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The knowledge level and precautionary measures taken by older adults during the SARS outbreak in Hong Kong

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Abstract

The study aims to examine the knowledge and the practice of the precautionary measures taken by older adults in Hong Kong against the outbreak of severe acute respiratory syndrome (SARS). Overall, more than half the participants responded correctly that droplet transmission is one of the main transmission routes of SARS. Those who received formal education demonstrated that they acquired greater knowledge of the sources and precautionary measures for SARS. The types of precautionary measures used and the factors affecting their behaviours were discussed. The results of the study could help the health-care professionals develop appropriate health promotion and disease prevention programmes for older adults.

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1. Introduction

Severe acute respiratory syndrome (SARS) has endangered populations worldwide (United States Department of Health and Human Service, Centers for Disease Control and Prevention, 22 May 2003). It has infected over 8000 people and caused more than 900 deaths (Hong Kong SARS Expert Committee (HKSARSEC), 2003). In the early days of the outbreak, the source and mode of transmission were unknown (HKSARSEC, 2003). Older adults and the chronically ill were particularly susceptible to SARS with a disproportionately large number of deaths occurring in these groups (HKSARS, 2003). The emerging nature of SARS has meant that there are few studies that have explored the perceptions of the Hong Kong community as they have passed through this crisis. The aim of the study is

to describe the knowledge about SARS and precautionary measures taken by older adults in Hong Kong.

2. Background

The World Health Organization (WHO) identified SARS by name on 15 March 2003 (HKSARSEC, 2003). Based on clinical and epidemiological data, and laboratory test, the WHO updated cases definition for surveillance of SARS (WHO, 1 May 2003). Clinical features of SARS at the prodrome stage include: (1) incubation period usually 2–7 days; (2) fever ($>38^{\circ}\text{C}$); (3) chills and rigors; and (4) other symptoms including headache, malaise, and myalgias may appear. At the later stage, respiratory symptoms including dry and non-productive cough, dyspnoea, and hypoxemia, may occur. Chest radiographs may show pneumonic changes such as signs of infiltration and consolidation (WHO, n.d.). It was determined that SARS was mainly transmitted by respiratory droplets or by direct contact

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with an infected person's secretions (Hong Kong Department of Health (HKDH), 2003).

The SARS epidemic in Hong Kong lasted almost 5 months (10 February–23 June 2003). It gained to public awareness through the Hong Kong news media on 10 February 2003 as an atypical pneumonia outbreak in a nearby province (Guangdong) in Southeastern Mainland China. The outbreak began in Hong Kong on 21 February 2003, when an infected professor from Mainland China (the index case) arrived with his wife; they stayed in a local hotel (HKSARSEC, 2003). One day after his arrival, he was admitted to a hospital in Hong Kong with severe pneumonia and subsequently died. This hotel was later identified as the original Hong Kong site from which local and international (Hanoi, Singapore, and Toronto) transmission occurred (HKSARSEC, 2003). The first hospital outbreak began on 10 March 2003 when 11 healthcare staff was reported on

sick leave from a public hospital. Outbreaks in other hospitals and a housing complex were also identified in April. (Major events in the SARS epidemic were summarized in Table 1.) On 2 April 2003, WHO issued travel advisory against travel to Hong Kong and Guangdong Province (Mainland China). WHO removed Hong Kong from the SARS list on 23 June 2003 (HKSARSEC, 2003). Over the course of the outbreak, 1755 cases were reported including 300 deaths. Adults 65 years of age or older were 17.6% of the SARS cases; however, 63.9% of the deaths were within this age demographic and 78.2% of the deaths in this population were persons with a history of chronic illnesses (The University of Hong Kong Clinical Trial Centre (HKUCTC), 26 October 2003).

The aging population is growing in Hong Kong, as it is elsewhere. Approximately 11.1% ($n=747,052$) of the total population is aged 65 years old or above

