Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Psychiatry Research 296 (2021) 113654

Contents lists available at ScienceDirect

Psychiatry Research

journal homepage: www.elsevier.com/locate/psychres

Suicidal and self-harm ideation among Chinese hospital staff during the COVID-19 pandemic: Prevalence and correlates

Xiaoming Xu [a], Wo Wang [b], Jianmei Chen [a], Ming Ai [a], Lei Shi [b], Lixia Wang [a], Su Hong [a], Qi Zhang [a], Hua Hu [a], Xuemei Li [a], Jun Cao [a], Zhen Lv [b], Lian Du [a], Jing Li [a], Handan Yang [b], Xiaoting He [b], Xiaorong Chen [b], Ran Chen [b], Qinghua Luo [a], Xinyu Zhou [a], Jian Tan [c], Jing Tu [d], Guanghua Jiang [c], Zhiqin Han [c], Li Kuang [a,b,*]

[a] Department of Psychiatry, The First Affiliated Hospital of Chongqing Medical University, Chongqing 400016, China
[b] Mental Health Center, University-Town Hospital of Chongqing Medical University, Chongqing 401331, China
[c] Chongqing Changshou Mental Health Center, Chongqing 401220, China
[d] Chongqing Iron and Steel General Hospital, Chongqing 400037, China

ARTICLE INFO

Keywords:
Suicidal ideation
Self-harm ideation
Coronavirus
Hospital staff
Anxiety
Depression

ABSTRACT

The COVID-19 pandemic put global medical systems under massive pressure for its uncertainty, severity, and persistence. For detecting the prevalence of suicidal and self-harm ideation (SSI) and its related risk factors among hospital staff during the COVID-19 pandemic, this cross-sectional study collected the sociodemographic data, epidemic-related information, the psychological status and need, and perceived stress and support from 11507 staff in 46 hospitals by an online survey from February 14 to March 2, 2020. The prevalence of SSI was 6.47%. Hospital staff with SSI had high family members or relatives infected number and the self-rated probability of infection. Additionally, they had more perceived stress, psychological need, and psychological impact. On the contrary, hospital staff without SSI reported high self-rated health, willingness to work in a COVID-19 ward, confidence in defeating COVID-19, and perceived support. Furthermore, they reported better marital or family relationship, longer sleep hours, and shorter work hours. The infection of family members or relatives, poor marital status, poor self-rated health, the current need for psychological intervention, perceived high stress, perceived low support, depression, and anxiety were independent factors to SSI. A systematic psychological intervention strategy during a public health crisis was needed for the hospital staff's mental well-being.

1. Introduction

The coronavirus disease 2019 (COVID-19) has resulted in nearly 66 million confirmed cases, and over 1.5 million deaths accumulatively by December 7, 2020 (World Health Organization, 2020). The pandemic of COVID-19 blocked the global economy, disturbed social activities, and affected people's mental health. Furthermore, it put global medical systems under massive pressure for its uncertainty, severity, and persistence. The hospital staff was reported to suffer from high infection risk, heavy workload, psychological stress, and insomnia (An et al., 2020; Holton et al., 2020).

Previous studies have reported that suicidal ideation, a sensitive and specific indicator for suicide, was higher among medical healthcare workers than in the general population and associated with stress and mental disorder (Galfalvy et al., 2008). The suicide of nurses was reported during the COVID-19 pandemic (Rahman and Plummer, 2020). Only one study reported the suicide risk in frontline medical staff during the initial phase of the COVID-19 outbreak was 13%, equal to the general population. Additionally, it found that the years of working, family income, and daily working hours were associated with suicide risk (Zhou et al., 2020). However, the prevalence of suicidal ideation among hospital staff and its correlates are still unclear during a public health crisis by far (Naushad et al., 2019).

Chongqing municipality is one of the 34 provincial administrative regions, located in the middle of China with a 31 million population, bordered by Hubei province, and closely connected with Wuhan in culture, economy, and transport (State Statistical Bureau, 2020). Moreover, during the Chinese traditional holiday-the Lunar spring

* Corresponding author at: Department of Psychiatry, The First Affiliated Hospital of Chongqing Medical University, Youyi Road, Yuzhong District, Chongqing 400016, China.

https://doi.org/10.1016/j.psychres.2020.113654
Received 15 August 2020; Accepted 13 December 2020
Available online 17 December 2020

festival, Chongqing is the third city outside of Hubei province, which received migration from Wuhan (Economic Observer, 2020). In the initial three months after the COVID-19 pandemic outbreak, the number of confirmed COVID-19 cases per million in Chongqing ranked the seventh in China, although the local government took vigorous measures to control the pandemic after starting the first level response to major public health emergencies on January 24, 2020 (Tencent news, 2020).

