

Level I Trauma Center Studies Characterizing Dog Bite Injuries Across Major U.S. Geographical Regions (2013-2026)

Summary

Table 1. From 2013 to 2026, 18 peer-reviewed scientific medical studies from Level I trauma centers spanning all major geographical regions in the United States—Midwest, Northeast, Northwest, South, Southeast, Southwest and West Coast—all report similar findings. Pit bulls are inflicting a higher prevalence of injuries than all other breeds of dogs. The majority of these studies (13 of 18) also report that pit bulls are inflicting the most severe injuries, requiring a higher number of operative interventions—up to five times higher—than other dog breeds.

Table 2. Four additional studies from this period—all from Level I trauma centers in the Denver metro area—show a mixture of results, possibly due to Denver and the surrounding metropolitan regions enforcing pit bull bans from 1989 to 2020.

Criteria for inclusion in this trauma study table requires being a multi-year retrospective study¹ of U.S. Level I trauma center dog bite patients (≥ 15 patients), published from 2013 to 2026, the inclusion of dog breed information, and the scientific research conducted by medical doctors.

Table 1: Major U.S. Geographical Regions

Years	Region	Breed & Injury Prevalence	Severity Information	Ref
Published: May 2026 Study period: 2016-2024 M. Hovell	Southeast - Regional Level 1 trauma center - Knoxville, Tennessee	276 patients studied. Over 30 different dog breeds were represented. Pit bulls accounted for 33% (91) all dog bites studied. Pet dogs accounted for 79% of bites. Nonpet dogs -- police K-9 (20), stray (19), other (1) and unknown ownership (15) -- accounted for the remainder.	Pit bull injuries were more likely to require surgical intervention compared to all other breeds combined (61.5% versus 47%). They also had a higher median number of operations and higher Injury Severity Score (ISS).	1
Results: “Pit bulls were implicated in nearly one-third of all injuries and were significantly more likely to require surgical intervention compared to other breeds (61.5% versus 47%) with a higher median number of operations (1 versus 0). Injuries from nonpet (unknown ownership, police or stray) dogs resulted in more operations (1 versus 0) and higher readmission rates (20.7% versus 7.3%) than those caused by pets.”				

Published: April 2026 Study period: 2012 -2023 <i>A. Rothka</i>	Northeast - Level 1 trauma center - Hershey, Pennsylvania	906 patients with facial dog bites and 2061 injuries studied. Of the 68 breeds reported, Pit bulls inflicted the highest prevalence of injuries, 22.4% (154), followed by Labradors, 10.5% (72), when breed was known 69% (686/998).	Family dogs were responsible for 61.3% of facial injuries. The cheeks, 25.9%, lips, 20.8%, and nose, 9.0%, were most injured. Of the 906 patients, 17.0%, (154) required hospital admission.	2
Selected Findings: “Family dogs were responsible for 61.3% of injuries. Pit bulls (22.4%), Labradors (10.5%), and German Shepherds (7.0%) were the most identified breeds. The cheeks (25.9%), lips (20.8%), and nose (9.0%) were most injured.” “2019 was the calendar year with the largest number of injuries and patients ... There was a 22.4% decrease in the number of injuries and a 25.4% decrease in the number of patients from 2019 to 2020.”				
Published: Jun. 2022 Study period: 2011-2017 <i>L. Boyd</i>	Southeast - Regional Pediatric Level I trauma center - Memphis, Tennessee	1422 pediatric patients studied: predominantly male (63.5%), African-American (57.4%), and < 10 years (69.4%). Head and neck areas sustained the most injuries (64.7%). Pit bulls inflicted the highest prevalence of injuries (n = 245, 47.9%). Breed was known in 36% of cases (511).	Operative repair was necessary in 16.9% of all cases. Head and neck bites accounted for 54.2% of all operative cases. Pit bulls were the most commonly identified breed in cases requiring operative repair (52.2%). No fatal dog bites occurred in this study.	3
Selected Findings: “The typical pediatric dog bite case was male (63.5%), African-American (57.4%), and less than 10 years old (69.4%). The head and neck were the most commonly affected areas (64.7%) ... Pit Bulls were the most frequently identified breed (n = 245, 47.9%) of the 511 cases in which the breed was known and were the most commonly identified breed in cases requiring operative repair (52.2%).”				
Published: Jun. 2021 Study period: 2007-2017 <i>K. Munoz</i>	Southeast - Pediatric Level I trauma center - Richmond, Virginia	356 pediatric patients studied. Patient ages 6-12 suffered the most injuries, 45.7%. Pit bulls inflicted the highest prevalence of injuries, 53%, when breed was known and 29.8% of cases studied. Pit bulls were more likely to bite ages 6-12 (36.2%). Huskies were more likely to bite infants (5.9%).	Facial injuries were the most common, 56.2% followed by extremities, 37.1%. Infants and preschoolers were more likely to sustain bites to the head/face. Approximately 25% of the patients required advanced reconstructive techniques.	4

