Growing Pains: Pediatric Trauma Epidemiology at the Puerto Rico Trauma Hospital from 2015 to 2019

Pedro E. Ruiz-Medina (pedro.e.ruiz@gmail.com)
University of Puerto Rico Medical Sciences Campus: Universidad de Puerto Rico Recinto de Ciencias Medicas https://orcid.org/0000-0002-7933-4059

Mariely Nieves-Plaza
University of Puerto Rico Medical Sciences Campus: Universidad de Puerto Rico Recinto de Ciencias Medicas

Laura Ramírez-Martínez
University of Puerto Rico Medical Sciences Campus: Universidad de Puerto Rico Recinto de Ciencias Medicas

Javier Ruiz-Rodríguez
University of Puerto Rico Medical Sciences Campus: Universidad de Puerto Rico Recinto de Ciencias Medicas

Adrianna Rivera-Delgado
University of Puerto Rico Medical Sciences Campus: Universidad de Puerto Rico Recinto de Ciencias Medicas

Ediel O. Ramos-Meléndez
University of Puerto Rico Medical Sciences Campus: Universidad de Puerto Rico Recinto de Ciencias Medicas

Lourdes Guerrios-Rivera
University of Puerto Rico Medical Sciences Campus: Universidad de Puerto Rico Recinto de Ciencias Medicas

Pablo Rodríguez-Ortiz
University of Puerto Rico Medical Sciences Campus: Universidad de Puerto Rico Recinto de Ciencias Medicas

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Original Contribution

Keywords: Trauma, Pediatric, Adolescent, Unintentional Injury, Epidemiology, Public Health

Posted Date: December 29th, 2020

DOI: https://doi.org/10.21203/rs.3.rs-134763/v1

Abstract

Background: Despite the high volume of admissions to the Puerto Rico Trauma Hospital (PRTH), the highest level trauma facility on the Island and the Caribbean, there is no evidence of recent trends related to pediatric trauma. In this study, we aim to describe and compare the epidemiology of pediatric trauma population in Puerto Rico according to age groups.

Methods: An IRB-approved cross-sectional study of 853 pediatric admissions to the PRTH from January 2015 through June 2019. Comparison between age groups (children/adolescent vs. youth) was done using trends of proportions, chi-square for trends, and Pearson's chi-square. Multivariate analysis of factors associated with the youth population was also performed.

Results: The majority of patients were male (n=644, 75.5%). When stratified by age groups, motor vehicle accidents (MVA) were the prevalent mechanism of injury for all age categories but for subjects <5 years of age. The incidence of major trauma, Injury Severity Score >15, was higher in the age group 15-21 years old (40.8%). In trends analysis, the occurrence of trauma was considerably higher among young adults (>15-21 years).

Conclusion: Pediatric and young adults patients were more likely to be male and suffer from a MVA. In addition, among factors associated with injuries among the youth population were penetrating injuries, major trauma, a longer length of stay, and ICU stay. Understanding the specific characteristics of the pediatric population we treat can help guide the treatment and help elucidate their needs in order to improve their outcomes.

Background

Trauma is often considered "a neglected disease of the modern society", as first described in the landmark report by the National Academy of Science back in 1966 (NAS, 1966). Despite no longer being neglected due to an increase in national awareness, up to this date, trauma remains the leading cause of mortality in children over age 1 in the United States (CDC, 2020; Myers et al., 2019; Oliver et al.,2018; Schlegel et al.,2018). On a larger scale, the sequalae of the unintentional injuries including the medical costs and emotional trauma represents an additional burden that extends beyond the financial aspect. The occurrence of trauma has a great impact on disability, potential of life lost and on society as a whole, therefore, it represents a public health problem (Alonso et al., 2017; Schwebel & Gaines, 2007).

Recent year tendencies in the pediatric population show that one in four American children suffers an injury requiring urgent clinical care within a year time span (Naranje et al., 2016). This in turn leads to over 8.7 million hospital visits, with an estimated annual treatment cost of $350 billion (Myers et al., 2019; Oliver et al., 2018). Due to the inherent differences between children and adults, these populations should be evaluated and treated accordingly. The few studies aimed specifically at the pediatric trauma population have found that the age of a child is predictive for risk and type of injury (CDC, 2012;

Cunningham et al., 2018), accentuating the importance of identifying our demographic distribution in Puerto Rico.

