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The dangers of being a “weekend warrior”: A new call for injury prevention efforts

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Abstract

BACKGROUND—Nonprofessionals routinely perform high-risk home maintenance activities otherwise regulated by the Occupational Health and Safety Administration when professionals perform the same work. Reducing the risks taken by these “weekend warriors” has not been the focus of injury prevention efforts. This study describes injury patterns and outcomes for nonprofessionals attempting home roof and tree maintenance.

METHODS—We queried our trauma registry for all adult patients (age, ≥18 years) with injury codes for “fall-from-height” or “struck-by-tree” (2005–present) and reviewed charts to determine injuries sustained during home roof or tree work. Patients injured during occupational duties (indicated by Workman’s Compensation) were excluded. Descriptive statistics were used to determine patient demographics, injury patterns, and outcomes.

RESULTS—A total of 129 patients were injured performing roof and tree maintenance during the study period. Of these patients, 90 (69.8%) were fall from height and 39 (30.2%) were struck by tree. Mean (SD) age was 45 (14) years. The majority were male (124, 96.1%) and white (116, 89.9%). Nearly half (59, 45.7%) were privately insured; a quarter (32, 24.8%) had no insurance. Mean (SD) Injury Severity Score was 12.7 (9.3). Injury distributions were as follows: head injury, 48.8%; facial fractures, 10.1%; cervical spine fractures, 3.9%; thoracic, lumbar, and sacral spine fractures, 28.1%; rib fractures, 27.3%; intrathoracic injuries, 22.5%; liver/spleen injuries, 6.2%; pelvic fractures, 15.6%; upper-extremity fractures, 27.3%; and lower-extremity fractures, 14.7%. Of the patients, 19 (14.7%) had one or more regions with Abbreviated Injury Scale score of higher than 3. Mean (SD) length of stay was 5.3 (7.6) days. Except for 2 deaths (1.6%), discharge dispositions were as follows: home, 64.2%; home with services, 10.1%; rehabilitation, 17.8%; and skilled nursing, 5.4%.

CONCLUSION—Weekend warriors performing home roof and tree maintenance sustain serious injuries with a potential for a long-term disability at young ages. Injury prevention efforts should educate the public about the hazards of high-risk home maintenance, possibly encouraging

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AUTHORSHIP

Charles M. Psoinos contributed to the study design, data analysis, data interpretation, and writing of the article. Timothy A. Emhoff contributed to the study design. W. Brian Sweeney contributed to the study design. Jennifer F. Tseng contributed to the study design and data interpretation. Heena P. Santry contributed to the study design, data analysis, data interpretation, and writing of the article.

Occupational Health and Safety Administration–regulated protective measures or deferral to trained professionals.

Keywords

Fall; residential; trauma surgery

Injury prevention is a key component of trauma care. Trauma providers have made great strides in injury prevention through patient education and advocacy in the three decades since trauma systems first emerged and espoused injury prevention as a vital aspect of a comprehensive trauma system. However, these injury prevention efforts have largely focused on motor vehicle safety (e.g., proper restraints and motorcycle helmets), sports and recreation safety (e.g., bicycle helmets and proper sporting equipment), and interpersonal violence reduction (e.g., firearms reduction, and domestic abuse screening). The risk of injury during home maintenance has not been the focus of traditional injury prevention efforts.

Falls are the number one cause of injury in the United States and the second most common cause of accidental death behind motor vehicle collisions.¹ It is unclear how many of these falls are sustained during home maintenance activities by nonprofessionals, in particular roof and tree work, which often occur at heights or involve shifting heavy objects. Importantly, when professionals perform such home maintenance, there are numerous regulations to ensure safe working conditions. These are typically monitored and regulated by the Occupational Safety and Health Administration (OSHA), which was established by the Occupational Safety and Health Act of 1970.² OSHA requires employers to provide guardrails, safety nets, or personal fall arrest systems to all employees working in areas with unprotected edges where a fall of 6 ft or greater is possible.³ To date, injury prevention efforts, however, have not urged nonprofessionals to take the same precautions while undertaking the same type of home maintenance activities.