Findings: “Most pediatric dog bite injuries afflicted male children (55.6%), ages 6 to 12 years (45.7%), by a household dog (36.2%). The most common offending breed was a pit bull or pit bull mix (53.0%) ... Other frequently identified breed groups included Labrador/Labrador mix (10%), German Shepherd/German Shepherd mix (6.5%) ... Specific dog breed was not associated with need for surgical repair or location of surgical repair.”				
Published: Jun. 2021 Study period: 2008-2019 <i>B. Parent</i>	Northeast - Pediatric Level 1 trauma center - western Pennsylvania	114 pediatric patients studied divided into two groups: craniofacial fractures (38) and those without (76). Across both groups, the most commonly identified breed was pit bull, 22%, followed by mixed-breed, 14%. Breed was known in 77% of cases (88).	A total of 60 craniofacial fractures were identified among 38 pediatric patients. The most commonly identified breed was pit bull, 37%, followed by mixed-breed, 13%. Breed was known in 92% of cases (35).	5
Selected Findings: “The most commonly reported dog breeds for both groups were Pit Bull Terriers (25 patients, or 22%), followed by a mixed breed dogs (16 patients, 14%).” “The most commonly reported breed among these fracture patients was the Pit Bull Terrier: a breed which has been previously identified as particularly high risk for aggressive and destructive behavior.”				
Published: Aug. 2020 Study period: 1997-2018² <i>N. Zhu</i>	Northeast - Level I trauma center, pediatric and adult, Boston, Massachusetts	321 patients studied -- facial dog bite injuries only. 141 males and 180 females. The majority of patients were adults (> 18 years, 69.5%). Most dogs (87.5%) were known, and provocation was recorded in 207 cases (64.5%). Pit bulls led in the number of injuries to both children and adults.	Among all age groups, 207 patients (64.5%) required surgical treatment. The most common wounds were lacerations (88.5%), followed by puncture (22.4%), avulsion (15%), facial fracture (2.5%), and 28 patients (8.7%) required revision surgery.	6
Findings: “In total, 321 patients were identified. There were 141 males and 180 females. The majority of patients were adults (age > 18 years; n = 223, 69.5%). Most dogs (n = 281, 87.5%) were known, and provocation was recorded in 207 cases (64.5%) ... Only 5.6% of the animals had a history of aggressive behavior ... Pit bulls led as the offending breed in injuries caused to both children and adults.”				
Published: Mar. 2020 Study period: 2009-2018³	Southeast - Regional Level I trauma center - Charleston, West Virginia	182 patients studied -- craniofacial and related injuries. Patient gender, 53% girls ≤ 10 and 65% female ≥ 11. Pit bulls inflicted the highest prevalence of attacks, 27% (49), followed by	Pit bulls inflicted the most complex wounds, 63% (41/65), the most mauling injuries, 71% (12/17), when 3 or more bites occurred over 2 or more distinct regional	7

