

✧ RESEARCH PAPER ✧

# *Nurses' perceptions of risk from emerging respiratory infectious diseases: A Singapore study*

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## **Nurses' perceptions of risk from emerging respiratory infectious diseases: A Singapore study**

The recent emergence of virulent respiratory infectious diseases such as Severe Acute Respiratory Syndrome (SARS) and Influenza A/H1N1 viruses predisposes nurses to occupational risks. This qualitative study investigated how Chinese Singaporean nurses perceived the risks of exposure to these infectious diseases and the factors that influenced this risk perception.

Data were collected through face-to-face interviews and were analyzed using Braun and Clarke's process of thematic analysis. Three themes emerged: living with risk; the experience of SARS; and acceptance of risk. The nature of nursing work was perceived to place participants at risk of infection. Another significant finding of this study is that the government's, organizations' and nurses' perceptions of new emerging respiratory infectious diseases were influenced by their previous experience with SARS. Similar to previous studies, nurses working at the 'front line' believed that infection from these diseases was an unavoidable occupational hazard.

**Key words:** infectious diseases, nurses, respiratory, risk perception.

## **INTRODUCTION**

Emerging infectious diseases, defined as diseases that have 'newly appeared in a population or have existed previously but are rapidly increasing in incidence or geographic

range',<sup>1</sup> are the second leading cause of death worldwide.<sup>2,3</sup> Significant acute respiratory tract infections which have emerged in the 21st century include Severe Acute Respiratory Syndrome (SARS) in 2003, the Avian influenza A/H5N1 virus in 2004 and the Influenza A/H1N1 virus in 2009. These viruses have the same mode of transmission via respiratory droplets and person-to-person contact.<sup>4</sup> They have high attack rates, are highly contagious and can spread rapidly within

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global populations, leading to a global pandemic. These features pose a problem for health authorities and health-care professionals.<sup>5</sup>

### Definition of risk perception

A key review conducted by Leppin and Aro, which examined empirical studies focusing on individuals' risk perceptions towards emerging acute respiratory infectious diseases, found that few studies had explicitly defined the meaning of 'risk perception'. The authors identified key constructs of health-care workers' (HCWs) risk perceptions within the organization. These were: personal health risks; health risk to others; social isolation; and acceptance of risks.<sup>6</sup> These constructs will now be discussed and where applicable, any data provided specifically on the perceptions of nurses will be highlighted.

### Personal health risks

HCWs are exposed to emerging acute respiratory infectious diseases as a result of their close contact with infected patients.<sup>7</sup> The majority of literature has focused on the risks from SARS-infected patients.<sup>8-10</sup> In particular, many studies report that HCWs perceived a high level of infection transmission and consequent adverse outcomes such as SARS infection and/or death.<sup>11-13</sup>

In contrast, however, Grace *et al.* found that HCWs perceived a low likelihood of being infected with SARS.<sup>14</sup> In many studies there were personal and organizational characteristics that were more likely to increase the HCW's perceived personal health risk. Personal factors included: being younger;<sup>15</sup> being female;<sup>16</sup> working as a nurse (in comparison with a physician);<sup>15,16</sup> perceiving that the virus was lethal;<sup>15</sup> daily exposure to SARS patients;<sup>17</sup> perceiving little personal control over their exposure to the virus;<sup>8</sup> and having a high Impact of Event Scale score, indicating emotional distress.<sup>10</sup> Organizational factors found by some authors to increase HCW's perceived risks included: a perception of the insufficiency and ineffectiveness of the health-care organization's infection control measures;<sup>12,15</sup> inability of the health-care organization to provide timely updates and information;<sup>11</sup> and their inability to fulfil additional work responsibilities required of them during an outbreak.<sup>11</sup> However, Grace *et al.* found that HCWs in their study did not perceive the effectiveness of the hospital infection control measures and the hospital's ability to provide education and updates to influence their risk perceptions.<sup>14</sup>

