

Clinical Study

# Spine surgery and malpractice liability in the United States

Symeon Missios, MD<sup>a</sup>, Kimon Bekelis, MD<sup>b,\*</sup>

<sup>a</sup>Department of Neurosurgery, Louisiana State University Health Sciences Center, 1541 Kings Hwy, Shreveport, LA 71103, USA

<sup>b</sup>Department of Surgery, Section of Neurosurgery, Dartmouth-Hitchcock Medical Center, One Medical Center Dr., Lebanon, NH 03756, USA

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## Abstract

**BACKGROUND CONTEXT:** The correlation of negative outcomes with aggressiveness of malpractice liability has been questioned in the literature.

**PURPOSE:** The aim of this study was to investigate the association of malpractice liability with unfavorable outcomes and hospitalization charges in spine surgery.

**STUDY DESIGN/SETTING:** This was a retrospective cohort study.

**PATIENT SAMPLE:** The sample included a total of 709,951 patients undergoing spine surgery who were registered in the Nationwide Inpatient Sample (NIS) database from 2005 to 2010.

**OUTCOME MEASURES:** The outcome measures were state-level mortality, length of stay (LOS), and hospitalization charges after spinal surgery.

**METHODS:** We performed a retrospective cohort study involving patients who underwent spine surgery from 2005 to 2010 and were registered in NIS. We used data from the National Practitioner Data Bank from 2005 to 2010 to create measures of volume and size of malpractice claim payments. Their association of the latter with the outcome measures was investigated.

**RESULTS:** During the study period, there were 707,951 patients (mean age, 54.4 years, with 49.7% females) who underwent spine surgery and were registered in NIS. In a multivariable regression model, higher number of claims per 100 physicians in a state was associated with increased hospitalization charges ( $\beta=0.14$ ; 95% confidence interval [CI], 0.13–0.14) and LOS ( $\beta=0.041$ ; 95% CI, 0.036–0.047). On the contrary, there was no association with mortality (odds ratio [OR], 0.99; 95% CI, 0.87–1.12). Larger magnitude of awarded claims was associated with increased hospitalization charges ( $\beta=0.08$ ; 95% CI, 0.075–0.09) and LOS ( $\beta=0.02$ ; 95% CI, 0.016–0.031). On the contrary, there was no association with mortality (OR, 0.95; 95% CI, 0.82–1.11).

**CONCLUSIONS:** In the present national study, aggressive malpractice environment was not correlated with mortality but was associated with higher hospitalization charges after spine surgery. Further research is needed to identify ways to regulate the malpractice system to address these disparities. © 2015 Elsevier Inc. All rights reserved.

**Keywords:** Spine surgery; Malpractice; Liability; Claims; NPDB; NIS

## Introduction

Physicians are at constant risk of litigation throughout their professional careers [1]. Neurosurgeons and orthopedic surgeons are faced with the heaviest burden, both in size

and numbers, of malpractice claims. Most of these cases involve spine surgery [2]. Despite the rising cost of malpractice for physicians and patients, there is growing concern about the effectiveness and the impact of this system [3,4]. Some argue that the current system plays a role in maintaining the quality of care [4,5]. Others point out that it fails to compensate most patients who suffer avoidable injuries and punishes many physicians for adverse events that were not caused by negligence [4,5]. Although there is evidence for the latter in some medical specialties [4], this paradoxical imbalance between liability environment and outcomes has not been investigated before in spinal surgery, which is particularly prone to litigation [2].

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\* Corresponding author. Section of Neurosurgery, Dartmouth-Hitchcock Medical Center, One Medical Center Dr., Lebanon, NH 03756, USA. Tel.: (603) 650-5110; fax: (603) 650-4547.

E-mail address: [kbekelis@gmail.com](mailto:kbekelis@gmail.com) (K. Bekelis)

Concerns have also been raised [6] with regard to the effect of increasing liability on the practice of defensive medicine, resulting in increased hospitalization charges.

