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Comparative analysis of all-terrain vehicles, motorcycle and automobile-related trauma in a rural border community of the USA

Haissam S Elzaim,[1] Kristina Vatcheva ,[2] Annelyn Torres-Reveron ,[3] Gregery Pequeno,[4] Monica M Betancourt-Garcia[5]

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For numbered affiliations see end of article.

Correspondence to
Dr Haissam S Elzaim;
h.elzaim@dhr-rgv.com

ABSTRACT

Introduction There is widespread use of all-terrain vehicles (ATVs) in the USA for both work-related and recreational activities. In this study, we aimed to determine the difference in injury severity, Glasgow Coma scales and length of stay between ATV-related injuries and injuries sustained from motorcycles (MOTOs) and automobiles (AUTOs).

Methods We retrospectively analysed ATV, MOTO and AUTO injuries from a Level 2 Trauma Center between 01 January 2015 and 31 August 2020. Proportional odds regression analyses, as well as multivariable regression models, were used to analyse the data.

Results There were significantly more male and paediatric patients that suffered ATV-related injuries compared with MOTO or AUTO injuries. Victims of ATV-related injuries were also more likely to have open fractures. Paediatric patients were less likely to sustain an injury from either AUTO or MOTO accidents compared with ATV accidents. Patients with no drug use during injury and those who used protective equipment such as seat belts and child seats were significantly associated with lower Injury Severity Scores and higher Glasgow Coma Scale scores, indicating less severe injuries.

Discussion Paediatric patients are very likely to suffer sequela and long-term disability due to the severity of ATV-related injuries. Public awareness campaigns to educate our population, especially our youth, about the danger of ATV use are highly needed.

STRENGTHS AND LIMITATIONS OF THIS STUDY

⇒ Data collected for this study represents the majority of all all-terrain vehicle-related cases in the region.
⇒ Regional hospital serviced 8 counties and approximately 1.7 million residents that allowed the formation of a large sample size.
⇒ Data on prehospital deaths in the region were not able to be obtained.

INTRODUCTION

All-terrain vehicles (ATVs), also known as quad bikes, are three-wheeled or four-wheeled motorised open-air vehicles with large soft tires, a relatively high centre of gravity and handlebars similar to ones found on a bicycle. They are typically designed for a single operator that straddles the vehicle's body and are primarily used for off-road activities.[1] ATVs were first developed in the 1960s as a farm vehicle and later introduced in the USA in the early 1970s.[2,3] Early generations of ATVs had a small 7-horsepower/89 cc engine and weighed less than 200 lb. Modern ATVs have engines with over 600 cc/50-hp, weigh over 600 lb, and reach speeds above 100 mph. Recreational use of ATVs increased shortly after their introduction. By the year 2000, nearly 4 million ATVs were sold in the USA and by 2012, the U.S. Consumer Product Safety Commission (CPSC) estimated that 10.7 million four-wheeled ATVs were in operation.[4,5]

According to the CPSC, close to 100 000 ATV-related injuries were treated in emergency departments in 2013 in the USA[4]; most injuries resulting orthopaedic injuries.[6] Risk factors for such injuries include young and inexperienced riders, male gender, intoxication, lack of helmets and protective equipment, and operating on the road.[7] Children under the age of 16 years are at a notably higher risk for ATV-related injuries. Although 15% of ATV riders are children, it is estimated that children account for 27% of ATV-related injuries and 28% of ATV-related deaths.[5,8,9] A study conducted in 2010 by Sawyer *et al* indicated that in the USA, there was a 140% increase in ATV-related injuries among children and a 368% increase in spinal injuries from 1997 to 2006.[10] The majority of injured children (76%) were males.[10] Children are more at risk for sustaining ATV-related injuries and death due to decreased emotional maturity, motor skill, depth perception and experience. Children are also smaller and have lower body mass than adults, which may contribute to rollovers.[11]

The southernmost region of Texas along the USA/Mexico border is largely rural with a strong agricultural economy. In this region, commonly known as the Rio Grande Valley, ATVs are frequently used for both work and recreational use. The primary objectives of the study are to determine the difference in Injury Severity Scores (ISS), Glasgow Coma Scale (GCS) scores and hospital length of stay (LOS) between ATV-related injuries and injuries sustained from motorcycles (MOTO) and automobiles (AUTOs) at a Level 2 Trauma Center. We will also examine the effect of protective equipment use on injury severity and LOS, given the lower regulations that exist for ATVs.

