

## **The study on risk factors for severity of physical violence against the medical staff in China.**

**Xuan Hu<sup>1</sup>, Jindong Xu<sup>2</sup>, Kai Wang<sup>3</sup>, Wenzhi Cai<sup>4\*</sup>, Guoxiao Zhang<sup>5</sup>**

<sup>1</sup>Nursing Department, Shenzhen Hospital of Southern Medical University, 1333 New Lake Road, Shenzhen, Guangdong Province, 518100, PR China

<sup>2</sup>Department of Anesthesiology, Guangdong Cardiovascular Institute, Guangdong General Hospital, Guangdong Academy of Medical Science, 510080, PR China

<sup>3</sup>School of Public Health, Southern Medical University, 1838 North Road, Guangzhou, Guangdong Province, 510515, PR China

<sup>4</sup>President's Office, Shenzhen Hospital of Southern Medical University, 1333 New Lake Road, Shenzhen, Guangdong Province, 518100, PR China

<sup>5</sup>College of Economic Jinan University, West Huangpu Avenue, Guangzhou, Guangdong, 510632, PR China

### **Abstract**

**Background:** To analyse the risk factors for severity of physical violence inflicted upon the medical staff in China.

**Methods:** Keywords related to physical violence against medical staff from January 2000 to December 2015 were extracted through on-line news, and risk factors for severity of physical violence against the medical staff in China were analysed.

**Results:** In location type, the risk for severity of physical violence was the highest in the places outside the hospital, followed by the office area, outpatient area and inpatient area. When there was a medical behavior between medical staff and attacker, the risk for severity of physical violence was higher. The ICU, emergency and outpatient clinics, other departments, internal medicine and surgery departments were the departments where the risk for severity of physical violence increased successively. Medical staff-, patient-, and illness-related factors increasingly contributed to severity of physical violence successively.

**Conclusions:** Risk factors for the severity of physical violence against medical staff were location where physical violence occurs, department where medical staff work, and causes underlying physical violence incidents. The study suggests that physical violence is serious in Chinese healthcare settings. Effective measures should be taken to prevent and reduce injuries of physical violence against medical staff.

**Keywords:** Physical violence, Severity, Risk factors, Medical staff. **List of Abbreviations:** NIOSH: National Institute for Occupational Safety and Health; WHO: World Health Organization; ICU: Intensive Care Unit; OR: Odds Ratio.

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### **Introduction**

Workplace violence, a dangerous and complex occupational hazard in the modern health care work environment, presents challenges for nurses, other health care employees, management, labor unions, and regulators [1]. The National Institute for Occupational Safety and Health (NIOSH) defines workplace violence as “violent acts (including physical assaults and threats of assaults) directed toward persons at work or on duty [2].” According to data from the Bureau of Labor Statistics, over 23,000 significant injuries in 2013 due to assaults in the workplace, of which more than 70% were in healthcare and social service industry. In case of violence,

healthcare and social service employees are almost 4 times as likely to be hurt as the average private sector employees [3]. According to the World Health Organization (WHO) report, Attacks on Health Care: Prevent, Protect, and Provide, over the 2-year period from January 2014 to December 2015, there were 594 reported attacks on healthcare workers that resulted in 959 deaths and 1561 injuries in 19 countries [4]. Suffering workplace violence can lead to many adverse outcomes, including personal safety concerns, job insecurity, fear, lower job performance, job satisfaction, reduced affective commitment, intent to turnover, psychological distress,

emotional exhaustion, depression, interpersonal deviance, and organizational deviance [5].

Workplace violence is even more serious in China. The earliest written record of assaults against physicians in Chinese history dates back to History of the Three Kingdoms: Biography of Hua Tuo. Cao Cao, an ancient emperor in the Three Kingdom Period, killed Hua Tuo, a reputed physician. In modern society, serious assaults against medical staff in China have attracted nationwide attention. The past few years have seen frequent occurrences of hospital violence, especially pernicious incidents. According to research data for 2014 published by the Chinese Medical Doctor Association, 59.97% of medical staff has encountered verbal violence and 13.07% have suffered from physical injuries. Only 27.14% of medical staff has never experienced violence [6]. On 7 May 2016 at 12:39 pm, Chen Zhongwei, a retired doctor in the stomatology department of Guangdong General Hospital died after an emergency rescue (he was stabbed in a knife attack by a former patient (25 y earlier) in the afternoon on 5 May). This event aroused the attention of Chinese society to the critical issue of hospital violence [7].

