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Work-related Aggression and Violence Committed by Patients and Its Psychological Influence on Doctors

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Abstract: Work-related Aggression and Violence Committed by Patients and Its Psychological Influence on Doctors: Keigo Saeki, *et al*. Department of Community Health and Epidemiology, Nara Medical University School of Medicine—Objectives: To determine the incidence rate of work-related aggression and violence (WRAV) against doctors and investigate risk factors and psychological influences of WRAV doctors. **Methods:** We sent a self-administered questionnaire on WRAV committed by patients and their associates to 1,148 doctors in Nara Prefecture, Japan. We calculated the incidence rate of WRAV using the number of incidents encountered during the previous 12 mo and the doctor's average weekly working hours. Risk factors for the incidence WRAV were analyzed by Poisson regression, and the influence of WRAV on the symptoms of post-traumatic stress disorder (PTSD) was evaluated by multiple logistic regression analysis. **Results:** A total of 758 (66.0%) doctors returned the questionnaire. The incidence rate of WRAV was 0.20 [95% CI: 0.17–0.24]×10^{-3} per practice hour. Adjusted incidence rate ratios of WRAV were significantly increased among doctors 1) with a shorter career (11.0; 95% CI: 5.0–24.2), 2) working in a region with the lowest average taxable income (1.6; 1.1–2.4), and 3) whose specialties were dermatology (3.8; 2.3–6.3), psychiatry (2.7; 1.3–5.6) and ophthalmology (1.9; 1.2–3.2). Of 289 subjects who had encountered WRAV at least once during their career, 26 doctors (8.2%) had symptoms suggestive of PTSD due to the most severe incident. **Conclusions:** Doctors encountered WRAV at an incidence rate of 0.20×10^{-3} per practice hour, and some of them might develop PTSD. Countermeasures are required to maintain sound health and safe workplaces for doctors.
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Key words: Aggression and violence, Doctors, Incidence rate, Period prevalence, Post-traumatic stress disorder, Risk factors

Doctors who have encountered work-related aggression and violence (WRAV) by patients and their associates have reported anxiety related to workplace safety, reduction of commitment to their practice and decrease in confidence as a doctor[1, 2]. Such encounters possibly contribute to a decrease in quality of their medical practice. Investigation of the occurrences and risk factors of WRAV and its psychological influence on doctors is also important for the nation.

Previous studies[3–13] revealed period prevalences of WRAV that were determined by the proportion of doctors who encountered incidents within a designated period. This method leads to underestimation of occurrences of WRAV because multiple incidents occurring with the same doctor are counted as one. In fact, not a few doctors encountered WRAV more than once in a rather short period[1, 2, 10]. This problem can be resolved by using the incidence rate instead of prevalence.

WRAV occurs in both hospitals and doctors' offices. These two types of settings differ in accessibility, severity of patients' conditions and the number of staff; therefore, the WRAV encountered in these facilities should be evaluated separately. Little is known about the actual situation of WRAV in doctors' offices which usually have much fewer staff than hospitals. Studies[3, 5–9] on WRAV against general practitioners (GP) in their own offices indicated that doctors treating abusers of alcohol and drugs and patients with mental illness had an increased risk of WRAV. However, there are no reports on the risk

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differences among doctors of certain medical specialties in their own offices. In addition, only a few studies[8, 9] investigated other risk factors of WRAV.

It has been reported[14] that doctors who have encountered WRAV suffered frequently from post-traumatic stress disorder (PTSD), including intrusive thoughts about a violent experience, avoidance of some types of patients or impaired concentration. However, there has been no research that used a validated scale to screen PTSD properly, nor did any study investigate factors related to PTSD among doctors who had encountered WRAV.

Thus, this study had three main objectives: 1) to estimate the incidence rate of WRAV, 2) to identify risk factors of WRAV and 3) to evaluate the severity of PTSD using a validated questionnaire among doctors working at their own offices.

The present study was approved by the Ethics Committee of Nara Medical University.

Methods

Study subjects

Our potential subjects were 1,148 (969 males and 179 females) doctors who were registered as members of the Nara Prefecture Medical Association in Japan as of the end of 2007. They worked at their own offices and had less than 20 inpatient beds. This number of doctors (1,148) was almost equal to the number (1,100) reported in the latest national doctor statistics in Nara Prefecture[15].

