Radiology

Exacerbation of Physical Intimate Partner Violence during COVID-19 Pandemic

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Background: Intimate partner violence (IPV) is a global social and public health problem, but published literature regarding the exacerbation of physical IPV during the coronavirus disease 2019 (COVID-19) pandemic is lacking.

Purpose: To assess the incidence, patterns, and severity of injuries in IPV victims during the COVID-19 pandemic in 2020 compared with the prior 3 years.

Materials and Methods: The demographics, clinical presentation, injuries, and radiologic findings of patients reporting physical abuse arising from IPV during the statewide COVID-19 pandemic between March 11 and May 3, 2020, were compared with data from the same period for the past 3 years. Pearson χ^2 and Fisher exact tests were used for analysis.

Results: A total of 26 victims of physical IPV from 2020 (mean age, 37 years ± 13 [standard deviation]; 25 women) were evaluated and compared with 42 victims of physical IPV (mean age, 41 years ± 15; 40 women) from 2017 to 2019. Although the overall number of patients who reported IPV decreased during the pandemic, the incidence of physical IPV was 1.8 times greater (95% CI: 1.1, 3.0; $P = .01$). The total number of deep injuries was 28 during 2020 versus 16 from 2017 to 2019; the number of deep injuries per victim was 1.1 during 2020 compared with 0.4 from 2017 to 2019 ($P < .001$). The incidence of high-risk abuse defined by mechanism was two times greater in 2020 (95% CI: 1.2, 4.7; $P = .01$). Patients who experienced IPV during the COVID-19 pandemic were more likely to be White; 17 (65%) victims in 2020 were White compared with 11 (26%) in the prior years ($P = .007$).

Conclusion: There was a higher incidence and severity of physical intimate partner violence (IPV) during the coronavirus disease 2019 (COVID-19) pandemic compared with the prior 3 years. These results suggest that victims of IPV delayed reaching out to health care services until the late stages of the abuse cycle during the COVID-19 pandemic.

The coronavirus disease 2019 (COVID-19) started in China in late December of 2019 and spread to the entire world, with 16 341 920 positive cases and 650 805 deaths as of July 29, 2020 (1). In response to this pandemic, most countries adopted quarantines, social isolation, travel restrictions, and stay-at-home orders. Although the degree of COVID-19 pandemic closures of business and schools varied between countries, most nonessential businesses closed, and hospitals shut down any elective procedures and nonemergent outpatient visits. Social distancing has been proven effective for controlling the spread of infection but with negative socioeconomic and psychologic impacts (2–4). Service-oriented economies have been especially affected and have seen increased unemployment and a higher incidence of substance or alcohol abuse or mental disorders (4,5).

Emerging data show that since the outbreak of COVID-19, reports of intimate partner violence (IPV) have increased worldwide because of mandatory "stay-at-home orders" to curb the spread of the virus (6,7). The United Nations Chief has described the current situation as a "horrifying global surge in domestic violence" (8). Even in the absence of a global pandemic, IPV is a common social and public health problem worldwide. According to the national survey in 2015, one in four women and nearly one in 10 men have experienced IPV during their lifetime in the United States (9). It is challenging to help victims of IPV during the pandemic when the majority of health care providers are overwhelmed by patients with COVID-19 (10). Therefore, the role of radiologists in identifying victims of IPV through radiologic studies has become crucial when there is limited personal contact during a health care visit due to social distancing.

Anecdotally, despite a decrease in our overall imaging volume, we encountered severe physical injuries related to IPV in the emergency department during the COVID-19 pandemic. We expected to see a greater number of victims of IPV during the pandemic, as IPV victims are quarantined

Abbreviations

COVID-19 = coronavirus disease 2019, IPV = intimate partner violence, ISS = Injury Severity Scale

Summary

During the coronavirus disease 2019 pandemic, there was a higher rate of physical intimate partner violence (IPV), with more severe injuries on radiologic images, despite fewer patients reporting IPV.

Key Results

- The incidence of physical intimate partner violence (IPV) in 2020 during the coronavirus disease 2019 pandemic was 1.8-fold (P = .01) higher than in 2017–2019.
- There were 28 deep injuries during the period of observation compared with a total of 16 deep injuries during the prior 3 years.
- There were 17 (65%) White victims of IPV was in 2020 versus only 11 (26%) White victims in the prior 3 years (P = .007).

with their abusers at home, which is considered to be the most dangerous environment for victims (8,11–13). Socioeconomic instability related to stay-at-home orders and business closures increased substance abuse, and lack of community support would be expected to further contribute to an increased occurrence of IPV. Therefore, the purpose of our study was to assess the incidence, pattern, and severity of injuries related to IPV at our institution during the COVID-19 pandemic (ie, from March 11 to May 3, 2020) and to compare these data with data from the prior 3 years.

Materials and Methods

Patients

This institutional review board–approved Health Insurance Portability and Accountability Act–compliant retrospective study was conducted at a large urban academic medical center located in the northeastern United States. Written informed consent was waived. Since 1997, all patients screening positive for or reporting IPV are referred to our institutional domestic violence intervention and prevention program. The program has grown substantially since its establishment, although there has been no change in the number of referral sites or data collection over the last 4 years. Data for patients with reported IPV were obtained from our institution's IPV prevention program for the period of the COVID-19 crisis from March 11, 2020, to May 3, 2020, and for the same period of time for the three prior years (2019, 2018, and 2017) (Fig 1).

