Original Article

A Study on SARS Awareness and Health-seeking Behaviour – Findings from a Sampled Population Attending National Healthcare Group Polyclinics

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Abstract

Introduction: The study aimed to assess the effectiveness of massive SARS public education effort on SARS awareness and the conduct of those suspected of having SARS. Materials and Methods: Five hundred and ninety-three respondents attending the National Healthcare Group Polyclinics (NHGP) participated in the survey from 9 to 13 June 2003. Associations between awareness of SARS symptoms and (i) first action to be taken and (ii) mode of transportation used, if the respondent was suspected of having SARS, were analysed using Chi-square or Fisher's exact tests. Logistic regression was performed to adjust for relevant covariates. Results: The majority (92.7%) of the respondents were aware of SARS symptoms. Television (91.6%), newspaper (65.2%) and radio (30.4%) formed the top 3 sources of information on SARS. Slightly more than half (51.6%) of those who suspect themselves of having SARS would choose to visit their primary health care doctors, while 22.7% of the respondents would go to Tan Tock Seng Hospital (TTSH). If they suspected themselves to have SARS, most (84.9%) of the 578 respondents would react appropriately by taking the SARS ambulance or driving themselves to TTSH. However, 60 respondents would nonetheless take public transport to TTSH [by taxi 8.5%, mass rapid transit (MRT) or bus 1.9%]. In particular, the retired with lower educational levels were likely to be oblivious both to the symptoms of SARS and the possible consequences of travelling by inappropriate transport. Conclusion: Despite more than 2 months of intensive SARS public education in Singapore, there remain important gaps in knowledge and appropriate behaviour that have to be bridged.

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Key words: Knowledge, Transportation

Introduction

There was a worldwide outbreak of Severe Acute Respiratory Syndrome (SARS) caused by the novel coronavirus between November 2002 and July 2003.[1-5] Singapore was one of the hot spots, in addition to China, Taiwan, Hong Kong, Toronto and Vietnam.[1,3,6]

The World Health Organisation reported more than 8000 probable SARS cases worldwide by July 2003.[1] In Singapore, 238 people were diagnosed to have probable SARS since the outbreak in March 2003.[7] One of them was a super-infector and infected over 100 people in Singapore. Singapore had 33[7] fatalities from this virus, including 5 healthcare workers.

On 22 March 2003, Singapore's Ministry of Health announced the centralisation of all suspect and probable SARS cases at Tan Tock Seng Hospital (TTSH). In addition, fever tents were set up at 4 polyclinics throughout the island on 2 May 2003 to provide dedicated and separate fever screening and management facilities for fever patients, to detect index SARS cases and contacts of SARS, and thereby to contain and control the spread of SARS. The aim of the fever tents was also to limit the exposure of suspect patients with non-SARS suspect patients and healthcare workers.

Extensive and comprehensive measures were put in place and enforced, both at the hospital and community level, to contain the disease. Regular updates from the Ministry of Health were released daily at press conferences chaired by the Minister of Health, during the period of the SARS outbreak. There was also extensive public education through the mass media. Public talks, including demonstrations showing the proper use of personal

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protective equipment and campaigns by grassroots leaders, were held during which pamphlets were distributed to instruct Singaporeans on the proper ways of protecting themselves appropriately against SARS. A SARS hotline, HealthLine, a SARS channel and websites were set up and used as additional avenues to reach out to the community.

On 31 May 2003,[8] the World Health Organisation removed Singapore from its list of areas with recent cases of local transmission of SARS.

This study was conducted on patients or accompanying relatives and friends attending the National Healthcare Group Polyclinics (NHGP) between 9 and 13 June 2003, more than 2 months after the initial SARS outbreak in Singapore. With the massive public education effort, we wanted to assess the effectiveness of the public education campaign on SARS awareness and the conduct of those suspected of having SARS. Such an assessment would provide administrators with the basis for improving our public education campaign and to better control the spread of the disease. There has not been any locally published data on this subject matter in Singapore.