### Social isolation

Due to the nature by which emerging acute respiratory infectious diseases are transmitted (through social contact among populations), an individual's risk perception would inherently contain a social dimension.<sup>6</sup> In some studies it has been reported that hospitals implemented socialization restrictions, such as discouraging face-to-face interactions within the hospital and eating out, in order to reduce disease transmission between staff.<sup>18,19</sup> The use of personal protective equipment (PPE) was seen to act as a communication and interaction barrier.<sup>20</sup> Although one study reported that being deployed to work in other work units with new colleagues as being a factor that would increase the perception of risk,<sup>20</sup> other studies indicated that there was a greater sense of collegiality and togetherness with other HCWs during the SARS outbreak.<sup>15,21</sup>

### Risk to others

A HCW is as much a family member and a friend as he or she is a HCW. In several studies HCWs expressed fear of inadvertent transmission of the disease to family and friends during the SARS outbreak.<sup>8,10,15</sup> HCWs were particularly worried about more vulnerable family members such as children and the elderly.<sup>15,22</sup> These findings, however, were not supported in Maunder *et al.*'s study where the majority of HCWs believed their loved ones were not at risk during the SARS outbreak.<sup>23</sup>

### Acceptance of risk

In spite of these perceived risks, the majority of HCWs expressed acceptance and believed that these risks were an occupational necessity.<sup>13,24</sup> However, not all HCWs were willing to accept this risk.<sup>8</sup> Acceptance of risk has been found to be higher in physicians, male HCWs and older HCWs in contrast to nurses, females and younger HCWs, respectively.<sup>10,16</sup> HCWs' acceptance of risk was also found to be correlated with their perceived availability of institutional measures for risk management.<sup>16</sup>

It can be seen from this discussion that there is a substantial amount of research examining how HCWs perceive the risks of Emerging Acute Respiratory Infectious Diseases such as H1N1 and SARS,<sup>17,25</sup> however, few studies have focused specifically on nurses. Thus this study aimed to provide some data on this gap in the literature. Additionally, there have been no published studies, to date, that explore nurse's perceptions of risk from different types of respiratory infectious diseases (e.g. between

SARS and Type A Influenza—H1N1). As such, this study also aimed to fill this gap in knowledge.

The study explored the perceptions of 10 Singaporean nurses of Chinese cultural background. Singapore was chosen because the first author was a four year baccalaureate nursing student, was a Chinese Singaporean and was attached to the major infectious diseases hospital in Singapore. To contextualize the study, we now provide a brief explanation of the SARS and H1N1 outbreaks in Singapore.

### The Singapore experience

The SARS outbreak in Singapore saw a total of 238 probable cases and 33 deaths during the infection period in 2003, with HCWs constituting 41% of the total infected cases.<sup>26,27</sup> During the SARS outbreak, many containment measures were implemented in order to control the rising rates of infection in health-care facilities. These measures were seen to lower the SARS transmission rate and Singapore was removed from the WHO's list of areas with local SARS transmission on 31 May 2003.<sup>27</sup> Following the SARS experience, policies and preparation were further carried out to prepare Singapore for future pandemics, specifically, against a possible Influenza A/H5N1 pandemic which had re-emerged in early 2004.<sup>4</sup> All of these measures were subsequently employed during the H1N1 pandemic outbreak in April 2009 but were gradually reduced in intensity as the H1N1 pandemic outbreak was found to be far less severe in contrast to SARS.

## METHODS

The aim of the study was to investigate how Singaporean Chinese nurses practicing in hospital and community settings perceived the risks of exposure to both H1N1 and SARS and the strategies that influenced this risk perception.