Data Collection

Four radiologists in the emergency radiology fellowship training program (B.G., H.P., R.T., R.G.; 7, 11, 11, and 12 years of experience in radiology, respectively) divided and reviewed the institution's electronic health record of each physical IPV victim. In addition to extracting age, sex, race, marital status, and history of substance use, they reviewed the health care provider's notes for the mechanism of injury, injuries documented in the physical examination, surgical notes, and radiologic studies.

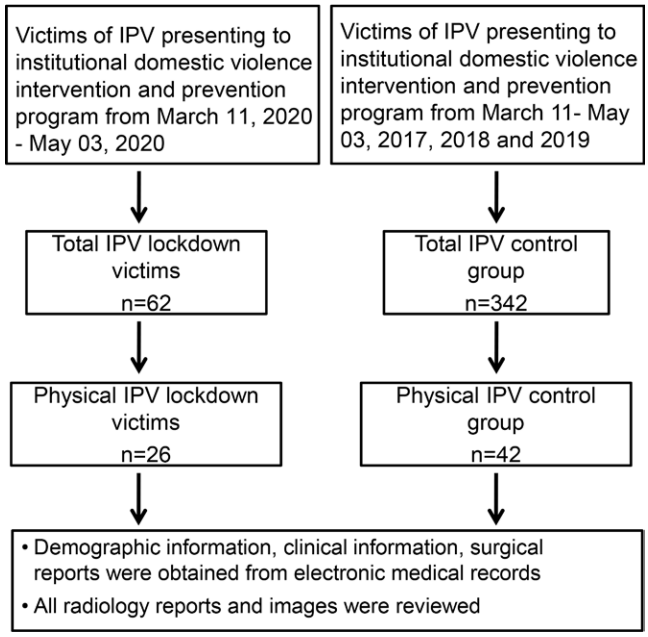

Figure 1: Flowchart of the coronavirus disease 2019 pandemic victims and control groups. IPV = intimate partner violence.

Imaging Findings

All radiology reports and images were reviewed by the same four radiologists. Injuries were grouped into nine anatomic areas: head, face, cervical spine, thoracic spine, lumbar spine, chest, abdomen, upper limb, and lower limb. A single injury was defined as physical trauma to one site. In patients with multiple injuries, injury to each organ or site was counted as one injury. Deep injuries include injuries to deep internal organs. For instance, if a patient had a liver laceration, renal laceration, and hemoperitoneum secondary to bowel injury, the total number of injuries in that patient were counted as three deep injuries in the abdomen.

Injuries were classified as central and peripheral. Central injuries included injuries of the head, face, spine, chest, and abdomen. Peripheral injuries included injuries of the upper and lower extremities. Injuries were also classified as superficial or deep injuries. Superficial injuries included injuries to the skin, subcutaneous soft tissues, and muscles; as indicated previously, deep injuries included injuries to deep internal organs.

Grading of IPV Based on Objective Signs of Abuse

We developed an objective grading system by considering the anatomic location of the physical injuries by dividing the body into six major parts (head and face, neck, chest, abdomen, extremities, and spine) and considering the depth of injuries (superficial injuries and deep injuries). Four grades of IPV based on the anatomic location and depth of injury defined the severity of physical injuries of IPV: grade 1 (mild), grade 2 (moderate), grade 3 (severe), and grade 4 (very severe), as summarized in Table 1. Additionally, the Injury Severity Scale (ISS) was calculated for each year by a registered trauma nurse with 5 years of experience in injury scoring. The ISS is an anatomic scoring system that provides an overall score for patients with multiple injuries. Each injury is assigned a severity and is allocated to

Table 1: Grading of IPV Based on Injuries

IPV Grade	Injuries
Grade I/mild	No visible external injuries; superficial injuries involving extremities on physical examination such as contusion, abrasion, bruise, swelling, etc; superficial soft-tissue swelling involving extremities
Grade II/moderate	Superficial injuries in the central torso (chest and abdomen), multiple superficial injuries involving the torso and extremities, subgaleal hematoma and facial hematoma
Grade III/severe	Extremity fractures, single rib fracture, intramuscular hematomas, soft-tissue stab wounds
Grade IV/very severe	Organ or visceral injury secondary to stab or blunt trauma, pneumothorax or hemothorax, pneumoperitoneum or hemoperitoneum, facial fractures, skull fractures, spine fractures, two or more rib fractures, strangulation marks over the neck, burns, gunshot wound

Note.—IPV = intimate partner violence.

one of six body regions (head or neck, facial, chest, abdomen or pelvis, extremities, external and other trauma). The ISS score ranges from 3 (minor injury) to 75 (most severe injury).

