

Prevalence, risk factors, consequences, and prevention and management of patient aggression and violence against physicians in hospitals: A systematic review

Yuhan Wu^{*}, Mathilde Strating, C.T.B. (Kees) Ahaus, Martina Buljac-Samardzic

Erasmus School of Health Policy & Management, Erasmus University Rotterdam, Rotterdam, the Netherlands

ARTICLE INFO

Keywords:

Patient aggression and violence
Prevalence
Risk factors
Physicians
Hospital
Prevention and management

ABSTRACT

Most reviews have examined workplace violence rather heterogeneously without explicit regard to a professional group or particular source of violence (from colleagues/leaders vs. from patients and their relatives/friends). This study reviews the literature regarding the prevalence, risk factors, consequences, and prevention and management of aggression and violence by patients (and their relatives/friends) against physicians in hospitals. A total of 104 studies were included by searching five databases. The prevalence of aggression and violence was higher in developing countries and against younger physicians. The risk factors for the occurrence of aggression and violence were present at multiple levels (i.e., patients, patient-physician interactions, hospitals, and society). However, knowledge on how risk factors at different levels interact is absent. Although research on risk factors acknowledged multiple levels, research on consequences was mainly focused on the individual level (i.e., work functioning, psychological well-being and health) with less attention to the team and organizational level. While some prevention models took into account the risk factors of aggression and violence in different contexts, there is still limited knowledge on how to establish a well-aligned and comprehensive intervention strategy that considers risk factors and consequences at different levels.

1. Introduction

Workplace violence in the healthcare system is acknowledged to be a problem that arouses disapproval in society (Bhattacharjee, 2021). The percentage of attacks on healthcare providers has risen globally over the past two decades (Mento et al., 2020). Among all professional groups, healthcare professionals are at high risk of encountering aggression and violence at the workplace (Kumari et al., 2020). Consequently, research focused on understanding the prevalence, risk factors, consequences, prevention and management of aggression and violence in healthcare settings.

Due to the great amount of research, multiple literature reviews have been conducted on aggression and violence toward healthcare professionals. Hills and Joyce (2013) indicated in their systematic review covering prevalence and risk factors that 48.9% of respondents reported any aggression in the past year, and workplace violence in clinical medical practices was associated with patient factors (e.g., patients with mental disorders), physician factors (e.g., less experience), and

organizational factors (e.g., working environment). Lanctot and Guay (2014) showed in a systematic review covering consequences that workplace violence had negative effects on the physical, psychological, emotional, work, and social life of healthcare professionals. Other reviews have focused on how to reduce and manage workplace violence against healthcare professionals. For instance, Kumari et al. (2020) suggested interventions to minimize incidents of workplace violence in healthcare settings at individual level (e.g., training and improving physicians' skills), organizational level (e.g., infrastructure changes and management policies), and societal level (e.g., unbiased media reporting). While Kumari et al. (2020) focused on minimizing workplace aggression and violence, Wirth, Peters, Nienhaus, and Schablon (2021) focused on mitigating it in emergency departments through behavioral interventions (training programs in class, online or hybrid) in de-escalation skills, managing violent persons and providing self-defense techniques.

Several models proposed interventions for aggression and violence that incorporated the risk factors of aggression and violence. For

^{*} Corresponding author at: Erasmus School of Health Policy & Management, Erasmus University Rotterdam, P.O. Box 1738, 3000 DR Rotterdam, the Netherlands. E-mail addresses: wu@eshpm.eur.nl (Y. Wu), strating@eshpm.eur.nl (M. Strating), ahaus@eshpm.eur.nl (C.T.B.(K. Ahaus), buljac@eshpm.eur.nl (M. Buljac-Samardzic).

instance, Bowers (2014) established the Safewards model from originating factors (e.g., staff team and physical environment) to staff interventions (e.g., decreasing the conflict-originating factors, and cutting the link between flashpoint and conflict), to reduce conflict on psychiatric wards. Bhattacharjee (2021) proposed an integrated model of workplace violence in healthcare, and then suggested that protective factors and prevention could consider distal factors and proximal factors.

These previous reviews and models examined workplace violence rather heterogeneously without explicit regard to a specific professional group or particular source of aggression and violence (from colleagues/leaders vs. from patients and their relatives/friends). First, most reviews combined hospital and non-hospital settings without distinguishing between them, whereas differences in risk factors for workplaces may exist between hospital and non-hospital settings (Hills & Joyce, 2013). Since hospitals are one of the most violence-prone places compared to other public places, as shown by the American National Institute for Occupational Safety and Health (NIOSH) (Volz, Fringer, Walters, & Kowalenko, 2017), there is a need for more insight into the risk factors, consequences and prevention and management of workplace violence in hospitals as a specific setting.

Second, the majority of reviews on workplace violence in healthcare have focused on healthcare professionals in general or solely on nurses rather than studying physicians as a specific target group. Physicians are key players in delivering care in hospitals and are at high risk of serious injury or even death due to attacks by patients or their relatives (Volz et al., 2017). For example, approximately 85 % of Indian physicians experienced aggression and violence from patients or their relatives/friends during their career (Kaur, Ahamed, Sengupta, Majhi, & Ghosh, 2020). Nevertheless, literature that focuses on solely physicians is scarce and remains limited to a few studies that examined physician encounters with workplace violence. For instance, De Jager et al. (2019) explored the characteristics of physicians who are at increased risk for patient-physician aggression. Verma et al. (2019), and Dixit et al. (2019) investigated the factors contributing to workplace violence against physicians. Mirza et al. (2012) examined the impact of workplace violence on physicians, such as psychological influence and satisfaction and performance.

Third, most reviews have investigated aggression and violence from multiple sources: from colleagues or leaders (internal violence) and from patients or their relatives/friends (external violence). The latter group has been identified as the most prevalent source of aggression and violence in hospitals (Hills & Joyce, 2013; Kowalenko, Walters, Khare, & Compton, 2005), as shown by Silwal and Joshi (2019) who claimed that the majority (63.8 %) of perpetrators who generated aggressive behaviors were patients or their relatives. Therefore, there is a need for a comprehensive literature review on patient aggression and violence toward physicians in hospitals. Given the scope on patient aggression and violence, we defined it as “all types of violence and aggression encountered by physicians in the workplace from patients and/or their relatives/friends”. Although some reviews focused on violence directed at employees by customers, clients, patients, students, or any others for whom an organization provides services, referred to as Type II workplace violence (Byon et al., 2020; Lanctot & Guay, 2014; Nowrouzi-Kia, Chai, Usuba, Nowrouzi-Kia, & Casole, 2019), we included in our definition relatives/friends who may not be directly served by healthcare providers.

Concluding, the aim of this study is to determine the prevalence, risk factors, consequences, and prevention and management of aggression and violence by patients (and their relatives/friends) specifically toward physicians in hospitals.

2. Methodology

2.1. Search strategy

The systematic review was conducted according to the updated Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement (Page et al., 2021). With the assistance of a research librarian specializing in designing systematic reviews, this search was carried out in five databases (i.e., Embase, Medline, PsycINFO, Web of Science SCI-EXPANDED & SSCI, Cochrane Central Register of Trials, and Web of Science). It took about 2–3 months from the time the search terms were proposed to the time the search results were finalized. Four main topics were combined in the search strategy: (1) violence (e.g., abuse, aggression), (2) patient and/or relatives/friends as the perpetrator (e.g., patient's friends, patient's family); (3) physician as the victim (e.g., surgeon, doctor), and (4) hospital setting (e.g., hospital, tertiary care center) or a specific hospital department (e.g., emergency department, intensive-care unit). The detailed strategy is included in the appendix (see Additional file 1). Searches were limited to articles published in English in peer-reviewed journals.

2.2. Eligibility criteria

The purpose of this systematic review was to provide a full spectrum of studies that empirically examined aggression and violence by patients and their relatives/friends against physicians in hospitals in terms of prevalence and characteristics, risk factors, aftermaths, prevention and management. Based on the purpose, the following research was excluded: 1) Studies without empirical data and not peer-reviewed, such as editorials, letters and literature reviews. Studies were included regardless of study design as long as empirical data were presented. 2) Studies outside the hospital setting (e.g., primary care center). 3) Studies in which aggression and violence was not perpetrated by patients and/or their relatives/friends. Since this review only investigated the aggression and violence from patients and their relatives/friends, studies that did not match the scope and definition of aggression and violence in this review were excluded. An example of an excluded study is bullying and violence from physicians' colleagues. 4) Studies in which aggression and violence was not focused on physicians or trainee physicians. For example, studies on patients showing violent behavior toward only nurses or other patients were excluded. 5) Studies not related to aggression and violence generated by patients. In other words, studies that did not relate to the prevalence and characteristics of aggression and violence by patients (and their relatives/friends), risk factors, consequences, and prevention and management of aggression and violence by patients (and their relatives/friends). For example, studies on medication for aggressive psychiatric patients were excluded. 6) Studies without physician-specific data. For instance, if the object of the article was healthcare providers (i.e., physicians and nurses), and the article did not show specific data for physicians (i.e., all data were about healthcare providers), it would be excluded on the grounds that the findings for physicians could not be isolated. In line with the purpose of our review, we did not set a time frame for the extraction, but the oldest paper we included was published in 1985.

2.3. Data collection process and data extraction

In the first stage, all titles and abstracts were screened by two of the authors to determine whether they met the inclusion and exclusion criteria of this review (YW and MS or MBS). If both screeners agreed that a paper should be included, the paper was transferred to the next phase. Papers that were a mismatch between the two screeners were transferred to the next phase as well. Next, two of the authors (YW and MS or MBS) independently evaluated the full text according to the inclusion and exclusion criteria. Disagreements between the two screeners were resolved through discussion and, if necessary, the judgment of a third

screeener (KA).

Data were extracted and summarized in a table, including source of the article (author, publication year, country, setting), study (aims, design), population (number, gender), specific definition of aggression and violence of each selected study, prevalence of characteristics (physicians, perpetrators, organizations), risk factors, consequences, prevention and management of aggression and violence by patients (and their relatives/friends). Notably, this review extracted the data only of physicians in hospitals.

2.4. Quality assessment

The Grading of Recommendations Assessment, Development and Evaluation (GRADE) approach was used to assess the level of evidence and the quality of the article. The GRADE rating scale has four levels of quality of evidence: (A) high, (B) moderate, (C) low, and (D) very low (Additional file 2 GRADE, the results of quality assessment were not used as a criterion for inclusion or exclusion in this study).

3. Results

By eliminating duplicates, a total of 3336 records were obtained. Following the abstract analysis and full-text screening, 104 records were eligible to be included in the review finally. The PRISMA flowchart of the record selection process is shown in Fig. 1. The quality of most articles was B and C (detailed information shown in Table 1).

These 104 studies were from 30 countries with the main aims of examining the prevalence, causes, aftermaths and prevention of violence in hospitals. Most articles were published in 2011–2021 (80 out of 104) and the majority of studies had sample sizes of <200 participants (61 out of 104). Of these, the largest sample was 87,998 participants

(secondary data analysis) and the smallest was 3 (case study). As for the methods, 94 out of 104 studies adopted a quantitative research method (detailed information shown in Table 2).

