

# Survey of Stress Reactions Among Health Care Workers Involved With the SARS Outbreak

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**The outbreak of severe acute respiratory syndrome (SARS) was unique because it was highly concentrated in health care settings and a large number of health care workers were infected. This study investigated stress reactions among 338 staff members in a hospital in East Taiwan that discontinued emergency and outpatient services to prevent possible nosocomial outbreak. Seventeen staff members (5 percent) suffered from an acute stress disorder; stepwise multiple logistic regression analysis determined that quarantine was the most related factor. Sixty-six staff members (20 percent) felt stigmatized and rejected in their neighborhood because of their hospital work, and 20 of 218 health care workers (9 percent) reported reluctance to work or had considered resignation. (*Psychiatric Services* 55: 1055–1057, 2004)**

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The outbreak of severe acute respiratory syndrome (SARS) in multiple countries—especially in Asian countries and Canada—is believed to have been caused by a newly discovered SARS-associated coronavirus (1). The first case of SARS that was identified in Taiwan was on March 14, 2003, in a traveler from Guangdong Province, China. SARS then spread to multiple regions of Taiwan, with 664 cases ultimately identified; by the end of June 2003, 184 patients had died. SARS was unique in its speed of transmission, its high concentration in health care settings, and the large number of health care workers who were infected (2–4). In fact, more than 70 percent of patients who tested positive for SARS by the use of a polymerase chain reaction assay had the origin of their disease traced back to a hospital (5).

In Taiwan a total of 105 health care workers became infected with SARS, and 12 of these workers ultimately died (5). Four hospitals had to discontinue emergency and outpatient services to prevent possible nosocomial infection. The outbreak of SARS caused not only extraordinary public health concerns but also tremendous psychological distress, particularly among health care workers. The known lethality of the syndrome as well as the intense media coverage of the outbreak exacerbated perceptions of personal danger. Staff members were discouraged from interacting with col-

leagues, thereby increasing feelings of isolation (6). Infection control procedures were frequently modified because of the evolving understanding of SARS. Health care workers spent hours each day putting on and removing airtight protective equipment, which only added to the exhaustion that the workers were experiencing from the increased workload that was caused from the SARS outbreak. Health care facilities became highly stressful environments (7).

We report here the stress reactions of staff members in a 2,500-bed psychiatric teaching hospital. The hospital, which is located in Hua-Lien, East Taiwan, also provides medical and surgical services to local residents. The hospital has 120 medical and surgical beds and averages 100,000 outpatient visits and 2,000 operations a year. Between May 10 and May 18, 2003, eight soldiers from the same squad successively presented to the emergency department, complaining of a fever and cough. On May 18 one nurse who had worked in the emergency department developed a fever. On May 19 the local anti-SARS team leader instructed the hospital to cease all outpatient and emergency services to prevent possible nosocomial transmission. Fifty-seven staff members who may have come in contact with suspected SARS cases were quarantined. Fortunately, all staff members were cleared of having SARS after nine days of quarantine, but all had

**Table 1**

Demographic characteristics and stress reactions among 338 staff members who were working in a hospital in East Taiwan that discontinued emergency and outpatient services to prevent a possible nosocomial outbreak of severe acute respiratory syndrome (SARS)<sup>a</sup>