Table 1
Timeline of Major Events during the SARS Epidemic*

<i>March 2003</i>	
10	Beginning of the epidemic: report of an outbreak of respiratory infections involving 11 staff from 1 tertiary care public hospital in Hong Kong (HK).
12	World Health Organization (WHO) issued global alert about cases of acute atypical pneumonia.
14	Index case from public hospital outbreak confirmed.
15	WHO named the illness Severe Acute Respiratory Syndrome (SARS).
19	Hong Kong Department of Health (HKDH) announced the chain of transmission from the hospital outbreak to guests of a specific hotel in HK and then to the identity of the index case of the epidemic.
21	Outbreaks in a private hospital and two private clinics reported.
22	The University of Hong Kong announced the identification of coronavirus as the causative agent responsible for SARS.
26	Community outbreak in a private housing complex with 15 suspected SARS cases admitted to one public hospital.
29	Health declaration for incoming visitors to Hong Kong. Classes suspended in schools and childcare centers.
31	HKDH ordered at 10-day isolation for sections of the private housing complex where the outbreak occurred. HKDH names 4 medical centers to provide medical surveillance of close contacts of all suspected SARS patients.
<i>April 2003</i>	
1	Residents of affected sections of the private housing complex outbreak evacuated. Outbreak in another public hospital reported.
2	WHO issued travel advisory for Hong Kong and Guangdong Province, China.
3	Hong Kong Hospital Authority implemented no-visiting policy for all acute wards.
10	HKDH introduced the home confinement policy for close contacts of all SARS patients.
17	Body temperature checks on all departing passengers at airport. The Government announced investigation findings of the outbreak at the private housing complex.
23	Outbreaks in 2 other public hospitals identified.
27	Outbreak in another public hospital identified.
<i>May 2003</i>	
2	Second outbreak in one private hospital identified.
5	A campaign entitled 'Team Clean' was established by the Hong Kong government to keep Hong Kong clean and establish a long-term structure to improve the environment.
16	WHO released investigation findings on the private housing outbreak.
23	WHO lifted the travel advisory for Hong Kong.
<i>June 2003</i>	
23	WHO removed Hong Kong from the SARS epidemic list.

* Adapted from: Hong Kong SARS Expert Committee (2 October 2003).

(Hong Kong Census and Statistic Department (HKCSD), 26 October 2001b). Unlike other demographic groups in Hong Kong, literacy rates are low in this group with more than 42% who have not received any formal education. Among the older adults who have received formal education, 39% of them received primary level of education. In other words, only a small portion of the older adults received higher levels of education (HKCSD, 26 October 2001a). This situation presents many challenges for health promotion and disease prevention activities, as many of the usual methods of disseminating health information are not appropriate for this population.

In Hong Kong, older adults can receive primary health care in both public and private health sectors. In the public sector there are two choices, the Elderly Health Services or the General Outpatient Clinics, both of which provide low-cost government subsidized services and both may be used concurrently. The Department of Health operates the Elderly Health Services, which provides primary health care and health promotion for older adults once they enroll (HKDH, 2001). The annual enrolment fee is HK\$110 (i.e. US\$14.10/UK£ 10.00) and curative services cost HK\$45 (i.e., US\$5.77/UK£ 4.09) per consultation. Older adults may also go to the Hospital Authority's General Outpatient Clinic (GOPC) for medical advice and treatment (Hong Kong Hospital Authority, n.d.). At the GOPC, the treatments including X-rays and laboratory cost HK\$45 (i.e. US\$5.77/UK£ 4.09) and medications cost only HK\$10 (i.e. US\$1.28/UK£ 0.91). If the patient cannot afford the payment for any of these services, the service charge is waived (HKDH, 2001; Hong Kong Hospital Authority, n.d.).

In the private sector, older adults can obtain primary and secondary health care from general practitioners (Grant and Yuen, 1998). Usually, fees are higher and charges vary, depending on the prestige of the physician and the location of the practice. Medications and laboratory tests will be charged separately and clients are usually referred to other clinical facilities for these. Older adults are able to buy prescribed medications, over-the-counter western medications and traditional Chinese medicines/herbs at pharmacies.

During mid-May, the Hong Kong Government launched a campaign, which was led by the Chief Secretary, to keep the city healthy and clean. Precautionary measures to prevent the transmission of SARS related to personal hygiene and environmental sanitation were publicized daily in the media as a way to minimize the possibility of becoming infected with SARS. The presence of functional impairments resulting from chronic illnesses or knowledge deficits due to low literacy levels may have influenced what older adults were able to do to comply with the recommended infection control measures. Thus, great concern about

older adults living alone was expressed by health care providers and in the media (Kong, 2003). Older adults, who may not have reacted promptly and appropriately to the Government's recommendations to prevent the transmission of SARS, could have been at higher risk for contracting SARS and potentially for presenting a higher risk of transmission to others. Understanding older adults' knowledge level and adherence to the government's recommended precautionary measures to prevent transmission of SARS is an essential step in being able to design similar promotion programmes for this population in the future. The research questions examined in this study were:

- (1) What demographic variables influenced older adults' knowledge level, beliefs, and precautionary measures taken to prevent transmission of SARS?
- (2) What was the knowledge level of older adults about the transmission routes of SARS?
- (3) What were the beliefs of older adults about the possibility of becoming infected with SARS?
- (4) What precautionary measures were taken by older adults to prevent the transmission of SARS?
- (5) Does the level of knowledge or beliefs about SARS affect the types of precautionary measures used by older adults?

