



Examining Violence Against Women at a Regional Level I Trauma Center During the COVID-19 Pandemic

The American Surgeon
2022, Vol. 88(3) 404–408
© The Author(s) 2021
Article reuse guidelines:
sagepub.com/journals-permissions
DOI: 10.1177/00031348211047467
journals.sagepub.com/home/asu


Brett M. Tracy, MD¹ , Amy K. Whitson, MD¹, JC Chen, MD¹, Brian D. Weiss, MD¹, and Carrie A. Sims, MD, PhD¹

Abstract

Introduction: There is a growing concern that certain public health restrictions imposed to prevent the spread of coronavirus disease 2019 (COVID-19) could result in more violence against women (VAW). We sought to determine if the rates and types of VAW changed during the COVID-19 pandemic at our level I trauma center (LITC).

Methods: We performed a retrospective review of female patients who presented to our LITC because of violence from 2019 through 2020. Patients were grouped into a pre-COVID or COVID period. The primary aim of this study was to compare rates of VAW between groups. Secondary aims sought to evaluate for any difference in traumatic mechanism between periods and to determine if a temporal relationship existed between COVID-19 and VAW rates.

Results: There was no difference in rates of VAW between the pre-COVID and COVID period (3.1% vs 3.6%, $P = .6$); however, rates of penetrating trauma were greater during the COVID period (38.2% vs 10.3%, $P = .01$). After controlling for patient age and race, the odds of penetrating trauma increased during the pandemic (OR 5.8, 95% CI 1.6–28.5, $P < .01$). From February 2020 through October 2020, there was a direct relationship between rates of COVID-19 and VAW ($r = .78$, $P < .01$).

Conclusion: Rates of VAW were unchanged between the pre-COVID and COVID periods, yet the odds of penetrating VAW were 5 times greater during the pandemic. Moving forward, trauma surgeons must remain vigilant for signs of violence and ensure that support services are available during future crises.

Keywords

Coronavirus disease 2019, violence against women, intimate partner violence, trauma center

Key Takeaways

- Rates of violence against women (VAW) during the COVID-19 pandemic were similar to the pre-pandemic period.
- The odds of penetrating trauma as a mechanism of VAW were more than 5 times greater during the pandemic.
- A direct relationship exists between rates of COVID-19 infection and cases of VAW at our regional trauma center.

spread of the virus, large gatherings were prohibited, movement restrictions were imposed, schools and businesses were closed, and shelter-in-place orders were instituted.^{2–4} Despite these efforts, the number of COVID-19 cases in the United States reached 2 million by the beginning of June.¹

While the infection blazed through the country, jobs were lost, access to basic services became limited, and social support networks evanesced.^{5–7} The interplay of these issues can exacerbate physical aggression and

Introduction

The coronavirus disease 2019 (COVID-19) pandemic drastically altered the lives of nearly all individuals in the United States. In early February 2020, COVID-19 was considered a public health emergency and by mid-March it had been declared a national emergency.¹ To quell the

¹Division of Trauma, Critical Care, Burn, The Ohio State University Wexner Medical Center, Columbus, OH, USA

Corresponding Author:

Brett M. Tracy, MD, Division of Trauma, Critical Care, Burn, The Ohio State University Wexner Medical Center, 395 West 12th Avenue, Columbus, OH 43210, USA.
Email: brett.tracy@osumc.edu

violence, particularly against socially vulnerable populations.⁵ Women are considered one of these groups and large-scale disasters can further increase their susceptibility to gender-based violence. Violence against women (VAW) is a type of gender-based violence that includes any harmful act inflicting physical, sexual, or mental harm against women.³ Intimate partner violence (IPV), a specific form of VAW, occurs when the violence is perpetrated by someone who is, was, or wishes to be in an intimate relationship with the victim.^{5,6} In the United States, the incidence of IPV is exceedingly high with 1 in 4 women experiencing IPV in their lifetime.^{7,8}

Unfortunately, the pandemic strained the existing infrastructure for IPV support (ie, social services, shelters, and law enforcement).^{3,9,10} Efforts to curtail viral spread also inadvertently confined women to their homes, leaving them without a place for escape.^{5,10,11} As such, the emergency department (ED) or trauma bay may be the first and only place to find safety. Accordingly, the purpose of this study was to determine if rates of VAW who presented to our level 1 trauma center (L1TC) was impacted by the COVID-19 pandemic. We hypothesized that there would be an increase in VAW after COVID-19 was deemed a public health emergency in the United States.