Over the past decades, several studies have been carried out on work place violence, and much attention has been focus on causes and preventive measures [8,9]. Many countries have adopted occupational and safety legislation to prevent workplace violence [10]. However, many of the existing studies on physical violence against medical staff have focused on the causes of physical violence and the influence of gender of the attackers [11]. The factors which influence the severity of physical violence in the Chinese healthcare setting still await comprehensive analysis. The purpose of this study was to better understand the factors which affect the severity of physical assaults on medical staff in China in an effort to prevent physical violence and decrease the deleterious effects.

## Methods

According to previous studies, the prevalence of non-physical or psychological aggression is higher than that for physical violence [5,12,13] and many hospital violence incidents is under-reported [1,14-16]. However the media is more concerned about the incidents of workplace violence causing severe physical injury. It is therefore likely that the assessments of severity and descriptions of physical injuries outlined in these reports are reasonably accurate [13]. So, we search for relevant media reports of physical violence against medical staff and analyse the risk factors for severity of physical violence in Chinese healthcare settings.

**Table 1.** Classification and value assignment of extracted information.

Classification	Extracted information	Value assigned
Severity of physical violence	No injury: no harm and no physical assault or damage	1
	Causing mild injury: such as pain, bruises, scratches, or nausea	2

## Study design

The study was conducted by extracting the keywords related to physical violence against Chinese medical staff from January 2000 to December 2015 through on-line news and analyse the risk factors of influence in severity of physical violence injuries.

The researchers collected online news reports about workplace violence by searching Chinese keywords, such as “violence against doctors,” “hospital violence,” and “assaults against doctors” on Baidu (www.baidu.com) and reviewing recorded workplace violence cases on www.dxy.cn, www.medlive.cn and other well-known medical websites. Cases involved in this research occurred in China between January 2000 and December 2015. Hospital violence referred to in the current study was defined as “incidents where staff are abused, threatened, or assaulted in circumstances related to their work, including commuting to and from work, involving an explicit or implicit challenge to their safety, well-being, or health” [17]. A total of 320 cases of physical violence incidents were included.

## Chinese keyword extraction and value assignment

The severity of physical violence against Chinese medical staff was classified according to the Investigation on hospital violence during 2003 to 2012 in China [18] and the standards used in previous studies [16,19]. For each reported incident, the information extracted was as follows: severity of physical violence inflicted upon the medical staff; city level; time of occurrence; level of hospital; department of occurrence; location where physical violence occur; causes of physical violence; whether or not there was a medical behavior between medical staff and attacker; professional title of the medical staff being attacked; response to physical violence; age of patient involved in the incident; treatment outcome of the patient; gender of the attacker; age of the attacker; relationship between the attacker and patient; occupation of the attacker; risk factors of the attacker himself; whether or not medical disputes occurred; and whether or not professional hospital violators were involved. Firstly, two researchers manually performed keyword extraction from the 320 reported cases. Then, the extracted information was classified and the value was assigned (Table 1). Finally, based on Python language, a logic check was carried out from two aspects, number and value of variables, concerning the manually extracted keywords.

