Determinate factors of mental health status in Chinese medical staff

A cross-sectional study

Chenyu Zhou, MDb, Lei Shi, MDb, Lei Gao, MDb, Wenhui Liu, MDb, Zhenkang Chen, MDb, Xinfa Tong, MDb, Wen Xu, MDb, Boshi Peng, MDb, Yan Zhao, MDb, Lihua Fan, MDb,*

Abstract
Numerous previous studies have investigated the mental health status of medical staff in China and explored its associated determinate factors; however, scope and methods associated with these have introduced uncertainty regarding the results. The aim of this study was to perform a comprehensive examination of the mental health status of Chinese medical staff and its relative risk factors based on a cross-sectional survey.

We conducted a broad area, cross-sectional, questionnaire-based survey of Chinese medical workers. Participants were randomly selected from 27 hospitals in the Heilongjiang province. The questionnaire that was distributed consisted of 5 parts: the demographic characteristics of the participant; questions related to the relative risk factors of psychological health; the posttraumatic stress disorder (PTSD) Checklist-Civilian Version (PCL-C); the Self-rating Depression Scale (SDS); and the Self-rating Anxiety Scale (SAS). The last 3 components were used to evaluate the mental health status of the target population. Logistic and linear regression analyses were used to analyze the determinate factors of the mental health status of Chinese medical staff.

Of the 1679 questionnaires distributed, 1557 medical workers responded (response rate: 92.73%; male: 24.1%; female 75.9%). The results of mental health status self-assessments indicated that 32.3% of participants were considered to have some degree of PTSD (based on the PCL-C). The SDS index was 0.67 and the mean score from SAS was 55.26; a result higher than found in the general population. Multivariate logistic regression analysis revealed that being female, dissatisfaction or average satisfaction with income, and good or very good self-perceived psychological endurance when faced with an emergency were associated with a reduction of PTSD symptoms. A frequency of verbal abuse incidents greater than 4 was associated with an increase in PTSD symptoms.

The mental health status of Chinese medical staff is poor. While the determinate factors based on different measurement standards were not completely consistent, the overlapping major risk factors identified that influenced psychological health were the amount of education, the perceived level of respect, and psychological endurance.

Abbreviations: CI = confidence interval, OR = odds ratio, PCL-C = PTSD checklist-civilian version, PTSD = posttraumatic stress disorder, SAS = Self-rating Anxiety Scale, SDS = Self-rating Depression Scale.

Keywords: Chinese medical staff, determinate factors, mental health

1. Introduction
Mental health is an important issue that is associated with social, psychological, behavioral, and biological factors, and it may seriously impact daily life and work. Compared with nonmedical personnel, medical employees are more likely to experience negative emotions from their job due to high workload, high pressure, high risk, and patient complaints. In recent years, medical staff have had to endure these and other various pressures due to competition for positions, promotions, the complexity of the doctor-patient relationship, and the contradictions and disequilibrium between healthcare needs and medical development.

In recent years, the mental health status of medical staff has drawn greater attention from both domestic and international scholars. In China, Xu and Zhu[1] performed a study on 4139 medical staff in Beijing. One hundred eighty-eight staff members were diagnosed with schizophrenia or other neuroses, and the prevalence rate was 4.52%. Tu et al[2] found that 66% of the medical staff included in their study frequently suffered from physical discomfort. Thirty percent of the medical staff were in a mental state of emergency for an extended period time. Xu and Zhao[3] reported that 28% of doctors in general hospitals have psychological problems, and the mental health status of doctors was significantly worse than the general population (normal adults). In studies outside of China, Coomber et al[4] found that 29% of intensive care unit (ICU) doctors felt depressed and 3%
had suicidal intentions. Reuben\cite{5} concluded that the incidence of depression in medical staff decreases with increased work experience and with increased income; however, it was still higher than in the general population.\cite{6,7}

The mental health status of medical staff directly influences the quality of medical service and patient safety. If attention is not given to the mental health status of medical staff, the quality of medical treatment will be negatively impacted, and this may even obstruct the reform of the national medical and health system. Although previous studies have made some interesting conclusions, there are many problems that still need to be addressed, such as the object population was single, a lack of comprehensive studies, and the use of invalid statistical methods, for example. In this comprehensive study, we interviewed medical staff with varying jobs in various departments over a large geographic area, and the questionnaire used included the most recent relevant content pertaining to mental health. Thus, the goals of this survey were to obtain a comprehensive understanding of the mental health status of Chinese medical staff, to determine its risk factors, and to preserve the mental health of those working in the medical field.

2. Methods

2.1. Participants

A repeated cross-sectional questionnaire survey was conducted at 27 hospitals in the Heilongjiang province in China from July to September of 2015. The formula used for the calculation of sample size was $N = 400 \times \frac{100}{p}$, According to previous reports, the detection rate of mental health problems is approximately 20%, therefore the minimum sample size was determined to be 1600. In accordance, 1679 paper-based questionnaires were distributed. All of the investigators were uniformly trained and all of the investigations were performed with informed consent.

