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ORIGINAL ARTICLE / ÖZGÜN ARAŞTIRMA MAKALESİ

Pandemic Periods and Their Reflection on Violence Against Healthcare Workers: Analysis of Nine Years of "White Code" Data

Pandemi Dönemlerinin Sağlık Çalışanlarına Yönelik Şiddet Oranlarına Yansıması: Dokuz Yıllık Beyaz Kod Verilerinin İncelenmesi

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ABSTRACT

Aim: This study aims to examine the changes in violence against healthcare workers in a tertiary education and research hospital during the pre-pandemic, pandemic, and post-pandemic periods through "White Code" notifications, and to evaluate the course of violence against physicians, especially those working in emergency departments, over time.

Material and Methods: In this retrospective descriptive study, White Code notifications recorded between January 1, 2017, and May 31, 2025, were analyzed. Incidents were classified according to type of violence, targeted personnel, and location. To control for variability in patient admission numbers, incidence rates of violence were normalized to 100,000 admissions. Chi-square test, two-ratio z-test, and trend analyses were used in statistical analyses.

Results: A total of 1,005 violence incidents were reported. A significant difference was found in the distribution of the number of cases and types of violence between periods (p = 0.001). Verbal violence was the most common type of violence across all periods, reaching its highest rate in the post-pandemic period (84.8%; p < 0.05). While the normalized incidence of violence against physicians showed a significant difference between periods (p < 0.001), no significant difference was found for non-physician personnel (p = 0.230). Although the physician/non-physician violence ratio was numerically higher in the post-pandemic period, it was not statistically significant (p = 0.079). Specifically, in the emergency department, a significant decrease in the incidence of violence against both personnel groups was observed in the post-pandemic period (p < 0.001). Annual trend analyses revealed that violence did not show a linear and sustained decrease during the 2017–2024 period (p > 0.05).

Conclusion: Violence against healthcare workers has been affected by the COVID-19 pandemic and continues to exist as a multifactorial problem in the post-pandemic period. The findings show that violence does not decrease spontaneously and linearly over time. This finding points to the need for targeted, sustainable preventive strategies, especially for physicians working in emergency departments.

Keywords: White Code, violence against doctors, COVID-19

ÖZ

Amaç: Bu çalışmanın amacı, üçüncü basamak bir eğitim ve araştırma hastanesinde sağlık çalışanlarına yönelik şiddetin pandemi öncesi, pandemi dönemi ve pandemi sonrası süreçlerdeki değişimini "Beyaz Kod" bildirimleri üzerinden incelemek ve özellikle acil servislerde görev yapan hekimlere yönelik şiddetin zaman içindeki seyrini değerlendirmektir.

Gereç ve Yöntemler: Retrospektif tanımlayıcı nitelikteki bu çalışmada, 1 Ocak 2017 – 31 Mayıs 2025 tarihleri arasında kaydedilen Beyaz Kod bildirimleri analiz edildi. Olaylar; şiddet türü, hedeflenen personel ve olay yeri açısından sınıflandırıldı. Hasta başvuru sayılarındaki değişkenliği kontrol etmek amacıyla şiddet insidansları 100.000 başvuruya normalize edildi. İstatistiksel analizlerde ki-kare testi, iki oran z-testi ve trend analizleri kullanıldı.

Bulgular: Toplam 1.005 şiddet olayı bildirildi. Dönemler arasında vaka sayısı ve şiddet türlerinin dağılımı açısından anlamlı fark saptandı (p = 0,001). Sözel şiddet tüm dönemlerde en sık görülen tür olup pandemi sonrası dönemde en yüksek orana ulaştı (%84,8; p < 0,05). Hekimlere yönelik normalize edilmiş şiddet insidansı dönemler arasında anlamlı farklılık gösterirken (p < 0,001), hekim dışı personel için anlamlı bir fark saptanmadı (p = 0,230). Hekim/hekim dışı personel şiddet oranı pandemi sonrası dönemde sayısal olarak daha yüksek olmakla birlikte istatistiksel olarak anlamlı değildi (p = 0,079). Acil servis özelinde pandemi sonrası dönemde her iki personel grubuna yönelik şiddet insidanslarında anlamlı azalma gözlendi (p < 0,001). Yıllık trend analizleri, şiddetin 2017–2024 döneminde doğrusal ve sürdürülebilir bir azalma göstermediğini ortaya koydu (p > 0,05).

