Severe Acute Respiratory Syndrome–Related Psychiatric and Posttraumatic Morbidities and Coping Responses in Medical Staff Within a Primary Health Care Setting in Singapore

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Background: Severe acute respiratory syndrome (SARS) is a major new infectious disease of this century that is unique in its high morbidity and concentration in health care settings. We aimed to determine the level of psychological impact and coping styles among the medical staff in a primary health care setting.

Method: Using a structured questionnaire, we conducted a cross-sectional survey of the doctors and nurses working within a public, primary health care setting in mid-July 2003. The main outcome measures were rates of psychiatric morbidity, level of posttraumatic stress symptoms, and coping strategies.

Results: The response rate was 92.0%. Of the 277 respondents (91 doctors and 186 nurses), psychiatric morbidity and posttraumatic morbidity were found in 20.6% and 9.4%, respectively. Both psychiatric and posttraumatic morbidities were associated with higher scores on coping efforts including self-distraction, behavioral disengagement, social support, venting, planning, and self-blame (all p < .001), but not with direct exposure factors such as contact with suspected SARS patients or working in fever rooms/ tentages. Multivariate analysis showed that psychiatric morbidity was associated with posttraumatic morbidity (p = .02) and denial (p = .03), whereas posttraumatic morbidity was associated with younger age (p = .007), being married (p = .02), psychiatric morbidity (p = .02), selfdistraction (p = .02), behavioral disengagement (p = .01), religion (p = .003), less venting (p = .04), less humor (p = .04), and less acceptance (p = .02).

Conclusion: SARS-related psychiatric and posttraumatic morbidities were present in the medical staff within a primary health care setting. Specific coping efforts, age, and marital status, not direct exposure factors, were associated with psychological morbidity. These findings provide possible foci for early identification and psychological support.

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H igh prevalences of psychiatric and posttraumatic morbidities have been found in individuals exposed to life-threatening situations,¹⁻³ including health care workers dealing with medical emergencies or illnesses.⁴⁻⁶ Factors associated with such psychological morbidities include age,⁷ marital status,⁸ job experience,⁹ and amount of direct exposure.^{7,10} However, the impact of such psychological responses can be moderated by the use of different coping strategies.^{11–13}

Severe acute respiratory syndrome (SARS) has been identified as the emerging new infectious disease of this century and is unique in its concentration in health care settings as well as its high morbidity among health care workers.^{14,15} To date, more than 8400 individuals worldwide have been affected; one fifth of them were health care workers,¹⁶ the most prominent being Dr. Carlo Urbani, who fought SARS and succumbed to the illness on March 29, 2003. The medical staff within the primary health care setting has played and continues to play an important and crucial role in the screening and detection of possible cases of SARS. However, recent reports on the psychological impact of SARS within health care settings have mainly focused on the hospital medical staff.^{17,18}

Hence, this study was conducted to examine the prevalence of SARS-related psychiatric and posttraumatic morbidities within the medical staff in a representative public, primary health care setting as well as compare the differences in sociodemographic characteristics, direct exposure features, and coping styles between those with and without such psychological morbidities.

METHOD

Primary Health Care Delivery System

Situated in southeast Asia, Singapore is an island state with a population of 4 million comprising 3 major ethnic groups-Chinese (76.8%), Malay (14.0%), and Indian (7.8%)—and 1.4% other ethnicities. In Singapore, there is a dual system of health care delivery. The public system is managed by the government, whereas the private system is provided by the private hospitals and general practitioners. The primary health care services are delivered at the public outpatient polyclinics and the private clinics of medical practitioners. The National Healthcare Group Polyclinics (NHGP), 1 of the 2 public primary health care delivery networks, run a total of 9 polyclinics in Singapore. Each polyclinic serves as a one-stop health care center that provides comprehensive outpatient medical care, immunization, health screening and education, follow-up of patients discharged from hospitals, investigative facilities, and pharmacy services.

