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Association between compassion fatigue and depression among emergency medical staff in China: a cross-sectional study

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Abstract

Objectives: Medical staff in emergency departments are at high risk of compassion fatigue and depression. The purpose of this study was to examine the relationship between compassion fatigue and depression among emergency department staff members.

Design: A cross-sectional study.

Setting: This study was conducted in five tertiary hospitals in five different cities across Sichuan province, China, in 2021.

Participants: A total of 342 emergency medical staff participated in the study.

Main outcome measures: Compassion fatigue and depression scores.

Results: Among the 342 emergency medical staff, 100% were found to have depressive symptoms, 27.8% had low compassion satisfaction, 2.3% had high burnout and 3.8% had secondary traumatic stress. In the final multiple linear regression model, marital status (p=0.008; 95% confidence interval [CI], –5.205 to –0.789), history of

chronic disease (p=0.003; 95% CI, –6.461 to –1.386), compassion satisfaction (p<0.001; 95% CI, 0.593 to 1.274), burnout (p=0.019; 95% CI, 0.084 to 0.930) and secondary traumatic stress (p<0.001; 95% CI, –1.527 to –1.053) among the emergency medical staff were considered to be significant predictors of depression.

Conclusions: The prevalence of depression among emergency medical staff is high in China. Compassion fatigue was significantly and meaningfully associated with depression among emergency medical staff. Hospital administrations should consider these findings to prevent depression among Chinese medical staff in emergency departments.

Keywords: compassion fatigue, depression, emergency department

Strengths and limitations of this study

•This is a novel study conducted in China, which describes the prevalence of compassion fatigue and depression and the influencing factors associated with depression among medical staff in emergency departments.

•The causal association between compassion fatigue and depression could not be established since this was a cross-sectional study.

•Data on compassion fatigue and depression were collected based on the participants' self-reports, which may have led to information bias.

Introduction

Emergency departments are fast-paced, high-pressure environments in which the medical staff encounter heavy workloads, violence, interpersonal conflict, high patient load, mass casualty incidents; moreover, limited resources and poor skill mix

compound the problem.[1 2] Emergency clinical staff who are at the frontline of a demanding health care system take significant responsibility for the care of emergencies, regardless of overstretched and overburdened resources.[3] Emergency medical staff who witness alarming morbidity and mortality on a daily basis, can experience adverse physical and mental health problems, such as compassion fatigue, depression and burnout.[4] It has been reported that compassion fatigue and depression afflicting emergency medical staff can not only harm individual mental health, but can also cause a series of fateful consequences, including medical errors, poor-quality patient care and increased patient mortality during hospital stay.[5 6]

Compassion fatigue, which is considered as an occupational hazard in healthcare, is conceptualized as "the natural, consequent behaviors and emotions resulting from knowing about a traumatizing event experienced by a significant other – the stress resulting from helping or wanting to help a traumatized or suffering person".[7 8] According to Stamm, [22] compassion fatigue is described as the combination of low compassion, high burnout and secondary traumatic stress. Compassion fatigue can result in a series of physical, mental and work-related symptoms that seriously affect quality of patient care and staff-patient relationships.[9] Chu reported that compassion fatigue has a significant negative effect on job performance and organisational citizenship behavior.[10] A study conducted on Chinese dialysis nurses indicated that compassion fatigue had a significant effect on turnover intention.[11] Barnett et al. noted that compassion fatigue was positively associated with emotional display.[12]

Depression, a common and serious mental illness, is listed by the World Health

Organization (WHO) as one of the most important factors contributing to global disability and the main contributor to suicide deaths at all ages.[13] The most common symptoms associated with depression are persistent sadness, a loss of interest and energy, insomnia, headache, unexplained pain, gastrointestinal symptoms, hopelessness and thoughts of self-harm or suicide.[14] Serious depression can lead to many negative psychosocial outcomes. For example, a recent study on psychiatry residents in Saudi Arabia showed that there was a significant relationship between depressive symptoms and burnout.[15] Fisher et al. found that higher levels of depressive symptoms was significantly associated with higher levels of fatigue and pain interference.[16] Emergency medical staff are exposed to all kinds of stress every day.[17] Hence, special attention should be paid to the psychological status of emergency clinical staff.

Although extensive studies on depression have been conducted, most of the studies have focused on university students and patients rather than emergency medical staff.[18-21] Considering that emergency medical staff have emotionally demanding tasks and work in high-pressure situations, the aim of this study was to determine the prevalence of compassion fatigue and depression and explore their relationship among this highly vulnerable population.

Methods

Study design and participants

A cross-sectional survey was carried out across five different cities of Sichuan province, China. A convenience sample was used to recruit doctors and registered

nurses working in the emergency department. The eligibility criteria were as follows: (1) being licensed doctors and registered nurses; (2) with more than one years' work experience; (3) working in emergency department ; (4) consented to participate. The data were collected by five trained research assistants from January to February 2021. A set of questionnaires was distributed to all emergency medical staff by the five tertiary hospitals' administration. All the participants were informed that their participation was voluntary and that their data would be anonymised. A total of 350 emergency medical staff filled in the questionnaires, out of which 342 questionnaires were returned (an effective response rate of 97.7%).

Measurements

The questionnaire comprised three instruments: a demographic survey, the Professional Quality of Life (ProQOLv5) scale and the Center for Epidemiologic Studies Depression (CES-D) scale. Sociodemographic data, including position, age, gender, marital status, education level, professional title, work experience, shifts worked, daily work hours, cigarette use, alcohol use and history of chronic disease, were collected.

Professional quality of life scale

Compassion fatigue levels were assessed using the ProQOLv5. The questionnaire includes 30 items with a Likert scale of 5 points (1=never; 5=always), 10 items for compassion satisfaction, 10 items for burnout and 10 items for secondary traumatic stress.[22] The total score range for each subscale is 5–50, with higher scores on burnout and secondary traumatic stress indicating more severe compassion fatigue.

For compassion satisfaction, lower scores represent higher compassion fatigue. The alpha reliability coefficients for compassion satisfaction, burnout and secondary traumatic stress were 0.775, 0.775 and 0.807, respectively.

Depression

The CES-D is a 20-item questionnaire intended to measure the frequency of occurrence of symptoms of depression over the past week using a 5-point Likert scale (each item was scored as follows: 0=rarely or none of the time to 3=most or all of the time; total score range, 0–60).[23] The CES-D scale has four reverse-scored items (items 4, 8, 12 and 16) and covers four major symptoms of depression, including depressed affect, somatic symptoms, positive affect and inter-personal relations. Standard cut-off value ≥16 indicates the likely presence of depression. The Cronbach's α in the current study was 0.916.

Statistical analysis

Statistical analysis was conducted using SPSS version 22.0 (SPSS Inc., Chicago, IL, USA). Continuous variables were summarised as mean with standard deviation (SD), while categorical variables were presented as frequencies and percentages. Independent samples t-test, and one-way analysis of variance (ANOVA) were used to compare participants' depression by demographic characteristics. The association between compassion fatigue and depression among emergency medical staff was analysed using Pearson's correlation analysis. A multiple linear regression model was used to estimate the effect of compassion fatigue and other demographic variables on depression. A *p* value of less than 0.05 was considered statistically significant

(two-tailed).

Patient and public involvement

Patients or members of the public were not involved in the design, reporting or dissemination plans of our research.

Results

The participants' baseline characteristics are shown in Table 1. The mean age was 32.59 years (SD, 8.19; age range, 20–58 years). Most participants were female (70.5%), nurses (71.1%), married (68.7.0%), held a bachelor degree (62.9%) and had a primary professional title (57.0%).

The differences in depression scores according to the characteristics of emergency medical staff are also presented in Table 1. There were significant differences in depression scores based on marital status (p<0.01), professional title (p<0.05), daily work hours (p<0.05), alcohol use (p<0.05) and history of chronic disease (p＜0.01).

As depicted in Table 2, compassion satisfaction levels were moderate in approximately 70.8% of the emergency medical staff, low in 27.8% of them and high in 1.4% of them. Of the participants, 2.3% had a high burnout score, 66 (19.3%) had a low burnout score and 3% of the respondents had a high secondary traumatic stress score. The mean scores for depression, compassion satisfaction, burnout and secondary traumatic stress were 37.36 (SD, 10.91), 26.70 (SD, 6.36), 27.74 (SD, 6.19) and 30.19 (SD, 6.59), respectively.

Both compassion satisfaction and burnout were significantly correlated with

three depression metrics: depressed affect, somatic symptoms and inter-personal relations. Apart from positive affect, there was no relationship between the other sub-scales of depression and secondary traumatic stress (Table 3).

Depression was computed as outcome variable, and the independent variables comprised the demographic characteristics and the three dimensions of compassion fatigue. Table 4 shows that marital status, history of chronic disease, compassion satisfaction, burnout and secondary traumatic stress collectively accounted for 39.6% of the variance in depression ($F = 28.952$, $p < 0.001$, $R^2 = 0.410$, adjusted $R^2 = 0.396$).

Discussion

The findings of the current study regarding the frequency and distribution of depression among emergency medical staff show that the following characteristics were significantly associated with higher levels of depression—marital status: unmarried; intermediate professional title; consumption of alcohol; daily worktime between 9 and 12 hours; and a history of chronic disease. Similar to our study, a statistically significant difference was observed in the levels of depression among breast cancer patients in Serbia with regard to marital status.[24] One reason for this could be that spousal support is beneficial for maintaining good mental health.[25] Our findings concur with those of Xiao et al. who found that depression levels were different among different professional titles and that an intermediate title was an independent influencing factor.[26] This could be explained by the fact that compared to medical staff with an intermediate title, doctors and nurses with a senior title have a richer work experience, a higher income and a lower family burden.[27] The findings of

this study are in accordance with those of two previous studies that reported that working excessively long hours on a daily basis was significantly associated with the frequency of depressive symptoms.[28] [29] Emergency medical staff endure a heavy burden of work imposed on them on a daily basis and most often without a day of safety rest. Work overload and chronic sleep deprivation can increase the risk for serious mental illness.[30] A study conducted by Luo et al. among 5,294 outpatients in China noted that drinking alcohol was a risk factor for depressive symptoms; this is in line with our research.[31] The possible explanation for this finding is that emergency medical staff who encounter psychological problems resort to drinking alcohol to reduce their mental stress and as a means of escape from reality. Thus, consumption of alcohol and depressive symptoms interact to form a vicious cycle.[32] Our results are also similar to those reported in a study by Ngasa et al. that found that the presence of a chronic disease was independently associated with depression.[33]

Our study found a considerably high prevalence of depressive symptoms among emergency medical staff, and the prevalence of depressive symptoms reached up to 100%, which is much higher than the incidence of 12.1% reported in caregivers of children with osteogenesis imperfecta.[34] The high level of depression may be associated with factors, such as excessive workload, overcrowding and resource shortages in the emergency department.[35] Levels of burnout and secondary traumatic stress were much higher than that reported in previous studies, with emergency department doctors and nurses in this sample showing significantly lower levels of compassion satisfaction.[36] [37] Compared to nurse leaders and surgical trainees,

emergency medical staff often take on more work and have higher levels of psychological stress.[38]

We found that compassion fatigue had a statistically significant correlation with depression. The current study shows that compassion satisfaction and burnout have a significant positive correlation with depression and secondary traumatic stress has a significant negative correlation with depression, which is in partial agreement with other recent studies. Jo et al. and Hegney et al. both found an opposite association, that is, compassion satisfaction was negatively associated with depression and secondary traumatic stress was positively corelated with depression.[39 40] One possible reason for this discrepancy is that the tools for measurement of depression were different.