3. Method

3.1. Sample and design

A descriptive cross-sectional design was chosen. Potential subjects were recruited from registered members of a government subsidized social service centre in the Southern District of Hong Kong. This centre provides services such as home visits, social activities, and meals-on-wheels to the elder members of this working-class district. The eligibility criteria were: (1) aged 65 or above, (2) able to speak in Cantonese, (3) no hearing impairment, and (4) reachable by telephone.

Initially, 295 registered members of the Social Service Centre were contacted by telephone to determine their eligibility; 207 older adults met the criteria. Of these, 163 people were willing to participate in the study (response rate = 78.74%). An additional 51 participants did not answer all the questions in the questionnaire and their data were not used in the analysis; therefore, the final sample size was 112.

3.2. Measurement

A survey instrument developed by Leung et al. (2003) was used in this study. The original survey instrument composed of 60 questions and is divided into five parts: (1) self-perceived general health status; (2) use of health

services; (3) possibility of contacting diagnosed SARS cases; (4) knowledge of transmission of SARS and beliefs of contracting SARS; (5) precautionary measures taken to prevent transmission of SARS; and (6) socio-demographics. In this paper, the last three parts of the instrument were described as these parts were used for analysis and discussion. The other parts of the instrument have been described elsewhere (Leung et al., 2003).

3.2.1. Knowledge about transmission of SARS

Participants were asked to choose the main transmission routes of SARS by answering “yes/no” or “do not know” for each of five possibilities. These five possible transmission routes reflected the current state of the knowledge about SARS at the time of the survey (HKHWFB, 22 April; 20 June, 2003).

3.2.2. Beliefs about contracting SARS

Three questions aimed at determining the participants’ beliefs about their likelihood of contracting SARS were developed: (1) How likely is it that you will become infected SARS? (2) How likely is it that you would survive if you were infected with SARS? (3) How confident are you in your doctor’s ability to diagnose SARS? Each question required a choice from a 4-point Likert scale (i.e., very likely = 1 to very unlikely = 4) and ‘do not know’ response.

3.2.3. Precautionary measures to prevent transmission of SARS

This section was composed of 8 questions based on the widely publicized government recommended behaviours for preventing transmission of SARS (HKHWFB, 17 April, 2003). The participants indicated how often they had implemented eight precautionary measures (e.g., wearing a face mask, covering your mouth when sneezing) during the past 3 days. Three of the questions asked were about hand washing behaviours (after sneezing/coughing, after touching possibly contaminated materials and the use of liquid soap instead of bar soap). The remaining three items asked about behaviours that are traditionally practised in Hong Kong, which required some alternation to avoid spread of SARS. For example, sharing dishes at meals is common in the Chinese culture. Use serving spoon or chopsticks, rather than each individual each using their own chopsticks to take food from commonly shared dishes was recommended as a precautionary measure, but is not widely used (HKDH, 29 November, 2003). Another common practice is to leave the toilet seat up while flushing; however, contact with urine or faeces is one of the transmission routes, so lowering the toilet cover before flushing may prevent contaminated water from splashing out (HKDH, 29 November, 2003). Thirdly, a common serving towel is often used during meals and this practice may also transmit the disease. A 4-point Likert scale ranging from

1 (always) to 4 (none) and a choice of “do not know” was added for the participants who did not know how to answer the questions.

3.2.4. Demographic characteristics of the sample

Demographic data collected were used to examine whether the demographic variables were associated with the precautionary measures used in fighting against the infection of SARS.

3.3. Procedure

The Institutional Review Board of the University of Hong Kong/Hospital Authority Hong Kong West Cluster approved this study. All the potential subjects were approached via telephone during the period between 15 and 25 May, 2003 to determine their eligibility. Twenty-six nursing students from the University of Hong Kong were trained as interviewers. The training programme included: (1) the purpose of the research including the research questions; (2) how to conduct a telephone survey (e.g., communication techniques, how to obtain an informed consent, consistent use of the study procedure, and data recording) and (3) assessment of their learning and ability to appropriately follow the study protocols were done by observation during role play.

