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Age-Specific Patterns of Intimate Partner Violence-Related Injuries in US Emergency Departments

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Abstract

Purpose: To identify intimate partner violence (IPV)-related injury patterns of U.S. patients of three age groups: <18 years (adolescents), 18–25 years (emerging adults), and >25 years (adults).

Methods: We performed a nationally representative retrospective review of all patients presenting to U.S. Emergency Department (EDs) for IPV-related injuries from 2005 through 2020. Demographics and injury patterns were calculated using statistical methods accounting for the weighted stratified data. Main outcomes were injury morphology, mechanism, severity, location, and temporal associations of IPV-related injuries among the three age groups.

Results: There was a higher proportion of female victims, sexual assault cases, and lower trunk injuries among adolescents compared to emerging adults and adults. There was increasing injury severity, fractures, and hospital admissions with increasing age. Adolescents experienced a greater

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prevalence of fractures of the head, neck, hands, fingers, and distal lower extremity, while trunk fractures increased with age. The peak prevalence of violence-related ED visits among adolescents was in June and September, with the peak day as Tuesday.

Discussion: Injurious forms of IPV are prevalent across all age groups, with sexual assault cases demonstrably higher among adolescents and increasing severity of injuries as victims age. Identification of age-specific injury patterns will aid healthcare professionals and policymakers in developing targeted interventions for adolescents who experience IPV.

Keywords

dating violence; domestic violence; fracture patterns; injury patterns; intimate partner violence; sexual assault; sexual violence

Introduction

Globally, intimate partner violence (IPV) is the most common cause of non-fatal injury to women.[1] About 37% of women have experienced physical violence, sexual violence, or stalking in their lifetime.[1] IPV includes any act of physical, psychological, or sexual harm done to a romantic or sexual partner or ex-partner. While IPV cuts across all sociodemographic strata, there is a disproportionate burden placed on women and younger populations, and peaks around the transition from adolescence to emerging adulthood.[2–5]

IPV in adolescents and emerging adults, sometimes known as dating violence (DV), refers to physical, emotional, or sexual violence occurring in the context of a relationship that is neither marriage nor a long-term cohabitating partnership.[6] This developmental age is characterized by autonomy establishment, identity development and stability, initiation and experimentation with risky behaviors, and increasing levels of intimacy. Thus, violence in this developmental period is associated with a host of mental, behavioral, and physical health problems, including depression, anxiety, substance misuse, and reproductive health problems.[7–9] Perhaps most alarming is the strong link between dating violence in adolescence and ongoing forms of IPV during adulthood.[10]

Given the prevalence and potentially severe and long-lasting consequences, recognition and intervention for IPV/DV are imperative. Healthcare professionals, including primary care providers, obstetrician/gynecologists, pediatricians, surgeons, psychiatrists, and dentists, play a critical role in identifying and responding to patients in abusive relationships. Help in these instances could mean providing emotional support, emergency care, expedited post-sexual assault care, including emergency contraception and treatment of sexually transmitted infections, specialty care where necessary, and linkage with social services.[3–11]Patients who have experienced IPV generally recognize healthcare providers to be trustworthy professionals to whom abuse can be disclosed.[12]

Radiologists play an important role in identifying abuse. Imaging findings have long been used to predict non-accidental injuries in cases of child abuse.[13–16] Specific fracture patterns detected on imaging in children have been shown to be highly suggestive of child abuse, including classic metaphyseal lesion avulsions (“corner fractures”) and fractures of

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the posterior ribs, spine, scapula, transphyseal distal humerus, hands and feet, as well as complex skull fractures and multiple fractures in various stages of healing.[17–23] Similarly, radiographic findings now recognized as predictive of IPV in adults include mid facial injuries, isolated ulnar fractures, finger injuries, and lower anterior rib fractures.[24–27] Older adult (> 60 years of age) victims of IPV tend to sustain fewer craniofacial injuries but more trunk fractures, and more hospitalizations compared to their younger counterparts.[28]

Despite the known age-related differences in imaging findings between children and adults, there is little information on injury and fracture patterns of adolescents and emerging adults who have sustained IPV. To address this gap in knowledge, we sought to characterize and compare injury and fracture patterns from 2005–2020 amongst U.S. patients experiencing IPV/DV in three age groups: <18 years (adolescents), 18–25 (emerging adults), and >25 (adults). By identifying age-related injury patterns of IPV, health care professionals will be better equipped to accurately detect IPV in patients of all ages.