<i>K. Khan</i>		German shepherds, 6% (11), among the top-biting breeds. Breed was known in 90% (163/182) of all cases.	anatomic areas, and the most fractures, 47% (7/15), within the top-biting breeds.	
Findings: “The data showed that compared with other dog breeds, pit bull terriers inflicted more complex wounds, were often unprovoked, and went off property to attack ... The probability of a bite resulting in a complex wound was 4.4 times higher for pit bulls compared with the other top-biting breeds ... and the odds of an off-property attack by a pit bull was 2.7 times greater than that for all other breeds.”				
Published: Jul. 2019 Study period: 2011-2016 <i>J. Abraham</i>	South - [Blinded] emergency department ([Blinded]), Texas ⁵	102 pediatric patients studied, 57% were girls. 80 dogs were identified by breed in 75 encounters (74% of total 102 encounters). Pit bulls inflicted the highest prevalence of injuries, 36.2%, when breed was known, followed by Labradors, 10%.	92.1% of injuries involved the head-neck region and 72.5% were of major severity. The pit bull was the most commonly identified breed involving major injury, including the only patients that required ICU monitoring.	8
Findings: “Parental presence was reported in 43.6% of cases, and most attacks occurred in the evening (46.8%). Injuries often involved the head–neck region (92.1%), and 72.5% were of major severity.” “The most commonly identified breed was the pit bull, followed by the Labrador retriever. Pit bulls were also the most commonly identified breed involved in major injuries.”				
Published: May 2019 Study period: 2010-2014 <i>C. Lee</i>	West Coast - Level I trauma center - Irvine, California	189 patients studied, all adults ≥ 18. Breed identified in 61 cases, 32.2%. Pit bulls inflicted the highest prevalence of injuries, 47.5% (29), when breed was known and 15.3% of total studied.	Pit bulls were responsible for 36.8% of head and neck injuries when breed was known (7/19). 65.5% of pit bull attacks involved the extremities. Other dog breeds were more evenly distributed.	9
Results: “The most common breed of dog identified was pit bull (n = 29, 47.5%). The majority of pit bull attacks involved the extremities (65.5%) compared to other breeds of dogs. Pit bull victims were noted to have a lower average annual income compared to other breed victims ... However, this was not statistically significant (0.16).”				
Published: Feb. 2019 Study period: 2002-2017	Midwest - Two Pediatric Level I trauma centers - Columbus, Ohio and Charlottesville,	Meta-study analysis conducted across 43 studies (1970 to current) to determine breed prevalence in all bites. Pit bulls were responsible for the highest	240 pediatric patients studied -- head, neck injuries only. Each patient characterized into an ordinal scale of bite injury. Mixed-breeds and	10

<i>G. Essig Jr.</i>	Virginia	percentage of reported bites across all the studies (22.5%) followed by mixed-breed (21.2%) and German shepherds (17.8%).	pit bulls had the highest relative risk of biting, and also had the highest average tissue damage per bite.	
Findings: “Injuries from pit bulls and mixed-breed dogs were both more frequent and more severe ... Physical characteristics like brachycephalic head shape and weight between 66 and 100 pounds were found to have both the highest bite risk and highest average tissue damage per bite.” “We recommend separating children from high-risk breeds and high-risk phenotypes reported in this study. Selecting for animals with low risk for biting and tissue damage may lower the risk injury.”				
Published: Sep. 2018 Study period: 2010-2016 <i>J. Brice</i>	West Coast - Level I trauma center - Fresno, California	95 patients studied -- orthopaedic injuries requiring specialized treatment only. Pit bulls inflicted the highest prevalence of injuries, 50% (47), followed by law enforcement dogs, 22% (21), of total studied. Breed was known in 84% (80) of all cases.	Pit bulls were responsible for 78% of all amputation injuries. Of those bitten by pit bulls, 51% had a bony injury. Bites from law enforcement dogs resulted in 24% bony injuries. 66% of pit bull bite patients (31/47) sustained an amputation or bony injury.	11
Conclusions: “Thirty-nine percent of all dog bite-related emergency department visits at our facility resulted in an injury requiring orthopaedic treatment. Pit bull terrier bites were responsible for a significantly higher number of orthopaedic injuries and resulted in an amputation and/or bony injury in 66% of patients treated, whereas bites from law enforcement dogs and other breeds were less associated with severe injuries.”				
Published: Aug. 2018 Study periods: 2011-2016, 2010-2016 <i>A. Smith</i>	South - Two Level I trauma centers, pediatric and adult - Little Rock, Arkansas	740 patients studied, 574 children and 166 adults. Pit bulls inflicted the highest prevalence of injuries to children, 28.1% (55), when breed was known. Breed was recorded in 34% (195/574) of pediatric cases and 58.6% (17/29) of pediatric cases that required operative intervention.	Of the 31 adult trauma cases in which a breed was recorded, 42% (13/31), pit bulls were represented in 69% of cases. Of all child and adult cases combined that required operative intervention, pit bulls were represented in 62.5% of cases.	12
Findings: “Our study corroborates much of the previous literature, supporting the notion that pit bull bites are severe enough to require operative intervention more frequently than the bites of other dog breeds ... Indeed, when looking at cases that required operative				