Yet, such activities are fraught with risk as noted by Lalikos et al.⁴ who described 17 patients injured after falling from rooftops during a single New England snow storm in 1996. Falls from height after significant snow fall (>12-in. snow accumulation) have been associated with head injuries, extremity fractures, and spinal fractures.⁵ In fact, approximately one third of the patients who fall from greater than 10 ft (the height of a typical one-story home roof) experienced a spinal injury.⁶

Unfortunately, it is commonplace for media outlets to stress the importance of roof and gutter maintenance and snow removal to prevent home damage without relaying the dangers of such activities.⁴ This, coupled with the “do-it-yourself ” mind-set common in American society, is a potentially hazardous combination wherein able-bodied “weekend warriors” subject themselves to risk of debilitating injury. However, there is a paucity of literature on the incidence and magnitude of injury from high-risk home maintenance activities. This study attempts to better elucidate the dangers of nonprofessionals attempting high-risk home maintenance activities such as clearing their roofs of snow, gutters of leaves, and other roof and tree maintenance activities that have not been the focus of contemporary injury prevention efforts.

PATIENTS AND METHODS

This was a retrospective single-institution study using a prospective trauma registry and subsequent chart review. The University of Massachusetts Memorial Medical Center is an American College of Surgeons–verified Level I trauma center with a wide catchment area

that expands into three adjoining states. The registry was queried for all adult patients (age, 18 years) with injury codes for “fall-from-height” or “struck-by-tree” for a period of 64 consecutive months from December 1, 2005, to March 31, 2011. Individual charts were reviewed to confirm mechanism of injury and to determine if injuries were sustained during home maintenance activities. Patients whose injuries were sustained during low-risk (defined a priori) activities such as routine lawn care, gardening, snow shoveling, pool care, and so on were excluded as were patients injured during professional/occupational duties as indicated by the submission of Workman’s Compensation claims.

Statistical analyses included descriptive statistics to determine patient demographics, injury patterns, and trauma outcomes. χ^2 tests of association (or Fisher’s exact test when individual cell size is <5) and the Student’s *t* tests were used to compare differences between injury mechanisms. All analyses were performed using Stata 10 (Stata Corp., College Station, TX).

This study was reviewed and approved by the University of Massachusetts Medical School Institutional Review Board.

RESULTS

Incidence

Between December 1, 2005, to March 31, 2011, there were a total of 129 patients identified as having been injured during high-risk home maintenance activities. Seven patients were excluded owing to lack of information on whether the injury was work related, and one was excluded owing to lack of traumatic mechanism (myocardial infarct during tree cutting). Of the patients, 90 (69.8%) were injured owing to fall from height, and 39 (30.2%) were struck by tree. First responders reported an estimated height fall on 75.7% (68 of 90) of the fall-from-height cohort (mean, 17 ft). Serum blood alcohol levels were available on 80% (103 of 129) of the cohort; 87.4% (90 of 103) had an undetectable alcohol level, whereas 12.6% (13 of 103) had positive alcohol levels with a range of 40 to 400 and a median of 188. The 129 patients represented 1.4% of our institution’s trauma admissions during the study period.

During this same period, only 45 professionals were seen for injuries sustained during tree or roof maintenance. Appendix 1 compares professionals with nonprofessionals. There were no significant differences between the two groups in demographics or injury patterns except that the nonprofessionals were on average 8 years older than their professional counterparts (45 and 37 years, respectively; $p < 0.05$). We did not have data available on what type of protective gear was being used by professionals at the time of injury.

Demographics

The mean (SD) age of the cohort was 45 (14) years. The majority were white (116, 89.9%) and males (124, 96.1%). Nearly half (59, 46.8%) had private health insurance; a quarter (32, 25.4%) had no insurance, with 10.1% ($n = 13$) and 12.4% ($n = 16$) having Medicare and Medicaid, respectively (Table 1).