3.4. Statistical analysis

Demographic variables were grouped by gender and chi squared test performed to determine if differences occurred due to gender. Correct and incorrect responses on the knowledge questions about the transmission routes of SARS were grouped by participants’ education level and chi squared test performed. Additional chi squared analysis was done on the remaining demographic characteristics. An alpha of 0.05 or less was considered significant. Mean scores on the Likert scales were calculated for each of the three beliefs about SARS items and for each of the eight possible precautionary measures used to prevent transmission. The ‘do not know’ responses for these variables were not scored or included in the means. The mean scores and the total number of ‘very often’ responses to the precautionary measures and were then compared to the demographic variables to determine if demographics affected the level of precautionary behaviours undertaken by the participants.

4. Results

4.1. Demographics

Information about the demographic characteristics of the participants grouped by gender is presented in

Table 2. Although 64.30% ($n=54$) of the participants were parents, 59.80% ($n=65$) did not live with the family and 53.30% ($n=57$; male=21; female=36) lived alone. More than half of the participants (55.90%) did not have any formal education. The majority of the participants (85.20%) were born outside Hong Kong and most of them (75.90%) were from Mainland China.

4.2. Knowledge of the transmission of SARS

The percentage of participants' who gave the correct answers on the three main transmission routes of droplets, direct physical contact, and urine/faeces ranged from 42.00% to 55.90% (Table 3). Demographic characteristics were compared with the participants' answers of the main transmission routes of SARS. Significant differences were found between education level and droplet transmission ($p<0.05$), and between a history of visiting the Mainland China within the past 3 months and direct physical contact ($p<0.05$).

4.3. Beliefs about the likelihood of contracting SARS

Participants' beliefs about the likelihood of contracting SARS are presented in Table 4. More than 20% of the participants reported that they were likely or very likely to contract SARS; while, 22.60% reported it was unlikely or very unlikely that they would survive if they contracted SARS. Overall, most participants had confidence in their doctor in terms of diagnosing SARS. Between 20% and 35% of participants gave the response 'do not know.' Demographic characteristics were

compared with the participants' beliefs about the likelihood of contracting SARS and no significance was found.

4.4. Precautionary measures to prevent transmission of SARS

The frequency of taking precautionary measures varied among the participants (Table 5). Means for the 3 hand-washing precautionary measures, covering the mouth while sneezing or coughing and wearing a mask were low, indicating that most participants often had practised these behaviours. In contrast, three precautionary measures (i.e., using serving spoons or chopsticks, lowering the toilet lid, and avoid using serving towels) that contradicted common cultural practices were not as frequently done. The participants who lived with their families were significantly more likely ($t=2.06$, $p<0.05$) to take preventive measures than those who did not live with their family. Mean scores on eight precautionary measures were compared among demographic variables. Significant differences were also found between: (1) attaining education and the use of serving spoons or chopsticks at meals ($p<0.05$); (2) place of birth and wear mask ($p<0.05$) and wash their hands after contact with possible contaminated materials ($p<0.05$); and (3) living with the family and to cover their mouth while sneezing or coughing ($p<0.05$) and wash hands afterwards ($p<0.05$). Participants who received formal education were more likely to use serving spoons or chopsticks at meals. For those born outside Hong Kong, were more likely to wear mask and

Table 2
Demographic characteristics of the sample grouped by gender ($N=112$)

Characteristic	Total 112 (100%)	Male 40 (35.70%)	Female 72 (64.30%)	χ^2	p -value
Age					
65–74	50 (44.60)	22 (55.00)	28 (38.90)	2.70	NS
75 or above	62 (55.40)	18 (45.00)	44 (61.10)		
Marital status				0.63	NS
Single/divorced/widower	75 (68.80)	25 (64.10)	50 (71.40)		
Married	34 (31.20)	14 (35.90)	20 (28.60)		
Has children	54 (64.30)	12 (50.00)	42 (70.00)	2.99	NS
Lives with family members	45 (40.20)	14 (35.00)	31 (44.30)	0.91	NS
Educational level				12.61	0.003**
No formal education	62 (55.90)	14 (35.90)	48 (66.70)		
Primary	29 (26.10)	12 (30.80)	17 (23.60)		
Secondary/tertiary	20 (18.00)	13 (33.30)	7 (9.70)		
Travel to and from Mainland China within 3 months	15 (13.50)	7 (17.50)	8 (11.30)	0.85	NS
Place of birth				0.02	NS
Hong Kong	16 (14.80)	6 (15.40)	10 (14.50)		
Outside Hong Kong	92 (85.20)	33 (84.60)	59 (85.50)		

Note: Missing values are marital status=3, has children=28, lives with family members=2, educational level=1, travel to the mainland in last 3 months=1, and place of birth=4; NS=not significant; ** $p<0.05$.

