



Upper Extremity Firearm Injuries: Epidemiology and Factors Predicting Hospital Admission

"I (and my co-authors) have nothing to disclose."

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INTRODUCTION

- Civilian gun violence is a public health crisis in the United States (US) will an economic burden reported to be as high as \$17.7 billion with over half coming from US taxpayers dollars through Medicaid related costs.
- The purpose of this study is to review the epidemiology of upper extremity firearm injuries in the US and the associated injury burden.

METHODS

- The Inter-University Consortium for Political and Social Research's (ICPSR) Firearm Injury Surveillance Study database, collected from the National Electronic Injury Surveillance System (NEISS), was queried from 1993 to 2015.
- The following variables were reviewed, patient demographics, date of injury, diagnosis, injury location, firearm type (if provided), incident classification, and a descriptive narrative of the incident.
- We performed chi-square testing and complex descriptive statistics, and binomial logistic regression model to predict factors associated with hospital admission.

Results

Predictive Factors for Hospital Admission				Annual Incidence of Accidental Firearm Injury involving Upper Extremity			
Factor	Odds Ratio	P value	95% CI	Year	Estimate (95%CI)	Proportion of upper extremity firearm injuries (%)	
Body Region	Shoulder	5.57	<.001	5.35-5.80	1993	1,918 (1,117-2,719)	10.0%
	Upper Arm	4.07	<.001	3.91-4.24	1994	1,860 (1,167-2,553)	11.1%
	Lower Arm	3.81	<.001	3.67-3.97	1995	1,770 (769-2,771)	11.2%
	Elbow	3.73	<.001	3.53-3.95	1996	1,017 (548-1,486)	7.9%
	Wrist	3.58	<.001	3.38-3.79	1997	1,832 (890-2,774)	15.1%
	Hand	2.54	<.001	2.44-2.63	1998	1,343 (670-2,016)	10.6%
	Finger	-	-	-	1999	1,173 (541-1,805)	10.8%
Diagnosis	Amputation	28.65	<.001	24.85-33.03	2000	1,044 (413-1,675)	8.2%
	Fracture	26.20	<.001	23.27-29.50	2001	674 (294-1,054)	5.7%
	Puncture	8.83	<.001	7.85-9.93	2002	1,499 (932-2,066)	13.8%
	Foreign Body	6.94	<.001	6.13-7.86	2003	1,705 (964-2,446)	13.2%
	Laceration	5.32	<.001	4.70-6.02	2004	1,957 (1,143-2,771)	14.2%
	Avulsion	4.14	<.001	3.18-5.38	2005	873 (421-1,325)	7.7%
					2006	1,529 (691-2,367)	12.3%
Injury Location	Farm	3.64	<.001	2.97-4.46	2007	1,182 (722-1,642)	10.3%
	Street/Hwy	1.91	<.001	1.77-2.06	2008	1,365 (733-1,997)	9.4%
	Home	1.78	<.001	1.65-1.92	2009	1,725 (945-2,505)	13.3%
	Public	1.68	<.001	1.55-1.81	2010	2,000 (1,122-2,878)	15.7%
					2011	1,546 (739-2,353)	11.9%
Other	Drugs involved	3.14	<.001	2.98-3.31	2012	2,144 (215-4,073)	13.6%
					2013	1,759 (1,132-2,386)	11.5%
	Crime Involved	1.24	<.001	1.19-1.29	2014	2,191 (1,120-3,262)	14.8%
					2015	2,093 (1,078-3,108)	11.7%

Results

Annual Incidence of Nonfatal Upper Extremity Firearm Injuries		
Year	Estimate (95%CI)	Incidence (per 100,000 persons)
1993	19,230 (12,526-25,934)	7.49
1994	16,801 (11,276-22,326)	6.46
1995	15,752 (9,800-21,704)	5.98
1996	12,882 (8,696-17,068)	4.83
1997	12,140 (8,040-16,240)	4.50
1998	12,716 (8,651-16,781)	4.66
1999	10,837 (7,441-14,233)	3.92
2000	12,750 (2,553-7,743)	4.52
2001	11,877 (8,417-15,337)	4.17
2002	10,843 (8,030-13,656)	3.77
2003	12,876 (8,298-17,454)	4.50
2004	13,767 (8,171-19,363)	4.78
2005	11,297 (7,467-15,127)	3.88
2006	12,413 (8,039-16,787)	4.22
2007	11,464 (7,459-15,469)	3.86
2008	14,551 (8,739-20,363)	4.86
2009	1,299 (7,960-18,038)	4.31
2010	12,718 (7,882-17,554)	4.18
2011	12,996 (8,215-17,777)	4.24
2012	15,774 (9,171-22,377)	5.10
2013	15,230 (9,691-20,768)	4.89
2014	14,811 (8,783-20,839)	4.72
2015	17,915 (10,981-24,849)	5.66

Patient Demographics		
		Estimate (95% CI)
Age (years)	0-14	10,470 (9,029- 11,911)
	15-24	142,537 (130,679- 154,394)
	25-34	81,439 (74,184- 88,694)
	35-44	38,660 (35,086- 42,234)
	45-54	21,783 (19,306- 24,260)
	55-64	11,605 (9,840- 13,370)
	65+	7,830 (6,259-9,401)
Gender	Male	282,433 (261,376- 303,490)
	Female	32,190 (28,991-35,389)
Race	Black	117,592 (105,658-129,526)
	White	94,646 (86,640-102,651)

Upper Extremity Region Affected		
Body Part	Estimate (95% CI)	%
Shoulder	55,014 (49,374-60,654)	17.5%
Upper Arm	50,473 (45,269-55,677)	16.0%
Elbow	11,975 (10,278-13,672)	3.8%
Forearm	62,107 (55,855-68,359)	19.7%
Wrist	10,131 (8,649-11,613)	3.2%
Hand	82,820 (75,973-89,667)	26.3%
Finger	42,119 (38,197-46,041)	13.4%

Conclusion

- The incidence of upper extremity firearm injuries has remained steady over the last decade ranging between 4-5 injuries per 100,000 persons.
- Patients with proximal injuries or involved the bone were more likely to require hospital admission.
- This study should bring new information to the forefront for policy makers regarding gun violence.