Limitations of the current study

Our study has a few limitations. First, our study sample was drawn from a single Chinese region with predominantly emergency medical staff and adopted the method of convenient sampling, which limits the generalisability of the findings to other professional groups. Second, most of the instruments used in this research were based on the respondents' self-reports, which is prone to information bias. Therefore, more robust methods of assessment and better tools should be used in future studies. Third, the causal association between compassion fatigue and depression is not clear, due to the cross-sectional study nature of our study. Hence, we recommend that future research should examine the interaction between compassion fatigue and depression and evaluate their potential impact rather than focusing on these phenomena

separately. Lastly, compassion fatigue, in our study, merely contributed to (did not cause) increase in depression. While the findings of our study have the potential to provide new directions and perspectives for future research, it is crucial to realize that depression is often multifactorial.

Conclusion

The prevalence of depression among Chinese emergency medical staff was shown to be extremely high. Marital status and the presence of a chronic disease among the staff affected their depression levels. We also examined the relationship between compassion fatigue and depression among emergency medical staff in China, and found a significant association between them. Moreover, it was also determined that independent variables, such as compassion satisfaction, burnout and secondary traumatic stress strongly predict depression levels among the emergency medical staff. Consequently, reducing the level of compassion fatigue could be a key factor in addressing depression in emergency department doctors and nurses.

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Contributors

BW wrote the manuscript and conducted the statistical analysis and interpretation; HM was responsible for conceptualisation and design of the study; and

SQH and YZ were in charge of data acquisition. All authors revised and approved the final manuscript.

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Competing interests

None declared.

Patient consent for publication

Not required.

Ethics approval

The study was approved by the Institutional Review Board of of Xiangya Nursing School, Central South University, China.

Data availability statement

Data are available upon reasonable request.

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Table 1. Demographic characteristics of emergency medical staff (N=342).

Variables	N (%)	Depression Mean (SD)
Position		*P*=0.181
Doctor	99(28.9)	38.60(11.76)
Nurse	243(71.1)	36.86(10.52)
Age (years)		*P*=0.991
＜35	236(69.0)	37.37(10.23)
≥35	106(31.0)	37.35(12.32)
Gender		*P*=0.162
Male	101(29.5)	38.64(12.22)
Female	241(70.5)	36.83(10.28)
Marital status		*P*=0.002
Unmarried	107(31.3)	40.01(11.05)
Married	235(68.7)	36.16(10.64)
Education level		*P*=0.071
Associate degree	102(29.8)	36.16(9.97)
Bachelor degree	215(62.9)	38.33(11.49)
Master degree	25(7.3)	34.00(8.24)
Profession title		*P*=0.034
Primary	195(57.0)	37.57(10.56)
Intermediate	108(31.6)	38.48(11.51)
Senior	39(11.4)	33.25(10.18)
Work experience (years)		*P*=0.810
＜5	94(27.5)	37.48(10.09)
5-10	95(27.8)	37.88(10.96)
＞10	153 (44.7)	36.97(11.39)
Weekly night shifts		*P*=0.063
0	46(13.5)	33.60(9.35)
1-2	148(43.4)	37.89(11.19)
3-4	106(31.0)	37.46(11.10)
＞4	42(12.3)	39.40(10.35)
Daily work hours(h)		*P*=0.017
＜9	161(47.1)	35.60(10.29)
9-12	118(34.5)	39.19(11.13)
＞12	163(18.4)	38.44(11.45)
Cigarette use		*P*=0.244
Yes	38(11.1)	39.31(12.13)
No	304(88.9)	37.12(10.74)
Alcohol use		*P*=0.019

Yes	50(14.6)	40.70(10.91)
No	292(85.4)	36.79(10.82)
History of chronic disease		*P*=0.001
Yes	58(17.0)	41.79(12.21)
No	284(83.0)	36.46(10.41)

Table 2. Depression and compassion fatigue levels among emergency medical staff (N=342).

Dimensions	N (%)	Mean	SD
Depression		37.36	10.91
Compassion satisfaction		26.70	6.36
Low	95(27.8)	-	-
Medium	242(70.8)	-	-
High	5(1.4)	-	-
Burnout		27.74	6.19
Low	66(19.3)	-	-
Medium	268(78.4)	-	-
High	8(2.3)	-	-
Secondary traumatic stress		30.19	6.59
Low	43(12.6)	-	-
Medium	286(83.6)	-	-
High	13(3.8)	-	-

Table 3. Correlations between dimensions of depression and compassion fatigue (N=342).

	Depression	Depressed Affect	Somatic	Positive Affect	Inter-personal
Compassion satisfaction	0.282**	0.319**	0.317**	0.003	0.311**
Burnout	0.171**	0.214**	0.239**	-0.163**	0.247**
Secondary traumatic stress	-0.178**	-0.092	-0.021	-0.430**	0.001

Note:**$p<0.01$

Table 4. Multiple linear regression analysis of depression (N=342).

		Unstandardised coefficient		Standardised coefficient			95% CI	
Dependent variables	Independent variables	B	SE	Beta	*t*	*P*	*Lower bound*	*Upper bound*
Depression	Marital status	-2.997	1.123	-0.128	-2.670	0.008	-5.205	-0.789
	History of chronic disease	-3.924	1.290	-0.135	-3.052	0.003	-6.461	-1.386

	Compassion satisfaction	0.934	0.173	0.545	5.388	＜0.001	0.593	1.274
	Burnout	0.507	0.215	0.288	2.359	0.019	0.084	0.930
	Secondary traumatic stress	-1.290	0.120	-0.779	-10.707	＜0.001	-1.527	-1.053

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Was ethical approval given and by whom? (give any reference number)	the Institutional Review Board of Xiangya Nursing School, Central South University (Approval number E202062)	
Please state any conflicts of interest	None	
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Highlights	Bullet points have been included that identify existing research knowledge relating to the specific research question / topic (what is already known) and a summary of the new knowledge added by this study (what the paper adds) *(see Guide for Authors*, does not apply to editorials or commentaries)	Page2
References	Citations accord to the journal's format (Author, date) and reference list includes full details of all cited references in the proper format and alphabetical order (see *Guide for Authors)*	Page12-17
Other Published accounts	*All* published and in press accounts of the study from which data in this paper originate are referred to in the paper and the relationship between this and other publications from the same study is made clear (see *Guide for Authors*)	
	The study is referred to by a distinctive name which will be used in any future publications to identify that it as the same study.	
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Section	Descriptor	TICK
a) **Primary research only**		
Background	A statement of the problem / phenomena of interest, a brief summary of existing research which addresses the topic and an explanation of the purpose of the current study / review in relation to this.	Page2
METHODS	Clear statement of the aims, objectives (hypothesis) and research design	Page4
Settings	The settings and locations where the study took place	Page4
Inclusion Criteria	Eligibility criteria for participants – inclusion and exclusion criteria	Page5
Sampling	Method of sampling and if relevant allocation to groups (e.g. convenience, random) and *description* of sampling, recruitment and allocation procedures .	Page4
Sample size	How sample size was determined.	Page5
Outcomes and data collection procedures	Clearly defined primary and secondary outcome measures (when applicable), Setting and methods of data collection and methods used to enhance the quality of data collection (*e.g.*, multiple observations, training of assessors).	Page5
Analysis Methods	Statistical methods used / approaches to qualitative analysis including procedures to ensure accuracy / validity / truthfulness of accounts.	Page6
Ethical review*	Details of ethical scrutiny / approvals obtained.	Page12
RESULTS Participant flow	Flow of participants through each stage of selection, allocation, follow up / inclusion in analysis (a diagram is strongly recommended). Describe protocol deviations from study as planned, together with reasons.	N/A
Recruitment	Dates defining the periods of recruitment and follow-up.	N/A
Baseline data	Baseline demographic and clinical characteristics of each group.	N/A
Results	Point estimates, exact p-values and confidence intervals for quantitative studies. Qualitative analyses are supported by appropriate quotations which support the derived themes / categories and which are anonymously attributed to participants (using pseudonyms, numbers or equivalent)	*Page6*
DISCUSSION	Brief recapitulation / summary of the results taking into account study hypotheses / aims	*Page8*
Interpretation	Interpretation of the results, taking into account study limitations	*Page10*
Overall evidence	Assessment of the current state of knowledge in the context of study results and other evidence.	*Page10*
Implications	Consideration of the implications of the current state of knowledge for further research and or practice	*Page11*

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Compassion fatigue, burnout, compassion satisfaction and depression among emergency department physicians and nurses: a cross-sectional study

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Compassion fatigue, burnout, compassion satisfaction and depression among emergency department physicians and nurses: a cross-sectional study

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Abstract

Objectives: Emergency department physicians and nurses are at high risk of compassion fatigue, burnout and depression. The purpose of this study was to examine the interrelationship between compassion fatigue, burnout, compassion satisfaction and depression in emergency department physicians and nurses.

Design: A cross-sectional study.

Setting: This study was conducted in five tertiary hospitals in five different cities across the province of Sichuan, China, in 2021.

Participants: A total of 342 emergency department physicians and nurses participated in the study.

Main outcome measures: Compassion fatigue, burnout, compassion satisfaction and depression scores.

Results: Among the study participants, 100% were found to have depressive

symptoms, 27.8% had low compassion satisfaction, 2.3% had high burnout and 3.8% had compassion fatigue. In the final multiple linear regression model, marital status (p=0.008; 95% confidence interval [CI], –5.205 to –0.789), history of chronic disease (p=0.003; 95% CI, –6.461 to –1.386), compassion satisfaction (p<0.001; 95% CI, 0.593 to 1.274), burnout (p=0.019; 95% CI, 0.084 to 0.930) and compassion fatigue (p<0.001; 95% CI, –1.527 to –1.053) among emergency department physicians and nurses were considered to be significant predictors of depression.