2.2. Evaluation of participants

The questionnaire consisted of 5 sections. The first section collected basic demographic information: gender, age, education, marital status, professional title, job category, department, and division. The second section collected information related to the relative risk factors of psychological health: income satisfaction, perceived security of the occupational environment, perceived level of respect, mood of the medical staff, self-assessed psychological endurance, workload satisfaction, and the influence of workplace altercations, verbal abuse, physical violence, and sexual harassment. Three established methods that are used to assess depression status were used as the last 3 sections of the questionnaire. The posttraumatic stress disorder (PTSD) Checklist-Civilian Version (PCL-C) consists of 17 questions with 5 options. Each question is scored from 1 to 5 and the sum of all individual scores gives the total score (minimum 17, maximum 85). Study participants with total scores ranging from 17 to 37 were defined as having no significant PTSD. Study participants with total scores ranging from 38 to 49 were defined as having some degree of PTSD. Study participants with total scores ranging from 50 to 85 were definitively diagnosed with PTSD. The Self-rating Depression Scale (SDS) was established by William WK. Zung and was used to evaluate the severity of the depressive state and treatment outcome. The SDS survey consists of 20 questions each with four choices (scored from 1 to 4). Ten questions are worded positively, while 10 items are worded negatively. The sum of the 20 individual scores gives the total score, and the total score divided by 80 produces the severity index of depression. This index value can range from 0.25 to 1. The higher the index, the more serious the extent of depression is in the subject. The Self-rating Anxiety Scale (SAS) also consists of 20 questions each with four choices (scored from 1 to 4) with 5 questions negatively worded. The sum of the 20 individual scores gives the total score and then the following formula is used to obtain the standard score: $y = \text{int}(1.25x)$. A high SAS standard score corresponds to serious depression.

2.3. Statistical analysis

SPSS 22.0 statistical analysis software was used for all analyses. Proportions or mean values with standard deviations were used to describe basic demographic data, relative risk factors, and PCL-C, SAS, and SDS scores. A univariable logistic regression model was then used to select significant factors ($P < .05$) that were then used in the multivariable logistic regression analysis. Odds ratios (ORs) with 95% confidence intervals (CIs) were used to analyze the risk factors. Independent associations between the risk factors and the SAS and SDS scores were also explored using single linear regression. Multiple linear regression was used to detect the risk factors related to serious depression of medical staff. All results were considered significant when $P < .05$ (2-sided).

3. Results

3.1. Analysis of demographic data and a description of the relative risk factors of mental health

Of the 1679 questionnaires distributed, 1557 individuals participated in the survey indicating a response rate of 92.73%. Social demographic characteristics are shown in Table 1, that include gender, age, education, marital status, professional title, job category, department, and division of the participants. In the questionnaire, 20 relative risk factors of psychological health were assessed. Results showed that 50% of the participants were dissatisfied or very dissatisfied with their income, 36.6% had average satisfaction, and only 13.4% were satisfied or very satisfied. Regarding the perceived security of the participants’ occupational environment, only 11.8% felt secure while more than half (56.9%) felt insecure. In addition, the perceived level of respect for the medical staff was also very low. Of the 73.1% of participants, only 3.6% deemed respect for medical staff to be high. 87.5% of participants thought that medical disputes or workplace violence influenced the mood of the medical staff. 94.5% of participants felt high work-related stress when subjected to workplace violence. 69.2% of participants indicated that their mood was affected after a patient death, and half when a patient’s disease or condition worsened. When faced with an emergency, 25.9% of participants felt they could handle the situation well, while 59.4% reported that their psychological endurance was average. 56.7% of participants found their workload to be acceptable.
threatened the personal security of medical staff was 48.0%. Physical violence was separated based on outcome: actions that did not succeed, actions that did not lead to significant damage, actions that led to significant damage, and actions that led to serious damage such as functional disorder or permanent disability. The incidence rates of physical violence based on these categorizations were 13.5%, 10.3%, 5.4%, and 1.2%, respectively. The incidence rates of verbal sexual harassment, physical sexual harassment, and rape or attempted rape were 3.3%, 1.8%, and 1.1%, respectively. The incidence of verbal abuse was significantly higher than the incidence of physical violence; however, sexual harassment did indeed occur with some of the participants (Table 2).

### 3.2. Determinate factors of mental health

Table 3 lists the results of the mental health status self-assessment. Two hundred seventy-five participants had some degree of PTSD, and 225 participants were diagnosed with significant PTSD symptoms. The mean value of the SDS indices was 0.67, and the mean value of the SAS scores was 55.26, which is higher than the mean score of the general Chinese population. Based on these 3 measures, we analyzed the determinate factors of psychological health. In this analysis we first included all the items from Tables 1 and 2 as factors in single regression models. Afterwards, selected statistically significant factors were included in multiple regression analyses.