METHODS

Design and data source

This is a retrospective analysis of all patients with ATV, MOTO and AUTO injuries recorded as the mechanism of injury in the trauma registry from 1 January 2015 to 31 August 2020 at a regional trauma centre. At the time of data collection, the hospital was one of three certified Level 2 Trauma hospitals in the Rio Grande Valley. The hospital serviced 8 counties and approximately 1.7 million residents. All data were collected from the hospital trauma database and included all patients who suffered an acute traumatic injury and were admitted to the hospital or transferred from another facility. The criteria for including a patient in the trauma registry follows the algorithm developed by the Committee on Trauma from the American College of Surgeons as published in the freely available National Trauma Data Standards.[12] The hospital trauma registry contains information extracted from the patient's medical record and is used to improve quality and trauma level certification by the American College of Surgeons. Data are entered into the trauma data bank by trauma nurse registrars and validated by a certified specialist in trauma registry and well as a certified abbreviated injury scaling specialist. There have been 15 482 encounters recorded in the trauma database across all injury mechanisms. Access to the database was approved by the DHR Health Institute for Research and Development Institutional Review Board.

Patient and public involvement

This is a fully deidentified retrospective research study for which patient identity was not known. Patients were not involved in the design, conduct of the research or choice of outcome measures. This study did not involve recruitment. If accepted for publication, results will disseminated to the community with the main goal of increasing safety awareness when using ATVs.

Variables

Data elements in the trauma registry are categorised into 10 broad categories of information: patients' demographic, injury, prehospital, emergency department, hospital procedures, pre-existing conditions, diagnosis, hospital events, outcomes and financial information. Predictors of interest included mechanisms of injury: ATV, MOTO and AUTO, along with age, sex, ethnicity, drug use and use of protective equipment at the time of injury. Outcome variables included presence of open fracture, ISS, GCS on admission, hospital LOS measured in hours and discharge status (including mortality) were collected. Patients were categorised as paediatric patients (age≤14 years of age) or adults patients (age≥15 years of age) as defined by the American College of Surgeons.[13] ISS was further categorised into minor (ISS≤9), moderate (ISS 10–15), severe (ISS 16–24) and very severe (ISS≥25).[14] The GCS is used to objectively describe the extent of impaired consciousness in all types of acute medical and trauma patients. The scale assesses patients according to three aspects of responsiveness: eye-opening, motor and verbal responses. The lowest possible total GCS is 3, while the highest is 15. GCS were categorised into mild (GCS 13–15), moderate (GCS 9–12) and severe (GCS 3–8).[15]