This study employed a qualitative approach to data collection and analysis. This approach was driven by the theoretical paradigm of interpretivism, which posits that humans are constantly trying to make sense of the world and their lived experience.<sup>28</sup> This paradigm was chosen to enable the researchers to explore and understand how nurses experienced and perceived the phenomenon of being exposed to emerging acute respiratory infectious diseases in their workplaces and how this life world and their consequent behaviour was affected by factors such as the cultural and societal context they are within.<sup>29</sup>

## Sample

Purposive sampling was used to recruit participants. Purposive sampling is a strategy in which researchers deliberately select information sources that will yield the most productive amount of information with regard to the aims of the research study.<sup>28,30</sup> As such, nurses who were in constant close contact with patients who were infected with emerging acute respiratory infectious diseases and who had worked through both the SARS and the H1N1 outbreak were chosen as they were information-rich and able to offer insights into the phenomenon of being exposed to such diseases.

### Inclusion and exclusion criteria

Following contact with one hospital and one primary care provider (polyclinic), 10 Chinese Singaporean registered nurses (five from each workplace) participated in tape-recorded face-to-face, semi-structured interviews at a place of their choosing. The inclusion criteria were: having previously nursed both patients with SARS and H1N1; and of Chinese ethnic background. Nurses of other races were excluded from the study, as they may have different perceptions from Chinese registered nurses, and this study did not seek to ascertain if there were cultural differences between the nursing care provided by the four main ethnic groups (Chinese, Malay, Indian and Eurasian) in Singapore. Additionally, nurses employed in other health facilities in Singapore were also excluded from the study. The final recruited sample included senior staff nurses, nurse clinicians and nurse managers and their years of experience ranged from 7 to 43 years.

A total of 10 participants were chosen as it was postulated that this number would provide sufficient numbers to achieve data saturation and this was the case in this study.<sup>31</sup> Participants from both hospital and community settings were interviewed in order to ascertain if there were any similarities or differences in the perceptions of nurses from these different contexts.<sup>32</sup>

The study was approved by the Directors of Nursing at the hospital and polyclinic. A flyer outlining the study was circulated to the nurses, and nurses who wished to participate contacted the primary author of this paper. If they met the inclusion criteria, an interview was arranged at a convenient place for them. A face-to-face semi-structured interview as chosen to allow exploration, in depth, of the phenomena of interest.<sup>33</sup>

The questions asked were: 'Can you tell me what you know about emerging infectious respiratory diseases?'; 'In

Singapore, we have been exposed to SARS and H1N1. I'd like you to think back to when you first heard of them and tell me about your initial thoughts'; 'Tell me about your role in the recent H1N1 pandemic'; 'Tell me what you think the role of the government is towards healthcare professionals during a pandemic such as H1N1 and SARS'; 'Has the latest pandemic affected your work practices and scope of practice'; 'Did the H1N1 pandemic affect your ability to care? If so, please can you describe how and why and what you did to try to overcome this. What about during the SARS epidemic? Was there a difference between the H1N1 and SARS? If so, can you tell me about it'; 'Tell me about any effects that working in healthcare with a pandemic had on your social and family life'.

Interviews ranged from 30 to 90 minutes. All interviews were conducted in English and did not require translation. Following completion of the interview, the tapes were transcribed verbatim.

### Data analysis

The data collected were analyzed using Braun and Clarke's six phase process of thematic analysis to generate categories and themes from the data.<sup>34</sup> Data analysis focused specifically on how the participants perceived their experiences of being exposed to H1N1 within their workplaces in the context of a previous SARS experience. Forty initial codes, which may be defined as the most fundamental element of the raw data which is meaningful to the phenomenon being explored,<sup>34</sup> were generated. These formed the basis of themes across the data sets and relevant data extracts were collated and placed under each code. The underlying meaning of the codes were then analyzed and organized into potential major themes through the use of thematic maps. This culminated in three themes. Prior to this analysis, to confirm concepts emerging from the data, the qualitative data analysis program *Leximancer*<sup>35</sup> was used.