Methods

We performed a retrospective review of female patients who presented to our L1TC due to violence from 2019 to 2020. Patients aged <18 years were excluded. We divided the cohort based on whether a patient presented before or after February 2020, which is when COVID-19 was declared a public health emergency in the United States.¹ Patients presenting between March 2019 and January 2020 comprised the pre-COVID group, whereas patients presenting between February 2020 and December 2020 comprised the COVID group. These time intervals were chosen to ensure equipoise between groups. This study was reviewed by our institutional review board and consent was waived.

Data Points and Study Aims

We collected data on patient age, race, traumatic mechanism (blunt or penetrating), and Injury Severity Score (ISS). Types of penetrating trauma included firearms and stabbings; types of blunt trauma included sexual assault and physical assault not involving a weapon (ie, punching, kicking, choking, and shoving). The primary aim of this study was to compare rates of VAW between the 2 groups. Secondary aims were (1) to evaluate for any change in type of traumatic mechanism between periods and (2) to determine if a temporal relationship existed between regional COVID-19 infection rates and cases of VAW during the COVID period. To assess for this relationship,

we specifically examined 2 time intervals: February 2020 through December 2020 (COVID period) as well as February 2020 through October 2020 (when the COVID-19 infection rate peaked in our state).¹² Rates of COVID-19 cases were obtained from our state's Department of Health website.¹³

Statistical Analyses

Continuous data were compared between groups using Wilcoxon rank sums tests and are presented as medians (interquartile range). Categorical data were compared with Pearson χ^2 tests or Fisher's exact tests when appropriate and are presented as n (percentage). A *P*-value less than .05 was considered statistically significant. If a significant difference was detected in rates of VAW or injury mechanism, multivariable logistic regression was used to identify if COVID-19 was a risk factor. Patient age and race were chosen a priori as confounders for the regression model.

Bivariate linear regression was used to discern if there was a temporal relationship between COVID-19 and VAW. A Pearson correlation coefficient (*r*) was used to identify the magnitude and direction of the association. The coefficient of determination (*r*²) was used to determine the proportion of variance in one variable that is accounted for by the other. Data analyses were performed with JMP Pro software, version 15.1 of the SAS System for Windows (Copyright 2019 SAS Institute Inc., SAS Campus Drive, Cary, North Carolina).

Results

During the 22-month study duration, 3.4% of patients (n = 63/1879) presented to our L1TC because of VAW. There was no difference in rates of VAW during the pre-COVID (3.1%, n = 29/932) and COVID period (3.6%, n = 34/947) (*P* = .6). Most of the cohort was physically assaulted without a weapon (71.4%, n = 45); 15.9% (n = 10) were injured by a firearm, 9.5% (n = 6) were stabbed, and 3.2% (n = 2) were survivors of sexual assault. There was no significant difference in patient age, race, or ISS between groups (Table 1). However, rates of penetrating trauma were greater during the COVID period (38.2% vs 10.3%, *P* = .01). After controlling for patient age and race, the odds of penetrating trauma increased during the COVID period compared to the pre-COVID period (OR 5.8, 95% CI 1.6-28.5, *P* < .01) (Table 2).

There was no correlation between the monthly number of COVID-19 cases in our county and the monthly number of VAW cases from February 2020 through December 2020 (*r* = .09, *r*² = .01, *P* = .8). However, Figure 1 shows that when restricting the analysis to February 2020 through October 2020, there was a strong and significant relationship between the rates (*r* = .88, *r*² = .78, *P* < .01).

Table 1. Patient Details Stratified by Study Period (N = 63).

| Variable | Pre-COVID n = 29 | COVID n = 34 | P |
|------------------------|------------------|--------------------|-----|
| Age, y | 35 (24.5 - 44) | 33.5 (24.8 - 40.3) | .9 |
| Race | | | |
| Black | 11 (32.4) | 11 (37.9) | .7 |
| White | 17 (58.8) | 20 (58.5) | |
| Other | 1 (8.8) | 3 (8.6) | |
| Mechanism, penetrating | 3 (10.3) | 13 (38.2) | .01 |
| Firearm | 2 (6.9) | 8 (23.5) | - |
| Stab | 1 (3.4) | 5 (14.7) | - |
| Mechanism, blunt | 26 (89.7) | 21 (61.8) | .01 |
| Non-weapon assault | 25 (86.2) | 20 (58.8) | - |
| Sexual assault | 1 (3.5) | 1 (2.9) | - |
| Injury Severity Score | 4 (1 - 5.5) | 5 (1 - 8.3) | .3 |