Statistical methods

Study data were summarised using frequencies. Percentages were generated for categorical variables, while median and range were used for the variables hospital LOS and ISS. Proportional odds regression analysis was used to evaluate factors associated with the ordinal type outcome variables including ISS and GCS.[16] The binary variable discharge status was analysed using logistic regression. Multinomial logistic regression was used to analyse the mechanism as an outcome variable. Univariable regression analyses were first conducted for each of the respective outcome variables and predictors of interest. Since the sample size was large, regardless of the findings in the bivariate analyses, for each of the outcomes, we fitted multivariable regression models including all predictors of interest.[17] Potential multicollinearity effect and two-way interaction effects between the variables included in the models were examined.[18,19] Crude and model-based adjusted ORs for lower versus higher response levels for the ordinal outcomes and their respective 95% CIs were estimated based on the proportional odds regression models. Similarly, crude and model-based adjusted ORs for dead versus alive and their respective 95% CIs were estimated based on the logistic regression model. The assumption of the proportional odds model that the effects of any explanatory variables are proportional across any response levels were tested using Score test. For the proportional odds and the logistic regression models, Hosmer-Lemeshow goodness-of-fit test was performed as well. To model the highly right-skewed variable hospital LOS, measured in number of hours, as well as considering the presence of overdispersion in the data, quasi-Poisson regression was used. The models were compared using the Akaike's information criteria and the Bayesian information criteria (BIC) (also Schwarz criterion, SBC, SBIC). Crude and model-based adjusted rate ratios and their respective 95% CIs were reported based on a quasi-Poisson regression

Table 1 Demographic variables for patients with traumatic injuries occurring when using AUTO, MOTO or ATV (n=3942)

Variables	Total (n=3942)	AUTO (n=3626)	MOTO (n=200)	ATV (n=116)	P value*
Age, mean (SD)	32.66 (10.06)	32.98 (19.28)	33.56 (15.37)	21.22 (13.98)	**<0.0001**
Age groups, n (%)					
0–14 years	478 (12.13)	420 (11.58)	14 (7.0)	44 (37.93)	**<0.0001**
≥15 years	3464 (87.87)	3206 (88.42)	186 (93.00)	72 (62.07)	
Sex, n (%)					
Male	2032 (51.55)	1671 (46.08)	164 (82.00)	75 (64.66)	**<0.0001**
Female	1910 (48.45)	1955 (53.92)	36 (18.00)	41 (35.34)	
Ethnicity (n=3940), n (%)					
Hispanic	3689 (93.63)	3398 (93.76)	177 (88.50)	114 (98.28)	**0.0024**
Non-Hispanic	251 (6.37)	226 (6.24)	23 (11.50)	2 (1.72)	
Drugs (n=3908), n (%)					
Yes	460 (11.77)	398 (11.08)	46 (23.00)	16 (13.91)	**<0.0001**
No	3448 (88.23)	3195 (88.92)	154 (77.00)	99 (86.09)	
Discharge status, n (%)					
Dead	29 (0.74)	29 (0.80)	0 (0)	0 (0)	0.9996
Alive	3913 (99.26)	2597 (99.20)	200 (100.00)	116 (100.00)	
Open fracture, n (%)					
Yes	38 (0.96)	24 (0.66)	7 (3.50)	7 (6.03)	**<0.0001**
No	3904 (99.04)	3602 (99.34)	193 (96.50)	109 (93.97)	
ISS (n=3019), median (range)	1 (74)	1 (74)	4 (32)	4 (25)	**<0.0001**
ISS groups (n=3019), n (%)					
Minor	2782 (92.15)	2533 (92.85)	159 (85.48)	90 (85.71)	**<0.0001**
Moderate	89 (2.95)	73 (2.68)	10 (5.38)	6 (5.71)	
Severe	76 (2.52)	57 (2.09)	11 (5.91)	8 (7.62)	
Very severe	72 (2.38)	65 (2.38)	6 (3.23)	1 (0.95)	
GCS groups (n=3914), n (%)					
Mild	3799 (97.06)	3493 (97.00)	193 (97.47)	113 (98.26)	0.6714
Moderate	56 (1.43)	51 (1.42)	4 (2.02)	1 (0.87)	
Severe	59 (1.51)	57 (1.58)	1 (0.51)	1 (0.87)	
LOS in hours, median (range)	3.10 (1557.53)	3.02 (1557.53)	5.04 (992.33)	3.70 (812.23)	**<0.0001**
Protective equipment (n=3809), n (%)					
Seat belt/child seat	2993 (78.68)	2993 (85.17)	0 (0)	0 (0)	**<0.0001**
Protective clothing/helmet	106 (2.79)	0 (0)	102 (53.13)	4 (4.08)	
No protective equipment	705 (18.53)	521 (14.83)	90 (46.88)	94 (95.92)	