### Trustworthiness

Several measures, based on Lincoln and Guba's four criteria: credibility, dependability, confirmability and transferability as cited in Polit and Beck,<sup>30</sup> were used to enhance the trustworthiness of this study. Credibility of research findings was enhanced by the use of investigator triangulation<sup>36,37</sup> and the use of a personal/reflexive journal.<sup>38</sup>

To enhance dependability and confirmability of the study, all documentation, such as the researcher's reflex-

ive journal, communication with research participants, decisions made together by the research team, as well as all procedures and data relevant to the study, were kept as part of an audit trail.<sup>39</sup> To facilitate transferability, thick descriptions explicating the context and settings in which the study was undertaken and other research steps were included.<sup>40</sup> Purposive sampling was also employed to enhance transferability of the findings.<sup>38</sup>

## RESULTS

Three major themes were identified: living with risk; the experience of SARS; and the acceptance of risks. These themes were generated by several sub-themes within the data which will now be discussed.

### Living with risk

The nature of their work, which involved interaction with patients, colleagues and members of the public who were possibly infected with H1N1, was perceived by the participants to place them at several risks: infection by patients; infection from sources other than patients; and health risk to others.

#### *Infection by patients*

Participants expressed their fears of a transmittable disease:

*I can feel that oh it's a life threatening thing . . . [to] all the nurses including me . . . even though its only one, one or two [H1N1] cases that time, but we still fear . . . it's very scary, maybe this thing will spread very fast to everybody (B3 hospital nurse).*

This was especially so for front line nurses in both the hospital and polyclinic settings as they had greater exposure to infected patients. For example, a hospital-based participant who screened members of the public for H1N1 expressed her concern about being more exposed to risk and thus being infected unknowingly:

*I think I might be the one getting H1N1. Because that time I was deployed to [the] screening centre. . . . You know most of the patients come in [and] the first stop [is] screening centre . . . . So you won't know whether you're in contact, whether you'll get it or not because you're whole day working with people around you [with] query H1N1 (B2 hospital nurse).*

Similarly, a nurse working in a polyclinic also noted that as front line workers, they were also at increased risk. Interestingly, this nurse believes that because of the primary care setting, these nurses are at an increased risk to nurses compared with nurses employed in a hospital:

*People who are 'flu' [Influenza], cough, fever, the first thing they think of is . . . going to the polyclinic . . . the fee is so attractive . . . [and] in hospital 'A&E' [Accident and Emergency], they put it very clearly . . . Mild 'flu', mild cough, please go to 'GP' [General Practitioner], polyclinic. Minimum waiting time two hours . . . So they actually do not come to A&E until they suspect [H1N1] or become very serious . . . [So] we're actually at higher risk, we actually take in . . . all walks of patients [sic] (A3 polyclinic nurse).*

Nurses who were not on the front line, but worked in management positions, felt their chances of infection were low, mainly due to their lack of contact with possible infected clientele:

*At work, I don't think I'll have a chance [of being infected]. . . I don't come in contact with patients so often like you know, my nurses sitting down and doing counselling. I'm just, err, you know, doing supervision work . . . We're doing admin work ensuring everything is okay (A2 polyclinic nurse).*

#### *Infection from sources other than patients*

Apart from their patients, participants also deemed themselves to be at risk of infection from their colleagues:

*In the tea room we all, you know, sometimes sharing food . . . [so] we feel that . . . H1N1 will spread among the nurses, you know, very fast (B3 hospital nurse).*

Additionally, some participants also perceived that they were at risk from the visitors and members of the public who visited the health care organization.

*Sometimes . . . when you go through the [hospital] lobby you won't know this person ha[s] H1N1 or not (B2 hospital nurse).*

This was especially the case if members of the public were seen to be noncompliant with infection control procedures of the organization:

*They wear the mask [inappropriately], it's either that sometimes they put it up here [motioning to the top of her head], or put it down here [motioning to below her chin] (A2 polyclinic nurse).*

#### *Health risks to others*

Some participants were not concerned about themselves, rather they were concerned that they would, because of their exposure to infected patients, colleagues or visitors to the organization, inadvertently infect their family:

*Frankly speaking, I wasn't that fearful for me [sic] lah . . . My fear is actually only [for] my family members only (A4 polyclinic nurse).*

This fear was heightened for those who lived with elderly parents who were seen as being at higher risk of being infected with H1N1:

