diagnose patients, assess treatment options, and provide treatment.86 Moreover, this framework reveals that states can achieve this goal by imposing malpractice liability on physicians who select and provide negligent treatment, even when they err accidentally. Indeed, this

85 See Arlen & MacLeod, supra note 2.
86 Id. States should also intervene to alter the behavior of medical institutions that affect patients’ welfare: specifically hospitals and MCOs. States can provide these incentives by subjecting physicians, hospitals, and MCOs to malpractice liability for medical negligence. Id.; See Arlen & MacLeod, supra note 13.
analysis shows that liability for accidental error is anything but a deadweight cost of tort liability. The threat of liability for accidental error is a valuable—indeed essential—mechanism for inducing medical providers to invest optimally in expertise. The fact that liability is imposed on competent providers who err accidentally is what we would expect were the system operating the way it should.87

As we will see in the next Section, we can employ this model to reassess classic reform proposals, such as suggestions to permit contracting over liability. This model also can be modified to permit assessment of new proposals. The most important modification to be discussed below is incorporating the ways in which institutions make decisions that affect patient safety.

IV. Reassessing Classic Reform Proposals

The empirically-grounded model reveals that malpractice liability has an important role to play in regulating the quality of medical care delivered by competent and incompetent providers alike. Moreover, this empirically-grounded model provides new insights on the merits of a leading reform proposal—to permit contracting over liability.88—showing that this reform would likely reduce social welfare. This model of medical malpractice reveals that this reform would harm patients

87 See Arlen & MacLeod, supra note 13. This is not to say that the current system functions perfectly. It is plagued with problems, as discussed in Arlen, supra note 18. But these problems do not include the fact that liability is imposed on competent providers who erred accidentally.
88 See Thaler & Sunstein, supra note 5; Epstein, supra note 5; Havighurst, supra note 57; Robinson, supra note 5; Hylton, supra note 25.
because patients potentially derive more benefit from malpractice liability than from liability procured by contract. Thus, the solution to malpractice liability reform lies in making the system more effective, not in eliminating it.89

Empirical analysis also provides insights on the direction that alternative reforms should take. State legislatures have tended to adopt reforms designed to reduce malpractice liability, such as damage caps, collateral source rule reform, joint and several liability reform, contingency fee reform, and contractual malpractice liability. These reforms can best be justified if providers currently face excessive expected liability. Yet empirical analysis suggests that there may be too little malpractice liability. Moreover, there is far less erroneously-imposed liability than standard political rhetoric would suggest. Indeed, the vast majority of medical malpractice settlements involve patients injured by genuine medical error.90 Finally, empirical studies provide evidence that suggests important directions for reforms to take. Of particular importance, evidence shows that many medical errors can be attributed, at least in part, to decisions made by medical institutions, especially hospitals. Yet these institutions generally avoid bearing financial responsibility for the errors caused by their decisions; indeed, hospitals may be able to profit from error, to the extent that error results in additional treatment.91 Empirical evidence thus provides support for proposals to impose liability on medical institutions, such as hospitals and MCOs.92

89 See Arlen, supra note 18.
90 See Studdert et al., supra note 22.
91 See Mello et al., supra note 29.
92 See Abraham & Weiler, supra note 27; Arlen & MacLeod, supra note 13; Havighurst, supra note 21; Mello & Brennan, supra note 18.
A. Contractual Liability

As previously explained, scholars operating within the traditional framework have argued that states seeking to reform malpractice liability can best do so by allowing patients to contract over liability with their providers. Proponents of this reform contend that contractual liability should be attractive to supporters and opponents of liability alike. This claim rests on the assumption that patients obtain the same benefit from liability (at the same cost) whether it is imposed by tort or contract. Given this assumption, patients cannot be hurt by being allowed to contract over liability because any patient who would have benefited from tort liability will impose it by contract—so long as patients are informed about the expected costs and benefits of liability, and contracting is voluntary.

The empirically-grounded model of malpractice liability enables us to see why the classic economic argument for contractual liability is incorrect. To see this, we focus on negotiated contracting between patients and individual providers at the moment patients seek care.

The claim that patients would not be harmed by the adoption of contractual liability rests on the conclusion that patients who benefit from tort liability necessarily would elect to contract into liability if offered the ability to pay for liability by their individual providers. This conclusion, in turn, rests on the premise that patients obtain the same

93 See Thaler & Sunstein, supra note 5; Epstein, supra note 5; Havighurst, supra note 5; Robinson, supra note 5.
94 This part only discusses one form of contracting. For a thorough discussion of why contractual malpractice liability is inefficient, showing that collective non-negotiable contracting through organizations also can be inefficient, see Arlen, supra note 18; see also Arlen & MacLeod, supra note 2, and compare Wickelgren, supra note 26 (discussing contracting over products liability).
deterrence benefit from liability procured through individual contracts as they do from liability imposed by the state. This premise appears reasonable if we accept the assumption of the traditional model that each patient’s risk of injury depends on patient-specific investments in care by individual providers. In this framework, tort liability operates to increase these patient-specific investments in care—a function that could be served equally well by contractual liability.