Table 3
Participants' perceptions of SARS transmission routes grouped by educational level ($N=112$)

Transmission route	Total N (%)	No formal education n (%)	Primary school or above n (%)	χ^2	p -value
Droplets*					
Correct	62 (55.90)	26 (42.60)	35 (71.40)	9.13	0.003**
Incorrect	49 (44.10)	35 (57.40)	14 (28.60)		
Airborne (other than droplet)					
Correct	41 (36.60)	19 (30.60)	21 (42.90)	1.77	NS
Incorrect	71 (63.40)	43 (69.40)	28 (57.10)		
Direct physical contact					
Correct	55 (49.10)	26 (41.90)	28 (57.20)	2.53	NS
Incorrect	57 (50.90)	36 (58.10)	21 (42.80)		
Contact with urine or faeces					
Correct	47 (42.00)	21 (33.90)	25 (51.00)	3.32	NS
Incorrect	65 (58.00)	41 (66.10)	24 (49.00)		
Animals					
Correct	31 (27.70)	15 (30.70)	16 (25.80)	0.31	NS
Incorrect	81 (72.30)	34 (69.30)	46 (74.20)		

Note: *One participant did not answer this question; NS = not significant; ** $p < 0.05$.

Table 4
Participants' beliefs about contracting SARS ($N=112$)

Beliefs	Very likely (1) n (%)	Likely (2) n (%)	Unlikely (3) n (%)	Very unlikely (4) n (%)	Do not know n (%)
Possibility of contracting SARS	5 (4.50)	19 (17.00)	34 (30.40)	31 (27.60)	23 (20.50)
Possibility of survival after contracting SARS	8 (7.20)	39 (35.10)	17 (15.40)	8 (7.20)	39 (35.10)
Confidence in doctors to diagnose SARS	25 (22.70)	34 (30.90)	14 (12.80)	2 (1.80)	35 (31.80)

Note: Missing values for survival after contracting SARS = 1; confidence in doctors = 2.

Table 5
Precautionary measures taken to prevent transmission of SARS ($N=112$)

Precautionary measures	Very often (1) n (%)	Often (2) n (%)	Sometimes (3) n (%)	Not at all (4) n (%)	M (SD)
Cover the mouth when sneezing/coughing	58 (51.80)	21 (18.80)	6 (5.40)	22 (19.60)	1.93 (1.20)
Wash hands after sneezing/coughing	62 (55.40)	23 (20.50)	12 (10.70)	11 (9.80)	1.74 (1.02)
Wash hands with liquid soap	77 (68.80)	19 (17.00)	7 (6.20)	9 (8.00)	1.54 (0.93)
Wash hands after contact with possible contaminated materials	65 (58.60)	21 (18.9)	10 (9.00)	14 (12.6)	1.75 (1.07)
Wear a face mask in public	63 (56.20)	14 (12.50)	18 (16.10)	17 (15.20)	1.90 (1.15)
Use serving spoons/chopsticks at meals ^a	18 (16.70)	12 (11.10)	8 (7.40)	66 (61.10)	3.17 (1.20)
Lower the toilet lid before flushing ^b	39 (34.80)	11 (9.80)	5 (4.50)	55 (49.10)	2.69 (1.39)
Avoid using serving towels ^c	39 (34.80)	16 (14.30)	3 (2.70)	45 (40.20)	2.52 (1.38)

Note: Missing values are: use serving chopsticks = 4; wash hands once contacted contaminated materials = 1.

^a Using serving spoon or chopsticks, rather than individuals each meal time.

^b Lowering the toilet cover before flushing can prevent contaminated water from splashing out.

^c Avoid using a common serving towel at meal time.

wash hands after contact with possible contaminated materials. Participants who lived with the family were more likely to cover their mouth while sneezing or coughing and wash hands afterwards.

