Anxiety among university students during the SARS epidemic in Hong Kong

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Summary
A questionnaire survey was conducted during the Severe Acute Respiratory Syndrome (SARS) epidemic to assess the anxiety level and the perceived sources of stress among students from two universities where the outbreak occurred in the teaching hospital of one of the universities. The anxiety level caused by SARS in medical students at the teaching hospital was higher than in non-medical students in the same university and lowest in students of the other university situated 20 km away from the affected hospital. Copyright © 2006 John Wiley & Sons, Ltd.

Key Words
SARS; anxiety; students; Hong Kong

Introduction
The epidemic of the Severe Acute Respiratory Syndrome (SARS) in Hong Kong in 2003 affected 1755 individuals over 4 months (SARS expert committee, 2003). The first hospital outbreak occurred in the Prince of Wales Hospital (PWH), a teaching hospital of the Chinese University of Hong Kong (CUHK), where over 150 patients—including 17 medical students—were infected within 2 weeks (SARS expert committee, 2003). The health and social impact of SARS to the community was considerable and several studies have reported its psychological impact on health care workers (Tam, Pang, Lam, & Chiu, 2004; Wong et al., 2005) and medical students (Wong et al., 2004a). To assess the anxiety level and psychological impact of the outbreak on medical students in the CUHK and to compare their response with non-medical university students, a questionnaire survey was conducted on medical students, students of other disciplines in the CUHK and students of the Hong Kong University of Science and Technology (HKUST), situated some 20 km away from the PWH during the outbreak. The latter university does not have a medical school.

Materials and methods
From April to June 2003, a self-administered questionnaire (in MS access format) was created on the Web, and an e-mail containing the link to its web-page was sent to students of the two universities. The e-mail invited the students to fill in the questionnaire online. After a student completed and returned the questionnaire to the database, the questionnaire would be checked for

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completeness. If any ambiguous responses or incomplete questionnaires were found, an e-mail would be sent to the student for clarification.

The questionnaire obtained information on their demographic characteristics, anxiety levels and perceived sources of stress (reflected by how they felt towards the SARS outbreak). The anxiety levels were measured using Zung’s self-rating anxiety scale (Zung, 1971), which consisted of 20 questions (five of which were reverse questions). A four-point Likert-type scale, comprising 1 (never or very rare), 2 (sometimes), 3 (often) and 4 (very often or always), was used to grade their response. A high score corresponds to a high anxiety level. The students’ perceived sources of stress from the SARS outbreak were measured with a 20-item scale that described various situations encountered during the SARS outbreak. A six-point Likert-type scale, ranging from 1 (no) to 6 (severe) was used to grade their response. Demographic data included gender, age, university, faculty, and year of study. Since the outbreak was an unprecedented public health emergency, the items were constructed based on interviews of SARS patients and health care workers at PWH as well as reference to the Life Experience Survey (Sarason, Johnson, & Siegel, 1978). The questionnaire was reviewed by a panel (comprising an epidemiologist, a public health doctor, a behavioural scientist and a psychologist).

Data were first divided into three groups according to institution and faculty—namely, medical students of CUHK, non-medical students of CUHK and students of HKUST. The first group comprised only undergraduates while a few graduate students were included in the latter two groups. Between-group comparisons for each question were made using the Kruskal–Wallis test (Higgins, 2004). The summary score for the anxiety scale in each group was calculated from the direct questions and reverse questions (which were recoded).

Results

Seven hundred and sixty-three students returned the questionnaire between mid-April and early June 2003: 190 (24.9 per cent) from medical students of CUHK, 295 (38.7 per cent) from students of other faculties of CUHK and 278 (36.4 per cent) students (all non-medical) from HKUST. The response rates were low: 27 per cent for the medical students, and less than 20 per cent for the two other groups. The number of male students of the three groups were 115 (60.8 per cent), 242 (82.0 per cent) and 150 (54.0 per cent), respectively, with significantly more males in the non-medical students of CUHK. The average ages of the groups were respectively, 21.8 (standard deviation, $\text{SD} = 1.74$; minimum, $\text{Min} = 18$; maximum, $\text{Max} = 28$), 22.1 ($\text{SD} = 4.58$; $\text{Min} = 18$; $\text{Max} = 49$) and 22.8 ($\text{SD} = 4.94$; $\text{Min} = 16$; $\text{Max} = 50$). Less than 5 per cent of respondents were aged over 30 years in the latter two groups.