This argument for contract collapses once we incorporate the insights of empirical analysis about the causes of medical error and the purposes of liability. The empirically-grounded model of malpractice liability finds that a central purpose of malpractice liability is to induce optimal investment in “expertise”—defined as investments in information, personnel, health care technology and systems that affect the probability that the provider is able to correctly diagnose the patient, select the correct treatment, and correctly provide any treatment that is selected.95 These investments in expertise generally are not patient-specific; they affect a provider’s ability to correctly diagnose, assess the

95 See Arlen & MacLeod, supra note 13. Consistent with the results of this model, empirical analysis reveals that inadequate expertise—which is defined here as any investment that affects the probability that the provider is able to provide the quality of care she wants to provide, and thus include inadequate knowledge, as well as errors attributable to health care technology and systems—is an important cause of medical error attributable to individual providers. See Mello & Studdert, supra note 10.

The argument against contractual liability is enhanced when we recognize that, in the case of medical care occurring within hospitals, many if not most injuries due to medical error are at least partially the result of “systems” errors attributable to the hospital. Id. When properly-designed, malpractice liability can redress these systems errors. Liability aimed at improving the systems of medical institutions clearly is a collective good since hospital systems benefit patients collectively and thus hospitals’ incentives to improve their systems for the benefit of any one patient depend on their liability to all patients.
treatments for, and provide care to, each of his patients. Accordingly, the expected benefit to a provider of investing in expertise does not depend only on his expected liability to one patient, but instead depends on his expected liability to all of his patients.\textsuperscript{96} This recognition undermines the economic argument for negotiable contractual liability because it reveals that malpractice liability is a collective good in that each medical provider’s incentive to invest in expertise depends on his expected

\begin{footnotesize}
\textsuperscript{96} See Arlen & MacLeod, \textit{supra} note 2. These investments in collective care include investments in obtaining the expertise needed to correctly diagnose patients and select the right treatment, as well as pre- and post-contractual investments in health care technology, staffing, and supervision. These investments benefit all of a provider’s patients because providers usually use their expertise, improved administrative systems, and good health information technology when treating all of their patients, not just a select few. For example, once a physician develops expertise in a particular illness or treatment choice, she uses this expertise to benefit all affected patients. She will not knowingly deny some patients the right to that expertise because they have not paid for premium care. Similarly, physicians who develop administrative systems or surgical procedures to reduce error generally apply them to all relevant patients, and do not limit them to a select few.

The claim that providers tend to standardize collective aspects of care—such as expertise, treatment assessments, and systems—even when patients have paid for care of differing quality is supported by evidence that the quality of care a patient receives from her physician depends not only on whether that patient has decided to insure through an MCO (which will place pressure on the physician to reduce costs), but also on whether a high portion of the physician’s other patients are insured through an MCO. \textit{See} Sherry Glied & Joshua G. Zivin, \textit{How Do Doctors Behave When Some (But Not All) of Their Patients Are in Managed Care?}, 21 J. HEALTH ECON. 337, 352-53 (2002) (concluding that the quality of care a patient receives from her physician depends not only on whether the patient is enrolled in an MCO, but also on whether the physician’s other patients are predominately managed care patients); Paul A. Heidenreich et al., \textit{The Relation Between Managed Care Market Share and the Treatment of Elderly Fee-for-Service Patients with Myocardial Infarction}, 112 AM. J. MED. 176 (2002) (providing evidence that a patient’s expected outcome from treatment by a particular physician depends on the portion of the patients enrolled in managed care in the local market and not just on that patient’s choice of insurer); \textit{see also} Richard G. Frank & Richard Zeckhauser, \textit{Custom-Made Versus Ready-to-Wear Treatments: Behavioral Propensities in Physicians’ Choices}, 26 J. HEALTH ECON. 1101, 1102 (2007) (finding that physicians tend to follow norms rather than customizing care for individual patients).
\end{footnotesize}
liability to all of his patients. Thus, each patient’s expected safety
depends not only on the patient’s own liability decisions, but also on the
liability choices of others. Moreover, no patient can reliably use liability
to induce optimal investment in expertise unless all patients collectively
impose liability.97

Because malpractice liability is a collective good, patients
contracting individually over liability might rationally eschew liability
even when all patients would be better off if liability were imposed. This
is because each patient derives more benefit from any given liability rule
when it is imposed collectively by all patients than when he imposes it
individually. When liability is imposed collectively, each patient obtains
the deterrence benefit of his provider’s expected liability to all of his
patients. By contrast, a patient imposing liability individually only
benefits to the extent that his individual choice alters his provider’s
expertise. As a result, each patient gains less from imposing liability by
contract than he gains from the imposition of malpractice liability
collectively (by fiat). Thus, patients do not have optimal incentives to
impose liability by contract in that a patient may rationally decide that it
is not worthwhile to impose liability individually (holding constant the
decision of other patients) even when all patients would be better off if
they could impose liability collectively.98

