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Asia Pacific Journal of Family Medicine Volume 5 Issue 2

## ORIGINAL ARTICLE

### Severe acute respiratory syndrome: knowledge, belief and behavior among Beijing residents

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Accepted for publication 26 July 2006.

#### Abstract

**Objective:** Severe acute respiratory syndrome (SARS) is considered a very contagious and fatal disease and lay people's knowledge will help considerably in preventive programs against this disease.

**Methods:** A telephone survey was conducted using a uniform questionnaire in May 2003. Among the 132 residents interviewed, 100 completed the questionnaire with a validity rate of 75.8%.

**Results:** The knowledge level regarding SARS is high among Beijing residents. The percentage of residents who regarded SARS as a terrible disease was 31%. Recommended infection control precautions were adopted by more than 90% of residents. Most subjects (85%) regarded hospitals as dangerous settings for SARS transmission, primarily because of the greater possibility of encountering SARS patients. In light of this possibility, 60% of residents were unwilling to visit hospital immediately, more than half of them doing self-quarantine at home for 2 days before medical care-seeking. Seventy percent of residents expressed their willingness to conduct home isolation and 36% would consult health care providers for instructions should they develop fever. Only 3% would do nothing.

**Conclusions:** Vigorous health education through various ways of dissemination has made great contributions to SARS epidemic control. Further mass education should focus on publicizing early health care-seeking and early home isolation. To provide correct and timely instructions for people with fever through 'hot-lines' is another acceptable and applicable measure for minimizing the potential for SARS transmission. Furthermore, health care sectors should adopt more feasible and effective measures to ensure safe medical settings for patients.

**Key words:** behavior, Beijing residents, belief, knowledge, severe acute respiratory syndrome

## Background

In March 2003, the first severe acute respiratory syndrome (SARS) case was confirmed in Beijing. Subsequently it reached the epidemic 'peak period' in the Beijing area from 16 April to 15 May. This study aimed to assess levels of knowledge, beliefs and preventive behaviors regarding SARS in a representative sample of the Beijing population. Specifically, the study aimed at determining the overall response, intention to seek prompt medical care and early home self-isolation, and to understand the effects of public education upon timely recognition of SARS, and to provide valuable information for health departments to develop more effective strategies for SARS prevention and control.

## Subjects and methods

### Subjects

From the 2000 Behavioral Risk Factor Surveillance System (BRFSS) sampling database of the Anzhen community of Beijing, 132 adult residents with telephone numbers were selected. Excluded in the study were (suspect) SARS patients, their close contacts, and medical-care workers. Eventually 100 residents (43 male and 57 female) were interviewed by telephone, with a response rate of 75.8%. The average age of respondents was 44.7 years; 83% of the respondents had more than high middle-school education. The average number of family members was 3.5. Among them, 25% were technical professionals, 16% were administrative employees, 20% were retirees, 21% were manual workers, 9% were employed in domestic service, and another 16% were from other lines of work.

### Questionnaire contents

The questionnaire contents addressed awareness of SARS prevention, infection control precautions being implemented among Beijing residents, their attitudes and intentions regarding fever, and awareness and intention for adoption of recommended precaution in the event of fever.

### Methods and statistics

A telephone survey was conducted by trained health workers, using the specially designed questionnaire during 8–9 May, 2003. The collected data were entered into a Foxpro V.6.0 database and statistical analysis was carried out by using SPSS V.9.0 software. Age (< 40 years, > 40 years), gender (male, female), education (high school diploma, beyond high school) were analyzed categorically. The relationships were assessed by chi-square test for categorical variables and two-tailed t-test for continuous variables.

## Results

### Knowledge level and behaviors for SARS prevention and control

#### Awareness of SARS

Only 31% of Beijing residents regarded SARS as a terrible disease, showing no difference by gender, age or education. The reasons for fearlessness of SARS were as follows: preventable 91.3% (63/69); curable 85.5% (59/69); personally, have the little chance of being infected 65.2% (45/69); leaves no sequelae 44.9% (31/69); moderately transmissible 15.9% (11/69); other reasons 14.5% (10/69) ([Table 1](#)). There were a few people who even conceived SARS as one of the common diseases. During the same period, another survey was conducted in Shantou City, Guangdong Province using the same questionnaire. The two sample populations were comparable in demographic characteristics. The results in [Table 1](#) show that the awareness of SARS was significantly higher among Beijing residents than among residents in Shantou City.

#### Awareness of Beijing residents on the potential settings for SARS transmission

Most (84%) respondents considered health care facilities as dangerous settings for potential SARS transmission. The major reasons were as follows: fear of most likely being exposed to SARS patients in a hospital environment (95.2%); influenced by daily epidemic reports (32.1%); and following the advice given by acquaintances (17.9%). Meanwhile, 89% of residents thought that SARS was easily spread in crowds and poor ventilation settings. Furthermore, 2% of these believed that everywhere was relatively safe provided that

recommended infection control measures had been strictly implemented.

