



# The impact of tort reform on intensity of treatment: Evidence from heart patients<sup>☆</sup>



Ronen Avraham<sup>a</sup>, Max Schanzenbach<sup>b,\*</sup>

<sup>a</sup> University of Texas, United States

<sup>b</sup> Northwestern University, United States

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## ABSTRACT

This paper analyzes the effect of non-economic damage caps on the treatment intensity of heart attack victims. We focus on whether a patient receives a major intervention in the form of either a coronary artery by-pass or angioplasty. We find strong evidence that treatment intensity declines after a cap on non-economic damages. The probability of receiving a major intervention in the form of either an angioplasty or bypass declines by 1.25–2 percentage points after non-economic damage caps are enacted, and this effect is larger a year or two after reform. However, we also find clear evidence of substitution between major interventions. When doctors have discretion to perform a by-pass and patients have insurance coverage, caps on non-economic damages increase the probability that a by-pass is performed. The effect of non-economic damage caps on costs is not always statistically significant, but in models with state-specific trends, total costs decline by as much as four percent. We conclude that tort reform reduces treatment intensity overall, even though it changes the mix of treatments. Using the Center for Disease Control's Vital Statistics data, we find that tort reform is not associated with an increase in mortality from coronary heart disease; if anything, mortality declines.

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Advocates of tort reform argue that limitations on medical malpractice liability, particularly non-economic damages, will reduce treatment intensity without compromising patient care. However, liability limitations could change provider behavior in ways that increase or decrease treatment intensity, with ambiguous consequences for patient outcomes. For example, limitations to physician liability could reduce so-called defensive medicine, and thereby reduce costs and unnecessary procedures. On the other hand, liability limitations could increase agency costs in the physician–client relationship through reduced caretaking and increases in induced demand (also called offensive medicine). Recent work has found evidence for both effects, depending on the practice area examined. However, few papers have considered shifting doctors' incentives

to provide defensive medicine or induce demand under various combinations of liability and reimbursement schemes. As a result, the effect of tort reform on treatment intensity and patient outcomes remains an important question of study.

This paper employs a unique data set comprised of a large sample of hospital inpatients, the Nationwide Inpatient Sample, to analyze the effect of non-economic damage caps on treatment intensity for patients experiencing acute myocardial infarctions (AMI or heart attacks). The data contains information on almost 1.5 million inpatients observed between the years 1998 and 2009 and aged 45–90 whose primary diagnosis was AMI. Roughly 25 percent of all heart attack victims in this period in states covered by the NIS are included in the sample. We find evidence that treatment intensity declines after a cap on non-economic damages, but that offsetting effects also exist and vary by insurance coverage. There are three treatment options for heart attack: medical management, Percutaneous Transluminal Coronary Angioplasty (PTCA), and CABG (Coronary-Artery Bypass Graft). The probability of receiving any major intervention in the form of either PTCA or CABG declines by 1.25–2 percentage points after non-economic damage caps are enacted, depending on the specification. These results provide evidence that damage limitations can reduce treatment intensity. However, we also find offsetting effects. PTCA

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\* Corresponding author. Tel.: +1 3125034425.

E-mail addresses: [ravraham@law.utexas.edu](mailto:ravraham@law.utexas.edu) (R. Avraham), [m-schanzenbach@law.northwestern.edu](mailto:m-schanzenbach@law.northwestern.edu) (M. Schanzenbach).

and CABG are almost never performed at the same time; they are effectively mutually exclusive. PTCAs decline by roughly 2 percentage points after caps on non-economic damages are imposed, while CABGs, which are more invasive and remunerative than PTCA, rise by .5–.6 percentage points. Further analysis finds that the increase in CABG is observed primarily when doctors (1) have discretion between treatment options and (2) patients have insurance coverage. On balance, however, costs seem to decrease. Though the cost data has limitations, we find in some specifications that total costs decline by as much as four percent.

To evaluate the effect of tort reform on quality of care, we study age-adjusted mortality rates from coronary heart disease. We find that mortality rates from coronary heart disease either decrease or are unchanged after a cap is imposed, suggesting that treatment quality was not impaired by either the reduction in PTCA or the substitution toward CABG. Mortality of course does not encompass all measures of quality of care, but it is well-recorded.

We focus on heart attacks for several reasons. First, heart disease, which includes heart attacks and related complications caused by blockages in vessels supplying blood to the heart, is the leading cause of death in the United States and accounts for nearly one-seventh of all medical spending (Cutler et al., 1996). Second, heart patients have been the focus of the study of the effect of medical liability pressure, but these studies have found conflicting results. Third, an inpatient sample raises selection issues for most conditions. An AMI, however, almost always results in admission. Over 90% of the admissions in the AMI sample are via the emergency room or transfer from a different hospital, and 93% of the AMI admissions in the data are coded as non-elective (Agency for Healthcare Research and Quality, 2006). Fourth, there is significant liability pressure for cardiac care. Heart surgeons are among the most sued group of physicians, so liability reforms should be especially salient to cardiac care providers.