97 Arlen & MacLeod, supra note 2, at 2003. The interdependence of patients’ liability
choices is heightened by the fact that many important medical care investments are
“lumpy”—the provider faces a discrete choice between making a substantial
investment in a particular type of care or no investment at all. In many situations, the
decision by one patient to impose liability will not provide a sufficient threat of
liability to induce the provider to undertake the expensive, lumpy, investment. See
Arlen, supra note 18.
98 Id. A similar argument applies to negotiable contracting over liability of medical
institutions. See supra note 95.
Indeed, in the case of a medical provider with many patients, the decision of any one patient to impose liability may have too little effect on the provider’s expected costs to induce the provider to increase his investment in expertise, personnel, administrative systems or health care technology—even when the provider would materially increase his investments when facing liability to all of his patients (and in so doing confer a collective benefit on patients that exceeds the cost of care). In this situation, contracting over liability would encourage each patient to waive liability in order to reduce his health care expenses because he can do so without substantially reducing expected outcomes. Of course, if each patient makes the same rational decision, none of them will impose liability even when all of them would have been better off if they imposed liability collectively. As a result, patients who would have benefited from state-imposed liability will be harmed by the move to contractual liability because patients required to contract over liability lose the ability to easily regulate collective investments in care that is afforded by collectively imposed tort liability. Empirical scholarship

99 See Arlen, supra note 18.
100 The free-rider problem is particularly great when liability is needed to induce providers to make substantial, discrete, collective investments that cannot be undertaken incrementally, such as health care technology, improvements in administrative systems or support staff, and substantial investments in expertise. In this situation, each patient knows that her medical provider will make the investment only if she faces liability for a substantial number of her patients. If she does face this liability, she will make the investment regardless of what any particular patient does. If she does not, she will not make it, also regardless of what any one patient does. Given this, each patient will rationally waive liability because she knows that her decision will have no effect on the provider’s expected investment in discrete care. Id.
101 Id. This problem could be addressed by the use of contracting with commitment, as when patients are presented with take-it-or-leave-it standard form contracts under which all patient contracting with the provider are required to make the same choice regarding liability. While this would reduce the collective good problem it would
thus helps reveal the tremendous benefit to patients of the ability to impose liability collectively, and in turn helps us understand why states should not embrace contractual liability.

B. Empirical Evidence on Malpractice Litigation and Settlements

The conclusion that we cannot rely on contracting over liability to produce efficient malpractice liability rules implies that states must address the issue of malpractice liability reform directly. Accordingly, it is important to determine the appropriate goals of malpractice liability reform. Many politically popular reform proposals—such as damage caps, collateral source rule reform, joint and several liability reform, and contingency fee reform—were adopted to curtail malpractice litigation, often in the belief that medical providers face an excessive risk of frivolous litigation and that a substantial portion of settlement awards are paid in cases where the physicians did not commit medical error. Empirical analysis of malpractice liability undermines the core justification for these malpractice liability reforms. The evidence suggests that reforms should be directed at enhancing expected liability for medical caregivers who deliver erroneous care and expanding the reach of medical malpractice to more thoroughly cover medical institutions when their policies and practices contribute to medical error.

Evidence reveals that negligent doctors face too little litigation; juries tend to get it right, and when they err they are more likely to err in favor of doctors, not patients; the vast majority of malpractice cases that introduce other problems, as discussed in Arlen, supra note 18. These issues are beyond the scope of this chapter since the analysis does not turn on insights from empirical analysis of malpractice liability.  

102 Epstein & Sykes, supra note 5, at 642.
settle with positive (nonzero) payments involve instances where external review reveals the medical provider probably did err; and the enormous trial verdicts one sees generally do not result in equally enormous payments.

1. Evidence on Claiming Rates and Settlement Accuracy

Consider a standard claim that there are too many malpractice liability claims and that many, if not most, successful litigations occur in cases where there was no error. The evidence does not support these conjectures.

If we compare the malpractice settlements to the amount of medical error, we see that the number of medical errors exceeds the number of malpractice settlements. Indeed, empirical analysis reveals that patients who are injured by medical error rarely sue: indeed, only 2–3 percent of the patients injured by medical error file a claim. Moreover, only one in three patients seriously injured (or killed) by medical error file a claim.103 Moreover, only one in three patients seriously injured (or killed) by medical error sue.104

Beyond this, patients with good claims do not always recover. Indeed, one study found that 27 percent of the victims of error who did sue did not recover.105 Victims of error are particularly likely to be

103 David M. Studdert et al., Negligent Care and Malpractice Claiming Behavior in Utah and Colorado, 38 MED. CARE 250, 253 (2000) (finding that only 2.5 percent of patients injured due to medical error filed a malpractice suit). A study of medical error at a Chicago hospital found that only 13 of the 175 patients who were the victims of medical error that caused serious injury filed suit. Andrews et al., supra note 69, at 312; Krizek, supra note 69, at 1360-61. In an early study out of California, Patricia Danzon found that only 10 percent of patients injured by negligent adverse events filed a medical malpractice case. Only 40 percent of these resulted in payment. PATRICIA M. DANZON, MEDICAL MALPRACTICE: THEORY, EVIDENCE AND PUBLIC POLICY 23-24 (1985).
104 WEILER, supra note 10, at 12-13.
105 Studdert et al., supra note 22, at 2038; see WEILER ET AL., supra note 43.
denied recovery if they proceed to trial.\textsuperscript{106}

As for the quality of the settled cases, empirical studies do not support the oft-repeated claim that malpractice liability is random, falling on physicians regardless of whether they erred.\textsuperscript{107} To the

\textsuperscript{106} See Mello & Studdert, supra note 10.

