

Workplace Violence Among Frontline Clinicians in Emergency Departments Amidst the COVID-19 Pandemic

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Abstract

Background: Frontline clinicians working in the emergency department (ED) were at disproportionate risk of workplace violence (WPV). This study investigated the prevalence of WPV and its association on quality of life (QOL) among this population in China during the COVID-19 pandemic.

Results: The overall prevalence of WPV was 29.2% (95%CI: 26.5%-31.9%). Multiple logistic regression analysis revealed that having family/friends/colleagues infected with COVID-19 (OR=1.81, $P=0.01$), current smoking status (OR=3.24, $P<0.01$) and severity of anxiety symptoms (OR=1.13, $P<0.01$) were positively associated with WPV. Working in inpatient ED units (OR=0.45, $P<0.01$) was negatively associated with WPV. After controlling for covariates, clinicians experiencing WPV had a lower overall QOL compared to those without ($F_{(1,1103)}=14.2$, $P<0.01$).

Conclusions: Prevalence of workplace violence was common among ED clinicians in China during the COVID-19 pandemic. Considering the negative impact of WPV on QOL and care quality, timely preventive measures should be undertaken for ED clinicians.

1. Introduction

The novel coronavirus disease (COVID-19) has become a major public health concern since early January, 2020 [1]. As of May 2020, over 5.9 million people have been infected with COVID-19 [2]. To contain the rapid transmission of the novel virus, timely identification and treatment of COVID-19 is important [3, 4]. As such, emergency departments (ED) play a critical role in medical services in early identification of infected cases [5, 6], provision of timely treatment and referral to other units/hospitals [7, 8]. Due to highly stressful and overcrowding clinical environment, heavy workload, limited communication between multidisciplinary team members, inadequate knowledge of the epidemic, lack of personal protective equipment and relevant guidelines on the diagnosis and treatment for patients in early stage of the COVID-19 pandemic, ED clinicians were often exposed to an elevated risk of infection, burnout, mental health problems and even workplace violence (WPV) [9-11].

As a global public health challenge, WPV refers to physically and psychologically damaging actions against professionals in the workplace [12]. Verbal and physical violence are common forms of WPV among clinicians [13, 14]. Some studies have examined the epidemiology of WPV on ED clinicians. For instance, a meta-analysis revealed that the lifetime prevalence of WPV was 79.8% among ED clinicians in China [13]. Previous studies found that the 1-year prevalence of WPV was 12.1% among ED clinicians in the US [15], the 2-year prevalence was 92.9% among ED clinicians in Taiwan [16], and the 1-year prevalence of WPV was 89.9% among ED clinicians in Beijing, China [17]. A recent study found that the 1-month prevalence of verbal and physical WPV was 15.8% and 3.3%, respectively among ED clinicians, while the corresponding 3-month prevalence was 13.8% and 3.3%, respectively in China [18]. WPV was associated with a diverse range of negative consequences, such as mental health problems, job dissatisfaction, decreased quality of patient care in service provision and medical errors [19, 20]. In order to develop preventive measures to mitigate the negative outcomes brought by WPV, it is important to understand the

patterns of WPV and its associated factors. In addition, quality of life (QOL) is a comprehensive health outcome which has been widely adopted in clinical practice. To date, no studies have examined the association between WPV and its association with QOL among ED clinicians during the COVID-19 pandemic. This research gap has given us the impetus to examine the prevalence of WPV and its associated factors in the frontline ED clinicians during the COVID-19 pandemic in China, and also explore the association between WPV and QOL.

2. Methods

2.1 Setting and sample

This was a cross-sectional, national online survey conducted between March 15 and March 20, 2020 in China. Due to the risk of contagion, traditional face to face assessments and random sampling cannot be not adopted. Similar to other studies [11, 21, 22], data collection was conducted using the WeChat-based QuestionnaireStar application (Changsha Renxing Science and Technology, Shanghai, China) using snowball sampling method. WeChat is a social communication program with more than 1 billion users in China including all the ED clinicians we invited to participate in this study. To be eligible, participants should be: 1) frontline ED clinicians during the COVID-19 pandemic commencing from January 20 to March 20, 2020; 2) aged 18 years; and 3) able to read/understand Chinese and provide informed consent. This study was approved by the ethics committee of University of Macau, China.

