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Ambulatory cell phone injuries in the United States
An emerging national concern

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ABSTRACT

Background: Over the past 15 years, the use of cell phones has increased 8-fold in the United States. Cell phone use has been shown to increase crash risks for drivers, but no systematic analyses have described injuries related to ambulatory cell phone use. *Objective:* The purpose of this study is to describe and quantitate injuries and deaths among persons using cell phones while walking. *Methods:* We searched the National Electronic Injury Surveillance System (NEISS) for emergency department (ED) reports of injuries related to phone use. The cases that returned were screened initially using words that would eliminate cases unlikely to be related to cell phone use and walking, possibly linked to distraction. The resulting cases were randomized and evaluated for consistency with predetermined case definitions by two authors blinded to the dates of the incidents. Cases that were disagreed upon were evaluated in a second screening by both authors for final case determination. National ED visit rates were estimated based on NEISS sampling methods. Annual variations were analyzed using linear regression with a restricted maximum likelihood approach. *Results:* Our screening process identified 5,754 possible cases that occurred between 2000 and 2011, and 310 were agreed on as cases of cell-phone-induced distraction. The majority of the patients were female (68%) and 40 years of age or younger (54%). The primary mechanism of injury was a fall (72%), and most patients were treated and released from the ED (85%). No patients died from their injuries while they were in the ED. Linear modeling by year revealed a statistically significant increase in distraction injury rates over the years of study ($p < 0.001$ for trend). *Conclusions:* The number of ED visits by ambulatory persons injured while being distracted by cell phone use has been increasing. More research is needed to determine the risks associated with walking and talking on a cell phone and to develop strategies for intervention. *Practical applications:* Cell phone use continues to increase both at home and outdoor environments. The use of smart phones, with their more enticing features, increases the likelihood of distraction-induced injuries even more. Manufacturers should consider the addition of tools or applications on smart phones to remind users to remain alert to outside auditory stimuli that herald external hazards and to encourage them to not use these devices while engaged in other activities.

1. Introduction

Cell phone use has become ubiquitous, particularly among teenagers and young adults. A 2010 Pew Research Study estimated that 85% of all Americans own a cell phone; in the 18- to 29-year-old age group, the ownership rate is even higher, at 96% (Lenhart, 2009). From 2004 to 2009, the rate of cell phone ownership among teenagers (ages 12 to 17) increased from 45% to 75% (Smith, 2010). Moreover, with the increasing capabilities of cell phones and smart phones (i.e., e-mail, text messaging, media streaming, games, and internet browsing), Americans are spending more time on their phones than ever before (Fredericksen, 2011).

Numerous studies have revealed drivers' increased risk of crashing while using a cell phone (McCartt, Hellinga, & Bratiman, 2006). The increase is attributed to deficits in attention resulting from engagement in conversation as well as the shift of visual attention and motor input needed to operate the device (inattention blindness). A comparable study of emergency department (ED) data from pedestrians injured while using cell phones demonstrated that the number of these injuries is increasing (Nasar & Troyer, 2013). That study, however, only investigated those incidents that occurred on a roadway. We believe the auditory masking and distraction caused by cell phones might increase ambulatory users' risk of injury in all settings.

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We sought to investigate injuries and fatalities associated with cell phone use among ambulatory people based on review of a national injury surveillance system database.

2. Methods

Cases were drawn from the National Electronic Injury Surveillance System (NEISS) database. This database, maintained by the U.S. Consumer Product Safety Commission (CPSC), is a collection of ED visit summaries related to consumer products. Each year, the NEISS records a random sampling of product-related hospital ED visits in the United States. This sampling can be used to estimate national incidences by using statistical weighting based on the size and sampling method of the hospital from which the injury was reported. The product code used was "0550 Telephone or telephone accessories."

The number of cases was initially pared down using exclusion words detailed in Appendix 1. The remaining case reports were randomized by using the rand() and sort functions in Microsoft Excel (Redmond, Washington) to assign each case a unique random number and sort them by these numbers. The cases were then evaluated independently by two authors blinded to the dates of the incidents (Author Review #1 in Fig. 1). Cases were analyzed for whether they involved: (a) distraction, (b) any independent physical movement, and (c) cell phone use, as detailed in the criteria of Table 1. Cases were marked to be included if all three criteria were met, excluded if one or less of the criteria were met, or needing further review if they only met two criteria. Author agreement was estimated using Cohen's kappa for the excluded and included cases (cases marked for further review were not involved in this calculation).

The two authors then compared results and discussed those cases that were disagreed upon or marked as needing further review (Author Review #2 in Fig. 1). If the authors still did not agree on categorization in this second review, the case was excluded. The final case list includes definite (meeting all three criteria) and probable (meeting only two criteria) cases.