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	Causing moderate injury: such as cuts, bone fractures, injuries of internal organs or head, abortion, hernia, and hospitalization	3
	Causing severe injury: such as functional disorders or permanent disability, shock, and coma	4
	Death	5
City level*	First-tier city: Including old and new first-tier cities	1
	Second-tier cities: Second-tier cities	2
	Third-tier cities: Third-, fourth-, fifth-, and sixth-tier cities	3
Time of occurrence	Day shift: 8:00-12:00; 14:30-18:00	1
	Night shift: 18:00-22:30; 22:30-8:00	2
	Middle shift: 12:00-14:30	3
Level of hospital	Tertiary hospital	1
	Non-tertiary hospital	2
Department	Outpatient departments .emergency and ICU: Outpatient clinic, emergency room, ICU, infusion room, and injection room	1
	Internal medicine and surgery departments	2
	Other departments: pediatrics, gynecology and obstetrics, otorhinolaryngology, ophthalmology, stomatology, oncology, and dermatology	3
Location	Inpatient area: Ward	1
	Outpatient area: Outpatient clinic, consulting room, examination room, waiting area, registration office, charge room	2
	Office area: Nurse's station, doctor's office, demonstration room, and dispensing room	3
	Outside hospital: Patient's home, on the way to emergency aid, commuting to and from work	4
	Illness-related factors: Falling short of the patients' expectations; dissatisfied with the treatment protocols; dissatisfied with the diagnosis; accidental death from anesthesia; dissatisfied with the treatment outcome; dissatisfied with medical appraisal	1
Causes	Medical staff-related factors: Poor doctor-patient communication; high medical expenses; poor service; inadequate medical equipment; complex hospital process/low working efficiency; neglect/ slow response to reasonable appeal by the patient; mistakes in laboratory reports (e.g., wrong name); slow traveling speed of the emergency car; shift of bed or medical equipment; technical error; puncture failure or pain; intrusion of gender-related privacy	2
	Patient-related factors: Alcohol abuse; mental diseases; ungrounded stigmatization; refusal to keep quiet in the hospital or waiting in a queue; demanding a leave permit or certificate for no reason; dissatisfied with a change doctor in charge; refusal to pay expenses; refusal to receive infusion; demanding unauthorized prescriptions; unpermitted visits; suspected intention of the medical staff; unpermitted entrance into the consulting room	3
Whether or not there was a medical behavior between medical staff and attacker	Yes	1
	No	2
	Hospital president, staff of medical affair department	1
	Senior title or associate senior title	2
Professional title of the medical staff being attacked	Intermediate title(attending doctor or nurses-in-charge)	3
	Primary title and interns	4
	No titles	5
	Mediation by superiors	1
	Calling the police or securities for help	2
Response to	Asking the colleagues and patients for help	3
Physical violence	Self-rescue and escape	4

	Be diametrically opposed to	5
	Explanation and persuasion	6
	Forbearance/no response	7
	New-borns and infants	1
	Young children and teenagers	2
Age of patient	Young adults	3
	Middle-age	4
	Old-age	5
	Missing	6
	Improved or cured	1
Treatment outcome	Not cured	2
	Death	3
	Male	1
Gender of the attacker	Female	2
	Adolescents	1
Age of attacker	Middle-age	2
	Old-age	3
	Missing	4
	Patient himself/herself	1
Relationship between the attacker and the patient	Relatives of patients	2
	Friends, colleagues, and caregivers of patients	3
	People who interfere with the treatment	4
	Unemployed, retired, laid-off, or employed	1
	Farmers	2
	Businessmen	3
Occupation of the attacker	Working staff of public institutions	4
	Workers and drivers	5
	Students	6
	Missing	7
	Mental diseases	1
	Alcohol and drug abuse	2
Attacker-related factors	Family misfortune: Divorced, poverty, and early death of children	3
	History of assaulted medical staff, drunken driving, and being sentenced	4
	Missing	5
Whether or not medical disputes occur	Yes	1
	No	2
Whether or not Professional Hospital Violators were involved	Yes	1
	No	2

**Conversion of extracted information to values assigned**

**Value conversion:** After value assignment for extracted information of each reported case, then conduct numeric conversion and input into Excel software, re-checked.

**Statistical analysis**

SPSS Windows (version 20.0) was used for data statistical analysis,  $\alpha$  0.05 significance level was used. Severity of physical violence was classified into 5 levels, with level 1 indicating the lowest severity and level 5 the highest severity

(i.e., no injury, mild injury, moderate injury, severe injury, and death). The frequencies were counted, then the Kruskal-Wallis rank-sum test was used to compare statistical difference of different risk factors to the severity of physical violence. The ordinal logistic regression model was fitted according to univariate analysis. Risk factors to the severity of physical violence were selected with the forward procedure.

**Results**

Keyword frequencies and constituent ratios are shown in Table 2.