Outcome Measures

The outcome measures compared the following incidence between the COVID-19 pandemic and the same period from 2017 to 2019: *(a)* the incidence of physical IPV, defined as the total number of victims sustaining physical injuries from domestic violence per time period; *(b)* the incidence of severe and very severe physical IPV, defined as the total number of victims sustaining grade 3 injuries and grade 4 injuries, respectively, per time period; *(c)* the absolute number of injuries classified as central versus an extremity injury; *(d)* the absolute number of deep injuries versus superficial injuries; *(e)* the incidence of high-risk mechanism of abuse by reported history, defined as the total number of victims sustaining injuries due to strangulation, stab injuries, burns, or use of weapons such as knives, guns, or other objects that could inflict deep injuries per time period; and *(f)* the ISS.

Statistical Analysis

Descriptive statistics for continuous measures are presented as means with standard deviations and as frequencies with proportions for categorical measures. The mean age of individuals experiencing physical IPV was compared between 2020 and 2017–2019 using two independent-samples *t* tests. Race or ethnicity and the proportion of individuals experiencing substance abuse were compared with those from the same time periods for the previous 3 years using the Fisher exact test and Pearson χ^2 test, respectively. The incidence of physical IPV, severe IPV, very severe IPV, high-risk abuse mechanisms, and deep injuries was compared between 2020 and 2017–2019 using Poisson regression with a log link. Additionally, the proportion of individuals who had an injury classified as central versus extremity and deep versus superficial were compared using the Pearson χ^2 test. Last, the Wilcoxon rank-sum test was used to compare distributions of ISS scores between the two time periods. All testing was two tailed, and $P < .05$ represented a significant difference. No patients were present in more than 1 year of data; therefore, no accounting for clustered data was required. Statistical analysis was performed using software (SAS, version 9.4; SAS Institute, Cary, NC).

Results

Patient Demographics

A total of 62 victims of IPV of all types (physical and nonphysical abuse) were identified in 2020, 104 victims were identified in 2019, 106 victims were identified in 2018, and 146 victims were identified in 2017 for this 7-week time window. Thus, the overall number of victims who reported IPV of all types (including physical and nonphysical abuse) during 2020 was 62 victims compared with 342 victims during the prior years (mean, 114 cases each year), namely, 0.5 times the incidence in 2020 versus 2017–2019 (95% CI: 0.4, 0.7; $P < .001$). Of all the victims of IPV in 2020, 20 (38%) victims were referred from the emergency department during the pandemic as opposed to 62 of the 342 (18%) victims from 2017 to 2019.

From these victims of IPV, we identified victims reporting physical IPV: 26 of 62 patients for 2020, 20 of 104 patients for 2019, seven of 106 patients for 2018, and 15 of 146 patients for 2017, which constituted the study sample (Fig 1).

The average age of the 26 victims of physical IPV from 2020 was 37 years ± 13 (25 women) versus 41 years ± 15 (40 women) for 42 victims of physical IPV from 2017 to 2019. Seventeen of 26 victims (65%) in 2020 identified as White compared with 11 of 42 victims (26%) in 2017–2019 ($P = .007$ across all race categories). Only two of 26 victims (8%) in 2020 were Black compared with 15 of 42 victims (35%) in 2017–2020. Ten victims reported substance abuse in 2020 (38%) compared with 11 victims in 2017–2019 (26%) ($P = .29$) (Table 2).

Description of IPV Injuries

As indicated previously, 26 women experienced physical IPV during the COVID-19 pandemic compared with 20 women in 2019, seven women in 2018, and 15 women in 2017. Five women experienced severe abuse (grade 3) in 2020 (five of 26, 19%) compared with one woman in 2019 (one of 10, 5%), one in 2018 (one of seven, 14%), and one in 2017 (one of 15, 7%). Five women experienced very severe abuse (grade 4) in 2020 (five of 26, 19%) compared with two women in 2019 (two of 10, 20%), one woman in 2018 (one of seven, 14%), and one in 2017 (one of 15, 7%).

Table 2: Comparison of Demographic Variables, Injury Patterns, and IPV Grading in Victims of Physical Abuse between 2020 COVID-19 Pandemic Group and Victims in 2017, 2018, and 2019.

Characteristic	2020	2019	2018	2017	2017–2019	*P* Value
Total no. of IPV victims	62	104	106	146	342	…
No. of cases referred from emergency department	20 (32)	26 (25)	14 (13)	22 (15)	62 (18)	…
No. of physical IPV victims	26	20	7	15	42	…
Age (y)*	37 ± 13	45 ± 16	43 ± 14	35 ± 13	41 ± 15	.18
Gender (female)	25 (96)	19 (95)	7 (100)	14 (95)	40 (95)	>.99
Race						.007
White	17 (65)	6 (30)	2 (29)	3 (20)	11 (26)	…
Black	2 (8)	7 (35)	4 (57)	4 (27)	15 (36)	….
Hispanic	4 (15)	2 (10)	1 (14)	7 (47)	10 (24)	…
Others	3 (12)	5 (25)	0 (0)	1 (6)	6 (14)	…
Marital status						.87
Single	18 (70)	11 (55)	4 (57)	11 (74)	26 (62)	…
Married	5 (19)	7 (35)	2 (29)	2 (13)	11 (26)	…
Divorced	3 (11)	2 (10)	1 (14)	2 (13)	5 (12)	…
Substance abuse	10 (38)	8 (4)	2 (3)	1 (7)	11 (26)	.29
Proportion of physical abuse†	42 (26/62)	19 (20/104)	9 (7/106)	10 (15/146)	12 (42/356)	<.001
Use of high-risk abuse mechanisms	15 (58)	6 (30)	6 (85)	7 (4%)	19 (45)	.01
Deep injuries per person (mean)	1.08	0.35	0.71	0.27	0.38	<.001
Severe grade IPV (grade III)	5 (19)	1 (5)	1 (14)	1 (7%)	4 (10)	.08
Very severe grade IPV (grade IV)	5 (19)	2 (10)	1 (14)	1 (7%)	3 (7)	.24