Bold values denote statistical significance.
*P values are based on χ^2 test for non-zero regression coefficients in univariable logistic regression analysis.
ATV, all-terrain vehicle; AUTO, automobile; GCS, Glasgow Coma Scale; ISS, Injury Severity Score; LOS, length of stay; MOTO, motorcycle.

model. All statistical analysis were conducted using SAS V.9.4 (SAS Institute, 2015). Statistical testing was two-sided and performed at a significance (α) level of 0.05.

RESULTS

Participants and demographic characteristics

Table 1 describes the demographic variables for the patient population. The trauma registry queries returned a sample of 3942 patient records, of which 3626 were AUTO, 200 were MOTO and 116 were ATVs injuries (table 1). Paediatric patients were 12.13% of our study population and comprising 37.93% of the ATV injured, 11.58% of the AUTO injured and 7% of the MOTO injured patients. Males were 51.55% of the study population and majority of the patients were Hispanic (table 1). Only 29 of patients (0.74%) died due to any of the AUTO, MOTO or ATV injures.

Main outcomes

Table 2 shows the crude and model-based adjusted OR and their respective 95% CI for AUTO compared with ATV injuries and MOTO compared with ATV injuries, respectively. Based on univariable analysis, females compared

Table 2 Model-based adjusted OR (95% CI) based on multinomial logistic regression for mechanism of injury

Variable	AUTO versus ATV adjusted OR (95% CI)	P value	MOTO versus ATV adjusted OR (95% CI)	P value
Age groups, n (%)				
0–14 years	**0.19 (0.12 to 0.29)**	**<0.0001**	**0.15 (0.08 to 0.31)**	**<0.0001**
≥15 years	Reference		Reference	
Sex, n (%)				
Male	Reference		Reference	
Female	**2.14 (1.39 to 3.27)**	**0.0005**	**0.5 (0.29 to 0.88)**	**0.016**
Ethnicity, n (%)				
Hispanic	0.17 (0.02 to 1.23)	0.0794	**0.1 (0.01 to 0.75)**	**0.0254**
Non-Hispanic	Reference		Reference	
Drugs, n (%)				
Yes	0.97 (0.52 to 1.81)	0.9207	1.36 (0.67 to 2.76)	0.4006
No	Reference		Reference	
Open fracture, n (%)				
Yes	**0.22 (0.07 to 0.73)**	**0.0132**	0.47 (0.10 to 2.10)	0.3202
No	Reference		Reference	
ISS groups, n (%)				
Minor	0.68 (0.08 to 5.91)	0.7222	0.36 (0.04 to 3.72)	0.3918
Moderate	0.3 (0.03 to 2.99)	0.3052	0.27 (0.02 to 3.29)	0.3032
Severe	0.17 (0.02 to 1.59)	0.1203	0.27 (0.02 to 3.00)	0.2829
Very severe	Reference		Reference	
GCS groups, n (%)				
Mild	0.32 (0.04 to 2.89)	0.3089	2.42 (0.12 to 48.13)	0.5631
Moderate	0.59 (0.03 to 10.79)	0.725	3.1 (0.08 to 115.93)	0.5399
Severe	Reference		Reference	

Bold values denote statistical significance.
ATV, all-terain vehicle; AUTO, automobile; GCS, Glasgow Coma Scale; ISS, Injury Severity Score; MOTO, motorcycle.