*Let's say if I get it right, then I'm afraid that you know I might spread to them . . . because my parents they are all old age, their immune system not so strong, yah if I spread to them their immune system not so strong then they've other complications also (B5 hospital nurse).*

Some participants were also concerned about infecting their colleagues:

*When you're in tea room everyone [has their] mask down . . . Then if I'm [H1N1] positive I'll be affecting . . . screening centre staff (B2 hospital nurse).*

### **The experience of SARS**

Importantly, the participants' risk perceptions towards the H1N1 outbreak were found to be situated within the context of their previous SARS experience. Specifically, the experience affected how they perceived the lethality of the H1N1 virus and their level of pandemic preparedness.

#### *Lethality of virus*

Participants' risk perceptions were low during the H1N1 outbreak because of their lower perceived lethality of the H1N1 virus:

*It's just a normal new type of flu and you can just take the, the [Tamiflu] prescription . . . Take for five days then you'll recover and then you'll have [to] isolate yourself at home (B5 hospital nurse).*



Furthermore, the H1N1 virus was perceived to cause death only in vulnerable populations:

*It's not something that you will die you know, unless you've underlying vulnerable disease . . . chronic diabetes or something like that (A2 polyclinic nurse).*

In contrast, being infected with SARS was likened to a death sentence:

*To be frank, SARS . . . I was a bit frightened because I had staff going high fever and never recover . . . . We were worried because I see people dying you see . . . there's a . . . level of fear (A5 polyclinic nurse).*

However, based on their past experience with SARS, the participants were initially worried during the early stages of the H1N1 outbreak as they did not know whether the H1N1 virus would be as lethal:

*At first, I feel a bit scared also [at the start of the H1N1 outbreak]. Because we all don't know what will happen you see . . . we also heard cases, that people die[d] because of H1N1 (B5 hospital nurse).*

With the progression of the disease outbreak and scientific findings demonstrating that the H1N1 virus was milder and treatable with an antiviral drug, Oseltamivir Phosphate (*Tamiflu*), participants' risk perceptions gradually lessened:

*This time . . . [within a] few weeks, they come out with Tamiflu, come out with vaccination, uh so I feel more safe (B3 hospital nurse).*

**Organizational and personal pandemic preparedness**  
More importantly, participants had low risk perceptions during the H1N1 outbreak because they perceived themselves and the organization to be sufficiently prepared for a pandemic outbreak as a result of their experience with SARS. Specifically, participants noted that many risk-mitigating organizational strategies were already in place within the organization as a result of the SARS experience:

*SARS, they were not prepared. Now I think they—they put everything in place . . . . This SARS episode has teach [sic] the MOH [Ministry of Health] preparedness (A5 polyclinic nurse).*

*When H1N1 ah, came about, I really do not have any fear. I still believe it will be contained eventually, you know? . . . Because based on the SARS experience . . . we are at a higher level of preparedness (A4 polyclinic nurse).*

Additionally, participants recognized that more organizational strategies had been instituted in the hospital and the polyclinics after the SARS outbreak to specifically prepare for future pandemics. One of which was pandemic exercises to prepare the polyclinics for the surge in patient load during a possible influenza outbreak:

*[After SARS outbreak] we also conducted . . . [Avian Influenza pandemic outbreak] role play and exercise . . . And we get like 200 over participants to come in suddenly like rush in like that with all this [mock symptoms] (A4 polyclinic nurse).*

The hospital also specially arranged to isolate and quarantine patients in the event of an outbreak:

*That's why the [name of block] block was being kept empty . . . . In case there's any [H1N1] infection hits . . . straightaway they'll activate the block, so they'll send the infectious cases there first to isolate the case . . . . It's well planned already (B2 hospital nurse).*

Pre-pandemic and pandemic influenza vaccinations and adequate PPE were also prepared in order to protect the participants against the outbreak. This preparation also allayed the fears of participants:

*Previously during SARS period there's been a shortage of N95 mask, but I, this time round I think we should be more prepared already so not so [I was] worried also. (B4 hospital nurse)*