The World Health Organisation has issued warnings of the possibility of a resurgence of SARS during the Northern Hemisphere winter. There is therefore an urgent need to identify and bridge any gaps in knowledge, attitude and practices among Singaporeans. The ultimate goal should be for every Singaporean to be aware of SARS and to respond appropriately if suspected of having SARS.

Aims and Objectives

The survey was conducted to determine the following:

1) Awareness of the symptoms of SARS[2,4,9,10] among NHGP's patients or accompanying relatives and friends.
2) Main sources of information on SARS obtained by patients or accompanying relatives and friends attending NHGPs.
3) Respondents' reactions to various case scenarios:
   a) First action taken by respondents if they were suspected of being infected with SARS.
   b) Mode of transportation used to travel to TTSH if the respondent was suspected of having SARS.

Materials and Methods

The survey was carried out for 1 week from 9 June to 13 June 2003, in all 9 NHGP.

The study population comprised NHGP patients and their accompanying visitors attending the clinic sessions during the day. Every fifth patient at the main clinic queue was selected to respond to the questionnaire. For patients who were less than 15 years of age, the accompanying visitor was selected for the interview instead. An average of 65 respondents were obtained from each polyclinic.

The exclusion criteria were as follows:

1) unaccompanied patients less than 15 years of age,
2) hearing-impaired respondents or
3) intellectually disabled respondents.

The questionnaire was translated into English-Mandarin and English-Malay. The questionnaires were piloted on 15 persons and fine-tuned before the actual survey. The pilot survey results were not included in the actual data of the 593 respondents for this survey.

The survey was launched at Toa Payoh Polyclinic on 9 June 2003 to test the procedures and processes needed to conduct the survey. Over the next 4 days, the survey was carried out at Ang Mo Kio Polyclinic, Bukit Batok Polyclinic, Choa Chu Kang Polyclinic, Clementi Polyclinic, Hougang Polyclinic, Jurong Polyclinic, Woodlands Polyclinic and Yishun Polyclinic.

The interviewers and polyclinic staff identified the selected subjects by tagging the subjects and case files. In addition, the tracking slip containing information on the location of the patients' next service points was tagged.

Each polyclinic had a team of 4 interviewers for the survey. The interviewers followed the selected persons around the polyclinic, to minimise disrupting the consultation/treatment processes.

Written consent was obtained from each respondent before conducting the survey. Confidentiality of individual data was assured to all respondents.

Demographic information such as age, gender, marital status, race, religion, education level, housing type, occupation and monthly income were sought from the respondents by face-to-face questioning.

All statistical analyses were carried out using SPSS (version 11.5). Associations between awareness of SARS symptoms and (i) first action to be taken and (ii) mode of transportation used, if the respondent was suspected of having SARS, were analysed using Chi-square or Fisher's exact tests. In addition, logistic regression was performed to adjust for relevant covariates. Comparison of the study's demographic data with the Singapore Census of Population 2000[11] was performed using Goodness of Fit test. Statistical significance was set at $P < 0.05$.

Results

A total of 878 (14.9%) subjects were systematically randomly sampled for the survey from the total NHGP attendances of 5883 during the survey. Of the sampled group, 79 (9.0%) refused consent for the survey, 22 (2.5%) were rejected based on exclusion criteria, 179 (20.4%) subjects could not be located and 5 (0.6%) incomplete surveys were rejected. A total of 593 (67.5%) subjects finally completed the survey. This constituted 10.1% of the

total attendance of the NHGP during the survey period.

Profile of Respondents and Results on Awareness of SARS Symptoms

The mean age of the respondents was 46.9 (SD = 17.8) years. There were more female (56.5%) and Chinese (74.0%) respondents. Of these respondents, 23.2% had received post-secondary and tertiary education. Blue-collar workers (28.2%), housewives (26.0%) and professional/skilled (20.0%) were the top 3 occupations reported (Table 1).