interventions, pit bulls were disproportionately represented in 62.5% of cases.”				
Published: Oct. 2017 Study period: 2012-2014 <i>K. Alizadeh</i>	Northeast - Pediatric Level I trauma center - Westchester, New York	108 pediatric patients studied. 17 dog breeds identified in 56 cases, 52%. Pit bulls inflicted the highest prevalence of injuries, 48.2% (27), when breed was known and 25% of total studied.	47.8% of pit bull injuries required operative repair, which was 3 times more than other breeds. Of the 9 patients with extended hospitalization, 66.7% were caused by a pit bull.	13
Findings: “Of the 56 cases that had an identified dog breed, pit bulls accounted for 48.2% of the dog bites ... More importantly, 47.8% of pit bull injuries required operative repair, which was 3 times more than other breeds.” “Of the 9 patients with extended hospitalization, 6 (66.7%) were caused by a pit bull that confirms our theory that this breed results in the most devastating injuries at our center. The penetrating and crushing nature of these bites can lead to lifelong deformities.”				
Published: Apr. 2017 Study period: 4 years <i>M. Golinko</i>	Southeast - Pediatric Level I trauma center - Atlanta, Georgia	1616 pediatric patients studied. 46 dog breeds identified in 509 cases, 31.3%. Pit bulls inflicted the highest prevalence of injuries, 38.5% (196), when breed was known and 12% of total studied.	Pit bull bites were implicated in 50% of all surgeries performed and over 2.5 times as likely to bite in multiple anatomic locations as compared to other breeds. A pit bull inflicted the only fatality.	14
Findings: “Pit bull bites were implicated in half of all surgeries performed and over 2.5 times as likely to bite in multiple anatomic locations as compared to other breeds.” “Our data were consistent with others, in that an operative intervention was more than 3 times as likely to be associated with a pit bull injury than with any other breed.”				
Published: Jul/Aug 2016 Study period: 2003-2013 <i>M. Prendes</i>	Northwest - Regional Level I trauma center - Seattle, Washington	342 patients studied. Breed identified in 270 cases, 79%. Pit bulls inflicted the highest prevalence of injuries 27% (92) of total studied and 25% (22.7) of all ocular injuries. Among dogs unknown to patients, pit bulls inflicted 60% of all injuries and 63% of ocular injuries.	5 patients (1.5%) ages < 7 sustained facial fractures. 3 sustained orbital fractures inflicted by a doberman, husky and Labrador, 1 sustained a nasal bone fracture by a pit bull, and 1 sustained a depressed skull fracture by a German shepherd.	15
Findings: “Importantly, this study is the first to accurately establish that pit bulls are the breed most commonly associated with ocular injuries (25%). Most alarming is the observation that when attacks come from unfamiliar dogs, the pit bull was responsible for 60% and 63% of all injuries and ocular injuries, respectively.”				