Description of the SARS Outbreak

In November 2002, there were initial reports from Guangdong Province in China of cases of highly contagious and severe atypical pneumonia of unknown cause. In late February 2003, this condition was termed *severe acute respiratory syndrome* (SARS) by the U.S. Centers for Disease Control and Prevention, which also provided a clinical case definition.¹⁹ This potentially fatal condition was reported to be caused by the SARS-associated coronavirus and is characterized by both an atypical pneumonia and efficient droplet transmission.²⁰ Locally, the largest outbreak of SARS began in mid-March 2003 and was traced to a traveler returning from Hong Kong.²¹ In Singapore, a total of 238 individuals were infected with SARS, of whom 97 (40.8%) were health care workers.¹⁶

At the onset of the outbreak in Singapore, Tan Tock Seng Hospital/Communicable Disease Centre was designated as the hospital for the intake and solitary isolation of all suspect and probable SARS cases. At the primary health care level, infection control measures that were rapidly implemented included the use of personal protective equipment among the health care workers attending to patients including those presenting with a febrile illness, regular temperature monitoring, completion of health declaration forms, regular audit of infection control measures, and the implementation of fever rooms and tents within polyclinics.²² Although Singapore was removed from the list of areas with recent local transmission by the World Health Organization on May 31, 2003, the operation of the fever tents at the polyclinics was not terminated until August 1, 2003.

Study Population and Design

This cross-sectional study on the psychological impact of SARS on the medical staff (doctors and nurses) and their coping responses within the NHGP cluster of polyclinics was conducted within a week in mid-July 2003. An earlier notification regarding the study was conveyed via electronic mail from the NHGP headquarters to all the medical staff within the NHGP a few days prior to the start of the study. Subsequently, the study instrument was distributed to the medical staff at the beginning of the week in mid-July 2003 via the respective clinic operations manager, who also collated the returns at the end of the week.

Instruments

The study instrument was a structured questionnaire that comprised 3 main outcome rating scales and a section on sociodemographic details including sex, age, marital status, living arrangements, and job experience. Direct exposure was indicated by responses to questions addressing contact with suspected SARS patient(s) and previous or current work in fever rooms or tentages during the SARS outbreak. Additional questions asked of the participants pertained to their major concerns about SARS and their major sources of help.

Three main outcome measures were used:

- 1. The degree of SARS-related psychiatric morbidity in the preceding few weeks was evaluated by the 28-item General Health Questionnaire (GHQ-28).²³ The 28 items can be grouped into 4 subscales: somatic, anxiety, social dysfunction, and depression. Suitable for identifying minor psychiatric disorders in community samples, this measure allows "caseness" to be determined by means of a total score. Using the conventional GHQ binary scoring method (scoring range, 0–28), a total GHQ score of 5 or above is indicative of a case of psychiatric morbidity.²⁴
- 2. The SARS-related posttraumatic morbidity was determined using the Impact of Event Scale-Revised (IES-R),²⁵ a 22-item scale that measured the extent to which the respondents were distressed by the SARS-related symptoms of intrusion, avoidance, and hyperarousal as experienced in the past week using a 5-point rating scale with a range of 0 to 4. Two scores were calculated from the IES-R, namely a continuous score (total and subscales) and a dichotomous categorization of high versus low level of posttraumatic symptoms.² When calculating the dichotomous scores, we considered symptoms present if the respondents reported that they had been at least moderately distressed by the symptoms in the previous week (score of at least 2 on a scale of 0-4).²⁶ The prevalence rate of posttraumatic stress features

was determined by using the DSM-IV criteria for posttraumatic stress disorder (≥ 1 reexperiencing symptoms, ≥ 2 arousal symptoms, and ≥ 3 avoidance symptoms).²⁷ Subjects fulfilling these criteria were classified as having a high level of posttraumatic stress symptoms.

3. Coping was assessed using the Brief COPE questionnaire.²⁸ It comprises 28 items and can be grouped into 14 coping strategies (2 items per strategy) used in response to a particular stressor: self-distraction, active coping, denial, substance use, emotional support seeking, instrumental support seeking, behavioral disengagement, venting, positive reframing, planning, humor, acceptance, religion, and self-blame. Participants were asked to indicate on a 4-point scale, ranging from 1 (I haven't been doing this at all) to 4 (I have been doing this a lot), how often they used each strategy to cope with SARS-related stress symptoms.