Conclusions: The prevalence of depression among emergency department physicians and nurses is high in the province of Sichuan, China. Compassion fatigue, burnout and compassion satisfaction were significantly associated with depression in emergency department physicians and nurses. Hospital administrations should consider these findings to develop appropriate psychological interventions and strategies, to prevent, alleviate or treat severe depression among emergency department physicians and nurses in the province of Sichuan.

Keywords: Compassion fatigue, burnout, compassion satisfaction, depression, emergency department

Strengths and limitations of this study

•This is a novel study conducted in the province of Sichuan, China, which describes the prevalence of compassion fatigue, burnout, compassion satisfaction and depression and the influencing factors associated with depression among emergency department physicians and nurses.

•The causal association between compassion fatigue, burnout, compassion satisfaction

and depression could not be established since this was a cross-sectional study.

•Data on compassion fatigue, burnout, compassion satisfaction and depression were collected based on the participants' self-reports, which may have led to information bias.

Introduction

Emergency departments are fast-paced, high-pressure environments in which the medical staff encounter heavy workloads, violence, interpersonal conflict, high patient load, mass casualty incidents; moreover, limited resources and poor skill mix compound the problem.[1 2] Emergency department physicians and nurses who are at the frontline of a demanding health care system take significant responsibility for the care of emergency patients, regardless of overstretched and overburdened resources.[3] Emergency physicians and nurses who witness alarming morbidity and mortality on a daily basis, can experience adverse physical and mental health problems, such as compassion fatigue, depression and burnout.[4] It has been reported that compassion fatigue, burnout and depression afflicting emergency physicians and nurses can not only harm individual mental health, but can also cause a series of fateful consequences, including medical errors, poor-quality patient care and increased patient mortality during hospital stay.[5-7]

Compassion fatigue, which is considered as an occupational hazard in healthcare, is conceptualized as "the natural, consequent behaviors and emotions resulting from knowing about a traumatizing event experienced by a significant other – the stress resulting from helping or wanting to help a traumatized or suffering person".[8 9]

Compassion fatigue can result in a series of physical, mental and work-related symptoms that seriously affect quality of patient care and staff-patient relationships.[10] Chu reported that compassion fatigue has a significant adverse effect on job performance and organizational citizenship behavior.[11] A study conducted in the U.S. indicated that about 80% of emergency nurses had moderate to high levels of compassion fatigue.[12] Barnett et al. noted that compassion fatigue was positively associated with emotional display.[13] Burnout is a work-related syndrome and predominantly defined as "high emotional exhaustion, depersonalization and a low level of personal accomplishment".[14] The prevalence of burnout among emergency medical staff was very high and burnout can cause serious consequences.[15-17] Moukarzel et al. noted that 34.6% emergency medical staff had severe burnout and Soltanifar et al. found that 84.5% emergency physicians had experienced high emotional exhaustion.[15 18] Jyothindran's findings indicated that severe burnout was highly correlated with medical error and turnover.[19] Compassion satisfaction is defined as the emotions generated and the sense of achievement derived from helping and caring for patients, whether related to direct assistance or support in improvement of patients' condition.[20]

Depression, a common and serious mental illness, is listed by the World Health Organization (WHO) as one of the most important factors contributing to global disability and the main contributor to suicide deaths at all ages.[21] The most common symptoms associated with depression are persistent sadness, a loss of interest and energy, insomnia, headache, unexplained pain, gastrointestinal symptoms,

hopelessness and thoughts of self-harm or suicide.[22] Severe depression can lead to many negative outcomes. For example, a recent study on emergency department nurses during the COVID-19 pandemic in China showed that depression had an adverse effect on quality of patient care and nurses' quality of life.[23] Vasconcelos et al. found that depressive symptoms were significantly associated with burnout.[24] Emergency medical staff are exposed to all kinds of stress every day.[25] Hence, special attention should be paid to the psychological status of emergency physicians and nurses.

Although extensive studies on depression have been conducted, most of the studies have only focused on nurses.[23 24] Moreover, few studies have been carried out to explore the factors that influence the development of depression in emergency physicians and nurses.[5 25] Considering that emergency physicians and nurses have emotionally demanding tasks and work in high-pressure situations, the aim of this study was to determine the prevalence of compassion fatigue, burnout, compassion satisfaction and depression and explore the interrelationship of these among this highly vulnerable population.

Methods

Study design and participants

A cross-sectional survey was conducted among emergency physicians and nurses across five different cities of Sichuan province, China. A convenience sample was used to recruit physicians and registered nurses working in the emergency department. The eligibility criteria were as follows: (1) being licensed physicians and registered

nurses; (2) with more than one year's work experience; (3) working in emergency department; (4) provided consent to participate. The data were collected by five trained research assistants from January to February 2021. A set of questionnaires was distributed to all emergency medical staff by the five tertiary hospitals' administration. All the participants were informed that their participation was voluntary and that their data would be anonymised. A total of 350 emergency physicians and nurses filled in the questionnaires, out of which 342 questionnaires were returned (an effective response rate of 97.7%).

Measurements

The questionnaire comprised three instruments: a demographic survey, the Professional Quality of Life (ProQOLv5) scale and the Center for Epidemiologic Studies Depression (CES-D) scale. Sociodemographic data were collected with a self-designed questionnaire, including position (physician, nurse), age (less than 35 years, 35 years or older), gender (male, female), marital status (married, unmarried), education level (diploma, associate degree, bachelor´s degree, master´s degree or higher), professional title (primary, intermediate, senior), work experience (less than 5 years, 5–10 years, over 10 years), weekly night shifts (none, 1–2, 3–4, more than 4), daily work hours (less than 9 h, 9–12 h, over 12 h), cigarette use (yes, no), alcohol use (yes, no) and history of chronic disease (yes, no).

Professional quality of life scale

Compassion fatigue, burnout and compassion satisfaction levels were assessed using the ProQOLv5. The questionnaire includes 30 items with a Likert scale of 5 points

(1=never; 5=always), 10 items for compassion satisfaction, 10 items for burnout and 10 items for compassion fatigue.[20] The level of compassion satisfaction was divided into less than 22 (low), 23–41 (middle) and more than 42 (high). For compassion fatigue and burnout, a score of 22 or less represents low levels, 23–41 represents middle levels, and a score of more than 42 high levels. The alpha reliability coefficients for compassion satisfaction, burnout and compassion fatigue were 0.775, 0.775 and 0.807, respectively.

Depression

The CES-D is a 20-item questionnaire intended to measure the frequency of occurrence of symptoms of depression over the past week using a 5-point Likert scale (each item was scored as follows: 0=rarely or none of the time to 3=most or all of the time; total score range, 0–60).[26] The CES-D scale has four reverse-scored items (items 4, 8, 12 and 16) and covers four major symptoms of depression, including (1) depressed affect (e.g. sadness, crying); (2) absence of positive affect (e.g. hope, enjoyment); (3) somatic symptoms (e.g., appetite problems, problems ‘‘getting going’’); and (4) interpersonal relations (e.g. perceiving others as unfriendly). Standard cut-off value ≥16 indicates the likely presence of depression. The Cronbach’s α in the current study was 0.916.

Statistical analysis

Statistical analysis was conducted using SPSS version 22.0 (SPSS Inc., Chicago, IL, USA). Continuous variables were summarized as mean with standard deviation (SD), while categorical variables were presented as frequencies and percentages.

Independent samples t-test, and one-way analysis of variance (ANOVA) were used to compare participants' depression by demographic characteristics. Associations between compassion satisfaction, burnout, compassion fatigue and depression among emergency physicians and nurses were analysed using Pearson's correlation analysis. A multiple linear regression model was used to estimate the effect of compassion satisfaction, burnout, compassion fatigue and other demographic variables on depression. A *p* value of less than 0.05 was considered statistically significant (two-tailed).

Patient and public involvement

Patients or members of the public were not involved in the design, reporting or dissemination plans of our research.

Results

The participants' baseline characteristics are shown in Table 1. The mean age was 32.59 years (SD, 8.19; age range, 20–58 years). Most participants were female (70.5%), nurses (71.1%), married (68.7.0%), held a bachelor degree (62.9%) and had a primary professional title (57.0%).

The differences in depression scores according to the characteristics of emergency physicians and nurses are also presented in Table 1. There were significant differences in depression scores based on marital status ($p<0.01$), professional title ($p<0.05$), daily work hours ($p<0.05$), alcohol use ($p<0.05$) and history of chronic disease ($p<0.01$).

Table 1. Demographic characteristics of emergency department physicians and

nurses (N=342).

Variables	N (%)	Depression Mean (SD)
Position		*P*=0.181
Physician	99 (28.9)	38.60 (11.76)
Nurse	243 (71.1)	36.86 (10.52)
Age (years)		*P*=0.991
＜35	236 (69.0)	37.37 (10.23)
≥35	106 (31.0)	37.35 (12.32)
Gender		*P*=0.162
Male	101 (29.5)	38.64 (12.22)
Female	241 (70.5)	36.83 (10.28)
Marital status		*P*=0.002
Unmarried	107 (31.3)	40.01(11.05)
Married	235 (68.7)	36.16(10.64)
Education level		*P*=0.071
Associate degree	102 (29.8)	36.16 (9.97)
Bachelor degree	215 (62.9)	38.33 (11.49)
Master degree	25 (7.3)	34.00 (8.24)
Profession title		*P*=0.034
Primary	195 (57.0)	37.57 (10.56)
Intermediate	108 (31.6)	38.48 (11.51)
Senior	39 (11.4)	33.25 (10.18)
Work experience (years)		*P*=0.810
＜5	94 (27.5)	37.48 (10.09)
5-10	95 (27.8)	37.88 (10.96)
＞10	153 (44.7)	36.97 (11.39)
Weekly night shifts		*P*=0.063
0	46 (13.5)	33.60 (9.35)
1-2	148 (43.4)	37.89 (11.19)
3-4	106 (31.0)	37.46 (11.10)
＞4	42 (12.3)	39.40 (10.35)
Daily work hours(h)		*P*=0.017
＜9	161 (47.1)	35.60 (10.29)
9-12	118 (34.5)	39.19 (11.13)
＞12	163 (18.4)	38.44 (11.45)
Cigarette use		*P*=0.244
Yes	38 (11.1)	39.31 (12.13)
No	304 (88.9)	37.12 (10.74)
Alcohol use		*P*=0.019
Yes	50 (14.6)	40.70 (10.91)
No	292 (85.4)	36.79 (10.82)
History of chronic disease		*P*=0.001
Yes	58 (17.0)	41.79 (12.21)

No	284 (83.0)	36.46 (10.41)

As depicted in Table 2, compassion satisfaction levels were moderate in approximately 70.8% of emergency physicians and nurses, low in 27.8% of them and high in 1.4%. Of the participants, 2.3% had a high burnout score, 66 (19.3%) had a low burnout score and 3% of the respondents had a high compassion fatigue score. The mean scores for depression, compassion satisfaction, burnout and compassion fatigue were 37.36 (SD, 10.91), 26.70 (SD, 6.36), 27.74 (SD, 6.19) and 30.19 (SD, 6.59), respectively.