Sonuç: Sağlık çalışanlarına yönelik şiddet, COVID-19 pandemisinden etkilenmiş ve pandemi sonrası dönemde de devam eden, çok faktörlü bir sorun olarak varlığını sürdürmüştür. Bulgular, şiddetin zamanla kendiliğinden ve doğrusal bir biçimde azalmadığını göstermekte; özellikle acil servislerde görev yapan hekimlere yönelik hedeflenmiş, sürdürülebilir önleyici stratejilerin gerekliliğine işaret etmektedir.

Anahtar Kelimeler: Beyaz Kod, hekime şiddet, COVID-19

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Introduction

Healthcare professionals, particularly those working on the front lines in emergency departments, are among the groups most frequently exposed to violence due to the high-stress environment in which they work. The consequences of such incidents can be severe at the individual, institutional, and systemic levels.

Workplace violence against healthcare professionals has increasingly been recognized as a global problem threatening the sustainability of healthcare systems. The WHO and ILO consider healthcare settings among the most dangerous work environments. Numerous studies have confirmed that exposure to verbal and physical violence negatively impacts the mental well-being, job satisfaction, and performance of healthcare professionals, and can lead to burnout and post-traumatic stress disorder (1–3).

However, the implementation of the “White Code” system in Turkey in 2012 has led to the systematic documentation and reporting of such incidents by recording cases of violence against healthcare personnel. The system includes important information such as the type of incident, the location where it occurred, the professional title of the affected personnel, and details of the legal process, if applicable (4).

The COVID-19 pandemic has reshaped healthcare delivery with dramatic changes in patient flow dynamics, workload distribution, and the risks faced by healthcare workers. However, findings in the literature regarding the impact of the pandemic on the frequency of cases are mixed: some studies point to a significant increase (5–7), while others suggest a temporary decrease (8,9). These differences are mostly attributed to differences in the healthcare system structures of countries, pandemic management strategies, and socio-cultural context.

This study examines incidents of violence against healthcare professionals in a tertiary hospital, classifying them into pre-pandemic, pandemic, and post-pandemic periods using "White Code" records. The main objective is to determine changes in the total number of cases, the distribution of types of violence, and the ratio of incidents targeting physicians to those targeting non-physician personnel; focusing particularly on trends related to emergency departments. This study evaluates longitudinal patterns over time to clarify the potential long-term impact of the pandemic on violence in healthcare settings.

Material and Methods

Study design and setting

This retrospective descriptive study was conducted at a tertiary training and research hospital. Data were obtained from all “White Code” notifications involving workplace violence against healthcare workers recorded between January 1, 2017, and May 31, 2025. The study was approved by the institutional ethics committee (Decision No: 2192, Date: April 16, 2025) and conducted in accordance with the Declaration of Helsinki.

Data Integrity and Reporting Process

All White Code cases reported through the hospital information management system during the study period were included in the analysis. A small number of reports were not transmitted to the central reporting system because they were later withdrawn; however, these records remained accessible in the hospital database. The proportion of such cases did not exceed 2% of the total data set, and it was assessed that they were unlikely to affect the statistical analyses.

Although near-miss incidents that do not meet the official White Code reporting criteria may occur, such incidents are not systematically recorded. Therefore, data on near-miss incidents could not be accessed and could not be included in the analyses.

Period Definitions

The beginning of the pandemic period was defined based on the date when the Ministry of Health of the Republic of Turkey officially announced the first confirmed COVID-19 case in the country (10). Although there is no official declaration regarding the end of the pandemic period in Turkey, the end of December 2021 has been accepted as the end of the pandemic period. This choice was made because it coincided with the period following the publication of the Presidential Circular titled "Normalization and Measures to be Taken in Public Institutions and Organizations within the Scope of COVID-19" (11) and coincided with the period when the number of COVID-19 cases was observed at the lowest level in our hospital.

Incidents were analyzed across three time periods:

- Pre-pandemic: January 1, 2017–March 10, 2020
- Pandemic period: March 11, 2020–December 31, 2021
- Post-pandemic: January 1, 2022–May 31, 2025

Variables and Definitions

- Total number of incidents: All “White Code” notifications within each defined period.
- Type of violence: Verbal only, physical only, or a combination of verbal and physical.
- Targeted personnel: Physicians or non-physician healthcare personnel (nurses, technicians, support staff, etc.).
- Location: Whether the incident occurred in the emergency department, outpatient clinic, ward/inpatient unit, or any other area within the hospital.
- Proportional change: The ratio of violence against physicians to violence against non-physician personnel.
- Annual hospital visits: The total number of outpatient visits, emergency department visits, and inpatient admissions per year.
- Annual emergency department visits: The total number of emergency department visits in a year.