2.2 Instruments

A data collection sheet was designed to collect demographic and clinical information including gender, age, education level, marital status, work experience, shift duty, rank (junior/senior), type of hospital (primary /tertiary), working unit (inpatient/outpatient), smoking status, and work experience during the 2003 SARS outbreak. Three additional COVID-19 related questions were also asked: 1) whether they provided direct care for COVID-19 patients; 2) whether they had family members, friends or colleagues infected with COVID-19; and 3) whether they lived in a province with more than 500 confirmed COVID-19 cases throughout the study period.

WPV experienced by the frontline ED clinicians during the COVID-19 pandemic was measured by the Chinese version of the 9-item workplace violence scale [23, 24], which covers verbal and physical violence [24]. This scale has satisfactory psychometric properties [25-27]. Anxiety symptoms were assessed by the validated Chinese version of the Generalized Anxiety Disorder Scale-7 (GAD-7) [28]. This scale had been widely used in the Chinese populations [29, 30]. The total score of the GAD-7 ranged between 0 to 21, with a higher total score indicating more severe anxiety. The sum of the first two items on the World Health Organization Quality of Life Questionnaire-brief version (WHOQOL-BREF) [31] was used to assess overall QOL. A higher total score indicated higher QOL [32].

2.3 Data analysis

Data analyses were performed using SPSS statistical software version 24.0. Categorical variables were compared using Chi-square tests, and continuous variables were compared using two samples independent t-tests, or Mann-Whitney U tests between ED clinicians with WPV and those without. To explore independent correlates of WPV, multiple logistic regression analysis was conducted, with WPV as the dependent variable. All variables with a *P* value of <0.05 in the univariate analyses were entered as independent variables. Analysis of covariance (ANCOVA) was conducted to compare QOL between ED clinicians with WPV and those without after controlling for variables with significant group difference in univariate analyses as covariates. Level of significance was set as *P*<0.05, and all tests were 2-tailed.

3. Results

A total of 1,103 ED clinicians from all the 32 provinces, municipalities and autonomous regions met the study criteria and participated in this study. Overall prevalence of WPV was 29.2% (95%CI: 26.5%-31.9%; 322/1,103), with verbal violence of 27.5% and physical violence of 5.8% during the COVID-19 pandemic.

Table 1 presents the demographic and clinical characteristics of participants between non-violence and violence groups. There were significant differences between the two groups in age, years of work experience, living circumstances, rank, clinical work unit, shift work, current smoking status, having family/friends/colleagues infected with COVID-19, direct patient care of COVID-19 patients and GAD-7 total score (all *P* values <0.05). After controlling for covariates, ED clinicians with WPV had a lower overall QOL compared to those without ($F_{(1,1103)}=14.2, P<0.01$).

Table 2 shows the results of multiple logistic regression analysis. Having family/friends/colleagues infected with COVID-19 (OR=1.81, 95%CI=1.13-2.90, *P*=0.01), current smokers (OR=3.24, 95%CI=1.72-6.09, *P*<0.01) and more severe anxiety symptoms (OR=1.13, 95%CI=1.10-1.17, *P*<0.01) were positively associated with WPV. In contrast, working in inpatients units (OR=0.45, 95%CI=0.33-0.62, *P*<0.01) was negatively associated with WPV.

4. Discussion

To the best of our knowledge, this was the first study that examined WPV among ED clinicians during the COVID-19 pandemic (from January 20 to March 20, 2020). The overall prevalence of WPV was 29.2% (95%CI: 26.5%-31.9%) among ED clinicians in this study. Since no studies have used similar timeframe in the past, direct comparison with our study findings was not plausible. Nonetheless, a previous study found that the 1-month prevalence of verbal and physical WPV among ED clinicians was 15.8% and 3.3%, respectively, while the corresponding 3-month prevalence was 13.8% and 3.3%, respectively [18]. Results of these existing studies were lower than our findings. Of particular note was that our findings were even higher than the 1-year prevalence of WPV among ED clinicians in the US (12.1%) [15], but lower than the 2-year prevalence (92.9%) in Taiwan [16], and the 1-year prevalence (89.9%) in Beijing, China [17]. Our findings were also lower than the lifetime prevalence (79.8%) among ED clinicians in China reported in a meta-analysis [13].