Demographic comparisons of our study population with that of the Singapore Census of Population 2000[11] revealed significant differences in sex ($P = 0.002$), race ($P < 0.001$), age group ($P < 0.001$), housing type ($P < 0.001$) and education qualification ($P < 0.001$). The proportion of female, other racial group and older age group (60 years and above) was significantly higher in the study while the proportion of Chinese, younger age group (15 to 29 years), subjects with post secondary or university education and subjects staying in private apartments or houses was significantly lower in the study.

Most respondents (92.7%) visiting NHGP were aware of the symptoms of SARS. Of the remaining 43 respondents who were unaware of the symptoms of SARS, the majority were Chinese (86.0%), females (60.5%) and those above 60 years old (58.1%). They were mainly housewives (37.2%), retirees (30.2%) or blue-collar workers (23.3%).

Table 1. Profile of All Respondents

	Aware n = 550 (%)	Not aware n = 43 (%)	Overall n = 593 (%)	Singapore Census 2000 (%)
Sex				
Male	241 (43.8)	17 (39.5)	258 (43.5)	50.0
Female	309 (56.2)	26 (60.5)	335 (56.5)	50.0
Race				
Chinese	402 (73.1)	37 (86.0)	439 (74.0)	76.8
Malay	72 (13.1)	4 (9.3)	76 (12.8)	13.9
Indian	52 (9.5)	0 (0)	52 (8.8)	7.9
Others	24 (4.4)	2 (4.7)	26 (4.4)	1.4
Age (y)	n = 545	n = 41		
15-29	123 (22.6)	2 (4.9)	125 (21.3)	42.7
30-44	139 (25.5)	7 (17.1)	146 (24.9)	28.4
45-59	152 (27.9)	7 (17.1)	159 (27.1)	18.2
60 years and over	131 (24.0)	25 (61.0)	156 (26.6)	10.7
Occupation				
Professional/skilled	118 (21.5)	1 (2.3)	119 (20.0)	*
Blue-collar	157 (28.5)	10 (23.3)	167 (28.2)	*
Housewives	138 (25.1)	16 (37.2)	154 (26.0)	*
Students/National Servicemen	51 (9.3)	0 (0)	51 (8.6)	*
Retirees	70 (12.7)	13 (30.2)	83 (14.0)	*
Unemployed	16 (2.9)	3 (7.0)	19 (3.2)	*
Housing	n = 550	n = 42		
HDB 3-room flat or smaller	130 (23.6)	11 (26.2)	141 (23.8)	27.7
HDB 4- or 5- room	331 (60.2)	27 (64.3)	358 (60.5)	50.9
HDB executive/maisonette	31 (5.6)	1 (2.4)	32 (5.4)	0.5
Private flats or houses	51 (9.3)	0 (0)	51 (8.6)	14.2
Others	7 (1.3)	3 (7.1)	10 (1.7)	6.7
Educational level attained	n = 547	n = 43		
No formal education	63 (11.5)	23 (53.5)	86 (14.6)	19.6
Primary	128 (23.4)	16 (37.2)	144 (24.4)	23.1
Secondary	219 (40.0)	4 (9.3)	223 (37.8)	24.6
Post-secondary	89 (16.3)	0 (0)	89 (15.1)	21.1
University/Postgraduate	48 (8.8)	0 (0)	48 (8.1)	11.7
Monthly household income	n = 429	n = 21		
Less than $2000	186 (43.4)	9 (42.9)	195 (43.3)	*
$2001 to $4000	138 (32.2)	11 (52.4)	149 (33.1)	*
$4001 to $6000	62 (14.5)	1 (4.8)	63 (14.0)	*
Above $6001	43 (10.0)	0 (0)	43 (9.6)	*

* Classification of occupation and monthly household income were different from the Singapore Census of Population 2000

Most of them (90.7%) had received primary education or lower.