Outcome Measures and Rate Normalization

To enable valid comparisons between years and to account for the impact of significant fluctuations in healthcare utilization—particularly during the COVID-19 pandemic—violence incidents were analyzed using normalized incidence rates instead of raw case numbers.

Emergency Department-Specific Violence Rates

For emergency department (ED)-specific analyses, annual violence rates were calculated by normalizing the number of ED-related incidents to the total number of ED visits in the corresponding year, and were expressed per 100,000 ED visits using the following formula:

$$EDviolencerate = \frac{Number\ of\ ED\text{-}related\ violence\ incidents}{Totalnumberof\ EDvisits} \times 100{,}00$$

This approach ensured that year-to-year changes in ED patient volume did not confound temporal trend analyses.

Hospital-Wide Violence Rates

For hospital-wide analyses, violence rates were calculated by normalizing the total number of incidents to the total number of hospital visits for each year. Rates were expressed per 100,000 hospital visits using the following formula:

$$Hospital\text{-}wideviolencerate = \frac{Total\ number\ of\ violence\ incidents}{Totalhospitaladmissions} \times 100{,}000$$

This normalization allowed institutional-level violence trends to be assessed independently of emergency department–specific utilization patterns.

Rationale for Using Separate Denominators

During the study period, particularly in the pandemic and post-pandemic phases, emergency department visits and total hospital visits showed different temporal patterns. Therefore, in order to prevent misinterpretations that may arise from heterogeneous changes in patient volume in different healthcare delivery areas, emergency department-specific and hospital-wide violence rates were normalized using service utilization-specific denominators.

Statistical Analysis

Data analysis was performed using IBM SPSS Statistics for Windows, Version 29.0 (IBM Corp., Armonk, NY, USA). Descriptive statistics were presented as mean ± standard deviation (SD) or median (min–max) for continuous variables, and as frequency (n) and percentage (%) for categorical variables. Comparisons between three time periods were performed using Pearson's chi-square test; Fisher's exact test was applied when the expected frequencies were low. Effect sizes for categorical variables were assessed using Cramér's V or Cohen's w.

To account for variation in hospital activity, normalized incidence rates were calculated per 100,000 visits for both total hospital visits and emergency department visits. Pairwise comparisons were performed using two-proportion z-tests; Bonferroni correction was applied to control for the possibility of error from multiple testing.

Temporal changes were assessed using simple linear regression of normalized annual ratios; statistical significance was determined using the regression coefficient (β). The Mann–Kendall trend test was also used to evaluate long-term trends.

All tests were two-tailed, and statistical significance was set at $p < 0.05$. Power analyses were performed using G*Power 3.1, assuming a 95% confidence level and α = 0.05.

Results

Between January 2017 and May 31, 2025, a total of 1,005 White Code incidents were recorded. Differences in the overall number of cases and the distribution of types of violence across the three periods were statistically significant ($\chi^2 = 18.28$, $p = 0.001$).

Overall Case Distribution and Types of Violence

Pre-pandemic period (2017–2019): A total of 387 cases were reported, with an average of 129 cases per year. Of these cases, 298 (77.0%) were related to verbal violence, 66 (17.1%) to combined physical and verbal violence, and 23 (5.9%) to physical violence only.

Pandemic period (March 2020–December 2021): A total of 229 cases were recorded, with an annual average of 76.3. Verbal violence was reported in 186 cases, combined verbal and physical violence in 29 cases, and only physical violence in 14 cases. This represents a 40.8% decrease in the total number of reported cases compared to the pre-pandemic period ($p < 0.05$).

Post-pandemic period (2022–May 2025): A total of 389 cases were recorded (annual average: 97.3). Verbal violence was observed in 330 cases (84.8%), physical violence in 31 cases (8.0%), and combined verbal and physical violence in 28 cases (7.2%). Although the number of cases increased compared to the pandemic period, it did not return to pre-pandemic levels ($p < 0.05$; Table 1).