For the purpose of this review and synthesizing the results, the following categorizations were derived: 1) prevalence; 2) risk factors: perpetrator-related factors, physician-related factors, interaction-related factors, factors related to organizational context, and external context; 3) consequences: physical effects, psychological well-being effects, job motivation and retention, and other effects; 4) prevention and management.

3.1. Prevalence

The 51 studies that researched the prevalence of aggression and violence by patients (and their relatives/friends) against physicians assessed the aggression and violence experienced by physicians in the previous twelve months or during their careers (see for summary information Table 3).

Half of these studies researched aggression and violence experienced during the physicians' careers and showed a global variation from 23.9 % (Norway, in 2004; 50.6 %, in 1994) to 87.5 % (Iraq) of physicians suffering whole types of aggression and violence from patients (and their relatives/friends) (Verma et al., 2019; Nagata-Kobayashi, Maeno, Yoshizu, & Shimbo, 2009; De Jager et al., 2019; Barlow & Rizzo, 1997; Paola & Oureshi, 1994; Pan et al., 2015; Cikriklar et al., 2016; Magnavita & Heponiemi, 2012; Oguz, Sayin, & Gurses, 2020; Nayyer-ul-Islam et al., 2014; Kumar, Munta, Kumar, & Rao, 2019; Udoji, Ifeanyi-Pillette, Miller, & Lin, 2019; Lowry, Eck, Howe, Peterson, & Gibson, 2019; Sui, Liu, Jia, Wang, & Yang, 2019; Kaya, Demir, Karsavuran, Urek, & Ilgun, 2016; Gong et al., 2014; Zeng, Zhang, Yao, & Fang, 2018; Alsalem et al., 2018; Shafran-Tikva, Zelker, Stern, & Chinitz, 2017; Kaur et al.,

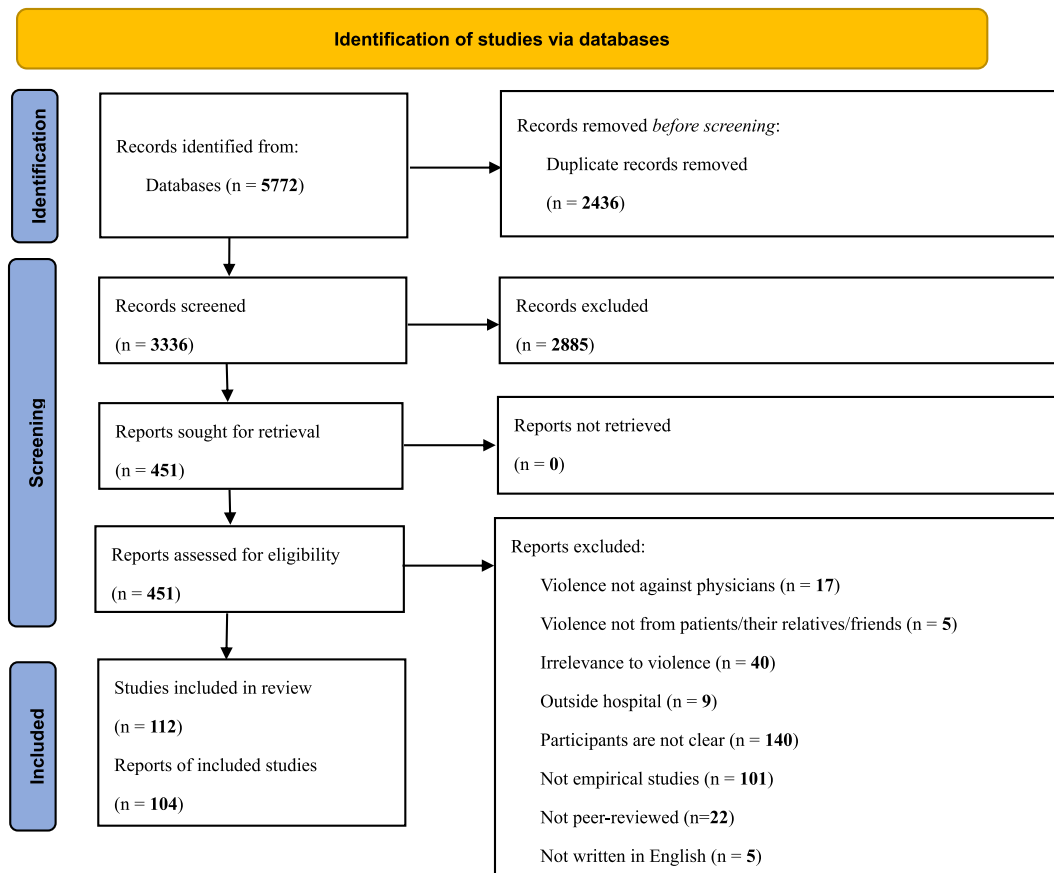


Fig. 1. PRISMA flowchart (2021 version).

Table 2
Descriptive information regarding the selected studies.

Year of publication	1985	1 (0.96 %)	
	1990–1999	9 (8.7 %)	
	2000–2010	14 (13.5 %)	
	2011–2021	80 (76.9 %)	
Country	China	21 (20.2 %)	
	United States	15 (14.4 %)	
	Turkey	12 (11.5 %)	
	India	10 (9.6 %)	
	United Kingdom	6 (5.8 %)	
	Italy	5 (4.8 %)	
	Pakistan	5 (4.8 %)	
	Israel	3 (2.9 %)	
	Poland	2 (1.9 %)	
	Spain	2 (1.9 %)	
	New Zealand	2 (1.9 %)	
	Australia	2 (1.9 %)	
	Japan	2 (1.9 %)	
	Iran, Bahrain, Jordan, Syria, Saudi, Kuwait, Iraq, Libya, Morocco, Palestine, Nepal, Myanmar	12 (11.5 %)	
	Finland, Belgium, Denmark, Norway	4 (3.8 %)	
	Canada	1 (0.96 %)	
	Methods	Quantitative study (questionnaire-based study)	94 (90.4 %)
		Qualitative (i.e., case study, interview, observation study, and secondary data analysis)	9 (8.7 %)
		Mixed method (interview and questionnaire)	1 (0.96 %)
Number of participants	≤100	27 (26 %)	
	101–200	34 (32.7 %)	
	201–300	7 (6.7 %)	
	301–500	7 (6.7 %)	
	501–700	7 (6.7 %)	
	701–1000	5 (4.8 %)	
	1001–3000	12 (11.5 %)	
	3001–10,000	4 (3.8 %)	
>10,000	1 (0.96 %)		

Table 3
Summary information on prevalence.

	Career life	Last 12-month
Total prevalence	23.9–87.5 % Developing countries: 60–84.7 %; Developed countries: 23.9–84.8 %	12.4–84.7 %
Verbal violence	47 %–96.8 %	8.7 %–86.2 %
Physical violence	17.2 %–51 %	1 %–51 %
Sexual harassment	0.9 %–21.8 %	

2020; Johansen, Baste, Rosta, Aasland, & Morken, 2017; Baykan, Öktem, Çetinkaya, & Naçar, 2015; Lafta & Pandya, 2006). The other half of the studies focused on aggression and violence experienced in the previous year and showed that between 12.4 % (U.K.) and 84.7 % (Syria) of physicians had experienced one or more types of aggression and violence by patients (and their relatives/friends) during the previous 12 months (Abualrub & Khawaldeh, 2013; Afkhamzadeh, Mohammadi, Moloudi, Safari, & Piroozi, 2018; Anand, Grover, Kumar, & Kumar, 2016; De Jager et al., 2019; Dixit et al., 2019; Duan et al., 2019; Hills, Joyce, & Humphreys, 2011; Karaahmet, Bakim, Altinbas, & Peker, 2014; Kumar et al., 2016; Mohamad, AlKhoury, Abdul-Baki, Alsalkini, & Shaaban, 2021; Naveen, Betadur, & Chandermani., 2020; Nevo, Peleg, Kaplan, & Freud, 2019; Rosenthal, Ashley, Adrienne, & Martinovich, 2018; Saeki et al., 2011; Sharma et al., 2019; Shi et al., 2020; Wu et al., 2015; Yao, Wang, Wang, & Yao, 2014). More studies on the prevalence of aggression and violence by patients (and their relatives/friends) were from developing countries (34 out of the 51 articles) than from developed countries, while this negative behavior was common in both developed countries and developing countries. More specifically, 23.9 % (Norway, in 2004) to 84.8 % (Japan) of physicians in developed countries (Barlow & Rizzo, 1997; Belayachi, Berrechid, Amlaiky, Zekraoui, & Abouqal, 2010; Bernaldo-De-Quiros, Piccini, Gomez, & Cerdeira, 2015; De Jager et al., 2019; Johansen et al., 2017; Lowry et al., 2019; Nagata-Kobayashi et al., 2009; Udoji et al., 2019; Wyatt & Watt, 1995) and 60 % (China) to 90.7 % (Turkey) of physicians in developing countries (Baykan et al., 2015; Cikriklar et al., 2016; Gong et al., 2014; Gulalp, Karcioglu, Koseoglu, & Sari, 2009; Lafta & Pandya, 2006; Nayyer-ul-Islam et al., 2014; Oztok et al., 2018; Pan et al., 2015; Verma et al., 2019; Zeng et al., 2018) were exposed to aggression and violence by patients (and their relatives/friends) during their careers. Among all countries, in Turkey, the rate of physicians in emergency departments experiencing violence by patients (and their relatives/friends) was the highest, ranging from 44.8 % to 90.7 % during their careers (Cikriklar et al., 2016; Altinbas, Altinbas, Turkcan, Oral, & Walters, 2010; Oztok et al., 2018; Erdur et al., 2015).

Physicians were subjected to three main forms of aggression and violence from patients: physical, verbal, and sexual. Sixty-six articles investigated the type of aggression and violence by patients (and their relatives/friends) and claimed that the most common form of such violence was verbal violence. During physicians' entire career, 47 % (Morocco) to 96.8 % (Turkey) of physicians encountered verbal violence (e.g., verbal threats, curses, scolding, blame) from patients (and their relatives/friends), and 17.2 % (India) to 51 % (U.S.) of physicians were exposed to physical assault (e.g., being spat on, hit, or pushed) by patients (and their relatives/friends). (Verma et al., 2019; Paola & Oureshi, 1994; Belayachi et al., 2010; Nagata-Kobayashi et al., 2009; Shi et al., 2015; Magnavita, Fileni, Pescarini, & Magnavita, 2012; Barlow & Rizzo, 1997; Wyatt & Watt, 1995; Kumar et al., 2019; Sui et al., 2019; Kowalenko, Hauff, Morden, & Smith, 2012; Kaya et al., 2016; Swain, Gale, & Greenwood, 2014; Catanesi, Carabellese, Candelli, Valerio, & Martinelli, 2010; Coverdale, Gale, Weeks, & Turbott, 2001; Bernaldo-De-Quiros et al., 2015; Altinbas et al., 2010; Winstanley & Whittington, 2004; Chaimowitz & Moscovitch, 1991; Chaudhuri, 2007; Demirci & Ugurluoglu, 2020; Mackin & Ashton, 2001; Kaur et al., 2020; Hu et al., 2019; Schnapp et al., 2016; Bilici, Sercan, & Izci, 2016; Erdur et al., 2015; Gulalp et al., 2009; Chang, Wu, & Du, 2020; Granek, Ben-David, Bar-Sela, Shapira, & Ariad, 2019; Berlanda, Pedrazza, Fraizzoli, & De Cordova, 2019; Oztok et al., 2018; Johansen et al., 2017; Baykan et al., 2015; Lafta & Pandya, 2006). The other half of the studies investigated aggression and violence by patients (and their relatives/friends) experienced by physicians in the previous year and claimed that 8.7 % (Myanmar) to 86.2 % (India) of physicians experienced verbal violence and 1 % (Myanmar) to 51 % (U.S.) of physicians suffered physical violence from patients (and their relatives/friends) (Zafar, Khan, Siddiqui, Jamali, & Razzak, 2016; Rafeea, Al Ansari, Abbas, Elmusharaf, & Abu Zeid, 2017; Kasai et al., 2018; Rosenthal et al., 2018; Nevo et al.,