From the results, it is found that respondents above 60 years of age (OR = 4.94; 95% CI, 2.56 to 9.53; P <0.001), those who were blue-collar workers/housewives/retirees/unemployed (OR = 18.52; 95% CI, 2.54 to 142.86; P <0.001), those who live in HDB 3-room flats or smaller/HDB 4- or 5-rooms/others (OR = 7.18; 95% CI, 1.01 to 52.95; P <0.024) and those with no formal or primary education (OR = 8.85; 95% CI, 4.59 to 16.95; P <0.001) were more likely to be unaware of SARS symptoms. There was no significant difference in SARS symptoms awareness with respondents' sex (P = 0.585), race (P = 0.089) and household income (P = 0.143). Logistic regression analysis was performed for awareness of SARS symptoms and after adjusting for age group, sex, housing type and educational qualifications, educational qualifications were found to be the most significant predictor. Respondents with no formal or primary education were 13.1 times more likely to be unaware of SARS symptoms than those with secondary education and above (OR = 13.09; 95% CI, 4.35 to 39.43; P <0.001).

Sources of Information about SARS

A breakdown of the sources of information from the group who were aware of SARS symptoms (Fig. 1) showed the mass media to be an important means of SARS information transmission. Television, newspaper and radio formed the top 3 sources of SARS information. In contrast, television, newspaper and information from family members comprised the top 3 sources of SARS information for the group who reported that they were unaware of SARS symptoms.

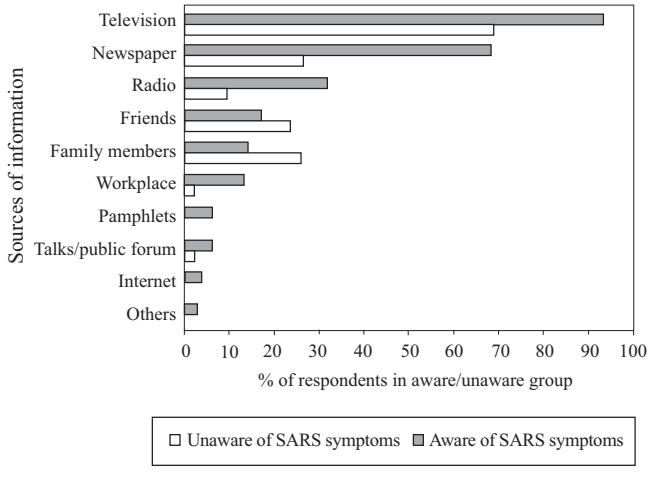

Fig. 1. Sources of information about Severe Acute Respiratory Syndrome (SARS) (total exceeds 100% as more than one answer was accepted).

Case Scenarios

Two case scenarios were posed to the respondents:

1) First action to be taken if they were suspected of having SARS
2) Mode of transport used to travel to TTSH if they were suspected of having SARS

(1) Case scenario 1: first action taken if suspected of having SARS

Neither of the group who were aware of or those who were unaware of the symptoms of SARS, chose to visit TTSH as their first response when suspected of having SARS (Fig. 2).

Of the 546 surveyed respondents who were aware of SARS symptoms, the majority chose to visit the general practitioner or company doctor as their first choice for care sought. Visiting TTSH was second, followed by visiting the polyclinic. In contrast, of the 40 respondents who were unaware of SARS symptoms, their first choice was visiting the polyclinic, followed by visiting TTSH, and thirdly, visiting the general practitioner (GP) or company doctor. Visiting primary healthcare doctors (GPs, polyclinic and company doctors) formed more than half (51.6%) of the total responses of this group.

More respondents who were aware of SARS symptoms would use the SARS ambulance. More respondents who were unaware of SARS symptoms chose to visit other hospitals besides TTSH.

Other responses elicited from the survey included isolation at home (n = 14), stay away from their family (n = 5), self-medicate with over-the-counter medications (n = 2), visit Chinese medical halls (n = 2), take their own temperatures/wash up (n = 4) or wear masks (n = 5).