### 3.3. Determinate factors based on the PCL-C results

From the single logistic regression analysis, 18 of the 28 total factors were selected and analyzed in the multivariate logistic regression analysis (Table 4). Being female ($P = .007$), having dissatisfaction ($P = .016$) or average satisfaction ($P = .035$) with income, and having average ($P = .000$), good ($P = .000$), or very good ($P = .005$) self-perceived psychological endurance when faced with an emergency were independently associated with a reduction in PTSD symptoms. On the other hand, the frequency of verbal abuse incidents greater than 4 ($P = .024$) was associated with a significant increase in PTSD symptoms.

### 3.4. Determinate factors based on SAS results

In Table 5, 23 items were included in the multivariate linear regression model. Gender ($P = .019$), education ($P = .000$), satisfaction with income ($P = .044$), perceived level of respect ($P = .029$), self-perceived psychological endurance in emergencies ($P = .000$), influence of worsened patient condition or disease on
Table 2
Relative risk factors of mental health.

| Content                                           | Option             | n     | %    |
|---------------------------------------------------|--------------------|-------|------|
| Satisfaction with income                         | Very dissatisfied  | 286   | 18.4 |
|                                                   | Dissatisfied       | 492   | 31.6 |
|                                                   | Average            | 570   | 36.6 |
|                                                   | Satisfied          | 199   | 12.8 |
|                                                   | Very satisfied     | 9     | 0.6  |
| Perceived security of the occupational environment| Very insecure      | 298   | 19.1 |
|                                                   | Insecure           | 589   | 37.8 |
|                                                   | Secure             | 166   | 10.7 |
|                                                   | Very secure        | 16    | 1.1  |
| Perceived level of respect for medical staff      | Very low           | 602   | 38.7 |
|                                                   | Low                | 536   | 34.4 |
|                                                   | Average            | 363   | 23.3 |
|                                                   | High               | 50    | 3.2  |
|                                                   | Very high          | 6     | 0.4  |
| Do medical disputes or workplace violence influence the mood of medical staff? | Yes                | 1362  | 87.5 |
|                                                   | No                 | 231   | 12.5 |
| Is your mood affected when the disease or condition of patients worsens? | Yes                | 779   | 50.0 |
|                                                   | No                 | 778   | 50.0 |
| Is your mood affected when patients die?          | Yes                | 1077  | 69.2 |
|                                                   | No                 | 480   | 30.8 |
| Does workplace violence induce high stress?       | Yes                | 1471  | 94.5 |
|                                                   | No                 | 86    | 5.5  |
| Your psychological endurance when faced with an emergency | Very poor          | 73    | 4.7  |
|                                                   | Poor               | 156   | 10.0 |
|                                                   | Average            | 925   | 59.4 |
|                                                   | Good               | 347   | 22.3 |
|                                                   | Very good          | 56    | 3.6  |
| Amount of time of working in a hospital           | <1 y               | 112   | 7.2  |
|                                                   | 1–4 y              | 399   | 25.6 |
|                                                   | 5–10 y             | 451   | 29   |
|                                                   | 11–20 y            | 337   | 21.6 |
|                                                   | >20 y              | 258   | 16.6 |
| Amount of time with direct contact with patients per day | <2 h               | 68    | 4.4  |
|                                                   | 2–4 h              | 71    | 4.6  |
|                                                   | 4–6 h              | 98    | 6.3  |
|                                                   | 6–8 h              | 473   | 30.4 |
|                                                   | >8 h               | 847   | 54.4 |
| Is your workload acceptable?                      | Yes                | 883   | 56.7 |
|                                                   | No                 | 674   | 43.3 |
| Frequency of verbal abuse related to damage of personal dignity | 0                  | 527   | 33.8 |
|                                                   | 1                  | 289   | 18.6 |
|                                                   | 2–3                | 352   | 22.6 |
|                                                   | ≥4                 | 389   | 25   |
| Frequency of verbal abuse that threatens the personal security of medical staff | 0                  | 809   | 52   |
|                                                   | 1                  | 292   | 18.8 |
|                                                   | 2–3                | 230   | 14.8 |
|                                                   | ≥4                 | 226   | 14.5 |
| Frequency of physical violence that did not succeed | 0                  | 1347  | 86.5 |
|                                                   | 1                  | 196   | 12.6 |
|                                                   | 2–3                | 14    | 0.9  |
|                                                   | ≥4                 | 0     | 0.0  |
| Frequency of physical violence that did not lead to significant damage | 0                  | 1397  | 89.7 |
|                                                   | 1                  | 156   | 10   |
|                                                   | 2–3                | 4     | 0.3  |
|                                                   | ≥4                 | 0     | 0.0  |
| Frequency of physical violence that led to significant damage (wounds, fractures, etc.) | 0                  | 1473  | 94.6 |
|                                                   | 1                  | 83    | 5.3  |
|                                                   | 2–3                | 1     | 0.1  |

(continued)
mood ($P = .020$), satisfaction with workload ($P = .000$), and the incidence of verbal abuse that threatens personal security ($P = .012$) were independently associated with depression as evaluated by SAS.