Questionnaire

In September 2008, a seven-page (full), self-administered questionnaire was mailed to all potential subjects. We requested that they return the questionnaire within two weeks by mail. In cases where the questionnaire was not returned even after a reminder two weeks after the due date, we mailed a one-page (short) questionnaire and asked them to fax it back within two weeks.

The full questionnaire included questions about (1) age, (2) sex, (3) encounters (or lack) with WRAV (see below) during the doctor's career, (4) the number of types of WRAV during the previous 12 mo, (5) specialty, (6) the number of inpatient beds in the office, (7) the number of years after getting a doctor's licence, (8) the average weekly working hours for outpatient practice, (9) the average number of treated outpatients per week, (10) location of the office (12 cities, 15 towns and 12 villages in Nara Prefecture) and (11) the IES-RJ (Japanese version of the Revised Impact of Event Scale) for the most severe incident of WRAV encountered during the doctor's career. The short questionnaire included only questions 1 through 6 in order to receive a high response. We estimated the incidence rate of WRAV per 10^3 h of practice by dividing the totaled values of question 4 by the total hours of outpatient practice per year estimated from the value of question 8. Thus, the incidence rate of WRAV and IES-RJ scores were calculated only for the respondents to the full questionnaire.

Definition of WRAV

We inquired about each of the following 10 types of WRAV against doctor committed by patients and their associates: 1) verbal sexual harassment, 2) sexual abuse (touching, grabbing), 3) indirect harassment and/or threats (telephone call, mail, email), 4) stalking, 5) verbal abuse (to force doctors to prescribe medications or to issue a fraudulent medical certificate), 6) property damage, 7) threats with a dangerous weapon (knife, stick) and physical injuries requiring treatment 8) for less than seven days including zero (slight), 9) for one to four weeks (moderate) and 10) for more than four weeks (severe). Types 1 to 7 and 8 to 10 are categorized into psychological and physical types of WRAV, respectively, by the framework guidelines[16] of the International Labour Organization, International Council of Nurses, World Health Organization and Public Services International.

Impact Event Scale-Revised (IES-R)

To evaluate psychological trauma due to WRAV, we used the IES-R questionnaire[17, 18]. The reliability and validity[19] of the Japanese version (IES-RJ) were comparable to those[20] of other screening instruments for PTSD. The IES-RJ consists of 22 items from three subscales (8 intrusion items, 8 avoidance items and 6 hyperarousal items). A 5-point scale (0 to 4) was applied to indicate the severity of each item during the previous week. We judged an IES-RJ score greater than 24[19] as PTSD suspected. Subjects who had encountered WRAV at least once during their career were asked to complete the IES-RJ for the most severe incident. The sensitivity and specificity for clinical PTSD using the IES-RJ were 75% and 71%, respectively, among persons whose traumatic incident had occurred within four years[19].

Statistical analyses

The differences in distributions of sex and age were evaluated by the chi-square test.

Crude incidence rate ratio (IRR) and its 95% CI for each category of predictive variables were obtained under the Poisson regression model[21]. The variables considered in these models were sex, age (ten-year interval), years of practice as a doctor (ten-year interval), 11 specialties, number of inpatient beds (0 or 1–19) and average taxable income in 2006[22] (categorized into four by quartile). Adjustment was made for all predictors mutually except doctor's age. Doctor's age was excluded from the model because it highly correlated with years of practice as a doctor (r=0.95).

The odds ratio (OR) and 95% confidence interval (95% CI) of the highest quartile group versus the remaining quartile groups of the IES-RJ score for each category of