Apart from different measures on WPV, sampling methods and timeframe between studies, we speculated some reasons that could possibly explain the common WPV among ED clinicians during the COVID-19 pandemic. First, many ED clinicians, especially those experienced physicians/nurses, joined the crisis response teams, they volunteered to work in infectious hospitals which increased insurmountable pressure on existing scant health resources in China. In addition, low clinician-to-patient ratio, alongside with many cases suffering from life-threatening illnesses in ED that required immediate attention [33, 34], may affect the efficiency and quality of care, which undeniably increase patients' and their families' dissatisfaction and irritability, and eventually lead to WPV [34]. Second, ED clinicians encountered enormous pressure and heavy workload from multi-party during the pandemic. Excessive mental stress and physical exhaustion may easily trigger mental health problems [35, 36], together with use of personal protective equipment, deter effective communication with patients, or stir up conflicts with patients / family members [17]. Miscommunication or ineffective communication was a known factor causing WPV in clinical settings. Third, some urgent contingent measures in ED were adopted to prevent the rapid disease transmission. For example, all patients and their families must wear face masks with temperature check on entry, and thus, the number of ED entrances and exits were reduced, which could lead to patient dissatisfaction, increased disputes between hospitals administrators, physicians/nurses and patients, on top of long waiting time and high medical expenses. All these human and structural factors may trigger WPV [37, 38].

Our study found that ED clinicians working in inpatient units had lower likelihood of reporting WPV. In inpatient units, ED clinicians usually had sufficient time to communication with patients about their illnesses and adjust treatment plans [39, 40]. Effective communication could improve the relationship between clinicians and care recipients. Furthermore, most family visits were suspended during the COVID-19 pandemic. This suspension could largely reduce the likelihood of face-to-face WPV originated from patients' families [41]. Besides, emergency psychological response services established for inpatients in many hospitals could help alleviate patients' mental distress and other mental health problems [42-44], which proportionally reduce the risk of WPV in ED settings.

In this study, ED clinicians who had family/friends/colleagues infected with COVID-19 reported more WPV than those without. Frontline clinicians with infected family/friends/colleagues usually suffered from fear of contagion and other negative mood symptoms, such as high level of stress, depressive and anxiety symptoms and psychological trauma [45]. Past research had also reported that psychological trauma was common among healthcare workers with infected family/friends/colleagues during the Severe Acute Respiratory Syndrome (SARS) outbreak [46]. Clinicians inherited with negativity could affect the overall quality of service delivery and deter effective communication with patients and their families, and even lead to WPV.

Previous studies found that clinicians with smoking behaviour reported more WPV than non-smokers [47, 48], which was also confirmed in this study. Smoking behaviors could be associated with high level of work-related stress [49] and burnout [49, 50]. High level of stress and burnout could impair concentration, inattention to patients which highly increase the risk of medical errors, resulting in poor relationship with patients and high risk of WPV. Similar with previous findings [14, 51], ED clinicians suffering from severe anxiety symptoms were associated with higher risks of WPV. The relationship between anxiety and WPV

was bidirectional. On the one hand, ED clinicians with anxiety symptoms were more likely to stir up conflicts with others, resulting in aggression and WPV [51]. On the other hand, anxiety may affect the quality of care in clinical practice, which triggered WPV perpetrated by patients and/ their family members [52, 53].

QOL is determined by the interaction of distressing (e.g. adverse events and anxiety) and protective factor (e.g. good social support and economic status) according to the distress/protection QOL model [54]. Previous studies found that health professionals may suffer from short- and long-term adverse consequences following WPV incidents such as lower quality of care, physical injuries and emotional problems [55, 56]. Therefore, it is reasonable to assume that ED clinicians who experienced WPV were more likely to have lower QOL than those without. As expected, our study found that ED clinicians with WPV had lower QOL than those without, which echoed previous findings [13, 19, 57].

The merits of this study included the large sample size and use of standardized instruments on WPV. There were several limitations that needed to be addressed. First, the cross-sectional study design implied that causal relationship between WPV and other variables cannot be established. Second, due to logistical reasons, pre-existing mental health conditions of participants were not measured. Third, most of ED clinicians were predominantly females, which may subject to gender bias to a certain extent.

5. Conclusions

WPV was common among ED clinicians during the COVID-19 pandemic in China. Due to the negative detrimental impact of WPV and QOL, effective preventive measures on WPV should be developed, and timely psychological assistance should be provided to those victimized by WPV.