Note.—Unless otherwise indicated, data in parentheses are percentages. High-risk abuse mechanism describes injury from the use of a weapon such as a gun or knife, strangulation, or choking. Severe grade IPV/grade III injuries that include extremity fractures, single rib fracture, intramuscular hematomas, extremity fractures, soft-tissue stab wounds, whereas very severe grade IPV/grade IV injuries include organ or visceral injury secondary to stab or blunt trauma, pneumothorax/hemothorax, pneumoperitoneum/hemoperitoneum, facial fractures, skull fractures, spine fractures, two or more rib fractures, strangulation marks over the neck, burns, gunshot wounds. *P* values were calculated by comparing 2020 data with 2017–2019 data. COVID-19 = coronavirus disease 2019, IPV = intimate partner violence.

* Data are mean ± standard deviation.

† Data are percentages, and data in parentheses are raw data.

When compared with 2017–2019, the incidence of physical IPV was 1.9 times greater in 2020 (95% CI: 1.1, 3.0; *P* = .01). When compared with 2017–2019, the incidence of severe grade IPV (grade 3) was five times greater in 2020 (95% CI: 1.1, 20.9; *P* = .03), and the incidence of very severe grade IPV (grade 4) was 3.8 times greater in 2020 (95% CI: 1.0, 14; *P* = .049) (Fig 2).

Fifty-eight injuries were observed in the victims of physical IPV in 2020 compared with 28 injuries in 2019, 22 in 2018, and 21 in 2017. Among these, 28 deep injuries were seen in the victims during the COVID-19 pandemic compared with seven in 2019, five in 2018, and four in 2017, with a mean of 1.1 deep injuries (2.2 total injuries) per person compared with 0.4 deep injuries (1.7 total injuries) per person in 2017–2019 (*P* < .001).

There were 44 central injuries in 2020 compared with 16 in 2019, 13 in 2018, and 15 in 2017. The total number of central injuries compared with extremity injuries was higher in 2020 (44 vs 14 injuries) than in 2017–2019 (44 vs 27 injuries) (*P* = .03) (Fig 3, Table 3).

Fifteen victims suffered abuse from high-risk abuse mechanisms in 2020 compared with six in 2019, six in 2018, and seven in 2017. The incidence of high-risk abuse mechanism by reported history was 2.4 times greater in 2020 (95% CI: 1.2, 4.6; *P* = .01) than in 2017–2019.

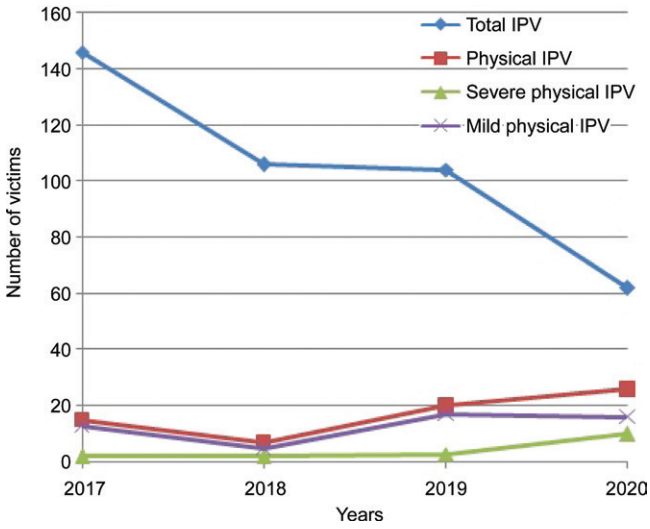

Figure 2: Graph shows year-wise comparison of total intimate partner violence (IPV), physical IPV, and severe and mild grades of physical IPV.

Mean ISS score for victims was 3.0 (range, 1–10) during 2020, 1.3 (range, 1–4) during 2019, 1.0 (range, 1–1) during 2018, and 2.6 (range, 1–9) during 2017 (*P* = .17 for comparison of ISS by year).