All 3 outcome measures were chosen because they are self-reported scales, easy to administer, and widely used in studies to evaluate psychiatric morbidity and posttraumatic stress.^{2,29} Participation in the survey was voluntary, and the study was approved by the Institutional Research and Ethics Committee.

Statistical Analysis

Data were analyzed using the Statistical Package for Social Sciences (SPSS)-PC version 11.0 (SPSS Inc.; Chicago, Ill.). Normality of quantitative data was checked using the Kolmogorov-Smirnov 1-sample test. Differences between groups were tested by t test and Mann-Whitney U test for normal and non-normal continuous variables, respectively, and χ^2 test or Fisher exact test for categorical variables whenever appropriate. Correlations for normally distributed data were made with linear regression (Pearson r), and non-normally distributed data were correlated with a rank-method (Spearman r_s). Multiple logistic regression analyses were carried out to determine the significant factors associated with 2 outcome variables (psychiatric morbidity and posttraumatic morbidity). Covariates entered in the multivariate logistic regression models included age, marital status, job experience, work at fever room/tent, contact with suspected SARS patient, and the 14 coping strategies. A p value of < .05 (2-tailed) was taken to indicate statistical significance.

RESULTS

Demographics

Of the 301 medical staff approached (103 doctors and 198 nurses), 277 responded (91 doctors and 186 nurses), giving a response rate of 92.0%. Overall, the mean (SD) age of the participants was 38.0 (12.7) years, and 236

| Table 1. Demographic, Exposure, and Outcome |
|---|
| Characteristics of Medical Staff ^a |

| | Doctors | Nurses | |
|--|----------------|-------------|---------------------|
| Characteristic | (N = 91) | (N = 186) | p Value |
| Gender | | | |
| Male | 40 (44.0) | 1 (0.5) | <.001 ^b |
| Female | 51 (56.0) | 185 (99.5) | |
| Age, mean (SD), y | 35.2 (10.6) | 40.7 (13.3) | <.001 ^c |
| Ethnicity | | | |
| Chinese | 67 (73.6) | 123 (66.1) | < .001 ^d |
| Malay | 2 (2.2) | 38 (20.4) | |
| Indian | 15 (16.5) | 21 (11.3) | |
| Other | 7 (7.7) | 4 (2.2) | |
| Marital status | | | |
| Single | 22 (24.2) | 27 (14.5) | .008 ^d |
| Separated/divorced/widowed | 3 (3.3) | 7 (3.8) | |
| Married | 66 (72.5) | 152 (81.7) | |
| Living arrangements | | | |
| Lives alone | 5 (5.5) | 2 (1.1) | .04 ^b |
| Lives with others | 86 (94.5) | 184 (98.9) | |
| Job experience, mean (SD), y | 11.0 (8.3) | 20.6 (11.4) | < .001 ^c |
| Working in fever room/tentage | 52 (57.1) | 45 (24.2) | < .001 ^d |
| Contact with suspected | 12 (13.2) | 14 (7.5) | .19 ^d |
| SARS patient | | | |
| GHQ-28 total score ≥ 5 | 15 (16.5) | 42 (22.6) | .27 ^d |
| High level of posttraumatic | 6 (6.6) | 20 (10.8) | .38 ^d |
| stress symptoms | | | |
| Brief COPE questionnaire | 41.9 (11.3) | 41.8 (11.3) | .69 ^c |
| total score, mean (SD) | | | |
| ^a Data are presented as N (%) u | nless otherwis | e noted. | |
| ^b Fisher exact test. | | | |
| Mann-Whitney test. | | | |

² Test.

Abbreviations: GHQ-28 = 28-item General Health Questionnaire, SARS = severe acute respiratory syndrome.

(85.2%) respondents were female. In terms of ethnicity, 190 (68.6%) respondents were Chinese, 40 (14.4%) were Malay, 36 (13.0%) were Indian, and 11 (4.0%) belonged to other ethnic groups. The majority of the respondents were married (N = 218, 78.7%), 49 (17.7%) were single, and 10 (3.6%) respondents were separated, divorced, or widowed. In terms of living arrangements, there was a preponderance among the staff of living with someone (N = 270, 97.5%) rather than alone (N = 7, 2.5%). In terms of job experience, the mean (SD) duration was 17.5 (11.4) years. Table 1 presents a comparison of the sociodemographic features and outcome measures between the medical staff (doctors vs. nurses).