### **Precautions against SARS taken by Beijing residents**

The results in [Table 2](#) show that recommended infection control precautions such as frequent air ventilation, good personal hygiene and home disinfection were adopted by about 90% of Beijing residents. Strikingly, 56% of residents were convinced that avoiding hospital visits was helpful to minimize the risk of contracting the virus from undetected SARS cases, and actually 85% of them were making attempts at avoiding medical settings.

### **Self-measurement of body temperature of Beijing residents**

The result of the survey showed that the rate of household ownership of thermometers was 88%. Since the SARS epidemic, 59% of residents were concerned about their body temperature, 35% of them measured their body temperature frequently, and 30% of them would make verification of fever if unwell. The better educated residents (equal to or higher than college level) were more likely to be concerned about body temperature than the less educated ones ( $P = 0.027$ ). Further, 11% of residents reported that entrance/exit screening for fever was conducted in their work places or residential communities.

### **Routes of information acquired by residents**

Result showed that 98% of Beijing residents mostly obtained relevant information about SARS through TV and radio. In addition, 85% of people had been informed about SARS by newspapers and 71% through community-based health education activities. Therefore, the primary routes used to spread SARS information were with large coverage among all kinds of people and groups.

### **Attitude, behavior and demands toward fever among Beijing residents**

#### **Judgment of the likelihood of SARS infection in the event of fever**

Forty-three percent of the population feared getting infected with SARS if they had been ill with fever. Of these, 28% thought they were unlikely to contract SARS, while the other 29% of people would judge by body temperature and relating symptoms. Beijing being listed as one of the epidemic zones was the major reason for fearfulness (81.4%). Other reasons included were: having contact with the SARS cases directly or indirectly (32.6%); having ever been to susceptible places (35%); or always being in poor health (14%). The reasons for lack of fear were as follows: no contact with suspect SARS cases (71.4%); had recently conducted disinfection (67.9%); had not been to susceptible places (64.3%); always in good health (53.6%); and had taken so-called preventive medicines (35.7%).

#### **Measures should be taken and their demands in case of fever**

##### **Intention to and reasons for prompt medical attention seeking**

Forty percent of Beijing residents would seek prompt medical care shortly after the onset of fever for the purpose of identifying diagnosis. Forty-two percent of Beijing residents would only do so on condition that their symptoms were somewhat similar to SARS, and half of them would rather have self-observation at home for 2 days before medical care-seeking. However, 18% would not go to health care facilities immediately, even if their symptoms indicated prodromes of SARS. It was the fear of contracting the virus in hospital settings that prevented the other 60% of residents from seeking medical care immediately ([Table 3](#)).

##### **Active self surveillance and voluntary home quarantine in the event of fever**

Forty-four percent of residents would carry out active observation themselves at home, much higher than that of 36.7% at other times ( $\chi^2 = 5.754$ ;  $p = 0.016$ ). The planned average observation time was 2.1 days (1 h to 14 days), with no significant difference from ordinary times ( $t = 0.149$ ;  $p = 0.882$ ). Of the better educated subjects, 58.7% seemed more likely to carry out self-observation initially than the 38.9% of those less well educated ( $\chi^2 = 3.904$ ;  $p = 0.048$ ).

Fifteen percent of residents expected to get clear instructions at home from health care professionals through 'hotlines'. Moreover, 36% of them would like to consult health-care professionals shortly after the onset of

fever.

### Intentions to implement home quarantine measures

The results in [Table 4](#) show that the majority of residents would follow recommendations for home isolation to prevent the possible transmission of SARS once they got fever. Only 3% of people would not take any measures for home isolation. However, there were still 7% of residents who would stay in a private room and keep doors closed incorrectly.

### Opinions toward infection control precautions

Eighty-five percent of residents suggested that preferably; suspect pyretic cases should be individually isolated. Of these, 82% thought it necessary to have a separate specific area for outpatients with fever. Seventy-four percent regarded it important to perform stringent initial fever screening in the reception area and perform triage as soon as possible. Sixty-seven percent were convinced that assignment of staff to undertake timely disinfection would further increase security. However, there were still 14% of residents who did not think this safe enough to prevent SARS transmission, even though almost all infection control measures were followed in health-care settings.

