Table Saw Injuries: Are Our Safety Features Really Keeping Us Safe?

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Abstract

Background: Currently, table saws sold in the United States have 3 safety features (riving knife, blade guard, and antikickback device) designed to prevent personal injury; however, these features can hinder the user's movements and are often disabled or removed. Despite the frequency of table saw injuries, there is relatively limited literature regarding them. **Methods:** We performed a retrospective, observational study of characteristics associated with injuries incurred while using a table saw. Electronic medical records from Bassett Medical Center were reviewed from 2002 to 2014 to identify patients who sustained table saw injury, and surveys were sent to the patients. Tests of association between survey variables (eg, presence/absence of safety device vs severity of injury) were carried out using chi-square or Fisher exact test. **Results:** Seventy-three percent of those injured had disabled their safety features or had no safety features present; 27% of those injured had one or more safety features enabled when they sustained the injury. Of those injured, 18% sustained a "mild" injury (skin laceration), 39% sustained a "moderate" injury (nerve or tendon injury), and 43% sustained a "severe" injury (partial or complete amputation). There was no statistically significant association between severity of the injury and presence/absence of safety features. **Conclusions:** This study highlights 2 major problems with the current safety features: People are dissatisfied with current safety features, disabling them and sustaining injuries, and even when they are enabled, people are still getting injured—suggesting inadequacy of the current features.

Keywords: table saw, hand, injury, amputation, laceration, saw

Introduction

The table saw is a commonly used tool in the United States with a potential for serious injury to those who operate them. It is estimated that 30 000 people per year are injured by saws, making it a common problem for hand surgeons.³ Medical costs for the treatment of table saw injuries are estimated at more than \$2 billion every year.³ Currently, table saws sold in the United States have 3 safety features (the riving knife, the blade guard, and the antikickback device) designed to prevent personal injury while operating the machine.¹ Unfortunately, these safety features can hinder the user's ability to perform certain cutting tasks and are therefore often disabled or removed. Technology does exist to completely prevent these injuries; however, this often comes at a price that the average table saw operator may not be able to afford. Despite the frequency of table saw injuries, there is relatively limited literature regarding them.

Methods

This was a retrospective, observational study of characteristics associated with injuries incurred while using a table saw. All study protocols were reviewed and approved by the Mary

Imogene Bassett institutional review board. Participants were identified from an *International Classification of Diseases, Ninth Revision/Current Procedural Terminology* (ICD-9/CPT) code search of codes likely to be associated with hand injuries from Bassett Medical Center's electronic medical record (EMR) from 2002 to 2014. Records were reviewed for evidence of injury related to table saw use. Those injuries were entered into a list for the study, and those with different cause of injury were excluded. Surveys were sent to those identified as sustaining an injury from a saw with questions regarding type of saw, safety devices present or disabled, extent of damage, time lost from work, and effect of the injury on their job. Those who were not injured by a table saw were excluded. For those who did not return the survey within 1 month, a telephone survey was offered. Tests of association between survey variables (eg, presence/

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Table 1. Safety Features vs Severity of Injury.

Severity	Any safety feature engaged	No safety feature engaged
Mild	2 (14.2%)	7 (18.9%)
Moderate	4 (28.6%)	16 (43.2%)
Severe	8 (57.1%)	14 (37.8%)

absence of safety device vs severity of injury) were carried out using chi-square, or alternatively, Fisher exact test. Participants who answered over the phone completed verbal consent, and for participants who returned surveys by mail, informed consent was implied by completion of the questionnaire.

Results

A total of 103 patients were identified from EMRs as having sustained an injury from a saw. Of these 103, 71 were found to be eligible (meaning the injury was caused by a table saw, the injury was to the hand, they had up-to-date contact information, and they were currently alive and well enough to answer the survey.) Of the 71 eligible participants, 52 responded to the survey (73% response rate.) Of those injured, 18% sustained a “mild” injury (skin laceration), 39% sustained a “moderate” injury (nerve or tendon injury), and 43% sustained a “severe” injury (partial or complete amputation).

Seventy-three percent of those injured reported that they had disabled their safety features or that there were no safety features present; 27% of those injured report that they had one or more safety features enabled when they sustained their injury. In particular, we noted that 71% of those injured had removed their blade guard.