Table 2. Multivariable Logistic Regression to Predict Penetrating Trauma.

| Variable | Odds ratio (95% CI) | P |
|-----------------------------|---------------------|------|
| Age | .99 (.95 - 1.01) | .9 |
| COVID period [vs pre-COVID] | 5.8 (1.6 - 28.5) | <.01 |
| White [vs black] | .5 (.1 - 2) | .3 |
| White [vs other] | 1.1 (.1 - 26.4) | .9 |

Discussion

At our LITC, rates of VAW remained constant throughout the pre-COVID and COVID periods. Several contemporaneous studies examining the effects of the pandemic have demonstrated similar results. For example, Shepherd et al observed that after the initiation of the lockdown in the United Kingdom, the number of ED visits for violent trauma within the home were stable yet declined for violence outside of the home.⁴ Likewise, Matthay et al noted that following San Francisco's shelter-in-place edict, violence-related injuries remained stable but injuries from nonviolent mechanisms decreased.²

In contrast to our results, Gosangi et al found a 1.8 times increase ($P = .01$) in physical VAW at their US medical center during the pandemic when compared to the previous 3 years.¹⁰ We hypothesized that we would observe a comparable trend as Gosangi et al because of the trends in VAW during previous humanitarian crises and epidemics.^{5,6,14} For instance, in many Louisiana communities afflicted by Hurricane Katrina, the relative risk of physical IPV significantly increased (RR 8.25, 95% CI 1.7-40.5) during the catastrophe.⁸ Additionally, during the West African Ebola outbreak, rates of sexual violence and rape amplified among adolescent and young girls.⁶ While we did not detect a difference in rates of VAW during COVID-19, we did notice a predominance of penetrating trauma. Specifically, we found that the odds of penetrating trauma were more than 5 times greater during the pandemic.

When the United States declared COVID-19 as a national emergency in March 2020, the average daily firearm sales increased from 92 000 to 176 000 within 3 days.¹⁵ The result of this surge yielded a surplus of 3 million more firearms into circulation than would have ordinarily been expected.¹⁵ A combination of easier access to guns, economic hardship, and limited social support likely fueled the shift toward more penetrating traumas.^{3,5,16} Qasim et al studied trauma epidemiology at LITCs in Philadelphia during the initial 6 weeks following the pandemic. They also found a significant increase in rates of penetrating trauma (15.4% vs 19.7%, $P = .03$) across the city.¹⁷

Another important result from our study was that a relationship exists between the rates of COVID-19 and VAW in our county. Other research groups have evaluated temporal trends in VAW during the COVID-19 pandemic. Holland et al reviewed IPV cases at more than 1500 EDs throughout the United States. They noticed an initial surge in cases during mid-February 2020 followed by a progressive wane for the remainder of the year.¹¹ Nix and Richards also observed a significant increase in phone calls at the onset of the pandemic made to the police for IPV-related events followed by a subsequent decline.¹⁸ In contrast, we found that as COVID-19 infection rates continued to increase in our county between February and October 2020, so did cases of VAW. One possible explanation for the difference in our results and findings from these other studies is that women stopped seeking medical attention due to an overwhelming fear of contracting COVID-19.^{9,18,19} An alternative reason for the discrepancy in these findings is that shelter-in-place orders were lifted at different times throughout the United States.^{11,17,18}

Regardless of the unique associations displayed between COVID-19 and VAW, these studies reveal that a substantial relationship exists between the two. As the pandemic ensues, these studies illuminate the need for better strategies to prevent future manifestations of VAW. One solution is to increase the use of telehealth. It creates