**Table 2.** Keyword frequencies and constituent ratios.

Classification	Keywords	Frequencies (n)	Constituent ratio (%)
Severity	No injury	43	13.4
	Mild injury	34	10.6
	Moderate injury	168	52.5
	Severe injury	44	13.8
	Death	31	9.7
City level	First-tier city	142	44.4
	Second-tier city	52	16.3
	Third-tier city	126	39.4
	Day shift	151	47.2
Time of occurrence	Night shift	123	38.4
	Middle shift	46	14.4
Hospital level	Tertiary hospital	175	54.7
	Non-tertiary hospital	145	45.3
Department	Outpatient clinic, emergency department, and ICU	123	38.4
	Internal medicine and surgery departments	93	29.1
	Other departments	104	32.5
Location	Inpatient area	54	16.9
	Outpatient area	169	52.8
	Office area	71	22.2
	Outside hospital	20	6.3
	Missing	6	1.9
Causes of physical violence	Illness-related	124	38.8
	Medical staff-related	99	30.9
	Patient-related	97	30.3
Whether or not there was a medical behavior between medical staff and attacker	Yes	114	35.6
	No	206	64.4
Professional title of the medical staff being attacked	Hospital president, staff of medical affair department	15	4.7

	Head of department, senior title, and associate senior title	62	19.4
	Intermediate title, attending doctor or nurses-in-charge	4	1.3
	Primary title and interns	14	4.4
	Missing	225	70.4
Response to physical violence	Mediation by superiors	6	1.9
	Calling the police or security for help	172	53.8
	Asking colleagues and patients for help	59	18.4
	Self-rescue and escape	24	7.5
	Be diametrically opposed to	9	2.8
	Explanation and persuasion	6	1.9
	Forbearance/no response	44	13.8
Age of patient	New-borns and infants	21	6.6
	Young children and teenagers	27	8.4
	Young adults	80	25
	Middle-age	32	10
	Old-age	38	11.9
	Missing	122	38.1
Treatment outcome	Improved and cured	188	58.8
	Not cured	63	19.6
	Death	69	21.6
Gender of the attacker	Male	285	89.1
	Female	35	10.9
Age of attacker	Adolescents	77	24.1
	Middle-age	37	11.6
	Old-age	9	2.8
	Missing	197	61.6
Relationship between the attacker and the patient	Patient himself/herself	101	31.6
	Relatives of patients	178	55.6
	Friends, colleagues, and caregivers of patients	38	11.9
	People who interfere with the treatment	3	0.9
Occupation of the attacker	Unemployed, retired, laid-off, or employed	18	5.6
	Farmers	18	5.6
	Businessmen	4	1.3
	Working staff of public institutions	26	8.1
	Workers and drivers	10	3.1
	Students	4	1.3
	Missing	240	75
Attacker-related factors	Mental diseases	15	4.7

	Alcohol and drug abuse	59	18.4
	Family misfortune: Divorced; poverty; early death of children	4	1.3
	History of assaulted medical staff, drunken driving, and being sentenced	23	7.2
	Missing	219	68.4
Whether or not medical dispute profit is involved	Yes	66	20.6
	No	254	79.4
Whether or not professional Hospital Violators were involved	Yes	45	14.1
	No	275	85.9

Source authors analyses keyword frequencies and constituent ratios of data.

### Risk factors for severity of physical violence

**Deleting some of the missing independent variables:** As shown in Exhibit 2, a large proportion of data regarding professional titles of the medical staff being attacked, patient age, attacker age, attacker occupation, and the attacker-related factors were not available. Therefore, these five variables were excluded in the follow-up study.

### Univariate analysis of the risk factors for severity of physical violence

The Kruskal-Wallis rank-sum test was used to evaluate the differences among the groups of the risk factors for severity of

physical violence. There were statistical significant differences in the following factors: time of the occurrence; department where the medical staff work; location where physical violence occur; causes of physical violence; whether or not a medical behavior between medical staff and attacker; treatment outcome of the patient; relationship between attacker and patient; and whether or not a medical dispute occurred. Other variables, such as city level, level of hospital, response to physical violence, gender of the attacker, and whether or not professional Hospital Violators were involved, have no significant difference for the severity of physical violence (Table 3).