\textsuperscript{107} Those who claim tort liability is regularly imposed on doctors who did not err often cite the Harvard Medical Study, Epstein & Sykes, supra note 5, at 642 (citing to the Harvard Medical Study as evidence that courts often focus on cases where physicians did nothing wrong), and find additional support in a study of medical error in Utah and Colorado by the core members of the same research team. Studdert et al., supra note 103. Both studies are excellent studies of medical error. Yet neither study should be used to provide evidence on the quality of the tort system. First, each included too few observations in which a suit was filed to enable scholars to draw any statistically significant conclusions regarding the tort system. See Patricia M. Danzon, Medical Malpractice, in 2 THE NEW PALGRAVE DICTIONARY OF ECONOMICS AND THE LAW 626 (Peter Newman ed., 1998); cf. Studdert et al, supra note 103 (noting that only 18 patients in the Utah/Colorado sample filed a claim). Moreover, the methodology used in the Harvard Medical Study to identify error understates the amount of error for several reasons. First, the Harvard Medical Study relied on written hospital medical records to evaluate the merits of each claim. Yet evidence reveals that written hospital records do not document most medical errors. Arlen & MacLeod, supra note 2, at 1940 n.36; see Andrews, supra note 10 (finding that most errors detected by on-site observation were not recorded in the hospital’s written records). Second, the Harvard Medical Study focused on errors identified within the hospital, and thus undercounted errors which were not discovered until years later by other medical professionals. See William E. Encinosa & Fred J. Hellinger, The Impact of Medical Errors on Ninety-Day Costs and Outcomes: An Examination of Surgical Patients, 43 HEALTH SERVICES RES. 2067 (2008) (explaining that the existence and consequences of error can remain hidden for years). Finally, the Harvard Medical Study employed a methodology to identify error that was designed to rule out close cases (that might nevertheless satisfy the “more likely than not” standard of proof employed in tort cases). Specifically, the Harvard Medical Study had two physicians review each claim; claims were not coded as involving error unless both doctors agreed that error had occurred. See Tom Baker, Reconsidering The Harvard Medical Practice Study Conclusions about the Validity of Medical Malpractice Claims, 33 J.L. MED. & ETHICS 501 (2005). These design features served the purpose of the Harvard Medical Study, which was to provide a conservative, but in the end startling, estimate of the rate of medical error. This design does not yield a good measure of litigation accuracy, however. See Andrews et al., supra note 69, at 312 (finding that
contrary, numerous studies show that the vast majority of patients who recover were in fact injured by medical negligence. For example, a recent review of medical malpractice settlements found that 82 percent of the malpractice liability claims that resulted in payment involved situations where it is more likely than not that the physician erred. By contrast, patients who file non-meritorious claims usually do not receive any money in settlement. These findings are supported by other studies.

Of course not all cases are resolved correctly. Almost 20 percent of malpractice cases with positive settlements involve claims where no error occurred. Yet a portion of the claims where patients did not recover also were resolved incorrectly. Indeed, if we examine the general direction of case-resolution-error, we find that erroneous claims resolutions are more likely to favor doctors than patients. Specifically, an examination of the claims that were resolved incorrectly found that 60 percent involved a pro-physician error (in which the patient lost even though his injuries probably were the result of physician error); only 40 percent of the erroneous decisions favored the patient. Jury trial errors were particularly likely to favor the physician, not the patient.

On-site evaluation of medical error reveals that eleven out of thirteen patients who filed tort suits were the victims of treatment-induced adverse events. In subsequent work, David Studdert and co-authors modified the methodology to include many more claims filed, information about quality of care going beyond written hospital records, and a standard for determining whether there is error that more closely matches the preponderance of the evidence standard used in the tort system. See Studdert et al., supra note 22.


109 Studdert et al., supra note 22, at 2028 fig.1.

110 See Peters, supra note 108.

111 Studdert et al., supra note 22, at 2028.
addition, when patients do obtain a favorable settlement erroneously, settlements tend to be substantially smaller than in cases involving error. Thus, the evidence does not support the view that the central problem facing the malpractice system is that patients are recovering too often for invalid claims. To the contrary, we find that patients regularly are injured by error and do not recover.

As for damages, empirical analysis provides evidence to suggest why medical professionals are concerned about malpractice awards, but nevertheless does not support the view that malpractice judgments either exceed the social cost of the injuries imposed or are spiraling upwards faster than the rate of medical inflation. A recent study of malpractice settlements found that fifty percent of paid claims involved awards of $206,400 or less. The median amount paid in settlement was less than $197,000, and the mean amount was less than $463,000. As for the trend in damages, recent analysis suggests that medical malpractice settlements and verdicts have not increased significantly in real terms,

112 Id. at 2029; see also Michelle J. White, The Value of Liability in Medical Malpractice, 13 HEALTH AFF. 75 (1994) (discussing evidence that claims involving negligence resulted in average awards of $205,000, compared with $41,800 for those with no negligence). For example, conditional on recovery, expected damages are higher when the physician erred. Henry S. Farber & Michelle J. White, A Comparison of Formal and Informal Dispute Resolution in Medical Malpractice, 23 J. LEGAL STUD. 777, 799 (1994) (“Controlling for severity, settlements in cases with bad care are estimated to be almost four times larger than in cases with good care.”); Henry S. Farber & Michelle J. White, Medical Malpractice: An Empirical Examination of the Litigation Process, 22 RAND J. ECON. 199, 204-05 (1991) (presenting “strong evidence” that negligence matters in the determination of liability).

