Psychological impact of the 2003 severe acute respiratory syndrome outbreak on health care workers in a medium size regional general hospital in Singapore

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Aims To describe the psychological impact of severe acute respiratory syndrome (SARS) on health care workers in a regional general hospital 2 months post-outbreak.

Method Doctors and nurses were encouraged to participate. The survey consisted of self-report measures: demographics, the General Health Questionnaire (GHQ) 28 and Impact of Events Scale (IES). A questionnaire enquiring about changes in life's priorities due to SARS and circumstances that helped with coping was used. Participation was strictly voluntary and responses anonymous.

Results In total 177 out of 661 (27%) participants [40 out of 113 (35%) doctors and 137 out of 544 (25%) nurses] had a GHQ 28 score ≥5. Doctors \( P = 0.026 \), odds ratio (OR) = 1.6 and 95% confidence interval (CI) = 1.1–2.5 and single health care workers were at higher risk \( P = 0.048 \), OR = 1.4 and 95% CI = 1.02–2.0) compared to nurses and those who were married. Approximately 20% of the participants had IES scores ≥30, indicating the presence of post-traumatic stress disorder (PTSD). Four areas were classified as more important using factor analysis: health and relationship with the family, relationship with friends/colleagues, work and spiritual. The areas for coping strategies were clear directives/precautionary measures, ability to give feedback to/obtain support from management, support from supervisors/colleagues, support from the family, ability to talk to someone and religious convictions. Support from supervisors/colleagues was a significant negative predictor for psychiatric symptoms and PTSD. Work and clear communication of directives/precautionary measures also helped reduce psychiatric symptoms.

Conclusions Many health care workers were emotionally affected and traumatized during the SARS outbreak. Hence, it is important for health care institutions to provide psychosocial support and intervention for their health care workers.

Key words Health care workers; post-traumatic stress disorder; severe acute respiratory syndrome.

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Introduction

Severe acute respiratory syndrome (SARS) is an emerging infectious viral disease caused by the SARS-associated corona virus and is characterized by both an atypical pneumonia and efficient nosocomial transmission, with a high rate of transmission to health care workers [1–4].

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The initial clinical features of SARS are non-specific, the physical signs on chest examination are minimal and a chest radiograph may be normal during week 1 of the illness. Therefore, in the early stages SARS may be hard to differentiate from other viral infections and diagnostic delays may contribute to the spread of the epidemic.

The largest outbreak to date in Singapore began in mid-March 2003 and was traced to a traveller returning from Hong Kong. As of 30 April a total of 201 probable cases of SARS and 722 suspect cases had been reported in Singapore. Twenty-two (11%) patients required mechanical ventilation and 25 died (case-fatality proportion 12.5%). There were 84 (42%) health care workers with probable SARS of whom 49 were nurses, 13 were physicians and 22 were persons with other occupations (attendants, radiographers, housekeepers, a porter and a cleaning supervisor): no SARS cases were reported among laboratory workers or pathologists. On the basis of surveillance reports 153 (76%) infections were acquired in a health care facility. Hence, stringent control measures were instituted for health care workers at all health care facilities in Singapore by 9 April. These included the mandatory use of personal protection equipment such as gloves, gowns and N95 masks or equivalent respirators when attending to patients with febrile illness and suspected or probable SARS, as well as temperature checks for fever twice daily [5].

Despite a large epidemiological literature on communicable diseases there is little information available regarding the psychological impact on health care workers or interventions for supporting health care workers and patients during disease outbreaks. Not surprisingly, research publications related to the SARS outbreak have also focused primarily on the epidemiology and disease process. At the time of reporting, only Maunder et al. [6] had described the immediate psychological impact of SARS on the staff in a teaching hospital in Toronto. Hence, research specific to this area is limited.

This study describes the emotional impact of SARS on doctors and nurses who were working in a medium size regional general hospital 2 months after the first case of SARS was reported in Singapore.