with males had 2.14 (95% CI: 1.45 to 3.15) times higher odds of AUTO versus ATV accident and 60% (OR=0.40, 95% CI: 0.24 to 0.68) lower odds of MOTO accident versus ATV accident (table 2). These ORs remained similar in the multivariable multinomial logistic regression after considering the effect of age, ethnicity, drug use, type of fracture, ISS groups and GCS groups (table 2). Paediatric patients were less likely to sustain an injury from either AUTO (OR=0.19, 95% CI: 0.12 to 0.28) or MOTO (OR=0.15, 95% CI: 0.08 to 0.31) accidents compared with ATV accidents controlling for the effect of all other variables included in the model (table 2). Patients with AUTO injuries had 78% lower odds of sustaining an open fracture (OR=0.22, 95% CI: 0.07 to 0.73) compared with ATV-related injuries, controlling for the effect of all other variables include in the model (table 2). There was a significant difference in the distribution of the ISS across the mechanism of injury (p<0.0001) (table 1), and the crude odds of a severe ISS versus very severe ISS was 89% lower in patients with AUTO compared with ATV injuries (OR=0.11, 95% CI: 0.01 to 0.90) (table 2). However, this effect was not significant in the multivariable model adjusting for the effect of age, ethnicity, drug use, type of fracture and GSC groups (table 2).

Table 3 shows the results from multivariable proportional odds regression for ISS groups. AUTO patients were less likely to sustain severe injuries (higher ISS scores) compared with MOTO patients (OR=0.60, 95% CI: 0.38 to 0.94), controlling for the effect of age, sex, ethnicity, drug use and protective equipment (table 3). Female patients had 31% lower odds of more severe ISS than male patients (OR=0.69, 95% CI: 0.51 to 0.94) controlling for the effect of mechanism, age, ethnicity, drug use and protective equipment. Patients who were under the influence compared with their counterparts had 3.73 (95% CI: 2.46 to 4.65) times higher odds more severe ISS. Those who used protective equipment at the time of the injury were less likely to have a more severe ISS than patients who did not use any protective equipment, controlling for the effect of the variables included in the model (table 3).

Table 3 Model-based adjusted OR (95% CI) based on proportional odds regression for higher versus lower ISS

Variable	OR (95% CI)	P value
Mechanism AUTO versus ATV	0.95 (0.49 to 1.81)	0.8662
Mechanism MOTO versus ATV	0.87 (0.38 to 1.97)	0.7375
Mechanism AUTO versus MOTO	**0.60** (0.38 to 0.94)	**0.0245**
Sex Female versus male	**0.69** (0.51 to 0.94)	**0.0195**
Paediatric versus adults	0.83 (0.49 to 1.38)	0.4665
Hispanic versus non-Hispanic	0.90 (0.51 to 1.61)	0.7333
Drug Use versus no drug use	**3.73** (2.46 to 4.65)	**<0.0001**
Child seat/seat belt versus no protective equipment	**0.29** (0.21 to 0.40)	**<0.0001**
Protective clothing/helmet versus no protective equipment	0.74 (0.33 to 1.66)	0.4589

Bold values denote statistical significance.
ATV, all-terrain vehicle; AUTO, automobile; ISS, Injury Severity Score; MOTO, motorcycle.

Table 4 shows the results from multivariable proportional odds regression for GCS groups. Female patients were less likely to have a more severe score compared with male patients (OR=0.63, 95% CI: 0.41 to 0.98) controlling for the effect of mechanism, age, ethnicity, drug use and use of protective equipment. As in the case of ISS, patients who were not under the influence were less likely to have a more severe GCS compared with their counterpart (OR=0.38, 95% CI: 0.24 to 0.62) and those who used either a seat belt or car seat at the time of injury were less likely to have a more severe GCS compared with patients who did not use any protective equipment (OR=0.21, 95% CI: 0.14 to 0.33) controlling for all other variable included in the model (table 4). Further analysis showed AUTO-injured patients had 4.25 (1.05 to 17.21) times higher odds of a severe GCS Score compared with MOTO patients (table 4).

Based on multivariable logistic regression for discharge status, females had 60% lower odds (OR=0.40, 95% CI: 0.18 to 0.88) of dying due to injuries, controlling for the effect of age, ethnicity and drug use (table 5).