**Table 3.** Univariate analysis of risk factors impact on the severity of physical violence.

Variable	No injury	Mild injury	Moderate injury (n)	Severe injury (n)	Death	$\chi^2$	p
	n	n			n		
City level						3.128	0.209
First-tier city	12	17	85	18	10		
Second-tier city	17	4	17	6	8		
Third-tier city	14	13	66	20	13		
Time of occurrence						13.781	0.001
Day shift	14	15	73	31	18		
Night shift	23	15	69	9	7		
Middle shift	6	4	26	4	6		
Level of hospital						1.556	0.212
Tertiary hospital	22	19	100	27	7		
Non-tertiary hospital	21	15	68	17	24		
Department						16.152	0
Outpatient clinic, department, and ICU	20	17	74	8	4		
Internal medicine and surgery departments	9	7	49	13	15		

Other departments	14	10	45	23	12		
Location						11.652	0.009
Inpatient area	5	7	33	8	1		
Outpatient area	28	17	94	21	9		
Office area	7	5	33	12	14		
Outside hospital	1	5	6	2	6		
Missing <sup>†</sup>							
Causes of physical violence						22.342	0
Illness-related	13	6	59	23	23		
Medical staff-related	17	17	50	12	3		
Patient-related	13	11	59	9	5		
whether or not there was a medical behavior between medical staff and attacker							
Yes	10	10	48	22	24		
No	33	24	120	22	7	22.794	0
Response to physical violence						10.074	0.122
Mediation by superiors	1	0	4	1	0		
Calling the police or security for help	24	20	96	21	11		
Asking the colleagues or patients for help	9	4	31	11	4		
Self-rescue and escape	1	3	11	4	5		
Antagonism	0	1	6	1	1		
Explanation and persuasion	2	1	3	0	0		
Forbearance/no response	6	5	17	6	10		
Treatment outcome						48.651	0
Improved and cured	28	27	107	18	8		
Not cured	2	2	22	18	19		
Death	13	5	39	8	4		
Gender of attacker						1.411	0.235
Male	37	29	151	37	31		
Female	6	5	17	7	0		
Relationship between the attacker and the patient						25.189	0
Patient himself/herself	8	9	41	22	21		
Relatives of patients	27	21	100	21	9		
Friends, colleagues, and caregivers of the patient	8	4	24	1	1		
People who interfere with the treatment	0	0	3	0	0		
Whether or not a medical dispute occurred							



Yes	8	3	26	13	16	14.163	0
No	35	31	142	31	15		
Whether or not professional Hospital Violators were involved						1.242	0.265
Yes	9	3	25	6	2		
No	34	31	143	38	29		

Source authors analyses the risk factors for severity of physical violence used Kruskal-Wallis rank-sum test .NOTES Missing\*: 6 cases for which the location was missing were deleted.

**Multi-collinearity analysis**

Spearman’s correlation analysis was used to test the level of correlation between the independent variables. As  $r > 0.3$  was

considered to be collinear. The r values of some independent variables in Spearman’s correlation test are shown in Table 4 ( $r > 0.3$ ).

**Table 4.** Variables with  $r > 0.3$  in Spearman’s correlation test.

Variable	Variable	r	P
Causes of physical violence	Treatment outcome	-0.633	0
Causes of physical violence	Whether or not a medical dispute occurred	0.488	0
Treatment outcome	Whether or not a medical dispute occurred	-0.446	0
Whether or not there was a medical behavior between medical staff and attacker	Relationship between the attacker and the patient	0.604	0

Source authors analyses correlation between the independent variables used Spearman’s correlation analysis.

**Table 5.** Ordinal logistic regression of risk factors for severity of physical violence.

Variable		$\beta$	SE	Wald	df	P	95% CI OR <sup>†</sup>
Constant term	Severity classification=level 1	-2.638	0.358	54.451	1	0	(-3.339, -1.937) 0.07
	Severity classification=level 2	-1.956	0.341	32.925	1	0	(-2.624, -1.288) 0.14
	Severity classification=level 3	-0.075	0.319	0.055	1	0.815	(-0.699, 0.550) 0.93
	Severity classification=level 4	0.586	0.318	3.391	1	0.066	(-0.038, 1.210) 1.79
Location	Inpatient area	-0.971	0.313	9.382	1	0.002	(-1.593, -0.350) 0.38
	Outpatient area	-0.88	0.282	9.727	1	0.002	(-1.433, -0.327) 0.41
	Office area	-0.45	0.316	2.031	1	0.154	(-1.608, 0.64)
	Outside hospital (control)				0		1
Whether or not there was a medical behavior between medical staff and attacker	Yes	0.644	0.14	20.993	1	0	(0.368, 0.919) 1.90
	No (control)				0		1
Department	Outpatient clinic, department, and ICU	-0.433	0.161	7.183	1	0.007	(-0.749, 0.65)
	Internal medicine and surgery departments	0.096	0.166	0.33	1	0.565	(-0.230, 1.10)