2. Methods

2.1 Data source

We used data from the National Electronic Injury Surveillance System (NEISS) All Injury Program (AIP).[29] The NEISS is a stratified, weighted dataset managed by the U.S. Consumer Product Safety Commission (USCPSC), which collects injury data from roughly 100 U.S. hospitals with an Emergency Department (ED). When using appropriate statistical techniques, this dataset allows researchers to obtain national estimates of ED visits. While the NEISS was initially designed for consumer product injuries, the USCPSC selected approximately 65 participating hospitals (actual numbers vary slightly from year to year) to obtain data for all injuries, regardless of their association with consumer products (i.e., All Injury Program [AIP]). Use of this publicly available, de-identified data was considered exempt by our local Institutional Review Board (IRB).

The NEISS database includes date of ED visit, basic demographics of the injured patient, diagnosis, disposition from the ED, incident locale, body part injured, perpetrator and type of assault, reason for assault, causative agent/mechanism of the injury, and hospital size. Hospital size (strata) is defined by the number of ED visits per year and categorized into small [0–16,830], medium [16,831–21,850], large [28,151–41,130], and very large [>41,130]), as well as a class encompassing children's hospitals of all sizes. We used the NEISS code RACETH_C to combine race and Hispanic ethnicity into the following six categories: white, non-Hispanic; Black, including Hispanic and non-Hispanic; Hispanic, for all races other than Black; Asian, non-Hispanic; Indigenous, non-Hispanic; other, non-Hispanic.[29] Because of coding differences used prior to 2005, we used NEISS-AIP data for the years 2005 through 2020.

We identified injuries due to assaults using the code INTENT =1 (assault). The NEISS definition of assault is any injury from an act of violence where physical force by one or more persons is used with the intent of causing harm, injury, or death to another person, or an intentional poisoning by another person. The type of assault was identified by the code REASON, and classified by NEISS as altercation, robbery/burglary, drug-related, sexual

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assault, gang related, other specified, and unknown/not specified. Sexual assault was defined as the use of physical force to compel another person to engage in a sexual act against his or her will with attempted or completed sex act and abusive sexual contact. The other specified category included injuries related to drive-by-shooting, homicide-suicide pact, mercy killing, revenge, blackmail, extortion, ransom, kidnapping, and contact injuries. When there was inadequate or no information in the narrative to describe the type of assault, it was categorized as unknown in the NEISS database. We defined IPV/DV as INTENT = 1 and PERP (perpetrator of the assault) = 1 (spouse/partner).

2.2 Statistical analysis

To obtain national estimates of ED visits we used SUDAAN 11.0.01™ software (RTI International, Research Triangle Park, North Carolina, 2013), which accounts for the weighted, stratified nature of the data. We estimated the number (N) of injuries/ED visits, along with 95% confidence intervals [CIs] of the estimates. When the actual number of patients (n) is < 20, the estimated number (N) becomes unstable and should be interpreted with caution; thus, we report both the n and N. We performed analyses between groups of continuous data with the t-test (2 groups) or ANOVA (3 or more groups). We analyzed differences between groups of categorical data by the χ^2 test. For all analyses, we considered $p < 0.05$ as statistically significant.

Results

From 2005–2020 there were an estimated 25,935,722 ED visits due to assault; an actual *n* of 51,462 patients were seen for IPV, or an estimated N of 3,107,381 [2,759,561 – 3,299,024]. Thus, IPV accounted for 11.6% of assault-related ED visits. Of these 3.1 million IPV-related ED visits, 81.8% were female and 18.2% male. There were an estimated 67,844 adolescent patients (2.2%), 831,752 emerging adult patients (27.6%), and 2,118,234 adult patients (70.2%).

Demographics:

As shown in Table 1, demographic differences emerged between the three age groups. The proportion of males increased from 11.0% to 13.3% to 20.3%, respectively, from the youngest to the oldest age groups (p=0.0001 for Group 1 Vs Group 3, and p<0.0001 for Group 2 Vs Group 3). There were slight group differences by race and ethnicity, with a higher representation of Indigenous and Hispanic adolescent victims compared to older cohorts.