Direct Exposure

Ninety-seven staff (35.0%) had worked in the fever rooms or tents during the SARS outbreak. Twenty-six staff (9.4%) had previous contact with a suspected SARS patient. Table 2 shows the comparison of the gender, age, job experience, direct contact, and outcome measures between medical staff working in fever versus non-fever areas.

Psychiatric Morbidity and Coping

Psychiatric morbidity was reported in 57 staff (20.6%). Cases of psychiatric morbidity were associated with a high level of posttraumatic stress symptoms as well as higher

| | Fever Area | Non-Fever Area | |
|---|---------------|-----------------|-------------------|
| Characteristic | (N = 97) | (N = 180) | p Value |
| Gender, N (%) | | | |
| Male | 24 (24.7) | 17 (9.4) | .001 ^b |
| Female | 73 (75.3) | 163 (90.6) | |
| Age, y | 37.1 (12.1) | 39.9 (13.0) | .05 ^c |
| Job experience, y | 14.7 (10.1) | 18.9 (11.8) | .005 ^c |
| Contact with suspected | 11 (11.3) | 15 (8.3) | .52 ^b |
| SARS patient, N (%) | | | |
| GHQ-28 total score ≥ 5 , | 23 (23.7) | 34 (18.9) | .35 ^b |
| N (%) | | | |
| GHQ-28 total score | 2.6 (4.2) | 2.3 (4.4) | .28 ^c |
| Somatic | 1.3 (1.9) | 0.9 (1.6) | .08 ^c |
| Anxiety | 0.8 (1.6) | 0.7 (1.6) | .62 ^c |
| Social dysfunction | 0.4 (1.0) | 0.5 (1.2) | .40 ^c |
| Depression | 0.1 (0.5) | 0.2 (0.9) | .44 ^c |
| High level of posttraumatic | 7 (7.2) | 19 (10.6) | .40 ^b |
| stress symptoms, N (%) | | | |
| IES-R | | | |
| Intrusion score | 0.7 (0.8) | 0.7 (0.8) | .41 ^c |
| Avoidance score | 0.7 (0.8) | 0.7 (0.8) | .54 ^c |
| Hyperarousal score | 0.5 (0.7) | 0.5 (0.8) | .83° |
| Brief COPE questionnaire | 43.1 (11.7) | 41.1 (11.7) | .09 ^c |
| total score | | | |
| ^a Data are presented as mean | (SD) unless c | therwise noted. | |

| Table 2. Comparison of Characteristics Between | Medical Staf |
|--|--------------|
| Working in Fever Versus Non-Fever Areas ^a | |

 ${}^{b}\chi^{2}$ Test. °Mann-Whitney test.

Abbreviations: GHQ-28 = 28-item General Health Questionnaire,

IES-R = Impact of Event Scale-Revised, SARS = severe acute respiratory syndrome.

IES-R mean subscale scores (Table 3). The total GHQ scores were also correlated with the IES-R mean total $(r_s = 0.26, p < .001)$ and intrusion $(r_s = 0.25, p < .001)$, avoidance ($r_s = 0.25$, p < .001), and hyperarousal ($r_s =$ 0.33, p < .001) subscale scores. Participants with psychiatric morbidity used certain coping measures more frequently compared with those without: self-distraction, active coping, substance use, emotional and instrumental support seeking, behavioral disengagement, venting, planning, and self-blame. On multivariate analysis, only a high level of posttraumatic stress symptoms and the use of denial as a way of coping were associated with psychiatric morbidity (Table 3).

Posttraumatic Morbidity and Coping

Posttraumatic morbidity was found in 26 respondents (9.4%). A high level of posttraumatic stress symptoms was associated with more frequent use of specific coping strategies compared with a low level of posttraumatic stress symptoms: self-distraction, active coping, denial, substance use, emotional and instrumental support seeking, behavioral disengagement, venting, positive reframing, planning, religion, and self-blame. On multivariate analysis, high levels of posttraumatic stress symptoms were associated with a younger age, being married, and increased use of behavioral disengagement and religion but decreased use of venting, humor, and acceptance as means of coping (Table 4).

