Patients Admitted for Treatment of Traumatic Finger Amputations: Characteristics, Causes, and Prevention

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Introduction

A finger amputation can have dire psychological and physical repercussions for the patient, not to mention the economic burden placed upon society. Patients that are hospitalized with these injuries are of the highest acuity and, therefore, represent the highest-yield target population for prevention strategies. To our knowledge, this is the first nationally representative epidemiological study of traumatic finger amputations in all age groups admitted from US emergency departments (ED). We also analyze and propose prevention strategies.

Methods

The National Electronic Injury Surveillance System was queried to obtain data on patients that presented to, and were admitted from US emergency departments for treatment of traumatic finger amputations during the period of 1998-2012. The Haddon Matrix was then used to evaluate possible contributing factors of amputation events, and thereby explore plausible prevention interventions.

Table 1. Haddon's Matrix Applied to Amputation Injuries

Phase	Human Factors	Equipment Factors	Physical and Social Environment
Pre-Event	•Age •Education •Certification •Impairment •Emotional state •Supervision	•Equipment condition •Lighting •Driver:, fatigue, inexperience •Availability of Safety Gear	•Lighting •Distractions •Warning Signs •Time Constraints and workload
Event	•Area of victim's body affected •Use of safety gear	•Equipment speed •Safety Mechanisms •Quality of Safety Gear	Facility's quality/layout
Post-Event	•Access to healthcare after injury •Victim health status	•Alarms •Emergency Shutoff	•EMS response •Proximity to Hand Surgeon
Possible Interventions	*•Certification requirements, Age limits* *•Educational Campaigns.* *•Fines*	*•Requirements for Alarms, Emergency Shutoffs (or taxes for lack thereof)* *•Funding (Grants) for innovation in safety mechanisms/gear, automated tools*	*•Lighting Standards.* *•Workload Limits* *•Protocols/drills for amputation events* *•Reminder/Warning Signs* *•Checklists*

Results

From 1998-2012, an estimated 40,921 people were admitted from the ED for traumatic amputations. The incidence has remained fairly constant over this 15-year period. A vast majority of these patients, 83.8%, were male. 45.7% of these patients were white, 9.9% were Hispanic, 4.6% were black, while race was not recorded in 36% of cases. The average age was 37.9 years old, with 19.04% of patients being less than 10 years old. This was significantly older than those who were not admitted ($p<0.01$, t-test). The top five products responsible for amputations in admitted patients were table saws (26.4% of cases), doors (11.7%), portable circular and other power saws (8.8%), lawn mowers (6.9%), and snow blowers (2.7%). This list included a higher proportion of powered tools than those with finger amputations who were discharged from the ED with a finger amputation.

DISCUSSION

Patients admitted with finger amputations from the ED were older, more likely to be male, and more likely to be victims of powered tools than those that were discharged. Table saws are responsible for a high proportion of the finger amputations that result in hospital admissions. Although advances in microsurgery have been able to improve physical and psychological outcomes, the best remedy is still prevention. The Haddon matrix helps us identify factors (host, agent, physical environment, and social environment) to be addressed in prevention strategies. Such approaches might include championing education campaigns, policy measures, and equipment safety features. The effectiveness of such strategies warrant further investigation.

DISCLOSURES

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