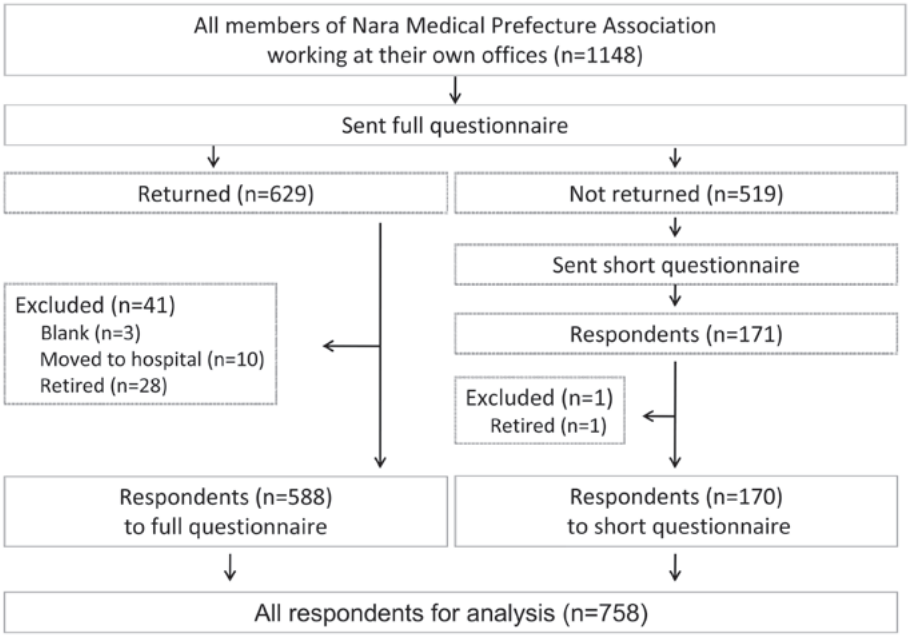

Fig. 1. Flow diagram of the enrollment of study participants.

explanatory variable were estimated using a logistic regression model. In the model, explanatory variables were years since the most severe incident of WRAV (categorized into four by quartile), eight types of WRAV, sex, age (ten-year interval), years of practice as a doctor (ten-year interval) and 11 specialties. In addition, ORs were adjusted for years since the most severe incident of WRAV.

Linear trend tests for IRRs and ORs for an ordinal categorical variable were conducted using a Poisson model and logistic model, respectively.

We used SPSS software (version 17) for all statistical analyses and rejected the null hypothesis when the P value was less than 0.05.

Results

Of 1,148 potential subjects, 629 (54.8%) returned the full questionnaire and 171 (14.9%) returned the short questionnaire (Fig 1). We excluded 42 subjects; 3 returned the questionnaire unanswered, 10 had moved to a hospital and 28 had retired. This resulted in 588 and 170 respondents to the full and short questionnaires, respectively. In total, 758 respondents (66.0%) were available for analysis. Over 80% of them were males, and half of the subjects were 55 yr of age or older.

Table 1 compares the distributions of sex and age among respondents and nonrespondents to the full or short questionnaire. These distributions for the nonrespondents were derived from records of the regional medical association. There were a significantly lower number of males and higher number of younger doctors that responded to the questionnaire. There was no significant difference in sex distribution among respondents to the full and short questionnaires; however, older doctors responded more frequently to the full questionnaire than to the short questionnaire.

Of the 758 respondents, 119 encountered WRAV by patients and their associates at least once over the previous 12 mo, which corresponded to an annual period prevalence of 15.7% (95% CI: 13.1–18.3%). They had an average of 2.3 incidents (range 1 to 18) of WRAV, and there was a total of 275 incidents. When these values were broken down, the respondents to the full questionnaire had an annual period prevalence of 14.3% (84/588, 95% CI: 11.5–17.1%), with 165 incidents in total, while the respondents to the short questionnaire had an annual period prevalence of 20.6% (35/135, 95% CI: 14.5–26.7%), with 110 incidents in total. Figure 2 shows the annual period prevalence of WRAV stratified by the group of respondents. The most frequent type of WRAV in both groups was verbal abuse (11.7 and 14.1%). This was followed by indirect harassment and/or threats (3.6 and 5.3%) and property damage (1.0 and 2.9%). All but one incident were classified into psychological types of WRAV.