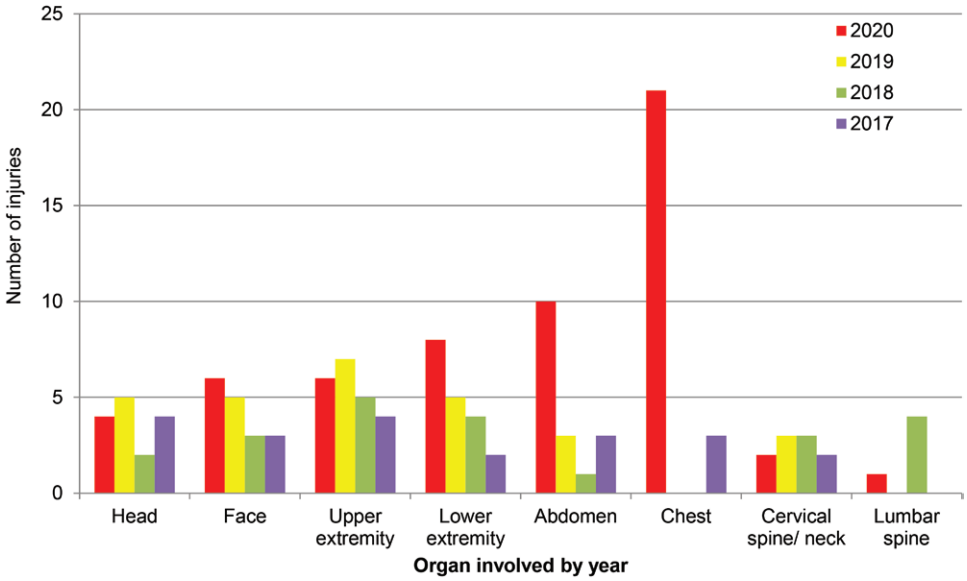

Figure 3: Graph shows organ injuries for victims of intimate partner violence based on the year.

Table 3: Comparison of the Number of Injuries by Year

Organ System or Anatomic Location	2020	2019	2018	2017	2017–2019
Head	4	5	2	4	11
Face	6	5	3	3	11
Chest	21	0	0	3	3
Abdomen	10	3	1	3	7
Cervical spine	2	3	3	2	8
Thoracic spine	0	0	0	0	0
Lumbar spine	1	0	4	0	4
Upper extremity	6	7	5	4	16
Lower extremity	8	5	4	2	11
Total	58	28	22	21	71

Note.—Data are numbers of injuries.

Radiologic Studies

Radiologic studies were performed in 17 of 26 victims (65%) in 2020 compared with 27 of 42 victims (64%) from 2017 to 2019. Studies from seven of 26 victims (27%) were positive for physical injuries in 2020 compared with studies from 12 of 42 victims (28%) from 2017 to 2020. Remote injuries were seen in one victim in 2020 (fifth metatarsal fracture), one victim in 2019 (zygomatic bone fracture), and one victim in 2017 (nasal bone fracture). Please refer to Figures 4, 5, and 6 for injuries of the chest, abdomen, and face, respectively, in victims of IPV from 2020.

Discussion

Our results showed that there was an overall decrease in the total number of intimate partner violence (IPV) victims seeking hospital care during the pandemic (62 victims in 2020, 104 in 2019, 106 in 2018, and 146 in 2017; $P < .001$). However, the incidence of physical IPV and the severity of injuries was greater during the pandemic: The number of victims of physical abuse was 26 of 62 (42%) in 2020 versus 42 of 342 (12%) from 2017 to 2019 ($P = .01$). The number of victims with severe-grade injury was 10 (38%) in 2020 versus seven (17%) from 2017 to 2019 ($P = .03$). This could be related to the closure of ambulatory and community referral sites during the pandemic and fear of being exposed to the virus in the emergency department, similar to other diseases (14,15). We also observed a higher incidence of victims of high-risk abuse, including strangulation, use of weapons, stab wounds, and burns. Radiologic studies showed more central and visceral organ injuries during the 2020 pandemic, which are suggestive of high-risk abuse (16,17). This could potentially reflect the fact that victims are reporting in the later stages of IPV, and victims of mild physical or emotional abuse are not seeking help as they usually would when visiting clinics in the prepandemic period.

Women killed by intimate partners or family members account for 58% of all instances of female homicide (12). Because victims reach out to health care providers before they present to social services or a criminal justice agency, IPV screening is recommended by many health care organizations, with an emphasis on appropriate referral and intervention (18). However, the actual screening implementation rate reported in clinics is low (range, 1.5%–13%), and IPV is still underdiagnosed (19–21). Especially in the time of the pandemic, in addition to underreporting, IPV-related injuries could be overlooked or misinterpreted while health care providers are overwhelmed by the vast number of patients with COVID-19 in the emergency department. During this global public health crisis, alternative options for IPV victims to seek help have decreased. Many ambulatory clinics are no longer seeing as many patients in person because of the virus and are instead pivoting their services to virtual consultation. Telehealth visits limit the opportunity to see bruises or other signs of physical trauma and hamper the ability of the health care provider to gather nonverbal cues. It may also be difficult for victims who are at home to report IPV, and health care providers may be omitting IPV screening questions altogether on these calls because of the patient's limited privacy.