According to the United States Census Bureau (2020), the pediatric population, defined as patients under 18 years of age, represents roughly 20% of the total population in Puerto Rico. Nevertheless, on our island, one must be over 21 years old to be considered an adult. Considering this age cutoff, the impact for pediatric trauma would be even higher since at least one-fifth of our population is constituted by this group. Despite the high volume of admissions, there is no evidence of recent trends related to pediatric trauma. In this study, we aim to describe and compare the childhood trauma epidemiology according to age group (pediatric or young adults) in Puerto Rico. The information gathered in this study can help understand the pediatric community and improve the quality of services that we provide to this vulnerable population.

Methods

Study design

We conducted a cross-sectional study of pediatric patients admitted to the Puerto Rico Trauma Hospital (PRTH), the only state-designated Level 1 trauma center in Puerto Rico and the Caribbean. The PRTH provides invaluable services to patients of all ages. The center takes part in the US National Trauma Registry System. The patient's admission and discharge data were collected in a standardized manner from the hospital trauma registry.

Study population

Eight-hundred and fifty-three pediatric patients between the ages of 0 to 21 years followed from January 2015 through July 2019 were included in the present research. Two groups of patients were identified: the children/adolescent group, which consisted of pediatric patients from 0 to 15 years of age (n = 220), and the youth group, comprising pediatric patients between the ages of 16 to 21 years (n = 633).

Variables

Sociodemographic data included: sex, age, health insurance, health region (based on the 8 Puerto Rico Government Health Plan regions), and year of admission. Injury-related data included: the season of the year of the trauma, mode of transport, mechanism of injury, injury type, measures of trauma severity [Injury Severity Score (ISS) and the Glasgow Coma Scale (GCS)], diagnoses, and blood transfusion. We also assessed the Abbreviated Injury Score (AIS) per body region. An AIS ≥ 1was defined as an injury to a body region. We also classified the AIS score according to its three main categories: AIS=0 (none), AIS=1–2 (mild/moderate) and AIS= 3–6 (severe or serious trauma). Hospital outcomes included: hospital length of stay (LOS), intensive care unit (ICU) stay and days, ventilator use and days, and in-hospital mortality.

Statistical Analysis

Descriptive statistics included the mean, standard deviation, median, 25th and 75th percentiles, frequencies, and proportions, as appropriate according to the type of variable (continuous or categorical). Comparison between the groups (children/adolescents and youth) was evaluated with the Wilcoxon rank-sum test for continuous data. Comparison for categorical data included the use of the test of proportions, chi-square for trends, as well as the Pearson's chi-square test.

Multivariate analysis of factors associated with the youth population was done using an unconditional logistic regression model. For each variable included in the model, odds ratio (OR) and 95% confidence interval (CI) were calculated. All variables with a $p < 0.05$ in bivariate analysis were incorporated in the final model.

Statistical significance was set at $p < 0.05$. The statistical software STATA version 13 (STATA Corp, College Station, TX, USA) was employed to perform the analysis. The Institutional Review Board from the Medical Sciences Campus of the University of Puerto Rico approved the present study (B0030514).

Results

During the study period, there were 853 inpatient traumatic injury admissions in the PRTH for pediatric patients aged 0 to 21, distributed as follows: 220 (25.8%) were children/adolescents (≤15 years) and 633 (74.2%) were youth (> 15 years) ($p < 0.01$). Figure 1 shows the admission trends from January 2015 through July 2019; no significant differences were observed for the groups (pediatric: $p = 0.10$, youth: $p = 0.08$). The overall ratio of male to female was 3:1 ($p < 0.01$). The proportion of patients admitted with private health insurance was significantly greater in the younger group (59.1% vs. 49.1%, $p = 0.02$).