3.5. Determinate factors based on SDS results

In Table 6, 19 items had statistical significance after the single linear regression and were included in the multivariate linear regression model. Education ($P = .004$), job category ($P = .008$), the perceived level of respect for the medical staff ($P = .000$), and self-perceived psychological endurance in emergencies ($P = .000$) were found to be determinate factors of psychological health by SDS.

4. Discussion

Previous studies\cite{9-11} have indicated that the mental health status of medical staff is worse than the general population, and that medical staff are at high-risk for psychological problems. Some studies\cite{12-16} have also indicated that mental health is highly relevant to work satisfaction. The unique medical working environment that chronically exposes workers to patients with pain, crying, and moaning can have a negative effect on mental health. Some reports\cite{17-22} have concluded that countermeasures for psychological pressure positively influence psychological health and that positive coping strategies can be even more helpful. Studies have indicated that 47.2\% of medical staff have depression. In our study, occupational stress factors were all positively related with depression by scoring with SAS and SDS. Li and Luo\cite{23} analyzed the associations among organizational ethics and integrity, occupational risk, and occupational stress on the mental health of 3946 medical staff in the Liaoning province and it was concluded that distribution and leadership ethics and integrity should be promoted to improve mental health. Li and Zhang\cite{24} reported that the depression incidence rate was 23.96\% and that gender, division, professional title, and the impact of physician–patient relationships were all statistically significant contributing factors to mental health.

Data from the present study showed that more than half of the participants were not satisfied with their income. This may be due to the fact that hospitals in China are nonprofit organizations. In the survey, we also discovered that the occupational environments of medical staff are not secure, and that while verbal abuse occurs frequently, physical violence and sexual harassment rarely occur. Clearly, workplace violence increases the stress of medical staff and influences their mood. The reasons for workplace violence included: information gaps between medical staff and patients, misguided public opinion, low level of respect for medical staff, and difficulties balancing increased medical demand with under-provisioning.

No significant differences were seen among the results of the 3 measures of mental health (PCL-C, SAS, and SDS). In our analyses, the depression rate of medical staff was found to be much higher than found in the general population, and this is consistent with most previous studies. It is clear that they are exposed to immense workplace pressure. In addition to having to navigate complex doctor–patient relationships, medical staff are faced with decisions that can make the difference between life and death for patients.

As shown by the analysis of determinate factors: gender, education, income satisfaction, perceived level of respect,

\begin{table}[h]
\centering
\begin{tabular}{llcc}
\hline
Content & Option & n & \% \\
\hline
Frequency of physical violence that led to serious damage such as a functional disorder or permanent disability & & & \\
& $\geq 4$ & 0 & 0.0 \\
& 0 & 1539 & 98.8 \\
& 1 & 18 & 1.2 \\
& 2–3 & 0 & 0.0 \\
& $\geq 4$ & 0 & 0.0 \\
Frequency of verbal sexual harassment & & & \\
& 0 & 1506 & 96.7 \\
& 1 & 51 & 3.3 \\
& 2–3 & 0 & 0.0 \\
& $\geq 4$ & 0 & 0.0 \\
Frequency of physical sexual harassment & & & \\
& 0 & 1529 & 98.2 \\
& 1 & 22 & 1.4 \\
& 2–3 & 6 & 0.4 \\
& $\geq 4$ & 0 & 0.0 \\
Frequency of rape or attempted rape & & & \\
& 0 & 1540 & 98.9 \\
& 1 & 17 & 1.1 \\
& 2–3 & 0 & 0.0 \\
& $\geq 4$ & 0 & 0.0 \\
\hline
\end{tabular}
\caption{Continued.}
\end{table}

\begin{table}[h]
\centering
\begin{tabular}{llcc}
\hline
Content & Option & n & \% \\
\hline
PCL-C & & & \\
No significant PTSD symptoms & & 1057 & 67.9 \\
Some degree of PTSD & & 275 & 17.7 \\
Significant PTSD & & 225 & 14.5 \\
Scale & Mean & SD & \\
Self-rating Anxiety Scale (SAS) & 55.26 & 11.24 & \\
Self-rating Depression Scale (SDS) & 0.67 & 0.11 & \\
\hline
\end{tabular}
\caption{Mental health status self-assessment results.}
\end{table}
Table 4  
Multivariate logistic regression analysis of determinate factors of mental health based on PCL-C.