This study was derived from the cooperation between our team and the Chongqing Health Commission as a part of the Chongqing psychological screening and intervention program. We collected epidemiological data timely to investigate the prevalence of suicidal and self-harm ideation (SSI) and its related factors in hospital staff during the COVID-19 pandemic. Furthermore, we hope to improve the hospital staff's mental well-being with some practical suggestions.

2. Methods

2.1. Design

This was a cross-sectional study.

2.2. Participants and data collection

This study was carried out based on the cooperation between our team and the Chongqing Health Committee following the introduction of an emergency psychological crisis intervention in the COVID-19 epidemic promulgated by the National Health Commission of China on January 27, 2020 (National Health Commission of China, 2020). The details of recrement can be found in another recently published research by our team (Xu et al., 2020).

In the 48 hospitals assigned by the Chongqing government to treat the COVID-19 patients, four hospitals received all the 576 confirmed patients and were classified as designated hospitals in this study. Except that, 16 hospitals were in central urban districts; 26 hospitals were in counties; two hospitals did not participate in this survey. Hospital staff working in the clinic, assistant, back office, and administration departments from the 46 hospitals mentioned above scanned a QR-code from their workgroup in the WeChat application under administrative encouragement. They finished the e-questionnaire on the backstage of a specified psychological screening system (Chongyixinli) from February 14 to March 2, 2020, the three to five weeks after the COVID-19 pandemic outbreak in Chongqing.

2.3. Measures

A structured e-questionnaire collected information on four domains, as described below. In this study, the criterion for SSI was the answer to the ninth item in PHQ-9, "Thought that you would be better off dead or of hurting yourself in some way.". Not at all" meant no SSI, while other answers, such as "several days", "more than half the days", or "nearly every day" meant SSI(Wang et al., 2020).

2.3.1. General information on demographic characteristics

Information regarding gender, age, ethnicity, educational background, marital status, number of children, hospital class, department, profession, technical title, work experience, work hours per day, and sleep hours per day were collected.

2.3.2. The COVID-19 pandemic related information

For detecting the impact on work, life, and attitudes in hospital staff, we collected the COVID-19 pandemic-related information. The questions were as followed: if they directly contacted with confirmed patients; how the quarantine status was in their workplace (complete isolation ward, partial isolation ward, or general ward); if they worked in a frontline department; if they had infected family members, relatives, or community members; if they have canceled their travel during the initial phase of the pandemic; how did they self-rated their possibility of infection (none, low, or high); if they were willing to work in a COVID-19 ward; if they still attend parties during the pandemic; if they were concern about COVID-19 progress; if they were confident in defeating COVID-19; and what was their prediction for the lasting time of this pandemic (1-2 months, 3-6 months, half to one year, 1-2 years, or more than 2 years).

2.3.3. Psychological status and the need

The Patient Health Questionnaire (PHQ-9) was used to measure the symptoms of depression (Spitzer et al., 1999). This scale consisted of a five-point Likert-type from "not at all" (score 0) to "extremely" (score 4), wherein participants were asked to indicate how often they had been bothered by the symptoms over the past two weeks. The total score of the PHQ-9 ranged from 0 to 27. The sensitivity and specificity reached .91 and .97, respectively, in the patients from Chinese general hospitals when the cut-off score was 10 (Hu et al., 2009). While in the general population, they reached .86 and .86 when the cut-off score was seven or higher (Wang et al., 2014). The Generalized Anxiety Disorder 7-item Scale (GAD-7) was used to measure anxiety symptoms (He et al., 2010; Spitzer et al., 2006). The GAD-7 score was calculated by assigning ratings of 0, 1, 2, and 3 to the response categories of "not at all", "several days", "more than half the days", and "nearly every day", respectively. A cut-off score of 10 on the GAD-7 had a sensitivity of .86 and a specificity of .96 in Chinese general hospital outpatients (He et al., 2010). The Patient Health Questionnaire (PHQ-15) (Chinese version) was used to measure somatic symptoms (Lee et al., 2011; Kroenke et al., 2002). The PHQ-15 score was calculated by assigning ratings of 0, 1, and 2 to the response categories of "not bothered at all", "bothered a little", and "bothered a lot", respectively. Patients with high somatic symptom severity can be differentiated from those with low somatic symptom severity by the cut-off of 10 (Zhu et al., 2012). In this study, high-level depression, anxiety, and somatic symptoms were defined as scoring equal or over 10 in PHQ-9, GAD-7, and PHQ-15. Other information was collected, such as family relationships, relationships with children, self-rated health status, the previous and current need for psychological intervention, measures of moderating emotions, and the attitudes to individual or group psychological interventions during the pandemic.