Published: May 2015 Study period: 2006-2013 ⁶ <i>M. Foster</i>	Southeast - Level I trauma center - Knoxville, Tennessee	20 patients studied -- head, neck and facial injuries only treated by oral and maxillofacial surgery. Breed identified in 16 cases, 80%. Pit bulls inflicted the highest prevalence of injuries, 56% (9), when breed was known and 45% of total studied.	Pit bulls were more frequently associated with injuries than other dog breeds (9/20). Two cases involved multiple dogs, all of which were pit bulls. A pit bull inflicted the only fatality.	16
Results: "The medical records from 20 patients were included and reviewed. More than one half (60%) of the patients were younger than 12 years old. The dog was owned by the patient or a relative in 58% of the cases. The children sustained injuries requiring hospital admission and repair in an operating room setting more often than did the adults. Pit bulls were more frequently associated with injuries than other breeds (9 of 20)."				
Published: Feb. 2015 Study period: 2007-2013 <i>E. Garvey</i>	Southwest - Pediatric Level I trauma center - Phoenix, Arizona	282 pediatric patients studied. Breed identified in 213 cases, 75.5%. Pit bulls inflicted the highest prevalence of injuries, 39% (83), when breed was known and 29.4% of total studied.	Among the 11 patients with the highest AIS (3–5), pit bulls were responsible in 45.5% of cases. Pit bulls also accounted for 38% of all head, neck or facial bites.	17
Findings: "Pit bulls were most frequently responsible, accounting for 39% (83/213) of incidents in which dog breed was documented ... Among the 11 patients with the highest AIS (3–5), Pit bulls were responsible in 45.5% of cases, followed by mixed-breeds in 18.2% (2/11) of cases. Pit bulls were also responsible for 38% of all head, neck or face bites." "Dog familiarity did not confer safety, and in this series, pit bulls were most frequently responsible. These findings have great relevance for child safety."				
Published: Jan/Feb 2015 Study period: 2012-2013 <i>D. O'Brien</i>	West Coast - Level I trauma center - Sacramento, California	334 patients studied. Breed identified in 211 cases, 63%. Pit bulls inflicted the highest prevalence of injuries, 54% (114), when breed was known and 34% of total studied. Pit bulls also inflicted the highest prevalence of head and neck injuries, 48% (32/67), when breed was known and 32% of total studied.	Bites from pit bull terriers were more severe than other dog breeds with a mean DBCI of 3.2 compared to 2.3, had a significantly higher rate of consultation (94%) and had 5 times the rate of operative repair when compared to other breeds.	18
Results: "Of the more than 8 different breeds identified, one-third were caused by pit bull terriers and resulted in the highest rate of consultation (94%) and had 5 times the relative rate of surgical intervention. Unlike all other breeds, pit bull terriers were relatively more				

likely to attack an unknown individual (+31%), and without provocation (+48%).”

Level I Trauma Center Studies Characterizing Dog Bite Injuries in Denver, Colorado Region (2013-2017)

Summary

In October 1989, the city and county of Denver adopted a pit bull ban. In 1994, one of the first epidemiological studies of "breeds of biting dogs" was carried out in Denver county, despite the absence of pit bull terriers due to the ban ([Which Breeds Bite? A Case-Control Study of Risk Factors](#)).⁷ As a result, pit bulls did not appear in the case-control study's "biting" or "nonbiting" breed findings (Gershman, 1994).

From 2013 to 2017, one of four Level I trauma center studies in the Denver metro area showed that pit bulls continue to have a high prevalence of facial injuries (Gurunluoglu, 2014). Another study, also limited to facial injuries, states that while the prevalence of pit bull injuries was low during their study period (2003-2008), the severity of pit bull injury included, "the patient who suffered the most extensive injuries and the longest hospitalization of our entire population" (Chen, 2013).

On November 3, 2020, [Denver voters repealed](#) the city's longstanding pit bull ban and replaced it with a provisional "breed-restricted license" ordinance.⁸ The new law requires pit bull owners to register and microchip their dogs and limits the ownership of pit bulls to two per household.