Time Period	Total cases	Mean, per year	Verbal	Physical and verbal	Physical	p Value
Pre-pandemic	387	129.0	298 (77.0%)	66 (17.1%)	23 (5.9%)	Ref.
Pandemic	229	76.3	186 (81.2%)	29 (12.7%)	14 (6.1%)	p = 0.001
Post-pandemic	389	97.3	330 (84.8%)	28 (7.2%)	31 (8.0%)	p = 0.001

Table 1. General white code data.
The Chi-square test was used to compare case distributions and types of violence among the three periods. A statistically significant difference was found between the pre-pandemic and pandemic periods, as well as between the pandemic and post-pandemic periods (p = 0.001).

Violence Against Physicians (Normalized by Total Hospital Visits)

Between January 2017 and May 2025, a total of 476 incidents targeted physicians.

Incidence rates per 100,000 hospital visits (normalized to total hospital visits) were as follows:

- Pre-pandemic: 3.54
- Pandemic period: 4.13
- Post-pandemic: 3.07

The differences were statistically significant: $\chi^2 = 145.93$, $p < 0.001$; effect size w = 0.554, power = 100%. Pairwise comparisons showed that this significant change was primarily due to the difference between the pandemic and post-pandemic periods (p = 0.011; Table 2 ; Figure 1).

Violence Against Non-Physician Healthcare Personnel (Normalized by Total Hospital Visits)

A total of 284 cases targeted non-physician healthcare personnel. Incidence rates per 100,000 hospital visits were as follows:

- Pre-pandemic: 2.30
- Pandemic period: 3.04
- Post-pandemic: 1.49

No statistically significant difference was found between the three periods (p = 0.230), and no significance level was reached in any of the pairwise comparisons (all p > 0.05) (Table 2, Figure 1).

Period	Violence Against Physicians	Violence Against Non-Physician Staff	Physician / Non-Physician Ratio	p Value
Pre-pandemic	3.54	2.30	1.54	Reference
Pandemic	4.13	3.04	1.36	$p_1 = 0.0034$
Post-pandemic	3.07	1.49	2.06	$p_2 = 0.011$ $p_3 = 0.079$ $p_4 = 0.230$

Table 2. Comparison of violence rates against physicians and non-physician healthcare staff Across pre-pandemic, pandemic, and post-pandemic periods.
*Overall difference: $\chi^2 = 145.93$, $p < 0.001$; effect size w = 0.554, power = 100%.
p_1 refers to the pairwise comparison of physician-targeted violence rates between the pre-pandemic and pandemic periods.
p_2 refers to the pairwise comparison of physician-targeted violence rates between the pandemic and post-pandemic periods.
p_3 represents the p value from the overall comparison of the physician-to-non-physician violence ratio across the three study periods.
p_4 represents the p value obtained from the overall statistical comparison of violence rates against non-physician healthcare staff across all three periods.

Figure 1. Trends in violence rates.

Rate of Violence Against Physicians/Non-Physician Personnel
The ratio of incidents targeting physicians to incidents targeting non-physician personnel was:

- Pre-pandemic: 1.54
- Pandemic period: 1.36
- Post-pandemic: 2.06

Although this difference did not reach the level of statistical significance (p = 0.079), the rate of violence against physicians/non-physicians was found to be numerically higher in the post-pandemic period (Table 2, Figure 2).

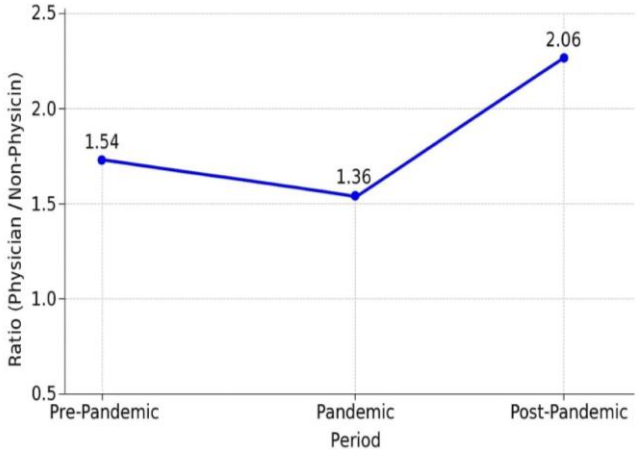

Figure 2. Trends in violence rates.