Table 2. Compassion satisfaction, burnout, compassion fatigue and depression levels among emergency physicians and nurses (N=342).

Dimensions	N (%)	Mean	SD
Depression		37.36	10.91
Compassion satisfaction		26.70	6.36
Low	95 (27.8)	-	-
Medium	242 (70.8)	-	-
High	5 (1.4)	-	-
Burnout		27.74	6.19
Low	66 (19.3)	-	-
Medium	268 (78.4)	-	-
High	8 (2.3)	-	-
Compassion fatigue		30.19	6.59
Low	43 (12.6)	-	-
Medium	286 (83.6)	-	-
High	13 (3.8)	-	-

Both compassion satisfaction and burnout were significantly correlated with three depression metrics: depressed affect, somatic symptoms and inter-personal relations. Apart from positive affect, there was no relationship between the other sub-scales of depression and compassion fatigue (Table 3).

Table 3. Correlation between dimensions of compassion satisfaction, burnout, compassion fatigue and depression (N=342).

	Depression	Depressed Affect	Somatic	Positive Affect	Inter-personal

Compassion satisfaction	0.282**	0.319**	0.317**	0.003	0.311**
Burnout	0.171**	0.214**	0.239**	–0.163**	0.247**
Compassion fatigue	–0.178**	–0.092	–0.021	–0.430**	0.001

Note:**$p<0.01$

Depression was computed as outcome variable, and the independent variables comprised the demographic characteristics and the three dimensions of compassion fatigue. Table 4 shows that marital status, history of chronic disease, compassion satisfaction, burnout and compassion fatigue collectively accounted for 39.6% of the variance in depression (F =28.952, $p<0.001$, $R^2=0.410$, adjusted $R^2=0.396$).

Table 4. Multiple linear regression analysis of depression (N=342).

		Unstandardised coefficient		Standardised coefficient			95% CI	
Dependent variables	Independent variables	B	SE	Beta	*t*	*P*	*Lower bound*	*Upper bound*
Depression	Marital status	–2.997	1.123	–0.128	–2.670	0.008	–5.205	–0.789
	History of chronic disease	–3.924	1.290	–0.135	–3.052	0.003	–6.461	–1.386
	Compassion satisfaction	0.934	0.173	0.545	5.388	<0.001	0.593	1.274
	Burnout	0.507	0.215	0.288	2.359	0.019	0.084	0.930
	Compassion fatigue	–1.290	0.120	–0.779	–10.707	<0.001	–1.527	–1.053

Discussion

The findings of the current study regarding the frequency and distribution of depression among emergency physicians and nurses show that the following characteristics were significantly associated with higher levels of depression—marital status: unmarried; intermediate professional title; consumption of alcohol; daily

worktime between 9 and 12 h; and a history of chronic disease. Similar to our study, a statistically significant difference was observed in the levels of depression among frontline doctors combating the COVID-19 pandemic in India with regard to marital status.[27] One reason for this could be that spousal support is beneficial for maintaining good mental health.[28] Our findings concur with those of Xiao et al. who found that depression levels were different among different professional titles and that an intermediate title was an independent influencing factor.[29] This could be explained by the fact that compared to medical staff with an intermediate title, physicians and nurses with a senior title have a richer work experience, a higher income and a lower family burden.[30] The findings of this study are in accordance with those of two previous studies that reported that working excessively long hours on a daily basis was significantly associated with the frequency of depressive symptoms.[31] [32] Emergency physicians and nurses endure a heavy burden of work imposed on them on a daily basis and most often without a day of safety rest. Work overload and chronic sleep deprivation can increase the risk for depression.[33] A study conducted by Sørensen et al. among 1,943 Danish physicians noted that the emergency department had the highest proportion of risky alcohol use.[34] Besides, the study of Silva et al. reported that the prevalence of depressive symptoms among emergency nurses in Brazil is 95.24%.[35] Emergency physicians and nurses who had severe depressive symptoms were more likely to be drinking alcohol to regulate these emotional states.[36] Our results are also similar to those reported in a study by Ngasa et al. that found that the presence of a chronic disease was independently associated with

depression.[37]

Our study found a considerably high prevalence of depressive symptoms among emergency physicians and nurses, and the prevalence of depressive symptoms reached up to 100%, which is much higher than the previous study.[38] The high level of depression may be associated with factors, such as excessive workload, overcrowding and resource shortages in the emergency department.[39 40] The COVID-19 pandemic has added to the heavy workload and the life-threatening emergencies that medical staff, especially physicians and nurses, were facing, thereby aggravating the psychological pressure; this is one of the neglected important reasons causing the high levels of depression.[41] The prevalence rates of burnout, compassion satisfaction and compassion fatigue in our study were much lower than those in nurses in a study conducted in an adult emergency and urgent care department.[8] However, these differences may be due to the small sample size (87 nurses), which consisted of emergency nurses only in the Portuguese study. However, in this study, the results indicated an average to high level of compassion fatigue and burnout among emergency nurses, which was much higher than that of a previous study.[42]

We found that compassion satisfaction, burnout and compassion fatigue had a statistically significant correlation with depression. The current study shows that compassion satisfaction has a significant positive correlation with depression and compassion fatigue has a significant negative correlation with depression, which is not consistent with other recent studies. Jo et al. and Hegney et al. both found an

opposite association, that is, compassion satisfaction was negatively associated with depression and compassion fatigue was positively correlated with depression.[43 44] The reason for this may include differences in measurement tools. Interestingly, an association analysis showed that burnout was significantly related to depression, a finding similar to that of a survey of emergency physicians. [45]

Limitations of the current study

Our study has a few limitations. First, our study sample was drawn from a single Chinese region with predominantly emergency physicians and nurses and adopted the method of convenient sampling, which may have caused the uncommonly high scores of depression and limits the generalisability of the findings to other professional groups. Second, most of the instruments used in this research were based on the respondents' self-reports, which is prone to information bias. Therefore, more robust methods of assessment and better tools should be used in future studies. Third, the causal association between compassion satisfaction, burnout, compassion fatigue and depression is not clear, due to the cross-sectional study nature of our study. Hence, we recommend that future research should examine the interaction between compassion fatigue, burnout, compassion satisfaction and depression and evaluate their potential impact rather than focusing on these phenomena separately. Lastly, compassion fatigue, in our study, merely contributed to (did not cause) increase in depression.

Conclusion

The prevalence of depression among emergency physicians and nurses in the province of Sichuan was shown to be extremely high. Marital status and the presence of a

chronic disease among the staff affected their depression levels. We also examined the relationship between compassion satisfaction, burnout, compassion fatigue and depression among emergency physicians and nurses in Sichuan province and found a significant association between these. Moreover, it was also determined that independent variables, such as compassion satisfaction, burnout and compassion fatigue strongly predict depression levels among emergency physicians and nurses. Consequently, reducing the level of burnout and compassion fatigue and increasing compassion satisfaction could be a key factor in addressing depression in emergency department physicians and nurses. The findings of our study have the potential to provide new directions and perspectives for future research. However, further studies are needed to derive more specific details through in-depth interviews with physicians and nurses to more accurately evaluate the prevalence of depression among emergency physicians and nurses.

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Contributors

HM wrote the manuscript and conducted the statistical analysis and interpretation; BW was in charge of the study concept and design; and SQH and YZ were in charge of data acquisition. All authors revised and approved the final manuscript.

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Competing interests

None declared.

Patient consent for publication

Not required.

Ethics approval

The study was approved by the Institutional Review Board of Xiangya Nursing School (Approval number E202062), Central South University, China.

Data availability statement

Data are available upon reasonable request.

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PART 1 Basic requirements	***Author response or further detail***	**Tick**
Word count	3962	
Was ethical approval given and by whom? (give any reference number)	the Institutional Review Board of Xiangya Nursing School, Central South University (Approval number E202062)	
Please state any conflicts of interest	None	
Please state sources of funding and the role of funders in the conduct of the research	None	
Please state any study registry number (e.g. ISRCTN)	Not applicable	
Title	The title is in the format 'Topic / question: design/type of paper' and identifies the population / care setting studied. *(e.g. The effectiveness of telephone support for adolescents with insulin dependant diabetes: controlled before and after study: the structure is optional for* discussion papers, editorials and commentaries*)*	Page1
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Section	Descriptor	TICK
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Background	A statement of the problem / phenomena of interest, a brief summary of existing research which addresses the topic and an explanation of the purpose of the current study / review in relation to this.	Page2
METHODS	Clear statement of the aims, objectives (hypothesis) and research design	Page4
Settings	The settings and locations where the study took place	Page4
Inclusion Criteria	Eligibility criteria for participants – inclusion and exclusion criteria	Page5
Sampling	Method of sampling and if relevant allocation to groups (e.g. convenience, random) and *description* of sampling, recruitment and allocation procedures .	Page4
Sample size	How sample size was determined.	Page5
Outcomes and data collection procedures	Clearly defined primary and secondary outcome measures (when applicable), Setting and methods of data collection and methods used to enhance the quality of data collection (*e.g.*, multiple observations, training of assessors).	Page5
Analysis Methods	Statistical methods used / approaches to qualitative analysis including procedures to ensure accuracy / validity / truthfulness of accounts.	Page6
Ethical review*	Details of ethical scrutiny / approvals obtained.	Page12
RESULTS Participant flow	Flow of participants through each stage of selection, allocation, follow up / inclusion in analysis (a diagram is strongly recommended). Describe protocol deviations from study as planned, together with reasons.	N/A
Recruitment	Dates defining the periods of recruitment and follow-up.	N/A
Baseline data	Baseline demographic and clinical characteristics of each group.	N/A
Results	Point estimates, exact p-values and confidence intervals for quantitative studies. Qualitative analyses are supported by appropriate quotations which support the derived themes / categories and which are anonymously attributed to participants (using pseudonyms, numbers or equivalent)	*Page6*
DISCUSSION	Brief recapitulation / summary of the results taking into account study hypotheses / aims	*Page8*
Interpretation	Interpretation of the results, taking into account study limitations	*Page10*
Overall evidence	Assessment of the current state of knowledge in the context of study results and other evidence.	*Page10*
Implications	Consideration of the implications of the current state of knowledge for further research and or practice	*Page11*

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Compassion fatigue, burnout, compassion satisfaction and depression among emergency department physicians and nurses: a cross-sectional study

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Compassion fatigue, burnout, compassion satisfaction and depression among emergency department physicians and nurses: a cross-sectional study

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Abstract

Objectives: Emergency department physicians and nurses are at high risk of compassion fatigue, burnout and depression. The purpose of this study was to examine the interrelationship between compassion fatigue, burnout, compassion satisfaction and depression in emergency department physicians and nurses.