There was no significant correlation found between having awareness of SARS symptoms and taking the

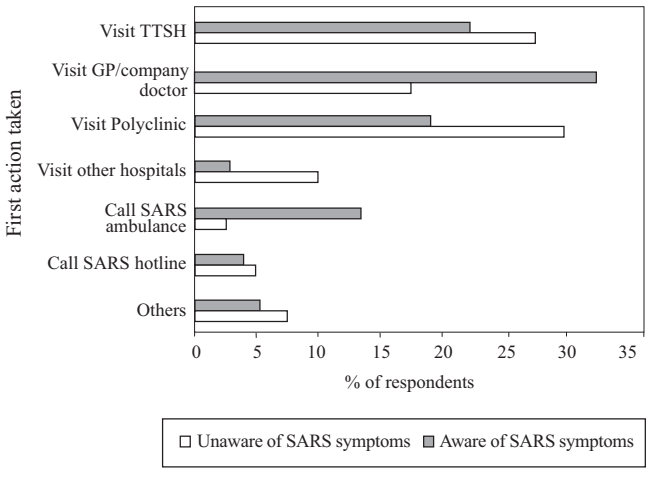

Fig. 2. First action taken if suspected to have Severe Acute Respiratory Syndrome (SARS).

appropriate first action if the respondents were suspected of having SARS ($P = 0.539$). Of those surveyed who were aware of symptoms of SARS, the survey results showed that the majority (60.1%) did not provide a correct response to the question of what they would do as their first reaction (namely visit TTSH, call SARS ambulance or drive oneself) if they were suspected of having SARS.

Breakdown by Polyclinic

Although fever tents were available in Yishun and Choa Chu Kang polyclinics, this did not result in more respondents choosing these polyclinics as the main source of help if suspected to have SARS (Table 2). Instead, more than 40% of the respondents from each of these clinics chose to visit their GPs or company doctor.

(2) Case scenario 2: mode of transport used to get to TTSH if suspected of having SARS

If the respondent was suspected of having SARS and had to go to TTSH, the majority (84.9%) of the 578 respondents responded appropriately that they would react by taking the SARS ambulance or driving themselves to TTSH. However, 49 respondents (8.5%) would take a taxi while 11 respondents (1.9%) would take the Mass Rapid Transit (MRT) train or bus to TTSH (Fig. 3).

The respondents who were aware of SARS symptoms were 3.6 times more likely to use the appropriate transportation (SARS ambulance or drive oneself) to get to TTSH compared with those who were not aware of SARS symptoms (OR = 3.57; 95% CI, 1.78 to 7.19; $P < 0.001$; Chi-square test).

Respondents who were unaware of SARS symptoms were more likely to take public transport including taxis, buses or MRT (17.9% versus 9.9%), use non-SARS ambulance or get relatives/friends to take them to the hospital (17.9% versus 3.7%).

When logistic regression analysis was performed for taking the inappropriate mode of transportation if suspected of having SARS and adjustments were made for age group, sex, race, housing type, occupational group, educational qualifications and awareness of SARS symptoms, 4 significant predictors were found. The respondents who were more than 60 years of age, those with no formal or primary education and those who were unaware of SARS symptoms are 1.9 (OR = 1.89; 95% CI, 1.05 to 3.38; $P = 0.033$), 2.3 (OR = 2.27; 95% CI, 1.22 to 4.23; $P = 0.010$) and 2.9 (OR = 2.89; 95% CI, 1.34 to 6.23; $P = 0.007$) times, respectively, more likely to use an inappropriate mode of transportation to get to TTSH if suspected of having SARS. The other racial group respondents were 2.9 and 3.8 times more likely to use an inappropriate mode of transportation to travel to TTSH compared to Chinese (OR = 2.94; 95% CI, 1.06 to 8.15; $P = 0.038$) and Malays (OR = 3.81; 95% CI, 1.09 to 13.39; $P = 0.037$) respectively.