2019; Zhu, Li, & Lang, 2018; Hamdan & Abu Hamra, 2015; Kumar et al., 2019; Sharma et al., 2019; Mirza et al., 2012; Gates, Ross, & McQueen, 2006; Anand et al., 2016; De Jager et al., 2019; Sun, Gao, et al., 2017; Kirkegaard, Kines, Nielsen, & Garde, 2018; Lepping, Lanka, Turner, Stanaway, & Krishna, 2013; Dixit et al., 2019; Behnam, Tillotson, Davis, & Hobbs, 2011; Kowalenko et al., 2005; Abualrub & Khawaldeh, 2013; Yao et al., 2014; Sun, Zhang, et al., 2017; Tian et al., 2020; Kumar et al., 2016; Duan et al., 2019; Saeki et al., 2011; Firenze et al., 2020; Winstanley & Whittington, 2004; Mohamad et al., 2021; Afkhamzadeh et al., 2018; Wang, Wu, Sun, Li, & Zhou, 2021). In addition, physicians were exposed to sexual harassment, with a range from 0.9 % (Turkey) to 21.8 % (U.S.) during their working life (Magnavita et al., 2012; Nagata-Kobayashi et al., 2009; Nayyer-ul-Islam et al., 2014; Lowry et al., 2019; Sui et al., 2019; Kaya et al., 2016; Coverdale et al., 2001; Chaudhuri, 2007; Demirci & Ugurluoglu, 2020; Bilici et al., 2016; Kaur et al., 2020; Hu et al., 2019; Schnapp et al., 2016; Oztok et al., 2018; Baykan et al., 2015). Moreover, seven studies investigated which type of physicians were more exposed to aggression and violence by patients (and their relatives/friends), and all showed that younger physicians with less work experience, especially internship physicians, were exposed to more aggressive behavior by patients (and their relatives/friends) (Kumar et al., 2016; De Jager et al., 2019; Paola & Oureshi, 1994; Saeki et al., 2011; Mohamad et al., 2021; Kaur et al., 2020; Carmel & Hunter, 1991).

For the perpetrators, eight studies explicitly compared the prevalence rates for aggression and violence from patients and patients' relatives/friends. Three Indian studies and one Pakistani study reported that physicians experienced more aggression and violence from patients' relatives in public hospitals than in private hospitals (Danivas et al., 2016; Dixit et al., 2019; Kaur et al., 2020; Zubairi, Ali, Sheikh, & Ahmad, 2019), while three other American studies noted that physicians in emergency rooms and surgical departments were more exposed to violence from patients themselves (Barlow & Rizzo, 1997; Behnam et al., 2011; Kowalenko et al., 2005). An Italian and an Australian study specifically distinguished differences arising from verbal or physical aggression by patients or their relatives against physicians: physicians were exposed to more physical assaults from patients and more verbal assaults from patients' relatives (Firenze et al., 2020; Hills, Joyce, & Humphreys, 2012) (see for detailed information Table 1).

3.2. Risk factors

3.2.1. Perpetrator-related factors

Sixteen articles identified the impact of perpetrators' characteristics on aggression and violence. Regarding the personal characteristics of perpetrators, most were male, between the ages of 20 and 35, or lacked education (Paola & Oureshi, 1994; Anand et al., 2016; Bayram, Cetin, Oray, & Can, 2017; Zeng et al., 2018). However, in a study of Pakistani physicians, 41 % suffered violence in the emergency department from patients with high socioeconomic status (Mirza et al., 2012). In addition, a patient with a mental illness, with a drug or alcohol addiction, or who smoked had a higher risk of generating violent acts (Belayachi et al., 2010; Nevo et al., 2019; Kaur et al., 2020; Hamdan & Abu Hamra, 2015; Mirza et al., 2012; Anand et al., 2016; Behnam et al., 2011; Debska et al., 2012; Schnapp et al., 2016), and patients were prone to become aggressive when they were in fear, pain, restraint and struggles with billing issues (Paola & Oureshi, 1994; Hamdan & Abu Hamra, 2015; Tucker et al., 2015; Dixit et al., 2019; Kumar et al., 2019; Kumar et al., 2016). Patients' high expectations and excessive demands were significant risk factors for triggering their negative behavior against physicians. More specifically, aggression and violence by patients (and their relatives/friends) can be triggered when they invest much money and time in their treatment, but the results do not meet their expectations or physicians are unable to meet their excessive demands (Zhu et al., 2018; Hamdan & Abu Hamra, 2015; Pan et al., 2015; Schnapp et al., 2016). In addition, dissatisfaction with physicians' treatment and services (Kumar et al., 2019; Nayyer-ul-Islam et al., 2014; Nevo et al., 2019; Pan et al.,

2018) and the patient's death were additional important precipitating factors for the violent behavior of patients or their relatives/friends (Anand et al., 2016; Dixit et al., 2019; Kaur et al., 2020; Kumar et al., 2019; Mirza et al., 2012).

3.2.2. Physician-related factors

3.2.2.1. Gender. Eleven articles investigated the relation between physicians' gender and aggression and violence by patients (and their relatives/friends). Eight studies claimed that male physicians experienced more aggression and violence by patients (and their relatives/friends) in their careers than female physicians (India, China, Pakistan, U.K., Turkey) (Binder & McNeil, 1994; Carmel & Hunter, 1991; Dhurmad, Wijeratne, & Treasaden, 2007; Erdur et al., 2015; Mirza et al., 2012; Oztok et al., 2018; Shi et al., 2015; Verma et al., 2019; Zhu et al., 2018), especially regarding physical attacks (De Jager et al., 2019). However, two studies showed that female anesthesiologists and female physicians working in emergency departments (95 % CI 1.4 to 5.8) in the U.S. had experienced more violence than their male colleagues (Kowalenko et al., 2005; Udoji et al., 2019).

3.2.2.2. Skill-related factors. Eight articles studied the impact of a lack of physicians' skills on aggression and violence by patients (and their relatives/friends), and three categories of physicians' skills that influenced the occurrence of aggression and violence were identified: poor medical skills, negative communication skills, and undesirable service awareness. Improper treatment provided by physicians, treatment errors, and insufficient working experience were the antecedents of aggression and violence by patients (and their relatives/friends) (Mirza et al., 2012; Chaimowitz & Moscovitch, 1991). In general, physicians with less than five to ten years of working experience were at higher risk of patient aggression and violence. A total of 24 % to 86.2 % of physicians considered miscommunication to be the most common risk factor for violence (Anand et al., 2016; Dixit et al., 2019; Kumar et al., 2019; Zeng et al., 2018; Zhu et al., 2018), and 10.1 % to 62 % of physicians reported that no sense of providing high-quality services and delivering poor services also led to violence (Zhu et al., 2018; Hamdan & Abu Hamra, 2015).

3.2.2.3. Work-related factors. Working hours, working schedule, and workload were three main risk factors for triggering aggression and violence by patients (and their relatives/friends). Twelve articles investigated the working hours when patient (and their relatives/friends) violence occurred frequently. Aggression and violence by patients (and their relatives/friends), especially verbal attacks, mainly occurred during the day between 8 am and 6 pm (hospital business hours) (Abualrub & Khawaldeh, 2013; Dixit et al., 2019; Kaya et al., 2016; Kumar et al., 2016; Lafta & Pandya, 2006; Oztok et al., 2018), while in the emergency department, aggression and violence also occurred frequently during the evening and night (Belayachi et al., 2010). Regarding the working schedule, aggression and violence by patients (and their relatives/friends) mainly occurs in two situations: first, more than half of aggression and violence occurs during shift work (Bayram et al., 2017; Kumar et al., 2016; Sharma et al., 2019); second, aggression and violence frequently happens during moments of interaction between patients and physicians, such as when physicians are examining/treating patients or during consultations (Kaya et al., 2016; Magnavita et al., 2012). Furthermore, heavy workload and stress and fatigue are risk factors for aggression and violence by patients (and their relatives/friends) (Huang, Zhang, & Liu, 2020; Tucker et al., 2015).

3.2.3. Interaction-related factors

Twelve studies found that the interaction between patients and physicians has the following characteristics, which can lead to patient (and their relatives/friends) violence: inadequate attention given to

patients (Anand et al., 2016), delay of consultation with patients/delay in the start of treatment (Anand et al., 2016; Belayachi et al., 2010; Kaur et al., 2020; Mohamad et al., 2021), denial of patient requests (Kumar et al., 2016), lack of follow-up after patients die (Granek et al., 2019), perception of wrong treatment given by physicians (Kaur et al., 2020), and misunderstanding and distrust of physicians (Pan et al., 2015; Tucker et al., 2015).

3.2.4. Factors related to organizational context

3.2.4.1. Organizational resources. Seventeen studies examined organizational resources that triggered the occurrence of aggression and violence. From the perspective of patients, the most common risk factors for aggression and violence were long-term waiting and overcrowding (Paola & Oureshi, 1994; Nevo et al., 2019; Hamdan & Abu Hamra, 2015; Kumar et al., 2019; Dixit et al., 2019; Pan et al., 2015; Nayyer-ul-Islam et al., 2014; Kumar et al., 2016; Kaur et al., 2020). Lack of needed services was another important element, including lack of enough equipment (e.g., unavailability of beds), insufficient staff, poor-quality food in cafeterias, and lack of medicines (Abualrub & Khawaldeh, 2013; Anand et al., 2016; Mirza et al., 2012). From the perspective of physicians, lack of security/secure facilities and violence prevention measures and poor training courses provided were risk factors for their inability to protect themselves against attacks by patients (Karahmet et al., 2014; Altinbas et al., 2010; Chaimowitz & Moscovitch, 1991; Schnapp et al., 2016; Tucker et al., 2015). Moreover, high humidity and temperature also contributed to patient aggression and violence (Anand et al., 2016; Kumar et al., 2019).

3.2.4.2. Organizational departments. Twenty-four studies specifically researched the department where aggression and violence by patients (and their relatives/friends) occurred. These studies showed that aggression and violence occurred most frequently in emergency departments and psychiatric units (Anand et al., 2016; Barlow & Rizzo, 1997; Baykan et al., 2015; Karahmet et al., 2014; Lafta & Pandya, 2006; Mohamad et al., 2021; Nayyer-ul-Islam et al., 2014; Oztok et al., 2018; Pan et al., 2015; Verma et al., 2019). In addition to these two departments, other studies found that outpatient rooms, inpatient wards, surgery and internal medicine were high-risk departments for aggression and violence (Coverdale et al., 2001; Dhumad et al., 2007; Jankowiak et al., 2007; Johansen et al., 2017; Karahmet et al., 2014; Shi et al., 2015; Sui et al., 2019; Zeng et al., 2018).