Injury mechanisms

Sexual assault was demonstrably higher (p<0.0001) among adolescents (17.9%) compared to emerging adults (3.2%) and adults (2.4%). The most common mechanism of physical injury in all three groups was being struck by or against something, but the proportion decreased with age (85.6%, 79.7%, and 78.4% in adolescents, emerging adults, and adults, respectively; p<0.0001). Fall as the mechanism of injury increased slightly from 5.7% in adolescents to approximately 7% in their older counterparts. Unsurprisingly, the home as

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the incident locale increased with age (42.8% among adolescents, 48.5% among emerging adults, and 53.4% among adults; p<0.0001).

Injury diagnosis

Five injury diagnoses (contusion/abrasion, fracture, laceration, strain/sprain, and internal organ injury) accounted for 91% of all injuries (Table 1). A contusion/abrasion was the most common type of injury in all three groups (Figure 1). Fractures increased by age group, accounting for 3.9% of injuries among adolescents, 7.5% among emerging adults, and 9.8% among adults (p < 0.0001). The percentage of lacerations also increased with age from 11.7% to 15.8% to 18.3% in adolescents, emerging adults, and adults, respectively (p < 0.0001). Lastly, the percentage of hospital admissions increased with age from 1.9% to 5.9% (p < 0.0001).

Injury locations:

We analyzed injuries by five major anatomic locations: head and neck, upper trunk, lower trunk, upper extremity, and lower extremity (Table 1). While the head and neck represented the area most commonly injured in all three age groups, there were significantly lower trunk injuries among adolescents (20%) compared to emerging adults (8.0%) and adults (6.3%) (p<0.001).

Fracture locations:

We further analyzed the subset of injuries reported as fractures (Table 2). There was a marked difference in fracture locations when divided by four major groups (trunk, head/neck, upper extremity, lower extremity) and by detailed fracture locations overall (Figure 2). While head/neck fractures were the most common for all three age groups, there was a significantly (p<0.0001) higher percentage of head and neck fractures among adolescents (69%) compared to emerging adults (57.2%) and adults (48.9%). Trunk fractures significantly increased across the three age groups, from 1.6% to 7.0% to 14% in adolescents, emerging adults, and adults, respectively. This same pattern was observed with upper extremity fractures (16.9%, 26% and 27.9%, respectively).

While rare, cervical spine fractures comprised 4.7% of the head/neck fractures among adolescents but only 1.2% in each of the other age groups. The reverse pattern was found for upper trunk fractures among adolescents (1.6%) compared to emerging adults (5.3%) and adults (11.5%). Fractures of the finger and hand were predominant among adolescents, accounting for 89.4% of all their upper extremity fractures, compared to 65.9% of emerging adults and 51.1% of adults. Fractures of the tibia/fibula were the most common type of lower extremity fractures in adolescents (48.0%) with a lower representation in emerging adults (24.8%) and adults (20.6%). The second most common type of lower extremity fracture in adolescents were toe fractures, which accounted for 42.9% of all their lower extremity fractures, compared to 24% and 16.1% in emerging adults and adults, respectively.

Temporal patterns

The peak prevalence for injury among adolescents was in June (11.2%) and September (8.7%). For emerging adults, the peak prevalence was in July (9.5%) and August (9.4%).

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For adults, the peak two months were May and July (9.4% for each month). The p-value for the difference in month-wise incidence between adolescents and emerging adults was 0.01. Tuesday represented the peak day for adolescents (16.6%) while Sunday saw the highest incidence of IPV-related injuries for both emerging adults (18.3%) and adults (18.8%). The p-value for the difference in day-wise incidence between adolescents and emerging adults was 0.04, and between adolescents and adults was 0.02.

Discussion

In this first national study of intimate partner violence (IPV)-related injury among three age cohorts of US emergency department patients, we found notable differences in injury patterns between adolescents, emerging adults, and adults. IPV-related injuries were relatively common across all identified age groups; however, injury severity increased with age, indicated by increased fractures, lacerations, and hospital admissions. These injury characteristics and patterns have important implications for improving both identification and tailored interventions for IPV, especially with respect to preventing the escalation of violence as adolescents transition into emerging adulthood and then adulthood.

Demographic differences

IPV accounted for a sizeable minority (12%) of all assault-related ED visits. Of these, most victims were women (82%) and adults over age 25 (70%), followed by emerging adults (28%) and adolescents (2%). While women overwhelmingly represented the injured party across all ages, males made up a greater proportion with increasing age, possibly reflecting higher incidence or disclosure among older men, or increase in injurious forms of dating violence (DV) amongst female adolescents.[30,31] This latter notion is supported by our finding that more injuries resulted from sexual assault (primarily male perpetrators and female victims) among adolescents (18%) compared to emerging adults and adults (2% – 3%).