| Effect factors (assignment instructions)                        | b       | P       | OR      | 95% CI   |
|-----------------------------------------------------------------|---------|---------|---------|----------|
| Gender                                                          |         |         |         |          |
| Male (=0)                                                       | −0.626  | .007    | 0.535   | 0.339    | 0.844   |
| Female (=1)                                                     | 1       |         |         |          |
| Age, y                                                          |         |         |         |          |
| <30 (X3a = 0, X3b = 0, X3c = 0, X3d = 0)                        | 1       |         |         |          |
| 31–40 (X3a = 1, X3b = 0, X3c = 0, X3d = 0)                      | 0.139   | .609    | 1.149   | 0.674    | 1.959   |
| 41–50 (X3a = 0, X3b = 1, X3c = 0, X3d = 0)                      | 0.181   | .634    | 1.198   | 0.569    | 2.522   |
| 51–60 (X3a = 0, X3b = 0, X3c = 1, X3d = 0)                      | −0.146  | .792    | 0.864   | 0.292    | 2.555   |
| >60 (X3a = 0, X3b = 0, X3c = 0, X3d = 1)                        | −18.567 | .999    | 0.000   | 0.000    | 0.000   |
| Professional title                                              |         |         |         |          |
| Chief physician (X4a = 0, X4b = 0, X4c = 0, X4d = 0)            | 1       |         |         |          |
| Associate chief physician (X4a = 1, X4b = 0, X4c = 0, X4d = 0)  | 0.293   | .500    | 1.340   | 0.572    | 3.142   |
| Attending physician (X5a = 0, X5b = 1, X5c = 0, X5d = 0)        | 0.695   | .107    | 2.004   | 0.860    | 4.670   |
| Resident physician (X5a = 0, X5b = 0, X5c = 0, X5d = 0)         | 0.118   | .802    | 1.125   | 0.448    | 2.821   |
| Chief nurse (X5a = 0, X5b = 0, X5c = 0, X5d = 0)                | 0.878   | .075    | 2.406   | 0.915    | 6.325   |
| Senior nurse (X5a = 0, X5b = 0, X5c = 0, X5d = 0)               | 0.708   | .103    | 2.030   | 0.866    | 4.760   |
| Nurse (X5a = 0, X5b = 0, X5c = 0, X5d = 0)                      | 0.774   | .105    | 2.168   | 0.851    | 5.524   |
| Practical nurse (X5a = 0, X5b = 0, X5c = 0, X5d = 0)            | 0.075   | .951    | 1.078   | 0.099    | 11.750  |
| Satisfaction with income                                        |         |         |         |          |
| Very dissatisfied (X6a = 0, X6b = 0, X6c = 0, X6d = 0)          | 1       |         |         |          |
| Dissatisfied (X6a = 1, X6b = 0, X6c = 0, X6d = 0)               | −0.520  | .016    | 0.595   | 0.389    | 0.908   |
| Average (X6a = 0, X6b = 1, X6c = 0, X6d = 0)                    | −0.490  | .035    | 0.613   | 0.389    | 0.966   |
| Satisfied (X6a = 0, X6b = 0, X6c = 1, X6d = 0)                  | −0.365  | .291    | 0.694   | 0.352    | 1.367   |
| Very satisfied (X6a = 0, X6b = 0, X6c = 0, X6d = 1)             | −18.872 | .999    | 0.000   | 0.000    | 0.000   |
| Department                                                      |         |         |         |          |
| Emergency (X7a = 0, X7b = 0)                                    | 1       |         |         |          |
| Outpatient (X7a = 1, X7b = 0)                                    | 0.173   | .830    | 1.189   | 0.588    | 2.406   |
| Inpatient (X7a = 0, X7b = 1)                                     | −0.057  | .823    | 0.945   | 0.576    | 1.551   |
| Perceived security of the occupational environment               |         |         |         |          |
| Very insecure (X8a = 0, X8b = 0, X8c = 0, X8d = 0)              | 1       |         |         |          |
| Insecure (X8a = 1, X8b = 0, X8c = 0, X8d = 0)                    | 18.441  | .998    | 102005178.435 | - | - |
| Average (X8a = 0, X8b = 1, X8c = 0, X8d = 0)                    | 17.916  | .998    | 60386844.821 | - | - |
| Secure (X8a = 0, X8b = 0, X8c = 0, X8d = 0)                      | 17.661  | .998    | 46795730.160 | - | - |
| Very secure (X8a = 0, X8b = 0, X8c = 0, X8d = 1)                 | 17.751  | .998    | 51185391.773 | - | - |
| Perceived level of respect for medical staff                     |         |         |         |          |
| Very low (X9a = 0, X9b = 0, X9c = 0, X9d = 0)                   | 1       |         |         |          |
| Low (X9a = 1, X9b = 0, X9c = 0, X9d = 0)                        | −0.316  | .112    | 0.729   | 0.494    | 1.076   |
| Average (X9a = 0, X9b = 1, X9c = 0, X9d = 0)                    | −0.502  | .074    | 0.605   | 0.349    | 1.049   |
| High (X9a = 0, X9b = 0, X9c = 1, X9d = 0)                       | −1.356  | .207    | 0.258   | 0.031    | 2.120   |
| Very high (X9a = 0, X9b = 0, X9c = 0, X9d = 1)                  | −19.028 | .999    | 0.000   | 0.000    | 0.000   |

Do medical disputes or workplace violence influence the mood of medical staff?