Declarations

Ethics approval and consent to participate

This study was approved by the ethics committee of University of Macau, China. All participants provide informed consent in the study.

Consent for publication

Not applicable.

Availability of data and materials

The datasets used and/or analyzed during the current study are available from the corresponding author upon request.

Competing interests

The authors declare that they have no competing interests.

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Authors' contributions

Study design: Feng-Rong An, Yu-Tao Xiang. Data collection, analysis and interpretation: Ying An, Rui Liu, Aiping Wang, Yue Li, Yan-Jie Zhao, Anzhe Yuan. Drafting of the manuscript: Rui Liu, Ling Zhang, Teris Cheung. Critical revision of the manuscript: Ming-Zhao Qin, Gabor S. Ungvari. Approval of the final version for publication: all co-authors.

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References

1. World Health Organization: The Coronavirus disease (COVID-19) outbreak. <https://www.who.int> (Accessed March 30, 2020) 2020.
2. World Health Organization: Coronavirus disease (COVID-2019) situation reports-132. https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200531-covid-19-sitrep-132pdf?sfvrsn=d9c2eaef_2 (Accessed May 31, 2020) 2020.
3. Shereen MA, Khan S, Kazmi A, Bashir N, Siddique R: COVID-19 infection: Origin, transmission, and characteristics of human coronaviruses. *J Adv Res* 2020, 24:91-98.
4. Chan JF-W, Yuan S, Kok K-H, To KK-W, Chu H, Yang J, Xing F, Liu J, Yip CC-Y, Poon RW-S *et al*: A familial cluster of pneumonia associated with the 2019 novel coronavirus indicating person-to-person transmission: a study of a family cluster. *The Lancet* 2020, 395(10223):514-523.
5. Bressan S, Buonsenso D, Farrugia R, Oostenbrink R, Titomanlio L, Roland D, Nijman RG, Maconochie I, Da Dalt L, Mintegi S: Preparedness and response to Pediatric CoVID-19 in European Emergency Departments: a survey of the REPEM and PERUKI networks. *Annals of Emergency Medicine* 2020.
6. National Health Commission of the People's Republic of China: Notice on Further Strengthening Epidemic Prevention and Control in Medical Institutions. <http://www.nhcgov.cn/xcs/zhengcwj/202003/0c85996bb762437581e98317365fa01cshtml> (Accessed March 13, 2020) 2020(accessed March 13 2020).
7. Lam SK, Kwong EW, Hung MS, Pang SM: Bridging the gap between guidelines and practice in the management of emerging infectious diseases: a qualitative study of emergency nurses. *Journal of Clinical Nursing* 2016.
8. Lam SKK, Kwong EWY, Hung MSY, Pang SMC, Chien WT: A qualitative descriptive study of the contextual factors influencing the practice of emergency nurses in managing emerging infectious