The occurrence of injury in children/adolescents was higher during Spring and Summer (29.6% each), while in the youth, injuries occurred more often during Winter (27.0%) and Spring (26.4%) ($p = 0.05$). Motor Vehicle Accident (MVA) injuries were the primary mechanism of injury in both pediatric groups. However, pedestrians and falls were predominant among the children/adolescents group, while the youth group experienced more gunshot wounds (GSW) and stab wound type of injuries ($p < 0.01$). The latter observation highlights the predominance of penetrating injuries among youth as compared to children/adolescents ($p < 0.01$).

ISS > 15 was significantly higher among youth as compared to their younger counterpart (40.8% vs. 24.5%, $p < 0.01$). In general, patients had a baseline GCS ≥ 13 (76.9%); fractures were the most common diagnosis in both pediatric groups (79.7%) ($p > 0.05$). Other demographic and injury-related profile is presented in Table 1.

Table 1
Sociodemographic and injury-related profile between children/adolescents and youth pediatric trauma patients admitted to the Puerto Rico Trauma Hospital (N = 853).

Variable	Total	≤ 15 years (n = 220) n(%)	> 15 years (n = 633) n(%)	p-value
Sociodemographic Data				
Gender				< 0.01
Male	644 (75.5)	144 (65.5)	500 (79.0)	
Female	209 (24.5)	76 (34.5)	133 (21.0)	
Insurance				0.02
Self-pay	45 (5.3)	13 (5.9)	32 (5.1)	
Private	441 (51.7)	130 (59.1)	311 (49.1)	
Public	367 (43.0)	77(35.0)	290 (45.8)	
Health Region (n = 830)				-
West	95 (11.5)	23 (10.6)	72 (11.7)	
North	93 (11.2)	26 (12.0)	67 (10.9)	
Metro North	157 (18.9)	46 (21.3)	111 (18.1)	
San Juan	125 (15.1)	33 (15.3)	92 (15.0)	
Northeast	94 (11.3)	21 (9.7)	73 (11.9)	
Southwest	58 (6.9)	16 (7.4)	42 (6.8)	
Southeast	68 (8.2)	17 (7.9)	51 (8.3)	
East	140 (16.9)	34 (15.8)	106 (17.3)	
Other	13 (1.5)	2 (1.0)	11 (1.7)	
Seasonality				0.05
Spring	232 (27.2)	65 (29.6)	167 (26.4)	
Summer	227 (26.6)	65 (29.6)	162 (25.6)	
Fall	184 (21.6)	51 (23.1)	133 (21.0)	
Winter	210 (24.6)	39 (17.7)	171 (27.0)	
Mode of transport (n = 850)				0.14

MVA: motor vehicle accident, GSW: gunshot wound, ISS: Injury Severity Score, GCS: Glasgow Coma Scale

Variable	Total	≤ 15 years (n = 220) n(%)	> 15 years (n = 633) n(%)	p-value
Ground ambulance	735 (86.5)	183 (83.5)	552 (87.5)	
Air ambulance	102 (12.0)	34 (15.5)	68 (10.8)	
Other	13 (1.5)	2 (1.0)	11 (1.7)	
Injury-Related Data				
Mechanism of injury				< 0.01
MVA	435 (51.0)	83 (37.7)	352 (55.6)	
GSW	177 (20.8)	14 (6.4)	163 (25.7)	
Stab wound	30 (3.5)	4 (1.8)	26 (4.1)	
Pedestrian/Pedal cyclist	81 (9.5)	48 (21.8)	33 (5.2)	
Fall	80 (9.3)	46 (20.9)	34 (5.4)	
Other	50 (5.9)	25 (11.4)	25 (4.0)	
Injury type				< 0.01
Blunt	627 (73.5)	192 (87.3)	435 (68.7)	
Penetrating	214 (25.1)	22 (10.0)	192 (30.3)	
Other	12 (1.4)	6 (2.7)	6 (1.0)	
ISS				< 0.01
1–15	540 (63.4)	166 (75.5)	374 (59.2)	
16–75	312 (36.6)	54 (24.5)	258 (40.8)	
GCS (n = 850)				0.69
3–8	144 (16.9)	41 (18.6)	103 (16.4)	
9–12	52 (6.2)	12 (5.5)	40 (6.4)	
13–15	654 (76.9)	167 (75.9)	487 (77.3)	
Diagnoses				0.14
Fractures	680 (79.7)	168 (76.4)	512 (80.9)	
Open wound	107 (12.5)	36 (16.4)	71 (11.2)	