3.2.5. External context

Only one study investigated whether misleading or unprofessional media reports about violence toward physicians may provoke copycat incidents. Zhu et al. (2018) claimed that 87.1 % of physicians in China considered adverse media reports to lead to patient (and their relatives/friends) aggression and violence because some media exaggerated or unrealistically reported situations in hospitals to attract customers' attention, intensifying patients' distrust of physicians (see for detailed information Table 1).

3.3. Consequences

3.3.1. Physical effects

Thirteen articles reported that physicians experienced negative physical impacts after being attacked by patients (and their relatives/friends). In total, 10.6 % to 34.8 % of physicians suffered minor or moderate physical injuries (Abualrub & Khawaldeh, 2013; Bilici et al., 2016; Baykan et al., 2015; Ma, Wang, Du, Wang, & Chen, 2014; Altinbas et al., 2010), leading them to take time off from work and health issues, such as insomnia and appetite loss (Zahid, Al-Sahlawi, Shahid, Awadh, & Abu-Shammah, 1999; Baykan et al., 2015; Nagata-Kobayashi et al., 2009; Sun, Zhang, et al., 2017). Severe physical injuries also led to

medical care, hospitalization or even death for physicians (Anand et al., 2016; Pan et al., 2015; Zahid et al., 1999; Reid, Bollinger, & Edwards, 1985; Altinbas et al., 2010). For the location of the injury, the heads, arms and eyes of physicians were attacked frequently (Carmel & Hunter, 1991; Coverdale et al., 2001). In addition, a study in India showed that 25 % of physicians reported headaches after encountering aggression and violence by patients (and their relatives/friends) (Anand et al., 2016).

3.3.2. Psychological well-being effects

Aggression and violence by patients (and their relatives/friends) affected physicians' mental health in two main aspects: psychology and emotion (total 37 articles). Nine studies reported that depression was the most common psychological impact of physicians encountering violence and assault by patients (and their relatives/friends) (Anand et al., 2016; Elhadi et al., 2020; Gong et al., 2014; Kaur et al., 2020; Mohamad et al., 2021; Nagata-Kobayashi et al., 2009; Shi et al., 2020; Sui et al., 2019; Tang & Thomson, 2019). Three studies claimed that 25.2 % to 75 % of physicians felt depressed after experiencing aggression and violence from patients (and their relatives/friends) (Anand et al., 2016; Nagata-Kobayashi et al., 2009; Shi et al., 2020). Fear was another psychological consequence that occurred frequently among physicians after facing aggression and violence by patients (and their relatives/friends) (Magnavita et al., 2012; Nagata-Kobayashi et al., 2009; Mikkola, Huhtala, & Paavilainen, 2016; Dixit et al., 2019; Kowalenko et al., 2005; Catanesi et al., 2010; Debska et al., 2012; Johansen et al., 2017). A total of 4.6 % to 75.2 % of physicians reported that they felt fearful when they were exposed to aggression and violence by patients (and their relatives/friends) (Catanesi et al., 2010; Debska et al., 2012; Dixit et al., 2019; Johansen et al., 2017; Magnavita et al., 2012; Mikkola et al., 2016; Nagata-Kobayashi et al., 2009), and physicians who had experienced physical violence felt more fearful than those who had experienced nonphysical violence (Magnavita et al., 2012). In addition, aggression and violence by patients (and their relatives/friends) affected physicians' job burnout (i.e., emotional exhaustion, depersonalization and accomplishment) (Gascon et al., 2013). More precisely, physicians felt emotional exhaustion (Bernaldo-De-Quiros et al., 2015; Erdur et al., 2015; Rafeea et al., 2017), a low level of depersonalization (Bernaldo-De-Quiros et al., 2015; Erdur et al., 2015; Rafeea et al., 2017), and low accomplishment (Rafeea et al., 2017). Eight studies mentioned that patient violence caused physician anxiety (Belayachi et al., 2010; Bernaldo-De-Quiros et al., 2015; Elhadi et al., 2020; Gong et al., 2014; Hamdan & Abu Hamra, 2015; Kaur et al., 2020; Magnavita et al., 2012; Shi et al., 2020), with a variation from 3 % to 22.1 % (Hamdan & Abu Hamra, 2015; Magnavita et al., 2012; Shi et al., 2020). Four articles reported that 28.7 %–60 % of physicians felt angry when suffering from aggressive acts by patients (and their relatives/friends) (Catanesi et al., 2010; Dixit et al., 2019; Magnavita et al., 2012; Nagata-Kobayashi et al., 2009). Aggression and violence by patients (and their relatives/friends) were also significantly associated with PTSD (posttraumatic stress disorder) among physicians, including intrusion symptoms, hyperarousal, nightmares, worse memories, and avoidance of talking about some situations (Lafta & Pandya, 2006; Rosenthal et al., 2018; Saeki et al., 2011; Zafar et al., 2013; Zafar et al., 2016). Six studies showed that physicians felt stressed, including occupational stress and psychological stress, when they experienced violence and attacks (Zhu et al., 2018; Sun, Zhang, et al., 2017; Yao et al., 2014; Mohamad et al., 2021; Kaur et al., 2020; Granek et al., 2019). Moreover, symptoms that were frequently found among physicians were that they were upset (Wyatt & Watt, 1995), were frustrated (Anand et al., 2016; Dixit et al., 2019), needed help (Debska et al., 2012), felt fatigued, humiliated, distressed (Magnavita et al., 2012), were worried (Silwal & Joshi, 2019; Wyatt & Watt, 1995; Zafar et al., 2013), were disappointed (Catanesi et al., 2010; Magnavita et al., 2012), felt fatigued (Anand et al., 2016), had lost self-confidence and self-efficacy (Yao et al., 2014), had a sense of defeat (Kaur et al., 2020), had low self-esteem (Anand et al., 2016; Kaur et al.,

2020), and were irritated and sad (Anand et al., 2016; Dixit et al., 2019; Debska et al., 2012).

3.3.3. Job motivation and retention

A total of fifteen studies investigated the impact of aggression and violence by patients (and their relatives/friends) on physicians' jobs. With a variation from 16 % (U.S.) to 32.2 % (Italy), physicians reported that they had considered leaving or changing jobs (Duan et al., 2019; Kowalenko et al., 2005; Magnavita et al., 2012; Shi et al., 2015), and in America, 19 % of emergency department physicians had the desire to change to another department (Magnavita et al., 2012). A Chinese study claimed that 73 % of physicians stated they would not choose to become a physician again (Ma et al., 2014). In fact, due to aggression and violence by patients (and their relatives/friends), 3.4 % of physicians in Pakistan had changed their department (Mirza et al., 2012), and 1 % of American emergency department physicians had quit their job (Kowalenko et al., 2005). In addition, 60 % of physicians in India eventually changed their place and pattern of work (Kumar et al., 2019). Four studies claimed that aggression and violence by patients (and their relatives/friends) reduced the job satisfaction of physicians (Granek et al., 2019; Oztok et al., 2018; Shi et al., 2015; Wu, Wang, Lam, & Hesketh, 2014). More specifically, 54.8 % of emergency department physicians reported a decrease in job satisfaction and interest in their profession in Turkey (Oztok et al., 2018). In addition, two articles indicated that 44.3 % (Pakistan) to 53.4 % (Turkey) of physicians reported that aggression and violence by patients (and their relatives/friends) had negatively affected their job performance and work quality (Mirza et al., 2012; Oztok et al., 2018). Two studies mentioned that this violent behavior had diminished physicians' job initiative and eagerness to work (Nagata-Kobayashi et al., 2009; Yao et al., 2014). Aggression and violence by patients (and their relatives/friends) had also impacted physician-patient relationships and physician-patient interactions (Hamdan & Abu Hamra, 2015; Debska et al., 2012; Wu et al., 2014; Kaur et al., 2020). Physicians minimized communication with the patient, reduced the time of patient care, avoided making decisions that might involve medical risks, and showed their anger directly to the patients because of their aggression and violence (Hamdan & Abu Hamra, 2015; Debska et al., 2012; Kaur et al., 2020). More specifically, Kaur et al. (2020) stated that incidents of aggression and violence by patients (and their relatives/friends) against physicians significantly influenced patient management and decision making by the treating physician. For example, as the severity of violence against physicians has increased, there has been an increase in recommendations for investigation and referral and consultation with other specialists.

3.3.4. Other effects

Three studies mentioned that aggression and violence by patients (and their relatives/friends) had a negative influence on physicians' lives (Nayyer-ul-Islam et al., 2014; Oztok et al., 2018), such as reducing their quality of life (Granek et al., 2019). In addition, a Chinese study claimed that 86 % of physicians reported that they do not want their children to become physicians (Ma et al., 2014). Regarding the violent behavior of patients (and their relatives/friends), only 13.2 % to 53 % of physicians reported these incidents to administrators; consequently, the majority decided not to report (Mirza et al., 2012; Mackin & Ashton, 2001; Firenze et al., 2020; Coverdale et al., 2001; Kaur et al., 2020; Baykan et al., 2015). At the organizational level, hospitals paid high compensation to patients to resolve medical disputes or pay compensation to injured physicians (Zeng et al., 2018; Liu, Zhou, Liu, & Wang, 2020; Tucker et al., 2015) (see for detailed information Table 1).

3.4. Prevention and management

A total of 24 articles investigated how to prevent aggression and violence by patients (and their relatives/friends). From the hospital perspective, twelve studies indicated that the education and training of

staff was the key method to mitigate aggression and violence by patients (and their relatives/friends) (Mackin & Ashton, 2001, Chaimowitz & Moscovitch, 1991; Zahid et al., 1999; Morrison, Lantos, & Levinson, 1998; Wyatt & Watt, 1995; Dhumad et al., 2007; Mirza et al., 2012; Nevo et al., 2019; Mohamad et al., 2021), particularly training in violence prevention or de-escalation techniques (Schnapp et al., 2016), conflict management (Kumar et al., 2019), training in managing potentially violent incidents or aggressive patients (Catanesi et al., 2010; Coverdale et al., 2001), communication skills, and self-defense (Abualrub & Khawaldeh, 2013). In addition, four articles suggested the need to improve staffing arrangements (Chaimowitz & Moscovitch, 1991; Mirza et al., 2012), especially the recruitment of new staff to reduce physicians' workload. (Granek et al., 2019; Kumar et al., 2016). Seven studies proposed improving security to prevent aggression and violence by patients (and their relatives/friends), including increasing security presence and weapon screening, badge-protected checkpoints, locks on ED doors (Behnam et al., 2011), installation of closed-circuit television (CCTV) cameras in the institution (Verma et al., 2019), establishment of a safe assessment room (Lillywhite, Morgan, & Walter, 1995), and optimization of a clinician escape route for physicians in consultation or treatment rooms (Abualrub & Khawaldeh, 2013). Enhancement of the physical setting was another significant way to protect physicians (Chaimowitz & Moscovitch, 1991), including the improvement of surroundings (e.g., lighting, noise, heat, access to food, cleanliness, privacy) (Abualrub & Khawaldeh, 2013), the improvement of conditions in public waiting areas (Abualrub & Khawaldeh, 2013) and proper infrastructure (Kumar et al., 2016; Kumar et al., 2019). Moreover, six studies indicated that improving services in hospitals could prevent aggression and violence by patients (and their relatives/friends). More precisely, hospitals could provide better services by providing translators on site to help with language barriers (Granek et al., 2019), improving communications (Kumar et al., 2016; Kumar et al., 2019; Nevo et al., 2019) and providing channels for patient feedback, such as patient suggestion boxes (Tucker et al., 2015). Four articles reported that 38.4 %–73.73 % of physicians suggested that restricting visitors' access to hospital departments was necessary (Abualrub & Khawaldeh, 2013; Hills et al., 2011; Mohamad et al., 2021), especially restricting visiting hours for relatives/friends of patients (Kumar et al., 2016), and that only one attendant should be allowed to accompany a patient into an accident and emergency unit (Abualrub & Khawaldeh, 2013; Wyatt & Watt, 1995). Furthermore, introducing a violence reporting system (Hills et al., 2011; Mohamad et al., 2021) and patient risk assessment (i.e., patient screening to record and be aware of previous aggressive behavior) were effective approaches to prevent patient aggression and violence (Abualrub & Khawaldeh, 2013; Mohamad et al., 2021). From the government perspective, physicians suggested that the government could improve laws and regulations (Bayram et al., 2017) and educate the public (Baykan et al., 2015; Mirza et al., 2012) to protect such incidents (see for detailed information Table 1).