## Discussion

The results indicate that the public was well informed during the peak of the SARS epidemic. The principal recommended infection control precautions for SARS were implemented by more than 90% of the public, similar to the percentage at the early stage of the SARS epidemic in Beijing.<sup>2</sup> According to the results of our survey, only 31% of the residents considered SARS as a terrible disease, lower than that of 65.3% during 22–23 April<sup>2</sup> and 47.8% in 6–8 May.<sup>3</sup> On the whole, people with different demographic characteristics have similar opinions and knowledge about SARS. Furthermore, the awareness of SARS among Beijing residents was higher than that of Santou residents. The reason may be attributed to a more intensive public health education program in the Beijing area. Timely and large-scale dissemination of information on SARS prevention and control aimed at the whole public through various mass media, is important in keeping residents well informed of preventive measures and the progress in infection control, and empowers their abilities to take precautionary actions. Furthermore, public education played an important role in reducing public panic. The results clearly demonstrated that the rapid containment of SARS in Beijing was the result of monumental efforts on the part of governments and health care staff, supported by a well-informed and cooperative public.

However, our results indicated that the fear of SARS among Beijing residents was greater than that among Shantou residents. Although this is probably due to Beijing itself being a hard-hit region, attention to more intelligible, reliable and timely information offered to the public will help correct mistaken viewpoints, and will verify information and dispel rumors regarding SARS in the early stages, and thus ultimately reduce unwanted social unease and over-reaction.

The survey found that 82% of respondents would seek medical care promptly in the event of fever, which is similar to the rate of 89.9% reported by Xueming Song et al.<sup>3</sup> It was the transmission in hospital settings that caused the spread of SARS in the early period of the epidemic and this acted as a major factor in influencing the behaviors of Beijing residents. This indicates that health care facilities should establish fever clinics to identify potential SARS patients and to minimize the risk of transmission in healthcare settings.<sup>5</sup> Furthermore, in order to promote early medical care-seeking and detection of suspect SARS cases, publicity on the safety of fever clinics should be given.

Nearly 50% of residents would conduct self-observation at home once they got fever. The shorter the time from symptom onset to isolation of patients, the less likely the disease will spread.<sup>5</sup> Early effective home quarantine will reduce the likelihood of community transmission. In view of the unwillingness of prompt medical care-seeking among residents, it is essential to intensify public education on home quarantine measures and to encourage prompt actions in this regard. On the other hand, since 36% of the population would like to receive instructions through a 'hotline', a 24-hour SARS telephone service should be established to ensure feverish cases get the best advice about personal isolation and observation.

The most consistent first symptom that is likely to appear is fever.<sup>6</sup> It is of great importance to emphasize rapid detection of fever and early isolation of suspected SARS patients. Entrance/exit screening for fever is

one of the most simplified and feasible measures. According to our results, the implementation rate was only 11%. The reason is probably that entrance fever screening was a voluntary community action and not enforced, and specific body temperature measuring instruments were not widely available for public use at that time.

In summary, one of the important lessons learned in Beijing is the decisive power of high-level political commitment and effort to contain an outbreak. Other successful measures include mass media campaigns to educate the public and encourage prompt reporting and seeking of medical help, as well as the designation of SARS-dedicated hospitals and establishment of fever clinics to minimize the extent of spread.

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Table 1 Comparison of awareness of SARS by residents in Beijing and Shantou City (%)

Awareness of SARS	Beijing residents (n = 100)	Shantou residents (n = 100)	<i>p</i>
Is a new infectious disease	96	93	0.87
Had been absent of effective preventive drugs or vaccines	39	21	0.006
Is a highly transmissible disease	89	78	0.036
Respiratory droplet transmission	68	53	0.03
Direct contact transmission	77	58	0.04

Table 2 Awareness rate and infection control precautions taken by residents in Beijing (%)

Precautions	Awareness rate (n = 100)	Infection control behaviors (n = 100)
Well air ventilation	96	98
Hand washing	100	94
Avoid visiting crowded settings	96	93
Frequent home disinfections	89	91
Wear mask	87	85
Pay attention to diet	82	81
Reinforce physical exercises	96	78
Keep enough sleep	91	77
Avoid visiting hospitals	56	85
Take Chinese traditional medicine	49	65

Table 3 Reasons for willingness or unwillingness of prompt medical care seeking in the event of fever

Reasons for prompt medical care seeking in the event of fever	Number	%
For fear of transmitting to others if the fever were caused by SARS	28/40	70.0
Try to receive early treatment and avoid acceleration of illness	29/40	72.5
To identify diagnosis	32/40	80.0
Reasons for unwillingness to seek medical care promptly		
For fear of contracting virus in hospital settings in case their discomfort were not due to SARS	39/60	65.0
Don't think medical care seeking is necessary	15/60	25.0
For fear of isolation provided being recognized as suspect case	11/60	18.4
Can't afford treatment	6/60	10.0

Table 4 Intentions of implementation of home quarantine measures in the event of fever

Measures	Number	Implementation rate (%)
Try to stay in a private room and make the room well-ventilated	82/100	82
Minimize contact with other people	74/100	74
Try to keep at least 1-meter's distance when contact with others	73/100	73
Wear mask when talking with others	68/100	68
Avoid sharing eating utensils with others	76/100	76

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