MVA: motor vehicle accident, GSW: gunshot wound, ISS: Injury Severity Score, GCS: Glasgow Coma Scale

Variable	Total	≤ 15 years (n = 220) n(%)	> 15 years (n = 633) n(%)	p-value
Others	66 (7.8)	16 (7.2)	50 (7.9)	
Blood transfusion				
Yes	75 (8.8)	18 (8.2)	57 (9.0)	0.71
MVA: motor vehicle accident, GSW: gunshot wound, ISS: Injury Severity Score, GCS: Glasgow Coma Scale				

Figure 2 shows the percentage of patients with injures scored 1 or greater by the AIS per body region in the pediatric population. Among the most common sites of injury in both pediatric groups were the extremities, chest, and abdomen; all three being higher in the youth group as compared to the children/adolescents ($p < 0.05$). Youth patients suffered more severe (≥ 3) trauma to the chest (31.8% vs.18.2%, $p < 0.01$) and extremities as compared to their younger counterparts (25.4% vs.14.6%, $p < 0.01$). [data not shown]. There was no statistically significant difference in head/neck, face, and external body regions ($p > 0.05$) [data not shown].

Table 2 shows the trauma outcomes of pediatric patients. The median hospital LOS was higher in the youth than in the children/adolescents (8 days vs. 5 days, $p < 0.01$). Even though more children/adolescents were admitted to ICU ($p < 0.01$), the youth had longer median ICU days (10 vs. 3; $p < 0.01$). No significant differences were observed for ventilator support, mechanical ventilation days, and mortality among the groups ($p > 0.05$).

Table 2
Trauma outcomes of pediatric injuries in the Puerto Rico Trauma Hospital (N = 853).

Variable	Total	≤ 15 years (n = 220) n(%)	> 15 years (n = 633) n(%)	p-value
Hospital LOS, days				< 0.01
Median (p25, p75)	7 (4, 13)	5 (3, 11)	8 (4, 15)	
ICU stay				< 0.01
Yes	245 (28.9)	98 (45.2)	147 (23.3)	
ICU, days **(n = 245)**				< 0.01
Median (p25, p75)	6 (3, 14)	3 (2, 6)	10 (5,17)	
MV				0.13
Yes	244 (28.7)	54 (24.7)	190 (30.1)	
MV, days **(n = 244)**				0.10
Median (p25, p75)	4 (2, 12)	3 (2, 8)	5 (2, 14)	
Mortality				0.88
Yes	64 (7.5)	16 (7.3)	48 (7.6)	

*Data is presented in frequencies and percentages unless otherwise stated. LOS: length of stay, ICU: Intensive Care Unit, MV: mechanical ventilation, p25 or p75: 25th or 75th percentile.

In multivariate analysis, youth trauma patients were more likely to be males (OR: 1.78), suffer a penetrating injury (OR: 4.04), have a major trauma (OR: 3.38), and have a hospital stay ≥ 7 days (OR: 3.06). Conversely, they were 85% less likely to be admitted to the ICU (OR: 0.15) as compared to their younger counterparts (see Table 3). Interestingly, the odds of injury in the youth patients given the presence of public health insurance was not significant once adjusted.

Table 3
Factors associated with injuries among the youth population in the Puerto Rico Trauma Hospital (N = 848).