**Methodology**

A set of self-report questionnaires were sent to all the doctors and nurses working in the hospital together with a cover note explaining the purpose of the survey. An e-mail was sent to all doctors and nurse managers to inform them about the survey and also to encourage participation. Participation was strictly voluntary and the responses were anonymous. Boxes were placed at various designated work areas for drop-off and collection of responses.

The questionnaires consisted of demographics, the General Health Questionnaire (GHQ) 28, the Impact of Events Scale (IES) and a set of questions enquiring about changes in life’s priorities and circumstances that helped them to cope with the SARS situation better.

**Self-report measures**

1. The GHQ 28 is a self-administered 28-item screening test aimed at detecting psychiatric caseness in community settings [7].
2. The IES is a self-administered 15-item questionnaire that has been used widely for assessing post-traumatic stress disorder (PTSD) symptoms in a wide variety of trauma populations [8]. The threshold score for this instrument varies between 25 and 40 for a person at risk of PTSD. The IES has been shown to be the best of several measures when it comes to diagnostic performance, with one study showing a threshold of 35 assigning a correct diagnosis of PTSD to 89% of subjects [9]. Hence, in this study a score $>30$ was chosen for indicating PTSD.
3. Questionnaire on changes in life’s priorities and coping (see the Appendix). This questionnaire was developed specifically for this study, as there were no suitable scales available for measuring changes in life’s priorities and coping among health care workers as a result of SARS. The questionnaire was meant to be descriptive and, hence, it was not validated. This was a 15-item questionnaire on a six-point scale ($1 = strongly disagree, 2 = disagree, 3 = not sure but probably disagree, 4 = not sure but probably agree, 5 = agree and 6 = strongly agree$). It was composed of two subscales, a six-item subscale looking at possible changes in life’s priorities as a result of SARS and a nine-item subscale looking at the circumstances that helped contribute to coping with the SARS situation. The first subscale looked at the importance of health, relationship with the family, friends and colleagues, work and spiritual beliefs in their lives. The second subscale explored the importance in helping them cope with the SARS situation of clear communication of directives and disease information about SARS, precautionary measures taken at work, being able to give feedback to management, the support of a supervisor/manager/head of department, colleagues and family, being able to confide in someone and religious convictions.

**Statistical analysis**

All analyses were performed using SPSS 11.0. Descriptives of the GHQ 28 and IES scores were presented using means (SD), ranges and medians. Associations between categorical variables were assessed using the $\chi^2$/Fisher’s exact test. A factor analysis was
performed in order to cluster the factors that the participants felt for coping strategies and changes in life’s priorities were important during this SARS situation. Finally, logistic regression analysis was performed in order to determine the predictors (the reduced factors for the coping strategies and changes in priorities determined from the factor analysis) indicative of psychiatric symptoms. Statistical significance was set at \( P < 0.05 \).

**Results**

Group A consisted of health care workers who were first-generation contacts or who had direct contact with suspect or probable SARS patients. Nine of these health care workers were subsequently transferred to the SARS-designated hospital in Singapore for observation and/or were later diagnosed as suspect or probable cases. There were 32 out of 44 (73%) doctors and 74 out of 103 (72%) nurses who responded to the survey in group A.

Group B consisted of health care workers who did not have direct contact with any suspect or probable SARS patients. There were 81 out of 189 (43%) doctors and 474 out of 657 (72%) nurses who responded to the survey in group B. In total, 67% (661 out of 993) responded from the four groups. The demographics for the four groups are given in Table 1.

A GHQ 28 case is one who had a total GHQ 28 score of 5 or above. Table 2 gives the descriptive statistics for the GHQ 28 total score and subscales and Table 3 gives the breakdown of cases for the four groups. In total, there were 177 out of 660 cases (27%) with the doctors being 1.6 times (95% CI = 1.1–2.5) more likely to experience psychiatric symptoms compared with the nurses (\( P = 0.026 \)). Single health care workers were 1.4 times (95% CI = 1.02–2.0) more likely to experience