When comparing the presence of safety features to severity of injury, we found more severe injuries (by nearly 20%) reported among those with safety features engaged (Table 1). Among the 14 participants with any safety feature on, 14% had a mild injury, 29% had a moderate injury, and 57% had a severe injury. In comparison, among the 37 participants without any safety features on, 19% had mild injury, 43% had moderate injury, and 38% had severe injury. Although this did not reach statistical significance ($P = .4587$), we felt this was an interesting pattern.

There was a marginally significant ($P = .079$) association between injury severity and time lost from work. The highest proportion of participants who were out of work for 4 or more weeks (14.2%) was found in the group with severe injuries; however, even among those with severe injuries, 47.6% stated they did not miss any work. Of those with mild injuries, the majority (78%) did not lose any time from work. Although not statistically significant, 68% of those with severe injuries, 72% of those with moderate

injuries, and 33% of those with mild injuries stated that their injury did affect how they performed at their job.

The majority of participants (69%) rated themselves as highly skilled at the time of their injury, 27% rated themselves as intermediate, and 4% rated themselves as beginners.

Discussion

This study portrays that many table saw operators are disabling their safety equipment. Even for table saw operators who had safety features engaged, many (27% of our participants) are still suffering injuries. This highlights 2 major problems with the current safety features: one is that people are dissatisfied with the safety features, disabling them and sustaining injuries; and the second is that even when safety features are enabled, people are still getting injured—suggesting inadequacy of the current features.

The majority of the people in our study who sustained injuries had disabled their safety equipment. In particular, we noticed that 71% of those injured had removed their blade guard, highlighting that the current features impede the operator’s ability to perform specific tasks and thus they disable them. Many of the participants in our study included comments such as “I blame myself” and that the accident was caused by them being “rushed, tired, and careless.” Many operators admitted they were distracted during their accident. Safety features are supposed to be there to protect operators when they do make these mistakes; however, if the features are disabled, they are unable to do so.

We were surprised that 27% of our participants who sustained injuries reported that their safety features actually were engaged. This brings up a bigger question of how are people getting injured despite having the current safety features engaged? Although not statistically significant, we found more severe injuries (by nearly 20%) reported among those with safety features engaged. Some of the participants in the study suggested that the safety features themselves were “poorly designed” and that some of the features were not compatible with the work they were doing. It was also suggested that safety equipment provided a false sense of security allowing operators to work less inhibited, and with the inadequate features, they sustained injuries.

A recent article published by Harper et al showed an annual increase of 18% in the incidence of power saw injuries in the United States between 1997 and 2004. From 2006 to 2015, they showed a decrease in the incidence of power saw injuries by 5% following implementation of safety mandates from the Consumer Product Safety Commission.² This shows that regulations have shown some improvement in recent years; however, there is much room for improvement.

If current safety features are cumbersome, being disabled, and leading to significant injuries, and even when

they are engaged they are not functioning well enough to protect the operators, it suggests that current safety features are not sufficient. It is our hope that this study sheds light on the inadequacy of current table saw safety features so that new safety features such as blade-sensing technology could be included on table saws at a price that the public can afford. Several participants in the study mentioned the “SawStop™” technology which detects blade contact with the skin and triggers immediate saw brake technology. The SawStop brake cartridge applies an electric charge to the saw blade which is continuously monitored, and when it contacts a conductive material such as a human finger, it lessens the charge, and the blade is lowered below the table surface and stopped within microseconds before serious injury can be sustained.⁴ The process happens so fast it is not detectable by the human eye. This technology has the potential to prevent serious injuries that negatively impact the lives of table saw operators but is often too expensive for many table saw operators to afford. However, by mandating SawStop technology be applied to all new saws, developing components that could be added to existing saws, or offering incentives such as health insurance rebates to encourage purchase of SawStop products, we may be able to prevent further table saw injuries.¹

Some limitations to our study include potential missed injuries through the ICD-9/CPT code search, missing table saw injuries on patients who did not seek medical help, and lack of response from eligible patients. However, we believe that with a 73% response rate, our study does comprise a representative sample. We hope the data in our study shed light on the prevalence of injuries sustained by table saw users, and we believe it is worth investing money into developing this safety technology now so that further injuries from table saws can be prevented.

Ethical Approval

This study was approved by our institutional review board.

Statement of Human and Animal Rights

All procedures followed were in accordance with ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2008.

Statement of Informed Consent

Informed consent was obtained from all patients for being included in the study.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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