Several studies have attempted to characterize malpractice claims in spine surgery [6–17]. These reports are in the context of the broader specialty (neurosurgery or orthopedics) and do not focus on spine surgery. In addition, most of these studies are based on physician surveys about defensive medicine [6,11,13,18], whereas others focus on the context and the size of malpractice claims [7,9,13,16,17]. Most of the literature involves retrospective analyses of single-institution experiences [7,9], demonstrating results with limited generalization, given their inherent selection bias. The interpretation of other multicenter studies is equally limited given their focus on specific subgroup data or a specific region of the United States [10,12,13,17]. There has been no investigation of the association of the local malpractice liability environment with unfavorable outcomes and hospitalization charges for spine surgery.

The Nationwide Inpatient Sample (NIS) is a hospital discharge database that represents approximately 20% of all inpatient admissions to nonfederal hospitals in the United States [19]. It allows for the unrestricted study of the patient population in question. By combining data from the NIS, National Practitioner Data Bank (NPDB), and Area Resource File (ARF), we investigated the association of the volume and size of claims payments at the state level with mortality, length of stay (LOS), and hospitalization charges after spine surgery.

## Methods

### *NIS database*

All patients undergoing spine surgery, who were registered in the NIS database [19] (Healthcare Cost and Utilization Project, Agency for Healthcare Research and Quality, Rockville, MD, USA), between 2005 and 2010 were included in the analysis. For these years, the NIS contains discharge data regarding 100% of discharges from a stratified random sample of nonfederal hospitals in several states to approximate a representative 20% subsample of all nonfederal US hospital discharges. More information about the NIS is available at <http://www.ahrp.gov/data/hcup/nisintro.htm>.

### *National Practitioner Data Bank*

We used data from the NPDB from 2005 to 2010 to create measures of volume and magnitude of claims payments [20]. This database is maintained by the Health Resources and Services Administration and contains approximately 200,000 medical malpractice payments made on behalf of physicians since 1990. Despite limitations (such as the “corporate shield” loophole and potential underreporting), NPDB is the most representative national database on medical malpractice payments, and the size of these potential biases is limited [4].

## EVIDENCE & METHODS

### **Context**

The authors sought to correlate outcomes with malpractice environment in an analysis that considered patients treated using spinal surgery in the Nationwide Inpatient Sample (NIS).

### **Contribution**

This study considered more than 700,000 patients treated with spine surgery between 2005 and 2010. The authors maintain that more litigious malpractice environments were associated with increased hospitalization charges and longer hospital lengths of stay.

### **Implications**

The authors findings regarding hospital charges are not adjusted in hierarchical fashion and may be over-inflated as a result. In addition, the study itself is subject to the potential for ecological fallacy in that the authors cannot ensure the malpractice environment is responsible for the findings related in the analysis. Moreover, it is not certain that the findings related to hospital length of stay, while statistically significant given the numbers involved, are clinically meaningful. These facts should be appreciated by readers when considering the authors contentions and interpretation.

—The Editors

### *Area Resource File*

We used the ARF, 2005 to 2010, a national county-level health information database, maintained by the US Department of Health and Human Services, to create measures of resource availability. By combining the county data and the 2010 census data, the state density of all physicians, neurosurgeons, and orthopedic surgeons was calculated.

### *Cohort definition*

To establish the cohort of patients, we used *International Classification of Disease-9-Current Modification* codes to identify patients in the NIS who underwent any spine surgery (03.2–03.29, 03.0, 03.01, 03.02, 03.09, 03.1, 03.4, 03.51, 03.53, 03.59, 03.6, 80.5, 80.50, 80.51, 80.52, 80.59, 81.00, 81.01, 81.02, 81.03, 81.04, 81.05, 81.06, 81.07, 81.08, 81.09, 81.3, 81.30, 81.31, 81.32, 81.33, 81.34, 81.35, 81.36, 81.37, 81.38, 81.39, 81.62, 81.63, 81.64, 84.51) between 2005 and 2010.

### *Outcome variables*

The primary outcome variables were mortality, average LOS of hospitalization, and the average hospitalization

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