



Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Elsevier hereby grants permission to make all its COVID-19-related research that is available on the COVID-19 resource centre - including this research content - immediately available in PubMed Central and other publicly funded repositories, such as the WHO COVID database with rights for unrestricted research re-use and analyses in any form or by any means with acknowledgement of the original source. These permissions are granted for free by Elsevier for as long as the COVID-19 resource centre remains active.

Original Research Reports

The Occupational and Psychosocial Impact of SARS on Academic Physicians in Three Affected Hospitals

SHERRY L. GRACE, PH.D., KAREN HERSHENFIELD, B.SC.
EMMA ROBERTSON, PH.D., DONNA E. STEWART, M.D., F.R.C.P.C.

A cross-sectional anonymous survey was administered to all directory-listed physicians within a network of three large teaching hospitals that provided care to SARS patients in Toronto. One hundred ninety-three physicians participated, 23% of whom provided direct care to SARS patients. A significantly higher rate of psychological distress was seen among physicians providing direct care to SARS patients (45.7%) than among those not providing direct care (17.7%), and physicians providing direct care reported feeling more stigmatized. Several physicians (10.9%) reported entering the hospital despite experiencing identified SARS symptoms. The most frequent SARS concerns were about the care of non-SARS patients following suspension of nonessential services and loss of physician income. (Psychosomatics 2005; 46:385–391)

Severe acute respiratory syndrome (SARS), a newly identified infectious disease caused by a novel coronavirus,^{1,2} is associated with considerable morbidity and mortality.³ Although SARS originated in Asia⁴ it quickly spread to other continents through air travel and was first identified in Toronto in March 2003.^{3,5} As of Aug. 14, 2003, there were cumulatively 247 probable cases, 128 suspected cases, and 44 deaths (including one physician and three nurses⁶). The SARS outbreaks caused a tremendous strain on the health care system.⁷

SARS disproportionately affected health care providers, accounting for upward of 50% of those affected in Toronto.⁸ In the only study published to date investigating the impact of SARS on health care workers, anecdotal retrospective descriptions revealed feelings of fear of infecting loved ones, uncertainty, anxiety, anger, guilt, and frustration.⁵ While physicians deserve accolades for their tireless efforts to control the spread of this disease and treat its victims, the effect of these efforts deserves empirical scrutiny. The objective of this study was to empirically assess the psychosocial and occupational impact of SARS on academic physicians working in hospitals where infected patients are being treated.

METHOD

Procedure and Design

The University Health Network (UHN) comprises three large teaching hospitals in downtown Toronto where SARS patients were treated. After the second outbreak in the city,⁹ SARS spread to UHN health care workers who then received care in their own critical care unit. It was at this juncture that all physicians with a UHN address (N = 577) were selected for inclusion in this study from an online version of the Canadian Medical Directory (available at <http://www.mdselect.com>). This group consisted of 405 male (70.2%) and 172 female (29.8%) 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 sur-

Received Jan. 13, 2004; revision received May 13, 2004; accepted June 15, 2004. From the University Health Network Women's Health Program and the University of Toronto. Address correspondence and reprint requests to Dr. Grace, University Health Network Women's Health Program, ML2-004c, 657 University Ave., Toronto General Hospital, Toronto, Ont., Canada M5G 2N2; sgrace@yorku.ca (e-mail)

Copyright © 2005 The Academy of Psychosomatic Medicine.

Impact of SARS on Physicians

vey, and a return envelope. As outlined on the information letter, the completion and return of the survey constituted the participant's informed consent for this study. To facilitate candid disclosure, the survey was completely anonymous, and therefore there was no means to recontact non-responding physicians through a numerical identifier.

Participants

Of the 577 physicians who were mailed the survey, 23 (4.0%) were ineligible: 22 could not be located (i.e., mail was returned) and one was deceased. From the remaining 554 physicians, 193 returned completed surveys (response rate of 34.8%).