2.3.4. Perceived stress and support

We reformulated a 14-item perceived stress scale and a 6-item perceived support scale, which originated from a previous study on frontline healthcare workers during the epidemic of severe acute respiratory syndrome (Tam et al., 2004). "Yes" or "No" options on the scales were adopted for convenience. The number of positive responses was counted as the total scores for the perceived stress and support. The participants were divided into seven groups by the perceived support score (0 to 6). Consequently, the SSI percentage for each group was calculated. We found that except for group "0", the SSI percentage was higher than 10% in group "1" to "3", while it was less than 10% in group "4" to "6". Therefore, low perceived support was defined as equal to or less than 3 in this study. The same method was conducted to identify the cut-off of perceived stress. The SSI percentage from group "0" to "14" increased gradually from 1.0% to 44.4% and was higher than 10% from group "8" (10.2%). Therefore, high perceived stress was defined as equal to or more than 8.

2.4. Ethics

Ethics approval for this study was provided by the Ethics Committee of Chongqing Medical University. Electronic informed consent was obtained at the beginning of participating in this survey. This study conforms to the ethical guidelines of the 1975 Declaration of Helsinki.

2.5. Statistical analysis

First, descriptive analyses were used to present the sociodemographic characters in hospital staff, such as gender, marital status, and family relationship. Second, Pearson chi-square ($\chi 2$) test, *t*-test, and nonparametric test (Mann-Whitney *U* test and Wilcoxon rank-sum test) were used to compare the differences in socialdemographic factors, epidemic-related factors, psychological characteristics, and the perceived stress and support between hospital staff with and without SSI, such as marital status, work hours per day, and self-rated health. Last, forward LR binary logistic regressive analysis was used to detect the independent risk factors to SSI in the hospital staff. Data were analyzed using SPSS version 25.0 (SPSS, Chicago, IL, USA), and $P< 0.05$ was considered statistically significant (double-side test).

3. Results

A total of 11705 e-questionnaires were collected. One hundred ninety-eight of them were excluded for duplication, incompleteness, or logistic error (less than 18 years old). Because a face-to-face survey was not recommended by the lockdown and social distance policy, we cannot distinguish which hospital staff refused this online survey from those who did not know it. Furthermore, the number of each hospital staff was unavailable. Consequently, it was not easy to get the response rate to the survey. Finally, 11507 participants were included, with an average age of 33.37±8.22 years, the work experience of 10.30±8.44 years, 78.1% (8986) females, and 54.11% (6241) nurses. 6.47% (744) of the hospital staff reported SSI. The SSI prevalence in doctors, nurses, technicians, and administrators were 6.26%, 6.68%, 6.37%, and 5.56%, respectively. The prevalence of high-level depressive, anxiety, and somatic symptoms were 9.47%, 5.12%, and 19.54%, respectively. 0.83% of these participants ask for psychologists or psychiatrists when they felt apparent depression or anxiety.

T-test and $\chi 2$ test were used to analyze the differences between hospital staff with and without SSI regarding sociodemographic, epidemic-related, psychological, and perceived stress and support factors (Tables 1–3). Three out of fourteen socialdemographic factors showed differences, marital status, work hours per day, and sleep hours per day (Table 1). Except for direct contact with confirmed patients, isolated ward, and canceled travel, the remaining 9 of 12 epidemic-related factors showed significant differences between hospital staff with and without SSI ($P<.05$) (Table 2). Almost all the psychological characteristics showed significant differences between hospital staff with and without SSI ($P<.05$) (Table 2). Most items in perceived stress and support scales showed significant differences between hospital staff with and without SSI ($P<.001$) (Table 3).

The LR binary logistic regressive analysis showed that poor marital relationship (OR, 1.779; 95%CI, 1.166-2.713), infection of family members or relatives (OR, 3.204; 95%CI; 1.491-6.888), poor self-rated health status (OR, 3.002; 95%CI; 2.484-3.629), anxiety (OR, 1.459; 95%CI, 1.064-2.001), depression (OR, 1.709; 95%CI, 1.324-2.205), the current need for psychological intervention (OR, 3.549; 95%CI, 2.917-

Table 1
Comparison of social demographic factors between hospital staff with and without SSI during COVID-19 pandemic (*N*=11,507).

