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Factors Affecting Perceived Risk of Contracting Severe Acute Respiratory Syndrome Among Academic Physicians

Sherry L. Grace, PhD; Karen Hershenfield, BSc; Emma Robertson, PhD; Donna E. Stewart, MD, FRCPC

ABSTRACT

SARS disproportionately affects healthcare providers. A physician survey was administered within three hospitals providing care to SARS patients. Knowing a colleague who contracted SARS and previous occupational exposure to infectious agents were significantly predictive of greater perceived risk, whereas perceived effectiveness of precautions and provision of direct care were not (*Infect Control Hosp Epidemiol* 2004;25:1111-1113).

Severe acute respiratory syndrome (SARS) disproportionately affects healthcare providers, who account for upward of 50% of those affected in Toronto.[1] Most physicians feel they have a "duty" to treat infectious patients[2]; however, factors such as perceived susceptibility or risk may affect physicians' compliance with infection control precautions[3] and willingness to provide clinical services to affected patients.[2,4] The objective of this study was to assess the degree of perceived occupational risk and the demographic, logistic, and attitudinal factors affecting perceived risk of contracting SARS among physicians.

METHODS

The University Health Network is composed of three large teaching hospitals in downtown Toronto where SARS patients are treated. After the second SARS outbreak in the city in May 2003,[5] there was spread to several healthcare workers (HCWs) at the University Health Network, who then received care on site. It was at this juncture that all physicians with a University Health Network address (n = 577) were selected for inclusion in this study from an online version of the Canadian Medical Directory. This sample consisted of 405 (70.19%) male and 172 (29.81%) female physicians. The institutional research ethics board approved the protocol for this study.

The cross-sectional survey was mailed to all physicians. Each package included an information letter, a survey, and a return envelope. As outlined in the information letter, the completion and return of the survey constituted the participant's informed consent for this study. To facilitate disclosure, the survey was completely anonymous, without any means to recontact nonresponding physicians through a numerical identifier. Of the 577 physicians who were mailed the survey, 23 (4%) were ineligible: 22 had moved and 1 was deceased. Of the remaining 554 physicians, 193 returned completed surveys (response rate, 34.8%).

Based on the literature regarding risk perception among HCWs,[3,4,6-10] relevant sociodemographic, logistic, and attitudinal factors were incorporated into the survey. Sociodemographic characteristics consisted of gender, age, specialty, number and ages of children, number of years in practice, health status, and ethnocultural background. Logistic and attitudinal factors consisted of information and knowledge, previous exposure to infectious agents, infection control practices, and direct occupational exposure to SARS. Specifically, provision of direct care to SARS patients, knowing someone who contracted SARS, previous occupational exposure to an infectious agent, new SARS symptomatology, satisfaction with information provision, and perceived effectiveness of infection control precautions (5-point Likert scale from 1 ["not effective"] to 5 ["extremely effective"]) were measured. The dependent variable of perceived risk asked physicians to rate how likely they thought they were to contract SARS on a scale from 1 ("not likely") to 5 ("extremely likely").

RESULTS

Participant characteristics are presented in Table 1. Regarding specialty, 72 (48.0%) practiced medicine, 31 (20.7%) were surgeons, 20 (13.3%) worked in radiology, 13 (8.7%) practiced anesthesia, 11 (7.3%) worked in psychiatry, 3 (2.0%) worked in pathology, and 43 did not list their specialty (likely to ensure anonymity). When asked their ethnocultural background, 131 (70.8%) responded caucasian–English–Anglo-Saxon, 28 (15.1%) were Asian, 11 (5.9%) were Jewish, 6 (3.2%) were Indian, and others reported Mediterranean, Arabic, Hispanic, and Persian backgrounds. A dichotomous variable was created consisting of caucasian–Canadian versus all other self-reported backgrounds. Forty-five (23.3%) of the participants provided direct care to one or more SARS patients.

