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# Musculoskeletal occupational injury among surgeons: effects for patients, providers, and institutions



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## ABSTRACT

**Background:** The aim of this study was to determine the risk of occupational musculoskeletal injury during a surgeon's career and the effects of these injuries for patients, providers, and institutions. We hypothesized that surgeons have occupational injuries, which affect work performance.

**Materials and methods:** Electronic RedCAP surveys on workplace injury were distributed statewide via e-mail to the members of the Tennessee chapter of the American College of Surgeons. Descriptive statistics were used to analyze survey data.

**Results:** A total of 260 of 793 surveys (33%) were returned. Forty percent of surgeons sustained  $\geq 1$  injuries in the workplace. Although 50% of injured surgeons received medical care for their most recent injuries, only 20% of these injuries were reported to their institution. Twenty-two percent of injured surgeons missed work and 35% performed fewer operations while they were recovering from their injury. Fifty-three percent of injured surgeons reported that pain from their injury had a minimal or moderate effect on their performance in the operating room.

**Conclusions:** Surgeons appear to be at moderate risk for occupation-related injuries. The low rate of institutional reporting for these injuries is concerning, as this is a required step to access institutional support once injured. Surgeon injury results in lost productivity due to missed workdays and may impact the quality of surgical care because of performance issues while recovering from injury.

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## 1. Introduction

Costs associated with occupational injury within the hospital industry exceed \$190 billion annually, the third highest among 313 US industries [1,2]. According to the Occupational Safety and Health Administration, "an occupational injury is

any wound or damage to the body resulting from an event in the work environment. An injury is considered work-related if an event or exposure in the work environment either caused or contributed to the resulting condition or significantly aggravated a preexisting condition [3]." Studies of occupational injury within the hospital industry have focused

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primarily on direct care occupations such as nursing [4,5]. Nursing aides, orderlies, and attendants have the second highest incidence of nonfatal occupational injuries leading to missed work among common US occupations, sustaining more injuries than construction and freight workers [6]. Despite the identification of the hospital environment as high risk for occupational injury, relatively little study has focused on the risk of occupational injuries among physicians or surgeons specifically.

The percentage of surgeons who regularly experience musculoskeletal symptoms in the workplace has varied between 50%–85% in recent surveys examining a broad array of surgical specialties [7–10]. These studies and anecdotal evidence suggest that most surgeons have chronic musculoskeletal complaints at some point in their careers. The positions held by surgeons for extended hours in the operating room are known to increase risk for musculoskeletal injury [11,12]. The modern surgical practice may increase risk for injury as laparoscopic procedures are being performed more often, and these techniques have been shown to increase risk of injury to the performing surgeon [13,14]. Thus, surgeons have specific occupational risk factors while working in an environment known to have elevated risks of workplace injury.

This study examines the impact of surgeon injury on patients, providers, and institutions. Surgeon injury may impact patient outcomes by affecting the quality of surgical care provided or through physician shortage if unable to perform the usual caseload [15]. Surgeons are highly trained workers with immense personal and institutional investment in their ability to function at the highest level. Surgeon injury may also impact providers through workload reduction thereby threatening personal earning potential [10]. Institutional injury reporting is a required step in the access of resources such as rehabilitation and disability for individuals injured in the workplace [16]. Surgeon injury may impact institutions on several levels including lost revenue, risk of malpractice claims, and general morale of injured workers [17]. In this study, we report the results of a survey study examining occupational injury among American College of Surgeons (ACS) Fellows in Tennessee. We will attempt to identify the prevalence of occupational injury over the career of a surgeon and the impact of these injuries on patients, providers, and institutions.

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## 2. Materials and methods

### 2.1. Participants

We contacted 793 current members of the Tennessee Chapter of the ACS to answer an anonymous web-based survey. The invitation noted that the study would be used to examine the impact of musculoskeletal injuries in the workplace among the surgeon population. After obtaining permission from our institutional review board, the original invitation was sent on July 26, 2012. Reminder e-mails were sent bimonthly to request participation from nonrespondents, and data collection closed on January 5, 2013. No incentives were offered for participation in the study.

### 2.2. Data instrument

Previously developed surveys assessing physician injury were used as a reference to develop a 25-item internet-based survey [18]. This survey further explores some of the questions raised by a recent publication examining occupational injury among orthopedic surgeons in a different study sample containing surgeons of various specialties [19]. REDCap (the project described was supported by Award Number UL1TR000445 from the National Center for Advancing Translational Sciences of the National Institutes of Health. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Center For Research Resources or the National Institutes of Health. Study data were collected and managed using REDCap electronic data capture tools hosted at the University of Vanderbilt) was used for data collection and management. Simple, direct questions were used to reduce redundancy and minimize respondent burden [20].

Demographics, lifestyle information, perception of injury support, and incidence of injury were collected for all respondents. We compared these data in surgeons who had no injuries with surgeons who sustained at least one injury during their career in an attempt to identify any risk factors for injury. For questions regarding perceptions of injury support, respondents were given an added option of no opinion.

Surgeons who sustained at least one injury were asked several questions in regards to their most recent injury. First, surgeons were asked to characterize the injury location and pain resulting from the injury. Then, injured surgeons were asked about the consequences of their most recent injury such as reporting the injury to their institution, medical treatment received, and workdays missed. All respondents were given a free response option to offer suggestions on how to improve workplace safety or provide better support for injured surgeons.

### 2.3. Statistical analysis

Descriptive statistics were analyzed using R statistical software that provided the mean, median, range, and standard deviation for survey items. A scatterplot of surgeon experience stratified by the number of injuries sustained by each surgeon was constructed to examine whether risk of injuries increased with more years of surgical practice. Qualitative analysis was performed on the free responses by the topic discussed.

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## 3. Results

Of 793 surgeons invited for participation in our survey, 260 (33%) successfully completed and returned the survey during the collection period. A total of 209 respondents (80%) were male, and the median body mass index of all respondents was 25.8 (Table 1). General surgery was the most commonly represented surgical specialty with 165 respondents (64%). Most of the 57 respondents (22%) indicating “other” for specialty represent general surgery specialties, such as cardiothoracic and vascular surgeries, according to respondent ACS member

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