		Total	Without SSI (*n*=10763)	With SSI (*n*=744)		
	Features	*N*%	*n*%	*n*%	χ^2/Z	*P*
Gender	Female	8986 (78.09%)	8393 (77.98%)	593 (79.70%)	1.209	.271
	Male	2521 (21.91%)	2370 (22.02%)	151 (20.30%)		
Ethnic group	Han	9955 (86.51%)	9322 (86.61%)	633 (85.08%)	1.555	.460
	Tujia	1238 (10.76%)	1151 (10.69%)	87 (11.69%)		
	Miao	257 (2.23%)	240 (2.23%)	17 (2.28%)		
	Else	57 (0.50%)	50 (0.46%)	7 (0.94%)		
Educational background#	Below junior high school	400 (3.48%)	378 (3.51%)	22 (2.96%)	-.793	.428
	Senior high school	3030 (26.33%)	2819 (26.19%)	211 (28.36%)		
	Undergraduate	6870 (59.70%)	6434 (59.78%)	436 (58.60%)		
	Postgraduate and above	1206 (10.48%)	1131 (10.51%)	75 (10.08%)		
Marital status	Single	2981 (25.91%)	2786 (25.88%)	195 (26.21%)	20.756	<.001
	In normal relationship	8261 (71.79%)	7747 (71.98%)	514 (69.09%)		
	In poor relationship	265 (2.30%)	230 (2.14%)	35 (4.70%)		
Parenting situation	No child	3962 (34.43%)	3711 (34.48%)	251 (33.74%)	.170	.680
	With child	7545 (65.57%)	7052 (65.52%)	493 (66.26%)		
Current location	Wuhan city	82 (0.71%)	74 (0.69%)	8 (1.08%)	2.582	.275
	Hubei province not Wuhan	248 (2.16%)	228 (2.12%)	20 (2.69%)		
	Chongqing	11177 (97.13%)	10461 (97.19%)	716 (96.24%)		
Hospital class	Designated hospital	2413 (20.97%)	2245 (20.86%)	168 (22.58%)	3.471	.176
	Main urban districts hospital	3136 (27.25%)	2954 (27.45%)	182 (24.46%)		
	County hospital	5958 (51.78%)	5564 (51.70%)	394 (52.96%)		
Department*	Clinical department	9252 (80.40%)	8654 (80.66%)	598 (81.47%)	4.308	.230
	Assistant department	1303 (11.32%)	1235 (11.51%)	68 (9.26%)		
	Back office	531 (4.61%)	492 (4.59%)	39 (5.31%)		
	Administrative department	377 (3.28%)	348 (3.24%)	29 (3.95%)		
Profession	Doctor	4108 (35.70%)	3851 (35.78%)	257 (34.54%)	1.327	.857
	Nurse	6241 (54.24%)	5824 (54.11%)	417 (56.05%)		
	Technician	518 (4.50%)	485 (4.51%)	33 (4.44%)		
	Administrator	288 (2.50%)	272 (2.53%)	16 (2.15%)		
	Other	352 (3.06%)	331 (3.08%)	21 (2.82%)		
Technical title#	None	1401 (12.18%)	1314 (12.21%)	87 (11.69%)	-.412	.681
	Primary title	6331 (55.02%)	5921 (55.01%)	410 (55.11%)		
	Intermediate title	2814 (24.45%)	2631 (24.44%)	183 (24.60%)		
	Senior vice title	779 (6.77%)	731 (6.79%)	48 (6.45%)		
	Senior	182 (1.58%)	166 (1.54%)	16 (2.15%)		
			Mean±S.D.	Mean±S.D.	t	P
	Age	33.37±8.22	33.38±8.22	33.25±8.20	-.411	.681
	Work experience	10.30±8.44	10.30±8.44	10.25±8.35	-.148	.882
	Work hours per day	8.50±3.00	8.44±2.96	8.89±3.53	3.406	.001
	Sleep hours per day	7.32±1.16	7.34±1.14	6.97±1.29	-7.767	<.001

*12 missing data. SSI = Suicidal and Self-harm Ideation; % = Percent; S.D.= Standard Deviation. # Nonparametric test was conducted.

Table 2
Comparison of epidemic-related factors and psychological characteristics between hospital staff with and without SSI during COVID-19 pandemic (N=11507).

