Gunshot Wounds to the Head in Urban South Florida: Novel Epidemiologic Insight

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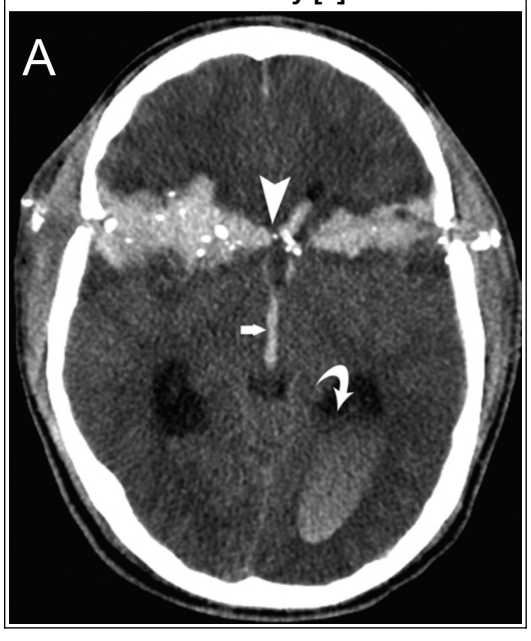
Introduction

- Rising levels of gun violence highlight its great morbidity and mortality, with a particularly poor prognosis from gunshot wounds to the head (GSWH).
- Annually, GSWH claims over 32,000 lives of the 62,000 victims of firearm related injuries.[1] Blunt head injuries are more common than penetrating injuries, yet penetrating traumatic brain injury (pTBI) account for thirty-five percent of trauma-related deaths.[2]
- We hypothesized GSWH would have a non-random geographic distribution associated with lower socioeconomic status (SES) and increased percent of residents living below the poverty line.

Figure 1. GSWH cause significant morbidity.[3]



Methods:

- Retrospective analysis of all GSWH patients presenting to Ryder Trauma Center and the Miami-Dade Medical Examiner 2013-2015.

Figure 2. All GSWH presenting over the 2-year study period.

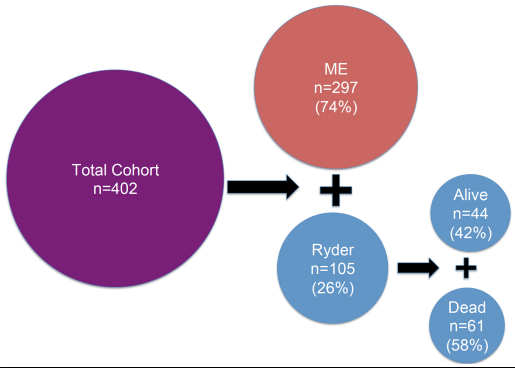


Table 1. Location of presentation was significantly associated with age, race, etiology, and the number of GSW of injury.

	Total, n (%)	Ryder Trauma, n (%)	Medical Examiner, n (%)	p-value
Age (mean ± SD)	41.9 ± 20.6	31.4 ± 17	45.6 ± 20.5	p<.0001
Gender				
Male	347 (86.3)	96 (91.4)	251 (84.5)	
Female	54 (13.4)	9 (8.6)	45 (15.2)	
Race/Ethnicity				p<.0001
African American	165 (41.0)	67 (63.8)	98 (33.0)	
Caucasian	204 (50.7)	31 (29.5)	173 (58.2)	
Hispanic	84 (20.9)	22 (21.0)	62 (20.9)	
Other	7 (1.7)	4 (3.8)	3 (1.0)	
Injury Etiology				p<.0001
Suicide	192 (47.8)	14 (13.3)	178 (60.0)	
Homicide/Assault	191 (47.5)	72 (68.6)	119 (40.1)	
Accident	9 (2.2)	9 (8.6)	0 (0.0)	
# GSW				p=.0049
Single	275 (68.4)	60 (14.9)	215 (53.5)	
Multiple	127 (31.6)	45 (11.2)	82 (20.4)	

Results

- 402 patients (297 ME, 105 Ryder) with GSWH from 2013-2015 yielded an annual prevalence of 7.4 cases/100,000 population.
- Patients were predominantly male (86.3%) Caucasian (50.7%), suicide victims (47.8%), with mean age of 42 years. Ryder patients were commonly assault victims (69%), with more suicides at the ME (60%; p<0.0001). African-Americans (64%) more commonly presented to Ryder and Caucasians (58%) to the ME (p<0.0001). Patients were significantly younger at Ryder vs. ME (mean 31 vs. 46 years, p<0.0001).

Figure 3. GSWH have high mortality.

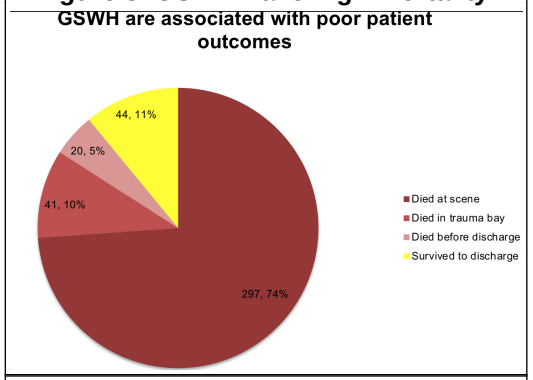
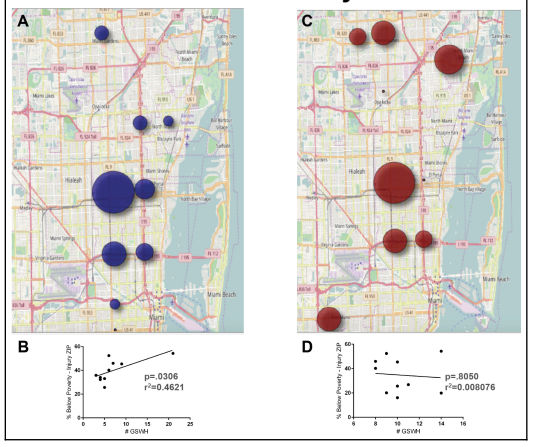


Figure 4. Injury location is correlated with SES status in the Ryder cohort.



Results (continued)

- While the overall case fatality rate was 89%, Ryder mortality was 58%, and 42% for those surviving to obtain CT.
- Among the Ryder cohort, the number of GSWH occurring in a given zip code (p=.0306, r2=.4621) and victims' zip code of residence (p=.0014, r2=.7395) were significantly correlated with percent of population living below the poverty line.

Conclusions

- This is the first study linking GSWH and SES, and the first to provide the complete patient spectrum by combining ME and hospital data.
- Our longitudinal analyses of GSWH closely mirrored the MDC incidence of firearm murders.
- Ryder is more likely to receive cases of young African American males involved in assaults, significantly correlated with low SES regions, while attempted suicide with GSWH more frequently presents to the ME.
- Identifying the GSWH "hot spots" may allow for targeted gun violence interventions.

Learning Objectives

- Urban trauma centers may be more likely to receive cases of younger African American males from low SES regions involved in assaults, while corresponding Medical Examiner cases are more likely to be older Caucasian male victims of suicide.
- While the violent crime rate in Miami has decreased, the corresponding use of firearms and resulting GSWH has recently increased.
- Despite the high initial mortality of GSWH, there remains a window of opportunity for neurosurgical intervention and patient survival.

References

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