Table 2 shows incidence rates and incidence rate ratios (IRRs) of all incidents of psychological types of WRAV among the 588 respondents to the full questionnaire. The respondents were 56.7 (SD12.2) yr old on average, worked for 30.7 yr (SD12.2) as a doctor and treated 252 (SD170) outpatients over 27.1 (SD7.8) h per week. They

Table 1. Sex and age distributions of respondents and nonrespondents to the full or short questionnaire

		Respondents (n=758)	Nonrespondents (n=390)	*p* value	Respondents to Full questionnaire (n=588)	Respondents to Short questionnaire (n=170)	*p* value
		n (%)	n (%)		n (%)	n (%)	
Sex	Male	621 (81.9)	344 (88.2)	<0.01	485 (82.5)	136 (80.0)	0.34
	Female	133 (17.5)	46 (11.8)		99 (16.8)	34 (20.0)	
	Unknown	4 (0.5)	0		4 (0.7)	0 (0.0)	
Age	65 or more	180 (23.7)	130 (33.3)	<0.01	152 (25.9)	28 (16.5)	
	55–64	208 (27.4)	97 (24.9)		161 (27.4)	47 (27.6)	
	45–54	246 (32.5)	102 (26.2)		185 (31.5)	61 (35.9)	0.07
	44 or less	119 (15.7)	61 (15.6)		87 (14.8)	32 (18.8)	
	Unknown	5 (0.7)	0 (0.0)		3 (0.5)	2 (1.2)	

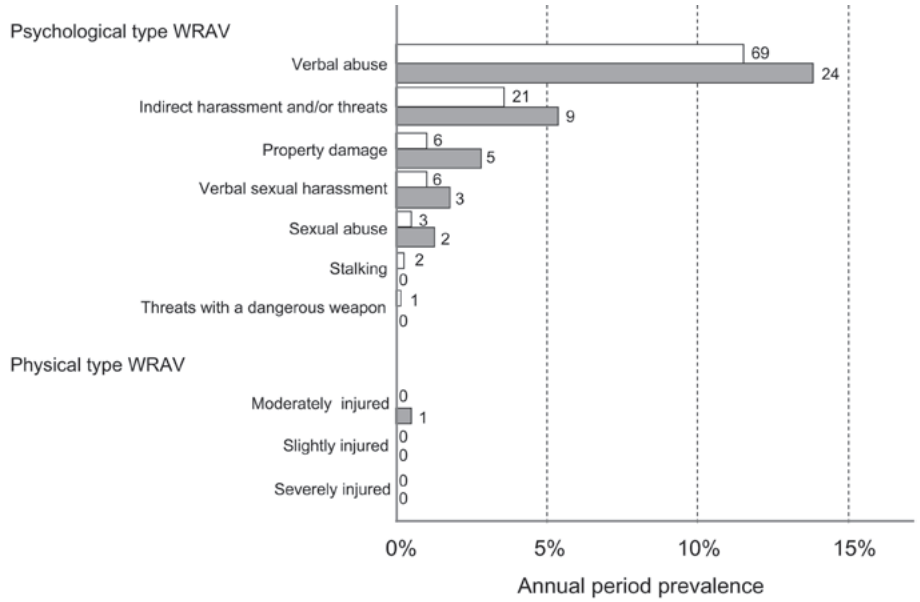

Fig. 2. Annual period prevalence of WRAV (work-related aggression and violence) during the previous 12 mo among respondents to the full (upper bar: 588 subjects) and short (lower bar: 170 subjects) questionnaires. Figures beside bars show the numbers of persons who encountered each kind of WRAV at least once.

encountered 165 incidents of WRAV for a total of 810,157 hours for outpatient practices. These figures produce an incidence rate of 0.20 (95% CI: 0.17–0.24) × 10^{-3} per practice hour. Crude IRRs significantly higher than the null value were found in females, younger doctors, those with fewer years of practice as a doctor and in the three medical specialties of ophthalmology, psychiatry and dermatology. On the other hand, pediatricians, otolaryngologists and doctors working in a region corresponding to the third quartile group of average taxable income showed significantly lower crude IRRs. In a multivariate model, we obtained an inverse relation between years of practice as a doctor and adjusted IRRs of WRAV (p<0.01). Doctors in practice for less than 20 yr were 11.0 (95% CI: 5.0–24.2) times more likely to encounter WRAV than those in practice for 40 yr or more. Compared with the incidence rate of internists, adjusted IRRs were significantly increased in comparison to the null value for dermatologists (3.8; 95% CI: 2.3–6.3), psychiatrists (2.7; 95% CI: 1.3– 5.6) and ophthalmologists (1.9; 95% CI: 1.2–3.2). The lower the average taxable income of the region where the doctors' offices were