Trends in Emergency Departments
A total of 3,901,518 patient visits were recorded in the emergency department from January 2017 to May 2025. During this period, 213 incidents targeting physicians and 258 incidents targeting non-physician personnel were recorded.
Before the pandemic, there were 1,276,187 visits. Violence against physicians: 7.05 per 100,000 visits. Violence against non-physician personnel: 9.17 per 100,000 visits.
During the pandemic (695,871 visits): Violence against physicians: 7.04 per 100,000 visits. Violence against non-physician personnel: 8.05 per 100,000 visits.
After the pandemic (1,929,460 visits): Violence against physicians: 3.84 per 100,000 visits. Violence against non-physician personnel: 4.41 per 100,000 visits.
Statistical analyses revealed that incidents targeting physicians differed significantly between periods ($\chi^2 = 18.45$, $p < 0.001$); this difference was attributed to the sharp decline in the post-pandemic period. Similarly, a significant decrease was observed in incidents targeting non-physician personnel ($\chi^2 = 28.98$, $p < 0.001$) (Table 3).
Hospital-Wide IncidenceAcross all hospital units:
Pre-pandemic: 387 cases out of 5,077,092 visits (7.62 per 100,000 visits)
Pandemic period: 128 cases out of 2,273,059 visits (5.63 per 100,000 visits)
Post-pandemic: 352 cases out of 6,575,086 visits (5.35 per 100,000 visits)
Accordingly, statistically significant decreases were found between the pre-pandemic and pandemic periods (p < 0.001) and between the pandemic and post-pandemic periods (p < 0.001). Furthermore, a small but significant decrease was determined when comparing the pre-pandemic and post-pandemic periods (p = 0.0018) (Table 3).
Annual Trend Analysis
Between 2017 and 2024, annual case numbers showed significant temporal fluctuations (Figure 3). Notable increases were observed in 2018 (+79.2%) and 2019 (+24.6%), and this upward trend peaked in the early stages of the pandemic in 2020. Following this rise, a significant decrease (-21.1%) was seen in 2021; the decrease continued in 2022 (-11.7%). Although a partial recovery (+11.5%) was recorded in 2023, case numbers decreased again in 2024 (-9.5%).

Period	Total Applications	Violence Against Physicians (N, per 100,000)	Violence Against Non-Physicians (N, per 100,000)	p Value (Physicians)	p Value (Non-physicians)
Pre-pandemic	1,276,187	213 (7.05)	258 (9.17)	$p_1 = 0.416$	$p_1 < 0.0001$
Pandemic	695,871	128 (7.04)	56 (8.05)	$p_2 = 0.978$	$p_2 < 0.0001$
Post-pandemic	1,929,460	352 (3.84)	85 (4.41)	$p_3 = 0.326$	$p_3 < 0.0001$

Table 3. Trends in violence against physicians and non-physician staff per emergency department visits.
Statistical test: The Pearson Chi-square test (χ^2 test) was used.
• p_1 = p value for pairwise comparison between the pre-pandemic and pandemic periods.
• p_2 = p value for pairwise comparison between the pandemic and post-pandemic periods.
• p_3 = p value for pairwise comparison between the pre-pandemic and post-pandemic periods.
Overall comparison (all three periods combined):
- Violence against physicians: $\chi^2 = 18.45$, p = 0.540 (not significant).
- Violence against non-physician staff: $\chi^2 = 28.98$, $p = 2.34 \times 10^{-42}$.

Non-parametric trend analysis using the Mann–Kendall test indicated a general downward trend throughout the 2017–2024 period; however, this trend did not reach statistical significance (trend: decreasing, p = 0.348). Linear regression analysis of emergency department-specific violence rates revealed a negative annual trend, corresponding to a decrease of approximately 0.7 cases per 100,000 visits per year. However, this decrease was not statistically significant ($\beta \approx -0.7$, p = 0.087) and had moderate explanatory power ($R^2 = 0.38$) (Figure 3).