Injury Mechanisms, Patterns, and Severity

For all three groups, being hit, kicked, pushed, or struck with an object was the most common mechanism of injury. Older adults were slightly more likely to be injured by assault-related falls relative to adolescents, potentially due to their increased fragility.[32] Given that adults are more likely than adolescents to cohabitate with their partners, it was not surprising to find that the proportion of survivors who reported the incident locale as “home” increased with age.[33] Additionally, the higher number of lacerations in the older age group may reflect more injuries occurred in the home (i.e., closer to sharp objects like kitchen knives and scissors).

Injury Anatomic Location

Consistent with studies of adults, our analysis found that head and neck injuries were the most common location for IPV-related injury amongst all age cohorts; however, the proportion was lower in the adolescent group.[33,34] Conversely, lower trunk injuries were more common amongst adolescents compared to their adult counterparts. This difference may be driven by increased sexual assault among adolescents, which more commonly leads

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to injuries to the pelvis, buttocks, anogenital and anal regions. Prior research has found that adolescents who experience sexual violence have higher rates of anogenital injuries compared to adults.[35]

The location of fractures also varied between groups. Adolescents were more likely to have facial and cervical spine fractures compared to the older cohorts. While cervical spine fractures are rare, they were almost four times higher in the adolescent cohort compared to the older cohorts. Cervical spine fractures are a known association of child abuse, likely due to larger head/body ratio in children less than 10 years old, as well as increased spinal laxity compared to adults.[36] Our findings suggest adolescent cervical spine fractures may also be relevant in detecting IPV.

Adolescents were less likely to have upper extremity fractures; however, when they occurred, they were almost 40% more likely due to finger/hand fractures compared to the older cohorts. The upper extremity is often used in self-defense, making it a common fracture site among victims of violence, including IPV and child abuse.[37] It is possible that adolescents are more inclined to use their hands/fingers in defense, and may have less experience, strength, and agency to defend themselves by attacking back or pushing the assailant with their upper extremities. Further, we found that adolescents had higher rates of tibula/fibula and toe fractures compared to the oldest cohort.[38] It is possible that adolescents are more likely to defend themselves by kicking/thrashing their legs to protect their lower trunk, especially with the high rates of sexual assault. Further research is needed to better understand the reasons for these anatomic differences in adolescents.

Temporal patterns

We have previously shown that holidays are peak times for IPV injuries.[39] Our current study adds to this literature by showing that peak months for adolescent IPV are September and June, which corresponds to the beginning and end of the academic school year, respectively. It is possible that the beginning of the school year includes new, potentially volatile relationships while the end of the school year is associated with increased autonomy, reduced parental monitoring, and increased risky behaviors linked to IPV.[39] The peak in IPV-related injuries among emerging adults and adults during July and August aligns with the literature showing that violence is often highest during the summer months. This increase is attributed to higher temperatures leading to discomfort and a lower aggression threshold for aggression, along with changes in routine and social behaviors.[40] Future research should distinguish between those who attend college vs those who do not, as well as comparing those transitioning into adulthood (19–20 year olds) vs older emerging adults.

Limitations

While it has shown to have high rates of accuracy, the NEISS dataset only analyzes those who sought care for injuries at the Emergency Department and likely selects for the most severe forms of physical injury. The NEISS dataset does not include those who sought care at other health care settings, such as primary care, or OB/GYN or specialty clinics. We included IPV/DV as non-accidental injury due to a spouse/partner, however the NEISS database does not include a category for more casual dating relationships e.g. boyfriend/

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girlfriend, that are more common amongst adolescents, which may lead to underestimation of IPV/DV in our adolescent sample. In addition, patients who experience IPV/DV may not disclose assault or abuse to their health providers, and thus those patients are likely unaccounted for in this dataset. Furthermore, the NEISS data set only contains the most severe injury for each patient. Detailed information about the location and mechanism of injury, circumstances surrounding the event, and perpetrator characteristics are not included in the NEISS dataset. However, the large, nationally representative sample provides robust and geographically and racially diverse information that provides important insights to better understand IPV injury characteristics and trends in this vulnerable population.