Table 2. Incidece rates and incidence rate ratios (IRR) for the physical type of WRAV among 588 respondents to the full questionnaire

Predictor variables	Incidents of WRAV/practice hour	Incidence rate per 1,000 h	Crude IRR (95% CI)	Adjusted[1] IRR (95% CI)
Sex				
Male	112 / 683,228	0.16 (0.13–0.20)	Reference	Reference
Female	48 / 118,079	0.41 (0.30–0.54)	2.5 (1.8–3.5)	1.7 (1.2–2.4)
Unknown	5 / 6,630	0.75 (0.24–1.76)		
Age				
65 or more	8 / 186,905	0.04 (0.02–0.08)	Reference	
55–64	33 / 220,796	0.15 (0.10–0.21)	3.5 (1.6–7.6)	Excluded from the model
45–54	59 / 270,699	0.22 (0.17–0.28)	5.1 (2.4–10.7)	
44 or less	60 / 124,518	0.48 (0.37–0.62)	11.3 (5.4–23.5)	
Unknown	5 / 5,018	1.00 (0.32–2.33)		
Years of practice as a doctor				
40 or more	7 / 173,151	0.04 (0.02–0.08)	Reference	Reference
30–39	27 / 193,379	0.14 (0.09–0.20)	3.5 (1.5–7.9)	4.1 (1.8–9.5)
20–29	55 / 295,724	0.19 (0.14–0.24)	4.6 (2.1–10.1)	4.7 (2.1–10.5)
19 or less	69 / 135,594	0.51 (0.40–0.64)	12.6 (5.8–27.4)	11.0 (5.0–24.2)
Unknown	7 / 10,088	0.69 (0.28–1.43)		(p for trend<0.01)
Speciality				
Internal medicine	70 / 421,755	0.17 (0.13–0.21)	Reference	Reference
Pediatrics	2 / 54,704	0.04 (0.00–0.13)	0.2 (0.1–0.9)	0.3 (0.1–1.1)
Otolaryngology	3 / 58,448	0.05 (0.01–0.15)	0.3 (0.1–0.98)	0.4 (0.1–1.2)
Urology	2 / 16,978	0.12 (0.01–0.43)	0.7 (0.2–2.9)	1.0 (0.2–4.0)
Orthopedics	15 / 66,612	0.23 (0.13–0.37)	1.4 (0.8–2.4)	1.2 (0.6–2.7)
Gyne-Obsterics	8 / 37,258	0.21 (0.09–0.42)	1.3 (0.6–2.7)	1.4 (0.6–3.1)
Ophthalmology	21 / 53,625	0.39 (0.24–0.60)	2.4 (1.4–3.8)	1.9 (1.2–3.2)
Surgery	8 / 30,238	0.26 (0.11–0.52)	1.6 (0.8–3.3)	2.1 (0.9–4.6)
Psychiatry	8 / 14,482	0.55 (0.24–1.09)	3.3 (1.6–6.9)	2.7 (1.3–5.6)
Dermatology	25 / 40,525	0.62 (0.40–0.91)	3.7 (2.4–5.9)	3.8 (2.3–6.3)
Others	3 / 13,312	0.23 (0.05–0.66)	1.4 (0.4–4.3)	1.8 (0.5–5.8)
Number of inpatient beds				
0	154 / 756,067	0.20 (0.17–0.24)	Reference	Reference
1–19	11 / 51,870	0.21 (0.11–0.38)	1.0 (0.6–1.9)	0.9 (0.5–1.8)
Average taxable income (10,000 yen)[2]				
Q4: 164.2–191.0	69 / 325,862	0.21 (0.16–0.27)	Reference	Reference
Q3: 138.7–164.2	8 / 99,632	0.08 (0.03–0.16)	0.4 (0.2–0.8)	0.5 (0.2–1.0)
Q2: 121.3–138.7	43 / 219,847	0.20 (0.14–0.26)	0.9 (0.6–1.4)	1.2 (0.8–1.7)
Q1: 72.8–121.3	45 / 162,595	0.28 (0.20–0.37)	1.3 (0.9–1.9)	1.6 (1.1–2.4)
				(p for trend=0.02)

1) Adjusted mutually for sex, years of practice as a doctor, speciality, number of inpatients beds, average taxable income and number of patients (data not shown). 2) Average taxable income in the regions where the doctors' offices were located.

located was, the higher the adjusted IRR of WRAV became (p=0.02).