Finally and most importantly, AMIs provide a unique opportunity to study substitution between treatment regimes because doctors often have discretion between PTCA and CABG. CABG is generally more profitable than PTCA, yet because it is more invasive, performing CABG may expose healthcare providers to greater liability risk. For patients with blockages in three or four arteries, the preferred treatment option in almost all cases is CABG. But for patients with blockages in one or two arteries, PTCA and CABG are often substitutes, with PTCA being the more commonly chosen option and generally preferred when there are no other complicating factors such as diabetes. Thus, by studying AMI patients, we can examine the effect of reduction in liability risks via tort reform on providers' choice between two discrete and mutually exclusive treatments, and, by considering patient insurance status, the additional influence of financial incentives to perform the different treatments.

The shift to more CABG after reform is consistent with two different interpretations. Under the offensive medicine interpretation, enacting liability limitations increases the ability of doctors to induce demand for a more remunerative and riskier procedure. Limitations on liability changes the provider's private cost-benefit analysis and makes CABG more appealing to the provider. Under the defensive medicine interpretation, enacting liability limitations increases the ability of doctors to perform a procedure that was better for patients, but (as an invasive procedure) may have created more liability risk. To separate these effects, we examine whether reform had differential impacts by insurance coverage. We find that the CABG rate only increased for those with insurance coverage, where financial incentives would be present. We argue that this pattern is most consistent with tort reform freeing doctors to pursue more remunerative procedures even if on

balance treatment intensity declines, though we consider competing explanations too.

Most papers studying the effect of medical malpractice focus either on costs of a particular procedure, overall medical costs, or the use of additional diagnostic procedures. Our paper makes several additional contributions. First, we confirm that tort reform reduces treatment intensity in heart patients by reducing costs and the probability of a major intervention. The effect of tort reform on cardiac care has been the subject of some controversy and is an important policy question considering that cardiac care accounts for roughly one-seventh of total health spending. Second, we find that tort reform leads to some substitution between treatment options, from the less invasive PTCA to the more invasive CABG, but only for those with insurance. Third, we find that even though tort reform reduced treatment intensity and altered treatment choice, mortality rates did not change (if anything, mortality declines for those aged 45–65) suggesting provisionally that tort reform might not have had negative welfare effects on AMI patients.

The rest of the paper is organized as follows. Part 1 surveys the theoretical background on tort reform and intensity of treatment. Part 2 discusses the identification strategy and data. Part 3 discusses the treatment intensity results. Part 4 considers quality as measured by coronary heart disease mortality and Part 5 concludes.

## 1. Theoretical background and literature review

The goal of malpractice liability is to align the interests of health care providers and patients by making providers internalize risks of poor treatment. By reducing incentives to provide proper care, however, limiting medical malpractice liability may cause patients' outcomes to worsen. Excessive liability pressures, on the other hand, may push doctors to excessive caretaking through the practice of defensive medicine. Defensive medicine is the practice of prescribing unnecessary (or non-cost-justified) tests, procedures, and medications as liability shields. Defensive medicine can also be achieved through avoidance of high-risk patients by either screening patients or leaving high-risk states or practice areas.

Defensive medicine may be pervasive due to hidden information and externalized costs. Hidden information exists because both patients and insurers cannot fully monitor providers' decisions. Externalities are present because healthcare providers and their patients do not bear the full costs of prescribing tests or procedures due to third-party health insurers. In contrast, providers may bear significant costs for medical liability. Although most physicians are fully insured against malpractice claims, incentives to practice defensive medicine remain. These incentives include the desire to avoid reputational harm, the stress of litigation and bad publicity, and the lost time associated with defending a claim, all of which can affect physician status and income (Dranove et al., 2012). Indeed, most doctors report practicing defensive medicine. A recent survey found that ninety-three percent of Pennsylvania doctors admitted that they sometimes or often engage in defensive medicine practices (Studdert et al., 2005). Moreover, hospitals, clinics, and practice groups also face significant financial liability for malpractice claims, and they are key players in setting practice standards and monitoring physician behavior. Thus, defensive medicine may provide significant benefits to healthcare providers by decreasing their exposure to various costs associated with malpractice liability. Tort reform should limit both the probability and magnitude of litigation, thereby reducing the incentives of health care providers to practice defensive medicine. Heart surgeons in particular face significant liability pressure. Each year, about 19% of heart surgeons are sued for malpractice, and nearly 20% of the claims involve a payout, making heart surgery the second riskiest practice area from a

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