

**Critical Review Form  
Prognosis**

[Choi PM, Hong C, Bansal S, Lumba-Brown A, Fitzpatrick CM, Keller MS. Firearm injuries in the pediatric population: A tale of one city. J Trauma Acute Care Surg. 2016 Jan;80\(1\):64-9.](#)

**Objectives:** “to examine the recent epidemiology of pediatric firearm injuries managed at our institutions to identify areas for improved outreach and future interventions.” (p. 64)

**Methods:** This retrospective, observational chart review evaluated children age 16 or younger treated following firearm injuries (power and non-powder) over a 5-year period from April 1, 2008 to March 31, 2013, at either St. Louis Children’s Hospital or Cardinal Glennon Children’s Medical Center, the only two level 1 pediatric trauma centers in St. Louis, MO. Following data abstraction from electronic medical records and the trauma registry, the circumstances of shooting were determined based on report of intention to harm versus accidental (based on patient report and social work interviews).

A total of 398 children younger than 16 who were treated for firearm injuries were identified at the two centers. The median age was 15 years and the majority were male (82.4%) and black (78.9%).

Guide		Comments
<b>I.</b>	<b>Are the results valid?</b>	
A.	<p><b>Was the sample of patients representative?</b> <i>In other words, how were subjects selected and did they pass through some sort of “filtering” system which could bias your results based on a non-representative sample. Also, were objective criteria used to diagnose the patients with the disorder?</i></p>	<p>Yes. All patients 16 years of age or younger presenting to the only 2 level 1 pediatric trauma centers following a firearm injury were included. Patients over 16 years of age were excluded based on state trauma recommendations. Patients were included regardless of the severity of the injury or the associated outcome.</p> <p>Only patients presenting to the two level 1 trauma centers in St. Louis were included. It is possible that some patients with minor injuries were not treated at other hospitals and were not transferred. Additionally, patients who died before making it to the hospital may not have been included.</p>
B.	<p><b>Were the patients sufficiently homogeneous with respect to prognostic risk?</b></p>	<p>Yes. While this study included a fairly broad range of injury severity (theoretically ranging from graze injuries to immediate life-threatening penetrating head and torso injuries), given the nature of the information</p>

	<i>In other words, did all patients share a similar risk from during the study period or was one group expected to begin with a higher morbidity or mortality risk?</i>	<p>being collected, this degree of heterogeneity seems reasonable.</p> <p>The inclusion of both powder and nonpowder (i.e. BB guns and air guns) firearms does introduce significant heterogeneity, as nonpowder firearm injuries are more likely to be accidental in nature and tend to result in far less severe injuries (<a href="#">Freeman 2017</a>). The authors did perform separate analyses for these injuries to account for these differences.</p>
C.	<p><b>Was follow-up sufficiently complete?</b></p> <p><i>In other words, were the investigators able to follow-up on subjects as planned or were a significant number lost to follow-up?</i></p>	<p>Yes. In theory, all pediatric GSWs should have been captured via this chart review; while it possible that some GSW victims did not report to an ED during the study period, this would likely represent very few (if any) cases. All patients who presented would have follow-up information up until discharge. Delayed outcomes, such as death due to complications of GSW that occurred after hospital discharge, would theoretically have been missed, but this seems beyond the scope of this article.</p>
D.	<p><b>Were objective and unbiased outcome criteria used?</b></p> <p>Investigators should clearly specify and define their target outcomes before the study and whenever possible they should base their criteria on objective measures.</p>	<p>The authors did not report they primary outcome measures at any time during the article. The outcomes they do report (mortality, disposition, location of injury) are objective and unbiased. The circumstance of the shooting (intentional or accidental) could be subject to some bias.</p>
<b>II.</b>	<b>What are the results?</b>	
A.	<p><b>How likely are the outcomes over time?</b></p> <p><i>For the defined follow-up period, how likely were subjects to have the outcome of interest.</i></p>	<p>For the entire cohort:</p> <ul style="list-style-type: none"> <li>• Overall mortality was 5% <ul style="list-style-type: none"> <li>○ Among 20 patients who died, the median age was 15 and 65% were black.</li> <li>○ Eleven of these patients (55%) died in the ED.</li> <li>○ Nearly one third (31.2%) of shootings were reported to be accidental.</li> <li>○ Over half of injuries (52.6%) occurred during the 6 hours between 6 PM and midnight.</li> <li>○ Approximately two-thirds of patients (67.6%) were between the ages of 14 and 16 years old.</li> <li>○ While there was a decline in the number of total GSWs over the study period, the number of accidental shootings and deaths remained fairly constant.</li> </ul> </li> </ul>

		<p>Among the 98.7% of patients with the geographic location of injury noted:</p> <ul style="list-style-type: none"> <li>• More than a third (38.9%) of shootings occurred in the patient's home.</li> <li>• A disproportionate number of shootings occurred in St. Louis City proper and north St. Louis County.</li> <li>• Among 5 zip codes where more than 20 shootings occurred, the median household income was \$24,861.</li> </ul> <p>Among the 124 patients suffering an accidental shooting:</p> <ul style="list-style-type: none"> <li>• The median age was 12.5 years, significantly younger than in the overall cohort.</li> <li>• The majority were male (84.7%) and 52.4% were black (compared with 90.9% of assaulted patients).</li> <li>• The vast majority of cases (74.2%) occurred in the patient's home.</li> </ul>
B.	<p><b>How precise are the estimates of likelihood?</b> <i>In other words, what are the confidence intervals for the given outcome likelihoods?</i></p>	<p>Unsure, as 95% confidence intervals were not provided and could not be calculated for most of these data based on the information provided.</p>
III.	<p><b>How can I apply the results to patient care?</b></p>	
A.	<p><b>Were the study patients and their management similar to those in my practice?</b></p>	<p>Mostly yes. This study was conducted here in St. Louis at both SLCH and Cardinal Glennon, and these results are completely applicable at these institutions. This study was conducted several years ago (2008 to 2013) and there have been some advances in the management of GSWs. Additional, <a href="#">risers in mass shootings</a> and <a href="#">school shootings</a> over time may also change the current epidemiology of pediatric GSWs nationally and at a local level.</p>
B.	<p><b>Was the follow-up sufficiently long?</b></p>	<p>Yes. The scope of this study was to assess the incidence of GSW among the pediatric population in St. Louis, and the epidemiology of these injuries. Long-term complications and cost were not addressed.</p>
C.	<p><b>Can I use the results in the management of patients in my practice?</b></p>	<p>No. While this study helps place the scope of the problem of pediatric gunshot wounds into perspective, it does not help address potential solutions to this problem, particularly from the physician perspective.</p>

**Limitations:**

1. Chart review methods (including who performed the chart review and how data was collected) were not provided ([Gilbert 1996](#) and [Worster 2004](#)).
2. No [primary outcome](#) or outcomes were identified in this study.
3. No [confidence intervals](#) were provided for the outcomes leaving no way to assess the precision of the results..
4. This study was conducted from 2008 to 2013. National trends in firearm violence (including [rises in mass shootings](#) and [school shootings](#)) may affect the epidemiology of pediatric firearm violence in our area.

**Bottom Line:**

This retrospective chart review of patients suffering GSW at the only two level 1 pediatric trauma centers in St. Louis identified a cohort of 398 patients over 5 years. There was fairly clear trend in increased risk among lower socioeconomic groups and significant disproportion of black children involved. Overall mortality was fairly low at 5%.