Features		Without SSI (n=10763) n%	With SSI (n=744) n%	χ^2/Z	P
Epidemic-related factors					
Direct contact with confirmed patients	No	9388 (87.22%)	633 (85.08%)	2.845	.092
	Yes	1375 (12.78%)	111 (14.92%)		
Isolated ward#	Complete isolation ward	1095 (10.17%)	67 (9.01%)	-1.319	.187
	Partial isolation ward	2209 (20.52%)	145 (19.49%)		
	General ward	7459 (69.30%)	532 (71.51%)		
Frontline department*	No	9227 (85.73%)	612 (82.26%)	6.764	.009
	Yes	1536 (14.27%)	132 (17.74%)		
Family members or relatives infected	No	10730 (99.69%)	732 (98.39%)	30.485	<.001
	Yes	33 (0.31%)	12 (1.61%)		
Community members infected	No	9643 (89.59%)	646 (86.83%)	5.625	.018
	Yes	1120 (10.41%)	98 (13.17%)		
Travel canceled	No	1016 (9.44%)	72 (9.68%)	.046	.830
	Yes	9747 (90.56%)	672 (90.32%)		
Probability of infection#	None	915 (8.50%)	50 (6.72%)	-9.553	<.001
	Low	7126 (66.21%)	374 (50.27%)		
	High	2722 (25.29%)	320 (43.01%)		
Willingness to work in a COVID-19 ward	No	2766 (25.70%)	235 (31.59%)	12.510	<.001
	Yes	7997 (74.30%)	509 (68.41%)		
Attendance of parties	No	10602 (98.50%)	710 (95.43%)	39.474	<.001
	Yes	161 (1.50%)	34 (4.57%)		
Concerns on COVID-19 progress	No	109 (1.01%)	26 (3.49%)	36.971	<.001
	Yes	10654 (98.99%)	718 (96.51%)		
Confidence in defeating COVID-19	No	53 (0.49%)	20 (2.69%)	53.224	<.001
	Yes	10710 (99.51%)	724 (97.31%)		
Prediction for lasting time#	1-2 months	6698 (62.23%)	391 (23.94%)	-5.657	<.001
	3-6 months	3748 (34.82%)	309 (18.92%)		
	Half to one year	297 (2.76%)	310 (18.98%)		
	1-2 years	12 (0.11%)	311 (19.04%)		
	More than 2 years	8 (0.07%)	312 (19.11%)		
Psychological characteristics					
PHQ-9	<10	9831 (91.34%)	586 (78.76%)	128.372	<.001
	>=10	932 (8.66%)	158 (21.24%)		
PHQ-15	<10	8737 (81.18%)	521 (70.03%)	55.013	<.001
	>=10	2026 (18.82%)	223 (29.97%)		
GAD-7	<10	10275 (95.47%)	643 (86.42%)	117.129	<.001
	>=10	488 (4.53%)	101 (13.58%)		
Self-rated health#	Poor	264 (2.45%)	103 (13.84%)	-20.747	<.001
	Normal	4092 (38.02%)	463 (62.23%)		
	Good	6407 (59.53%)	178 (23.92%)		
Previous psychological need	No	10090 (93.75%)	515 (69.22%)	579.466	<.001
	Yes	673 (6.25%)	229 (30.78%)		
Current psychological need	No	10125 (94.07%)	508 (68.28%)	659.622	<.001
	Yes	638 (5.93%)	236 (31.72%)		
Relationship with child#	Good	7499 (69.70%)	520 (70%)	-.425	.671
	Normal	514 (4.80%)	45 (6.10%)		
	Poor	81 (0.80%)	7 (0.90%)		
	No child	2665 (24.80%)	171 (23.00%)		
Family relationship#	Good	9834 (91.40%)	652 (87.60%)	-3.465	.001
	Normal	890 (8.30%)	88 (11.8%)		
	Poor	39 (0.40%)	4 (0.50%)		
Moderating emotions	By self	7438 (69.11%)	508 (68.28%)	30.011	<.001
	People around	2808 (26.09%)	168 (22.58%)		
	Psychologist	75 (0.70%)	8 (1.08%)		
	Psychiatrist	11 (0.10%)	2 (0.27%)		
	Other	431 (40%)	58 (7.80%)		
Necessity of psychological intervention	No	2632 (24.45%)	144 (19.35%)	9.886	.002
	Yes	8131 (75.55%)	600 (80.65%)		

* Frontline department: includes the intensive care unit, outpatients, COVID-19 designated ward, emergency, pneumology, or infection department. SSI = Suicidal and Self-harm Ideation; % = Percent. # Non-parametric test was conducted.

4.319), higher perceived stress (OR, 1.422; 95%CI, 1.186-1.704), and insufficient support (OR, 1.428; 95%CI, 1.216-1.678) were independent factors for SSI after adjusting age, work experience, somatic symptom, work hours per day, sleep hours per day, self-rated probability of infection (P<.05). These adjusted results are listed in Table 4.