Measures

The survey that was developed was based on a literature review and input from key health care professionals and included items on sociodemographic variables (sex, age, specialty, number and ages of children, number of years in practice, and ethnocultural background); health status; attitudes and perceptions toward SARS; SARS-related coping methods, concerns, and symptoms; and effects on personal relationships and changes to work resulting from the SARS outbreak. Items were measured as categorical, open-ended, or 5-point Likert responses.

Statistical Analysis

All data analyses were performed using SPSS version 11.0.¹⁰ Qualitative responses generated by physicians were coded. A descriptive examination of participant responses was conducted. A principal components analysis of physician coping methods was performed.

RESULTS

Respondent Physician Characteristics

Participant characteristics are presented in Table 1. Participant ages ranged from 32 to 75 years, and years in practice ranged from 1 to 50 years. Eighty-eight participants (62.4%) had a child under age 18. It is likely that the many respondents who did not list their specialty did so to ensure anonymity.

Occupational Impact

Forty-five (23.3%) participants provided direct care to one or more SARS patients, and these physicians had been

in practice significantly fewer years (mean = 18.18, SD = 8.46) than physicians not providing direct care (mean = 23.45, SD = 11.55) ($t = 3.29$, $df = 97.15$, $p = 0.001$, equal variances not assumed). Ten (5.2%) physicians had been quarantined for a range of 1 to 15 days (mean = 8.78, SD = 3.90). Eighty-three respondents (43.0%) knew someone who had contracted SARS, and this person was most often a colleague ($N = 61$, 73.5%). Eleven physicians (5.7%) reported feeling pressured to work with SARS patients, with 17 (8.8%) considering not going to work in order to avoid SARS by taking sick or vacation days. Eighteen physicians (9.3%) reported that the outbreaks had caused them to reevaluate their career choice. Seventeen physicians (8.8%) perceived that they had been exposed to the SARS virus while wearing appropriate protection. Despite these findings, physicians strongly believed it was their duty to provide care for highly infectious patients with a life-threatening illness (mean rating of 4.32 [SD = 0.81] on a scale in which 1 = strongly disagree, and 5 = strongly agree).

On a scale from 1 (a lot) to 5 (not at all), physicians perceived that their work had been seriously affected by

TABLE 1. Characteristics of Physician Survey Respondents (N = 193) From Three Toronto Hospitals in Which SARS Patients Were Treated

Characteristic	Mean	SD	N	%
Sex				
Male			131	67.9
Female			62	32.1
Age (years)	48.2	11.0		
Years in practice	22.2	11.1		
Children				
Yes			141	73.1
No			52	26.9
Number of children	2.5	0.9		
Ethnocultural background				
Caucasian/white			131	67.9
Asian			28	14.5
Jewish			11	5.7
Indian			6	3.1
Other ^a /not reported			43	23.2
Health status ^b	1.41	0.64		
Specialty				
Medicine			72	37.3
Surgery			31	16.1
Radiology			20	10.4
Anesthesiology			13	6.7
Psychiatry			11	5.7
Pathology			3	1.6
None given			43	22.3

^aMediterranean, Arabic, Hispanic, or Persian background.

^bAssessed on a scale from 1 (excellent) to 5 (poor).

the SARS outbreaks (mean = 1.79, SD = 0.89). Ways in which their work had been affected included: interruptions to teaching and education (84.5%, N = 163), unwillingness of patients to attend outpatient clinics (79.8%, N = 154), infection control precautions (77.2%, N = 149), inability to see outpatients (71.0%, N = 137), inability to perform regular activities (51.8%, N = 100), interruptions to research (51.8%, N = 100), new involvement in SARS-related work (8.8%, N = 17), and inability to enter work due to symptoms (4.1%, N = 8).