Nevertheless, physicians in some specialties may face an excessive risk of payouts even when there is no error. See Mello & Studdert, supra note 10 (suggesting that pro-plaintiff errors are more likely when plaintiffs are infants).

113 Studdert et al., supra note 22, at 2027.
once one controls for the rate of medical inflation.\textsuperscript{114} Claiming rates per capita also appear to be stable.\textsuperscript{115}

Moreover, while juries periodically do award enormous verdicts, analysis of paid claims suggests that these verdicts rarely result in enormous payments by individual physicians. Patients who receive enormous verdicts against physicians rarely receive the full award because they tend to settle at the providers’ policy limits to avoid an appeal. Providers pay out of pocket in only a small fraction of the cases.\textsuperscript{116}

C. Summary

Empirical analysis highlights the importance of taking a fresh approach to malpractice liability by revealing the fallacy of conventional wisdom. Whereas the reforms embraced by many politicians and law and economic scholars focus on curtailing malpractice suits on the apparent assumption that most malpractice suits are frivolous or random, empirical analysis shows this is not correct. It shows that the core task of reform should not be to limit suits, but instead should be to ensure that medical institutions and medical providers who provide suboptimal care bear the full cost of their neglect, while insulating high quality providers from the liability costs of their lower quality peers.\textsuperscript{117}

\footnotesize{\textsuperscript{114} Bernard Black et al., Stability, Not Crisis: Medical Malpractice Claim Outcomes in Texas, 1988-2002, 2 J. EMPIRICAL LEGAL STUD. 207, 209 (2005) (finding that, controlling for medical inflation, damages evidence reports an annual increase of only 0.1–0.5 percent per year, and this increase is either insignificant or marginally significant).

\textsuperscript{115} Id.

\textsuperscript{116} See David Hyman et al., Do Defendants Pay What Juries Award? Post Verdict Haircuts in Texas Medical Malpractice Cases, 4 J. EMPIRICAL LEGAL STUD. 3 (2007).

\textsuperscript{117} Empirical evidence that collateral course rule reform, which curtails recovery, is}
In addition, empirical analysis indirectly enabled scholars to reexamine the claim that states should permit contracting over liability. Empirical analysis led to the development of a more empirically-grounded model of malpractice liability. This model deepens our understanding of the purposes and effect of malpractice liability. Specifically, by revealing the central importance of expertise, empirical scholarship led scholars to understand that malpractice liability is a collective good. This framework thus reveals the tremendous benefit to patients of the ability to impose liability collectively, and in turn reveals why states are right to reject contractual liability and to seek alternative mechanisms for reforming the malpractice liability system.¹¹⁸

V. The Empirically-Grounded Case for Organizational Liability

Empirical analysis has not only helped scholars understand why states should reject many favored reforms, it also illuminates the direction that malpractice liability reform should take. In particular, it reveals that we cannot optimally deter medical error unless liability is imposed on the medical organizations (e.g., hospitals and MCOs) that affect patients’ welfare. Empirically-grounded analysis of medical error also highlights the critical importance of holding medical institutions liable for their own neglect, as well as for those of individual providers associated with an increase in mortality rates among black infants is consistent with this conclusion. Jonathan Klick & Thomas Stratmann, Medical Malpractice Reform and Physicians in High-Risk Specialties, 36 J. LEGAL STUD. S121, S134 (2007).

¹¹⁸ See Arlen, supra note 18.
practicing under their purview.119

A. Empirical Evidence on the Role of Medical Institutions

Empirical analysis reveals that patients’ welfare depends on choices made by medical institutions, specifically hospitals and MCOs. Both institutions affect patient welfare both directly, through interventions that directly affect the probability of a patient receiving erroneous care, as well as indirectly, through actions that affect the likelihood that a physician will commit actionable negligence. To optimally regulate medical care, liability must ensure that both institutions make decisions that minimize the joint cost of care and expected accidents, and not just decisions that minimize their own direct costs. To do this, we must expand hospital liability to ensure that they are liable for independent-contractor physicians practicing within them and also impose liability on MCOs both for their decisions regarding what constitutes “medically necessary and appropriate” care as well as for negligence in the care provided by the physicians and hospitals with whom they contract.