| Table 1. Demographics of the participants |
|------------------------------------------|
| Group A doctor (\( n = 32 \)) | Group B doctor (\( n = 81 \)) | Group A nurse (\( n = 74 \)) | Group B nurse (\( n = 474 \)) |
| Age group (years) |
| <25 | 3 (9.4) | 4 (5.1) | 13 (17.6) | 93 (19.7) |
| 25–30 | 15 (46.9) | 30 (38.0) | 22 (29.7) | 154 (32.6) |
| 31–40 | 11 (34.4) | 29 (36.7) | 17 (23.0) | 122 925.8 |
| 41–50 | 1 (3.1) | 12 (15.2) | 11 (14.9) | 70 (14.8) |
| >51 | 2 (6.3) | 4 (5.1) | 11 (14.9) | 34 (7.2) |
| Race |
| Chinese | 24 (75.0) | 77 (95.1) | 39 (54.9) | 232 (51.9) |
| Malay | 1 (3.1) | 0 (0) | 10 (14.1) | 71 (15.9) |
| Indian | 6 (18.8) | 4 (4.9) | 5 (7.0) | 50 (11.2) |
| Others | 1 (3.1) | 0 (0) | 17 (24.0) | 94 (21.0) |
| Marital status |
| Single | 18 (56.3) | 33 (40.7) | 41 (56.2) | 220 (46.7) |
| Married | 14 (43.8) | 48 (59.3) | 28 (34.8) | 251 (53.3) |
| Work place |
| Medical intensive care unit | 3 (9.4) | 2 (2.8) | 0 (0) | 37 (8.5) |
| Accident and emergency | 2 (6.3) | 10 (13.9) | 7 (9.6) | 2 (0.5) |
| Fever ward | 4 (12.5) | 0 (0) | 33 (45.2) | 0 (0) |
| General | 20 (62.5) | 37 (51.4) | 33 (45.2) | 239 (54.9) |
| Others | 3 (9.4) | 23 (31.9) | 0 (0) | 157 (36.1) |

Values are given as \( n (\%) \).

| Table 2. Descriptive statistics for the GHQ 28 and IES scores |
|-----------------------------------------------|
| GHQ 28—somatic | Group A doctor | Group B doctor | Group A nurse | Group B nurse |
| 1.5 (2.1) | 1.3 (1.9) | 1.1 (1.8) | 1.1 (1.7) |
| GHQ 28—anxiety | 0.9 (1.8) | 0.8 (1.4) | 0.7 (1.1) | 0.6 (1.2) |
| GHQ 28—social | 1.8 (2.4) | 1.5 (2.1) | 0.8 (1.5) | 1.1 (1.8) |
| GHQ 28—depression | 0.6 (1.1) | 0.4 (0.9) | 0.3 (0.6) | 0.4 (1.0) |
| GHQ 28—total | 4.8 (6.4) | 4.0 (5.6) | 2.9 (4.1) | 3.2 (4.9) |
| IES—intrusive | 7.0 (7.8) | 7.7 (7.7) | 7.1 (6.2) | 6.9 (6.7) |
| IES—avoidance | 8.1 (8.6) | 7.7 (8.3) | 9.7 (7.6) | 9.1 (8.4) |
| IES—total | 15.1 (15.8) | 15.4 (15.4) | 16.8 (12.9) | 16.0 (14.6) |

Values are given as means (SD).
psychiatric symptoms compared with married health care workers ($P = 0.048$). There were differences in the experience of psychiatric symptoms between the doctors and nurses of groups A and B (33 versus 26%) ($P = 0.123$).

Tables 4 and 5 show the responses of the participants to changes in life’s priorities and the coping questionnaires. The following components were determined by performing factor analyses on the two sets of questionnaires separately.

1. Four factors were classified for changes in life’s priorities (explaining 92% of the variance): health and relationship with the family, relationship with friends and colleagues, work and spiritual beliefs.

2. Six factors were classified for the coping strategies (explaining 91% of the variance): clear communication of directives and precautionary measures, feedback to hospital management and support from administration, support from supervisors and colleagues, support from the family, being able to talk to someone and religious convictions.

