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The impact of medical errors on physician behavior: Evidence from malpractice litigation☆

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ABSTRACT

How do medical errors affect physician behavior? Despite the importance of this question empirical evidence about it remains limited. This paper studies the impact of obstetricians' medical errors that resulted in malpractice litigation on their subsequent choice of whether to perform a C-section, a common procedure that is thought to be sensitive to physician incentives. The main result is that C-section rates jumped discontinuously by 4% after a medical error, establishing an association between medical errors and treatment patterns. C-section rates continued to increase afterwards, bringing the cumulative increase 2.5 years after a medical error to 8%.

1. Introduction

Medical errors, their causes, and their impact on physician behavior have become central issues in the political debate and the scientific discourse in the past decade. Until recently, there was very little evidence on the issue of medical errors, their scope, and their consequences (Wu, 2000). However, the scientific and policy making communities are increasingly aware that medical errors, often resulting in severe patient outcomes and even death, are very common (Kohn et al., 2000).

An important question in understanding the consequences of medical errors and reducing their incidence is whether a relation exists between medical errors and physician behavior. Conventional wisdom in the medical community has it that physicians' medical errors affect treatment patterns. Self reported data support this view: in surveys, physicians consistently report that they change their treatment patterns after making a medical error (Wu et al., 1991, 1993; Fischer et al., 2006). Nevertheless, perhaps because physicians are concerned about the implications of disclosing errors (Gallagher et al., 2003) and despite the growing interest in the issue, observational evidence is scarce and the mechanisms underlying this association are poorly understood.

This study examines the impact of physicians' medical error on their subsequent behavior. It focuses on an important subgroup of medical errors, those that result in malpractice lawsuits.[1] This subgroup offers a unique opportunity to rigorously examine the impact of a medical error on physician behavior. Using data from Florida, one may directly observe the exact timing of physicians' medical errors that resulted in litigation and match it with data on their treatment patterns over time. Together, these data create a very appropriate setting for the assessment of the research question.

While this subgroup of medical errors provides a rare opportunity to examine the impact of a medical error on physicians' treatment patterns, one should keep in mind that the interaction between medical-malpractice law and physicians' personal exposure to litigation may also be associated with physicians' treatment patterns. It is often argued that fear of lawsuits affects treatment patterns and may encourage high-cost, low-benefit medical

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[1] I use the terms lawsuit and medical malpractice claim interchangeably in reference to malpractice cases reported by a physician to her insurer.

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treatment ("defensive medicine") (Studdert et al., 2005; Kessler and McClellan, 1997; Reyes, 2010). Therefore, this study examines the impact of physicians' medical errors on their subsequent behavior and its underlying mechanisms, while bearing in mind the role of malpractice lawsuits.

The physicians whom I investigated were obstetricians, who are regarded as particularly sensitive to malpractice concerns (Reyes, 2010). I studied their responses by examining their decision to perform C-sections, a common procedure that is thought to be sensitive to obstetrician incentives (Currie and MacLeod, 2008). The analysis draws on inpatient data from Florida, matched with data on the physicians' malpractice claim history.

I use the timing of an *adverse event*, which I define as a procedure that ultimately led to a lawsuit, to demarcate a pre-medical-error period and measure the impact of a medical error that resulted in a lawsuit on subsequent medical treatment. First I use a simple "before and after" analysis to examine the physicians' discontinuous response immediately after an adverse event. Then I use an event study approach to study the effect of an adverse event on medical treatment over time, estimating physicians' response by controlling for physician and time fixed effects as well as other covariates. To complement the analysis, I estimate the "very long-run" effect of an adverse event, up to four and a half years after the event, using a matching method that pairs each affected physician with an individually tailored control group.

The main findings of the empirical analysis are as follows. First, an adverse event is followed by a discontinuous increase of about 1 percentage point in C-section rates. Second, two to two and a half years after the adverse event the cumulative increase in C-section rates adds up to roughly 2.2 percentage points. Given that the base C-section rates before the adverse event are roughly 25%, these results reflect an increase of 4% and 8% in C-section rates, respectively. Using the matching approach, I find that the effect of the adverse event and the lawsuit persists for at least four and a half years after the adverse event. Additionally, I find no evidence of a hospital-wide change in treatment patterns in response to an adverse event. Finally, the response is concentrated among claims which are ultimately successful and hence are more likely to be associated with a medical error, implying that the response is not occasioned by an emotional or institutional reaction to the bad outcome that led to the lawsuit.