Apart from organizational preparedness, participants also perceived themselves to be personally prepared as a result of their SARS experience and knew what risk-mitigating strategies to carry out when exposed to H1N1:

*Because I have experienced SARS before . . . so I'm more prepared of what I need to do when I nurse this kind of patients (B5 hospital nurse).*

One such risk-mitigating strategy was their use of PPE when exposed to infected patients:

*Actually every patient . . . should be a suspect . . . . So everybody that come in, with a cough and cold, we assume they are H1N1 especially with high fever. So we don't take risk you see. Wear mask (A5 polyclinic nurse).*

Another risk-mitigating strategy employed was hand washing when appropriate:

*Before we go back home, we have a thorough seven-step [hand wash]. Even before [we] go for lunch, before lunch, before each patient, we do seven steps [of] hand washing (A1 polyclinic nurse).*

Similar to the use of PPE, the importance of hand washing and its practice had been ingrained in the participants as a result of the SARS experience:

*Because I undergone SARS I know . . . washing hands [is] very important. And I stress the washing hands a lot. Seven steps (A5 polyclinic nurse).*

### Acceptance of risk

All the participants believed that nursing people with an infectious disease and being subsequently exposed to that disease was an unavoidable occupational hazard:

*When we're in nursing we're actually facing risk, deadly disease . . . H1N1, airborne diseases . . . [but] I don't resign because of airborne disease or deadly disease. That should not be an excuse for me to step down . . . . But I guess it's . . . our job. And somehow or rather after taking it as a job, it becomes our responsibility . . . . I think nurses are willing to go an extra mile for the public (A3 polyclinic nurse).*

As such, they continued to interact with and care for their patients as they did before the H1N1 outbreak:

*I really just, you know, just contact with the patient . . . . When I take care of the patient, I don't feel that "Oh I better don't go near to the patient or whatever" (B3 hospital nurse).*

## DISCUSSION

Nurses are often exposed to a variety of occupational hazards within their workplaces, in particular, infectious diseases, some of which may cause death.<sup>41,42</sup> With the resurgence of emerging acute respiratory infectious diseases such as SARS and pandemic influenza in the 21st

century, research investigating nurses' risk perceptions towards their exposure is more than ever pertinent.

The data show that the nurses in this study have similar concerns to previous research on HCW's perceptions of risk from SARS and other emerging acute respiratory infectious diseases in that these nurses were concerned about risks to their personal health (from patients, from colleagues and visitors to the organization).<sup>6,10</sup> They were also concerned about the health risks that their employment as a nurse might cause to others,<sup>6,19</sup> in particular those more vulnerable such as the elderly. Finally, the study findings clearly indicate that although participants perceived themselves to be at risk of infection, all of them were accepting of these risks as they saw it to be part of their professional obligation. HCWs surveyed in studies about their risk perceptions during SARS and possible pandemic influenza pandemics likewise expressed the same perceptions and willingness to serve in such pandemics.<sup>8,10,43,44</sup>

In addition to the similarities of previous research, particularly into perceptions of risk and SARS, this study adds to the existing knowledge in several ways. First, it was apparent that the nurses were fearful of being infected by others—patients, colleagues, visitors to the organization. This fear was heightened by patients or visitors or colleagues who did not comply with the infectious disease precautions, in particular the use of PPE. Second, it appears that previous experience of one pandemic prepared these nurses for subsequent epidemics. Third, it is apparent that personal, organizational and government strategies, also based on previous experience, increased the confidence of the nurses in this study.

### Infectivity from sources other than patients

In addition to infected patients, the participants believed that colleagues and members of the public visiting the hospital were a source of infection. No studies were found that explored similar perceptions of HCWs towards their colleagues or the members of the public. However, studies examining the public's practice of social distancing within the community during the SARS outbreak in order to help contain the spread of the SARS virus, may lend relevance to the topic at hand. Given the asymptomatic yet transmissible characteristics of early stage SARS infection,<sup>45</sup> social distancing was encouraged by the government as one way to contain the spread of the disease.<sup>6,46</sup> Hence, it is possible that the participants' perceptions

were rooted in the same principles that governed the measure of social distancing, suggesting that participants recognized that anyone, and not just their patients, could possibly be infected.