Major Concerns and Sources of Help

There were 192 and 195 responses to the questions on the major concerns regarding the SARS outbreak and sources of help, respectively. Table 5 summarizes the 3 most frequent responses to the 2 questions in each of the biological, psychological, and social domains.

DISCUSSION

We found significant prevalence rates of SARS-related psychiatric and posttraumatic morbidities (20.6% and 9.4%, respectively) among medical staff working in a primary health care setting about 16 weeks after the initial local outbreak of SARS and 9 weeks after the last case of local SARS transmission. The presence of psychiatric morbidity was associated with a high level of posttraumatic stress symptoms. Posttraumatic morbidity was associated with younger age and being married. Furthermore, both psychiatric and posttraumatic morbidities were associated with different, specific means of coping.

The rate of psychiatric morbidity found in this study was slightly higher than that found within the local general population (16.6%) in a previous National Mental Health Survey.³⁰ However, the rate of psychiatric morbidity is consistent with the extant literature, which reported rates of psychiatric morbidity of 22% to 47% within health care workers exposed to life-threatening conditions.5,31,32 The rate of posttraumatic morbidity found was lower compared with rates reported in the literature ranging from 15% to 47%, although these were usually in the context of oncologic illnesses or major disasters.^{2,33–35} We found that younger staff had greater posttraumatic morbidity, which was also reported in previous studies.^{7,36} Epstein et al.³⁶ reported that younger health care workers were more likely to develop posttraumatic stress disorder following an air disaster. Moreover, Marmar et al.7 found that peritraumatic dissociation was more likely to occur in younger emergency service personnel compared with older personnel. This posttraumatic morbidity did not appear to be adequately explained by its relationship to being single⁸ or having shorter job experience in this study. In the present study, being married was found to be associated with a high level of posttraumatic stress symptoms, and more of the married staff were older and had longer job experience. The association of posttraumatic morbidity with being married is in contrast to the findings of Ursano et al.,8 who found increased rates of avoidance and somatization in disaster workers who were single. It may thus be useful to identify young medical staff who are also married, as they are more likely to be experiencing a higher level of SARS-related posttraumatic stress symptoms and in greater need of psychological support.

Direct exposure was not associated with psychological morbidity in this study. Neither previous exposure to fever rooms or tents nor contact with suspected SARS