- diseases. *International Journal of Qualitative Studies on Health and Well-Being* 2019, 14(1):1626179.
9. Gerberich SG, Church TR, McGovern PM, Hansen H, Nachreiner NM, Geisser MS, Ryan AD, Mongin SJ, Watt GD, Jurek A: Risk factors for work-related assaults on nurses. *Epidemiology* 2005, 16(5):704-709.
 10. Chapman R, Styles I: An epidemic of abuse and violence: Nurse on the front line. *Accident and Emergency Nursing* 2006, 14(4):245-249.
 11. Liu S, Yang L, Zhang C, Xiang Y-T, Liu Z, Hu S, Zhang B: Online mental health services in China during the COVID-19 outbreak. *The Lancet Psychiatry* 2020, 7(4):e17-e18.
 12. National Institute for Occupational Safety and Health: National Institute for Occupational Safety and Health Violence: occupational hazards in hospitals. <https://www.cdc.gov/niosh/docs/2002-101/pdfs/2002-101pdf> (Accessed June 5, 2016) 2016.
 13. Lu L, Dong M, Wang SB, Zhang L, Ng CH, Ungvari GS, Li J, Xiang YT: Prevalence of Workplace Violence Against Health-Care Professionals in China: A Comprehensive Meta-Analysis of Observational Surveys. *Trauma Violence Abuse* 2020, 21(3):498-509.
 14. Jiao M, Ning N, Li Y, Gao L, Cui Y, Sun H, Kang Z, Liang L, Wu Q, Hao Y: Workplace violence against nurses in Chinese hospitals: a cross-sectional survey. *BMJ Open* 2015, 5(3):e006719.
 15. Speroni KG, Fitch T, Dawson E, Dugan L, Atherton M: Incidence and cost of nurse workplace violence perpetrated by hospital patients or patient visitors. *J Emerg Nurs* 2014, 40(3):218-228; quiz 295.
 16. Lee H-L, Han C-Y, Redley B, Lin C-C, Lee M-Y, Chang W: Workplace Violence Against Emergency Nurses in Taiwan: A Cross-Sectional Study. *Journal of Emergency Nursing* 2020, 46(1):66-71.e64.
 17. Li N, Zhang L, Xiao G, Chen J, Lu Q: The relationship between workplace violence, job satisfaction and turnover intention in emergency nurses. *Int Emerg Nurs* 2019, 45:50-55.
 18. Wang P-Y, Fang P-H, Wu C-L, Hsu H-C, Lin C-H: Workplace Violence in Asian Emergency Medical Services: A Pilot Study. *Int J Environ Res Public Health* 2019, 16(20):3936.
 19. Wu S, Lin S, Li H, Chai W, Zhang Q, Wu Y, Zhu W: A study on workplace violence and its effect on quality of life among medical professionals in China. *Archives of environmental & occupational health* 2014, 69(2):81-88.
 20. Gacki-Smith J, Juarez AM, Boyett L, Homeyer C, Robinson L, MacLean SL: Violence against nurses working in US emergency departments. *J Nurs Adm* 2009, 39(7-8):340-349.
 21. An Y, Yang Y, Wang A, Li Y, Zhang Q, Cheung T, Ungvari GS, Qin M-Z, An F-R, Xiang Y-T: Prevalence of depression and its impact on quality of life among frontline nurses in emergency departments during the COVID-19 outbreak. *J Affect Disord* 2020, 276:312-315.
 22. Tian T, Meng F, Pan W, Zhang S, Cheung T, Ng CH, Li X-H, Xiang Y-T: Mental health burden of frontline health professionals treating imported patients with COVID-19 in China during the pandemic. *Psychological Medicine* 2020:1-2.
 23. Chen Z-H, Wang S-Y, Lu Y, Jing C-X: Analysis on the epidemiological features and risk factors of hospital workplace violence in Guangzhou. *Zhonghua liu xing bing xue za zhi= Zhonghua liuxingbingxue zazhi* 2004, 25(1):3-5.