The mean scores of the 20 anxiety items for the three groups are shown in Table I. Eight out of 20 show significant differences between the three groups. There were also significant differences among the three groups in the summary anxiety scores of the 15 direct questions and the five reverse questions, as well as the overall scores (after recoding the reverse questions). The highest values were found for medical students in the CUHK, followed by non-medical CUHK students and finally, HKUST students. This difference was also observed when the results were analysed separately by gender. There was no relation between age and the mean score. Table II shows the results for the 20 items of the students’ perceived sources of stress from SARS. Nine out of 20 items show significant differences in their response.

Discussion

A web-based survey was conducted to assess the anxiety level and perceived sources of stress among students during the SARS outbreak in Hong Kong. This approach has several advantages—in particular, high efficiency and low cost (Best & Krueger, 2002). Coverage error, a well-recognized problem of e-mail surveys is of less concern because a comprehensive list of e-mail addresses was available for students in each university, which was used to contact students. The major limitations of the survey are the low response rates and the lack of information of the non-respondents. Selection bias can be substantial. Yet, systematic differences between respondents and non-respondents cannot be accurately ascertained. This severely limited the interpretation of the study results. In this survey, three groups of university students with similar socio-economic status were studied. It is reasonable to assume that respondents were more concerned about the SARS outbreak than non-respondents.
(and therefore took the trouble to respond to the survey). Their anxiety scores could therefore be higher than those of the non-respondents. However, it seems unlikely that the direction of this bias would differ between the groups. Hence, between-group comparisons are still valid.

The mean anxiety scores—highest for medical students, followed by non-medical students of CUHK, and lowest for HKUST students. The mean score of the medical students was just above the limit of the normal range 20–34 (Fruehwald, Loeffler-Stastka, Eher, Saletu, & Baumhackl, 2001), while those of the other two groups were slightly lower. Assuming that the observations were unbiased, one possible explanation for the observed differences between the three groups could be the distance of the respondents from the epicentre of the SARS outbreak. The outbreak of SARS started in the PWH, where most medical students lived. It is located about 7km from the CUHK main campus (where most non-medical students resided), while the HKUST is about 20 km away. Since a large number of medical students contracted SARS during the outbreak (Wong et al., 2004b), this group might have perceived a higher risk of contracting SARS. This hypothesis agrees with findings by Chen, Chung, Chen, Fang, and Chen (2003). Besides the geographical proximity of the CUHK campus to the hospital, the higher scores found among non-medical CUHK students (as compared to HKUST students, who share similar backgrounds) could also be explained by social interactions between the medical and non-medical students in the
CUHK campus or residential halls. The three groups were also quite different in how they felt towards the disease. Among the questions with significant differences in their scores, those pertaining to the facts and characteristics of the disease, such as the diagnosis, treatment and complications of SARS, and the risk of being infected, had significantly lower scores among the medical students. This suggests that knowledge of the disease might reduce one’s fear and anxiety, while inadequate understanding of SARS and its control measures might have accounted for the anxiety of visiting a hospital, as exemplified by higher scores among the non-medical CUHK and HKUST students. In contrast, the higher scores seen among medical students for questions relating to the spread of the disease and its control might have reflected a genuine worry about the immense difficulties faced by the health workers in controlling SARS. Likewise, medical students also scored higher in questions relating to the perceived risk to health care workers, and their feeling of being ostracized by the community. It should be noted however, that the between-group differences were small and of uncertain clinical significance.

