

The Impact of Safety Regulations on the Incidence of Upper-Extremity Power Saw Injuries in the United States

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Purpose Over 50,000 power saw-related injuries occur annually in the United States. Numerous safety measures have been implemented to protect the users of these tools. This study was designed to determine which interventions, if any, have had a positive impact on the safety of the consumer or laborer.

Methods We queried the National Electronic Injury Surveillance System database for hand and upper-extremity injuries attributed to power saws from 1997 to 2014. Demographic information including age, sex, date of injury, device, location, body part involved, diagnosis, and disposition was recorded. We performed statistical analysis using interrupted time series analysis to evaluate the incidence of injury with respect to specific safety guidelines as well as temporal trends including patients' age.

Results An 18% increase in power saw-related injuries was noted from 1997 (44,877) to 2005 (75,037). From 2006 to 2015 an annual decrease of 5.8% was observed. This was correlated with regulations for power saw use by the Consumer Safety Product Commission (CPSC) and Underwriters Laboratories. Mean age of injured patients increased from 48.8 to 52.9 years whereas the proportion of subjects aged less than 50 years decreased from 52.8% to 41.9%. These trends were most pronounced after the 2006 CPSC regulations.

Conclusions The incidence of power saw injuries increased from 1997 to 2005, with a subsequent decrease from 2006 to 2015. The guidelines for safer operation and improvements in equipment, mandated by the CPSC and Underwriters Laboratories, appeared to have been successful in precipitating a decrease in the incidence of power saw injuries to the upper extremity, particularly in the younger population.

Clinical relevance The publication of safety regulations has been noted to have an association with a decreased incidence in power saw injuries. Based on this, clinicians should take an active role in their practice as well as in their professional societies to educate and counsel patients to prevent further injury. (*J Hand Surg Am.* 2017;42(4):296.e1-e10. Copyright © 2017 by the American Society for Surgery of the Hand. All rights reserved.)

Key words Hand lacerations, power saw, safety regulations, table saw.



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UPPER-EXTREMITY POWER SAW INJURIES lead to a substantial financial burden because of lost wages and medical claims. These injuries most frequently come from direct blade contact and result in a range of injuries from simple lacerations to mangling injuries and amputations. The United States Consumer Product Safety Commission (CPSC) noted that such injuries cost as much as \$3.3 billion, cause an average of 64 lost days of work per patient injured, and are preventable in 85% of 96% of cases.^{1,2} Owing to the volume of these injuries, guidelines and regulations from the CPSC, Underwriters Laboratories (UL), and the Occupational Safety and Health Administration (OSHA) have led to several mandates for both device-specific safety accommodations and policies for a general “culture of safety.”

To this end, these organizations collect data from emergency departments via the National Electronic Injury Surveillance System (NEISS) database to determine injury incidence and causative equipment and to recommend measures that may decrease future events. These events are divided into 2 categories by the CPSC: incidental (inherent to the instrument) and nonincidental (the use of the instrument).¹ The goals of these recommendations are to decrease nonincidental injuries by altering product use and to minimize the potential for injury inherent to an instrument (incidental) with the installation of safety devices.

These mandates began on a federal level with the 2003 statements from the CPSC, which have served as the landmark compendia regarding power saw safety.^{1,3} This statement calls attention to the facts that 83% of injuries come from blade contact and that there need to be more research and regulation aimed at consumer protection, although no specific safety devices have yet been delineated. This document was followed by another CPSC statement in 2006 petitioning for all table saws to be produced with certain performance standards to eliminate or reduce the likelihood of blade contact injuries. These devices include mechanisms geared toward avoiding kickbacks such as blade guards and riving knives.⁴

Based on these recommendations, the UL issued a formal statement of mandates in 2007 (UL 987, Seventh edition), which required the installation of riving knives and an improved modular blade guard that provided better visualization of the material being cut, which was intended to prevent post-purchase modification of saw safety features.⁵ Compliance with the new blade guards and riving

knives on all commercially sold power saws were required by 2007 and 2008, respectively. From the industrial sector, since 1999, OSHA has mandated (OSHA 3157) that in the industrial setting these 3 safety mechanisms be in place on all woodcutting equipment.^{6,7} The goals of the CPSC statements and UL regulations were to extend woodworking safety beyond an industrial environment.

Given the prevalence of these injuries, the effect of these regulations has not been evaluated with regards to their impact on the frequency and severity of power saw–related injuries. The purpose of this study was to analyze the incidence of power saw injuries, to determine whether these measures have been associated with a decrease in the incidence of these injuries.

MATERIALS AND METHODS

We queried NEISS within the CPSC. This information is used to analyze consumer hazards and potentially intervene by setting guidelines for the manufacture and use of consumer products to enhance the safety of the user. This database is composed of approximately 100 hospitals in the United States selected on a probability sample of over 5,000 hospitals and stratified based on the size of their emergency departments and whether they treat adult or pediatric patients. These hospitals are located across the country and their weight for incidence extrapolation is based on size. The database records patient demographic information and frequency of injury based on product and diagnosis code.^{3,8}

For each diagnosis code, individual deidentified patient data are reported, including patient age and sex, date of injury, device involved in the incident, the location where the event took place, the body part involved, the diagnosis, and the patient’s disposition. Reports generated contain the actual incidence of injury reported by institutions participating in the NEISS program through a NEISS coordinator that reviews all emergency department records, as well as the estimated national incidence based on an internal algorithm. All injuries occurred between January 1997 and December 2014.

Search technique: Within the NEISS database, consumer goods are classified by codes, which in this case correspond to different types of saws. We queried the database for portable circular power saws (code 832), bench and table saws (code 841), other power saws (codes 843, 844, 863, and 864), and power saws—not specified (code 872). Results were then filtered to

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