Comorbidities

Medical comorbidities were relatively uncommon in this study cohort and included hypertension (11, 8.5%), hyperlipidemia (3, 2.3%), type II diabetes (4, 3.1%), and underlying seizure disorder (2, 1.6%). Previous psychiatric diagnoses included depression (5, 3.9%), anxiety (1, 0.8%), and bipolar disorder (3, 2.3%). Of the patient population, 8.5% ($n = 11$) were smokers, and 5.4% ($n = 7$) admitted to alcohol abuse. An additional 4.6% ($n = 6$) of the patients had unspecified preexisting comorbidities (Table 1).

Injuries

Mean (SD) Injury Severity Score (ISS) was 12.7 (9.3). Injury distributions were as follows: head injury, 48.8% (n = 63) (see Appendix 2 for details of head injuries), facial fractures, 10.1% (n = 13); cervical spine fractures, 3.9% (n = 5); thoracic, lumbar, and sacral (TLS) spine fractures, 28.1% (n = 36); rib fractures, 27.1% (n = 35); intrathoracic injuries, 22.5% (n = 29); liver/spleen injuries, 6.2% (n = 7); pelvic fractures, 15.6% (n = 20); upper-extremity fractures, 27.3% (n = 35); and lower-extremity fractures, 14.7% (n = 19). Of the patients, 19 (14.7%) had one or more regions with Abbreviated Injury Scale score of higher than 3. Injury patterns did differ somewhat based on mechanism of injury with intrathoracic injury more prevalent in the struck-by-tree cohort (33.3% vs. 18.0%, $p = 0.05$) and the upper- and lower-limb injuries more prevalent in the fall-from-roof cohort (32.6% vs. 15.4%, $p = 0.044$ and 20.0% vs. 2.6%, $p = 0.01$, respectively) (Table 2).

Outcomes

Mean (SD) length of stay was 5.3 (7.6) days. Except for 2 deaths (1.6%), discharge dispositions were as follows: home, 64.2% (n = 83); home with services, 10.1% (n = 13); rehabilitation, 17.8% (n = 23); and skilled nursing, 5.4% (n = 7). Discharge dispositions did differ between injury mechanisms, with the proportion of patients discharged home and to skilled nursing higher in the fall-from-roof cohort (67.8% vs. 56.4% and 7.8% vs. 0%, respectively), whereas the proportion of patients discharged to rehabilitation centers was higher in the struck-by-tree cohort (23.1% vs. 15.6%) (overall p value = 0.03) (Table 3).

DISCUSSION

This study brings to light the risks nonprofessionals take on when attempting home roof and tree maintenance as well as the lack of injury prevention efforts in this area. Not surprisingly, most of the cohort were middle aged, employed (as indicated by private insurance through an employer), men who experienced a high rate of debilitating head, TLS spine, and thoracic injuries. These injuries sustained during high-risk home maintenance, although producing low overall mortality, produced a high level of disability, with one third of injured patients requiring home services, rehabilitation, or skilled nursing upon discharge.

Millions of dollars are spent annually on both the local and national level toward injury prevention education. The National Highway Traffic Safety Administration alone has spent between \$23.7 million and \$32.6 million (years 2003–2007) annually on their “Click It or Ticket” media campaign, which targets 18-year-olds to 34-year-olds with media messages and increased citations to raise car safety belt use.⁷ The National Highway Traffic Safety Administration reports that seat belt use increased from 58% to 84% between 1994 and 2009, whereas there was a concurrent decrease in unrestrained passenger fatalities.⁸ These results are largely attributed to the Click It or Ticket campaign.⁷ Similar local and national efforts have been put toward increasing the use of bicycle helmets and proper sporting equipment, as well as firearm safety and proper installment of pediatric car seats.^{9–12} We were unable, however, to identify any injury prevention campaigns targeted at increasing awareness of the dangers inherent in taking on high-risk home maintenance activities despite the fact that similar activities in the professional realm are highly regulated by OSHA. Our study highlights the risks of such activities and suggests that these activities should be the focus of injury prevention efforts, particularly targeting able-bodied men who tend to embrace the weekend warrior mentality in our society.