Table 2: Denver Level I Trauma Centers

Children's Hospital Colorado and Denver Health Level I Trauma Center are regional Level I trauma centers that serve the Denver metro area and 7-state Rocky Mountain region.

Years	Region	Breed & Injury Prevalence	Severity Information	Ref
Published: Jan. 2017 Study period: 2000-2015 ⁹ <i>R. Kumar</i>	Southwest - Regional Pediatric Level I trauma center - Denver, Colorado	17 pediatric patients studied; 53% girls -- neurosurgical consultation for head and neck injuries only. Akitas and German shepherds inflicted the highest prevalence of wounds (3 each), followed by American bulldogs, Labradors, large mixed-breed dogs and pit bulls (2 each).	All attacks requiring neurosurgical consultation were committed by large- breed dogs. Neurological deficits, all of which were considered catastrophic, developed in 3 patients involving an Akita (1), American bulldog (1) and unknown breed (1).	19

Conclusions: “In this study, large-breed dogs were responsible for all attacks on children requiring neurosurgical consultation. Most dogs were family pets with no history of prior aggression, and most of the attacks occurred at home.” “Parental supervision, though important, may not be enough, given that the majority of attacks in this series occurred in the presence of an adult, even those with catastrophic neurological injury.”				
Published: May 2014 Study period: 2006-2012 <i>R. Gurunluoglu</i>	Southwest - Regional Level I trauma center - Denver, Colorado	75 patients studied, 98 total wounds -- facial dog bite injuries treated by plastic surgery only. Pit bulls and German shepherds inflicted the highest prevalence of wounds, 11.6% each (11/95), when breed was known and 11.22% each of total wounds.	Over half of all wounds inflicted by pit bulls and German shepherds required reconstruction procedures (7/11 each). Combined, the two breeds accounted for 37% (14/38) of all reconstruction procedures performed.	20
Findings: “Ninety-eight wounds in the head and neck region were repaired. Twelve different breeds were identified. There was no significant association between the type of dog breed and the number of bite injuries ... There was no statistically significant association between wounds needing reconstruction versus direct repair according to dog breed.”				
Published: Dec. 2013 Study period: 2003-2008 <i>H. Chen</i>	Southwest - Regional Pediatric Level I trauma center - Aurora, Colorado	537 pediatric patients studied -- facial dog bite injuries only. Breed identified in 366 cases, 68.2%. Mixed-breed inflicted the highest prevalence of injuries, 23% (84), when breed was known and 16% of total studied.	There were 11 victims of pit bull bites from 2003 to 2008, including the patient who suffered the most extensive injuries and the longest hospitalization of our entire population.	21
Findings: “Pit bulls were banned in Denver because of several gruesome maulings and fatalities that occurred between 1984 and 1989. Our study found 11 victims of pit bull bites from 2003 to 2008, including the patient who suffered the most extensive injuries and the longest hospitalization of our entire population, indicating that despite legislation, pit bull bites continue to be a public health concern.”				
Published: May/Jun 2013 Study period: 2003-2011 ¹⁰	Southwest - Regional Pediatric Level I trauma center - Aurora, Colorado	17 pediatric patients studied -- facial fracture dog bite injuries only. Patient gender, 53% girls. Breed identified in all 17 cases. German shepherds inflicted the highest prevalence of	15 of the 17 patients required hospitalization. One patient suffered “degloving injury to the face” and the amputation of his left arm after being severely mauled by his	22

L. Wei	injuries, 23.5% (4 of 17) followed by pit bulls 17.6%.	family's pit bull.
Findings: “Seventeen of 1,201 (1.4%) children with dog bite injuries to the face also sustained facial fractures. The average age of patients was 3.9+/-3.2 years and 53% were female. Thirty-five percent of patients presented with multiple facial fractures ... Almost a quarter (4 of 17, 23.5%) of the attacking dogs that caused facial fractures were German Shepherds,” followed by pit bulls with 17.6% (3 of 17).		