4. Discussion and conclusion

This review investigated the prevalence, risk factors, consequences, and prevention and management of aggression and violence by patients (and their relatives/friends) toward physicians in hospitals by summarizing and synthesizing 104 articles. Most articles examined the prevalence of violence by patients (and their relatives/friends) and showed that this aggression and violence represented a prominent risk for physicians around the world.

In general, physicians working in developing countries were more exposed to patient (and their relatives/friends) aggression and violence than those working in developed countries. Although eight studies differentiated the prevalence of aggression and violence between patients and patients' relatives/friends (most studies combined patient violence with that of patients' family/friends), there were no significant differences in risk factors, consequences, and prevention management

for aggression and violence coming from patients or their relatives/friends.

Research on the characteristics of aggression and violence by patients (and their relatives/friends) has focused on two main areas: the type of patient violence and the type of physicians who are more likely to experience violence. More specifically, verbal violence, physical violence, and sexual harassment were the three most prevalent types of aggression and violence by patients (and their relatives/friends), with verbal violence being the most common. Our review indicated that young physicians were a high-risk group for experiencing violence, which is in line with the review of Hills and Joyce (2013). This phenomenon can be explained in two ways: 1) younger physicians have less experience in identifying potentially aggressive patients and taking effective methods to protect themselves from violence, and 2) younger physicians are more likely to spend more time interacting with patients (Hills & Joyce, 2013). In terms of the risk factors for aggression and violence by patients (and their relatives/friends) toward physicians, our review found that these are associated with factors on multiple levels, including patients, interactions between physicians and patients, hospitals, and society (e.g., unbiased media reporting). On the patient level, the dissatisfaction of patients (and their families/friends) with the quality of service (e.g., long waits, insufficient medicine and staff) and dissatisfaction with the treatment results (e.g., high expectations, poor outcomes) are significant triggers for their aggression and violent behavior. Notably, on a societal level, billing issues were more likely to be a major risk factor for patients' violent behavior in developing countries than in developed countries. Due to undeveloped healthcare insurance, patients and their relatives often become aggressive when they have to bear the high cost of healthcare treatment when the results do not meet their expectations. Meanwhile, adverse media reports can mislead patients into thinking that physicians and hospitals can profit from high medical/treatment bills (Zhu et al., 2018). This perception often aggravates the patient's distrust of the physician and is not conducive to a positive professional image of doctors (patient-level risk factor), which can lead to serious violent behaviors (Bayram et al., 2017; Chang et al., 2020; Dixit et al., 2019; Kaur et al., 2020; Kumar et al., 2019; Sharma et al., 2019; Tucker et al., 2015). A risk factor at the societal level regarding health policy (such as an underdeveloped insurance system) may aggravate a patient's distrust. In this sense, societal-level factors interact with patient-level factors. However, there is a lack of research that provides a better understanding of how certain risk factors interact with each other and lead to the occurrence of aggression and violence. In addition, although the risk factors for aggression and violence by patients (and their relatives/friends) are multifaceted, from the existing studies, it is difficult to determine which factors are the most significant for patient (and their relatives/friends) aggression and violence.

Regarding the consequences of aggression and violence by patients (and their relatives/friends), our review found that aggression and violence had many negative effects on physicians' health, psychological well-being and work functioning. In general, aggression and violence by patients (and their relatives/friends) were found to be mainly related to psychological and negative emotional consequences, such as anger, fear and sadness. Although many articles mainly studied the impact of aggression and violence by patients (and their relatives/friends) on the individual level, few articles focused on the impact of aggression and violence by patients (and their relatives/friends) on the team or organizational level. Only three articles in our review claimed that aggression and violence by patients (and their relatives/friends) had a negative impact on the organization, i.e., considering compensation for injured physicians. These results were in line with the review conducted by Lanctot and Guay (2014). They claimed that effects of Type II workplace violence have been found on seven different aspects among healthcare providers (i.e., physical, psychological, emotional, work functioning, relationship with patients/quality of care, social/general, and financial effects), but this violence mainly affected healthcare providers' emotions

and psychology and only the financial impact could be considered at the organizational level (i.e., cost and compensation). Mento et al. (2020) also mentioned that violence may affect budgets and costs for health organizations due to absence and burnout of professionals experiencing aggression and violence by patients (and their relatives/friends). Kumari et al. (2020) indicated that in extreme cases of workplace violence, protests have erupted in the healthcare community, resulting in tremendous loss of days of work and lack of staff. In conclusion, a range of reviews summarized consequences at individual level (e.g., psychological reaction, burnout, and physical effects) but did not mention the effects at team/organizational level (Caruso, Toffanin, Folesani, et al., 2022; Edward, Ousey, Warelou, & Lui, 2014). Therefore, there is still a lack of research on the impact of aggression and violence by patients (and their relatives/friends) on teams and the organization.

This review found scant studies on the prevention and management of aggression and violence by patients (and their relatives/friends) against physicians in hospitals. Moreover, there is a lack of articles examining the actions hospitals take to cope with the negative effects of patient aggression and violence when it occurs. Two main methods to prevent aggression and violence in hospitals were found, namely, improving the context (e.g., increasing security staff and installing CCTV) and providing training to physicians. Some hospitals chose to compensate the patient as a solution to reduce aggression and violence. However, such behavior has certain drawbacks. In China, there is a phenomenon called Yinao (healthcare disturbance); that is, some patients and their families intentionally harm doctors and damage hospital property to obtain high hospital compensation for actual or perceived medical malpractice (Zhang, Stone, & Zhang, 2017). In addition, some physicians also proposed suggestions for the prevention of aggression and violence by patients (and their relatives/friends), such as increasing staff to reduce physicians' workload, improving the violence reporting system, improving the availability of resources (e.g., sufficient medicine and beds), and providing social support to cope with negative emotions.

Although there are some mitigation strategies for the prevention and management of aggression and violence by patients (and their relatives/friends), we find that these existing strategies are developed rather loosely, without a clear theoretical notion of the risk factors. More specifically, risk factors for aggression and violence by patients (and their relatives/friends) are multifaceted, and there are links between these factors. However, existing strategies always focus on one or two levels of risk factors, and there was not a well-aligned strategy in which attention was paid to the different levels on which risk factors can be distinguished in relation to the type of violence, type of physicians and violence-prone departments involved in practice. Some models can be helpful to come to more comprehensive strategies, like the Safewards model (Bowers, 2014) which combines risk factors and prevention methods of violence in psychiatric context. However, this knowledge is still scarce and prevention approaches or models still cannot be generalized to other hospital settings or other departments.

This study has several limitations that should be considered. First, it was limited to peer-reviewed articles, which means that books and gray literature were not included. Second, due to publication bias, intervention studies that did not produce the expected results may have been underreported. Third, interventions of aggression and violence based on the interprofessional context were not considered in this review due to the scope of this review and selection criteria.

This review has implications for risk factors, consequences, and prevention and management of patient (and their relatives/friends) aggression and violence against physicians in hospitals. Most studies have focused on the individual level, and there has been little research on aggression and violence by patients (and their relatives/friends) at the team/organizational level. Moreover, the strategies of prevention and management of aggression and violence by patients (and their relatives/friends) lack connection with prevalence, risk factors and consequences, which means that there is a lack of a stronger theoretical conceptual model between these aspects. More specifically, 1)

prevention approaches should focus on locations, times and populations that are prone to violence; for example, hospitals should pay more attention to protecting young physicians from aggression and violence because they are more likely to be attacked by patients (and their relatives/friends) and to strengthening security measures in departments during time periods where violence frequently occurs; 2) the main triggers of patient (and their relatives/friends) aggression and violence need to be further identified to better understand the underlying mechanisms between risk factors and prevention strategies; 3) strategies should pay attention to the interactions between different levels of risk factors; and 4) because patient (and their relatives/friends) aggression and violence is most likely to have negative psychological and emotional effects on physicians, it is important for hospitals to provide measures to mitigate physician's negative emotions and to support them effectively.

Funding

This work was supported by China Scholarship Council (No. 202107720007; receiver: Yuhan Wu). This funder has no role in the study design, data collection and analysis, interpretation of data and writing the manuscript.

CRediT authorship contribution statement

Yuhan Wu: Conceptualization, Writing – original draft, Investigation. **Mathilde Strating:** Methodology, Investigation, Writing – review & editing. **C.T.B. (Kees) Ahaus:** Investigation, Writing – review & editing, Supervision, Project administration. **Martina Buljac-Samardzic:** Methodology, Investigation, Writing – review & editing.

Declaration of competing interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Data availability

Data will be made available on request.

Acknowledgement

We thank the librarian Dr. Wichor Bramer from Erasmus Medical Centre, Erasmus University Rotterdam for his support in searching in English databases for this systematic review.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.avb.2023.101892>.