Conclusion

Our study revealed several important findings with implications for screening, identification, and further research. The injurious forms of IPV are common across all age groups, but with increased rates of sexual assault amongst adolescents, and increasing severity and gender bidirectionality with increasing age. The location of IPV injuries varied, with more lower trunk injuries in adolescents compared to the two older cohorts. IPV-related fractures among adolescents were more likely to impact the head and neck, hand and finger, and lower leg, while trunk fractures increased across age groups. Health care providers should be aware of the unique characteristics of IPV in different age groups to better identify and respond to cases effectively. While injuries were generally less severe among adolescents, this is the ideal time to intervene to interrupt the progression to more severe forms of violence

Implications and Contribution summary statement (50 words): In this 15-year nationally representative review of U.S. emergency departments, there were significant differences in intimate partner violence (IPV) related injury and fracture patterns of adolescents, emerging adults, and adults. Understanding how IPV-related injuries differ by age may improve the detection of IPV and the provision of tailored management.

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Abbreviations:

AIP	All Injury Program
DV	dating violence
ED	Emergency Department
IRB	Institutional Review Board
IPV	intimate partner violence
NEISS	National Electronic Injury Surveillance System

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SA	sexual assault
SV	sexual violence
USCPSC	U.S. Consumer Product Safety Commission

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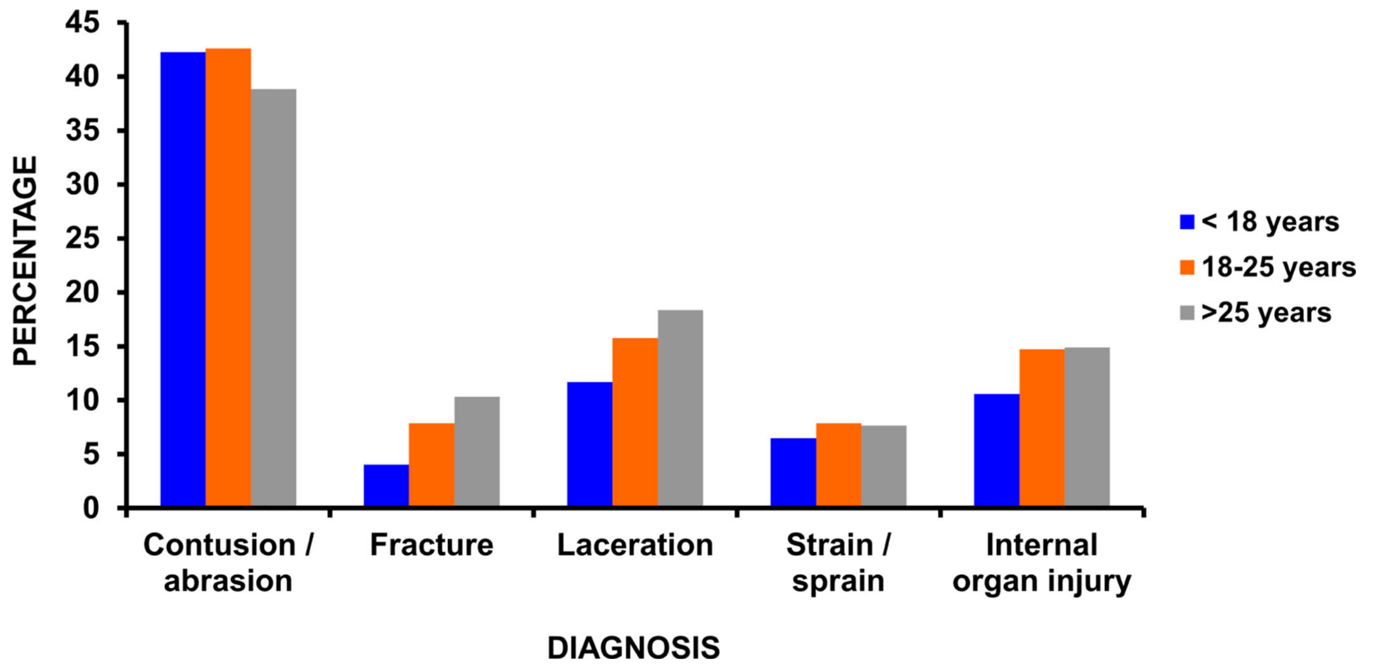

Figure 1:

Percentage of IPV-related injuries for the five most common injury diagnoses and the three age groups.