During our study period, only 45 professionals were seen at our trauma center for injuries sustained during a tree or roof maintenance. Although we lack data on these professionals’ compliance with OSHA regulations, professionals presumably have more frequent exposure

to such maintenance activities because it is their daily occupation as opposed to weekend warriors. Therefore, although once injured no differences were seen between the professionals and nonprofessional whom we treated (Appendix 1), we think it is telling that far fewer incidents of injured professionals were seen compared with injured nonprofessionals. This suggests that being a professional, whether due to compliance with professional safety regulations or to experience/training, does, in fact, confer a protective effect.

This study has a number of important limitations. It is a retrospective, single-center study; the incidence, demographics, and injury patterns represented by our small cohort may not be generalizable across the United States. In our detailed chart review for injury circumstances, none of the 129 patients reported any use of personal protective devices. However, it is possible that some in our cohort may have been using some type of safety mechanism. Thus, we may be overestimating the exposure risk during home roof and tree work by nonprofessionals. Furthermore, owing to the small numbers of professionals injured during similar high-risk home maintenance activities, we were unable to compare injury patterns and outcomes between those who were presumably using OSHA-required safety devices and those who were not (our study cohort). We also do not have information on long-term disabilities and rates of return to previous level of quality of life on our patients.

Nevertheless, given the paucity of research and lack of injury prevention efforts focusing on risks of home maintenance activities such as roof or tree work, coupled with the strong media messages urging weekend warriors to tackle such activities around their homes, ours is an important study. We hope it serves as a call for trauma providers to consider targeting education and advocacy to prevent injuries related to home maintenance activities that are otherwise highly regulated to protect individual health and safety when undertaken by trained professionals. Reduction of such preventable injuries not only will reduce direct health care costs associated with the injuries but also will reduce the societal cost of loss able-bodied workforce.

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DISCLOSURE

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APPENDIX 1

Injury Distributions of Professionals Versus Nonprofessionals

Variable	Nonprofessionals	Professionals
Age, mean (SD), y [*]	45 (14)	37 (8)
Male, n (%)	124 (96)	45 (100)
Mechanism of injury, n (%)		
Fall from roof	90 (69)	38 (84)
Struck by tree	39 (30)	7 (16)
Length of stay, mean (SD), d	5.3 (7.6)	4.6 (4.8)
ISS, mean (SD)	12.7 (9.9)	12.0 (10.6)
Injury distributions, n (%)		
Head	63 (49)	17 (38)

Variable	Nonprofessionals	Professionals
Facial fracture(s)	13 (10)	3 (7)
Cervical spine fracture(s)	5 (4)	3 (7)
TLS spine fracture(s)	36 (28)	14 (31)
Rib fracture(s)	35 (27)	10 (22)
Intrathoracic injury	29 (23)	10 (22)
Liver/spleen injury	7 (6)	0 (0)
Pelvic fracture(s)	20 (16)	6 (13)
Upper-extremity fracture(s)	35 (27)	9 (20)
Lower-extremity fracture(s)	19 (15)	14 (31)
EtOH level at admission > 10, [†] n (%)	13 (13)	2 (6)

*
p < 0.05

[†]Percentage based on the number of patients who were not missing an EtOH level at admission (nonprofessionals, n = 103; professionals, n = 34).

APPENDIX 2

Detailed Breakdown of Head Injuries

Variable	Nonprofessionals	Professionals
Head injury, n	63	17
Head injury type, n (%)		
Concussion *	43 (68)	13 (76)
Subarachnoid hemorrhage	1 (2)	2 (12)
Interparenchymal hemorrhage	3 (5)	0 (0)
Subdural	0 (0)	0 (0)
Skull fracture	8 (13)	1 (6)

*ISS region indicating head injury with a negative result on computed tomographic scan (without contrast).