Onset of Symptoms

Thirty-five (18.1%) respondents reported experiencing new SARS-like symptoms when working during the outbreak, and 21 (10.9%) reported attending work regardless. These symptoms included cough, fever, myalgia, headache, and fatigue. Thirty-one (16.1%) reported experiencing non-SARS symptoms during the outbreak, including asthma exacerbation, allergies, depression, facial rash, and runny nose. It should be highlighted however, that 15 (48.4%) of these physicians self-reporting "non-SARS symptoms" in fact had symptoms listed on the SARS screening protocol (i.e., cough, fatigue, headache, dry or sore throat, and upper respiratory infections).

Thirty-five respondents (18.1%) reported experiencing new distressing psychological symptoms that they attributed to working during the SARS outbreaks. There were no significant sex differences in the reporting of new psychological symptoms ($\chi^2 = 0.01$, $df = 1$, $p = 0.91$). However, the rate of psychological distress was significantly higher among physicians providing direct care to SARS patients (45.7%, N = 16) than among physicians not providing direct care (17.7%, N = 28) ($\chi^2 = 11.62$, $df = 1$, $p < 0.001$).

Interpersonal Relations

Sixty-nine physicians felt that they had been treated differently because others knew they had potentially been exposed to a SARS patient (i.e., stigmatization). Physicians felt that the way others perceived them was somewhat affected by being a physician from Toronto (on a 1–5 scale [1 = a lot, 5 = not at all], mean rating was 2.75 [SD = 1.22]). Physicians providing direct care to SARS patients rated that they felt significantly more stigmatized than did physicians not providing such care (mean = 2.28 [SD = 1.18] versus 2.89 [SD = 1.20], respectively; $t = 2.92$, $df = 183$, $p = 0.004$). On the same scale, Caucasian/white physicians perceived significantly less effect of their ethno-

cultural background on people's perceptions of them than did Asian physicians (mean = 4.78 [SD = 0.67] versus 3.12 [SD = 1.42]; $t = 9.19$, $df = 149$, $p < 0.001$).

Eighteen physicians (9.3%) reported that SARS had affected their relationships with their family and friends, either by stigmatization or avoidance or decreases in contact with others. Fifty-three (27.5%) were concerned about spreading SARS to a family member, specifically young children, elderly parents or partners, or pregnant family members. Twelve physicians (6.2%) had changed their living or sleeping arrangements because of SARS. Physicians who provided direct care to a suspected or probable SARS patient were significantly more likely to be concerned about spreading SARS to a specific family member than were physicians who did not provide direct care (48.9% versus 20.9% [$\chi^2 = 13.53$, $df = 1$, $p < 0.001$]) and were also more likely to change their living arrangements (15.6% versus 3.4% [$\chi^2 = 8.78$, $df = 1$, $p = 0.003$]).

SARS Concerns and Coping Methods

Physician concerns and coping methods regarding SARS are presented in Table 2 and Table 3, respectively. As shown, physicians who self-reported psychological distress were significantly more likely to cope by talking to others and avoiding travel than were physicians without distress. Principal components analysis with varimax ro-

TABLE 2. SARS Concerns Among Physician Survey Respondents (N = 193) From Three Toronto Hospitals in Which SARS Patients Were Treated

Concern	Mean Rating ^a	SD
The care of non-SARS patients will suffer	3.35	1.24
I will lose income	2.71	1.33
I will not be able to travel	2.67	1.24
I will not be able to work	2.60	1.21
My education or teaching will be interrupted	2.53	1.24
I will have to be quarantined	2.32	1.15
I will not be able to care for loved ones	2.22	1.29
I will spread SARS to family/friends	2.20	1.17
I will get SARS	2.15	1.02
I will not be able to enjoy my usual social activities	2.12	1.18
I will spread SARS to living companions	2.11	1.14
I will get very sick or die from SARS	1.82	1.79
I will spread SARS to others in public	1.82	1.79
I will get SARS from touching objects in hospital	1.78	0.94
I will get SARS from the air that I breathe	1.47	0.79

^aBased on a 5-point Likert-type scale: 1 = not concerned, 5 = extremely concerned.