24. Chen Z: An epidemiological study of hospital workplace violence in Guangzhou city (in Chinese) [thesis]. *Guangdong: Southern Medical University* 2011.
25. Duan X, Ni X, Shi L, Zhang L, Ye Y, Mu H, Li Z, Liu X, Fan L, Wang Y: The impact of workplace violence on job satisfaction, job burnout, and turnover intention: the mediating role of social support. *Health and quality of life outcomes* 2019, 17(1):93.
26. Lu L, Lok K-I, Zhang L, Hu A, Ungvari GS, Bressington DT, Cheung T, An F-R, Xiang Y-T: Prevalence of verbal and physical workplace violence against nurses in psychiatric hospitals in China. *Archives of psychiatric nursing* 2019, 33(5):68-72.
27. Shi L, Li G, Hao J, Wang W, Chen W, Liu S, Yu Z, Shi Y, Ma Y, Fan L: Psychological depletion in physicians and nurses exposed to workplace violence: A cross-sectional study using propensity score analysis. *International Journal of Nursing Studies* 2020, 103:103493.
28. Spitzer RL, Kroenke K, Williams JB, Löwe B: A brief measure for assessing generalized anxiety disorder: the GAD-7. *Archives of internal medicine* 2006, 166(10):1092-1097.
29. He XY, Li C, Qian J, Cui HS, Wu WY: Reliability and validity of a generalized anxiety scale in general hospital outpatients. *Shanghai Archives of Psychiatry* 2010, 22:200-203.
30. Tong X, An D, McGonigal A, Park S-P, Zhou D: Validation of the Generalized Anxiety Disorder-7 (GAD-7) among Chinese people with epilepsy. *Epilepsy Research* 2016, 120:31-36.
31. Harper A, Power M, Grp W: Development of the World Health Organization WHOQOL-BREF quality of life assessment. *Psychological Medicine* 1998, 28(3):551-558.
32. Gholami A, Jahromi LM, Zarei E, Dehghan A: Application of WHOQOL-BREF in Measuring Quality of Life in Health-Care Staff. *Int J Prev Med* 2013, 4(7):809-817.
33. Ajani K: Triage; a literature review of key concepts. *J Pak Med Assoc* 2012, 62(5):487-489.
34. Chen S, Lin S, Ruan Q, Li H, Wu S: Workplace violence and its effect on burnout and turnover attempt among Chinese medical staff. *Archives of environmental & occupational health* 2016, 71(6):330-337.
35. Xiang Y-T, Yang Y, Li W, Zhang L, Zhang Q, Cheung T, Ng CH: Timely mental health care for the 2019 novel coronavirus outbreak is urgently needed. *The Lancet Psychiatry* 2020, 7(3):228-229.
36. Li W, Yang Y, Liu Z-H, Zhao Y-J, Zhang Q, Zhang L, Cheung T, Xiang Y-T: Progression of Mental Health Services during the COVID-19 Outbreak in China. *Int J Biol Sci* 2020, 16(10):1732-1738.
37. Wu S, Zhu W, Li H, Lin S, Chai W, Wang X: Workplace violence and influencing factors among medical professionals in China. *American journal of industrial medicine* 2012, 55(11):1000-1008.
38. Liu H, Zhao S, Jiao M, Wang J, Peters DH, Qiao H, Zhao Y, Li Y, Song L, Xing K *et al*: Extent, Nature, and Risk Factors of Workplace Violence in Public Tertiary Hospitals in China: A Cross-Sectional Survey. *Int J Environ Res Public Health* 2015, 12(6):6801-6817.
39. Briones AA: Admission handoff between emergency department and inpatient units. 2016.
40. Michel J-P, Walston JD: Oxford textbook of geriatric medicine: Oxford University Press; 2018.
41. Sharifi S, Shahoei R, Nouri B, Almvik R, Valiee S: Effect of an education program, risk assessment checklist and prevention protocol on violence against emergency department nurses: A single center before and after study. *International Emergency Nursing* 2020:100813.

42. Xiang Y-T, Yang Y, Li W, Zhang L, Zhang Q, Cheung T, Ng CH: Timely mental health care for the 2019 novel coronavirus outbreak is urgently needed. *Lancet Psychiatry* 2020, 7(3):228-229.
43. Yang Y, Li W, Zhang Q, Zhang L, Cheung T, Xiang Y-T: Mental health services for older adults in China during the COVID-19 outbreak. *The Lancet Psychiatry* 2020, 7(4):e19.
44. Chen Q, Liang M, Li Y, Guo J, Fei D, Wang L, He L, Sheng C, Cai Y, Li X *et al*: Mental health care for medical staff in China during the COVID-19 outbreak. *The Lancet Psychiatry* 2020, 7(4):e15-e16.
45. Kumar A, Nayar KR: COVID 19 and its mental health consequences. *Journal of Mental Health* 2020:1-2.
46. Wu P, Fang Y, Guan Z, Fan B, Kong J, Yao Z, Liu X, Fuller CJ, Susser E, Lu J *et al*: The psychological impact of the SARS epidemic on hospital employees in China: exposure, risk perception, and altruistic acceptance of risk. *Can J Psychiatry* 2009, 54(5):302-311.
47. Borrello S: Warning! Smoking may be hazardous to your career. *Nursing made Incredibly Easy* 2012, 10(2):56.
48. Arnetz JE, Arnetz BB, Petterson I-L: Violence in the nursing profession: occupational and lifestyle risk factors in Swedish nurses. *Work & Stress* 1996, 10(2):119-127.
49. Roberts RK, Grubb PL: The consequences of nursing stress and need for integrated solutions. *Rehabil Nurs* 2014, 39(2):62-69.
50. Koutsimani P, Montgomery A, Georganta K: The Relationship Between Burnout, Depression, and Anxiety: A Systematic Review and Meta-Analysis. *Front Psychol* 2019, 10:284-284.
51. Cheung T, Yip PS: Workplace violence towards nurses in Hong Kong: prevalence and correlates. *BMC public health* 2017, 17(1):196.
52. Chen WC, Hwu HG, Kung SM, Chiu HJ, Wang JD: Prevalence and determinants of workplace violence of health care workers in a psychiatric hospital in Taiwan. *Journal of occupational health* 2008, 50(3):288-293.
53. Pourshaikhian M, Abolghasem Gorji H, Aryankhesal A, Khorasani-Zavareh D, Barati A: A Systematic Literature Review: Workplace Violence Against Emergency Medical Services Personnel. *Arch Trauma Res* 2016, 5(1):e28734-e28734.
54. Kurs R, Farkas H, Ritsner M: Quality of life and temperament factors in schizophrenia: comparative study of patients, their siblings and controls. *Quality of Life Research* 2005, 14(2):433-440.
55. Magnavita N: Workplace violence and occupational stress in healthcare workers: a chicken-and-egg situation-results of a 6-year follow-up study. *J Nurs Scholarsh* 2014, 46(5):366-376.
56. Mento C, Silvestri MC, Bruno A, Muscatello MRA, Cedro C, Pandolfo G, Zoccali RA: Workplace violence against healthcare professionals: A systematic review. *Aggression and Violent Behavior* 2020, 51:101381.
57. Nowrouzi-Kia B: The impact of workplace violence on health care workers' quality of life. *Developmental Medicine & Child Neurology* 2017, 59(7):675-675.