References

- * Abualrub, R., & Khawaldeh, A. (2013). Workplace physical violence among hospital nurses and physicians in underserved areas in Jordan. *Journal of Clinical Nursing*, 23(13–14), 1937–1947. <https://doi.org/10.1111/jocn.12473>.
- * Afkhamzadeh, A., Mohamadi, B. A., Moloudi, B., Safari, H., & Pirooz, B. (2018). Workplace violence against physicians and medical students in west part of Iran. *International Journal of Human Rights in Healthcare*, 12(2), 116–123. <https://doi.org/10.1108/LJHRH-07-2018-0049>.
- * Alsaleem, S. A., Alsabaani, A., Alamri, R. S., Hadi, R. A., Alkhaiyri, M. H., Badawi, K. K., ... Al-Bishi, A. M. (2018). Violence towards healthcare workers: A study conducted in Abha City, Saudi Arabia. *Journal of Family & Community Medicine*, 25(3), 188–193. https://doi.org/10.4103/jfcm.JFCM_170_17.
- * Altinbas, K., Altinbas, G., Turkcan, A., Oral, T., & Walters, J. (2010). A survey of verbal and physical assaults towards psychiatrists in Turkey. *International Journal of Social Psychiatry*, 57(6), 631–636. <https://doi.org/10.1177/0020764010382364>.
- * Anand, T., Grover, S., Kumar, R., & Kumar, M. (2016). Workplace violence against resident doctors in a tertiary care hospital in Delhi. *The National Medical Journal of India*, 29(6), 344–348.
- * Barlow, C. B., & Rizzo, A. G. (1997). Articles violence against surgical residents. *Western Journal of Medicine*, 167(2), 74–78.
- * Baykan, Z., Öktem, I. S., Çetinkaya, F., & Naçar, M. (2015). Physician exposure to violence: A study performed in Turkey. *International Journal of Occupational Safety and Ergonomics: JOSE*, 21(3), 291–297. <https://doi.org/10.1080/10803548.2015.1073008>.
- * Bayram, B., Cetin, M., Oray, N., & Can, I. (2017). Workplace violence against physicians in Turkey's emergency departments: A cross-sectional survey. *BMJ Open*, 7, Article e013568. <https://doi.org/10.1136/bmjopen-2016-013568>.
- * Behnam, M., Tillotson, R. D., Davis, S. M., & Hobbs, G. R. (2011). Violence in the emergency department: A national survey of emergency medicine residents and attending physicians. *Journal of Emergency Medicine*, 40(5), 565–579. <https://doi.org/10.1016/j.jemermed>.
- * Belayachi, J., Berrechid, K., Amlaiki, F., Zekraoui, A., & Abouqal, R. (2010). Violence toward physicians in emergency departments of Morocco: Prevalence, predictive factors, and psychological impact. *Journal of Occupational Medicine and Toxicology*, 5, 27–32. <https://doi.org/10.1016/j.ajp.2016.06.004>.
- * Berlanda, S., Pedrazza, M., Fraizzoli, M., & De Cordova, F. (2019). Addressing risks of violence against healthcare staff in emergency departments: The effects of job satisfaction and attachment style. *Bio Med Research International*, 2019, Article 5430870. <https://doi.org/10.1155/2019/5430870>.
- * Bernaldo-De-Quiros, M., Piccini, A., Gomez, M., & Cerdeira, J. (2015). Psychological consequences of aggression in pre-hospital emergency care: Cross sectional survey. *International Journal of Nursing Studies*, 52(1), 260–270. <https://doi.org/10.1016/j.ijnurstu.2014.05.011>.
- Bhattacharjee, D. (2021). Workplace violence in healthcare: Towards a psychosocial perspective. *Aggression and Violent Behavior*, 58, 1359–1789. <https://doi.org/10.1016/j.avb.2021.101573>
- * Bilici, R., Sercan, M., & Izci, F. (2016). Levels of the Staff's exposure to violence at locked psychiatric clinics: A comparison by occupational groups. *Issues in Mental Health Nursing*, 37(7), 501–506. <https://doi.org/10.3109/01612840.2016.1162883>.
- * Binder, R. L., & McNeil, D. E. (1994). Staff gender and risk of assault on doctors and nurses. *The Bulletin of the American Academy of Psychiatry and the Law*, 22(4), 545–550.
- Bowers, L. (2014). Safewards: A new model of conflict and containment on psychiatric wards. *Journal of Psychiatric Mental Health Nurse*, 21(6), 499–508. <https://doi.org/10.1111/jpm.12129>
- Byon, H. D., Lee, M., Choi, M., Sagherian, K., Crandall, M., & Lipscomb, J. (2020). Prevalence of type II workplace violence among home healthcare workers: A meta-analysis. *American Journal of Industrial Medicine*, 63(5), 442–455. <https://doi.org/10.1002/ajim.23095>
- * Carmel, H., & Hunter, M. (1991). Psychiatrists injured by patient attack. *The Bulletin of the American Academy of Psychiatry and the Law*, 19(3), 309–316.
- Caruso, R., Toffanin, T., Folesani, F., et al. (2022). (2022). Violence against physicians in the workplace: Trends, causes, consequences, and strategies for intervention. *Current Psychiatry Reports*, 24, 911–924. <https://doi.org/10.1007/s11920-022-01398-1>
- * Catanesi, R., Carabellese, F., Candelli, C., Valerio, A., & Martinelli, D. (2010). Violent patients: What Italian psychiatrists feel and how this could change their patient care. *International Journal of Offender Therapy and Comparative Criminology*, 54(3), 441–447. <https://doi.org/10.1177/0306624X09334987>.
- * Chaimowitz, G. A., & Moscovitch, A. (1991). Patient assaults on psychiatric residents: The Canadian experience. *Canadian Journal of Psychiatry. Revue Canadienne de Psychiatrie*, 36(2), 107–111. <https://doi.org/10.1177/070674379103600206>.
- * Chang, P., Wu, T., & Du, J. (2020). Psychological contract violation and patient's antisocial behaviour: A moderated mediation model of patient trust and doctor-patient communication. *International Journal of Conflict Management*, 31(4), 647–664. <https://doi.org/10.1108/IJCM-07-2019-0119>.
- * Chaudhuri, P. (2007). Experiences of sexual harassment of women health workers in four hospitals in Kolkata, India. *Reproductive Health Matters*, 15(30), 221–229. [https://doi.org/10.1016/S0968-8080\(07\)30319-4](https://doi.org/10.1016/S0968-8080(07)30319-4).
- * Cikriklar, H., Yurumez, Y., Gungor, B., Askin, R., Yucel, M., & Baydemir, C. (2016). Violence against emergency department employees and the attitude of employees towards violence. *Hong Kong Medical Journal*, 22(5), 464–471. <https://doi.org/10.12809/hkmj154714>.
- * Coverdale, J., Gale, C., Weeks, S., & Turbott, S. (2001). A survey of threats and violent acts by patients against training physicians. *Medical Education*, 35(2), 154–159. <https://doi.org/10.1111/j.1365-2923.2001.00767.x>.
- * Danivas, V., Lepping, P., Punitharani, S., Gowrishree, H., Ashwini, K., Raveesh, B., & Palmstierna, T. (2016). Observational study of aggressive behaviour and coercion on an Indian acute ward. *Asian Journal of Psychiatry*, 22, 150–156.
- * De Jager, L., Deneyer, M., Buyl, R., Roelandt, S., Pacqueu, R., & Devroey, D. (2019). Cross-sectional study on patient-physician aggression in Belgium: Physician characteristics and aggression types. *BMJ Open*, 9(12), Article e025942. <https://doi.org/10.1136/bmjopen-2018-025942>.
- * Debska, E., Szczegielniak, A., Skowronek, A., Wydra, K., Frey, P., Skowronek, R., & Krysta, K. (2012). Different dimensions of aggression occurring in the work environment of psychiatrists. *Psychiatria Danubina*, 24, S165–S168.
- * Demirci, S., & Ugurluoglu, O. (2020). An evaluation of verbal, physical, and sexual violence against healthcare workers in Ankara, Turkey. *Journal of Forensic Nursing*, 16(4), E33–E41. <https://doi.org/10.1097/JFN.0000000000000286>.
- * Dhumad, S., Wijeratne, A., & Treasaden, I. (2007). Violence against psychiatrists by patients: Survey in a London mental health trust. *Psychiatric Bulletin*, 31(10), 371–374. <https://doi.org/10.1192/pb.bp.106.012815>.
- * Dixit, S., D'Souza, B., Singh, R., Thomas, J., Somu, G., & Kamath, R. (2019). Factors contributing to workplace violence against doctors in a tertiary care teaching