Variable	Univariate OR (95% CI)	Multivariate OR (95% CI)
Male	1.98 (1.42, 2.78)	1.78 (1.21, 2.62)
Public health insurance	1.57 (1.14, 2.16)	1.05 (0.72, 1.52)
Penetrating injury	3.85 (2.40, 6.18)	4.04 (2.38, 6.85)
Major trauma (ISS 16–75)	2.12 (1.50, 3.00)	3.38 (2.23, 5.15)
Hospital LOS ≥ 7 days	1.83 (1.34, 2.49)	3.06 (2.04, 4.59)
ICU stay	0.37 (0.27, 0.51)	0.15 (0.10, 0.24)

OR: Odds Ratio, CI: confidence interval, ISS: Injury Severity Score, LOS: length of stay, ICU: Intensive Care Unit

Discussion

Despite the dawn of technology and an increase in public awareness, trauma and injury continue to be common in children and remain an important cause of morbidity and mortality (Holland & Soundappan; 2017). As evidenced in this study, children and young adults are not immune to injury. Our results show that the age of a child poses a higher risk for a particular type and mechanism of injury along with variance in trauma-related outcomes. While both groups have innate qualities that make them heterogenous, the analysis focused on describing and comparing both groups. As a result, we found that the older pediatric trauma population was more likely to be male, suffer a major trauma and spend more days at the hospital compared to their younger counterparts. Of note, in terms of admission trends, there was no significant differences between both groups throughout the study period. Through the years we have seen a decline in deaths from infectious disease and cancer, mainly due to the advantage of performing earlier diagnosis, the advent of immunizations, antibiotics, medical and surgical treatment. All this has given way to increases in deaths from injury-related causes, including motor vehicle crashes, and firearm injuries, among others (Cunningham et al., 2018).

Age, as well as other factors such as gender, behavioral pattern, and environment influence childhood injuries (Lalwani et al., 2018). In our study, we defined children as those who fall under the age of 15 years, the same cutoff used by the American College of Surgeons Committee on Trauma, and we decided to include a second group of patients until the age of 21 years, since in our country, those patients would be treated in a pediatric institution based on their age. Our results showed that the predominant gender affected by trauma out of all patients were males, for both the children/adolescent and youth/young adult group. As seen in previous studies, gender itself is a risk factor for the occurrence of trauma (Alonso et al., 2017; Aoki et al., 2019; Cunningham et al., 2018; Jalalvandi et al., 2015; Lalwani et al., 2018). In our

study, the male population presented more often to the hospital due to trauma, this could be because boys are generally considered physically more active and more prone to aggressive behavior than girls, and show more interest in competitive and physical activities (Alonso et al., 2017; Cunningham et al, 2018; Schwebel & Gaines, 2007).

Injuries were classified according to the underlying mechanism (e.g., MVA, GSW, falls) in order to understand the possible associated risk and protective factors, which would allow for the development of effective prevention strategies in the future. For both groups, MVA was the predominant mechanism of injury, similar to other pediatric studies (Avarello & Cantor, 2007; Avraham et al., 2019, Cunningham et al., 2018, Merrick et al., 2004, Oliver et al., 2018). Despite the interplay between technological improvements in safety, legislative initiatives and improved injury care, and an apparent decline in the incidence of such trauma from other studies (Cunningham et al., 2018), the fact is that MVA remains the prevalent mechanism of injury in this population regardless of age (Avraham et al., 2019; Cunningham et al., 2018; Oliver et al., 2018).

While MVA remain the most important cause of pediatric trauma, assaults, including GSWs, was the second most common mechanism of severe injury in 15-to-21-year-olds. These results are consistent with prior studies (Bayouth et al., 2019; Oliver et al., 2018) and highlight an important public health challenge (Oliver et al., 2018). Older children are more likely to engage in more dangerous activities compared to their younger counterparts, as they are less likely to be dependent on their parents, more likely to engage in risk-taking behaviors and be driven by peer-pressure, which would explain the difference in the type of trauma (Bayouth et al., 2019; Schwebel &Gaines, 2007). Some studies have associated the socioeconomic status as a direct risk factor for this specific type of injury mechanism (Bayouth et al., 2019), however, socioeconomic factors seem to be a risk factor no matter the type of injury (Fallat et al., 2006; Schecter et al., 2012; Schwebel &Gaines, 2007). In our study, most patients had private health insurance, consonant with findings by the US Census Bureau (2020). Nonetheless, traditionally low socioeconomic status has been correlated with a higher rate of injury among children (Fallat et al., 2006; Marcin et al., 2003; Merrick et al., 2004).