1. Hospitals

Empirical analysis of medical error reveals that states cannot hope to optimally safeguard patient safety unless they can induce hospitals to invest optimally in measures to reduce error. Many errors result when organizations (such as hospitals) fail to implement systems to reduce the probability and consequences of medical error. Indeed, one recent study suggested that most medical errors were attributable, at least in part, to systems problems; most of these systems are in the control of hospital

119 See Abraham & Weiler, supra note 27; Arlen & MacLeod, supra note 2; Epstein & Sykes, supra note 5; Havighurst, supra note 57; Mello & Brennan, supra note 18.
administrators, not individual physicians.\textsuperscript{120} For example, hospitals control equipment purchases and repairs.\textsuperscript{121} They also determine whether inexperienced physicians are adequately supervised,\textsuperscript{122} the probability that medical personnel know their patient responsibilities and are adequately informed about their patients’ care, and the likelihood of patient infection. They also control whether their employees and affiliated physicians have access to information technology capable of alerting providers promptly when an error has been made.\textsuperscript{123} Finally, hospitals establish the rules governing maximum (and required) shifts that determine whether patients are cared for by a physician whose judgment is potentially impaired by lack of sleep.\textsuperscript{124}

\textsuperscript{120} See Weiler, supra note 10; Andrews, supra note 10; Mello & Studdert, supra note 10.

\textsuperscript{121} See Andrews, supra note 10.

\textsuperscript{122} Hospitals’ policies determine the likelihood that a patient will be treated by an inexperienced medical provider, such as an intern; they also determine whether that inexperienced provider is properly supervised. Lack of supervision has been shown to be a contributing factor in 20 percent of medical errors where claims were filed. See Mello & Studdert, supra note 10.

\textsuperscript{123} Hospitals also affect error rates through their investment in health care technology. For example, many patients are injured each year by drug errors. See Gawande, supra note 34, at 63. Yet, only a small percentage of hospitals have adopted computerized physician order entry systems to prevent such errors. Michael L. Millenson, Moral Hazard vs. Real Hazard: Quality of Care Post-Arrow, 26 J. Health Pol’y, Pol’y & L. 1069, 1076 (2001). Surgery patients also face a significant risk of injury from foreign objects left in them during surgery. Susan Burton, The Biggest Mistakes of Their Lives, N.Y. Times, Mar. 16, 2003, at 48 (explaining that foreign objects are left in at least 1500 surgery patients); Barbara F. Ostrove & Julie S. Lyons, Surgical Errors Alleged at Stanford Hospital, San Jose Mercury News, Apr. 30, 2002, at 1B (finding that surgical gauze remains inside patients with sufficient frequency that some surgical gauze companies have incorporated materials into their gauze to make it detectable by X-ray post-surgery). Hospitals could reduce these problems through adopting surgical materials count procedures pre- and post-surgery.

\textsuperscript{124} Prior to 2003, work hour guidelines allowed interns in the United States to work very long shifts. The resulting exhaustion contributed to medical error. See Christopher P. Landrigan, Effect of Reducing Interns’ Work Hours on Serious
a sense of the importance of hospitals’ decisions concerning internal systems from evidence indicating that the best hospitals impose expected error costs of only $42 per patient admission whereas the worst impose error costs per patient admission of $4769.125.

Thus, in order to protect patients, states must ensure that hospitals have sufficient incentives to invest optimally in systems and equipment that prevent and detect errors and adopt rules governing hospital practice in order to adequately care for patients. Hospitals thus must

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*Medical Errors in Intensive Care Units*, 351 *New Eng. J. Med.* 1838 (2004) (explaining that residents on the traditional extended schedule made 39.5 percent more “serious medical errors” than did residents on a lighter schedule); J. Todd Arnedt, *Neurobehavioral Performance of Residents After Heavy Night Call vs. After Alcohol Ingestion*, 9 *J. Am. Med. Ass’n* 1025 (2005) (finding that pediatric residents on a “heavy call” schedule committed 40 percent more errors than those on a light call schedule, and that residents had limited ability to diagnose their own impairment); Drew Dawson & Kathryn Reid, *Fatigue, Alcohol, and Performance Impairment*, 388 *Nature* 235 (1997) (finding that after 24 hours of wakefulness, cognitive psychomotor performance decreased to a level equivalent to a person with a blood alcohol content of 0.10 percent). Maximum shifts were reduced to 24 consecutive hours by the American Council for Graduate Medical Education (ACGME), but these shifts still produce error-causing exhaustion. Moreover, physicians’ hours remain unregulated, in contrast with the European Union, which limits the duration of shifts for all physicians to 13 hours. See Laura Berger et al., *Extended Work Shifts and the Risk of Motor Vehicle Crashes among Interns*, 352 *New Eng. J. Med.* 125 (2005).

125 See Mello et al., *supra* note 29.

126 For example, hospitals significantly affect errors through their rules and practices governing the supervision of inexperienced physicians, procedures to prevent patient infection, procedures governing the hand-off of patients between shifts, and rules governing the maximum shift that physicians may work. See, e.g., Mello & Studdert, *supra* note 10 (explaining that a lack of supervision partially explains 20 percent of medical errors where claims were filed); Kevin Sack, *Swabs in Hand, Hospital Cuts Deadly Infections*, *N.Y. Times*, July 27, 2007, at A1 (explaining that deadly hospital-induced infections in the U.S. could be reduced by 68 percent through better procedures; those adopted by European hospitals have nearly eliminated the risk of antibiotic resistant staphylococcus); Landrigan et. al., *supra* note 124 (finding that residents on the traditional extended schedule made 39.5 percent more “serious medical errors” than did residents on a lighter schedule);
internalize the cost of medical errors. This implies that we need to impose liability directly on institutions because individual provider liability will not ensure that institutions have optimal incentives to make systemic investments in care.