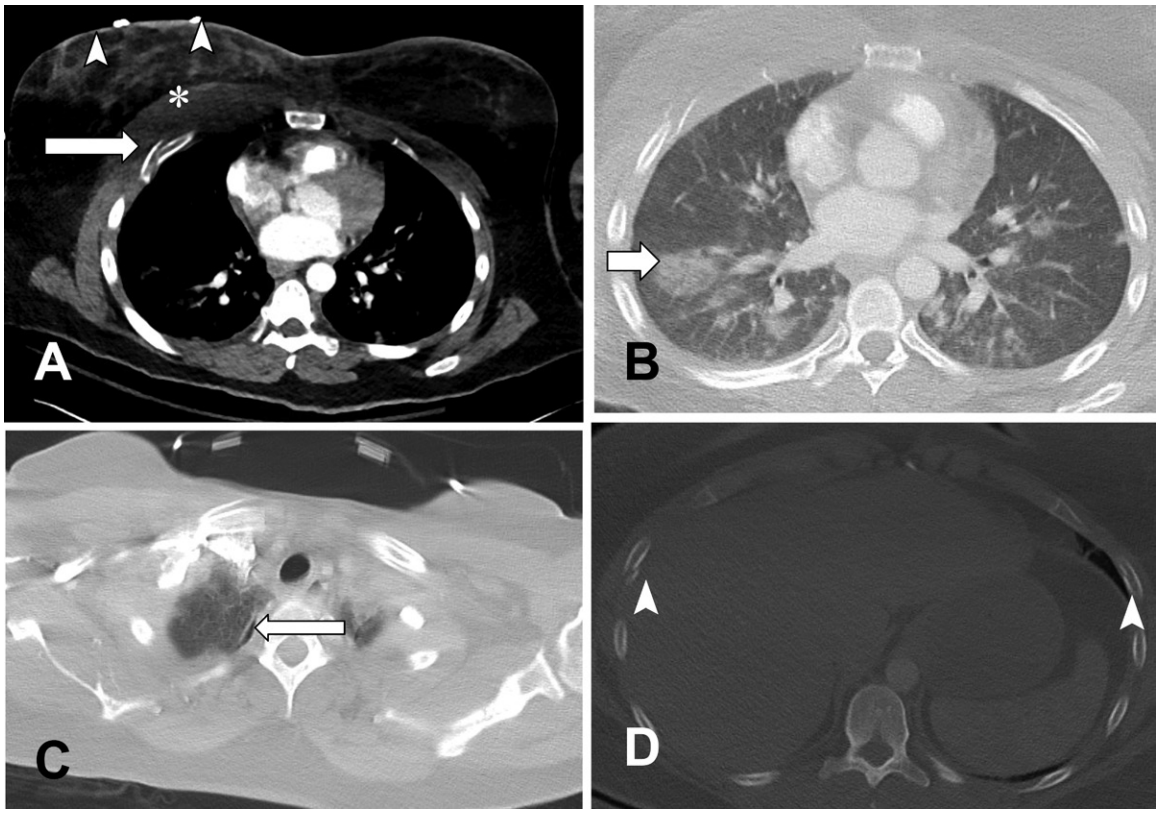

Figure 4: A 38-year-old woman was struck in the face and chest by her boyfriend and sustained multiple bilateral rib fractures. *A*, Axial postcontrast chest CT scan shows a comminuted right fourth rib fracture (arrow), extensive swelling of the right breast (arrowheads) and anterior chest wall muscle (*), suggesting contusion and intramuscular hematoma. *B*, Ground-glass opacity in the right lung peripherally, suggestive of lung contusion (arrow). *C*, Additional chest CT image through apices on lung window demonstrates trace right apical pneumothorax (arrow). *D*, Bilateral rib fractures (arrowheads).

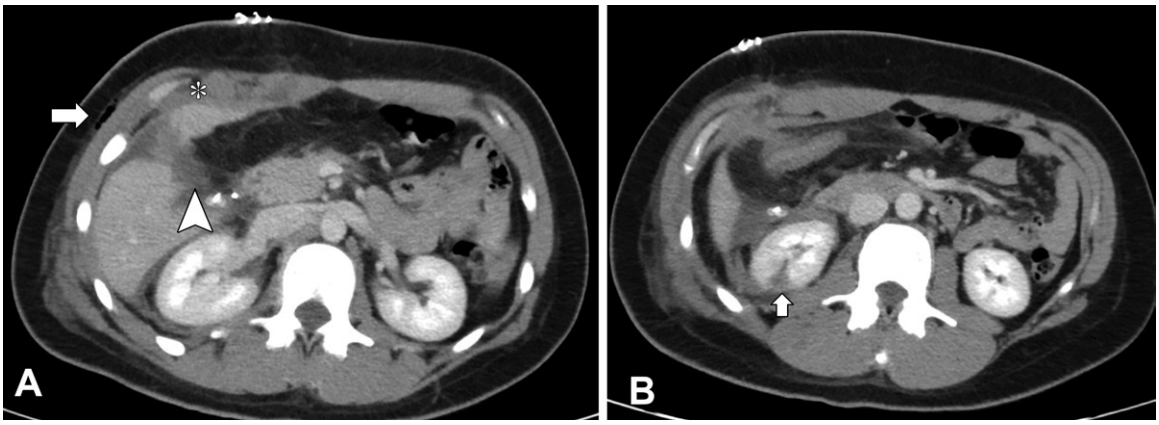

Figure 5: A 27-year-old woman was stabbed in the right midabdomen by her boyfriend. *A*, Axial abdomen CT scan shows an American Association for the Surgery of Trauma (AAST) grade 2 liver laceration (arrowhead) with a small perihepatic hematoma (*) and subcutaneous emphysema (arrow) at the site of stab injury. *B*, Additional axial abdomen CT scan shows irregular hypoattenuation in the inferior aspect of the right kidney (arrow), representing an AAST grade 2 laceration. The patient underwent surgical repair of liver laceration and cholecystectomy. The renal injury was managed conservatively.