Item	Total sample (N=338)		Health care workers (N=218)		Administrative personnel (N=79)		p	Quarantined staff (N=41)		Nonquarantined staff (N=297)		p
	N	%	N	%	N	%		N	%	N	%	
Age (mean±SD years)	39.1±9.4		36.9±8.9		41.7±9.1		<.001	36.6±9.7		39.2±9.4		ns
Male	163	49	74	34	59	76	<.001 <sup>b</sup>	19	46	136	48	ns
Married	230	70	140	65	59	77	ns	28	68	193	69	ns
More than 12 years of education	181	60	129	68	44	59	ns	23	64	154	60	ns
Mean±SD years in occupation	12±7.2		11.1±7.2		14.1±7.1		.004	9.9±6.8		12.3±7.2		ns
Ever been quarantined	41	13	37	18	3	4	.002 <sup>b</sup>					
Health care workers	218	64						37	93	174	70	.002 <sup>b</sup>
Feared getting in- fected with SARS	111	33	81	37	23	30	ns	18	45	90	32	ns
Pessimism or hopelessness	40	12	31	15	7	9	ns	8	20	30	11	ns
Absence of emotional response	21	6	15	7	4	5	ns	4	10	17	6	ns
Exhaustion	51	15	44	20	6	8	.009 <sup>b</sup>	13	32	38	13	.005 <sup>b</sup>
Reduced awareness or being in a daze	19	6	12	6	7	9	ns	3	8	16	6	ns
Detachment from others	32	10	25	12	6	8	ns	9	22	23	8	.001 <sup>b</sup>
Always wore mask and protective equip- ment, even in open spaces	19	6	13	6	4	5	ns	5	12	14	5	ns
Invest a majority of free time reading or watching SARS- related information	169	50	116	54	34	44	ns	19	46	147	52	ns
Anxiety when dealing with febrile patients	56	17	40	19	14	18	ns	13	33	39	14	.004 <sup>b</sup>
Avoided SARS-related information	20	6	11	5	5	6	ns	3	8	17	6	ns
Anxiety	44	13	36	17	6	8	ns	8	20	34	12	ns
Irritability	16	5	14	7	2	3	ns	6	15	10	4	.008 <sup>b</sup>
Insomnia	35	10	31	14	4	5	.04 <sup>b</sup>	9	22	26	9	.026 <sup>b</sup>
Uncertainty about frequent modifica- tion of infection control procedures	92	27	75	35	14	18	.006 <sup>b</sup>	14	35	75	26	ns
Poor concentration and indecisiveness	24	7	16	8	7	9	ns	7	18	17	6	.018 <sup>b</sup>
Afraid to go home because of fear of infecting family	52	15	39	18	11	14	ns	14	34	37	13	.002 <sup>b</sup>
Deteriorating work performance	21	6	14	7	6	8	ns	8	20	13	5	.002 <sup>b</sup>
Reluctant to work or considered resignation	24	7	20	9	3	4	ns	10	24	13	5	<.001 <sup>b</sup>
Depressed mood	38	11	31	14	6	8	ns	6	15	32	11	ns
Stigmatization and re- jection in neighbor- hood because of hospital work	66	20	47	22	15	19	ns	14	34	49	17	.002 <sup>b</sup>
Met criteria for an acute stress disorder	17	5	11	5	5	6	ns	7	17	10	4	.002 <sup>b</sup>

<sup>a</sup> Data were not available for all questions.

<sup>b</sup> Fisher's exact test

endured tremendous stress during the quarantine period. This study surveyed SARS-related stress reactions among all hospital staff members during the SARS outbreak.

## Methods

The authors designed an anonymous SARS-related stress reactions questionnaire, composed of acute stress disorder criteria according to *DSM-IV* criteria and related emotional and behavioral changes. It was hoped that the anonymity would allow colleagues to feel less embarrassed about expressing their psychological stress. On May 29, after all quarantined members had returned to work, the personnel department sent the questionnaires to 557 staff members in all departments (402 health care workers and 155 administrative personnel), with instructions to complete the questionnaire within one week. The filled-out questionnaire was then to be put in a departmental collection box, for collection and return to the personnel department on June 5.

The statistical significance level was set at 5 percent for two-sided tests. The software package SPSS 10.0 for Windows was used for statistical analysis.