- hospital in South India. *Indian Journal of Forensic Medicine and Toxicology*, 13(3), 108–113. <https://doi.org/10.5958/0973-9130.2019.00176.2>.
- * Duan, X., Ni, X., Shi, L., Zhang, L., Ye, Y., Mu, H., Li, Z., Liu, X., Fan, L., & Wang, Y. (2019). 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*, 17(1), 93–103. <https://doi.org/10.1186/s12955-019-1164-3>.
- Edward, K. L., Ousey, K., Warelow, P., & Lui, S. (2014). Nursing and aggression in the workplace: A systematic review. *British Journal of Nursing*, 23(12), 653–659. <https://doi.org/10.12968/bjon.2014.23.12.653>
- * Elhadi, M., Khaled, A., Malek, A., El-Azhari, A., Gwea, A., Zaid, A., ... Ahmed, H. (2020). Prevalence of anxiety and depressive symptoms among emergency physicians in Libya after civil war: A cross-sectional study. *BMJ Open*, 10(8), Article e039382 <https://bmjopen.bmj.com/content/10/8/e039382>.
- * Erdur, B., Ergin, A., Yuksel, A., Turkcu, I., Ayrik, C., & Boz, B. (2015). Assessment of the relation of violence and burnout among physicians working in the emergency departments in Turkey. *Turkish Journal of Trauma & Emergency Surgery: TJTES*, 21(3), 175–181. <https://doi.org/10.5505/tjtes.2015.91298>.
- * Firenze, A., Santangelo, O., Gianfredi, V., Alagna, E., Cedrone, F., Provenzano, S., & La Torre, G. (2020). Violence on doctors. An observational study in Northern Italy. *Medicina del Lavoro*, 111(1), 46–53. <https://doi.org/10.23749/mdl.v111i1.8795>.
- * Gascon, S., Leiter, M. P., Andres, E., Santed, M. A., Pereira, J. P., Cunha, M. J., ... Martinez-Jarreta, B. (2013). The role of aggressions suffered by healthcare workers as predictors of burnout. *Journal of Clinical Nursing*, 22(21–22), 3120–3129. <https://doi.org/10.1111/j.1365-2702.2012.04255.x>.
- * Gates, D., Ross, C., & McQueen, L. (2006). Violence against emergency department workers. *Journal of Emergency Medicine*, 31(3), 331–337. <https://doi.org/10.1016/j.jemermed.2005.12.028>.
- * Gong, Y., Han, T., Chen, W., Dib, H. H., Yang, G., Zhuang, R., ... Lu, Z. (2014). Prevalence of anxiety and depressive symptoms and related risk factors among physicians in China: A cross-sectional study. *PLoS One*, 9(7), Article e103242. <https://doi.org/10.1371/journal.pone.0103242>.
- * Granek, L., Ben-David, M., Bar-Sela, G., Shapira, S., & Ariad, S. (2019). "Please do not act violently towards the staff": Expressions and causes of anger, violence, and aggression in Israeli cancer patients and their families from the perspective of oncologists. *Transcultural Psychiatry*, 56(5), 1011–1035. <https://doi.org/10.1177/1363461518786162>.
- * Gulalp, B., Karciglu, O., Koseoglu, Z., & Sari, A. (2009). Dangers faced by emergency staff: Experience in urban centers in southern Turkey. *Turkish Journal of Trauma & Emergency Surgery: TJTES*, 15(3), 239–242.
- * Hamdan, M., & Abu Hamra, A. (2015). Workplace violence towards workers in the emergency departments of Palestinian hospitals: A cross-sectional study. *Human Resources for Health*, 13(1), 28–37. <https://doi.org/10.1186/s12960-015-0018-2>.
- Hills, D., & Joyce, C. (2013). A review of research on the prevalence, antecedents, consequences and prevention of workplace aggression in clinical medical practice. *Aggression and Violent Behavior*, 18, 554–569. <https://doi.org/10.1016/j.avb.2013.07.014>
- * Hills, D., Joyce, C., & Humphreys, J. (2011). Prevalence and prevention of workplace aggression in Australian clinical medical practice. *Australian Health Review*, 35(3), 253–261. <https://doi.org/10.1071/AH10983>.
- * Hills, D., Joyce, C., & Humphreys, J. (2012). A national study of workplace aggression in Australian clinical medical practice. *Medical Journal of Australia*, 197(6), 336–340. <https://doi.org/10.5694/mja12.10444>.
- * Hu, Y. Y., Ellis, R. J., Hewitt, D. B., Yang, A. D., Cheung, E. O., Moskowitz, J. T., ... Bilimoria, K. Y. (2019). Discrimination, abuse, harassment, and burnout in surgical residency training. *The New England Journal of Medicine*, 381(18), 1741–1752. <https://doi.org/10.1056/NEJMsa1903759>.
- * Huang, J., Zhang, M., & Liu, X. (2020). Correlation between patient and visitor violence and workload among public healthcare workers in China: A cross-sectional study. *BMJ Open*, 10(4), Article e034605. <https://doi.org/10.1136/bmjopen-2019-034605>.
- * Jankowiak, B., Kowalczyk, K., Krajewska-Kulak, E., Sierakowska, M., Lewko, J., & Klimaszewska, K. (2007). Exposure the doctors to aggression in the workplace. *Advances in Medical Sciences*, 52, 89–92 (PMID: 18232101).
- * Johansen, I. H., Baste, V., Rosta, J., Aasland, O. G., & Morken, T. (2017). Changes in prevalence of workplace violence against doctors in all medical specialties in Norway between 1993 and 2014: A repeated cross-sectional survey. *BMJ Open*, 7(8), Article e017757. <https://doi.org/10.1136/bmjopen-2017-017757>.
- * Karaahmet, E., Bakim, B., Altinbas, K., & Peker, E. (2014). Evaluation of assaults on doctors in Canakkale within the last year. *Dusunen Adam*, 27(2), 108–114. <https://doi.org/10.5350/DAJPN2014270202>.
- * Kasai, Y., Mizuno, T., Sakakibara, T., Thu, S., Kyaw, T., & Htun, K. (2018). A survey of workplace violence against physicians in the hospitals, Myanmar. *BMC Research Notes*, 11(1), 133–136. <https://doi.org/10.1186/s13104-018-3240-x>.
- * Kaur, A., Ahamed, F., Sengupta, P., Majhi, J., & Ghosh, T. (2020). Pattern of workplace violence against doctors practising modern medicine and the subsequent impact on patient care, in India. *PLoS ONE*, 15(9), Article e0239193. <https://doi.org/10.1371/journal.pone.0239193>.
- * Kaya, S., Demir, I., Karsavuran, S., Urek, D., & Ilgun, G. (2016). Violence against doctors and nurses in hospitals in Turkey. *Journal of Forensic Nursing*, 12(1), 26–34. <https://doi.org/10.1097/JFN.0000000000000100>.
- * Kirkegaard, M., Kines, P., Nielsen, H., & Garde, A. (2018). Occupational safety across jobs and shifts in emergency departments in Denmark. *Safety Science*, 103, 70–75. <https://doi.org/10.1016/j.ssci.2017.11.014>.
- * Kowalenko, T., Hauff, S., Morden, P., & Smith, B. (2012). Development of a data collection instrument for violent patient encounters against healthcare workers. *Western Journal of Emergency Medicine*, 13(5), 429–433. <https://doi.org/10.5811/westjem.2011.12.6795>.
- * Kowalenko, T., Walters, B., Khare, R., & Compton, S. (2005). Workplace violence: A survey of emergency physicians in the state of Michigan. *Annals of Emergency Medicine*, 46(2), 142–147. <https://doi.org/10.1016/j.annemergmed.2004.10.010>.
- * Kumar, M., Verma, M., Das, T., Pardeshi, G., Kishore, J., & Padmanandan, A. (2016). A study of workplace violence experienced by doctors and associated risk factors in a tertiary care hospital of South Delhi, India. *Journal of Clinical and Diagnostic Research*, 10(11), LC06–LC10. <https://doi.org/10.7860/JCDR/2016/22306.8895>.
- * Kumar, N. S., Munta, K., Kumar, J. R., & Rao, S. M. (2019). A survey on workplace violence experienced by critical care physicians. *Indian Journal of Critical Care Medicine*, 23(7), 295–301. <https://doi.org/10.5005/jp-journals-10071-23202>.
- Kumari, A., Kaur, T., Ranjan, P., Chopra, S., Sarkar, S., & Baitaha, U. (2020). Workplace violence against doctors: Characteristics, risk factors, and mitigation strategies. *Journal of Postgraduate Medicine*, 66(3), 149–154. https://doi.org/10.4103/jpgm.JPGM_96_20
- * Lafta, M., & Pandya, A. (2006). Verbal and physical aggression against resident physicians in two general hospitals in Baghdad. *Journal of Muslim Mental Health*, 1(2), 137–144. <https://doi.org/10.1080/15564900600980673>.
- Lancot, N., & Guay, S. (2014). The aftermath of workplace violence among healthcare workers: A systematic literature review of the consequences. *Aggression and Violent Behavior*, 19, 492–501. <https://doi.org/10.1016/j.avb.2014.07.010>
- * Lepping, P., Lanka, S., Turner, J., Stanaway, S., & Krishna, M. (2013). Percentage prevalence of patient and visitor violence against staff in high-risk UK medical wards. *Clinical Medicine, Journal of the Royal College of Physicians of London*, 13(6), 543–546. <https://doi.org/10.7861/clinmedicine.13-6-543>.
- * Lillywhite, A., Morgan, N., & Walter, E. (1995). Reducing the risk of violence to junior psychiatrists. *Psychiatric Bulletin*, 19, 24–27.
- * Liu, J., Zhou, H., Liu, L., & Wang, C. (2020). The weakness of the strong: Examining the squeaky-wheel effect of hospital violence in China. *Social Science & Medicine* (1982), 245, Article 112717. <https://doi.org/10.1016/j.socscimed.2019.112717>.
- Lowry, B., Eck, L., Howe, E., Peterson, J., & Gibson, C. (2019). Workplace violence: Experiences of internal medicine trainees at an Academic Medical Center. *Southern Medical Journal*, 112(6), 310–314. <https://doi.org/10.14423/SMJ.0000000000000984>
- * Ma, Z. S., Wang, L., Du, G. S., Wang, L., & Chen, X. J. (2014). What is the work environment of orthopaedic surgeons in China? *Clinical Orthopaedics and Related Research*, 472(11), 3576–3580. <https://doi.org/10.1007/s11999-014-3859-4>.
- * Mackin, J., & Ashton, M. (2001). Violence against trainee paediatricians. *Archives of Disease in Childhood*, 84(2), 106–108. <https://doi.org/10.1136/ad.84.2.106>.
- * Magnavita, N., Fileni, A., Pescarini, L., & Magnavita, G. (2012). Violence against radiologists. I: Prevalence and preventive measures. *Radiologia Medica*, 117(6), 1019–1033. <https://doi.org/10.1007/s11547-012-0825-7>.
- * Magnavita, N., & Heponiemi, T. (2012). Violence towards health care workers in a public health care facility in Italy: A repeated cross-sectional study. *BMC Health Services Research*, 12, 108. <https://doi.org/10.1186/1472-6963-12-108>.
- Mento, C., Silvestri, M. C., Bruno, A., Muscatello, A., Cedro, C., Pandolfo, G., & Zoccali, A. (2020). Workplace violence against healthcare professionals: A systematic review. *Aggression and Violent Behavior*, 51, Article 101381. <https://doi.org/10.1016/j.avb.2020.101381>
- * Mikkola, R., Huhtala, H., & Paavilainen, E. (2016). Work-related fear and the threats of fear among emergency department nursing staff and physicians in Finland. *Journal of Clinical Nursing*, 26(19–20), 2953–2963. <https://doi.org/10.1111/jocn.13633>.
- * Mirza, N., Amjad, A., Bhatti, A., Mirza, F., Shaikh, K., Kiani, J., Yusuf, M., Khan, M., Nazir, M., Assad, Q., Humayun, A., Kiani, I., Amjad, S., & Imam, S. (2012). Violence and abuse faced by junior physicians in the emergency department from patients and their caretakers: A nationwide study from Pakistan. *Journal of Emergency Medicine*, 42(6), 727–733. <https://doi.org/10.1016/j.jemermed.2011.01.029>.
- * Mohamad, O., Alkhoury, N., Abdul-Baki, M. N., Alsalkini, M., & Shaaban, R. (2021). Workplace violence toward resident doctors in public hospitals of Syria: Prevalence, psychological impact, and prevention strategies: A cross-sectional study. *Human Resources for Health*, 19(1), 8. <https://doi.org/10.1186/s12960-020-00548-x>.
- * Morrison, J., Lantos, J., & Levinson, W. (1998). Aggression and violence directed toward physicians. *Journal of General Internal Medicine*, 13(8), 556–561. <https://doi.org/10.1046/j.1525-1497.1998.00167.x>.
- * Nagata-Kobayashi, S., Maeno, T., Yoshizu, M., & Shimbo, T. (2009). Universal problems during residency: Abuse and harassment. *Medical Education*, 43(7). <https://doi.org/10.1111/j.1365-2923.2009.03388.x> (628–626).
- * Naveen, P., Betadur, D., & Chandermani. (2020). Study on mitigation of workplace violence in hospitals. *Medical Journal Armed Forces India*, 76(3), 298–302. <https://doi.org/10.1016/j.mjafi.2019.09.003>.
- * Nayyer-ul-Islam, Yousuf-ul-Islam, M., Farooq, M. S., Mazharuddin, S. M., Hussain, S. A., & Umair-ul-Islam. (2014). Workplace violence experienced by doctors working in government hospitals of Karachi. *Journal of College of Physicians and Surgeons Pakistan*, 24(9), 698–699 (PMID: 25233981).
- * Nevo, T., Peleg, R., Kaplan, D., & Freud, T. (2019). Manifestations of verbal and physical violence towards doctors: A comparison between hospital and community doctors. *BMC Health Services Research*, 19(1), 888–895. <https://doi.org/10.1186/s12913-019-4700-2>.
- Nowrouzi-Kia, B., Chai, E., Usuba, K., Nowrouzi-Kia, B., & Casole, J. (2019). Prevalence of type II and type III workplace violence against physicians: A systematic review and meta-analysis. *The international journal of occupational and environmental medicine*, 10(3), 99. <https://doi.org/10.15171/ijom.2019.1573>
- * Oguz, M., Sayin, E., & Gurses, D. (2020). Violence against health employees in a child health and diseases clinic: A tertiary-level hospital. *Turkish Archives of Pediatrics*, 55(2), 117–123. <https://doi.org/10.14744/TurkPediatriArs.2020.27003>.