Of the 588 respondents to the full questionnaire, 317 (53.9%) encountered WRAV at least once during their career. Of these, 289 completed the IES-RJ for the most severe incident of WRAV they had ever experienced. Among them, 172 reported intrusion symptoms, 165 reported avoidance and 150 reported hyperarousal. Their IES-RJ scores averaged 8.5, and 26 (8.2% of 317) had a score greater than the cut-off value (> 24) set for PTSD suspected. We divided these 289 respondents by the quartiles of IES-RJ into Q1 [0 pt: 74 (25.6%)], Q2 [1–4: 82 (28.4%)], Q3 [5–12: 62 (21.5%)] and Q4 [13–80: 71 (24.6%)]. Table 3 presents the proportion of and ORs for the highest quartile group (Q4) versus the remaining quartile groups (Q1–3) of the IES-RJ score by some

Table 3. Prevalence of and odds ratio (OR) for the highest quartile group of IES-RJ score[1)]

Variables	IES-RJ No. of highest quartile group (Q4)[3)]/ No. of all victims (%)		ORs for Q4 of IES-RJ score versus Q1–3[3)] Crude OR (95% CI)	OR (95% CI) adjusted for years pased since the most severe incident of WRAV[2)]
Years since the most severe incident of WRAV				
Over 10 yr	6/68	(8.8)	Reference	
4–10 yr	11/81	(13.6)	1.6 (0.5–4.5)	
2–4 yr	11/51	(21.6)	2.8 (0.95–8.2)	
Within 2 yr	40/109	(36.7)	6.0 (2.4–15.3)	
Unknown	3/8	(37.5)	(p for trend < 0.001)	
Types of WRAV				
Verbal abuse	46/209	(22.0)	Reference	Reference
Sexual harassment	2/6	(33.3)	1.6 (0.3–9.0)	1.1 (0.1–11.6)
Sexual abuse	1/4	(25.0)	1.6 (0.1–18.0)	1.6 (0.1–20.4)
Indirect harassment[4)]	15/48	(31.3)	1.7 (0.8–3.3)	1.6 (0.7–3.4)
Stalking	2/7	(28.6)	1.6 (0.3–9.0)	2.6 (0.4–16)
Property damage	1/17	(5.9)	0.2 (0.0–1.9)	0.2 (0.0–2.0)
Threat with weapon	1/7	(14.3)	0.5 (0.1–4.5)	1.3 (0.1–11.4)
Mild physical violence	2/11	(18.2)	0.7 (0.1–3.4)	1.3 (0.3–6.9)
Unknown	1/8	(12.5)		
Sex				
Male	59/256	(23.0)	Reference	Reference
Female	12/58	(20.7)	0.8 (0.4–1.7)	0.7 (0.3–1.5)
Unknown	0/3	(0)		
Age				
65 or more	9/57	(15.8)	Reference	Reference
55–64	11/87	(12.6)	0.8 (0.3–2.0)	0.6 (0.2–1.6)
45–54	34/119	(28.6)	2.0 (0.9–4.5)	1.6 (0.7–3.9)
44 or less	17/53	(32.1)	2.3 (0.9–5.8)	1.7 (0.6–4.5)
Unknown	0/1	(0)		
Years of practice as a doctor				
40 or more	9/49	(18.4)	Reference	Reference
30–39	9/78	(11.5)	0.6 (0.2–1.6)	0.5 (0.2–1.4)
20–29	29/127	(22.8)	1.1 (0.5–2.7)	1.0 (0.4–2.3)
19 or less	23/60	(38.3)	2.6 (1.0–6.3)	2.0 (0.7–5.2)
Unknown	1/3	(33.3)		
Speciality				
Internal medicine	31/165	(18.8)	Reference	Reference
Orthopedics	7/31	(22.6)	1.2 (0.5–3.1)	1.1 (0.4–2.9)
Ophthalmics	4/19	(21.1)	1.0 (0.3–3.3)	0.6 (0.2–2.0)
Otolaryngology	5/18	(27.8)	1.7 (0.6–5.3)	2.5 (0.8–8.5)
Pediatrics	5/19	(26.3)	1.6 (0.5–4.8)	1.4 (0.4–4.6)
Dermatology	8/18	(44.4)	3.4 (1.2–9.5)	1.9 (0.6–6.0)
Gyne-Obsterics	3/14	(21.4)	1.4 (0.4–5.7)	1.2 (0.2–6.4)
Surgery	4/12	(33.3)	2.2 (0.6–7.9)	1.7 (0.4–8.1)
Urology	1/5	(20.0)	1.0 (0.1–8.8)	0.8 (0.1–7.5)
Psychiatry	2/10	(20.0)	1.1 (0.2–5.5)	0.8 (0.2–4.6)
Others	1/6	(16.7)		

