

# Firearm Injuries Attended by Emergency Medical Services (EMS) in Kansas from 2020-2023

Alyssa M. Green<sup>1</sup>, Chad E. Pore<sup>2</sup>, Joseph A. House<sup>2</sup>, Jonathan Powell<sup>3</sup>, Morgan K. Anderson<sup>1</sup>

<sup>1</sup>Clinical and Research Services, ImageTrend Inc.; <sup>2</sup>Kansas Board of EMS, <sup>3</sup>National Registry of Emergency Medical Technicians

**Introduction:** Firearm injuries constitute a significant public health challenge, often necessitating the activation of Emergency Medical Services (EMS). The Centers for Disease Control and Prevention (CDC) rank firearm injuries among the top five causes of death for individuals between the ages of 1-44 in the United States in 2022. However, there is limited knowledge regarding the demographic characteristics and injury intent associated with prehospital firearm injuries in Kansas.

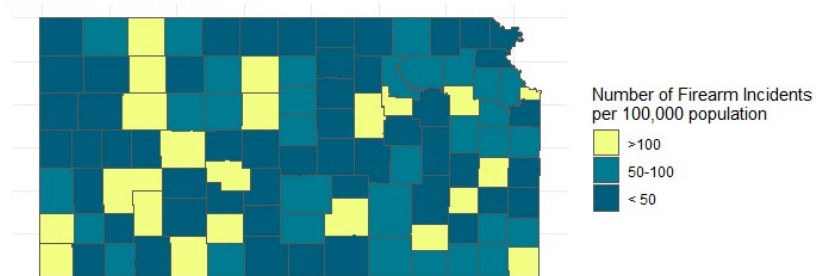
**Objective:** Our objective was to evaluate firearm injury-related EMS incidents in the state of Kansas.

**Methods:** We conducted a retrospective analysis of 9-1-1 EMS incidents in Kansas from 2020-2023. Firearm injuries were identified by searching for "gun" or "firearm" in the Cause of Injury field of the electronic patient care records. We reported descriptive statistics for patient age, race, sex, urbanicity, injury location, initial patient acuity (critical, lower acuity, or cardiac arrest), stratified by injury intent (accidental, self-harm, assault, or unknown). We also calculated the frequency of firearm injuries by county. Continuous variables were reported with median and interquartile range (IQR).

**Results:** Between 2020-2023, we identified 2,726 firearm injuries from 9-1-1 EMS incidents in Kansas. The majority of patients were male (82.9%), White (47.6%), with the assault being the most common intent (58.7%). The median age for self-harm cases (41.0 [IQR 34.0]) was higher than for accidental (28.0 [IQR 22.0]), assault (30.0 [IQR 20.0]), and unknown cases (32.0 [IQR 21.5]). Injury location varied by intent: accidental injuries were predominantly in the extremities (39.5%); self-harm injuries were primarily in the head/neck (49.5%); in assault and unknown injuries, the location was often undocumented (55.6% and 38.9% respectively). Acuity also differed by intent: accidental injuries were mainly lower acuity (69.4%); assault injuries were typically critical (47.6%); self-harm and unknown injuries were mostly in cardiac arrest (71.6% and 41.5% respectively). In metro areas, assault was the most common intent (64.6%), while in non-metro and rural areas, self-harm was prevalent (44.1% and 53.4% respectively). The counties with the highest number of firearm injuries were Sedgwick County (n=674, 99.5% assault), Wyandotte County (n=558, 69.3% assault), Shawnee County (n=395, 64.3% assault), and Johnson County (n=250, 42.0% self-harm).

**Conclusion:** The four counties with the highest number of firearm injuries (Sedgwick, Wyandotte, Shawnee, and Johnson) accounted for 68.8% of the total firearm injuries in Kansas. The patient acuity and injury location varied with injury intent. Consequently, tailored protocols and preparedness efforts, aligned with the most common injury intent in each county, might enhance their efficacy. EMS clinicians need to understand the importance of accurately documenting intent, which can guide EMS and public health initiatives. Efforts should focus on establishing a standard for documenting firearm injuries, ensuring accurate recording of injury intent and location. The EMS incidents for firearm injuries could provide a novel method for monitoring firearm injuries and public health burdens.