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TABLE 1

Characteristics of Patients Injured During High-Risk Home Maintenance Activities *

Variable	n (%) or Mean (SD)
Injury type	
Fall from roof	90 (69.8)
Struck by tree	39 (30.2)
Age, y	45 (14)
Range	18–81
Male	124 (96.1)
White race	116 (89.9)
Insurance type	
Medicare	13 (10.1)
Medicaid	16 (12.4)
Private	59 (45.7)
Other	6 (4.7)
Uninsured	32 (24.8)
Unknown	3 (0.2)
Comorbidity	
Hypertension	11 (8.5)
Hyperlipidemia	3 (2.3)
Type 2 diabetes	4 (3.1)
Seizure	2 (1.6)
Malignancy	1 (0.8)
Asthma	5 (3.9)
Depression	5 (3.9)
Anxiety	1 (0.8)
Bipolar	3 (2.3)
Unspecified	6 (4.7)
Substance abuse	
Alcohol	7 (5.4)
Tobacco	11 (8.5)

* Roof- and tree-related maintenance.

TABLE 2

Injury Patterns of Patients Injured During High-Risk Home Maintenance Activities *

Variable	Struck by Tree	Fall From Roof	Total	<i>p</i> [†]
ISS, mean (SD)	15.2 (13.0)	11.7 (9.0)	12.7 (9.3)	0.061
ISS > 25, n (%)	9 (23.1)	8 (8.9)	17 (13.2)	0.029
Abbreviate Injury Scale score 3, [‡] n (%)	11 (28.2)	8 (8.9)	19 (14.7)	0.006
Injury distributions, n (%)				
Head	20 (51.3)	43 (47.8)	63 (48.8)	NS
Facial fracture(s)	4 (10.3)	9 (10.0)	13 (10.1)	NS
Cervical spine fracture(s)	0 (0.0)	5 (5.6)	5 (3.9)	NS
TLS spine fracture(s)	15 (38.5)	21 (23.6)	36 (28.1)	0.085
Rib fracture(s)	10 (25.6)	25 (27.8)	35 (27.3)	NS
Intrathoracic injury [§]	13 (33.3)	16 (18.0)	29 (22.5)	0.052
Liver/spleen injury	3 (7.7)	5 (5.6)	7 (6.2)	NS
Pelvic fracture(s)	4 (10.3)	16 (18.0)	20 (15.6)	NS
Upper-extremity fracture(s)	6 (15.4)	29 (32.6)	35 (27.3)	0.044
Lower-extremity fracture(s)	1 (2.6)	18 (20.0)	19 (14.7)	0.013

* Roof- and tree-related maintenance.

[†] χ^2 test or Fisher's exact test for categorical variables; Student's *t* test for continuous variables.[‡] ISS 3 in at least one body region.[§] Hemothorax, pneumothorax, and/or pulmonary contusion.

NS, nonsignificant.

TABLE 3

Outcomes of Patients Injured During High-Risk Home Maintenance Activities *

Variable	Struck by Tree	Fall From Roof	Total	$p^{\dagger}$
Deaths, n (%)	2 (5.1)	0 (0)	2 (1.6)	0.091
Length of stay, mean (SD), d	6.6 (9.2)	4.7 (6.6)	5.3 (7.6)	NS
Discharge disposition, n (%)				0.03
Home	22 (56.4)	61 (67.8)	83 (64.2)	
Home with services	5 (12.8)	8 (8.9)	13 (10.1)	
Rehabilitation center	9 (23.1)	14 (15.6)	23 (17.8)	
Skilled nursing facility	0 (0.0)	7 (7.8)	7 (5.4)	

* Roof and tree-related maintenance.

$^{\dagger}\chi^2$ or Fisher's exact test for categorical variables; Student's t test for continuous variables.