Two separate logistic regressions with the above factors were carried out in order to look at what would predict psychiatric symptoms (GHQ 28 score $\geq 5$). The results showed that those who felt that work had become more important ($P < 0.001$, OR = 0.34 and 95% CI = 0.21–0.54) as well as those who agreed that support from supervisors/colleagues ($P = 0.003$, OR = 0.35 and 95% CI = 0.17–0.69) and clear communication of directives/precautionary measures ($P = 0.020$, OR = 0.51 and 95% CI = 0.29–0.90) helped them to cope better were less likely to develop psychiatric symptoms. There were no significant differences between groups A and B in psychiatric symptoms for both the more important ($P = 0.296$) and coping ($P = 0.417$) factors (see Table 6).

Twenty per cent of the doctors and nurses were suffering from PTSD (given by an IES total score $\geq 30$) (see Table 7). Logistic regression analyses showed that only those who perceived that they were obtaining support from supervisors/colleagues ($P = 0.003$, OR = 0.33 and 95% CI = 0.16–0.69) were least likely to have PTSD. None of the more important factors were significant. There were also no differences between groups A and B (see Table 6).

### Table 3. Distribution of GHQ 28 total scores $\geq 5$ by group

|                     | Yes      | No       | $P$-value |
|---------------------|----------|----------|-----------|
| Participants        |          |          |           |
| Group A doctor      | 13 (40.6)| 19 (59.4)|           |
| Group B doctor      | 27 (33.3)| 54 (66.7)|           |
| Group A nurse       | 22 (29.7)| 52 (70.3)|           |
| Group B nurse       | 115 (24.5)| 355 (75.5)|           |
| Marital status      |          |          | 0.048     |
| Single              | 93 (30.1)| 216 (69.9)|           |
| Married             | 80 (23.3)| 264 (76.7)|           |

### Table 4. Responses to the item: because of the SARS situation the following have become more important to me

|                               | Group A doctor | Group B doctor | Group A nurse | Group B nurse |
|-------------------------------|----------------|----------------|---------------|--------------|
| My health                     | 54.8           | 77.6           | 93.2          | 94.2         |
| My relationship with my family| 74.2           | 78.2           | 93.2          | 93.3         |
| My relationship with my friends| 64.5           | 67.9           | 87.7          | 88.9         |
| My relationship with my colleagues | 46.7           | 62.8           | 89.0          | 85.7         |
| My work                       | 36.7           | 48.1           | 87.7          | 83.7         |
| My spiritual beliefs          | 48.4           | 59.7           | 86.3          | 81.2         |

Values are given as percentages.

### Table 5. Responses to the item: things that helped me to cope with the SARS situation

|                                                   | Group A doctor | Group B doctor | Group A nurse | Group B nurse |
|---------------------------------------------------|----------------|----------------|---------------|--------------|
| Clear communication of directives and disease information about SARS | 67.7           | 76.5           | 94.5          | 94.8         |
| Precautionary measures taken at work               | 74.2           | 84.8           | 93.2          | 95.7         |
| Being able to give feedback to hospital management | 58.1           | 58.2           | 80.8          | 82.1         |
| Support from hospital administration               | 38.7           | 51.9           | 83.6          | 86.0         |
| Support from my supervisor/manager/head of department | 61.3           | 68.4           | 86.3          | 88.3         |
| Support from my colleagues                         | 64.5           | 67.1           | 90.4          | 88.8         |
| Support from my family                             | 80.6           | 81.3           | 95.9          | 95.4         |
| Being able to talk to someone about my concerns    | 64.5           | 69.6           | 91.8          | 90.9         |
| My religious convictions                           | 56.7           | 67.9           | 80.8          | 79.9         |

Values are given as percentages.
The rapid changes in medical practice in the past quarter of a century have stimulated considerable interest in understanding the emotional health and perceptions of health care workers about their work. Some studies performed in the UK have shown that the prevalence of psychiatric disorders using the 12-item GHQ amongst doctors and nurses was between 28 and 32% [10–12]. To date there has been no published literature on the prevalence of psychiatric disorders among health care workers in Singapore. However, a survey carried out by the authors in June 2002 in this same hospital showed a similar prevalence of between 28 and 35% for psychiatric disorders among doctors and nurses using the 28-item GHQ (unpublished data).