5. Discussion

The perceptions of older adults in one district in Hong Kong about SARS transmission routes, the likelihood of contracting and the precautionary measures taken to prevent transmission of SARS were explored. The affect of demographic variables also was determined. Significant differences occurred between the males and females in terms of educational attainment only, indicating that women were less educated than men. Although no significance difference was found on other demographic variables, women were generally older, more likely to live without a partner, but to live with family members.

5.1. Knowledge about the transmission of SARS

More than half of the participants responded correctly by saying that transmission by droplets is one of the main transmission routes of SARS. However, less than half of them provided correct answers for the rest of the questions.

The timing and sequence of identifying the possible routes of SARS transmission may have been a factor in whether or not the older adult acquired this information promptly. Perhaps, participants had a better understanding of droplets transmission because it was the first route to be discovered and this occurred at an early stage of the outbreak (HKSARSEC, 2003). It was later found that direct physical contact with SARS patients and contact with urine or faeces was another route of transmission (HKSARSEC, 2003). Older adults usually take a longer time to acquire new knowledge and information (Eliopoulos, 2001). In addition, participants might not have received the information promptly due to a limited social network.

Another demographic variable that may have affected some participants' knowledge about transmission routes was the education level and travel to Mainland China. When comparing the droplets transmission and education attainment, a significant difference occurred in the group of participants who answered incorrectly and who received less formal education. Other significant differences were not found between knowledge and educational level. The participants' experience of traveling to and from the Mainland China without contracting SARS may be the reason why they did not recognize that direct physical contact was a major transmission route.

Knowledge about the transmission of SARS may have affected participants' behaviours of taking

precautionary measures. Throughout the outbreak, the main route of transmission was a direct contact of the mucous membrane (eyes, nose, and mouth) with infectious respiratory droplets (Weekly epidemiological record, 24 October, 2003). Under certain circumstances, contact with urine or faeces was also reported as another route of transmission. The public awareness about the "fecal droplet" as a transmission route of SARS was increased after the community outbreak in a private housing complex in Hong Kong (Inadequate plumbing systems, 26 September, 2003). The WHO technical consultation concluded that inadequate plumbing systems also contributed to the spread of infectious diseases (Inadequate plumbing systems, 26 September, 2003). Therefore, it was essential to maintain good plumbing systems and take appropriate precautionary measures such as to lower the toilet lid before flushing. However, insufficient knowledge about transmission route of SARS may have affected participants' awareness of adequate precautionary measures. This was evidenced by more than half of the participants reporting that they did not lower the toilet lid before flushing. Although faecal droplet transmission has been less commonly identified as the main transmission route among the infected cases when compared with respiratory droplet transmission (The University of Hong Kong, n.d.), insufficient knowledge among the older adults could have led to a higher risk of contracting SARS. It is important for those who develop public health messages during crisis situations, such as the one SARS presented in Hong Kong, to identify vulnerable populations that may not be literate and to target health promotion messages in appropriate methods, which have a high probability of reaching these populations.

5.2. Beliefs about the likelihood of contracting SARS

Although the proportion of SARS cases among the older adult population was low (17.6%) compared with the young adult (61.2%) and the middle-aged population (21.2%), the fatality rate was the highest (63.9%) in the older adult population (HKUCTC, 26 October, 2003). The participants' responses may have reflected this reality, as many believed that it was unlikely that they would contract SARS; however, they were less positive about their ability to survive if they did contract it. Confidence in their physicians was expressed by over half of the participants. The rate of participants answering 'do not know' was high for all three questions in this section of the survey. This may reflect participants' uncertain knowledge level or their lack of understanding of the questions asked. These findings reinforce the importance of teaching older adults, who may be less easily reached by traditional methods due to the education level and social isolation, how to take precautionary measures and why they are important.

5.3. Precautionary measures to prevent transmission of SARS

The frequency of taking precautionary measures varied among the participants. Interestingly, the means on hygiene measures related to hand washing and covering the face to prevent spread by droplets were low, indicating that these measures were practised by most participants; however, means on precautionary measures that required changing traditional cultural behaviours were much higher. Most of the participants did not use serving chopsticks at mealtime and did not avoid using serving towels including their home and at restaurants. Several possible explanations exist. Older adults may find it harder to change ingrained cultural behaviours, they may not have known that these were important ways to prevent transmission or these behaviours may not be relevant for them because they live alone; therefore, have meals alone. Additional research is needed to clarify the lack of compliance to these measures.

Participants who were born outside Hong Kong may be more likely to go to Mainland China or their place of birth. Since they may have higher risk of infection when they travel around or their relatives and friends visit them, they may increase their alertness to take precautionary measures to prevent transmission of SARS.