For the children/adolescent group, the second most common mechanism of injury included pedestrians and falls (Oliver et al., 2018). Pediatric falls are frequently seen among young children and can cause injuries requiring hospitalization (Chaudhary et al., 2018). As a child ages, their mobility naturally increases, from being able to roll over, to sitting up, pulling to a standing position to eventually walking, running, and climbing. As expected, the children/adolescent group had a higher percentage of falls-related trauma. Regardless of the mechanism of injury, the most common site of injury for both pediatric groups were the extremities. This was closely followed by the chest and abdominal region as seen in Fig. 2. Not many studies, specifically in children, take into consideration which body part was the most injured, however, those that do are usually studies that focus on fractures. Out of all the body parts mentioned in such studies, the extremities were the most common site of injury as well (Naranje et al., 2016; Oliver et al., 2018).

For injury severity, clinical profile, and trauma outcomes, we analyzed different sets of variables, including the ISS, LOS, ICU stay, the need for mechanical ventilation, and mortality. The ISS is known as a surrogate for morbidity and mortality. In our study, most patients presented with a low ISS (< 15), comparable to other studies in the literature (Guice et al, 2010; Nesje et al., 2019). However, if we compared both study groups, we see that the proportion of patients with a high ISS > 15 was substantially larger in the youth group compared to the pediatric group. If we take a closer look at the severely injured group (ISS > 15; those who are more likely to suffer greater morbidity, mortality, and longer hospitalization), this group represents roughly 36% of all patients. In a study in Germany, their severely injured group totaled 32%, which is in the same range as our patient group (Schoeneberg et al., 2014).

One aspect to consider during trauma admissions is the LOS, for which we found that the younger adult cohort, spent more days on average compared to the children cohort. In previous studies, LOS could be as low as 2 days and as high as 7 (Nesje et al., 2019; Oliver et al., 2018). When combined, the median for all our pediatric patients was 7 days. The LOS can have a serious economic impact on both the health care system and the patients' family, however we are not able to address this, but this an area of future research interest. this aspect was not analyzed in our study. It was interesting to notice that, even though more children were admitted to the ICU, it was the older cohort who spent more days in it (3 vs. 10; $p < 0.01$). It makes sense considering that the youth presented with a higher ISS than the pediatric group. However, despite this stark difference, the use of mechanical ventilation, while higher for the young adults, it was not statistically different than the children group. Likewise, mortality was similar for both groups, with 7.5% on average. In recent literature, the mortality for the pediatric group was found to be as low as 0.9% and as high as 25% depending on the setting of treatment, injury mechanism, the pediatric age cutoff used for their study, among other aspects (Aoki et al., 2019; Jalalvandi et al., 2015; Myers et al., 2019; Schlegel et al.,2018). The risk factors associated with mortality can be both direct (e.g., injury mechanism) and indirect (e.g., lack of health insurance) (Avraham et al., 2016). In our multivariate analysis, the youth trauma population was more likely to be male, suffer major trauma, a penetrating injury, and have a longer hospital stay. All the aforementioned parameters, known risk factors for trauma in previous studies as stated above. Surprisingly, the presence of public health insurance, usually associated with low socioeconomic status and therefore a higher occurrence of trauma, lost its significance once adjusted in our study.

There are several limitations to our study. First, although the study used a cross-sectional design, the study relies on registry-based data that uses medical record information as the source of information. This inherently restrict our data to the information available on the patient's record. As with any other registry, patient's documentation may vary affecting the available information for each case entered. Second, this is a single-center study, which may impact the applicability to other centers and populations. However, the PRTH is the only state-designated Level 1 trauma center in Puerto Rico and the Caribbean. The Trauma Registry does not keep track of patients transferred to the nearest pediatric institution once stabilized. Once they are transferred, the information regarding the overall outcome and associated variables are not available to our registry, and thus, not included in the scope of our study.