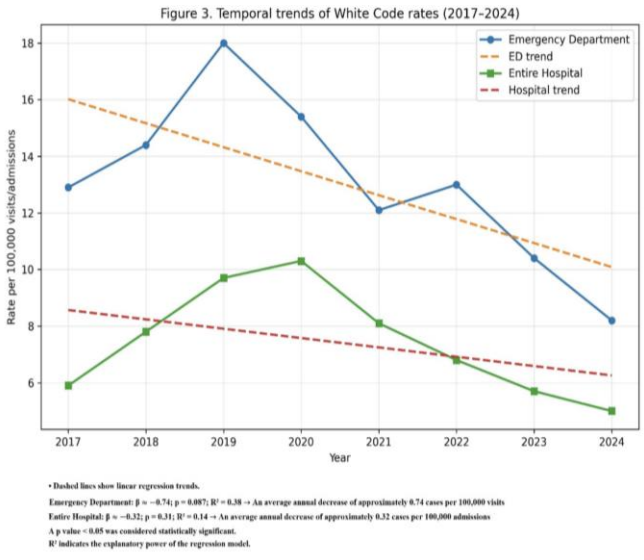

Figure 3. Annual Trends of Code White

Similarly, hospital-wide violence rates, using total hospital visits as the denominator, showed a moderate negative trend that did not reach statistical significance ($\beta \approx -0.32$, p = 0.31), and the explanatory power of the regression model remained limited ($R^2 = 0.14$).

Discussion

This study examined workplace violence against healthcare workers reported through the "White Code" system between 2017 and 2025, comparing pre-pandemic, pandemic, and post-pandemic periods in a tertiary hospital. The findings show statistically significant differences between the three periods in terms of both total case numbers and the distribution of types of violence.

The overall increase in case numbers after the pandemic suggests that structural and psychosocial disruptions caused by COVID-19 may have created lasting effects on workplace dynamics. These findings are consistent with international studies reporting long-term transformative effects of pandemics on violence in healthcare settings.

For example, Brigo et al. reported a significant increase in workplace violence in healthcare settings in the post-COVID period (12); Lombardi et al. reported a total increase of 30% in healthcare settings (13). O'Brien noted that overcrowding, long waiting times and communication breakdowns consistently increase the likelihood of aggression towards healthcare professionals (14).

In our study, violence in the emergency department increased during the pandemic period; however, it decreased afterwards. Nevertheless, it has not returned to pre-pandemic levels. It is well known that emergency departments are high-risk environments characterized by patient density, long waiting times, difficulties in crisis response, and frequent communication problems (14,15). Previous studies from Turkey also confirm this trend: In a study conducted in Afyonkarahisar, 109 cases of violence were evaluated, and it was shown that 35.7% of the violent incidents occurred in the emergency department, and the most common type of violence was verbal aggression (16). Similarly, most of the "White Code" notifications between 2015–2019 at Gaziosmanpaşa Training and Research Hospital were related to emergency departments (17).

The combination of increased workload, emotional exhaustion, and systemic crisis conditions during the pandemic has increased healthcare workers' exposure to violence, both quantitatively and qualitatively. Brigo et al. reported a significant increase in violence in emergency departments during the COVID-19 period (12). Keller et al. (18) stated that factors such as excessive workload, communication barriers, extended shifts, and discomfort due to prolonged use of personal protective equipment (PPE) contributed to increased aggression.

A meta-analysis published by Ramzi et al. in 2022 concluded that workplace violence during the pandemic weakened healthcare workers' perception of safety and contributed to their psychological distress (19). All these findings, when considered together, support our conclusion that pandemic-related violence has multifactorial psychosocial origins.

Although the number of patients visiting emergency departments decreased during the pandemic, the relative rate of violence increased. This shows that violence against healthcare workers is related not only to patient volume but also to general systemic factors such as social tension, fear, communication breakdowns, and disruptions in service delivery. For example, in the United States, despite a general decrease in emergency department visits, the relative rate of child abuse cases has been reported to have increased

(20). This reflects how crisis contexts can distort behavioral patterns. Similarly, international studies also support the association of violence during the COVID-19 period with generalized uncertainty and increased social anxiety (21).

Verbal aggression has been the dominant form of violence throughout the three periods; it has also increased significantly in the post-pandemic period (84.8%), consistent with previous research. In a university hospital in Italy, 60.5% of all violent incidents were reported to be verbal (22). A meta-analysis in Pakistan reported that between 25% and 100% of healthcare workers were exposed to verbal abuse (23). Since verbal aggression can often be a precursor to physical violence and can leave long-term psychological effects, it is necessary to strongly implement practices for its systematic identification and prevention at an early stage (24).

Furthermore, our findings show that violence targeting physicians increased significantly during the pandemic, while attacks against non-physician personnel remained relatively stable. This suggests the presence of physician-specific triggers that may be related to decision-making roles and patient interactions.