When interpreting the results as reflective of a change in practice patterns, one must be concerned about the possibility that the adverse event led to a change in patient composition. I address this concern by testing for observed differences in the number of births, the risk level of the pool of mothers, mothers' mean age, and the share of mothers insured by a private carrier before and after the adverse event. I find no evidence of a change in the number of births or the characteristics of mothers following an adverse event, thereby alleviating these concerns.

This study is related to earlier work that used similar data to study the association between healthcare and personal experience with malpractice litigation. Grant and McInnes (2004) related the change in Florida obstetricians' propensity to perform C-sections between 1992 and 1995 to their malpractice experience in 1993 and 1994. They found that claims that ultimately resulted in large indemnity payments were associated with an increase in C-section rates and conversely, claims that ultimately resulted in small indemnity payments were associated with a decrease in C-section rates, with a small effect overall on C-section rates. Gimm (2010), using inpatient data from 1992 to 2000, aggregated in physician-year cells, did not find statistically significant evidence of a change in physicians' patterns of practice in response to malpractice claims. Dranove and Watanabe (2010) studied the response of physicians to news about malpractice litigation by carefully examining whether physicians changed their C-section rates after first being contacted about a lawsuit. Their results imply small and short-lived increases in C-section rates after a physician is contacted about a malpractice claim. Dranove et al. (2012) extend this literature further and study the demand side response to litigation by examining the change in patient volume and composition around the time of filing of a lawsuit, the time when the alleged medical malpractice case officinally becomes public information. They find that starting in the second year after the time of filing of a lawsuit high-quality physicians see fewer PPO patients but this decline is offset by an increase in the number of HMO and Medicaid patients. On the other hand, low-quality physicians see a decline in the overall number of patients they treat.

The findings that follow expand on the foregoing literature in several ways. First, my main and most robust finding is that C-section rates show a discontinuous increase after a medical error that results in a lawsuit. This result establishes, for the first time to my knowledge, the existence of a statistically significant and economically important relation between a physician's medical error and her medical treatment patterns. While this result in itself does not explain the mechanisms that underly this association, it strongly suggests that further examination of this association is important for understanding the consequences of medical errors and the extent to which physicians correct themselves after making them.

Second, this study shows a substantial and persistent impact of medical errors that result in lawsuits on medical treatment. This finding is of interest for the discourse on the interaction between medical-malpractice law and a physician's exposure to malpractice litigation. Put together with the results of Dranove and Watanabe (2010) and Dranove et al. (2012), the results in this study imply that physicians' response to malpractice litigation (the so-called "supply side" response) takes place immediately after the adverse event and it is persistent. Afterwards, a year after the filing of a lawsuit, a demand side response occurs, affecting patient volume and the mix of patient characteristics.

Finally, this study shows one special case in which a physician's medical errors directly affect her choice of medical treatment, a finding consistent with conventional wisdom but poorly documented in the literature.

The rest of the paper is organized as follows. Section 2 reports the data, Section 3 offers evidence about physicians' response to an adverse event, Section 4 presents evidence on peer effects, and Section 5 concludes.

2. The data

I use the universe of all births recorded in the Florida Hospital Inpatient Discharge Database (the "inpatient data") in 1992–2008. Births are linked to physicians and physicians who performed fewer than 25 deliveries throughout the entire period are excluded from the analysis. This leaves about three million births performed by 2,307 physicians, comprising 99.8% of all births. I merged the inpatient data with the Practitioner Profile Data File (the "profile data") which contains information about physicians' education history. Next, I matched the Medical Professional Liability Files (the "closed claims data") for 1979–2008 to the data, using both medical license numbers and physicians' names. The claims data contain a history of closed medical malpractice claims, payments made if any, severity of injury, and dates of the injury, and the reportage and closing of malpractice claims. I then create an *adverse event panel*: a five-year balanced panel, comprised of physicians who appear in the data ten quarters before and after the adverse event. I limit the number of adverse events per physician in the analysis to one by