Profile of Respondents who would Take a Taxi or Public Transport to Get to TTSH if Suspected of Having SARS

Most respondents who chose to take public transport (taxi, bus or MRT) to TTSH were blue-collar workers (taxi 30.6%; bus/MRT 45.5%) or retirees (taxi 18.4%; bus/MRT 27.3%) with primary education or lower (taxi 49.0%; bus/MRT 81.8%) and with household incomes of less than $2000 (taxi 40.8%; bus/MRT 45.5%).

Discussion

This study was done more than 2 months after the SARS outbreak. After all the intensive public education, this study aimed to find out if people were aware of SARS, and if one would react correctly if suspected of having been infected with SARS by seeking medical attention at TTSH using the SARS ambulance.

We must, however, bear in mind that the study was done on patients who visit the NHGP or their accompanying visitors. In our analysis, the demographic profile was found to be significantly different from that obtained from the Singapore Census of Population 2000.[11] Therefore, our

Table 2. First Action Taken if Suspected to have SARS (Breakdown of Figures by Polyclinic)

First action taken 586 (%)	GP/company doctor 185 (%)	Polyclinic 117 (%)	TTSH 133 (%)	Other hospitals 20 (%)	SARS hotline 24 (%)	SARS ambulance 75 (%)	Others 32 (%)
Ang Mo Kio	22 (33.8)	18 (27.7)	14 (21.5)	2 (3.1)	1 (1.5)	5 (7.7)	3 (4.6)
Bukit Batok	19 (28.8)	12 (18.2)	17 (25.8)	5 (7.6)	4 (6.1)	4 (6.1)	5 (7.6)
Clementi	18 (27.7)	21 (32.3)	16 (24.6)	2 (3.1)	0 (0)	3 (4.6)	5 (7.7)
Choa Chu Kang	26 (40.6)	13 (20.3)	4 (6.3)	3 (4.7)	2 (3.1)	15 (23.4)	1 (1.6)
Hougang	31 (46.3)	6 (9.0)	15 (22.4)	1 (1.5)	3 (4.5)	6 (9.0)	5 (7.5)
Jurong	11 (16.4)	8 (11.9)	13 (19.4)	3 (4.5)	5 (7.5)	19 (28.4)	8 (11.9)
Toa Payoh	14 (22.6)	6 (9.7)	32 (51.6)	0 (0)	2 (3.2)	4 (6.5)	4 (6.5)
Yishun	26 (40.6)	8 (12.5)	15 (23.4)	1 (1.6)	4 (6.3)	10 (15.6)	0 (0)
Woodlands	18 (27.3)	25 (37.9)	7 (10.6)	3 (4.5)	3 (4.5)	9 (13.6)	1 (1.5)

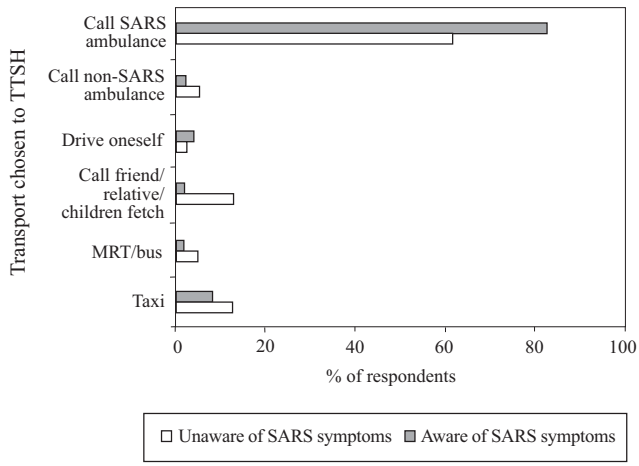

Fig. 3. Mode transportation used if going to Tan Tock Seng Hospital (TTSH) when suspected to have Severe Acute Respiratory Syndrome (SARS).

findings may not reflect the full community's opinion. The survey also only managed to capture those respondents who had since returned to the polyclinic for medical attention. The views of those who had yet to return to the polyclinics were thus not represented in the survey.