Design: A cross-sectional study.

Setting: This study was conducted in five tertiary hospitals in five different cities across the province of Sichuan, China, in 2021.

Participants: A total of 342 emergency department physicians and nurses participated in the study.

Main outcome measures: Compassion fatigue, burnout, compassion satisfaction and depression scores.

Results: Among the study participants, 100% were found to have depressive

symptoms, 27.8% had low compassion satisfaction, 2.3% had high burnout and 3.8% had compassion fatigue. In the final multiple linear regression model, marital status (p=0.008; 95% confidence interval [CI], –5.205 to –0.789), history of chronic disease (p=0.003; 95% CI, –6.461 to –1.386), compassion satisfaction (p<0.001; 95% CI, 0.593 to 1.274), burnout (p=0.019; 95% CI, 0.084 to 0.930) and compassion fatigue (p<0.001; 95% CI, –1.527 to –1.053) among emergency department physicians and nurses were considered to be significant predictors of depression.

Conclusions: The prevalence of depression among emergency department physicians and nurses is high in the province of Sichuan, China. Compassion fatigue, burnout and compassion satisfaction were significantly associated with depression in emergency department physicians and nurses. Hospital administrations should consider these findings to develop appropriate psychological interventions and strategies, to prevent, alleviate or treat severe depression among emergency department physicians and nurses in the province of Sichuan.

Keywords: Compassion fatigue, burnout, compassion satisfaction, depression, emergency department

Strengths and limitations of this study

•This is a novel study conducted in the province of Sichuan, China, which describes the prevalence of compassion fatigue, burnout, compassion satisfaction and depression and the influencing factors associated with depression among emergency department physicians and nurses.

•The causal association between compassion fatigue, burnout, compassion satisfaction

and depression could not be established since this was a cross-sectional study.

•Data on compassion fatigue, burnout, compassion satisfaction and depression were collected based on the participants' self-reports, which may have led to information bias.

Introduction

Emergency departments are fast-paced, high-pressure environments in which the medical staff encounter heavy workloads, violence, interpersonal conflict, high patient load, mass casualty incidents; moreover, limited resources and poor skill mix compound the problem.[1 2] Emergency department physicians and nurses who are at the frontline of a demanding health care system take significant responsibility for the care of emergency patients, regardless of overstretched and overburdened resources.[3] Emergency physicians and nurses who witness alarming morbidity and mortality on a daily basis, can experience adverse physical and mental health problems, such as compassion fatigue, depression and burnout.[4] It has been reported that compassion fatigue, burnout and depression afflicting emergency physicians and nurses can not only harm individual mental health, but can also cause a series of fateful consequences, including medical errors, poor-quality patient care and increased patient mortality during hospital stay.[5-7]

Compassion fatigue, which is considered as an occupational hazard in healthcare, is conceptualized as "the natural, consequent behaviors and emotions resulting from knowing about a traumatizing event experienced by a significant other – the stress resulting from helping or wanting to help a traumatized or suffering person".[8 9]

Compassion fatigue can result in a series of physical, mental and work-related symptoms that seriously affect quality of patient care and staff-patient relationships.[10] Chu reported that compassion fatigue has a significant adverse effect on job performance and organizational citizenship behavior.[11] A study conducted in the U.S. indicated that about 80% of emergency nurses had moderate to high levels of compassion fatigue.[12] Barnett et al. noted that compassion fatigue was positively associated with emotional display.[13] Burnout is a work-related syndrome and predominantly defined as "high emotional exhaustion, depersonalization and a low level of personal accomplishment".[14] The prevalence of burnout among emergency medical staff was very high and burnout can cause serious consequences.[15-17] Moukarzel et al. noted that 34.6% emergency medical staff had severe burnout and Soltanifar et al. found that 84.5% emergency physicians had experienced high emotional exhaustion.[15 18] Jyothindran's findings indicated that severe burnout was highly correlated with medical error and turnover.[19] Compassion satisfaction is defined as the emotions generated and the sense of achievement derived from helping and caring for patients, whether related to direct assistance or support in improvement of patients' condition.[20]

Depression, a common and serious mental illness, is listed by the World Health Organization (WHO) as one of the most important factors contributing to global disability and the main contributor to suicide deaths at all ages.[21] The most common symptoms associated with depression are persistent sadness, a loss of interest and energy, insomnia, headache, unexplained pain, gastrointestinal symptoms,

hopelessness and thoughts of self-harm or suicide.[22] Severe depression can lead to many negative outcomes. For example, a recent study on emergency department nurses during the COVID-19 pandemic in China showed that depression had an adverse effect on quality of patient care and nurses' quality of life.[23] Vasconcelos et al. found that depressive symptoms were significantly associated with burnout.[24] Emergency medical staff are exposed to all kinds of stress every day.[25] Hence, special attention should be paid to the psychological status of emergency physicians and nurses.

Although extensive studies on depression have been conducted, most of the studies have only focused on nurses.[23 24] Moreover, few studies have been carried out to explore the factors that influence the development of depression in emergency physicians and nurses.[5 25] Considering that emergency physicians and nurses have emotionally demanding tasks and work in high-pressure situations, the aim of this study was to determine the prevalence of compassion fatigue, burnout, compassion satisfaction and depression and explore the interrelationship of these among this highly vulnerable population.

Methods

Study design and participants

A cross-sectional survey was conducted among emergency physicians and nurses across five different cities of Sichuan province, China. A convenience sample was used to recruit physicians and registered nurses working in the emergency department. The eligibility criteria were as follows: (1) being licensed physicians and registered

nurses; (2) with more than one year's work experience; (3) working in emergency department; (4) provided consent to participate. The data were collected by five trained research assistants from January to February 2021. A set of questionnaires was distributed to all emergency medical staff by the five tertiary hospitals' administration. All the participants were informed that their participation was voluntary and that their data would be anonymised. A total of 350 emergency physicians and nurses filled in the questionnaires, out of which 342 questionnaires were returned (an effective response rate of 97.7%).

Measurements

The questionnaire comprised three instruments: a demographic survey, the Professional Quality of Life (ProQOLv5) scale and the Center for Epidemiologic Studies Depression (CES-D) scale. Sociodemographic data were collected with a self-designed questionnaire, including position (physician, nurse), age (less than 35 years, 35 years or older), gender (male, female), marital status (married, unmarried), education level (diploma, associate degree, bachelor´s degree, master´s degree or higher), professional title (primary, intermediate, senior), work experience (less than 5 years, 5–10 years, over 10 years), weekly night shifts (none, 1–2, 3–4, more than 4), daily work hours (less than 9 h, 9–12 h, over 12 h), cigarette use (yes, no), alcohol use (yes, no) and history of chronic disease (yes, no). According to the level of experience of the professionals, physicians and nurses' professional ranks in China were divided into three categories, including primary titles, intermediate titles and senior titles.

Professional quality of life scale

Compassion fatigue, burnout and compassion satisfaction levels were assessed using the ProQOLv5. The questionnaire includes 30 items with a Likert scale of 5 points (1=never; 5=always), 10 items for compassion satisfaction, 10 items for burnout and 10 items for compassion fatigue.[20] The level of compassion satisfaction was divided into less than 22 (low), 23–41 (middle) and more than 42 (high). For compassion fatigue and burnout, a score of 22 or less represents low levels, 23–41 represents middle levels, and a score of more than 42 high levels. The alpha reliability coefficients for compassion satisfaction, burnout and compassion fatigue were 0.775, 0.775 and 0.807, respectively.

Depression

The CES-D is a 20-item questionnaire intended to measure the frequency of occurrence of symptoms of depression over the past week using a 5-point Likert scale (each item was scored as follows: 0=rarely or none of the time to 3=most or all of the time; total score range, 0–60).[26] The CES-D scale has four reverse-scored items (items 4, 8, 12 and 16) and covers four major symptoms of depression, including (1) depressed affect (e.g. sadness, crying); (2) absence of positive affect (e.g. hope, enjoyment); (3) somatic symptoms (e.g., appetite problems, problems ‘‘getting going’’); and (4) interpersonal relations (e.g. perceiving others as unfriendly). Standard cut-off value ≥16 indicates the likely presence of depression. The Cronbach’s α in the current study was 0.916.

Statistical analysis

Statistical analysis was conducted using SPSS version 22.0 (SPSS Inc., Chicago, IL,

USA). Continuous variables were summarized as mean with standard deviation (SD), while categorical variables were presented as frequencies and percentages. Independent samples t-test, and one-way analysis of variance (ANOVA) were used to compare participants' depression by demographic characteristics. Associations between compassion satisfaction, burnout, compassion fatigue and depression among emergency physicians and nurses were analysed using Pearson's correlation analysis. A multiple linear regression model was used to estimate the effect of compassion satisfaction, burnout, compassion fatigue and other demographic variables on depression. A *p* value of less than 0.05 was considered statistically significant (two-tailed).

Patient and public involvement

Patients or members of the public were not involved in the design, reporting or dissemination plans of our research.

Results

The participants' baseline characteristics are shown in Table 1. The mean age was 32.59 years (SD, 8.19; age range, 20–58 years). Most participants were female (70.5%), nurses (71.1%), married (68.7.0%), held a bachelor degree (62.9%) and had a primary professional title (57.0%).

The differences in depression scores according to the characteristics of emergency physicians and nurses are also presented in Table 1. There were significant differences in depression scores based on marital status ($p<0.01$), professional title ($p<0.05$), daily work hours ($p<0.05$), alcohol use ($p<0.05$) and history of chronic

disease ($p<0.01$).

Table 1. Demographic characteristics of emergency department physicians and nurses (N=342).