Yes (=0) 1
| Effect factors (assignment instructions)                                                                 | b     | P     | OR   | 95% CI      |
|----------------------------------------------------------------------------------------------------------|-------|-------|------|-------------|
| Is your mood affected when the disease or condition of patients worsens?                                |       |       |      |             |
| No (=1)                                                                                                 | -0.385 | .201  | 0.681| 0.378 1.227 |
| Yes (=0)                                                                                                 |       |       |      |             |
| Your psychological endurance when faced with an emergency                                               |       |       |      |             |
| No (=1)                                                                                                 | -0.149 | .369  | 0.862| 0.623 1.192 |
| Very poor ($X_{100} = 0, X_{102} = 0, X_{108} = 0, X_{103} = 0$)                                       |       |       |      |             |
| Poor ($X_{103} = 1, X_{102} = 0, X_{108} = 0, X_{102} = 0$)                                             | -0.518 | .128  | 0.596| 0.306 1.160 |
| Average ($X_{104} = 0, X_{103} = 1, X_{108} = 0, X_{103} = 0$)                                         | -1.458 | .000  | 0.233| 0.130 0.417 |
| Good ($X_{102} = 0, X_{102} = 0, X_{108} = 1, X_{103} = 0$)                                             | -1.447 | .000  | 0.235| 0.122 0.453 |
| Very good ($X_{103} = 0, X_{108} = 0, X_{103} = 0, X_{103} = 1$)                                        | -1.370 | .005  | 0.254| 0.097 0.662 |
| Amount of time of working in a hospital                                                                  |       |       |      |             |
| <1 y ($X_{114} = 0, X_{112} = 0, X_{114} = 0, X_{113} = 0$)                                             |       |       |      |             |
| 1–4 y ($X_{114} = 1, X_{112} = 0, X_{114} = 0, X_{113} = 0$)                                             |       |       |      |             |
| 5–10 y ($X_{114} = 0, X_{113} = 1, X_{114} = 0, X_{113} = 0$)                                             | 0.107  | .812  | 1.113| 0.460 2.692 |
| 11–20 y ($X_{114} = 0, X_{113} = 0, X_{114} = 1, X_{113} = 0$)                                           | 0.122  | .807  | 1.129| 0.425 3.003 |
| >20 y ($X_{113} = 0, X_{113} = 0, X_{112} = 0, X_{113} = 1$)                                             | 0.178  | .747  | 1.194| 0.406 3.512 |
| Amount of time with direct contact with the patients per day                                              |       |       |      |             |
| <2 h ($X_{120} = 0, X_{128} = 0, X_{126} = 0, X_{123} = 0$)                                             |       |       |      |             |
| 2–4 h ($X_{120} = 1, X_{128} = 0, X_{126} = 0, X_{123} = 0$)                                             |       |       |      |             |
| 4–6 h ($X_{120} = 2, X_{126} = 1, X_{126} = 0, X_{123} = 0$)                                             |       |       |      |             |
| 6–8 h ($X_{120} = 0, X_{128} = 0, X_{126} = 1, X_{123} = 0$)                                             |       |       |      |             |
| >8 h ($X_{120} = 0, X_{128} = 0, X_{126} = 0, X_{123} = 1$)                                             |       |       |      |             |
| Is your workload acceptable?                                                                             |       |       |      |             |
| No (=1)                                                                                                 |       |       |      |             |
| Yes (=0)                                                                                                 | 0.090  | .613  | 1.094| 0.771 1.553 |
| Frequency of verbal abuse related to damage of personal dignity                                          |       |       |      |             |
| $0 (X_{140} = 0, X_{142} = 0, X_{140} = 0)                                                                |       |       |      |             |
| 1 ($X_{144} = 1, X_{142} = 0, X_{140} = 0$)                                                              | -0.431 | .146  | 0.650| 0.364 1.162 |
| 2–3 ($X_{144} = 0, X_{142} = 1, X_{140} = 0$)                                                            | -0.470 | .113  | 0.625| 0.349 1.118 |
| ≥4 ($X_{144} = 0, X_{142} = 0, X_{142} = 1$)                                                              | -0.140 | .660  | 0.869| 0.466 1.622 |
| Frequency of verbal abuse such that threatens the personal security of medical staff                    |       |       |      |             |
| $0 (X_{153} = 0, X_{152} = 0, X_{150} = 0)                                                                |       |       |      |             |
| 1 ($X_{154} = 1, X_{152} = 0, X_{150} = 0$)                                                              | -0.456 | .120  | 0.634| 0.356 1.126 |
| 2–3 ($X_{154} = 0, X_{152} = 1, X_{150} = 0$)                                                            | -0.041 | .894  | 0.960| 0.530 1.740 |
| ≥4 ($X_{154} = 0, X_{152} = 0, X_{152} = 1$)                                                              | 0.722  | .024  | 2.058| 1.100 3.853 |
| Frequency of physical violence that did not succeed                                                      |       |       |      |             |
| $0 (X_{164} = 0, X_{160} = 0)                                                                            |       |       |      |             |
| 1 ($X_{164} = 1, X_{162} = 0$)                                                                            | 0.432  | .091  | 1.540| 0.934 2.541 |
| 2–3 ($X_{164} = 0, X_{162} = 1$)                                                                            | 0.136  | .849  | 1.145| 0.284 4.623 |
| Frequency of physical violence that did not lead to significant damage                                   |       |       |      |             |
| $0 (X_{174} = 0, X_{170} = 0)                                                                            |       |       |      |             |
| 1 ($X_{174} = 1, X_{172} = 0$)                                                                            | 0.116  | .669  | 1.123| 0.659 1.914 |
| 2–3 ($X_{174} = 0, X_{172} = 1$)                                                                            | -0.349 | .774  | 0.705| 0.065 7.607 |
| Frequency of physical violence that led to significant damage (wounds, fractures, etc.)                  |       |       |      |             |
| $0 (X_{184} = 0, X_{180} = 0)                                                                            |       |       |      |             |
| 1 ($X_{184} = 1, X_{182} = 0$)                                                                            | 0.018  | .962  | 1.018| 0.491 2.110 |
| 2–3 ($X_{184} = 0, X_{182} = 1$)                                                                            | -20.432| 1.000 | 0.000| 0.000 0.000 |