4. Discussion

This study is the first large-scale cross-sectional research with many variables on SSI and its correlates among hospital staff during a pandemic. To our knowledge, studies on suicidal ideation among hospital staff during a public health crisis are rarely conducted (Naushad et al., 2019). It was challenging to compare SSI's prevalence rate for various evaluating tools and different time quantum (current, 12-month, or lifetime suicidal ideation) in the non-epidemic days. The prevalence of suicidal ideation ranged from 5.8% for 12 months to 10.6% for a lifetime in the general population (Liu et al., 2020). The 12-month and lifetime suicidal ideation in doctor ranged from 6.4% to 18% (Shanafelt et al., 2011; Petrie et al., 2020; Wall et al., 2014) and from 3% to 51.1%, respectively (Petrie et al., 2020; Loas et al., 2018; Hem et al., 2000).

Table 3
Perceived stress and support in hospital staff with and without SSI during COVID-19 pandemic (N=11,507).

Features		Without SSI (n=744) n%	With SSI (n=10763) n%	$\chi 2$	P
Perceived stress					
1.Heavy workload	No	7910 (73.49%)	435 (58.47%)	78.831	<.001
	Yes	2853 (26.51%)	309 (41.53%)		
2.Recruitment into other hospitals	No	8388 (77.93%)	565 (75.94%)	1.600	.206
	Yes	2375 (22.07%)	179 (24.06%)		
3.Hazardous working environment	No	3641 (33.83%)	188 (25.27%)	22.966	<.001
	Yes	7122 (66.17%)	556 (74.73%)		
4.Unclear job instructions	No	9584 (89.05%)	540 (72.58%)	178.413	<.001
	Yes	1179 (10.95%)	204 (27.42%)		
5.Ambiguous infection control policies	No	9856 (91.57%)	562 (75.54%)	208.84	<.001
	Yes	907 (8.43%)	182 (24.46%)		
6.Risk for own health	No	4459 (41.43%)	206 (27.69%)	54.508	<.001
	Yes	6304 (58.57%)	538 (72.31%)		
7.Interference with home life	No	4518 (41.98%)	187 (25.13%)	81.677	<.001
	Yes	6245 (58.02%)	557 (74.87%)		
8.Risk of infecting relatives/friends	No	4035 (37.49%)	180 (24.19%)	52.999	<.001
	Yes	6728 (62.51%)	564 (75.81%)		
9.Disrupting personal plans	No	3063 (28.46%)	102 (13.71%)	75.918	<.001
	Yes	7700 (71.54%)	642 (86.29%)		
10.Isolation from friends/relatives	No	9481 (88.09%)	537 (72.18%)	156.39	<.001
	Yes	1282 (11.91%)	207 (27.82%)		
11.Healthcare workers getting infected	No	10356 (96.22%)	672 (90.32%)	60.638	<.001
	Yes	407 (3.78%)	72 (9.68%)		
12.Fear of infecting colleagues	No	4832 (44.89%)	207 (27.82%)	82.399	<.001
	Yes	5931 (55.11%)	537 (72.18%)		
13.Handling colleagues' negative emotions	No	7666 (71.23%)	394 (52.96%)	110.687	<.001
	Yes	3097 (28.77%)	350 (47.04%)		
14.Being discriminated against as a high-risk spreader	No	9122 (84.75%)	527 (70.83%)	99.591	<.001
	Yes	1641 (15.25%)	217 (29.17%)		
Perceived stress	Low	8687 (80.71%)	426 (57.26%)	232.329	<.001
	High	2076 (19.29%)	318 (42.74%)		
Perceived support					
1.Getting adequate support from family	No	463 (4.30%)	118 (15.86%)	193.923	<.001
	Yes	10300 (95.70%)	626 (84.14%)		
2.Getting adequate support from colleagues	No	423 (3.93%)	104 (13.98%)	160.785	<.001
	Yes	10340 (96.07%)	640 (86.02%)		
3. Getting adequate support from your workplace	No	1277 (11.86%)	234 (31.45%)	234.050	<.001
	Yes	9486 (88.14%)	510 (68.55%)		
4. Getting adequate Insurance and compensation support	No	2173 (20.19%)	294 (39.52%)	154.327	<.001
	Yes	8590 (79.81%)	450 (60.48%)		
5. Getting adequate support from the public	No	2056 (19.10%)	261 (35.08%)	110.479	<.001
	Yes	8707 (80.90%)	483 (64.92%)		
6. Getting adequate support from news media	No	1466 (13.62%)	212 (28.49%)	123.599	<.001
	Yes	9297 (86.38%)	532 (71.51%)		
Perceived support	Low	3444 (32.00%)	354 (47.58%)	76.413	<.001
	High	7319 (68.00%)	390 (52.42%)		

SSI = Suicidal and Self-harm Ideation; % = Percent.