- * Oztok, B., Icme, F., Sahin, K. H., Pamukcu, G., Sener, A., & Kurtoglu, G. (2018). Evaluation of violence against emergency physicians in Turkey. *Eurasian Journal of Emergency Medicine*, 17(4), 182–186. <https://doi.org/10.5152/eajem.2018.20982>.
- Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., et al. (2021). The PRISMA 2020 statement: An updated guideline for reporting systematic reviews. *International Journal of Surgery*, 88, Article 105906. <https://doi.org/10.1016/j.ijsu.2021.105906>
- * Pan, Y., Yang, X., He, J., Gu, Y., Zhan, X., Gu, H., ... Jin, H. (2015). To be or not to be a doctor, that is the question: A review of serious incidents of violence against doctors in China from 2003-2013. *Journal of Public Health (Germany)*, 23(2), 111–116. <https://doi.org/10.1007/s10389-015-0658-7>.
- * Paola, F., & Oureshi, A. (1994). Violence against physicians. *Journal of General Internal Medicine*, 9, 503–506. <https://doi.org/10.1007/BF02599220>.
- * Rafeea, F., Al Ansari, A., Abbas, E., Elmusharaf, K., & Abu Zeid, M. (2017). Violence toward health workers in Bahrain Defense Force Royal Medical Services & emergency department. *Open Access Emergency Medicine*, 9, 113–121. <https://doi.org/10.2147/OAEM.S147982>.
- * Reid, H., Bollinger, F., & Edwards, G. (1985). Assaults in hospitals. *Bulletin of the American Academy of Psychiatry and the Law*, 13, 1–4.
- * Rosenthal, L., Ashley, B., Adrienne, T., & Martinovich, Z. (2018). Impact and prevalence of physical and verbal violence toward healthcare workers. *Psychosomatics*, 59(6), 584–590. <https://doi.org/10.1016/j.psym.2018.04.007>.
- * Saeki, K., Okamoto, N., Tomioka, K., Obayashi, K., Nishioka, H., Ohara, K., & Kurumatani, N. (2011). Work-related aggression and violence committed by patients and its psychological influence on doctors. *Journal of Occupational Health*, 53(5), 356–364. <https://doi.org/10.1539/joh.11-0108-OA>.
- * Schnapp, B. H., Slovis, B. H., Shah, A. D., Fant, A. L., Gisondi, M. A., Shah, K. H., & Lech, C. A. (2016). Workplace violence and harassment against emergency medicine residents. *The Western Journal of Emergency Medicine*, 17(5), 567–573. <https://doi.org/10.5811/westjem.2016.6.30446>.
- * Shafran-Tikva, S., Zekler, R., Stern, Z., & Chinitz, D. (2017). Workplace violence in a tertiary care Israeli hospital - A systematic analysis of the types of violence, the perpetrators and hospital departments. *Israel Journal of Health Policy Research*, 6(1), 43–54. <https://doi.org/10.1186/s13584-017-0168-x>.
- * Sharma, S., Lal Gautam, P., Sharma, S., Kaur, A., Bhatia, N., Singh, G., Kaur, P., & Kumar, A. (2019). Questionnaire-based evaluation of factors leading to patient-physician distrust and violence against healthcare workers. *Indian Journal of Critical Care Medicine*, 23(7), 302–309. <https://doi.org/10.5005/jp-journals-10071-23203>.
- * Shi, J., Wang, S., Zhou, P., Shi, L., Zhang, Y., Bai, F., ... Zhang, X. (2015). The frequency of patient-initiated violence and its psychological impact on physicians in China: A cross-sectional study. *PLoS One*, 10(6), Article e0128394. <https://doi.org/10.1371/journal.pone.0128394>.
- * Shi, L., Li, G., Hao, J., Wang, W., Chen, W., Liu, S., Yu, Z., Shi, Y., Ma, Y., Fan, L., Zhang, L., & Han, X. (2020). Psychological depletion in physicians and nurses exposed to workplace violence: A cross-sectional study using propensity score analysis. *International Journal of Nursing Studies*, 103. <https://doi.org/10.1016/j.ijnurstu.2019.103493>.
- * Silwal, K., & Joshi, S. (2019). Prevalence of verbal abuse among doctors in tertiary care hospital. *Journal of the Nepal Medical Association*, 57(220), 445–447. <https://doi.org/10.31729/jnma.4762>.
- * Sui, G., Liu, G., Jia, L., Wang, L., & Yang, G. (2019). Associations of workplace violence and psychological capital with depressive symptoms and burn-out among doctors in Liaoning, China: A cross-sectional study. *BMJ Open*, 9(5). <https://doi.org/10.1136/bmjopen-2018-024186>.
- * Sun, P., Zhang, X., Sun, Y., Ma, H., Jiao, M., Xing, K., Kang, Z., Ning, N., Fu, Y., Wu, Q., & Yin, M. (2017). Workplace violence against health care workers in north chinese hospitals: A cross-sectional survey. *International Journal of Environmental Research and Public Health*, 14(1), 96–106. <https://doi.org/10.3390/ijerph14010096>.
- * Sun, T., Gao, L., Li, F., Shi, Y., Xie, F., Wang, J., Wang, S., Zhang, S., Liu, W., Duan, X., Liu, X., Zhang, Z., Li, L., & Fan, L. (2017). Workplace violence, psychological stress, sleep quality and subjective health in Chinese doctors: A large cross-sectional study. *BMJ Open*, 7(12), Article e017182. <https://doi.org/10.1136/bmjopen-2017-017182>.
- * Swain, N., Gale, C., & Greenwood, R. (2014). Patient aggression experienced by staff in a public hospital setting. *Journal of the New Zealand Medical Association*, 127, 10–18.
- * Tang, N., & Thomson, L. (2019). Workplace violence in Chinese hospitals: The effects of healthcare disturbance on the psychological well-being of Chinese healthcare workers. *International Journal of Environmental Research and Public Health*, 16(19), 3687–3701. <https://doi.org/10.3390/ijerph16193687>.
- * Tian, Y., Yue, Y., Wang, J., Luo, T., Li, Y., & Zhou, J. (2020). Workplace violence against hospital healthcare workers in China: A national we chat-based survey. *BMC Public Health*, 20(1). <https://doi.org/10.1186/s12889-020-08708-3>.
- * Tucker, J., Cheng, Y., Wong, B., Gong, N., Nie, J., Zhu, W., McLaughlin, M., Xie, R., Deng, Y., Huang, M., Wong, W., Lan, P., Liu, H., Miao, W., & Kleinman, A. (2015). Patient-physician mistrust and violence against physicians in Guangdong Province, China: A qualitative study. *BMJ Open*, 5(10), Article e008221. <https://doi.org/10.1136/bmjopen-2015-008221>.
- * Udoji, M., Ifeanyi-Pillette, I., Miller, T., & Lin, D. (2019). Workplace violence against anesthesiologists: We are not immune to this patient safety threat. *International Anesthesiology Clinics*, 57(3), 123–137. <https://doi.org/10.1097/AIA.0000000000000237>.
- * Verma, R., Bhalla, K., Dhaka, R., Agrawal, G., Dhankar, M., Singh, A., & Kumar, G. (2019). Violence against doctor is a threat in India: A study in a tertiary care institution. *Indian Journal of Public Health Research and Development*, 10(8), 472–477. <https://doi.org/10.5958/0976-5506.2019.01928.4>.
- Volz, N. B., Fringer, R., Walters, B., & Kowalenko, T. (2017). Prevalence of horizontal violence among emergency attending physicians, residents, and physician assistants. *Western Journal of Emergency Medicine*, 18(2), 213. <https://doi.org/10.5811/westjem.2016.10.31385>.
- * Wang, N., Wu, D., Sun, C., Li, L., & Zhou, X. (2021). Workplace violence in county hospitals in eastern China: Risk factors and hospital attitudes. *Journal of Interpersonal Violence*, 36(9–10), 4916–4926. <https://doi.org/10.1177/0886260518792242>.
- * Winstanley, S., & Whittington, R. (2004). Aggression towards health care staff in a UK general hospital: Variation among professions and departments. *Journal of Clinical Nursing*, 13(1), 3–10. <https://doi.org/10.1111/j.1365-2702.2004.00807.x>.
- Wirth, T., Peters, C., Nienhaus, A., & Schablon, A. (2021). Interventions for workplace violence prevention in emergency departments: A systematic review. *International Journal of Environmental Research and Public Health*, 18(16), 8459. <https://doi.org/10.3390/ijerph18168459>.
- * Wu, D., Wang, Y., Lam, K. F., & Hesketh, T. (2014). Health system reforms, violence against doctors and job satisfaction in the medical profession: A cross-sectional survey in Zhejiang Province, Eastern China. *BMJ Open*, 4(12), Article e006431. <https://doi.org/10.1136/bmjopen-2014-006431>.
- * Wu, J., Tung, T., Chen, P., Chen, Y., Lin, Y., & Chen, F. (2015). Determinants of workplace violence against clinical physicians in hospitals. *Journal of Occupational Health*, 57(6), 540–547. <https://doi.org/10.1539/joh.15-0111-OA>.
- * Wyatt, J., & Watt, M. (1995). Violence towards junior doctors in accident and emergency departments. *Journal of Accident and Emergency Medicine*, 12(1), 40–42. <https://doi.org/10.1136/emj.12.1.40>.
- * Yao, Y., Wang, W., Wang, F., & Yao, W. (2014). General self-efficacy and the effect of hospital workplace violence on doctors' stress and job satisfaction in China. *International Journal of Occupational Medicine and Environmental Health*, 27(3), 389–399. <https://doi.org/10.2478/s13382-014-0255-y>.
- * Zafar, W., Khan, U., Siddiqui, S., Jamali, S., & Razzak, J. (2016). Workplace violence and self-reported psychological health: Coping with post-traumatic stress, mental distress, and burnout among physicians working in the emergency departments compared to other specialties in Pakistan. *Journal of Emergency Medicine*, 50(1), 167–177. <https://doi.org/10.1016/j.jemermed.2015.02.049>.
- * Zafar, W., Siddiqui, E., Ejaz, K., Shehzad, M., Khan, U., Jamali, S., & Razzak, J. (2013). Health care personnel and workplace violence in the emergency departments of a volatile Metropolis: Results from Karachi, Pakistan. *Journal of Emergency Medicine*, 45(5), 761–772. <https://doi.org/10.1016/j.jemermed.2013.04.049>.
- * Zahid, M. A., Al-Sahlawi, K. S., Shahid, A., Awadh, J. A., & Abu-Shammah, H. (1999). Violence against doctors 2. Effects of violence on doctors working in accident and emergency departments. *European Journal of Emergency Medicine*, 6, 305–309. <https://doi.org/10.1097/00063110-199912000-00006>.
- * Zeng, Y., Zhang, L., Yao, G., & Fang, Y. (2018). Analysis of current situation and influencing factor of medical disputes among different levels of medical institutions based on the game theory in Xiamen of China: A cross-sectional survey. *Medicine*, 97(38), Article e12501. <https://doi.org/10.1097/MD.00000000000012501>.
- Zhang, L., Stone, E., & Zhang, J. (2017). Understanding the rise of Yinao in China: A commentary on the little known phenomenon of healthcare violence. *Nursing and Health Sciences*, 19(2), 183–187. <https://doi.org/10.1111/nhs.12311>
- * Zhu, L., Li, L., & Lang, J. (2018). Gender differences in workplace violence against physicians of obstetrics and gynecology in China: A questionnaire in the national congress. *PLoS One*, 13(12), Article e0208693. <https://doi.org/10.1371/journal.pone.0208693>.
- * Zubairi, A., Ali, M., Sheikh, S., & Ahmad, T. (2019). Workplace violence against doctors involved in clinical care at a tertiary care hospital in Pakistan. *Journal of the Pakistan Medical Association*, 69(9), 1355–1359.