We believe that it is the right moment for radiologists to play a critical role as a team in identifying victims of IPV and become an integral part of the multidisciplinary teams providing direct care to these patients. With high-risk physical abuse being highly associated with homicide, a smaller number of victims seeking medical care, and emergency medicine physicians overwhelmed by treating patients with COVID-19, radiologists should embrace the opportunity to provide patient-centered care by integrating longitudinal imaging data and providing early identification of victims. By recognizing high imaging use, location, and imaging patterns specific to IPV, old injuries of different body parts, and injuries inconsistent to provided history, radiologists can identify victims of IPV, even when the victims are not forthcoming (22,23). As radiologists become more familiar and comfortable with various artificial intelligence algorithms, a clinical decision support rule based on imaging and clinical risk

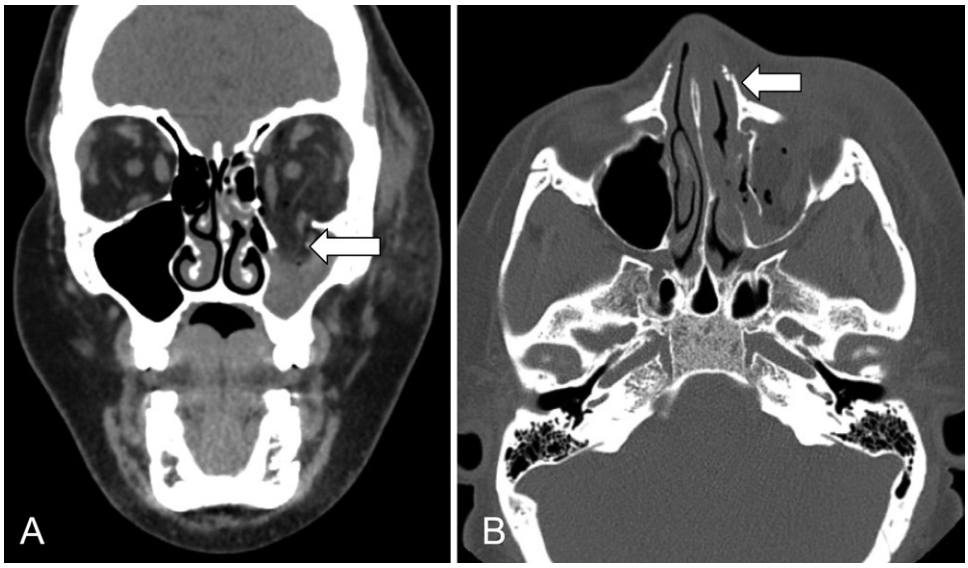

Figure 6: A 35-year-old woman was strangulated and hit on the face multiple times by her boyfriend. *A*, Coronal reconstructed unenhanced face CT scan shows acute comminuted inferiorly displaced fracture of the left inferomedial orbital wall (arrow), with herniation of fat and inferior rectus muscle into the left maxillary sinus. Asymmetric subcutaneous swelling is noted on the left side. *B*, Axial face CT scan shows a minimally displaced left nasal bone fracture (arrow). The patient underwent surgical repair of the left orbital wall.

factors can be established to proactively identify victims, with more business and school closings expected in the future (7,24).

This study had several limitations. First, this is a retrospective observational study from a single institution with a small number of IPV victims. Second, we focused on victims with physical injury only and did not review radiologic studies of the patients who did not report physical IPV. Third, our ISS is based on documented physical examination and radiologic findings and does not account for reported history. A patient with a reported history of strangulation with no physical or radiologic findings will still be placed in grade 1, though we also analyzed and compared the numbers of high-risk abuse, such as strangulation, weapons, stabbing, and burns individually.

An overall lower number of victims of intimate partner violence (IPV) with a greater number and severity of physical abuse is suggestive of victims reaching out to health care services in a later stage of abuse due to fear of coronavirus disease 2019. This may be due to the limited availability of services and resources for victims during the pandemic. Radiologists and other health care providers should proactively participate in identifying victims of IPV and reaching out to vulnerable communities as an essential service during the pandemic and other crisis situations.