| | Psych Morbidit (GHQ-28 tot (N = | niatric y Present tal score ≥ 5) = 57) | Psych Morbidit (GHQ-28 tot (N = | iatric y Absent al score < 5) 220) | Univariate Analysis | Ν | /ultivariate Analy | ysis |
|--------------------------------------|--|--|--|---|------------------------|------|--------------------|---------|
| Variable | Ν | % | Ν | % | p Value ^a | OR | 95% CI | p Value |
| Male | 6 | 10.5 | 35 | 15.9 | .40 | 1.98 | 0.63 to 6.26 | .25 |
| Married | 45 | 78.9 | 173 | 78.6 | 1.00 | 1.14 | 0.47 to 2.76 | .78 |
| Working in fever room/tent | 23 | 40.4 | 74 | 33.6 | .35 | 0.82 | 0.39 to 1.72 | .60 |
| Contact with suspected SARS patient | 9 | 15.8 | 17 | 7.7 | .08 | 0.51 | 0.17 to 1.50 | .22 |
| High level of posttraumatic stress | 15 | 26.3 | 11 | 5.0 | < .001 | 3.38 | 1.17 to 9.73 | .02 |
| | Mean | SD | Mean | SD | p Value ^b | | | |
| Age, y | 36.9 | 11.6 | 39.4 | 13.0 | .10 | 1.01 | 0.98 to 1.05 | .50 |
| Job experience, y IES-R | 17.0 | 10.6 | 17.6 | 11.6 | .86 | 0.99 | 0.95 to 1.04 | .75 |
| Intrusion score | 1.1 | 1.0 | 0.6 | 0.7 | < .001 | | | |
| Avoidance score | 1.1 | 0.9 | 0.6 | 0.7 | < .001 | | | |
| Hyperarousal score | 1.0 | 1.0 | 0.4 | 0.6 | < .001 | | | |
| Brief COPE questionnaire total score | 49.7 | 13.2 | 39.7 | 10.4 | < .001 | | | |
| Self-distraction | 3.5 | 1.5 | 2.6 | 1.0 | < .001 | 0.76 | 0.53 to 1.07 | .12 |
| Active coping | 4.3 | 1.7 | 3.3 | 1.5 | < .001 | 0.96 | 0.67 to 1.38 | .83 |
| Denial | 2.6 | 1.1 | 2.4 | 1.0 | .07 | 1.69 | 1.06 to 2.69 | .03 |
| Substance use | 2.5 | 1.2 | 2.1 | 0.7 | < .001 | 0.74 | 0.44 to 1.26 | .27 |
| Emotional support seeking | 3.7 | 1.6 | 2.8 | 1.2 | < .001 | 0.94 | 0.65 to 1.37 | .76 |
| Instrumental support seeking | 3.6 | 1.5 | 2.7 | 1.0 | < .001 | 0.82 | 0.51 to 1.30 | .39 |
| Behavioral disengagement | 2.6 | 1.0 | 2.2 | 0.6 | < .001 | 0.78 | 0.44 to 1.38 | .40 |
| Venting | 3.2 | 1.3 | 2.4 | 0.9 | < .001 | 0.82 | 0.55 to 1.23 | .34 |
| Positive reframing | 4.1 | 2.0 | 3.3 | 1.4 | .08 | 1.10 | 0.80 to 1.52 | .56 |
| Planning | 4.0 | 1.7 | 3.1 | 1.3 | < .001 | 1.07 | 0.72 to 1.59 | .73 |
| Humor | 2.8 | 1.2 | 2.5 | 1.0 | .01 | 1.03 | 0.71 to 1.50 | .88 |
| Acceptance | 5.3 | 1.9 | 4.5 | 1.9 | .01 | 0.95 | 0.76 to 1.19 | .68 |
| Religion | 4.8 | 2.5 | 3.7 | 1.8 | .01 | 0.90 | 0.73 to 1.11 | .34 |
| Self-blame | 2.6 | 1.2 | 2.1 | 0.5 | < .001 | 0.74 | 0.50 to 1.18 | .19 |

^aχ² Test. ^bMann-Whitney test.

Abbreviations: GHQ-28 = 28-item General Health Questionnaire, IES-R = Impact of Event Scale-Revised, OR = odds ratio, SARS = severe acute respiratory syndrome.

patients was associated with psychiatric morbidity or posttraumatic morbidity. Although previous studies have linked exposure with posttraumatic morbidity,³⁷ other studies have also found that the development and severity of posttraumatic stress symptoms were not directly related to the proximity of exposure or severity of the traumatic stress.^{38,39} This is perhaps a reflection of the complexity of psychosocial responses to life-threatening critical incidents, which are affected not only directly by the exposure factors but also by other factors such as the context of the situation, attached meaning, personality vulnerabilities, associated losses, stage of life issues, and cultural setting.40

The association of psychiatric morbidity with a high level of posttraumatic stress symptoms suggests that the presence of one may indicate the presence of the other. McFarlane⁴¹ had proposed that the 2 may be separate phenomena, and this proposition may be supported by the fact that they were associated with specific and different coping strategies as found in this study.

Coping efforts have been found to moderate the psychological impact of highly stressful conditions,¹¹⁻¹³ but there is no consensus on the most effective coping method.⁴² In this study, psychiatric and posttraumatic morbidities were associated with more frequent use of a wide range of coping methods. This suggests that coping represents a psychological process that is used to contain the distress caused by stressful symptoms as well as to manage environmental adversity.⁴³ Staff with psychiatric morbidity coped more frequently by use of denial. Some of the major concerns of the respondents included the dread of losing the control of the spread of SARS, the fear of catching SARS, the fear of passing it to loved ones, and the fear of death. Similar fears regarding contagion, danger, and safety were also found in hospital staff caring for patients with SARS^{17,44,45} or other infectious⁴⁶ or noninfectious medical illnesses.⁴⁷ Denial could be a coping response to the threat of SARS pertaining to the personal sense of uncertainty⁴⁸ and its associated overwhelming fears and emotions.