Prevalence of Firearm Injuries Attended by EMS  
By County in Kansas 2020-2023



Source: KSBEMS from ImageTrend Elite

**Table 1.** Patient Characteristics for Firearm Injuries for 9-1-1 Incidents in Kansas from 2020-2023

	<b>Accidental</b> (N=314)	<b>Self-Harm</b> (N=578)	<b>Assault</b> (N=1,600)	<b>Unknown</b> (N=234)	<b>Total</b> (N=2,726)
<b>Age</b>					
Median [IQR]	28.0 [22.0]	41.0 [34.0]	30.0 [20.0]	32.0 [21.5]	32.0 [23.0]
Missing	1 (0.3%)	14 (2.4%)	30 (1.9%)	7 (3.0%)	52 (1.9%)
<b>Gender</b>					
Male	264 (84.1%)	505 (87.4%)	1302 (81.4%)	190 (81.2%)	2,261 (82.9%)
Female	49 (15.6%)	66 (11.4%)	294 (18.4%)	42 (17.9%)	451 (16.5%)
Missing	1 (0.3%)	7 (1.2%)	4 (0.3%)	2 (0.9%)	14 (0.5%)
<b>Race</b>					
White	189 (60.2%)	465 (80.4%)	539 (33.7%)	105 (44.9%)	1,298 (47.6%)
Black/African American	25 (8.0%)	21 (3.6%)	476 (29.8%)	38 (16.2%)	560 (20.5%)
Hispanic/Latino	21 (6.7%)	21 (3.6%)	188 (11.8%)	16 (6.8%)	246 (9.0%)
Other/Multiple	79 (25.2%)	71 (12.3%)	396 (24.8%)	74 (31.6%)	620 (22.7%)
Missing	0 (0%)	0 (0%)	1 (0.1%)	1 (0.4%)	2 (0.1%)
<b>Anatomical Location of Injury</b>					
Extremity	124 (39.5%)	5 (0.9%)	180 (11.3%)	33 (14.1%)	342 (12.5%)
General/Global	45 (14.3%)	142 (24.6%)	227 (14.2%)	24 (10.3%)	438 (16.1%)
Head/Neck	34 (10.8%)	286 (49.5%)	119 (7.4%)	44 (18.8%)	483 (17.7%)
Torso	39 (12.4%)	40 (6.9%)	184 (11.5%)	42 (17.9%)	305 (11.2%)
Missing	72 (22.9%)	105 (18.2%)	890 (55.6%)	91 (38.9%)	1,158 (42.5%)
<b>Initial Acuity</b>					
Critical	69 (22.0%)	135 (23.4%)	761 (47.6%)	64 (27.4%)	1,029 (37.7%)
Lower Acuity	218 (69.4%)	19 (3.3%)	621 (38.8%)	70 (29.9%)	928 (34.0%)
Cardiac Arrest	22 (7.0%)	414 (71.6%)	188 (11.8%)	97 (41.5%)	721 (26.4%)
Missing	5 (1.6%)	10 (1.7%)	30 (1.9%)	3 (1.3%)	48 (1.8%)
<b>Urbanicity</b>					
Metro	234 (74.5%)	392 (67.8%)	1,506 (94.1%)	200 (85.5%)	2,332 (85.5%)
Non-Metro	50 (15.9%)	105 (18.2%)	65 (4.1%)	18 (7.7%)	238 (8.7%)
Rural	27 (8.6%)	79 (13.7%)	27 (1.7%)	15 (6.4%)	148 (5.4%)
Missing	3 (1.0%)	2 (0.3%)	2 (0.1%)	1 (0.4%)	8 (0.3%)

**Table 2:** Firearm Injury Intent by Year for 9-1-1 Incidents in Kansas from 2020-2023

	<b>2020</b>	<b>2021</b>	<b>2022</b>	<b>2023</b>	<b>Total</b>
<b>Accidental</b>	80 (11.1%)	76 (10.6%)	82 (12.4%)	76 (12.1%)	<b>314 (11.5%)</b>
<b>Self-Harm</b>	138 (19.2%)	165 (23.0%)	134 (20.3%)	141 (22.4%)	<b>578 (21.2%)</b>
<b>Assault</b>	439 (61.1%)	417 (58.2%)	376 (57.0%)	368 (58.4%)	<b>1,600 (58.7%)</b>
<b>Unknown</b>	62 (8.6%)	59 (8.2%)	68 (10.3%)	45 (7.1%)	<b>234 (98.6%)</b>
<b>Total</b>	<b>N=719</b>	<b>N=717</b>	<b>N=660</b>	<b>N=630</b>	<b>N=2,726</b>