The final case list was analyzed for demographics and injury type. The case identifiers were sent to CPSC statisticians, who used a custom Statistical Analysis System (SAS) program to estimate national incident rates, with confidence intervals based on the sampling characteristics of each case. The methodology of the sampling and estimation in the NEISS database is detailed elsewhere (Schroeder & Ault, 2001). Trend analysis was performed using a restricted maximum likelihood approach to account for each estimate's variance. The study was approved by the institutional review board at the University of Maryland School of Medicine.

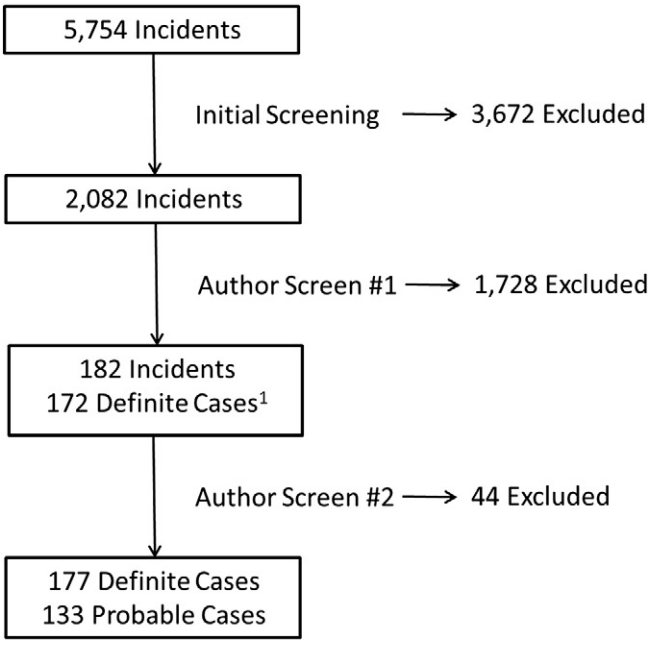

Fig. 1. Incident screening results. A total of 172 incidents were agreed on by both authors in Author Review #1 and therefore did not undergo Author Review #2 but were included in the final case list as definite cases. Another 182 incidents underwent Author Review #2. See Appendix 3 for detailed results of second author screen.

Table 1
Criteria applied to reports to determine eligibility for study.

Term	Definition
Distraction	It is reasonable to assume the victim would have avoided the injury without the cell phone use.
Ambulation	The case description implies that the victim was ambulating, e.g., tripped or slipped, without being in a vehicle. Probable cases include those that are unclear in regard to victim motion at time of incident, e.g., described with verbs such as "fell" or "twisted."
Cell phone use	Includes one or more of the following activities: talking into mouthpiece, texting, turning on, reading screen. Probable cases are either (a) those in which the phone was in hand but it is not stated what the victim was doing with the phone or (b) those in which the phone type is not specified.*

* If the incident occurred in an outdoor setting such as a roadway and the phone type was not stated, it was assumed to be a cell phone.

3. Results

A total of 5,754 cases occurring between 2000 and 2011 were pulled from the NEISS database. After the initial screen and review by two of the authors, 310 cases were selected as probable or definite cell-phone-induced distraction injuries (Fig. 1). Appendices 1 and 2 detail the reasons for exclusion in the first and second screens, respectively. Author agreement for the independent reviews was good ($\kappa = 0.80$).

Demographics of the cohort are detailed in Table 2. Patients were disproportionately female (68%), and most were 40 years old or younger (54%).

Incident characteristics are shown in Table 3. The majority of cases occurred at home (52%). Most patients fell (78%) and were talking on their phone at the time of the incident (62%). The majority of patients (85%) were treated and discharged from the ED. There were no fatalities.

National estimates (Fig. 2, Appendix 3) show a statistically significant upward trend in estimated ED visits during the study period (354 incidents [95% CI 55–652] in 2000 to 1,444 incidents [95% CI 904–1,983] in 2011 [$p < 0.001$ for trend]). This significant trend remained even when probable cases were removed from the model.

4. Discussion

Cell phone use in the United States grew more than 3.1-fold during the study years 2000 to 2011: from 97 million to 306 million

Table 2
Incident demographics (N = 310).

Category		# cases (%)
Gender	Male	99 (32)
	Female	211 (68)
Race	White	151 (49)
	Black/African American	49 (16)
	Other	17 (5)
	Not stated in ED record	93 (30)
Age	0–10	8 (3)
	11–20	67 (22)
	21–30	55 (18)
	31–40	33 (11)
	41–50	35 (11)
	51–60	24 (8)
	61–70	22 (7)
	71 and over	62 (20)
	Unknown	4 (1)