Variables	N (%)	Depression Mean (SD)
Position		*P*=0.181
Physician	99 (28.9)	38.60 (11.76)
Nurse	243 (71.1)	36.86 (10.52)
Age (years)		*P*=0.991
＜35	236 (69.0)	37.37 (10.23)
≥35	106 (31.0)	37.35 (12.32)
Gender		*P*=0.162
Male	101 (29.5)	38.64 (12.22)
Female	241 (70.5)	36.83 (10.28)
Marital status		*P*=0.002
Unmarried	107 (31.3)	40.01(11.05)
Married	235 (68.7)	36.16(10.64)
Education level		*P*=0.071
Associate degree	102 (29.8)	36.16 (9.97)
Bachelor degree	215 (62.9)	38.33 (11.49)
Master degree	25 (7.3)	34.00 (8.24)
Profession title		*P*=0.034
Primary	195 (57.0)	37.57 (10.56)
Intermediate	108 (31.6)	38.48 (11.51)
Senior	39 (11.4)	33.25 (10.18)
Work experience (years)		*P*=0.810
＜5	94 (27.5)	37.48 (10.09)
5-10	95 (27.8)	37.88 (10.96)
＞10	153 (44.7)	36.97 (11.39)
Weekly night shifts		*P*=0.063
0	46 (13.5)	33.60 (9.35)
1-2	148 (43.4)	37.89 (11.19)
3-4	106 (31.0)	37.46 (11.10)
＞4	42 (12.3)	39.40 (10.35)
Daily work hours(h)		*P*=0.017
＜9	161 (47.1)	35.60 (10.29)
9-12	118 (34.5)	39.19 (11.13)
＞12	163 (18.4)	38.44 (11.45)
Cigarette use		*P*=0.244
Yes	38 (11.1)	39.31 (12.13)
No	304 (88.9)	37.12 (10.74)
Alcohol use		*P*=0.019
Yes	50 (14.6)	40.70 (10.91)

No	292 (85.4)	36.79 (10.82)
History of chronic disease		*P*=0.001
Yes	58 (17.0)	41.79 (12.21)
No	284 (83.0)	36.46 (10.41)

As depicted in Table 2, compassion satisfaction levels were moderate in approximately 70.8% of emergency physicians and nurses, low in 27.8% of them and high in 1.4%. Of the participants, 2.3% had a high burnout score, 66 (19.3%) had a low burnout score and 3% of the respondents had a high compassion fatigue score. The mean scores for depression, compassion satisfaction, burnout and compassion fatigue were 37.36 (SD, 10.91), 26.70 (SD, 6.36), 27.74 (SD, 6.19) and 30.19 (SD, 6.59), respectively.

Table 2. Compassion satisfaction, burnout, compassion fatigue and depression levels among emergency physicians and nurses (N=342).

Dimensions	N (%)	Mean	SD
Depression		37.36	10.91
Compassion satisfaction		26.70	6.36
Low	95 (27.8)	-	-
Medium	242 (70.8)	-	-
High	5 (1.4)	-	-
Burnout		27.74	6.19
Low	66 (19.3)	-	-
Medium	268 (78.4)	-	-
High	8 (2.3)	-	-
Compassion fatigue		30.19	6.59
Low	43 (12.6)	-	-
Medium	286 (83.6)	-	-
High	13 (3.8)	-	-

Both compassion satisfaction and burnout were significantly correlated with three depression metrics: depressed affect, somatic symptoms and inter-personal relations. Apart from positive affect, there was no relationship between the other sub-scales of depression and compassion fatigue (Table 3).

Table 3. Correlation between dimensions of compassion satisfaction, burnout, compassion fatigue and depression (N=342).

	Depression	Depressed Affect	Somatic	Positive Affect	Inter-personal
Compassion satisfaction	0.282**	0.319**	0.317**	0.003	0.311**
Burnout	0.171**	0.214**	0.239**	–0.163**	0.247**
Compassion fatigue	–0.178**	–0.092	–0.021	–0.430**	0.001

Note:**$p<0.01$

Depression was computed as outcome variable, and the independent variables comprised the demographic characteristics and the three dimensions of compassion fatigue. Table 4 shows that marital status, history of chronic disease, compassion satisfaction, burnout and compassion fatigue collectively accounted for 39.6% of the variance in depression (F =28.952, $p<0.001$, $R^2=0.410$, adjusted $R^2=0.396$).

Table 4. Multiple linear regression analysis of depression (N=342).

		Unstandardised coefficient		Standardised coefficient			95% CI	
Dependent variables	Independent variables	B	SE	Beta	*t*	*P*	*Lower bound*	*Upper bound*
Depression	Marital status	–2.997	1.123	–0.128	–2.670	0.008	–5.205	–0.789
	History of chronic disease	–3.924	1.290	–0.135	–3.052	0.003	–6.461	–1.386
	Compassion satisfaction	0.934	0.173	0.545	5.388	<0.001	0.593	1.274
	Burnout	0.507	0.215	0.288	2.359	0.019	0.084	0.930
	Compassion fatigue	–1.290	0.120	–0.779	–10.707	<0.001	–1.527	–1.053

Discussion

The findings of the current study regarding the frequency and distribution of depression among emergency physicians and nurses show that the following characteristics were significantly associated with higher levels of depression—marital

status: unmarried; intermediate professional title; consumption of alcohol; daily worktime between 9 and 12 h; and a history of chronic disease. Similar to our study, a statistically significant difference was observed in the levels of depression among frontline doctors combating the COVID-19 pandemic in India with regard to marital status.[27] One reason for this could be that spousal support is beneficial for maintaining good mental health.[28] Our findings concur with those of Xiao et al. who found that depression levels were different among different professional titles and that an intermediate title was an independent influencing factor.[29] This could be explained by the fact that compared to medical staff with an intermediate title, physicians and nurses with a senior title have a richer work experience, a higher income and a lower family burden.[30] The findings of this study are in accordance with those of two previous studies that reported that working excessively long hours on a daily basis was significantly associated with the frequency of depressive symptoms.[31] [32] Emergency physicians and nurses endure a heavy burden of work imposed on them on a daily basis and most often without a day of safety rest. Work overload and chronic sleep deprivation can increase the risk for depression.[33] A study conducted by Sørensen et al. among 1,943 Danish physicians noted that the emergency department had the highest proportion of risky alcohol use.[34] Besides, the study of Silva et al. reported that the prevalence of depressive symptoms among emergency nurses in Brazil is 95.24%.[35] Emergency physicians and nurses who had severe depressive symptoms were more likely to be drinking alcohol to regulate these emotional states.[36] Our results are also similar to those reported in a study by Ngasa et al. that

found that the presence of a chronic disease was independently associated with depression.[37]

Our study found a considerably high prevalence of depressive symptoms among emergency physicians and nurses, and the prevalence of depressive symptoms reached up to 100%, which is much higher than the previous study.[38] The high level of depression may be associated with factors, such as excessive workload, overcrowding and resource shortages in the emergency department.[39 40] The COVID-19 pandemic has added to the heavy workload and the life-threatening emergencies that medical staff, especially physicians and nurses, were facing, thereby aggravating the psychological pressure; this is one of the neglected important reasons causing the high levels of depression.[41] The prevalence rates of burnout, compassion satisfaction and compassion fatigue in our study were much lower than those in nurses in a study conducted in an adult emergency and urgent care department.[8] However, these differences may be due to the small sample size (87 nurses), which consisted of emergency nurses only in the Portuguese study. However, in this study, the results indicated an average to high level of compassion fatigue and burnout among emergency nurses, which was much higher than that of a previous study.[42]

We found that compassion satisfaction, burnout and compassion fatigue had a statistically significant correlation with depression. The current study shows that compassion satisfaction has a significant positive correlation with depression and compassion fatigue has a significant negative correlation with depression, which is

not consistent with other recent studies. Jo et al. and Hegney et al. both found an opposite association, that is, compassion satisfaction was negatively associated with depression and compassion fatigue was positively correlated with depression.[43 44] The reason for this may include differences in measurement tools. Interestingly, an association analysis showed that burnout was significantly related to depression, a finding similar to that of a survey of emergency physicians. [45]

Limitations of the current study

Our study has a few limitations. First, our study sample was drawn from a single Chinese region with predominantly emergency physicians and nurses and adopted the method of convenient sampling, which may have caused the uncommonly high scores of depression and limits the generalisability of the findings to other professional groups. Second, most of the instruments used in this research were based on the respondents' self-reports, which is prone to information bias. Therefore, more robust methods of assessment and better tools should be used in future studies. Third, the causal association between compassion satisfaction, burnout, compassion fatigue and depression is not clear, due to the cross-sectional study nature of our study. Hence, we recommend that future research should examine the interaction between compassion fatigue, burnout, compassion satisfaction and depression and evaluate their potential impact rather than focusing on these phenomena separately. Lastly, compassion fatigue, in our study, merely contributed to (did not cause) increase in depression.

Conclusion

The prevalence of depression among emergency physicians and nurses in the province

of Sichuan was shown to be extremely high. Marital status and the presence of a chronic disease among the staff affected their depression levels. We also examined the relationship between compassion satisfaction, burnout, compassion fatigue and depression among emergency physicians and nurses in Sichuan province and found a significant association between these. Moreover, it was also determined that independent variables, such as compassion satisfaction, burnout and compassion fatigue strongly predict depression levels among emergency physicians and nurses. Consequently, reducing the level of burnout and compassion fatigue and increasing compassion satisfaction could be a key factor in addressing depression in emergency department physicians and nurses. The findings of our study have the potential to provide new directions and perspectives for future research. However, further studies are needed to derive more specific details through in-depth interviews with physicians and nurses to clarify the underlying causes of the high prevalence of depression among emergency physicians and nurses.

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Contributors

HM wrote the manuscript and conducted the statistical analysis and interpretation; BW was in charge of the study concept and design; and SQH and YZ were in charge

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Competing interests

None declared.

Patient consent for publication

Not required.

Ethics approval

The study was approved by the Institutional Review Board of Xiangya Nursing School (Approval number E202062), Central South University, China.

Data availability statement

Data are available upon reasonable request.

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METHODS	Clear statement of the aims, objectives (hypothesis) and research design	Page5
Settings	The settings and locations where the study took place	Page5
Inclusion Criteria	Eligibility criteria for participants – inclusion and exclusion criteria	Page5
Sampling	Method of sampling and if relevant allocation to groups (e.g. convenience, random) and *description* of sampling, recruitment and allocation procedures .	Page5
Sample size	How sample size was determined.	Page6
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Interpretation	Interpretation of the results, taking into account study limitations	*Page14*
Overall evidence	Assessment of the current state of knowledge in the context of study results and other evidence.	*Page14*
Implications	Consideration of the implications of the current state of knowledge for further research and or practice	*Page15*

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Compassion fatigue, burnout, compassion satisfaction and depression among emergency department physicians and nurses: a cross-sectional study

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Compassion fatigue, burnout, compassion satisfaction and depression among emergency department physicians and nurses: a cross-sectional study

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Abstract

Objectives: Emergency department physicians and nurses are at high risk of compassion fatigue, burnout and depression. The purpose of this study was to examine the interrelationship between compassion fatigue, burnout, compassion satisfaction and depression in emergency department physicians and nurses.