Given that the PRTH is the only Level 1 Trauma Center, this guarantees that all patients with high ISS or those included in the severely injured category will be treated at our hospital, which translates to adequate representation in our study. However, those patients that fall below the ISS for the category of severely injured may arrive at our PRTH or at another pediatric institution, which may affect the number of cases and the overall incidence of this group of patients in our study. Future research should evaluate multiple pediatric centers, specifically, the trauma encounters at the ER, and include patient follow-up data. This should also include, if available, the intent of injury which is an important aspect in this population as many different types of abuse are disguised as “accidents”. Notwithstanding these constraints, every effort has been made to faithfully represent the scope of the pediatric admissions to the PRTH.

Despite these limitations, the study has some strengths. First, the cross-sectional design allowed the study of multiple parameters associated to age, providing a general knowledge of the potential risk factors that may play an important role in the demographics of pediatric trauma admissions. In addition, since we made use of regression models, the control of confounding was possible having a better estimate of the risk factors studied.

Conclusion

Our study is the first to characterize the epidemiology of pediatric trauma in the principal trauma institution of Puerto Rico. The importance and strength of this study rely on the fact that it is the first study to showcase the different mechanisms of injuries along with demographics of an underserved population, both as Puerto Ricans and as a pediatric group.

Evidenced in this study is the fact that age and gender are important parameters for pediatric trauma. Particularly, if we take a closer look at the older population in our study, we see that they were more likely to be male, suffer a major trauma, and have a prolonged hospital stay. But why does it matter what we expect to happen with this population? The importance of our study relies on the fact that understanding the mechanisms of childhood injury along with its associated factors is paramount in planning response protocols, especially because our trauma center is not a dedicated pediatric center. Trauma overall is a preventable “disease”. We must equip ourselves with all the necessary knowledge to better serve this population. It is our commitment to use this information to become advocates and create better prevention strategies to improve child safety, which have been proven to be effective in the past. It is by recognizing what to expect, that we can prevent, treat, and hopefully create a lasting impact on the future of our society, the children.

Abbreviations

PRTH= Puerto Rico Trauma Hospital

ISS= Injury Severity Score

GCS= Glasgow Coma Scale

AIS= Abbreviated Injury Score

LOS= Length of stay in day units

ICU= Intensive Care Unit

OR= Odds Ratio

CI= Confidence Interval

MVA= Motor Vehicle Accidents

GSW= Gunshot wounds

MV= Mechanical Ventilation

Declarations

Ethics approval and consent to participate

This study was approved by the Human Research Subjects Protection Office – University of Puerto Rico, Medical Sciences Campus, Institutional Review Board.

Consent for publication

Not applicable.

Availability of data and materials

The dataset that supports the findings of this study is available from the Puerto Rico Trauma Hospital Data Registry but restrictions apply to its availability. Data is however available from the authors upon reasonable request and with permission of the Puerto Rico Trauma Hospital.

Competing interests

The authors declare that they have no competing interests.

Funding

This work was supported by the Trauma Research Program funds. This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Authors' contributions

PRM contributed to the study concept and design, and was the major contributor in writing the manuscript. MNP contributed with the methodology, statistical analysis, interpretation of data and wrote portions of the manuscript. LRM, JRR and ARD contributed in writing portions of the manuscript. ERM and LGR contributed to the study conceptualization and manuscript editions. PRO supervised the study and manuscript review. All authors read and approved the final manuscript.

Acknowledgements

Not applicable.