Stelnicki and his colleagues reported the 12-month and lifetime suicidal ideation in nurses was 10.5% and 33%, respectively (Stelnicki et al., 2020). The prevalence of suicidal ideation showed a wide range in the general population or the medical personnel. However, medical professionals hold a higher rate of 12-month and lifetime suicidal ideation than the general population (Kim et al., 2018; Han et al., 2016; Cao et al., 2015; Cano-Langreo et al., 2014).

For the current suicidal ideation during the non-epidemic days, two studies showed that 15.9% of the Chinese clinicians in 6 country hospitals (Nie et al., 2020) and 10.8% of nurses in a province reported suicidal ideation in the last one or two weeks (Wang et al., 2020), which were surprisingly higher than that in this study (6.26% and 6.68%). This finding may be interpreted from several aspects as below. First, hospital staff spent considerable time and energies coping with realistic difficulties, such as patients treatment, personnel shortage, and personal protection. They had no time to "think about death". Second, they were prone to reflect pressure through emotional and somatic symptoms. The percentage of hospital staff with psychological impact during the pandemic approached 50% with depression, 44.6% with anxiety, 34% with insomnia, and 71.5% with distress, respectively(Lai et al., 2020). Third, our data were collected in the first three to five weeks of the pandemic spreading in China ()(Dingxiangyuan, 2020). Halford and his colleagues found some suicidality indices have fallen in the United States in the early stage of the COVID-19 pandemic. However, they thought that the COVID-19 pandemic might have caused an increase in suicide risk factors that could yield long-term increases in suicidality and suicide rates (Halford et al., 2020). Fourth, hospital staff internalized a robust "ready to devote" occupational faith in the non-pandemic period and presented resilience during this crisis. Therefore, we predicted that the SSI rate might increase at the end of the pandemic and may not be higher than in non-epidemic days after the active psychological intervention. Our subsequent study may further verify this hypothesis.

Although there is no study focused on SSI in medical professionals during a public health crisis, previous studies found a few common social and psychological factors which indirectly caused SSI. A systematic review found high-risk working environments, job stress, perceived infection risk, social rejection, and poor family relationships were related to anxiety, depression, and posttraumatic stress in healthcare employees during SARS (Brooks et al., 2018). Family members or relatives confirmed or suspected, working in frontline departments, working in Wuhan hospitals were susceptible to more stress, depression, anxiety,

Table 4
Factors associated with SSI in hospital staff (*N*=11507).

Variables	B	S.E.	Walt	df	P	OR	95% CI	
							Lower	Upper
High stress (Low stress)	.352	.092	14.473	1	<.001	1.422	1.186	1.704
Inadequate support (Adequate support)	.357	.082	18.916	1	<.001	1.428	1.216	1.678
The current need for psychological intervention (Not need)	1.267	.100	159.949	1	<.001	3.549	2.917	4.319
Probability of infection-No			9.822	2	.007			
Probability of infection-Low	-.318	.164	3.751	1	.053	.728	.528	1.004
Probability of infection-High	-.068	.172	0.158	1	.691	.934	.667	1.308
Self-rated health condition-Well			167.214	2	<.001			
Self -rated health condition-Normal	1.724	.158	119.168	1	<.001	5.609	4.116	7.645
Self-rated health condition-Poor	1.099	.097	129.331	1	<.001	3.002	2.484	3.629
Marital status-Single			9.833	2	.007			
Marital status-Normal relationship	-.068	.092	.549	1	.459	.934	.779	1.119
Marital status-Poor relationship	.576	.215	7.149	1	.008	1.779	1.166	2.713
Family member or relatives infected (Not infected)	1.164	.390	8.894	1	.003	3.204	1.491	6.888
Depression (Normal)	.536	.130	16.939	1	<.001	1.709	1.324	2.205
Anxiety (Normal)	.378	.161	5.486	1	.019	1.459	1.064	2.001

Forward LR binary regressive analysis was conducted. CI = Confidence Interval; SSI = Suicidal and Self-harm Ideation; OR = Odds Ratio; % = Percent; df=degree of freedom; S.E.= Standard Error. The current need for psychological intervention, self-rated health condition, depression, perceived stress, perceived support, family member or relative infected, marital status, probability of infection, and anxiety were included in this model from the first to ninth step successively, adjusting age, work experience, work hours per day, sleep hours per day, and somatic symptom.

insomnia, and distress during the COVID-19 pandemic (Lai et al., 2020; Luo et al., 2020). Furthermore, a systematic review found age, gender, education, professional experience, work type, or profession were related to adverse outcomes in medical responders during the public health crisis (Naushad et al., 2019). However, it was not found in this study. Unexpectedly, this study found some unique risk factors related to SSI for the first time, including poor self-rated health status, current or previous need for psychological intervention, and necessity of psychological intervention during the pandemic.