Family support has been shown to influence older people's health beliefs and self-care behaviours (Hsu and Gallinagh, 2001). Participants who lived with their families were more likely to use a higher number of the precautionary measures than those who did not live with their families. Family support in terms of reinforcing and educating the participants to take preventive measures may influence the older adults' health behaviours. This finding supports previous findings in a similar Hong Kong population (Hsu and Gallinagh, 2001).

6. Implications

Although no new case of SARS has occurred since 12 June 2003 (HKHWF, 23 June 2003) in Hong Kong, the possibility of another outbreak of SARS still exists. Health care professionals must understand how to deliver important health-related information to all segments of society, particularly when these types of public health crises arise. Older adults, who are socially isolated or those who have low literacy rates, require health professionals to use alternative methods of dissemination of essential information; for example, in-person out-reach activities to district social services settings rather than relying on broadcast media.

When acute disease outbreaks occur, a number of epidemiologic investigations are immediately undertaken;

they provide essential information for managing and stopping the outbreak. However, smaller scale descriptive studies also need to be undertaken during these times to provide the needed insights concerning vulnerable populations (e.g., who is least likely to be knowledgeable) and culture-specific information (e.g., use of serving spoons/chopsticks). It is important that nurses become involved in this type of research because of the perspective they bring and that this type of research is conducted while people are still experiencing the crisis. These studies can provide nurses direction for planning and implementing appropriate health promotion and education programmes for older adults.

7. Limitations

Several limitations were inherent in the methodology used in this study. The cross-sectional design provides information about one point in time. The convenience sample recruited from only one district in Hong Kong, limited the external validity of the findings among the older adult population. Data were collected by phone interview, leaving the possibility that older adults who did not have phones may have different responses on study instruments. Other variables such as social network that may have influenced older adults' beliefs or possibility of contracting SARS were not included. A more representative and randomly chosen sample with the use of alternate data collection method (e.g. mailing, face-to-face interview) in future studies would improve the generalizability of findings. The telephone survey was used with content and face validity which was established by an expert panel; now that it has been used, some modifications could be made, which might clarify the participants' response so that fewer 'do not know' responses would occur. Also, it is possible that the students collecting the data could have altered the study protocol causing some inaccuracy in the data unknown to the researchers.

Another factor that could have affected the responses given by participants was specific to Hong Kong culture. In Chinese traditions, older adults do not feel comfortable discussing issues such as death and diseases. These traditions might hinder older adults in providing answers to some questions considered culturally sensitive (i.e., the possibility of contracting SARS and the survival rate after contracting SARS).

8. Conclusion

The SARS outbreak in Hong Kong presented unusual challenges for health care providers and citizens. Before the outbreak had been contained, older adults' perceptions about SARS and their preventative health

behaviours were explored. This was the first systematic study to describe the knowledge, beliefs and SARS precautions taken by the older adult population in Hong Kong. The participants' knowledge about the main transmission routes of SARS was consistent with the precautionary measures they practised. Nurses are in an ideal position to develop and implement studies of the learning needs of vulnerable sections of the population.