Citations

- 1.) Hovell M, McKnight C, Proffitt G, Hungerford A, Rowe A, Berry D, [Behind the Bite: Ownership and Breed as Predictors of Dog Bite Severity](#), *Journal of Surgical Research*, May 2026; 321, 303-307.
- 2.) Rothka AJ, Aziz M, Nguyen KPK, Lorenz FJ, Schopper HK, Lighthall JG, [Evaluating Dog Bite-Induced Facial Trauma: A Study From a Single Tertiary Care Center](#), *OTO Open*, April 2026.
- 3.) Boyd LC, Chang J, Ajmera S, Wallace RD, Alvarez SM, Konofaos P, [Pediatric Dog Bites: A Review of 1422 Cases Treated at a Level One Regional Pediatric Trauma Center](#), *J Craniofac Surg*, 33(4):p 1118-1121, June 2022.
- 4.) Munoz KR, Powell LE, Andersen ES, Nye AD, Powers JM, Rhodes J, Pozez AL, [Analysis of Pediatric Dog Bite Injuries at a Level 1 Trauma Center Over 10 Years](#), *Ann Plast Surg*, 2021 Jun 1;86(6S Suppl 5):S510-S516.
- 5.) Parent B, Bykowski MR, Marji FP, Ramgopal S, Goldstein JA, Losee JE, [Pediatric Craniofacial Fractures From Canine Bites](#), *J Craniofac Surg*, 2021 Jun 1;32(4):1627-1632.
- 6.) Zhu N, Walma AC, Troulis MJ, August M, [Facial Dog Bites Treated at the Massachusetts General Hospital Over a 20-year Period](#), *Oral Surg Oral Med Oral Pathol Oral Radiol*, August 2020;130(2):136-143.
- 7.) Khan K, Horswell B, Samanta D, [Dog-Bite Injuries to the Craniofacial Region: An Epidemiologic and Pattern-of-Injury Review at a Level 1 Trauma Center](#), *J Oral Maxillofac Surg*, March 2020 [2019 Nov 14, Epub].
- 8.) Abraham JT, Czerwinski M, [Pediatric Dog Bite Injuries in Central Texas](#), *Journal of Pediatric Surgery*, July 2019 [2018 Oct 31, Epub].
- 9.) Lee CJ, Santos PJ, Vyas RM, [Epidemiology, Socioeconomic Analysis, and Specialist Involvement in Dog Bite Wounds in Adults](#), *J Craniofac Surg*, May 2019;30(3):753-757.
- 10.) Essig G, Sheehan C, Rikhi S, Elmaraghy C, Christophel J, [Dog Bite Injuries to the Face: Is There Risk with Breed Ownership? A Systematic Review with Meta-Analysis](#), *International Journal of Pediatric Otorhinolaryngology*, Volume 117, February 2019.
- 11.) Brice J, Lindvall E, Hoekzema N, Husak L, [Dogs and Orthopaedic Injuries: Is There a Correlation to Breed?](#), *J Orthop Trauma*, 2018 Sep;32(9):e372-e375.
- 12.) Smith AM, Carlson J, Bartels AB, McLeod CB, Golinko MS, [Characteristics of Dog Bites in Arkansas](#), *South Med J*, 2018 Aug;111(8):494-500.
- 13.) Alizadeh K, Shayesteh A, Xu ML, [An Algorithmic Approach to Operative Management of Complex Pediatric Dog Bites: 3-Year Review of a Level I Regional Referral Pediatric Trauma Hospital](#), *Plast Reconstr Surg Glob Open*, October 2017.
- 14.) Golinko MS, Arslanian B, Williams JK, [Characteristics of 1616 Consecutive Dog Bite Injuries at a Single Institution](#), *Clinical Pediatrics (Phila)*, April 2017;56:316-325 [July 2016, Epub].
- 15.) Prendes MA, Jian-Amadi A, Chang SH, Shaftel SS, [Ocular Trauma From Dog Bites: Characterization, Associations, and Treatment Patterns at a Regional Level I Trauma Center Over 11 Years](#), *Ophthalmic Plast Reconstr Surg*, 2016 Jul-Aug;32(4):279-83 [June 2015, Epub].