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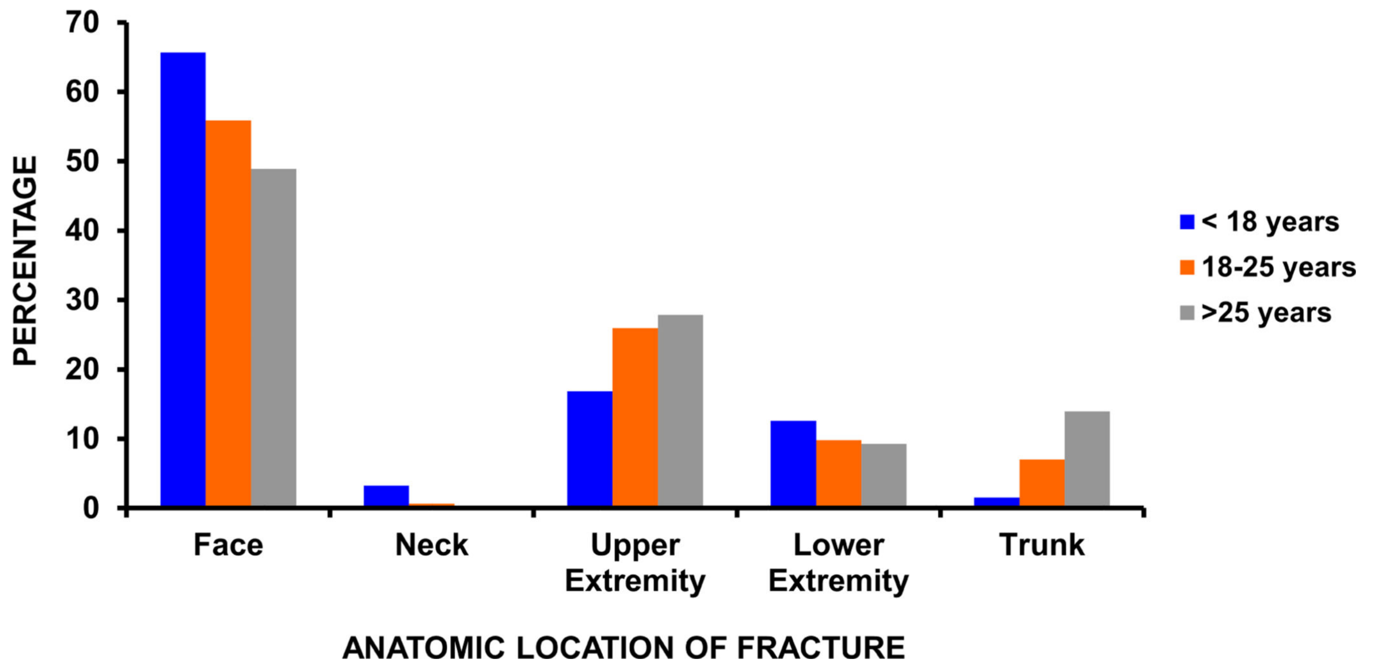

Figure 2:
Percentage of IPV-related fractures based on the anatomic location for the three age groups.

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Table 1:

Differences in IPV victims and injuries based on three age groups

	< 18 years - group 1					18–25 years - group 2					>25 years - group 3								
	n	**N**	**L95%**	**U95%**	**%**	**n**	**N**	**L95%**	**U95%**	**%**	**n**	**N**	**L95%**	**U95%**	**%**	**p value all 3**	**p value 1 vs. 2**	**p value 1 vs. 3**	**p value 2 vs. 3**
Variable Age (years)	1,710	67,844	59,753	77,256	2.2	14,319	831,752	806,364	857,668	27.6	35,433	2,118,234	2,088,943	2,146,885	70.2				
Age (years)																			
Mean			15.8 [15.6, 16.0]					21.8 [21.8, 21.9]					38.4 [38.2, 38.6]						
Median			16.0					21.3					35.5						
Sex																			
Male	174	7,472	6,167	9,010	11.0	2,028	110,812	94,404	129,504	13.3	7,766	429,780	365,184	502,445	20.3	0.0001	0.10	0.0001	0.0001
Female	1,536	60,372	58,834	61,677	89.0	12,291	720,940	702,248	737,348	86.7	27,677	1,688,455	1,615,789	1,753,050	79.0				
Sexual assault																			
Yes	442	12,133	8,514	16,852	17.9	464	26,260	21,210	32,522	3.2	917	50,920	41,941	61,641	2.4	0.0001	0.0001	0.0001	0.0001
No	1,269	55,712	50,992	59,330	82.1	13,855	805,482	799,230	810,542	96.8	34,516	1,067,315	2,056,593	2,076,293	50.4				
Race/ ethnicity																			
White	493	25,753	18,629	32,930	48.4	4,019	306,722	223,188	392,014	48.1	11,665	893,175	676,714	1,099,436	54.6	0.0001	0.43	0.0091	0.0001
Black	577	17,271	13,017	22,076	32.5	4,872	220,496	164,871	283,674	34.6	10,268	508,459	356,768	689,807	31.1				
Hispanic	255	8,252	4,554	14,039	15.5	1,439	91,907	52,001	154,407	14.4	2,958	183,051	109,813	295,889	11.2				
Asian	13	217	101	460	0.4	73	4,552	2,807	7,338	0.7	307	15,753	9,328	26,512	1.0				
Native American	16	1,70	314	8,230	3.2	107	10,655	4,020	27,627	1.7	309	26,335	9,819	69,553	1.6				
Other	17	245	96	631	0.5	92	3,711	2,106	6,444	0.6	210	9,779	5,237	18,493	0.6				
ED disposition																			
Release	1,617	64,906	64,109	65,392	98.1	13,253	772,717	752,268	785,336	96.0	31,979	1,924,188	1,871,860	1,961,454	94.1	0.0001	0.0094	0.0001	
Admit	49	1,233	747	2,030	1.9	593	31,848	19,229	52,297	4.0	2,303	121,338	84,071	173,665	5.9				
Anatomic area injured																			
Head/neck	787	34,268	30,647	37,841	53.0	8,575	492,226	478,936	505,305	60.9	20,457	1,220,915	1,197,437	1,244,198	59.3	0.0001	0.0001	0.0001	0.0001

	< 18 years - group 1					18–25 years - group 2					>25 years - group 3								
	n	N	L95%	U95%	%	n	N	L95%	U95%	%	n	N	L95%	U95%	%	p value all 3	p value 1 vs. 2	p value 1 vs. 3	p value 2 vs. 3
Upper trunk	123	4,585	3,348	6,225	7.1	1,299	76,713	69,321	84,770	9.5	3,907	242,367	222,060	264,289	11.8				
Lower trunk	429	12,911	9,392	17,331	20.0	1,064	64,715	56,055	74,578	8.0	2,099	128,897	113,914	164,382	6.3				
Upper extremity	208	9,747	7,964	11,849	15.1	2,191	126,669	117,287	136,619	15.7	5,836	342,752	317,847	369,139	16.6				
Incident locale																			
Unknown	771	30,775	24,790	36,968	45.4	6,421	369,054	285,457	456,715	44.4	14,781	857,869	631,022	1,105,718	40.5	0.0001	0.0001	0.0001	0.0001
Home	739	29,070	23,732	34,668	42.8	6,868	403,794	328,043	480,337	48.5	18,497	1,131,135	908,299	1,347,832	53.4				
School/ sports	68	2,889	2,117	3,915	4.3	45	2,649	1,747	3,992	0.3	78	5,817	3,601	72,020	0.3				
Street	49	2,218	1,147	4,227	3.3	483	28,239	21,376	37,179	3.4	1,011	60,197	48,084	75,197	2.8				
Other property	83	2,897	1,805	4,600	4.3	502	28,017	22,707	34,518	3.4	1,066	63,847	52,109	78,163	3.0				
Diagnosis																			
Contusion/ abrasion	595	27,560	23,638	31,637	42.2	5,518	336,143	315,352	357,257	42.6	12,273	779,782	728,532	832,149	38.8	0.0001	0.0001	0.0001	0.0001
Fracture	66	2,629	1,957	3,517	4.0	1,064	62,046	57,609	66,843	7.9	3,449	207,426	187,956	228,720	10.3				
Laceration	183	7,618	5,813	9,898	11.7	2,374	124,539	105,117	146,785	15.8	6,639	368,242	309,646	435,151	18.3				
Strain / sprain	71	4,237	3,236	5,520	6.5	959	62,173	50,980	75,523	7.9	2,469	153,590	127,915	183,940	7.6				
Internal organ injury	174	6,896	5,017	9,363	10.6	2,048	116,337	96,594	139,288	14.7	5,141	299,015	250,809	354,426	14.9				
Concussion	46	1,464	966	2,212	2.2	380	23,464	17,598	31,172	3.0	689	40,419	31,527	51,808	2.0				
Unknown	500	14,308	10,700	18,712	21.9	1,078	57,856	47,587	70,157	7.3	2,429	138,954	115,866	166,269	6.9				
Poisoning	7	382	104	1,409	0.6	43	2,975	1,894	4,656	0.4	193	12,366	9,438	16,265	0.6				
Asphyxia	6	148	33	698	0.2	61	3,636	2,131	6,234	0.5	144	8,288	5,221	13,253	0.4				
Fracture Locations																			
Trunk	3	41	11	148	1.6	69	4,342	3,394	5,535	7.0	458	29,009	23,978	34,889	14.0	0.0001	0.019	0.0007	0.0001
Upper Extremity	13	443	246	750	16.9	280	16,112	14,779	17,522	26.0	974	57,782	53,827	61,896	27.9				