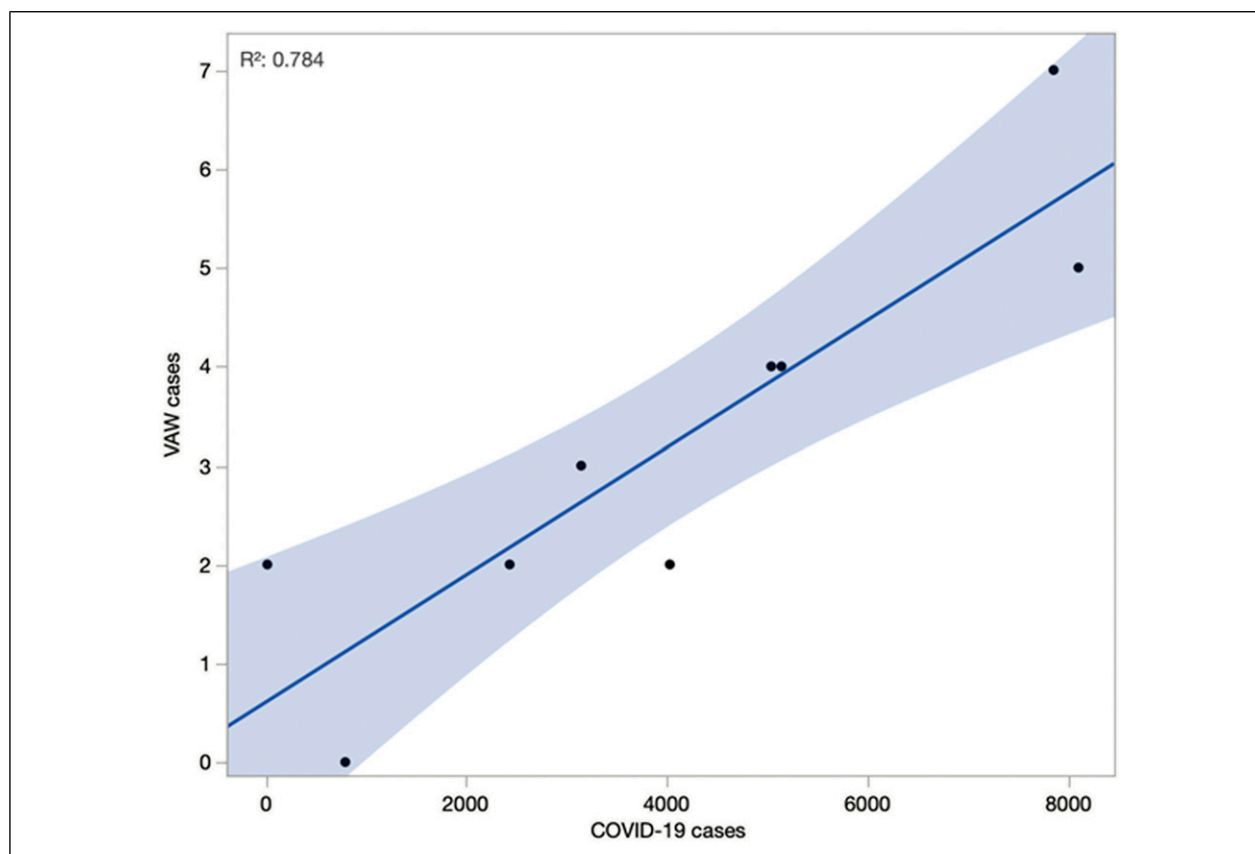


Figure 1. Bivariate relationship between monthly coronavirus disease 2019 rates and violence against women rates in our county from February 2020 through October 2020.

a continuum of care for survivors and provides a venue for women to acquire help by using subtle, non-verbal gestures during a video call.^{3,9,19} In addition, trauma surgeons should be more cognizant about the signs of IPV and ensure that the public is educated on the safe storage of firearms within the home.^{8,16,19} Furthermore, similar to preparing for a mass-casualty event, future pandemic-related planning should integrate regional trauma centers and social services to instruct on ways to recognize, treat, and support survivors of VAW.^{5,17,20}

This study has several limitations. The research was performed retrospectively and evaluated trauma patients at only 1 center. The size of the cohort was also relatively small, potentially increasing the risk of type II error. Additionally, we caution the extrapolation of our findings to trauma centers in other parts of the country because of the regional variation in timing of movement restrictions. The relationship between COVID-19 and VAW may also geographically vary because of the demographic composition of patients presenting to individual trauma centers. Finally, while women in this study were injured by violent mechanisms, we were unable to consistently determine if each case involved IPV.

At our LITC, rates of VAW during the COVID-19 pandemic were unchanged from the pre-pandemic period. However, rates of penetrating trauma significantly increased and the likelihood of sustaining an injury from a firearm or stab was more than 5 times greater during the pandemic. Trauma surgeons must remain watchful for VAW, provide continuing support for identified survivors, and ensure that fundamental needs and resources are available during future health crises.