Other departments (control)					0	1	
Causes of physical violence	Illness-related	0.441	0.161	7.511	1	0.006	(0.126, 0.757) 1.55
	Medical staff-related	-0.108	0.164	0.438	1	0.508	(-0.429, 0.213) 0.90
Patient-related (control)					0	1	

### **Ordinal logistic regression analysis of risk factors for severity of physical violence**

Proportional odds assumption was adopted and held true ( $\chi^2=28.271$ ,  $P=0.249$ ), thus ordinal logistic regression analysis was used. Variables with a  $P<0.1$  in the univariate analysis were included in the ordinal logistic regression model. Variables were selected using forward method. Considering the multiple collinearity effect, variables with strong correlation were selected sequentially with adjusification. Variables selected are shown in Table 5.

### **Discussion**

Unlike previous studies, we focused on the risk factors for the severity of physical violence inflicted upon Chinese medical staff by examining 320 physical violence cases reported in on-line news from 2000-2015. The results showed as the following: 52.5% of the medical staff have had moderate injuries; 44.4% of the physical assaults occurred in first-tier cities; 47.2% of the assaults occurred during day shifts; 54.7% of the assaults occurred in tertiary hospitals; 38.4% of the assaults occurred in the outpatient clinic, emergency department, and Intensive Care Unit (ICU); 52.8% of the violence incidents occurred in the outpatient area; 38.8% of the incidents were caused by illness-related factors; 35.6% of the medical staff been assaulted have a medical behavior with attacker; 53.8% of the medical staff being attacked coped with assault were called the police or securities; 58.8% of the patients involved in the physical violence with the treatment outcome is cured or improved; 89.1% of the attackers were males; 55.6% of the attackers were patients' relatives; 79.4% of the incidents were not combined with medical disputes or complaints; and 85.9% of the incidents did not with professional hospital violators.

At this time, very few guidelines for preventing physical violence in hospitals are available, especially those for coping with unexpected physical assaults against doctors. To our knowledge, this is the first study on the risk factors for severity of physical violence against the medical staff in China. According to previous studies, the most common locations where hospital violence happen are emergency rooms and psychiatric departments [20,21]. Physical assaults occur more frequently in psychiatric and geriatric departments, and ICUs [22,23]. In our study, however, the risk factors for severity of physical violence against Chinese medical staff included location where physical violence occur, whether or not there was a medical behavior between medical staff and attacker, the department where the violence occurred, and causes of

physical violence. As to the type of location, the risk for severity of physical violence increased successively for the medical staff in the inpatient area, outpatient area, office area, and places outside the hospital. When the medical staff had been assaulted have a medical behavior with attacker, the risk for severity of physical violence was higher. As to the type of department, the ICU, emergency and outpatient clinics, other departments, internal medicine and surgery departments were the departments where the risk of physical violence increased successively. As to the type of causes of physical violence, medical staff-, patient-, and illness-related factors were the causes contributing to severity of physical violence with an increasing significance.

Location is an independent risk factor. Compared with the risk for physical violence outside the hospital, the severity of physical violence increased successively in the inpatient, outpatient, and office areas (Odds Ratio (OR)=0.38, 0.41, 0.64; OR=1 for outside the hospital). Thus, the risk for severity of physical violence outside the hospital was the highest. Outside the hospital area including patient's home or on the way to emergency aid which the environment is comparatively uncontrolled [23,24]. The reasons for high risk of physical violence in the office area were as follows: the office area is where the physician-patient communication takes place and where the physicians are closest to the patients or relatives who may undergo significant mood swings [25]; and medical staff are busy with work and less ready to cope with sudden violence. In the outpatient area, such as the consulting rooms, the medical staff spends longer time with the patients alone, which increases the risk for physical violence [3]. Compared with the outpatient area, the inpatient area, such as the ward, implements stricter regulations that specific the time of visit and the number of visitors permitted and this effectively reduces the risk of physical violence.