Tables

Table 1 Demographic Characteristics

Variables	Total (N=1,103)		Non-violence group (N=781)		Violence group (N=322)		χ^2	df	P
	N	%	N	%	N	%			
Male gender	102	9.2	66	8.5	36	11.2	2.02	1	0.16
Married	710	64.4	495	63.4	215	66.8	1.14	1	0.29
College education and above	1073	97.3	756	96.8	317	98.4	2.34	1	0.13
Living with family	838	76.0	578	74.0	260	80.7	5.67	1	0.02
Junior (ranking)	747	67.7	552	70.7	195	60.6	10.68	1	<0.01
Experience of 2003 SARS outbreak	184	16.7	130	16.6	54	16.8	0.003	1	0.96
Working in tertiary hospitals	961	87.1	681	87.2	280	87	0.01	1	0.91
Working in inpatient department	377	34.2	299	38.3	78	24.2	20.04	1	<0.01
Shift duty	929	84.2	670	85.8	259	80.4	4.92	1	0.03
Local COVID-19 cases \geq 500	156	14.1	116	14.9	40	12.4	1.11	1	0.29
Having infected family/friends/colleagues	90	8.2	52	6.7	38	11.8	8.05	1	<0.01
Taking care of infected patients	250	22.7	157	20.1	93	28.9	10.03	1	<0.01
Current smoker	45	4.1	22	2.8	23	7.1	10.90	1	<0.01
	Mean	SD	Mean	SD	Mean	SD	T/Z	df	P
Age (years)	32.2	7.6	31.8	7.6	33.2	7.5	-2.77	1101	<0.01
Working experience (years)	10.7	8.3	10.3	8.3	11.8	8.3	-3.51 ^a	-	<0.01
GAD-7 total	3.6	4.6	2.8	4.1	5.5	5.1	-9.41 ^a	-	<0.01
Overall QOL score	6.3	1.6	6.6	1.6	5.7	1.5	8.22	1101	<0.01

a: Mann-Whitney U test; Bolded values: P<0.05; SD: standard deviation; COVID-19: Corona Virus Disease 2019; SARS: Severe Acute Respiratory Syndrome; QOL: Quality of Life; GAD: Generalized Anxiety Disorder

Table 2 Independent correlates of violence by multiple logistic regression analysis

Variables	Multiple logistic regression analysis		
	P value	OR	95%CI
Living with family	0.28	1.22	0.85 - 1.77
Junior (ranking)	0.05	0.68	0.46 - 1.00
Working in inpatient department	<0.01	0.45	0.33 - 0.62
Shift duty	0.34	0.81	0.53 - 1.25
Having infected family/friends/colleagues	0.01	1.81	1.13 - 2.90
Direct care of COVID-19 patients	0.06	1.37	0.99 - 1.89
Current smoker	<0.01	3.24	1.72 - 6.09
Age (years)	0.39	0.97	0.90 - 1.04
Working experience (years)	0.54	1.02	0.95 - 1.10
GAD-7 total	<0.01	1.13	1.10 - 1.17
Bolded values: P<0.05; CI: confidential interval; GAD: Generalized Anxiety Disorder; OR: odds ratio			