Behavioral disengagement represents a form of avoidance coping⁴⁹ and was associated with a greater likelihood of posttraumatic morbidity^{50,51} in this study. In combination with less-frequent venting of unpleasant or negative emotions, behavioral disengagement among medical staff may lead to a lesser degree of acceptance of their predicament. These difficulties with acceptance and reticence in disclosure of their emotions among medical

| Table 4. Demographic, Exposure Characteristics and Outcome Scores Between Staff With and Without Posttraumatic Morbidity | | | | | | | | |
|--|---|------|---|------|------------------------|-----------------------|--------------|---------|
| | Posttraumatic Morbidity Present (N = 26) | | Posttraumatic Morbidity Absent (N = 251) | | Univariate Analysis | Multivariate Analysis | | |
| Variable | Ν | % | Ν | % | p Value ^a | OR | 95% CI | p Value |
| Male | 3 | 11.5 | 38 | 15.1 | .78 | 0.77 | 0.14 to 4.43 | .78 |
| Married | 24 | 92.3 | 194 | 77.3 | .08 | 11.63 | 1.41 to 100 | .02 |
| Working in fever room/tent | 7 | 26.9 | 90 | 35.9 | .40 | 1.02 | 0.28 to 3.68 | .98 |
| Contact with suspected SARS patient | 3 | 11.6 | 23 | 9.2 | .72 | 0.36 | 0.04 to 3.03 | .35 |
| GHQ-28 total score ≥ 5 | 15 | 57.7 | 42 | 16.7 | < .001 | 4.31 | 1.28 to 14.6 | .02 |
| | Mean | SD | Mean | SD | p Value ^b | | | |
| Age, y | 35.6 | 15.8 | 39.2 | 12.4 | .42 | 0.94 | 0.89 to 0.98 | .007 |
| Job experience, y | 17.5 | 10.2 | 17.5 | 11.5 | .91 | 1.02 | 0.96 to 1.08 | .59 |
| GHQ-28 total score | 6.9 | 7.4 | 1.9 | 3.5 | < .001 | | | |
| Somatic | 2.5 | 2.7 | 0.9 | 1.5 | < .001 | | | |
| Anxiety | 2.4 | 2.8 | 0.6 | 1.3 | < .001 | | | |
| Social dysfunction | 1.3 | 1.9 | 0.4 | 0.9 | < .001 | | | |
| Depression | 0.7 | 1.7 | 0.1 | 0.6 | < .001 | | | |
| Brief COPE questionnaire total score | 53.4 | 13.1 | 40.6 | 10.9 | < .001 | | | |
| Self-distraction | 4.0 | 1.4 | 2.6 | 1.1 | < .001 | 1.75 | 1.09 to 2.80 | .02 |
| Active coping | 4.8 | 1.5 | 3.4 | 1.5 | < .001 | 0.84 | 0.45 to 1.54 | .57 |
| Denial | 3.2 | 1.5 | 2.4 | 0.9 | .001 | 0.84 | 0.50 to 1.44 | .53 |
| Substance use | 2.8 | 1.5 | 2.2 | 0.7 | < .001 | 0.85 | 0.48 to 1.50 | .58 |
| Emotional support seeking | 3.9 | 1.5 | 2.9 | 1.3 | < .001 | 0.92 | 0.52 to 1.62 | .76 |
| Instrumental support seeking | 4.0 | 1.5 | 2.7 | 1.1 | < .001 | 1.84 | 0.91 to 3.72 | .09 |
| Behavioral disengagement | 2.9 | 1.1 | 2.2 | 0.6 | < .001 | 2.85 | 1.25 to 6.47 | .01 |
| Venting | 3.2 | 1.2 | 2.5 | 0.9 | .001 | 0.51 | 0.26 to 0.97 | .04 |
| Positive reframing | 4.3 | 1.6 | 3.4 | 1.5 | .002 | 1.09 | 0.71 to 1.66 | .70 |
| Planning | 4.5 | 1.7 | 3.2 | 1.4 | < .001 | 1.35 | 0.72 to 2.53 | .36 |
| Humor | 2.6 | 0.8 | 2.5 | 1.0 | .24 | 0.45 | 0.21 to 0.97 | .04 |
| Acceptance | 5.1 | 1.8 | 4.6 | 1.9 | .24 | 0.53 | 0.32 to 0.89 | .02 |
| Religion | 5.2 | 2.1 | 3.8 | 1.9 | .001 | 1.70 | 1.20 to 2.39 | .003 |
| Self-blame | 2.8 | 1.3 | 2.2 | 0.7 | < .001 | 1.68 | 0.90 to 3.12 | .10 |

 b X² Test. ^bMann-Whitney test. Abbreviations: GHQ-28 = 28-item General Health Questionnaire, IES-R = Impact of Event Scale-Revised, OR = odds ratio, SARS = severe acute respiratory syndrome.