From this survey, although it was perceived that the SARS situation had greatly impacted on the emotional state of health care workers, there was no significant change in the prevalence of psychiatric disorders among health care workers (35% of doctors and 25% of nurses) in this hospital who responded. However, doctors were more likely than nurses to suffer from a psychiatric disorder and health care workers who were single were at higher risk. Interestingly, there was no significant difference between those who were or were not exposed to SARS patients and those working in high-risk areas or those in the general wards. Although this result was rather unexpected, it could be explained. In Singapore all suspect or probable cases of SARS are transferred immediately upon diagnosis to the SARS-designated hospital. The hospital in this study was not the SARS-designated hospital and only a small number of SARS patients were identified here. Perhaps this limited contact with SARS patients in the study hospital may have resulted in this unexpected outcome. Whatever the reason, the SARS situation did affect health care workers, regardless of exposure to SARS patients or work areas. Hence, psychological support and programmes should target all health care workers in all work areas.

Since the SARS outbreak, doctors have had to be extra vigilant when examining and reviewing patients. The burden of ensuring that suspect or probable cases of SARS are transferred immediately upon diagnosis to the SARS-designated hospital. The hospital in this study was not the SARS-designated hospital and only a small number of SARS patients were identified here. Perhaps this limited contact with SARS patients in the study hospital may have resulted in this unexpected outcome. Whatever the reason, the SARS situation did affect health care workers, regardless of exposure to SARS patients or work areas. Hence, psychological support and programmes should target all health care workers in all work areas.

## Discussion

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## Table 6. Multivariate logistic regression on GHQ 28 scores ≥5 and IES scores ≥30

|                          | GHQ 28 score ≥5 |                 |                 | IES score ≥30 |                 |                 |
|--------------------------|-----------------|-----------------|-----------------|---------------|-----------------|-----------------|
|                          | P-value          | OR              | 95% CI          | P-value        | OR              | 95% CI          |
| More important factors   |                 |                 |                 |               |                 |                 |
| Health and relationship with family | 0.495           | 0.788           | 0.40–1.56       | 0.984          | 1.01            | 0.47–2.17       |
| Relationship with friends and colleagues | 0.531           | 1.22            | 0.65–2.29       | 0.635          | 0.64            | 0.34–1.20       |
| Work                     | <0.001          | 0.34            | 0.21–0.54       | 0.121          | 0.63            | 0.36–1.13       |
| Spiritual beliefs        | 0.999           | 1.0             | 0.60–1.67       | 0.06           | 2.03            | 0.97–3.78       |
| Group A versus group B   | 0.296           | 1.28            | 0.80–2.04       | 0.665          | 0.88            | 0.51–1.54       |
| Coping factors           |                 |                 |                 |               |                 |                 |
| Clear communication of directives and precautionary measures | 0.020           | 0.51            | 0.29–0.90       | 0.581          | 0.81            | 0.37–1.74       |
| Being able to give feedback to hospital management and support from hospital administration | 0.667           | 0.86            | 0.44–1.69       | 0.830          | 1.1             | 0.54–2.14       |
| Support from supervisors and colleagues | 0.003           | 0.35            | 0.17–0.69       | 0.003          | 0.33            | 0.16–0.69       |
| Support from my family   | 0.648           | 0.83            | 0.38–1.84       | 0.654          | 0.82            | 0.35–1.94       |
| Being able to talk to someone about my concerns | 0.844           | 1.07            | 0.56–2.04       | 0.748          | 1.13            | 0.55–2.30       |
| My religious convictions  | 0.526           | 0.86            | 0.55–1.36       | 0.135          | 1.52            | 0.88–2.62       |
| Group A versus group B   | 0.417           | 1.22            | 0.75–1.98       | 0.774          | 0.92            | 0.53–1.61       |