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	< 18 years - group 1					18–25 years - group 2					>25 years - group 3								
	n	N	L95%	U95%	%	n	N	L95%	U95%	%	n	N	L95%	U95%	%	p value all 3	p value 1 vs. 2	p value 1 vs. 3	p value 2 vs. 3
Lower Extremity	6	331	112	834	12.6	98	6,078	5,262	7,632	9.8	323	19,247	16,988	21,780	9.3				
Head/neck	44	1,814	1,466	2,096	69.0	617	35,514	33,567	37,426	57.2	1,694	101,388	96,826	105,953	48.9				

n = the actual number of ED visits, N the estimated number of ED visits, L95% the lower 95% confidence interval of the estimate N, U 95% the upper 95% confidence interval of the estimate N

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Table 2:

Detailed fracture locations of intimate partner violence patients

Fracture Locations	< 18 years - group 1					18–25 years - group 2					>25 years - group 3								
	n	N	L95%	U95%	%	n	N	L95%	U95%	%	n	N	L95%	U95%	%	p value all 3	p value 1 vs. 2	p value 1 vs. 3	p value 2 vs. 3
Head	0	0	0	0	0.0	9	397	149	1,067	0.6	36	1,601	10,591	25,419	0.1	<0.0001	0.03	0.0001	<0.0001
Face	43	1,728	1,321	2,063	65.7	602	34,706	32,704	36,675	55.9	1,637	98,571	957,442	105,953	46.5				
Neck	1	86	14	463	3.3	6	411	186	887	0.7	21	1,216	7,626	20,335	0.1				
Upper Trunk	3	41	11	148	1.6	52	3,289	2,296	4,672	5.3	378	23,923	195,937	302,907	1.1				
Lower Trunk	0	0	0	0	0.0	17	1,054	602	1,830	1.7	80	5,083	40,882	65,877	0.2				
Shoulder	1	8	1	62	0.3	21	1,450	943	2,227	2.3	77	5,380	43,424	69,478	0.3				
Humerus	0	0	0	0	0.0	11	387	199	751	0.6	59	3,427	25,207	48,296	0.2				
Elbow	1	8	1	60	0.3	11	412	199	856	0.7	49	2,960	21,606	42,153	0.1				
Radius/ulna	1	10	1	74	0.4	27	1,707	987	2,922	2.8	136	8,44	68,631	108,030	0.4				
Wrist	1	21	3	154	0.8	32	1,556	1,042	2,308	2.5	148	8,022	66,513	100,616	0.4				
Hand	5	213	49	767	8.1	70	4,296	3,313	5,541	6.9	190	10,974	93,626	133,872	0.5				
Finger	4	183	55	546	7.0	108	6,340	5,162	7,663	10.2	315	18,576	160,562	223,474	0.9				
Femur	0	0	0	0	0.0	0	0	0	0	0.0	16	1,180	6,355	22,453	0.1				
Knee	0	0	0	0	0.0	2	174	56	558	0.3	26	1,199	6,778	22,241	0.1				
Tib/fib	2	159	29	708	6.0	22	1,505	924	2,438	2.4	75	3,968	32,621	50,414	0.2				
Ankle	0	0	0	0	0.0	27	1,702	1,042	2,755	2.7	78	4,837	37,069	65,665	0.2				
Foot	2	30	6	148	1.1	27	1,237	807	1,892	2.0	76	4,973	39,823	64,818	0.2				
Toe	2	142	25	665	5.4	20	1,460	875	2,420	2.4	52	3,090	22,665	43,847	0.1				

n = the actual number of ED visits, N the estimated number of ED visits, L95% the lower 95% confidence interval of the estimate N, U 95% the upper 95% confidence interval of the estimate N