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References

1. Coronavirus disease (COVID-19) situation report – 190. World Health Organization. https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200728-covid-19-sitrep-190.pdf?sfvrsn=fec17314_2. Published July 28, 2020. Updated July 28, 2020. Accessed July 28, 2020.
2. Atkeson A. What will be the economic impact of COVID-19 in the US? Rough estimates of disease scenarios. National Bureau of Economic Research. https://www.nber.org/papers/w26867. Published March 2020. Updated March 2020. Accessed July 28, 2020.
3. Ozili PK, Arun T. Spillover of COVID-19: impact on the global economy. SSRN. https://ssrn.com/abstract=3562570. Published March 27, 2020. Updated March 27, 2020. Accessed July 28, 2020.
4. Qiu J, Shen B, Zhao M, Wang Z, Xie B, Xu Y. A nationwide survey of psychological distress among Chinese people in the COVID-19 epidemic: implications and policy recommendations. Gen Psychiatr 2020;33(2):e100213. [Published correction appears in Gen Psychiatr 2020;33(2):e100213corr1.].
5. Pfefferbaum B, North CS. Mental health and the COVID-19 pandemic. N Engl J Med 2020;383(6):510–512.
6. Boserup B, McKenney M, Elkbuli A. Alarming trends in US domestic violence during the COVID-19 pandemic. Am J Emerg Med doi:10.1016/j.ajem.2020.04.077. Published online April 28, 2020.
7. Matoori S, Khurana B, Balcom MC, et al. Intimate partner violence crisis in the COVID-19 pandemic: how can radiologists make a difference? Eur Radiol doi:10.1007/s00330-020-07043-w. Published online June 30, 2020.
8. UN chief calls for domestic violence 'ceasefire' amid 'horrifying global surge'. United Nations News. April 6, 2020. https://news.un.org/en/story/2020/04/1061052. Accessed May 18, 2020.
9. Smith SG, Zhang X, Basile KC, et al. The national intimate partner and sexual violence survey: 2015 data brief–updated release. Centers for Disease Control and Prevention. https://www.cdc.gov/violenceprevention/pdf/2015data-brief508.pdf. Published November 2018. Updated November 2018. Accessed July 28, 2020.
10. Roesch E, Amin A, Gupta J, García-Moreno C. Violence against women during COVID-19 pandemic restrictions. BMJ 2020;369:m1712.
11. Bradbury-Jones C, Isham L. The pandemic paradox: the consequences of COVID-19 on domestic violence. J Clin Nurs 2020;29(13-14):2047–2049.
12. Global study on homicide: gender-related killing of women and girls. United Nations Office on Drugs and Crime. https://www.unodc.org/documents/data-and-analysis/GSH2018/GSH18_Gender-related_killing_of_women_and_girls.pdf. Published November 2018. Updated November 2018. Accessed July 28, 2020.
13. Bosman J. Domestic violence calls mount as restrictions linger: 'No One Can Leave'. The New York Times. May 15, 2020. https://www.nytimes.com/2020/05/15/us/domestic-violence-coronavirus.html?campaign_id=

2&emc=edit_th_200517&instance_id=18495&nl=todaysheadlines&regi_id=67605176&segment_id=28156&user_id=a2712d6899381f929013dc043baab6e0. Accessed May 18, 2020.
14. Ebbert S. When is a drop in domestic violence bad news? Boston Globe. May 12, 2020. https://www.bostonglobe.com/2020/05/12/metro/when-is-drop-domestic-violence-bad-news/. Accessed May 18, 2020.
15. Southall A. Why a drop in domestic violence reports might not be a good sign. New York Times. April 17, 2020. https://www.nytimes.com/2020/04/17/nyregion/new-york-city-domestic-violence-coronavirus.html. Accessed May 18, 2020.
16. Wu V, Huff H, Bhandari M. Pattern of physical injury associated with intimate partner violence in women presenting to the emergency department: a systematic review and meta-analysis. Trauma Violence Abuse 2010;11(2):71–82.
17. Bhandari M, Dosanjh S, Tornetta P 3rd, Matthews D; Violence Against Women Health Research Collaborative. Musculoskeletal manifestations of physical abuse after intimate partner violence. J Trauma 2006;61(6):1473–1479.
18. Narayan AK, Lopez DB, Miles RC, et al. Implementation of an intimate partner violence screening assessment and referral system in an academic women's imaging department. J Am Coll Radiol 2019;16(4 Pt B):631–634.
19. Hamberger LK, Saunders DG, Hovey M. Prevalence of domestic violence in community practice and rate of physician inquiry. Fam Med 1992;24(4):283–287.
20. Abbott J, Johnson R, Koziol-McLain J, Lowenstein SR. Domestic violence against women. Incidence and prevalence in an emergency department population. JAMA 1995;273(22):1763–1767.
21. Chamberlain L, Perham-Hester KA. The impact of perceived barriers on primary care physicians' screening practices for female partner abuse. Women Health 2002;35(2-3):55–69.
22. George E, Phillips CH, Shah N, et al. Radiologic findings in intimate partner violence. Radiology 2019;291(1):62–69.
23. Rivara FP, Anderson ML, Fishman P, et al. Healthcare utilization and costs for women with a history of intimate partner violence. Am J Prev Med 2007;32(2):89–96.
24. Khurana B, Seltzer SE, Kohane IS, Boland GW. Making the 'invisible' visible: transforming the detection of intimate partner violence. BMJ Qual Saf 2020;29(3):241–244.