## Table 7. Distribution of IES total scores ≥30 by group

| Participants       | Total IES score ≥30 | P-value |
|--------------------|---------------------|---------|
|                    | Yes     | No     |
| Group A doctor     | 6 (18.8) | 26 (81.3) |
| Group B doctor     | 16 (19.8) | 65 (80.2) |
| Group A nurse      | 14 (19.4) | 58 (80.6) |
| Group B nurse      | 91 (19.5) | 375 (80.5) |
2 months after the outbreak of SARS, the IES scores suggested that approximately 20% of the doctors and nurses were suffering from PTSD. This was considerably higher than was reported in the June 2002 survey, which showed a prevalence rate of 8% using the Posttraumatic Stress Disorder Checklist (unpublished data). It was expected that those who had been exposed to SARS patients would be more traumatized, but interestingly there was no significant difference between the two groups. This implied that the SARS situation was perceived by all to be an equally traumatic experience regardless of exposure experience to SARS patients.

Many health care workers in Singapore had friends and/or family who were also health care workers. Forty-two per cent of those diagnosed to be infected by SARS were health care workers and five of them eventually died. Maunder et al. [6] highlighted the emotional effects on health care workers whenever other health care workers were admitted with an unclear infection and the strong emotional identification with these colleagues who later became patients. In addition, the media during this period was constantly highlighting the morbidity and mortality rates of SARS, focusing particularly on index cases and affected health care workers. Hence, the authors postulated that many health care workers were traumatized either directly or vicariously as a consequence.

It is common, almost expected for health care workers, particularly doctors, to neglect their health and their families, as well as other relationships. Hence, it was interesting to note that the following had become more important to them: their own health and their relationship with their families, their relationship with friends and colleagues, their work and their religious beliefs.

Doctors and nurses who experienced psychiatric symptoms (GHQ 28 score >5) were more likely to report that they did not perceive the support from their supervisor or head of department to be helpful and their work did not become more important to them. In contrast, doctors and nurses who reported that the support from their colleagues and clear communication of directives/precautionary measures helped them to cope better with the SARS situation were emotionally less distressed (GHQ 28 score <5) and less traumatized (low IES score). This is consistent with the findings of Freeborn [13], who perceived that control over the practice environment, support from colleagues and satisfaction with the availability of resources were associated with higher levels of physician satisfaction at work and organizational commitment. Suchman [14] pointed out that it was important for health care organizations to appreciate the powerful adverse effects of internal factors such as leadership, management styles and administrative policies and to foster a healthy organizational culture through thoughtful attention to communication, relationships, self-awareness and the symbolic significance of policies and behaviours.

SARS has left an indelible mark on health care. Its rapidity of transmission, concentration in health care settings and impact on health care workers has highlighted the need for reviewing existing health care practices and organizational culture. Traditionally, stress in the workplace has been seen as the responsibility of the individual worker, in that programmes are focused on improving the individual’s ability to cope with stress. However, current research has signalled the importance of stress in the context of the organization where job tasks and job roles, patterns of communication and cultural norms are key factors in reducing worker stress [15]. Support services are essential if health care workers’ stress and needs are to be addressed. These should be flexible, collegial and varied in form. Some of these services should include stress management programmes, critical incident stress management and peer support programmes.

The peer support programme is a voluntary, systems-wide, peer help, crisis counselling intervention for assisting employee victims in dealing with the psychological aftermath of patient assaults on staff. Just prior to this outbreak, our hospital initiated a peer support programme, which later played a special role in supporting the administrative leadership during the outbreak and assessment of affected staff and patient needs, as well as the organization of a supportive institutional response to address feedback from health care workers. The results of this survey and informal feedback from other health care institutions have shown that health care workers would certainly benefit from more support from colleagues and peers during times of crisis. Perhaps hospitals could consider providing a similar peer support system for their health care workers if they do not already have such programmes in place.

The SARS outbreak has highlighted the emotional and occupational vulnerabilities of health care workers. Health care organizations will not only have to take another look at existing infectious disease control measures and practices, but also psychosocial support for their health care workers.

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