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References

- Eliopoulos, C., 2001. *Gerontological Nursing* 5th Edition. Lippincott, Philadelphia.
- Grant, C., Yuen, P., 1998. *The Hong Kong Health Care System*. University of New South Wales, NSW.
- Hong Kong Census and Statistic Department (HKCSD), 26 October 2001a. 2001 population census: Hong Kong resident population aged 15 and over by quinquennial age group and educational attainment (highest level attended), 2001. Retrieved 25 November, 2003, from http://www.info.gov.hk/censtatd/eng/hkstat/fas/01c/cd0192001_index.html.
- Hong Kong Census and Statistic Department (HKCSD), 26 October 2001b. 2001 population census: population by age group, 1991, 1996, 2001. Retrieved 25 November 2003, from http://www.info.gov.hk/censtatd/eng/hkstat/fas/01c/cd0192001_index.html.
- Hong Kong Department of Health (HKDH), 2001. Elderly health services. Retrieved 30 November 2003, from <http://www.info.gov.hk/elderly/english/main-service.htm>.
- Hong Kong Department of Health (HKDH), 2003. Health advice for people who have been in contact with SARS patients. Retrieved 9 July 2003, from <http://www.info.gov.hk/dh/diseases/ap/eng/contact.htm>.
- Hong Kong Department of Health (HKDH), 29 November 2003. Severe Acute Respiratory Syndrome (SARS)—preventive measures. Retrieved 2 December 2003, from http://www.info.gov.hk/info/sars/e_hkcomm.htm.
- Hong Kong Health, Welfare and Food Bureau (HKHWFB), 17 April 2003. SARS bulletin. Retrieved 24 July 2003, from <http://www.info.gov.hk/dh/diseases/ap/eng/bulletin0417.htm>.
- Hong Kong Health, Welfare and Food Bureau (HKHWFB), 22 April 2003. SARS bulletin. Retrieved 24 July 2003, from <http://www.info.gov.hk/dh/diseases/ap/eng/bulletin0422.htm>.
- Hong Kong Health, Welfare and Food Bureau (HKHWFB), 20 June 2003. SARS bulletin. Retrieved 24 July, 2003, from <http://www.info.gov.hk/dh/diseases/ap/eng/bulletin0620e.pdf>.
- Hong Kong Health, Welfare and Food Bureau (HKHWFB), 23 June 2003. SARS bulletin. Retrieved 24 July 2003, from <http://www.info.gov.hk/dh/diseases/ap/eng/bulletin0623e.pdf>.
- Hong Kong Hospital Authority (n.d.). Fees and charges for public health services. Retrieved 24 July, 2003, from http://www.ha.org.hk/hesd/nsapi/?Mlval=ha_visitor_indexandintro=ha%5fvview%5ftemplate%26group%3dOSR%26Area%3dHNI.
- Hong Kong SARS Expert Committee (HKSARSEC), 2 October 2003. SARS in Hong Kong: from experience to action. Retrieved 3 October, 2003 from http://www.sars-expertcom.gov.hk/english/reports/reports/reports_fullrpt.html.
- Hong Kong SARS (HKSARS, 2003) fatality rate same as overseas, 9 July 2003. News.gov.hk.. Retrieved 24 July 2003, from <http://www3.news.gov.hk/ISD/ebulletin/en/category/issues/030709/html/030709en05006.htm>.
- Hsu, H.Y., Gallinagh, R., 2001. The relationships between health beliefs and utilization of free health examinations in older people living in a community setting in Taiwan. *Journal of Advanced Nursing* 35 (6), 864–873.
- Inadequate plumbing systems likely contributed to SARS transmission, 26 September 2003. World Health Organisation Western Pacific Region. Retrieved 27 March 2004, from http://www.wpro.who.int/public/press_release/press_view.asp?id=297.
- Kong, T.K., 2003. Message from the president. *The Hong Kong geriatrics society newsletter*, May 2003, pp. 1–2. The Hong Kong Geriatrics Society, Hong Kong.
- Leung, G.M., Lam, T.H., Ho, L.M., Ho, S.Y., Chan, B.H.Y., Wong, I.O.L., et al., 2003. The impact of community psychological responses on outbreak control for severe acute respiratory syndrome in Hong Kong. *Journal of Epidemiology and Community Health* 57, 857–863.
- The University of Hong Kong (n.d.). Transmission routes and risk factors. Retrieved 27 March, 2004, from <http://www.hku.hk/sars/medical-info/modeoftrans.html>.
- The University of Hong Kong Clinical Trial Centre (HKUCTC), 26 October 2003. SARS statistics for Hong Kong: Specific updates for Hong Kong—age & gender specific fatality rate. Retrieved 27 March 2004, from http://www.hku.hk/ctc/sars_hk_23.htm.
- United States Department of Health and Human Service, Centers for Disease Control and Prevention, 22 May 2003. CDC Telebriefing transcript: update on severe acute respiratory syndrome (SARS). Retrieved 24 July 2003, from <http://www.cdc.gov/od/oc/media/transcript/t030522.htm>.
- Weekly epidemiological record, 24 October 2003. *World Health Organization*, 78(43), 373–380. Retrieved 27 March 2004, from <http://www.who.int/wer/2003/en/wer7843.pdf>.
- World Health Organization (WHO), 1 May 2003. Case definitions for surveillance of Severe Acute Respiratory Syndrome (SARS), Retrieved 27 March 2004 from <http://www.who.int/csr/sars/casedefinition/en/print.html>.
- World Health Organization (n.d.). Preliminary clinical description of Severe Acute Respiratory Syndrome. Retrieved 27 March 2004, from <http://www.who.int/csr/sars/clinical/en/print.html>.