CI = confidence interval, OR = odds ratio, PCL-C = PTSD checklist-civilian version.
frequency of verbal abuse, workload, and psychological endurance in emergencies were all statistically significantly factors that were associated with the psychological health status of medical staff. These results are consistent with previous studies and some are easily understood. The more income one receives, the higher one may value their efforts and work. Interestingly, the self-perceived psychological endurance of males and females was found to be different. We also found that a higher level of education is associated with a reduced risk for depression. As the

level of respect and the frequency of verbal abuse originate from the public, policy makers and the media should help the public understand the job pressures that medical staff face.

There were some limitations to our study. First, cross-sectional designs do not allow for conclusions to be made regarding cause-effect relationships. In addition, the study had selection bias as all designs do not allow for conclusions to be made regarding cause-effect relationships. In addition, the study had selection bias as all

Table 5

| Effect factors | B   | SE  | 95% CI (B) | t    | p    |
|----------------|-----|-----|------------|------|------|
| Gender         | -1.57 | 0.67 | -2.34 - 0.47 | -2.34 | 0.02 |
| Age, y         | 0.288 | 0.465 | -0.65 - 1.12 | 0.023 | 0.069 |
| Education      | -1.739 | 0.444 | -2.67 - 0.81 | -3.98 | 0.000 |
| Marital status | 0.440 | 0.629 | -0.79 - 1.66 | 0.019 | 0.069 |
| Satisfaction with income | -0.646 | 0.320 | -1.31 - 0.06 | -2.016 | 0.044 |
| Department     | -0.517 | 0.426 | -1.34 - 0.31 | -2.14 | 0.032 |
| Perceived security of the occupational environment | -0.477 | 0.380 | -1.21 - 0.27 | -2.13 | 0.031 |
| Perceived level of respect for medical staff | -0.826 | 0.378 | -1.56 - 0.05 | -2.18 | 0.032 |
| Is your mood affected when the disease or condition of patients worsens? | 1.466 | 0.631 | 0.27 - 2.74 | 2.32 | 0.020 |
| Your psychological endurance when patients die? | 0.697 | 0.697 | 0.30 - 1.09 | 1.01 | 0.311 |
| Your psychological endurance when faced with an emergency | -2.378 | 0.335 | -3.04 - 1.71 | -7.09 | 0.000 |
| Amount of time working in a hospital | 0.620 | 0.351 | 0.02 - 1.21 | 1.76 | 0.078 |
| The time in direct contact with patients per day | 0.503 | 0.257 | 0.01 - 1.00 | 1.94 | 0.054 |
| Is your workload acceptable? | 2.351 | 0.566 | 1.24 - 3.46 | 4.15 | 0.000 |
| Frequency of verbal abuse, related to damage of personal dignity | 0.323 | 0.063 | 0.20 - 0.44 | 3.37 | 0.001 |
| Frequency of verbal abuse that threatens the personal security of medical staff | 0.888 | 0.354 | 0.19 - 1.58 | 2.50 | 0.012 |
| Frequency of physical violence that did not succeed | 0.568 | 0.841 | -1.08 - 2.21 | 0.67 | 0.499 |
| Frequency of physical violence that did not lead to significant damage | 0.431 | 0.993 | -1.51 - 2.38 | 0.43 | 0.665 |
| Frequency of physical violence that led to significant damage (wounds, fractures, etc.) | 1.299 | 1.469 | -1.58 - 4.18 | 0.88 | 0.377 |
| Frequency of physical violence that led to serious damage such as a functional disorder or permanent disability | 0.924 | 2.969 | -4.89 - 7.47 | 0.31 | 0.756 |
| Frequency of physical sexual harassment | 0.165 | 0.659 | -3.09 - 3.41 | 0.09 | 0.921 |
| The occurred frequency of rape or attempted rape | 2.383 | 2.008 | -1.56 - 6.32 | 1.18 | 0.236 |

CI = confidence interval. SAS = Self-rating Anxiety Scale.