Hospital liability is needed for two reasons. First, evidence reveals that hospitals generally do not internalize the cost to their patients of injuries resulting from medical error, even when this produces actionable negligence. Hospitals often are not liable for individual providers’ negligence because they generally have an independent contractor relationship with the surgeons, anesthesiologists, and radiologists who use their facilities. Moreover, providers often purchase their own malpractice insurance. Finally, hospitals can benefit from nonactionable medical errors that require additional billable hospital services. Thus, individual liability does not ensure that hospitals have optimal incentives to reduce the risk that individual providers will be negligent. Second, many deficiencies in hospital systems harm patients through their cumulative effect without producing a clear act of individual negligence that is actionable under our current system, which focuses on whether a given individual provider delivered substandard care. Given this,

Arnedt et. al., supra note 106 (explaining that pediatric residents on a “heavy call” schedule committed 40 percent more errors than those on a light call schedule); Dawson & Reid, supra note 124 (showing that after 24 hours of wakefulness, cognitive psychomotor performance decreased to a level equivalent to a person with a blood alcohol content of 0.10 percent); cf. Berger, supra note 124 (explaining that in the U.S. non-resident physicians hours are unregulated; by contrast, the European Union limits all physicians to shifts of no more than 13 hours).

127 See Mello & Studdert, supra note 10.
128 See Mello & Brennan, supra note 18.
129 See Mello & Studdert, supra note 10.
130 See Mello & Brennan, supra note 18. Consider, for example, the problem of hospital infections. Patients often suffer serious injuries as a result of infections. Traditionally, malpractice liability has treated infection as a background risk, not
malpractice liability does not provide either a direct or indirect incentive to remedy these problems, as the errors they produce will not be actionable.\textsuperscript{131}

Accordingly, malpractice liability cannot provide hospitals with adequate incentives to safeguard their patients if liability is predicated primarily on individual provider negligence.\textsuperscript{132} In order to optimally deter medical errors, we must hold hospitals directly liable for iatrogenic injuries, even when these cannot be attributed to any particular individual provider. We also need to hold hospitals liable for the negligence of providers who use their facilities, even when these providers are independent contractors. This liability for patient injuries resulting from individual, institutional, and systemic errors will improve patient welfare.\textsuperscript{133}

\textbf{2. Managed Care Organizations}

\begin{itemize}
\item \textsuperscript{131} See Abraham & Weiler, \textit{supra} note 27; Arlen, \textit{supra} note 18; Mello & Brennan, \textit{supra} note 18; Sage, \textit{supra} note 28.
\item \textsuperscript{132} See Weiler, \textit{supra} note 10; Mello & Brennan, \textit{supra} note 18; Mello & Studdert, \textit{supra} note 10. For a discussion of the ways in which systems can cause preventable error without any one individual provider being clearly to blame, see Gawande, \textit{supra} note 34.
\item \textsuperscript{133} See Abraham & Weiler, \textit{supra} note 27; Arlen & MacLeod, \textit{supra} note 2; Mello & Brennan, \textit{supra} note 18; Sage, \textit{supra} note 28.
\end{itemize}
MCOs also affect patient welfare both directly and indirectly in ways that are not optimally regulated by individual malpractice liability. Of particular importance, many MCOs affect care directly through the use of utilization review. Utilization review enables an MCO to deny coverage for treatments that the MCO deems not to be “medically necessary or appropriate” (or otherwise not covered). In the case of expensive treatments, this denial of coverage tends to result in a denial of treatment. Moreover, evidence reveals that MCOs’ authority to affect treatment choices not only affects the care their own subscribers receive, but also affects contracted providers’ choice of treatment for patients with non-MCO insurance.

MCO liability is needed to ensure that these organizations make optimal decisions about what treatments are “medically necessary and appropriate.” The current regime of individual provider liability for malpractice is not sufficient. It does not deter MCOs from negligently denying coverage for treatments that were, in fact, medically necessary because individual providers are not liable if they recommend the

134 See Arlen & MacLeod, supra note 2; Havighurst, supra note 57.
135 MCOs also affect quality through their authority to select the physicians and hospitals on their plans (to the extent permitted by state law), their ability to influence the treatment provided (through their ability to use utilization review to deny coverage for treatments deemed “unnecessary”), and through the financial incentives they give to providers to favor cost or quality. See Arlen & MacLeod, supra note 2.
136 See Glied & Zivin, supra note 96, at 352-53 (concluding that the quality of care a patient receives from her physician depends not only on whether the patient is enrolled in an MCO, but also on whether the physician’s other patients are predominately managed care patients); Heidenreich et al., supra note 96 (providing evidence that a patient’s expected outcome from treatment by a particular physician depends on the portion of the patients enrolled in managed care in the local market and not just on that patient’s choice of insurer); see also Frank & Zeckhauser, supra note 96, at 1102 (finding that physicians tend to follow norms rather than customizing care for individual patients).
treatment and the MCO denies it. Moreover, MCOs often can structure their decisions to deny coverage for recommended treatments in ways that leave them insulated by federal preemption from liability under state tort law. Optimal regulation of patient safety thus requires that MCOs be held liable for their own negligence, as well as that of individual physicians.137