Design: A cross-sectional study.

Setting: This study was conducted in five tertiary hospitals in five different cities across the province of Sichuan, China, in 2021.

Participants: A total of 342 emergency department physicians and nurses participated in the study.

Main outcome measures: Compassion fatigue, burnout, compassion satisfaction and depression scores.

Results: Among the study participants, 100% were found to have depressive

symptoms, 27.8% had low compassion satisfaction, 2.3% had high burnout and 3.8% had compassion fatigue. In the final multiple linear regression model, marital status (p=0.008; 95% confidence interval [CI], –5.205 to –0.789), history of chronic disease (p=0.003; 95% CI, –6.461 to –1.386), compassion satisfaction (p<0.001; 95% CI, 0.593 to 1.274), burnout (p=0.019; 95% CI, 0.084 to 0.930) and compassion fatigue (p<0.001; 95% CI, –1.527 to –1.053) among emergency department physicians and nurses were considered to be significant predictors of depression.

Conclusions: The prevalence of depression among emergency department physicians and nurses is high in the province of Sichuan, China. Compassion fatigue, burnout and compassion satisfaction were significantly associated with depression in emergency department physicians and nurses. Hospital administrations should consider these findings to develop appropriate psychological interventions and strategies, to prevent, alleviate or treat severe depression among emergency department physicians and nurses in the province of Sichuan.

Keywords: Compassion fatigue, burnout, compassion satisfaction, depression, emergency department

Strengths and limitations of this study

•This is a novel study conducted in the province of Sichuan, China, which describes the prevalence of compassion fatigue, burnout, compassion satisfaction and depression and the influencing factors associated with depression among emergency department physicians and nurses.

•The causal association between compassion fatigue, burnout, compassion satisfaction

and depression could not be established since this was a cross-sectional study.

•Data on compassion fatigue, burnout, compassion satisfaction and depression were collected based on the participants' self-reports, which may have led to information bias.

Introduction

Emergency departments are fast-paced, high-pressure environments in which the medical staff encounter heavy workloads, violence, interpersonal conflict, high patient load, mass casualty incidents; moreover, limited resources and poor skill mix compound the problem.[1 2] Emergency department physicians and nurses who are at the frontline of a demanding health care system take significant responsibility for the care of emergency patients, regardless of overstretched and overburdened resources.[3] Emergency physicians and nurses who witness alarming morbidity and mortality on a daily basis, can experience adverse physical and mental health problems, such as compassion fatigue, depression and burnout.[4] It has been reported that compassion fatigue, burnout and depression afflicting emergency physicians and nurses can not only harm individual mental health, but can also cause a series of fateful consequences, including medical errors, poor-quality patient care and increased patient mortality during hospital stay.[5-7]

Compassion fatigue, which is considered as an occupational hazard in healthcare, is conceptualized as "the natural, consequent behaviors and emotions resulting from knowing about a traumatizing event experienced by a significant other – the stress resulting from helping or wanting to help a traumatized or suffering person".[8 9]

Compassion fatigue can result in a series of physical, mental and work-related symptoms that seriously affect quality of patient care and staff-patient relationships.[10] Chu reported that compassion fatigue has a significant adverse effect on job performance and organizational citizenship behavior.[11] A study conducted in the U.S. indicated that about 80% of emergency nurses had moderate to high levels of compassion fatigue.[12] Barnett et al. noted that compassion fatigue was positively associated with emotional display.[13] Burnout is a work-related syndrome and predominantly defined as "high emotional exhaustion, depersonalization and a low level of personal accomplishment".[14] The prevalence of burnout among emergency medical staff was very high and burnout can cause serious consequences.[15-17] Moukarzel et al. noted that 34.6% emergency medical staff had severe burnout and Soltanifar et al. found that 84.5% emergency physicians had experienced high emotional exhaustion.[15 18] Jyothindran's findings indicated that severe burnout was highly correlated with medical error and turnover.[19] Compassion satisfaction is defined as the emotions generated and the sense of achievement derived from helping and caring for patients, whether related to direct assistance or support in improvement of patients' condition.[20]

Depression, a common and serious mental illness, is listed by the World Health Organization (WHO) as one of the most important factors contributing to global disability and the main contributor to suicide deaths at all ages.[21] The most common symptoms associated with depression are persistent sadness, a loss of interest and energy, insomnia, headache, unexplained pain, gastrointestinal symptoms,

hopelessness and thoughts of self-harm or suicide.[22] Severe depression can lead to many negative outcomes. For example, a recent study on emergency department nurses during the COVID-19 pandemic in China showed that depression had an adverse effect on quality of patient care and nurses' quality of life.[23] Vasconcelos et al. found that depressive symptoms were significantly associated with burnout.[24] Emergency medical staff are exposed to all kinds of stress every day.[25] Hence, special attention should be paid to the psychological status of emergency physicians and nurses.

Although extensive studies on depression have been conducted, most of the studies have only focused on nurses.[23 24] Moreover, few studies have been carried out to explore the factors that influence the development of depression in emergency physicians and nurses.[5 25] Considering that emergency physicians and nurses have emotionally demanding tasks and work in high-pressure situations, the aim of this study was to determine the prevalence of compassion fatigue, burnout, compassion satisfaction and depression and explore the interrelationship of these among this highly vulnerable population.

Methods

Study design and participants

A cross-sectional survey was conducted among emergency physicians and nurses across five different cities of Sichuan province, China. A convenience sample was used to recruit physicians and registered nurses working in the emergency department. The eligibility criteria were as follows: (1) being licensed physicians and registered

nurses; (2) with more than one year's work experience; (3) working in emergency department; (4) provided consent to participate. The data were collected by five trained research assistants from January to February 2021. A set of questionnaires was distributed to all emergency medical staff by the five tertiary hospitals' administration. All the participants were informed that their participation was voluntary and that their data would be anonymised. A total of 350 emergency physicians and nurses filled in the questionnaires, out of which 342 questionnaires were returned (an effective response rate of 97.7%).

Measurements

The questionnaire comprised three instruments: a demographic survey, the Professional Quality of Life (ProQOLv5) scale and the Center for Epidemiologic Studies Depression (CES-D) scale. Sociodemographic data were collected with a self-designed questionnaire, including position (physician, nurse), age (less than 35 years, 35 years or older), gender (male, female), marital status (married, unmarried), education level (diploma, associate degree, bachelor´s degree, master´s degree or higher), professional title (primary, intermediate, senior), work experience (less than 5 years, 5–10 years, over 10 years), weekly night shifts (none, 1–2, 3–4, more than 4), daily work hours (less than 9 h, 9–12 h, over 12 h), cigarette use (yes, no), alcohol use (yes, no) and history of chronic disease (yes, no). According to the level of experience of the professionals, physicians and nurses' professional ranks in China were divided into three categories, including primary titles (physicians, nurses, nurse practitioners), intermediate titles (physicians in charge of a case, nurses-in-charge) and senior titles

(assistant director physicians, director physicians, assistant director nurses, director nurses).

Professional quality of life scale

Compassion fatigue, burnout and compassion satisfaction levels were assessed using the ProQOLv5. The questionnaire includes 30 items with a Likert scale of 5 points (1=never; 5=always), 10 items for compassion satisfaction, 10 items for burnout and 10 items for compassion fatigue.[20] The level of compassion satisfaction was divided into less than 22 (low), 23–41 (middle) and more than 42 (high). For compassion fatigue and burnout, a score of 22 or less represents low levels, 23–41 represents middle levels, and a score of more than 42 high levels. The alpha reliability coefficients for compassion satisfaction, burnout and compassion fatigue were 0.775, 0.775 and 0.807, respectively.

Depression

The CES-D is a 20-item questionnaire intended to measure the frequency of occurrence of symptoms of depression over the past week using a 5-point Likert scale (each item was scored as follows: 0=rarely or none of the time to 3=most or all of the time; total score range, 0–60).[26] The CES-D scale has four reverse-scored items (items 4, 8, 12 and 16) and covers four major symptoms of depression, including (1) depressed affect (e.g. sadness, crying); (2) absence of positive affect (e.g. hope, enjoyment); (3) somatic symptoms (e.g., appetite problems, problems ‘‘getting going’’); and (4) interpersonal relations (e.g. perceiving others as unfriendly). Standard cut-off value ≥16 indicates the likely presence of depression. The

Cronbach's α in the current study was 0.916.

Statistical analysis

Statistical analysis was conducted using SPSS version 22.0 (SPSS Inc., Chicago, IL, USA). Continuous variables were summarized as mean with standard deviation (SD), while categorical variables were presented as frequencies and percentages. Independent samples t-test, and one-way analysis of variance (ANOVA) were used to compare participants' depression by demographic characteristics. Associations between compassion satisfaction, burnout, compassion fatigue and depression among emergency physicians and nurses were analysed using Pearson's correlation analysis. A multiple linear regression model was used to estimate the effect of compassion satisfaction, burnout, compassion fatigue and other demographic variables on depression. A *p* value of less than 0.05 was considered statistically significant (two-tailed).

Patient and public involvement

Patients or members of the public were not involved in the design, reporting or dissemination plans of our research.

Results

The participants' baseline characteristics are shown in Table 1. The mean age was 32.59 years (SD, 8.19; age range, 20–58 years). Most participants were female (70.5%), nurses (71.1%), married (68.7.0%), held a bachelor degree (62.9%) and had a primary professional title (57.0%).

The differences in depression scores according to the characteristics of

emergency physicians and nurses are also presented in Table 1. There were significant differences in depression scores based on marital status (p<0.01), professional title (p<0.05), daily work hours (p<0.05), alcohol use (p<0.05) and history of chronic disease (p＜0.01).

Table 1. Demographic characteristics of emergency department physicians and nurses (N=342).