| Table 5. Major Concerns About Severe Acute Respiratory Syndrome (SARS) and Sources of Help | | | | | | |
|--|--|--|--|--|--|--|
| Area of Concern | Major Concern About SARS | Major Source of Help | | | | |
| Biological | Losing control of the spread of SARS | Information on SARS by institution | | | | |
| | Recurrence of SARS | Infection control measures | | | | |
| | Need for early detection and cure | Implementation of infection control measures | | | | |
| Psychological | I may catch SARS | Positive thinking | | | | |
| | Fear of death | Religion | | | | |
| | Fear of discrimination | Teamwork | | | | |
| Social | Passing SARS to family and friends | Support from friends and family | | | | |
| | Effect of SARS on economy | Care expressed by public | | | | |
| | Nobody to care for family if I come down with SARS | Self-quarantine | | | | |

staff were not unique to SARS.52 More open communication of personal emotions or distress within a supportive group may reduce the sense of isolation and has been associated with a better outcome.⁵³ Education of the staff and their families is paramount¹⁷ and must take into consideration the background perception of possible risks as well as anxiety associated with an emerging infectious disease such as SARS.⁵⁴ Psychological support services could focus on greater engagement of the medical staff, allowing the expression of their feelings within a safe, supportive peer group setting, which may then reduce the level of denial and facilitate greater acceptance of their situation.

Humor has been found to be a useful mode of coping in highly stressful situations such as the intensive care unit^{55,56} but was found to be less frequently employed by our participants. The use of self-distraction by activities and the greater use of religion may indicate more active ways of dealing with the distress associated with SARS.^{57,58} Major sources of help included the provision of SARS-related information, infection control guidelines and their implementation, as well as support from family and friends. Provision and clear communication of information and guidelines regarding the infection helped in coping with the sense of uncertainty,^{17,44,59} and the availability of social support has been found to reduce

subsequent posttraumatic symptomatology.^{60,61} Further systemic and longitudinal research is warranted to determine the psychological impact of SARS on the oftenunseen populations, such as the family members of health care workers, and whether coping efforts and coping self-efficacy perceptions remain important mediators of SARS-related psychiatric morbidity and posttraumatic stress symptoms/disorder over time.

There were several limitations in this study. First, baseline rates of posttraumatic morbidity before the outbreak of SARS were not available for the local population, hence making the ascertainment of the impact of SARS on posttraumatic morbidity more uncertain. Second, although there were significant associations between psychiatric and posttraumatic morbidities and coping styles, the cross-sectional nature of the study disallowed us to make any conclusion regarding causality. Third, the study only surveyed the medical staff working in a public, primary health care setting, hence the findings may not be generalizable to those medical staff working within the other private primary health care settings. Fourth, the incidence of SARS in personal acquaintances as well as indirect exposure to the SARS outbreak were not measured. Fifth, life events that may have occurred between the outbreak of SARS or the last local case of SARS transmission and the period of this study may have had an impact on the psychological morbidity and could have confounded the findings. Last, other important factors that would contribute to the complex psychological response to traumatic stress, such as personality variables, past trauma, or precise details of social support, were not examined in this study.

In conclusion, SARS-related psychiatric and posttraumatic morbidities were not uncommon in medical staff working in a public, primary health care setting. Coping styles rather than direct exposure were associated with these psychological morbidities. These findings can help to direct the focus of SARS-related psychological support efforts toward education about its psychological effects, facilitation of peer support groups, and enhancement of more adaptive personal coping styles, especially in younger and married staff. This would be a step toward lessening the SARS-related psychological impact on medical staff both now and in the future.

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