Ninety-nine (54.4%) of the physicians self-reported occupational exposure to at least one other infectious

TABLE 1
CHARACTERISTICS OF THE PARTICIPANTS (N = 193)

Characteristic	Mean (SD)	No. (%)
Gender		
Male		131 (67.9)
Female		62 (32.1)
Age, y	48.2 (11.0)	
Years in practice*	23.4 (11.0)	
Children		
Yes		141 (73.1)
No		52 (26.9)
No. of children	2.5 (0.9)	
Ethnocultural background		
Caucasian–white		142 (76.8)
Other		43 (23.2)
Health status†	1.41 (0.64)	

SD = standard deviation.
*Median, 22 years.
†Assessed on a scale from 1 ("excellent") to 5 ("poor").

TABLE 2
ANALYSIS OF VARIANCE PREDICTING PHYSICIAN PERCEPTION OF LIKELIHOOD OF CONTRACTING SEVERE ACUTE RESPIRATORY SYNDROME (SARS)

Variable	*df*	F	*P*	eta-square
Gender	1	0.12	.73	.001
Ethnicity	1	2.02	.16	.013
Years of medical practice	1	0.17	.68	.001
Perceived health	1	0.71	.40	.004
Provides direct care to SARS patients	1	1.33	.25	.008
Knows someone who contracted SARS	1	6.08	.02	.037
Previous occupational exposure to an infectious agent	1	5.51	.02	.034
New SARS symptomatology experienced during outbreaks	1	1.07	.30	.007
Perception of timely and adequate information received	1	1.68	.20	.010
Perceived effectiveness of hospital infection control practices	1	1.63	.20	.010

agent in the past, including human immunodeficiency virus, tuberculosis, hepatitis, polio, cholera, typhoid, and prion disease. Eighty-three (43%) of the respondents knew someone who had contracted SARS, and this individual was most often a colleague (61; 80.3%). Thirty-five (18.1%) of the respondents reported experiencing new SARS-like symptoms when working during the outbreaks. One hundred seventy (88.1%) of the physicians thought they had been given appropriate, adequate, and timely information about proper infection control precautions to take regarding SARS. Physicians rated the hospital infection control procedures as effective in limiting the spread of SARS (mean, 3.97; standard deviation [SD], 0.79). Their mean personal perceived risk of contracting SARS was 1.74 (SD, 0.81).

Demographic, logistic, and attitudinal factors postulated to affect perceived risk were investigated. A univariate analysis of covariance (SPSS General Linear Model procedure, version 11.0.1; SPSS, Inc., Chicago, IL) was used to predict physicians' perceived risk of contracting SARS. After adjustment for covariates, a significant difference in perceived risk was found (F [10] = 3.40; $P < .001$; adjusted $R^2 = 12.4\%$; eta-square = .18; Table 2). These results suggest that after controlling for gender, ethnocultural background, years in medical practice, and perceived health, those who perceived greater risk of contracting SARS personally knew someone who had contracted SARS (mean, 2.00; SD, 0.91) and had previous exposure to an infectious agent (mean, 1.90; SD, 0.89) when compared with participants who perceived lesser risk (mean, 1.53; SD, 0.65 and mean, 1.57; SD, 0.68, respectively).

DISCUSSION

Some physicians are appropriately fearful of contracting SARS[11] given the communicability of the virus, its novelty, the contradictory information regarding infection control precautions,[11] the lack of effective treatment,[12] and the increased risk of infection and death among HCWs.[13] However, in this sample of physicians working in affected hospitals, physicians generally perceived it unlikely that they would personally contract SARS. Future studies should attempt to determine whether physicians' sense of invulnerability contributes to their heroism and ability to perform vitally essential work in caring for patients with highly infectious and dangerous diseases and to what extent this may interfere with prudence and strict adherence to infection control precautions.