1) Japanese-language version of the Impact of Event Scale-Revised. 2) Work-related aggression and violence. 3) The quartile groups for the IES-RJ score were as follows: Q1 (0 pt), Q2 (1–4 pt), Q3 (5–12 pt) and Q4 (13–80 pt). 4) Indirect harassment and/or threats (telephone call, mail, email).

selected factors. Significantly increased crude ORs higher than the null value were obtained among subjects 1) who had encountered the most severe WRAV within the previous two years (6.0; 95% CI: 2.4–15.3) compared with those who encountered it more than 10 yr previously, 2) whose years of practice as a doctor were less than 20 yr (2.6; 95% CI: 1.03–6.3) compared with those who were in practice for more than 40 years and 3) whose specialty was dermatology (2.6; 95% CI: 1.2–9.5) compared with those internal medicine. However, none these factors showed statistically increased ORs any more when adjusted for years passed since the most severe incident of WRAV. The types of WRAV did not show an elevation of either crude or adjusted ORs.

Discussion

The present study revealed that the annual period prevalence of WRAV committed by patients and their associates was 15.7% (95% CI: 13.1–18.3%) among doctors who treated outpatients predominantly at their own offices. Because not a few doctors have encountered WRAV more than once in a rather short period, which has also been reported in previous studies[1, 2, 10], the incidence rate is a better epidemiological measure than period prevalence to evaluate actual occurrences of WRAV. We estimated the incidence rate to be 0.2×10^{-3} (95% CI: 0.17–0.24) per practice hour based on the number of incidents of WRAV in the previous year and the average weekly working hours, though the rate varied among doctors depending on sex, age, specialty, years of practice and other factors (Table 2). The incidence rate of 0.2×10^{-3} per practice hour together with the average annual working hours (approximately 1,400 h) suggests that our doctors would experience one incident of WRAV in every 3.5 yr and, therefore, approximately ten times during their career as a doctor. Physical types of WRAV were much less common than the psychological types, and verbal abuse was predominant (Fig 2).

To achieve a high response rate, we sent a reminder and then the short questionnaire instead when the full form had not been returned. However, one-third of the potential subjects did not respond. The nonresponsive group consisted of more males and more doctors in the oldest age group than did the respondents to the full or short questionnaire (Table 1). According to our results, males rather than females and older doctors rather than younger doctors showed lower incidence rates of WRAV (Table 2). Therefore, our period annual prevalence of 15.7% and incidence rate of 0.2×10^{-3} per practice hour must be overestimated, though recall bias possibly led to underreporting of incidents of WRAV to some extent. In addition, we assumed in the present study that all WRAV incidents reported by the same doctor occurred independently but not dependently. This might overestimate the incidence rate of WRAV. However, these values were apparently lower than those in previous studies using a similar self-administered questionnaire[3, 4, 6–9]. For example, general practitioners (GPs) in England[4] reported an annual period prevalence of WRAV of 63% and an incidence rate of 1.52/yr, and GPs in Australia[8] reported an annual period prevalence of 64%. Differences in the definition of WRAV, question statements and answer options might cause differences in attitudes of reporting WRAV. Seven countries studied[23] occurrences of WRAV with the same definition and the same questionnaire among medical staff, and a great difference in annual period prevalence was seen across the countries, ranging from 30.4–79.0%. Sociocultural diversities such as healthcare insurance systems, doctor-patient relationships, work environments and national character might also result in differences in the frequency of WRAV.