One of our findings deserved much attention. Less than 1% out of 11,507 hospital staff had asked for a psychologist or psychiatrist when they felt apparent depression or anxiety. A previous study reported that physicians had a high suicide rate and low suicidal attempts rate (Hem et al., 2000). Their role conflict, stigma, and occupational qualification probably blocked them from seeking mental health assistance (Chin et al., 2019). Therefore, a regular mental health screening, training of coping with psychological crisis, various accessible psychological supports, and necessary referral to psychiatric services may help to reduce the SSI or other adverse outcomes among hospital staff and prevent it from evolving into suicidal behavior.

This study had two strengths. First, this is a large-scale study, including 11507 participants, to detect SSI prevalence among hospital staff. Second, this study, to the best of our knowledge, was the first one so far to investigate SSI and its related factors during a public health crisis. However, there are several limitations. First, this cross-sectional study cannot reveal causality, and voluntary participation may result in selection bias. Second, vertical comparison cannot be conducted for lacking the previous psychological information. Third, most references in this study were on doctors and suicidal ideation because there were limited studies on other medical professionals or self-harm ideation. Fourth, the response rate was uncalculated for unavailable staff numbers in each hospital and voluntary participation. Perhaps those with SSI prefer not to complete surveys so that the percentage may be the minimum SSI prevalence in hospital staff.

5. Conclusions

The prevalence of SSI was 6.47% among hospital staff during the COVID-19 pandemic. Self-rated health status, infection of family members or relatives, poor marital relationships, the current need for psychological intervention, depression, and anxiety were risk factors for SSI. An active systematic psychological intervention should be conducted to reduce the psychological effect and SSI incidence among hospital staff.

Authors' statement

Xiaoming Xu: Conceptualization, Methodology, Data curation, Formal analysis, Writing-original draft, Visualization, Writing-review & editing; **Wo Wang:** Conceptualization, Methodology, Supervision, Project administration, Funding acquisition; **Jianmei Chen:** Data curation, Validation, Visualization; **Ming Ai:** Data curation, Validation, Visualization; **Lei Shi:** Data curation, Conceptualization, Methodology; **Lixia Wang:** Data curation, Conceptualization, Methodology; **Su Hong**: Data curation, Formal analysis, Conceptualization, Methodology; **Qi Zhang:** Project administration, Conceptualization, Methodology; **Hua Hu:** Project administration, Supervision, resources, investigation; **Xuemei Li:** Project administration, Supervision, resources, investigation; **Jun Cao:** Conceptualization, Methodology, Supervision, resources, investigation; **Zhen Lv:** resources, investigation; **Lian Du:** Conceptualization, Methodology, Resources, Investigation; **Jing Li:** Conceptualization, Methodology, Resources, Investigation; **Handan Yang:** Conceptualization, Methodology, Resources, Investigation; **Xiaoting He:** Conceptualization, Methodology, Resources, Investigation; **Xiaorong Chen:** Conceptualization, Methodology, Resources, Investigation; **Ran Chen:** Conceptualization, Methodology, Resources, Investigation; **Qinghua Luo:** Conceptualization, Methodology, Resources, Investigation; **Xinyu Zhou:** Conceptualization, Methodology, Resources, Investigation; **Jian Tan:** Conceptualization, Methodology, Resources, Investigation; **Jing Tu:** Conceptualization, Methodology, Resources, Investigation; **Guanghua Jiang:** Conceptualization, Methodology, Resources, Investigation; **Zhiqin Han:** Conceptualization, Methodology, Resources, Investigation; **Li Kuang:** Conceptualization, Methodology, Data curation, Writing-review & editing, Project administration, Funding acquisition.

Funding

This work is funded by a special project of the emergency clinical research on the novel coronavirus disease of Chongqing Medical University.

Declaration of Competing Interest

None

Acknowledgment

We thank Elsevier and English professor Wang Yan from Chongqing

Medical University for providing language assistance. We express our gratitude for the support of the Chongqing Health Commission. We wish to thank all the hospital staff for protecting the public against the COVID-19 pandemic.

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.psychres.2020.113654.

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