In addition, knowledge, perceptions and practices can alter as knowledge increases and worldwide and local events change with time.

Awareness of the Symptoms of SARS

A small group (7.3%) remained unaware of SARS symptoms despite massive public education. This group consisted mainly of housewives, retirees and the unemployed above 60 years old with primary education or less.

Sources of Information

Forms of mass media such as television, newspaper and radio were the most important sources of SARS information. Thus, mass media should remain as the primary medium to disseminate information and knowledge to the public in a major national crisis like SARS.

However, different strategies might be needed to specifically reach housewives, retirees or the unemployed, especially those without access to mass media. The radio could be used as a medium of reaching out to these groups. Intense public education through community events should be coupled with door-to-door efforts by grassroots representatives. Hotline numbers manned by trained staff should be readily available to answer enquiries from the public. Through these approaches, misconceptions can be dispelled and clarified. The main goal is to equip each individual with correct knowledge about the disease and appropriate behaviour.

First Action Taken if Suspected of having SARS

Most respondents chose to visit their primary healthcare doctors as the first source of medical help instead of visiting TTSH despite intense public education over the weeks. Even among those who were aware of SARS symptoms, the majority did not choose the correct response. The authors would like to suggest that possible reasons for this outcome could be due to fear of contracting SARS while at TTSH or the stigma associated with going to TTSH. Further studies may need to be performed to determine the reasons.

Despite having fever tents in Yishun and Choa Chu Kang Polyclinics, this study showed that respondents preferred to visit GPs or company doctors first if they were suspected of having SARS. This could be the result of poor publicity regarding the availability and purpose of fever tents while the accessibility and convenience of GPs could be key factors affecting the respondents' choices of medical help.

The study results also highlight the importance of a high risk to healthcare workers from the primary healthcare sector since they are likely to become the first contact point for a suspected SARS patient. Adequate protection and vigilance of healthcare workers in the primary healthcare setting therefore become very important.

Mode of Transport Used

The majority of the respondents reacted appropriately by choosing to use the SARS ambulance or driving themselves to TTSH if they were suspected of having SARS. Those aware of the symptoms of SARS were likely to take the right mode of transportation to TTSH if they were suspected of having SARS.

Particularly worrying was the group who would use public transport like buses, MRT trains or taxis to travel to TTSH if they were suspected to have SARS. These were likely to be blue-collar workers or retirees with Primary School Leaving Examination (PSLE) education or less, and who fall within the lower socio-economic strata.

Although the numbers are small, their inappropriate behaviour due to their limited knowledge and lack of public spirit-mindedness could result in a community outbreak among other passengers sharing the same public transport. Likewise, taxis should not be used if one is suspected of having SARS as this could result in the infection of the taxi driver and other passengers. Again, this illustrates the prevalence of inappropriate behaviour despite vigorous public education.

Conclusion

Despite more than 2 months of intensive SARS public education in Singapore, deficiencies in knowledge and

behaviour persist. Our survey shows that while SARS public education through the mass media is important, it remains inadequate.

Although our study cannot be extrapolated to the general population, a large number of people who attend the polyclinics are those who are elderly, less educated and of lower social economic class. In particular, retirees with lower educational levels were shown to be quite oblivious to both the symptoms of SARS and travel by appropriate means of transport. These groups should be targeted by the authorities and specifically reached out to.

Despite the presence of fever tents to isolate and manage febrile patients at the 2 NHG polyclinics, it appears that there would be poor use of these tents by people who suspected themselves of having SARS. This was all the more disconcerting as this survey was carried out amongst polyclinic respondents. More publicity is required to educate the public on the importance of isolation at specified centres if suspected of having been infected with the disease, so as to contain the spread of SARS.

Targeted public education needs to be reinforced since it is predicted that SARS will re-emerge. It is vital that every resident should be equipped with accurate SARS knowledge and know how to conduct himself or herself appropriately to prevent a new cluster of events occurring in our country again.

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