Table 6 displays the results based on fitted multivariable scaled Poisson regression for hospital LOS. Paediatric patients who were not under the influence at the time of injury and used protective equipment had a lower rate of hospital LOS compared with their respective counterparts, controlling for the effect of sex and ethnicity (table 6).

DISCUSSION

Previous literature has demonstrated that ATVs are fundamentally unstable.[20] In 1988, the CPSC imposed a 10-year ban on the sale of three-wheeled vehicles due to the dramatic injury rate. The 10-year ban was combined with a legally binding 10-year consent decree with the ATV industry to reduce injury and death. However, since the ban's expiration in 1998, there has been a dramatic increase in the production of more powerful ATVs with a corresponding rise in ATV-related injuries, especially among children and young adults.[21]

This study showed that ATV-related injuries reported from a Level 2 Trauma Center were more common among paediatric and male patients. The percentage of paediatric patients admitted for ATV injuries was three times higher than AUTO injuries and five times higher than

Table 4 Model-based adjusted OR (95% CI) based on proportional odds regression for higher versus lower GCS

Variable	OR (95% CI)	P value
Mechanism AUTO versus ATV	**4.17** (0.98 to 17.77)	**0.0410**
Mechanism MOTO versus ATV	0.98 (0.14 to 6.73)	0.0533
Mechanism AUTO versus MOTO	4.25 (1.05 to 17.21)	0.9853
Sex female versus male	**0.63** (0.41 to 0.98)	**0.0426**
Paediatric versus adults	0.99 (0.51 to 1.92)	0.9828
Hispanic versus non-Hispanic	1.41 (0.51 to 3.93)	0.5066
Drug use versus no drug use	**0.38** (0.24 to 0.62)	**<0.0001**
Child seat/seat belt versus no protective equipment	**0.21** (0.14 to 0.33)	**<0.0001**
Protective clothing/helmet versus no protective equipment	1.19 (0.21 to 6.89)	0.8471

Bold values denote statistical significance.
ATV, all-terrain vehicle; AUTO, automobile; GCS, Glasgow Coma Scale; MOTO, motorcycle.

Table 5 Model-based adjusted OR (95% CI) based on multivariable logistic regression for discharge status

Variable	OR (95% CI)	P value
Sex female versus male	**0.40** (0.18 to 0.88)	**0.0228**
Paediatric versus Adults	0.78 (0.23 to 2.61)	0.6873
Hispanic versus non-Hispanic	0.64 (0.19 to 2.15)	0.4754
Drug use versus no drug use	2.25 (0.53 to 9.61)	0.2736

Bold values denote statistical significance.

MOTO injuries. Similar results have been found in the literature.[22–24] Additionally, victims of ATV-related injuries had significantly higher odds of sustaining an open fracture compared with patients in the AUTO cohort. Furthermore, data showed no statistical difference in injury severity between the difference mechanisms of injury (ATV vs AUTO vs MOTO) even though ATVs have smaller motors and travel at much slower speeds. There is clear evidence that ATV-related injuries continue to be a significant cause of injuries among paediatric patients.

Unlike AUTOs, ATVs are open-air vehicles that lack a shell of protection to its operator/passenger. This increases the likelihood of sustaining more severe injuries and soft tissue damage even with low-speed injuries and was evidenced by data from this study that showed open fractures in ATV injuries were higher than in AUTO or MOTO cohorts. Most open fractures and soft tissue injuries require multiple interventions to lower the risk of infection and may require several surgical specialties such as plastic surgeons and vascular surgeons to treat the patient. Rehabilitation practices for traumatic brain injury, spine injuries and fractures depend on the injury severity and there exists a potential detrimental impact on daily life activities.[25 26] Therefore, open fractures potentially result in increased risk to patients and could affect patient outcomes.