Whether or not there was a medical behavior between medical staff and attacker is another independent risk factor. The risk for severe injury when medical staff being attacked is directly involved in the treatment of patient is 1.9 times higher than medical staff being attacked is not directly involved in the treatment of the patient (OR=1.90, 1). This is especially true the doctor or nurse in charge is taking care of the patients for prolonged periods. Therefore they are more exposed to the negative physical and psychological impact of illness and treatment that affect the patients [26]. If the treatment outcome falls short of the patients' expectation, physical violence is even more likely to occur.

Previous studies on hospital violence indicate that physical violence is most likely to occur in psychiatry [27] and emergency departments [28] and the ICU [23]. Similarly, we found that department is one independent risk factor for severity of physical violence. Internal medicine and surgery departments have the highest risk of physical violence, followed by other departments. The outpatient clinic, emergency department, and the ICU have the lowest risk of physical violence (OR=0.65 for the outpatient clinic, emergency department, and ICU; OR=1.10 for internal medicine and surgery departments; OR=1 for other departments). Compared with other departments, internal medicine department receives patients with chronic, critical, and refractory diseases who require treatment or nursing care for longer periods of time. Therefore, the risk for severity of physical violence is higher in the internal medicine department [29,30]. The surgery department also has a higher risk for physical violence due to the fact that the effect of surgical treatment is more intuitive, it is easier to detect negative consequences [31]. Other departments as gynecology and obstetrics department, pediatrics department are at low risk for severity of physical violence because there are fewer male adults in these areas [23]. The ICU is unattended severe ward, thus reducing the risk and severity of physical violence. According to existing studies, a crowded environment and inadequate medical staff in the emergency department and outpatient clinic are major reasons for physical violence in these areas [28]. To solve the above problems, a reasonable allocation of medical resources is very important.

The cause of physical violence is also an independent risk factor for severity of physical violence. Studies have shown that main causes of hospital violence include the following: treatment outcome falling short of patients' expectation; overcrowded environment; inadequate medical resources; and intentional violence and aggressive behaviors without perpetrators being under influence of disease or substances [12]. In this study, illness-, medical staff-, and patient-related factors were associated with an increasing risk for severity of physical violence (OR=1.55, 0.90, and 1, respectively). In china, distrust between physicians and patients, many patients go to the hospital with unrealistic expectations [32], high medical expenses, and poor doctor-patient communication [15] all lead to hospital violence. In previous surveys, low educational level and poverty are the most common features shared by attackers. Approximately 40% of attackers are introverts and have eccentric and bigoted disposition and 30% of the attackers have histories of mental diseases. Many of the attackers are faced with the dilemma of an inability to pay medical expenses or an incurable disease [18]. As compared with medical staff-related factors which are easier to improve, patient-related factors, if not properly controlled, can lead to a higher risk for severity of physical violence.

## **Limitations**

We research only focused on the hospital violence incidents in China between 2000 and 2015 and the data collected are

limited. Some physical assaults occurring in the hospital might be missing from this study. Cases recorded and analysed in this research may not covered all those recorded by the government. Moreover, due to a lack of standards for news reports covering hospital violence, some important information or details may be missing.

## **Conclusions**

Chinese medical staff are now facing the danger of physical violence, the severity of which is affected by location, whether or not there was a medical behavior between medical staff and attacker, department, and causes of physical violence.

According to the law published in 2015, Professional Hospital Violators are now considered illegal in China [33], however our study suggested that physical violence is still serious in Chinese healthcare settings. Many countries have issued guidelines for preventing workplace violence [34], however general prevention strategies for preventing physical violence are not enough. Along with the understanding of the risk factors for severity of physical violence in Chinese healthcare settings, more effective countermeasures will be released to protect the medical staff.

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**\*Correspondence to**

Wenzhi Cai

President's Office

Shenzhen Hospital of Southern Medical University

PR China

E-mail: [caiwzh@smu.edu.cn](mailto:caiwzh@smu.edu.cn)