Author's Note

Presented at the Southeastern Surgical Congress 2021 Annual Scientific Meeting in Atlanta, Georgia in August 2021.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

ORCID iD

Brett M. Tracy  <https://orcid.org/0000-0002-1469-3608>

References

1. Staff AJMC. A timeline of COVID-19 developments in 2020. *Am J Manag Care*. Accessed August 13, 2021. <https://www.ajmc.com/view/a-timeline-of-covid19-developments-in-2020>.
2. Matthay ZA, Kornblith AE, Matthay EC, et al. The distance study: determining the impact of social distancing on trauma epidemiology during the COVID-19 epidemic-An interrupted time-series analysis. *J Trauma Acute Care Surg*. 2021;90(4):700-707.
3. Sánchez OR, Vale DB, Rodrigues L, Surita FG. Violence against women during the COVID-19 pandemic: an integrative review. *Int J Gynaecol Obstet*. 2020;151(2):180-187.
4. Shepherd JP, Moore SC, Long A, Mercer Kollar LM, Sumner SA. Association between COVID-19 lockdown measures and emergency department visits for violence-related injuries in cardiff, wales. *J Am Med Assoc*. 2021; 325(9):885-887.
5. First JM, First NL, Houston JB. Intimate partner violence and disasters. *Affilia*. 2017;32(3):390-403.
6. Onyango MA, Resnick K, Davis A, Shah RR. Gender-based violence among adolescent girls and young women: a neglected consequence of the West African ebola outbreak. In: Schwartz D, Anoko J, Abramowitz S, eds *Pregnant in the Time of Ebola*. New York, NY: Springer; 2019:121-132.
7. Boserup B, McKenney M, Elkbuli A. Alarming trends in US domestic violence during the COVID-19 pandemic. *Am J Emerg Med*. 2020;38(12):2753-2755.
8. Harville EW, Taylor CA, Tesfai H, Xu Xiong X, Buekens P. Experience of hurricane katrina and reported intimate partner violence. *J Interpers Violence*. 2011;26(4):833-845.
9. Viero A, Barbara G, Montisci M, Kustermann K, Cattaneo C. Violence against women in the Covid-19 pandemic: a review of the literature and a call for shared strategies to tackle health and social emergencies. *Forensic Sci Int*. 2021;319:110650.
10. Gosangi B, Park H, Thomas R, et al. Exacerbation of physical intimate partner violence during COVID-19 pandemic. *Radiology*. 2021;298(1):E38-E45.
11. Holland KM, Jones C, Vivolo-Kantor AM, et al. Trends in US emergency department visits for mental health, overdose, and violence outcomes before and during the COVID-19 pandemic. *JAMA Psychiatry*. 2021;78(4):372-379.
12. Covid Act Now. Ohio COVID-19 infection Rates. Act now coalition. Accessed August 21, 2021. <https://covidactnow.org/?s=22051131>.
13. Ohio Department of Health. COVID-19 dashboard. Accessed August 13, 2021. <https://coronavirus.ohio.gov/wps/portal/gov/covid-19/home>.
14. Parkinson D, Zara C. The hidden disaster: domestic violence in the aftermath of natural disaster. *Aust J Emerg Manag*. 2013;28(2):28-35.
15. Levine P, McKnight R. Three million more guns: the Spring 2020 spike in firearm sales. *The Brookings Institution*. Accessed August 15, 2021. <https://www.brookings.edu/blog/up-front/2020/07/13/three-million-more-guns-the-spring-2020-spike-in-firearm-sales/>.
16. Duncan TK, Weaver JL, Zakrisson TL, et al. Domestic violence and safe storage of firearms in the COVID-19 Era. *Ann Surg*. 2020;272(2):e55-e57.
17. Qasim Z, Sjöholm LO, Volgraf J, et al. Trauma center activity and surge response during the early phase of the COVID-19 pandemic-the Philadelphia story. *J Trauma Acute Care Surg*. 2020;89(4):821-828.
18. Nix J, Richards TN. The immediate and long-term effects of COVID-19 stay-at-home orders on domestic violence calls for service across six U.S. Jurisdictions. *Police Pract Res*. 2021;22(4):1443-1451.
19. Barbara G, Facchin F, Micci L, et al. COVID-19, Lockdown, and intimate partner violence: some data from an Italian service and suggestions for future approaches. *J Womens Health (Larchmt)*. 2020;29(10):1239-1242.
20. Melmer P, Carlin M, Castater CA, et al. Mass casualty shootings and emergency preparedness: a multidisciplinary approach for an unpredictable event. *J Multidiscip Healthc*. 2019;12:1013-1021.