This study was performed during the outbreak of the SARS epidemic in Hong Kong, with one group physically present in the hospital where the outbreak occurred. Wong et al. (2004a) conducted a similar study, which showed a lower perceived stress score in health care students compared to non-health care students. This was different from the results of this study and was attributed to a ‘fear of the unknown’. Wong’s study (Wong et al., 2004a) was targeted at a smaller number of medical and nursing students attending infection control training and an unspecified, much smaller group of non-health care students. Although the response rate among the health care students was high, the corresponding rate for the non-health care students was not provided. Nor was the sampling method in this group described. In contrast to this study, their medical and nursing students were from another teaching hospital that did not have any SARS cases (SARS expert committee, 2003). It was the only public hospital spared of the SARS outbreak and was situated some 15 km away from the nearest hospital with SARS in the same region. By contrast, a higher stress level among the CUHK medical students during the

Table II. Perceived source of stress among students.

|                                               | CUHK (M)  | CUHK (O)  | HKUST    |
|------------------------------------------------|-----------|-----------|----------|
| I feel that I might be infected by the SARS virus at any moment | 3.13 (1.08) | 3.14 (1.13) | 3.09 (1.26) |
| I worry that I have been infected**           | 1.86 (1.27) | 1.81 (1.16) | 2.26 (1.46) |
| I am afraid of going to hospital for consultation** | 1.69 (1.21) | 1.80 (1.41) | 2.23 (1.55) |
| I worry that my family members and friends will be infected. | 3.69 (1.21) | 3.60 (1.26) | 3.69 (1.34) |
| I feel SARS will spread quickly               | 4.25 (1.22) | 4.19 (1.09) | 4.13 (1.19) |
| I feel SARS would persist in the community for a long time** | 4.47 (1.09) | 3.92 (1.15) | 3.70 (1.26) |
| I feel SARS is easy to spread and difficult to prevent | 3.69 (1.18) | 3.64 (1.25) | 3.58 (1.40) |
| I feel that it is difficult to diagnose SARS patients* | 3.42 (1.29) | 3.75 (1.28) | 3.74 (1.30) |
| I feel that it is difficult to treat SARS patients* | 3.10 (1.30) | 4.07 (1.28) | 4.10 (1.29) |
| I feel that it is difficult to control the SARS epidemic in such a dense city as Hong Kong.*** | 3.93 (1.22) | 3.59 (1.24) | 3.45 (1.38) |
| I feel that SARS patients might have serious consequences** | 2.91 (1.35) | 3.75 (1.29) | 3.79 (1.48) |
| I worry about the poor relationship between family members/schoolmates/friends and me induced by SARS | 2.28 (1.35) | 2.32 (1.27) | 2.27 (1.33) |
| I feel the Government fails to provide enough, adequate and true information | 3.72 (1.54) | 3.46 (1.48) | 3.69 (1.50) |
| I feel SARS restricts my social meetings with my friends** | 3.81 (1.38) | 3.75 (1.45) | 3.39 (1.48) |
| I feel SARS restricts my shopping, sporting and other activities | 3.48 (1.51) | 3.46 (1.51) | 3.27 (1.53) |
| I am afraid to take any transport with air-conditioning | 2.26 (1.32) | 2.27 (1.30) | 2.43 (1.45) |
| I am afraid to take any public transport | 1.74 (1.14) | 1.63 (1.06) | 1.87 (1.28) |
| I am afraid to use lifts | 1.67 (1.11) | 1.67 (1.05) | 1.81 (1.20) |
| I am afraid my daily life will be interfered with | 2.73 (1.34) | 2.69 (1.39) | 2.68 (1.41) |
| I feel health care workers are at high risk** | 2.89 (1.41) | 1.27 (0.89) | 1.41 (1.19) |

* p-Value of Kruskal–Wallis test p < 0.05.
** p-Value of Kruskal–Wallis test p < 0.01.
outbreak could be related to the geographical proximity.

Despite the limitations of a low response rate and possible selection bias, there are lessons to be learnt from this study. A potential influenza pandemic is likely to cause great anxiety to the health care profession including medical students, as well as to the general public. Intensified training in infection control measures and the provision of clear guidelines should be provided to all medical students. In addition, stress management training, which has been shown to be effective in reducing depression and anxiety, should be provided to all students as a preventive measure during future outbreaks (Shapiro, Shapiro, & Schwartz, 2000).

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