

Geospatial Analysis of Pediatric Gunshot Wounds Presenting to a Level I Trauma Center in New Orleans

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Importance: Firearm injuries are the 3rd most common cause of premature death in children. Louisiana's rate of child firearm mortality ranks 2nd in the nation. Successive mayoral administrations in New Orleans have recognized that a data-driven approach is critical to produce generational changes in the epidemic of gun violence. As funding for firearm injury initiatives is often limited, targeting interventions in high prevalence areas for firearms associated injury may be needed to maximize potential benefits.

Objective: To perform geospatial analysis of gunshot wound (GSW) incidents resulting in pediatric victims presenting to University Medical Center New Orleans (UMCNO), the only Level I Trauma Center in New Orleans. This analysis can guide future firearm injury prevention efforts.

Methods: All pediatric (ages 0-18) GSW victims from incidents in Orleans Parish that met trauma activation criteria between January 1, 2015 and October 1, 2019 at UMCNO were reviewed. EMS incident response locations were abstracted and geocoded by obtaining the latitude, longitude, and Federal Information Process Standards codes. These coordinates were used to analyze spatial correlation and identify geographic clusters.

Results: 173 pediatric GSWs occurred in Orleans Parish that met trauma activation criteria at UMCNO. 51 did not have EMS records available or were transferred from other hospitals. Another 19 were unable to be geocoded due to incomplete records. 103 pediatric GSW were geocoded and plotted by 2010 US census tracts. Using Ripley's K function, 999 simulations were conducted; comparison of the envelopes of theoretical K-functions to the observed K-function from actual GSWs that occurred in New Orleans demonstrated non-random clustering of incidents. The Diggle-Cressie-Loosmore-Ford test statistic was used to assess complete spatial randomness, and also showed pediatric GSWs occurred at non-random locations with statistical significance ($p < 0.001$). Moran's I coefficient showed census tracts with higher number of GSWs were likely to be closer to other census tracts with high numbers of GSW events ($p < 0.05$). Five clusters were identified that may serve as geographic targets for future prevention and risk reduction efforts.

Conclusion: In the 46-month study period, pediatric GSWs were non-randomly and statistically significantly clustered within spatial tracts, despite a limited sample size. Five clusters of high incidence were identified, serving as high-yield future targets for firearm prevention efforts.