Adjusted IRR showed that female doctors were 1.7 (95% CI: 1.2–2.4) times more likely to encounter WRAV than male doctors, which is consistent with several previous studies of GPs[6–9]. Female workers are more likely to be affected by aggression and violence than males irrespective of kinds of occupations[24].

A higher occurrence of WRAV was reported among residents in the field of psychiatry at hospitals[25, 26]. The present adjusted IRR of 2.7 (95% CI: 1.3–5.6) among psychiatrists compared with internists supports this finding, though our doctors treated outpatients at their own offices. A community-based epidemiological study[27] indicated that individuals with a mental illness such as schizophrenia or bipolar disorder and drug abusers were more likely to commit violence. Pediatricians also carry a higher risk of encounters with WRAV[28], but our results did not support this finding. We could not confirm a higher risk for doctors in emergency departments[10–12] because of the small number of subjects.

To our knowledge, the present study is the first to identify an increased risk of WRAV among dermatologists and ophthalmologists. Dermatologists particularly showed an adjusted IRR of as high as 3.8 (95% CI: 2.3–6.3). Patients with a disease in these medical fields can easily identify their own conditions. Therefore, they are more likely to feel dissatisfaction with the undesired appearance of diseased skin or an unexpected decrease in visual function regardless of whether treatment was successful or not. Further studies are necessary to validate our assumption.

In the present study, the average taxable income of the region showed a statistically significant positive trend with the adjusted IRRs of WRAV (Table 2). The lower the income was, the higher the IRR was. Taxable income is a good proxy for socioeconomic status (SES). Our results are in agreement with the report[6, 8, 27] that persons with a low SES have a tendency to commit violence. However, we must be cautious of the interpretation of our results because taxable income here was not based on an

individual patient but an average of the population of the region. In addition, the region itself indicated only the places where the doctors' offices were located, but not their exact medical catchment area.

Years of practice as a doctor showed an inverse trend with encounters with WRAV. When compared with the longest group in practice (40 yr or more), the adjusted IRRs of the shortest group revealed the highest value, 11.0 (95% CI: 5.0–24.2), among all factors concerned in this study. This is partly because doctors gradually acquire skills of patient management and communication throughout their careers. Workplace violence prevention programs for health professionals can increase their knowledge about WRAV, change their attitudes towards patients and enhance their confidence in treating patients[29–33]. The effectiveness of these programs was confirmed mainly in psychiatry[30, 31] and emergency departments in hospitals[32, 33]. Prevention programs specific to doctors working at their own offices are expected, and doctors with shorter years of practice will be preferentially targeted for the programs.

The doctors in the group with the fewest years in practice and those working as a dermatologist were significantly more likely to score a value corresponding to the highest quartile group of the IES-RJ (Table 3). However, none of the independent variables showed increased ORs for the IES-RJ score after adjusting for years passed since the most severe WRAV. This fact suggests that it is unlikely to predict development of PTSD by types of WRAV and personal characteristics such as sex, age, years of practice and medical specialty under observation. It is possible that the small numbers of incidents of each type of WRAV were insufficient to detect the magnitude of psychological effects.

The prevalence of the doctors with IES-RJ scores over the cut-off point of PTSD (IES-R > 24) was 8.2% of those who encountered WRAV at least once during their career. This is the first study to indicate the prevalence of PTSD suspected among doctors who have encountered WRAV. Once being injured mentally, persons are reluctant to seek relief for their symptoms[34]. Since doctors at their own offices usually work by themselves with a few staff members, countermeasures different from those for hospital doctors are needed to detect early signs of PTSD.

In conclusion, the present study reveals that doctors encountered WRAV at an incidence rate of 0.20 [95% CI: 0.17–0.24] $\times 10^{-3}$ per practice hour and that some of them might develop PTSD. Our study also suggests that prevention programs should be preferentially targeted at doctors with less practice experience. To maintain sound health and safe workplaces for doctors, more studies are required on risk factors and countermeasures of WRAV.

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