Although risk perception of the lay population is often assumed to be based on past experience and affect, physician risk perception is assumed to be based on scientific knowledge and probability.[8] Based on the available scientific evidence to date, SARS transmission occurs through droplets, and strict adherence to infection control precautions can reduce nosocomial transmission.[14] Therefore, a scientific approach to risk appraisal would suggest that direct contact with SARS patients and ineffectiveness of infection control precautions would be strongly related to risk of contracting SARS. Although most physicians (88%) thought they were well informed about precautions and almost one-fourth provided direct care to one or more SARS patients, the scientific variables did not significantly predict physicians' perceived risk in our multivariate model. This may reflect low perceived susceptibility[15] or a sense of invulnerability, despite the fact that HCWs are at greatly increased risk.[16]

Instead, our results suggest that physicians erro-

neously judged their likelihood of contracting SARS based on their experience with colleagues who contracted SARS and their previous occupational exposure to infectious agents. The availability heuristic[17] refers to the common human tendency to judge the likelihood of events in terms of how readily instances come to mind. Thus, physicians who are familiar with an infected colleague may perceive greater risk because the possibility of contagion is personally salient. Alternatively, an optimistic bias may also explain the findings, given that physicians rated their health status highly, and only slightly more than half reported previous occupational exposure to any infectious agent. Undoubtedly, all physicians would have had some personal exposure to infectious agents during training or practice, so responses to this question were presumably based on personal exposure to serious infections that readily came to mind.

The main limitation of this study pertains to the response rate, although our rate is similar to that of other reported physician surveys.[18] The generalizability of our findings to nonresponders, non-academic physicians, or those in other reimbursement systems is unknown.

Despite the increased risk among HCWs of contracting SARS, these highly trained academic physicians generally perceived a low personal risk of infection. Similar to that of the lay population, their risk perception was more strongly related to personally salient examples than to scientific evidence. Future study is required to understand the constellation of cognitive and affective factors at play. The relationship among risk perception, willingness to treat infectious patients, and infection control practices should also be investigated.

The authors are from the University Health Network Women's Health Program, Toronto, Ontario, Canada.

Address reprint requests to Sherry L. Grace, PhD, University Health Network Women's Health Program, ML2-004c, 657 University Avenue, Toronto General Hospital, Toronto, Ontario, Canada, M5G2N2.

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A Large-Volume Nebulizer Would Not Be an Infectious Source for Severe Acute Respiratory Syndrome

Gwo-Hwa Wan; Ying-Huang Tsai; Yao-Kuang Wu; Kuo-Chien Tsao

ABSTRACT

We attempted to detect the presence of airborne SARS-coronavirus (CoV) in a healthcare setting when a patient with SARS used a humidifier or a large-volume nebulizer (LVN). All of the air samples from the humidifier and LVN were found to have negative SARS-CoV–specific DNA products (*Infect Control Hosp Epidemiol* 2004;25:1113-1115).

Severe acute respiratory syndrome (SARS) is a recently emergent disease that started in Asia and spread to other continents through international travel.[1] Patients infected with SARS coronavirus (CoV) have fever, dry cough, dyspnea, headache, and hypoxemia. Death may result from progressive respiratory failure due to alveolar damage.[2]

The SARS-CoV may be carried in droplets produced by aerosolization that can occur as a result of coughing or talking.[3] In primary clinical therapy, SARS patients were treated with oxygen therapy combined with humidification using a humidifier or a large-volume nebulizer. Until recently, no studies had confirmed whether a large-volume nebulizer was a risk factor for SARS transmission in a healthcare setting. Therefore, we specifically evaluated airborne SARS-CoV DNA concentrations using filter sampling and SARS-CoV–specific reverse transcriptase polymerase chain reaction (RT-PCR) assay when a SARS patient was treated with a humidifier or a large-volume nebulizer.

METHODS

Subjects

A patient with the diagnosis of SARS confirmed by symptoms, chest radiograph, throat swab, and nasopha-