## Results

Three hundred and thirty-eight staff members completed the questionnaires, giving a total response rate of 61 percent. Health care workers were defined as the doctors, physician assistants, and nursing staff members who had direct contact with patients every day, whereas all other staff members—including accountants and sanitary teams—were defined as administrative personnel. A total of 41 questionnaires did not identify the respondents' duties; therefore, responses were obtained from 218 health care workers and 79 administrative personnel, for response rates of 54 and 51 percent, respectively. Seventeen staff members (5 percent) met the criteria for an acute stress disorder, stepwise multiple logistic regression analysis determined that quarantine was the most related factor ( $\beta=1.405$ , standard error=.647, odds ratio=4.077, 95 percent confidence interval=1.148 to 14.48).

SARS-related stress reactions in the total sample, comparisons between health care workers and administrative personnel, and comparisons between quarantined and nonquarantined staff members are shown in Table 1.

Sixty-six staff members (20 percent) reported feeling stigmatized and rejected in their neighborhood because of their hospital work, and 52 staff members (15 percent) did not go home after work during the outbreak for fear of infecting their family.

In contrast to administrative personnel, health care workers reported experiencing significantly more insomnia, exhaustion, and uncertainty about the frequent modifications to infection control procedures. Twenty health care workers (9 percent) reported that they were reluctant to work during the outbreak or had considered resignation.

## Discussion

This report is very preliminary. Generalization of the results is limited by the type of institution and by the time that had elapsed from the most stressful period of the nine-day quarantine to when all staff members had been excluded as probable SARS cases. Psychological stress may have been greater and more sustained among workers in SARS treatment centers. Other limitations were the moderate response rate; the voluntary nature of the survey, which may have created a selection bias; and a lack of validity in the absence of face-to-face interviews. Anonymity may have allowed staff members to feel comfortable in reporting their stress, but it prevented the tracing and investigation of nonresponders and follow-up of staff members who needed help. Nevertheless, this preliminary report should contribute to the understanding of stress reactions among health care workers who were involved in the SARS outbreak.

These findings suggest that there is a role for providing accurate and timely SARS information to health care workers and the public to reduce uncertainty and minimize stigmatization of health care workers. Providing suitable accommodation to health care workers would benefit those who

are concerned about the risk of infecting loved ones.

The results highlight the value of shortened work hours as a means by which the tremendous stress caused by a SARS outbreak can be reduced and the value of unambiguous information in reducing uncertainty.

Quarantined staff members were at a high risk of developing an acute stress disorder. In addition, almost a quarter of the respondents who were quarantined were reluctant to work or had considered resignation. Although the hospital's psychiatric team tried to support staff members with informal support groups and education about relaxation techniques, there was clearly a need for more psychosocial support and follow-up programs.

## Conclusions

The past quarter century has seen the emergence of several new diseases, but the SARS outbreak was unique because of the speed at which SARS was transmitted, the high concentration of cases in health care settings, and the large number of health care workers who were infected (5). Organizations will need to develop an integrated administrative and psychosocial response to the occupational and psychological challenges that are caused by future outbreaks of this nature. ♦

## References

1. Kuiken T, Fouchier RA, Schutten M, et al: Newly discovered coronavirus as the primary cause of severe acute respiratory syndrome. *Lancet* 26:263–270, 2003
2. Koh D, Lim MK, Chia SE: SARS: health care work can be hazardous to health. *Occupational Medicine* 53:241–243, 2003
3. Cluster of severe acute respiratory syndrome cases among protected health-care workers—Toronto, Canada, April 2003. *Morbidity and Mortality Weekly Report* 52: 433–436, 2003
4. Fletcher M: SARS: nurses among first quarantined. *Canadian Nurse* 99:12, 2003
5. SARS Online Information Center. Center for Disease Control, Department of Health, Taiwan, ROC. Available at [www.cdc.gov.tw/sarsen](http://www.cdc.gov.tw/sarsen)
6. Maunder R, Hunter J, Vincent L, et al: The immediate psychological and occupational impact of the 2003 SARS outbreak in a teaching hospital. *Canadian Medical Association Journal* 168:1245–1251, 2003
7. Severe acute respiratory syndrome—Taiwan, 2003. *Morbidity and Mortality Weekly Report* 52:461–466, 2003