### Previous pandemic experience

This study also clearly illustrates the impact the SARS outbreak had on the participants. It was evident that their risk perceptions towards the H1N1 outbreak were situated within the context of their previous SARS experience. In contrast to their perception of SARS, participants' risk perceptions were low during the H1N1 outbreak once they perceived the H1N1 virus to be mild and treatable. The influence of the perceived lethality of the virus on risk perceptions has been examined in several studies, which found that HCWs who perceived higher risks of death from SARS virus had higher overall risk perceptions.<sup>10,15</sup> In addition, participants' appraisal of the severity of the virus and their aforementioned perceived vulnerability to it appear to be constructs of the Protection Motivation Theory, which represents a form of cognitive judgment in determining risks to oneself.<sup>6</sup> As such, participants who perceived that they were healthy, and the H1N1 to be less severe, were less likely to perceive themselves at risk of being affected.

### Personal, organizational and government strategies

The use of the polyclinics as 'flu clinics' was part of the government's strategy to shift the clinical burden from the tertiary to the primary care setting.<sup>4</sup> This was particularly important during the H1N1 outbreak where approximately 25% of the population was estimated to seek care for influenza symptoms.<sup>47</sup>

Participants' risk perceptions were also found to be low during the H1N1 outbreak because of their perceived organizational and personal pandemic preparedness as a result of their experience with SARS. Their past experience during SARS had equipped them with the knowledge of personal risk-mitigating strategies, several of which had already become habits for some of the participants. Furthermore, these strategies—having had successfully mitigated the risk of exposure to participants during SARS—were perceived as being effective, hence lowering their risk perceptions from the outset and throughout the H1N1 outbreak. These findings are similar to Brewer *et al.* who postulated that individuals may have already factored in the effects of their risk-mitigating behaviour

when determining their levels of personal risk.<sup>48</sup> To date, no studies pertaining to emerging acute respiratory infectious diseases have been found to examine this unique relationship, that is, the distinction between behaviour-conditioned and behaviour-unconditioned risk perceptions.<sup>6</sup>

### Limitations to the study

There are several limitations to this study. First, the findings of this study are not meant to be generalized to the whole population of nurses due to the nature of qualitative research.<sup>49</sup> There is, however, an element of transferability of the study findings especially in view of the similarity of some of the findings to previous studies, especially those about SARS.

### CONCLUSION

This interpretative qualitative study examined the perceptions of risk of exposure to emerging acute respiratory infectious diseases, specifically SARS and Influenza A/H1N1. There were three major themes which emerged from the data. These were: living with risk, the experience of SARS and acceptance of risk. For the nurses in this study, the nature of their work was perceived to place them at higher risk than other health-care professionals due to the frontline nature of nursing work. This perception was accepted as an occupational hazard and did not affect their willingness to care for patients with SARS or other acute respiratory infectious diseases. In this study, the participants were more concerned about how their work would cause harm to others in the community, particularly their family with whom they were in close contact.

The fear of becoming infected was heightened by their exposure not only to other health professionals who could potentially be infected but also patients and visitors to the health facility. This was heightened when others did not adhere to infectious disease protection protocols such as the washing of hands and/or the wearing of PPE.

A significant finding of the study is that nurses, government and organizations' perceptions of new emerging respiratory infectious disease (and their response to it) is influenced by their previous experience—particularly with SARS. However, the data suggest that although the initial response to the Influenza A/H1N1 was severe containment—especially in Singapore, once the virulence of Influenza A/H1N1 was found to be less severe, the participants perceived there was less risk to themselves



and their family. Thus the participants' appraisal of the severity of the virus and their perceived vulnerability to it appear to be constructs of the Protection Motivation Theory, which represents a form of cognitive judgement in determining risk to oneself.

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