Equally concerning was the lack of protective equipment, for example, seat belts, child seats and helmets, used by patients in each of the mechanistic cohorts. Only 4% of patients who sustained ATV injuries were wearing a helmet, whereas only about half of MOTO patients were wearing one. Previous studies have reported low use of protective equipment in ATV riders[27 28]; however, the use of protective equipment was exceptionally low in this cohort. The data demonstrated that patients who wore protective equipment had a lower odds of severe injuries, severe Glasgow scores and had a lower rate of hospital LOS. Unmistakably, using protective equipment improves patient outcomes.

Table 6 Model-based adjusted RR (95% CI) based on quasi-Poisson regression for hospital LOS

Variable	RR (95% CI)	P value
Sex female versus male	0.85 (0.69 to 1.05)	0.1405
Paediatric versus adults	**0.53** (0.33 to 0.86)	**0.0096**
Hispanic versus non-Hispanic	0.89 (0.54 to 1.22)	0.3161
Drug use versus no drug use	**3.36** (2.65 to 4.25)	**<0.0001**
Child seat/seat belt versus no protective equipment	**0.43** (0.32 to 0.53)	**<0.0001**

Bold values denote statistical significance.
LOS, length of stay; RR, rate ratio.

LIMITATIONS

There were few deaths reported in the dataset and mortality averages did not follow the previously reported national averages,[29] with the most reasonable explanation for this being a small sample size. The data on prehospital deaths in the region were not able to be obtained, therefore conclusions on mortality were not able to be made. This may have given insight on the mortality rate associated with ATV-related injuries in the region. Other than injury severity, classification of injury using the International Classification of Diseases was not conducted as it was outside the scope of the current study. However, future studies that investigate injury types are likely to give insight on long-term sequelae and disabilities.

CONCLUSIONS

Without enforceable safety standards, the sale and use of four-wheel ATVs or quads remain loosely regulated. As a result, the pattern of increasing injury and death caused by ATVs continues. Public awareness campaigns to educate on ATV-related injuries, particularly in the paediatric population are needed. A concerted effort to highlight the vulnerability of young riders and the importance of protective equipment is a vital step in curtailing ATV-related injuries. With similar injury severity among ATV, MOTO and AUTO injuries, similar regulations and laws regarding the use of protective devices should be imposed. Additionally, reimaging the configuration of ATVs with implementation of antiroll bars, protective shells or seat belts and revisiting the regulation of ATV use could also help reduce the risk of injuries.

Author affiliations
[1]Orthopedic Institute, DHR Health, Edinburg, Texas, USA
[2]School of Mathematical and Statistical Sciences, The University of Texas Rio Grande Valley, Brownsville, Texas, USA
[3]Center of Excellence for Trauma Research in the Border Region, DHR Health Institute for Research and Development, McAllen, Texas, USA
[4]Center for Data Analytics, DHR Health Institute for Research and Development, Edinburg, Texas, USA
[5]Center of Excellence for Trauma Research in the Border Region, DHR Health Institute for Research and Development, Edinburg, Texas, USA

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Competing interests HSE is employed by the Renaissance Medical Foundation, the main group that provides clinical services to DHR Health.

Patient and public involvement Patients and/or the public were not involved in the design, or conduct, or reporting, or dissemination plans of this research.

Patient consent for publication Not applicable.

Ethics approval This study received approval by the DHR Health Institute for Research and Development Institutional Review Board (protocol number 1574841-2 approved on 18 August 2020).

Provenance and peer review Not commissioned; externally peer reviewed.

Data availability statement Data are available upon reasonable request. The data were extracted from a trauma registry at a regional trauma center from 1 January 2015 to 31 August 2020. The deidentified data are available upon reasonable request.

ORCID iDs
Kristina Vatcheva http://orcid.org/0000-0002-7260-2524
Annelyn Torres-Reveron http://orcid.org/0000-0003-0347-5469

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