- 16.) Foster MD, Hudson JW, [Contemporary Update on the Treatment of Dog Bite: Injuries to the Oral and Maxillofacial Region](#), *J Oral Maxillofac Surg*, May 2015 Volume 73, Issue 5, Pages 935–942.
- 17.) Garvey EM, Twitchell DK, Ragar R, Egan JC, Jamshidi R, [Morbidity of pediatric dog bites: A case series at a level one pediatric trauma center](#), *J Pediatr Surg*, February 2015;50:343-6.
- 18.) O'Brien DC, Andre TB, Robinson AD, Squires LD, Tollefson TT, [Dog bites of the head and neck: an evaluation of a common pediatric trauma and associated treatment](#), *Am J Otolaryngol*, 2015 Jan-Feb; 36(1): 32–38. [2014 Sep 28, Epub].
- 19.) Kumar R, Deleyiannis FW, Wilkinson C, O'Neill BR, [Neurosurgical sequelae of domestic dog attacks in children](#), *J Neurosurg Pediatr*, January 2017:24-31 [Epub 2016 Oct 21].
- 20.) Gurunluoglu R, Glasgow M, Arton J, Bronsert M, [Retrospective analysis of facial dog bite injuries at a Level I trauma center in the Denver metro area](#), *J Trauma Acute Care Surg*, 2014 May;76(5):1294-300.
- 21.) Chen HH, Neumeier AT, Davies BW, Durairaj VD, [Analysis of Pediatric Facial Dog Bites](#), *Craniofacial Trauma Reconstr*, Dec; 6(4): 225–232 [Sept 2013, Epub].
- 22.) Wei LA, Chen HH, Hink EM, Durairaj VD. [Pediatric facial fractures from dog bites](#). *Ophthalmol Plast Reconstr Surg*. 2013 May-Jun;29(3):179-182.

Archive Trauma Tables

An archive of retrospective dog bite medical study tables from U.S. Level I trauma centers examining nonfatal dog bite injuries and breeds date back to 2009. [View archive trauma tables](#).

Footnotes

¹ (Parent, 2021) is a case-control study that compared characteristics of dog bites in children with craniofacial fractures to children without between the years of 2008 to 2019 from a single institution.

² (Zhu, 2020) Indicates gender reversal in patients, a female predilection instead of male. “Our study, however, found ... a female predominance in all age groups.”

³ (Khan, 2020) indicates gender reversal in patients, a female predilection instead of male. “We recorded data from 182 patients, of whom 104 were female and 78 were male patients.”

⁴ (Abraham, 2019) indicates gender reversal in pediatric patients, a female predilection instead of male. “Patient age ranged from 3 days to 16 years, and 57% of patients were girls.”

⁵ (Abraham, 2019) 72.5% of dog bite injuries in this study were of “major severity.” Thus, it is presumed the blinded institution was a pediatric Level I trauma center and is included in our literature review.

⁶ (Foster, 2016) indicates gender reversal in patients, a female predilection instead of male. “Of the 20 patients, 12 were younger than 12 years old (60%), and 9 were male and 11 female.”

⁷ Gershman KA, Sacks JJ, and Wright JC, [Which Dogs Bite? A Case Control Study of Risk Factors](#), *Pediatrics*, 1994 Jun;93(6 Pt 1):913-7.

⁸ [Council Bill No. 20-0071](#), Safety, Housing, Education and Homelessness, City and County Denver, February 10, 2020.

⁹ (Kumar, 2017) indicates gender reversal in pediatric patients, a female predilection instead of male. “In this subset of 17 patients, 9 females (53%) and 8 males (47%) were victims of a dog attack.”

¹⁰ (Wei, 2013) indicates gender reversal in pediatric patients, a female predilection instead of male. “The average age of patients was 3.9+/-3.2 years and 53% were female.”