Variables	N (%)	Depression Mean (SD)
Position		*P*=0.181
Physician	99 (28.9)	38.60 (11.76)
Nurse	243 (71.1)	36.86 (10.52)
Age (years)		*P*=0.991
＜35	236 (69.0)	37.37 (10.23)
≥35	106 (31.0)	37.35 (12.32)
Gender		*P*=0.162
Male	101 (29.5)	38.64 (12.22)
Female	241 (70.5)	36.83 (10.28)
Marital status		*P*=0.002
Unmarried	107 (31.3)	40.01(11.05)
Married	235 (68.7)	36.16(10.64)
Education level		*P*=0.071
Associate degree	102 (29.8)	36.16 (9.97)
Bachelor degree	215 (62.9)	38.33 (11.49)
Master degree	25 (7.3)	34.00 (8.24)
Profession title		*P*=0.034
Primary	195 (57.0)	37.57 (10.56)
Intermediate	108 (31.6)	38.48 (11.51)
Senior	39 (11.4)	33.25 (10.18)
Work experience (years)		*P*=0.810
＜5	94 (27.5)	37.48 (10.09)
5-10	95 (27.8)	37.88 (10.96)
＞10	153 (44.7)	36.97 (11.39)
Weekly night shifts		*P*=0.063
0	46 (13.5)	33.60 (9.35)
1-2	148 (43.4)	37.89 (11.19)
3-4	106 (31.0)	37.46 (11.10)
＞4	42 (12.3)	39.40 (10.35)
Daily work hours(h)		*P*=0.017
＜9	161 (47.1)	35.60 (10.29)
9-12	118 (34.5)	39.19 (11.13)

＞12	163 (18.4)	38.44 (11.45)
Cigarette use		*P*=0.244
Yes	38 (11.1)	39.31 (12.13)
No	304 (88.9)	37.12 (10.74)
Alcohol use		*P*=0.019
Yes	50 (14.6)	40.70 (10.91)
No	292 (85.4)	36.79 (10.82)
History of chronic disease		*P*=0.001
Yes	58 (17.0)	41.79 (12.21)
No	284 (83.0)	36.46 (10.41)

As depicted in Table 2, compassion satisfaction levels were moderate in approximately 70.8% of emergency physicians and nurses, low in 27.8% of them and high in 1.4%. Of the participants, 2.3% had a high burnout score, 66 (19.3%) had a low burnout score and 3% of the respondents had a high compassion fatigue score. The mean scores for depression, compassion satisfaction, burnout and compassion fatigue were 37.36 (SD, 10.91), 26.70 (SD, 6.36), 27.74 (SD, 6.19) and 30.19 (SD, 6.59), respectively.

Table 2. Compassion satisfaction, burnout, compassion fatigue and depression levels among emergency physicians and nurses (N=342).

Dimensions	N (%)	Mean	SD
Depression		37.36	10.91
Compassion satisfaction		26.70	6.36
Low	95 (27.8)	-	-
Medium	242 (70.8)	-	-
High	5 (1.4)	-	-
Burnout		27.74	6.19
Low	66 (19.3)	-	-
Medium	268 (78.4)	-	-
High	8 (2.3)	-	-
Compassion fatigue		30.19	6.59
Low	43 (12.6)	-	-
Medium	286 (83.6)	-	-
High	13 (3.8)	-	-

Both compassion satisfaction and burnout were significantly correlated with three depression metrics: depressed affect, somatic symptoms and inter-personal

relations. Apart from positive affect, there was no relationship between the other sub-scales of depression and compassion fatigue (Table 3).

Table 3. Correlation between dimensions of compassion satisfaction, burnout, compassion fatigue and depression (N=342).

	Depression	Depressed Affect	Somatic	Positive Affect	Inter-personal
Compassion satisfaction	0.282**	0.319**	0.317**	0.003	0.311**
Burnout	0.171**	0.214**	0.239**	–0.163**	0.247**
Compassion fatigue	–0.178**	–0.092	–0.021	–0.430**	0.001

Note:**$p<0.01$

Depression was computed as outcome variable, and the independent variables comprised the demographic characteristics and the three dimensions of compassion fatigue. Table 4 shows that marital status, history of chronic disease, compassion satisfaction, burnout and compassion fatigue collectively accounted for 39.6% of the variance in depression (F =28.952, $p<0.001$, $R^2=0.410$, adjusted $R^2=0.396$).

Table 4. Multiple linear regression analysis of depression (N=342).

		Unstandardised coefficient		Standardised coefficient			95% CI	
Dependent variables	Independent variables	B	SE	Beta	*t*	*P*	*Lower bound*	*Upper bound*
Depression	Marital status	–2.997	1.123	–0.128	–2.670	0.008	–5.205	–0.789
	History of chronic disease	–3.924	1.290	–0.135	–3.052	0.003	–6.461	–1.386
	Compassion satisfaction	0.934	0.173	0.545	5.388	<0.001	0.593	1.274
	Burnout	0.507	0.215	0.288	2.359	0.019	0.084	0.930
	Compassion fatigue	–1.290	0.120	–0.779	–10.707	<0.001	–1.527	–1.053

Discussion

The findings of the current study regarding the frequency and distribution of depression among emergency physicians and nurses show that the following characteristics were significantly associated with higher levels of depression—marital status: unmarried; intermediate professional title; consumption of alcohol; daily worktime between 9 and 12 h; and a history of chronic disease. Similar to our study, a statistically significant difference was observed in the levels of depression among frontline doctors combating the COVID-19 pandemic in India with regard to marital status.[27] One reason for this could be that spousal support is beneficial for maintaining good mental health.[28] Our findings concur with those of Xiao et al. who found that depression levels were different among different professional titles and that an intermediate title was an independent influencing factor.[29] This could be explained by the fact that compared to medical staff with an intermediate title, physicians and nurses with a senior title have a richer work experience, a higher income and a lower family burden.[30] The findings of this study are in accordance with those of two previous studies that reported that working excessively long hours on a daily basis was significantly associated with the frequency of depressive symptoms.[31] [32] Emergency physicians and nurses endure a heavy burden of work imposed on them on a daily basis and most often without a day of safety rest. Work overload and chronic sleep deprivation can increase the risk for depression.[33] A study conducted by Sørensen et al. among 1,943 Danish physicians noted that the emergency department had the highest proportion of risky alcohol use.[34] Besides, the study of Silva et al. reported that the prevalence of depressive symptoms among emergency nurses in

Brazil is 95.24%.[35] Emergency physicians and nurses who had severe depressive symptoms were more likely to be drinking alcohol to regulate these emotional states.[36] Our results are also similar to those reported in a study by Ngasa et al. that found that the presence of a chronic disease was independently associated with depression.[37]

Our study found a considerably high prevalence of depressive symptoms among emergency physicians and nurses, and the prevalence of depressive symptoms reached up to 100%, which is much higher than the previous study.[38] The high level of depression may be associated with factors, such as excessive workload, overcrowding and resource shortages in the emergency department.[39 40] The COVID-19 pandemic has added to the heavy workload and the life-threatening emergencies that medical staff, especially physicians and nurses, were facing, thereby aggravating the psychological pressure; this is one of the neglected important reasons causing the high levels of depression.[41] The prevalence rates of burnout, compassion satisfaction and compassion fatigue in our study were much lower than those in nurses in a study conducted in an adult emergency and urgent care department.[8] However, these differences may be due to the small sample size (87 nurses), which consisted of emergency nurses only in the Portuguese study. However, in this study, the results indicated an average to high level of compassion fatigue and burnout among emergency nurses, which was much higher than that of a previous study.[42]

We found that compassion satisfaction, burnout and compassion fatigue had a

statistically significant correlation with depression. The current study shows that compassion satisfaction has a significant positive correlation with depression and compassion fatigue has a significant negative correlation with depression, which is not consistent with other recent studies. Jo et al. and Hegney et al. both found an opposite association, that is, compassion satisfaction was negatively associated with depression and compassion fatigue was positively correlated with depression.[43 44] The reason for this may include differences in measurement tools. Interestingly, an association analysis showed that burnout was significantly related to depression, a finding similar to that of a survey of emergency physicians. [45]

Limitations of the current study

Our study has a few limitations. First, our study sample was drawn from a single Chinese region with predominantly emergency physicians and nurses and adopted the method of convenient sampling, which may have caused the uncommonly high scores of depression and limits the generalisability of the findings to other professional groups. Second, most of the instruments used in this research were based on the respondents' self-reports, which is prone to information bias. Therefore, more robust methods of assessment and better tools should be used in future studies. Third, the causal association between compassion satisfaction, burnout, compassion fatigue and depression is not clear, due to the cross-sectional study nature of our study. Hence, we recommend that future research should examine the interaction between compassion fatigue, burnout, compassion satisfaction and depression and evaluate their potential impact rather than focusing on these phenomena separately. Lastly, compassion

fatigue, in our study, merely contributed to (did not cause) increase in depression.

Conclusion

The prevalence of depression among emergency physicians and nurses in the province of Sichuan was shown to be extremely high. Marital status and the presence of a chronic disease among the staff affected their depression levels. We also examined the relationship between compassion satisfaction, burnout, compassion fatigue and depression among emergency physicians and nurses in Sichuan province and found a significant association between these. Moreover, it was also determined that independent variables, such as compassion satisfaction, burnout and compassion fatigue strongly predict depression levels among emergency physicians and nurses. Consequently, reducing the level of burnout and compassion fatigue and increasing compassion satisfaction could be a key factor in addressing depression in emergency department physicians and nurses. The findings of our study have the potential to provide new directions and perspectives for future research. However, further studies are needed to derive more specific details through in-depth interviews with physicians and nurses to clarify the underlying causes of the high prevalence of depression among emergency physicians and nurses.

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Contributors

HM wrote the manuscript and conducted the statistical analysis and interpretation; BW was in charge of the study concept and design; and SQH and YZ were in charge of data acquisition. All authors revised and approved the final manuscript.

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Competing interests

None declared.

Patient consent for publication

Not required.

Ethics approval

The study was approved by the Institutional Review Board of Xiangya Nursing School (Approval number E202062), Central South University, China.

Data availability statement

Data are available upon reasonable request.

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STROBE Statement—Checklist of items that should be included in reports of ***cross-sectional studies***

	Item No	Recommendation	Page No
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	1
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	1-2
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	3
Objectives	3	State specific objectives, including any prespecified hypotheses	5
Methods			
Study design	4	Present key elements of study design early in the paper	5
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	5-6
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants	5-6
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	5
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	*6-7*
Bias	9	Describe any efforts to address potential sources of bias	14
Study size	10	Explain how the study size was arrived at	5
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	8
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	8
		(*b*) Describe any methods used to examine subgroups and interactions	N/A
		(*c*) Explain how missing data were addressed	N/A
		(*d*) If applicable, describe analytical methods taking account of sampling strategy	N/A
		(*e*) Describe any sensitivity analyses	N/A
Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	9
		(b) Give reasons for non-participation at each stage	N/A
		(c) Consider use of a flow diagram	N/A
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	8
		(b) Indicate number of participants with missing data for each variable of interest	N/A
Outcome data	15*	Report numbers of outcome events or summary measures	10-12

Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	11
		(*b*) Report category boundaries when continuous variables were categorized	N/A
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	N/A
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	N/A
Discussion			
Key results	18	Summarise key results with reference to study objectives	12-14
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	14
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	12-14
Generalisability	21	Discuss the generalisability (external validity) of the study results	14
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	16

*Give information separately for exposed and unexposed groups.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.