Table 6

| Effect factors | B   | SE  | 95% CI (B) | t    | p    |
|----------------|-----|-----|------------|------|------|
| Education      | -0.014 | 0.005 | -0.22 - 0.00 | -2.87 | 0.004 |
| Satisfaction with income | -0.004 | 0.003 | -0.01 - 0.00 | -2.28 | 0.026 |
| Job category   | 0.015 | 0.006 | 0.00 - 0.02 | 2.64 | 0.008 |
| Department     | -0.002 | 0.004 | -0.01 - 0.00 | -0.013 | 0.926 |
| Perceived security of the occupational environment | -0.002 | 0.004 | -0.01 - 0.00 | -0.016 | 0.941 |
| Perceived level of respect for medical staff | -0.013 | 0.004 | -0.02 - 0.00 | -0.110 | 0.905 |
| Do medical disputes or workplace violence influence the mood of medical staff? | 0.005 | 0.006 | 0.00 - 0.01 | 0.66 | 0.509 |
| Is your mood affected when the disease or condition of patients worsens? | 0.012 | 0.006 | 0.01 - 0.02 | 1.84 | 0.065 |
| Your psychological endurance when patients die? | -0.002 | 0.007 | -0.016 - 0.01 | -0.009 | 0.935 |
| Your psychological endurance when faced with an emergency | -0.017 | 0.003 | -0.024 - 0.01 | -0.127 | 0.100 |
| Amount of time working in a hospital | 0.004 | 0.002 | 0.00 - 0.01 | 1.59 | 0.110 |
| Is your workload acceptable? | 0.008 | 0.006 | 0.00 - 0.01 | 1.48 | 0.139 |
| Frequency of verbal abuse related to damage of personal dignity | 0.003 | 0.003 | 0.00 - 0.01 | 0.76 | 0.449 |
| Frequency of verbal abuse that threatens the personal security of medical staff | 0.005 | 0.004 | 0.00 - 0.01 | 1.43 | 0.152 |
| Frequency of physical violence that did not succeed | 0.009 | 0.008 | 0.007 - 0.00 | 0.031 | 0.977 |
| Frequency of physical violence that did not lead to significant damage | -0.003 | 0.010 | -0.022 - 0.016 | -0.08 | 0.924 |
| Frequency of physical violence that led to significant damage (wounds, fractures, etc.) | 0.018 | 0.015 | -0.010 - 0.047 | 1.26 | 0.207 |
| Frequency of physical violence that led to serious damage such as a functional disorder or permanent disability | 0.017 | 0.029 | -0.040 - 0.075 | 0.59 | 0.530 |
| Frequency of physical sexual harassment | 0.026 | 0.017 | -0.007 - 0.060 | 1.54 | 0.122 |

CI = confidence interval. SDS = Self-rating Depression Scale.
the validity of the collected data may be compromised. Second, the questionnaire was not able to include all potential risk factors. Third, the sample size was not very large, which reduced the power of certain statistical tests: only 1557 medical staff from the Heilongjiang province participated in our study. Finally, the mental health status of stratified subgroups was not compared. For these reasons, caution should be taken in generalizing the results of this study.

In conclusion, the findings of this study indicated that the overall psychological health status of Chinese medical staff is poor. The determinate factors based on the various measurement standards used in this study were not completely consistent, but the overlapping major factors identified that influenced psychological health were the amount of education, income satisfaction, the perceived level of respect for medical staff, frequency of verbal abuse, and psychological endurance when faced with emergencies. Medical staff should be relieved from unnecessary psychological pressure derived from social misunderstanding and overworking, and should be treated with dignity and respect.

References
[1] Xu J, Zhu Z. The psychological health survey of medical staff. Chinese Mental Health J 1993;7:73–4.
[2] Tu L, Zhang XQ, Ren N, et al. Current situation and analysis of the medical staff’s psychological health in China. Med Philos 2009;30:44–6.
[3] Xu X, Zhao T. The psychological health survey of medical staff in general hospital. J China Clin Psychol 2006;14:324–5.
[4] Coomber S, Todd C, Park G, et al. Stress in UK intensive care unit doctors. Br J Anaesth 2002;89:873–81.
[5] Reuben DB. Depressive symptoms in medical house officers. Effects of level of training and work rotation. Arch Intern Med 1985;145:286–8.
[6] Caplan RP. Stress, anxiety, and depression in hospital consultants, general practitioners, and senior health service managers. BMJ 1994; 309:1261–3.