International evidence also supports this: Babkair et al. (25) found that emergency physicians in Saudi Arabia were exposed to higher rates of both verbal and physical violence compared to other personnel groups. Bhusal et al. (26) emphasized that physicians' vulnerability increased due to the pressures of visibility and communication associated with treatment outcomes.

Our findings are closely consistent with these studies, and the results show that physicians have become the primary targets of workplace aggression in emergency departments in the post-pandemic period. This also supports the need for physician-specific prevention strategies.

The absence of a statistically significant linear trend in the trend analysis indicates that violence against healthcare workers does not follow a simple or monotonic pattern of improvement over time. The year-to-year fluctuations observed throughout the study period suggest that workplace violence exhibits a non-linear, heterogeneous, and time-variable trajectory following major systemic disruptions such as the COVID-19 pandemic. Recent studies have shown that violent incidents peaked during the COVID-19 period and then decreased in some years; however, this decrease did not turn into a consistent or sustainable downward trend, but rather the levels of violence tended to stabilize around a fluctuating plateau (27–29). This pattern underlines that expecting workplace violence to decrease simply due to the passage of time is not methodologically realistic.

Furthermore, considering that violence in healthcare settings is affected by many simultaneous factors such as patient admissions, workload intensity, staff burnout, and communication difficulties, it is not surprising that univariate linear models have limited explanatory power (3, 30). Therefore, the absence of a significant linear trend in our study should not be considered an indicator of "weak effect," but rather as evidence that workplace violence is a multifactorial and nonlinear phenomenon. These findings also suggest that the partial decrease observed in the post-pandemic period cannot be seen as a spontaneous or permanent improvement; they highlight the need for continuous and targeted preventive strategies, especially in emergency departments.

Limitations

This study has several limitations. First, data were obtained from only one tertiary hospital; this may limit generalizability. Regional differences in institution size, staffing structure, and safety protocols may affect violence rates.

Second, the data are based on notifications made via “White Code”; therefore, unreported or unrecorded incidents may have been overlooked. This may be especially true for verbal aggression. Underreporting by physicians or emergency department personnel may occur, particularly due to workload issues or the normalization of aggression. This may have led to an underestimation of true incidence. Third, the retrospective design did not allow for the evaluation of contextual details such as situational stress, the tone of communication, or the distress experienced by the patients and relatives. Yet these elements could have helped to explain the specific mechanisms mediating the relationship between pandemic stressors and increased aggression.

Finally, trends in violence during the pandemic may have been influenced by various confounding factors, such as changes in patient profiles, hospital management policies, and the general level of societal anxiety. Therefore, it is not possible to establish causality by attributing the observed changes solely to the effects of the pandemic.

Conclusion

This study shows that workplace violence against healthcare workers, reported through the White Code system, is a multifaceted problem. It was significantly affected by the COVID-19 pandemic and continued in the post-pandemic period. Although a partial decrease in violent incidents was observed after the pandemic, the rates did not return to pre-pandemic levels and did not exhibit a stable or linear improvement pattern over time. These findings suggest that structural and psychosocial effects related to the pandemic have had lasting effects on healthcare delivery settings, especially in emergency departments.

The prevalence of verbal abuse and the disproportionate increase in aggression targeting physicians during the pandemic highlight the need for role-specific and unit-focused approaches rather than uniform, general measures. In this context, implementing structured training programs for emergency department personnel—repeatedly conducted and focusing on de-escalation techniques, early risk recognition, and crisis management skills—can be a critical first step. Furthermore, the wider adoption of standardized communication tools, such as structured patient information and handover protocols, can help reduce communication breakdowns that frequently trigger aggressive behavior.

In high-risk environments, particularly emergency departments, routinely implementing standardized security risk assessments can facilitate the early identification of vulnerabilities related to physical layout, personnel distribution, and existing security measures. Additionally, strengthening user-friendly digital notification

infrastructures integrated with the White Code system can enhance real-time incident reporting, improve data quality, and support the timely activation of organizational feedback and response mechanisms.

In conclusion, it is unrealistic to expect workplace violence against healthcare workers to decrease spontaneously over time. Achieving lasting and meaningful reductions requires the implementation of multi-component, unit-specific, and sustainable preventive strategies supported by continuous monitoring and trend analysis. Such structured interventions are crucial not only for ensuring the safety of healthcare workers but also for maintaining the continuity and quality of healthcare delivery.

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