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Figures

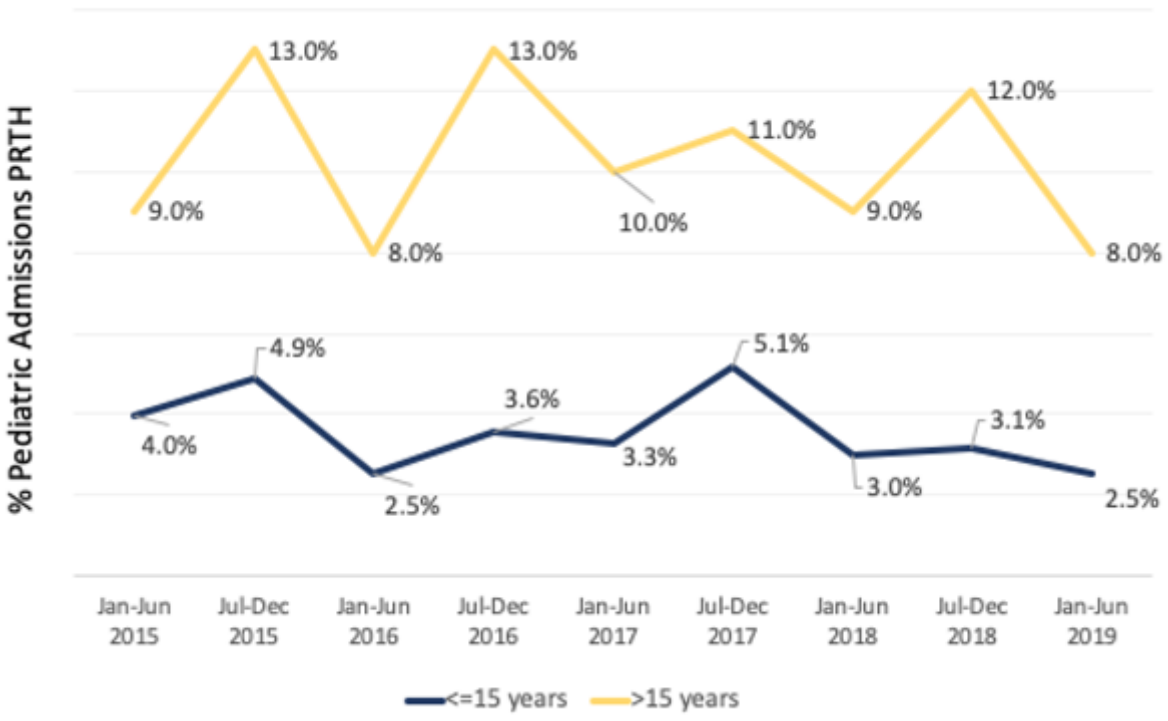

Figure 1

Pediatric admissions trends 2015 – 2019, N=853

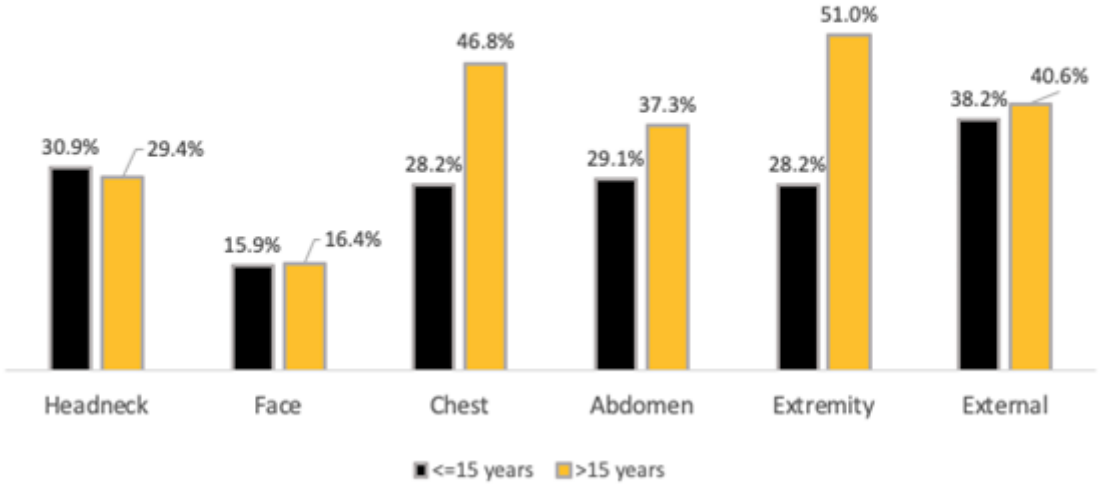

Figure 2

Percentage of patients with injures scored 1 or greater by the AIS per body region