B. Summary

Empirical analysis thus reveals that optimal malpractice liability reform must include reforms that increase medical entities’ incentives to invest in care. This conclusion follows from evidence on the multitude of ways that institutions affect patient safety directly and indirectly,138 as well as the degree to which they avoid bearing the cost of injuries resulting from their decisions.139 Moreover, states should impose liability directly on hospitals and MCOs, even when physicians can be, and are, held liable for their medical negligence. One effective way to achieve this goal would be to impose liability for all malpractice claims on medical entities—MCOs or hospitals—and allow these entities to contract with physicians to shift liability to them. Malpractice liability would be more effective if liability were imposed on medical entities

137 See Arlen & MacLeod, supra note 2.
139 See Arlen & MacLeod, supra note 2; Mello et al., supra note 29; Mello & Brennan, supra note 18. The arguments favoring institutional liability go beyond the arguments presented here. The present analysis focuses on arguments that flow directly from empirical analysis. For a more detailed economic analysis of medical institution liability, see, e.g., Arlen & MacLeod, supra note 2; Arlen, supra note 18; Mello & Brennan, supra note 18; see also Abraham & Weiler, supra note 27; Havighurst, supra note 57.
because much (if not most) medical error appears to result from decisions made by entities that either affect care directly or influence the quality of care that physicians can provide. Entity-level liability would provide the entities with financial incentives to use their influence to make optimal decisions regarding the costs and quality of care. Entity-level liability also would induce entities to make superior investments in systematic care and to better monitor the quality of providers with whom they contract. MCOs and hospitals would also have incentives to use their substantial data on health outcomes to develop protocols for physicians based on due consideration of treatment cost-effectiveness.140

VI. Conclusion

Empirical legal studies has transformed our understanding of the economic functions of malpractice liability, thereby reshaping the debate over malpractice liability reform.

140 Malpractice liability would function better as a deterrent under entity-level liability because entity-level liability is not as distorted by liability insurance. Hospitals and MCOs either self-insure or purchase liability insurance that is experience-rated. See, e.g., Arlen & MacLeod, supra note 2; Mello & Brennan, supra note 18, at 1617-18. Thus, entities subject to liability would have a strong incentive to reduce their risk of error. Entity-level liability also would reduce the distortions created by physician liability insurance because it would induce entities to use their rich data on physician quality to ensure that physicians who under-invest in quality bear more costs than those who do not. Finally, entity-level liability might improve the under-claiming problem because patients injured by medical care in a hospital would no longer be deterred from suit by the prospect of having to identify precisely the individual wrongdoer. These measures often would require MCOs and hospitals to invest in both equipment and changes in administrative systems to ensure broad monitoring of outcomes.
Many popular reforms are predicated on the assumption that the best way to reform malpractice liability is to curtail it. This belief finds support in the results of the classic model of accidents, which assumes that medical malpractice represents a knowing decision by a physician to select a suboptimal treatment in order to reduce his costs.

Empirical malpractice analysis undermines both the theoretical and empirical arguments supporting this approach. Empirical analysis reveals that scholars cannot rely on the classic model of accidents to analyze malpractice liability because it does not accurately capture the root causes of medical error. In contrast with the classic model, empirical analysis demonstrates that medical error does not generally result from a deliberate decision to economize on treatment costs, but instead results from insufficient “expertise.” Empirical analysis thus reveals that we cannot accurately understand the central functions of malpractice liability unless we employ a model that captures the effect of expertise on the probability of medical error. Theoretical models that incorporate expertise show that malpractice liability is vital to the effective operation of health care markets. Well-designed liability for medical negligence is among the most effective mechanisms for inducing medical providers to invest optimally in expertise—a primary determinant of patient welfare.

Empirical analysis also reveals that we cannot optimally regulate health care markets unless we take a dramatically different approach to malpractice liability reform. Many traditional reforms are predicated on the belief that malpractice liability provides little benefit because it is randomly imposed. Others press states to embrace contractual liability. Empirical analysis undermines the core assumptions of both reform proposals. Empirical analysis shows that malpractice liability is anything but random, and instead generally is imposed correctly on providers who
erred. It also helps us understand why malpractice liability imposed collectively through the tort system is superior to other individual forms of liability, such as contractual liability: the primary benefit of malpractice liability flows from its ability to regulate a form of care, expertise, that is a collective good.

Finally, empirical analysis has helped scholars identify the most productive avenue for malpractice reform. Specifically, empirical combined with theoretical analysis has shown that states seeking to safeguard patient welfare can best do so by imposing malpractice liability directly on hospitals and MCOs, as they have the greatest ability to affect health care quality.

Thus, by understanding medical error and malpractice liability, we gain the insight needed to guide policymakers towards solutions that offer a genuine promise of saving patients’ lives.