Impact of SARS on Physicians

TABLE 3. SARS Coping Methods Among Physician Survey Respondents (N = 193) From Three Toronto Hospitals in Which SARS Patients Were Treated, by Self-Reported Psychological Distress

Coping Method	No Distress (N = 158)		Distress (N = 35)		Total (N = 193)	
	Mean Rating ^a	SD	Mean Rating ^a	SD	Mean Rating ^a	SD
Adhering to infection control procedures	4.48	0.91	4.57	0.56	4.50	0.86
Staying informed about SARS	4.40	0.85	4.53	0.62	4.42	0.81
Just accepting the risks	3.37	1.25	3.79	0.81	3.45	1.19
Keeping a positive mindset	3.22	1.43	3.56	1.24	3.28	1.40
Keeping a healthy lifestyle	2.99	1.49	3.18	1.42	3.03	1.48
Talking to others	2.55	1.26	3.40**	1.22	2.70	1.30
Avoiding crowds or people with colds	2.22	1.23	2.54	1.38	2.24	1.25
Avoiding thinking about the risks	1.77	1.04	1.97	1.00	1.80	1.03
Avoiding travel	1.71	1.01	2.11*	1.18	1.79	1.05
Relying on my religious faith	1.54	0.99	1.69	1.21	1.56	1.04
Taking vitamins, herbs, or other complementary substances	1.12	0.47	1.31	0.83	1.16	0.56

^aBased on a 5-point Likert-type scale: 1 = never used this method, 5 = always used this method.

*p<0.05. **p<0.001.

tation was conducted on the 11 Likert-type coping items to determine the number and nature of methods utilized by physicians. Upon examination of the scree plot and the rotated component matrix, three factors were extracted. Table 4 presents the resulting solution. The first factor appears to reflect psychosocial coping techniques such as enlisting social support and engaging in positive health behaviors. The second factor appears to reflect active coping based on the best available scientific evidence. The third factor appears to reflect avoidant strategies to impede contracting or spreading the infection.

Physician Perspectives on the Worst and Best Aspects of the SARS Outbreaks

Physicians were asked to qualitatively report the worst and best aspects about working during the SARS outbreaks. Themes were generated and responses coded. The most frequently cited worst aspect concerned disruptions to clinical care (28.5%, N = 55), followed by infection control precautions (e.g., screening protocols and wearing masks [20.7%, N = 40]), living in fear/uncertainty (10.9%, N = 21), and loss of income (7.3%, N = 14). Other responses related to isolation, lack of contact with colleagues, government response, fatigue, communication, staff strain, and colleagues who contracted SARS. The best aspects consisted of staff collegiality (28.0%, N = 54), improved infection control (14.0%, N = 27), more time for alternate endeavors such as writing and research (13.5%, N = 26), and advances in scientific knowledge (3.1%, N = 6). Nineteen physicians (9.8%) responded that there was no "best" aspect.

DISCUSSION

Although the psychosocial and occupational effects of health care worker exposure to blood-borne viral agents such as HIV,¹¹⁻¹³ hepatitis B,^{14,15} and other infectious agents have been investigated, SARS presents a new challenge for health care workers. Despite the lower mortality rate of SARS when compared with HIV,¹⁶ SARS is much more communicable in health care settings through droplet-based transmission.¹⁷ The outbreaks caused suspension of clinical services, and quarantines were rampant. Our re-

TABLE 4. Principal Components Analysis: Three-Factor Solution of Psychosocial Coping Techniques Employed by Physician Survey Respondents (N = 193) From Three Toronto Hospitals in Which SARS Patients Were Treated

Coping Technique	Factor 1:	Factor 2:	Factor 3:
	Active	Medical	Contagion
Keeping a healthy lifestyle	0.71	0.36	<0.01
Keeping a positive mindset	0.69	0.40	<0.01
Talking to others	0.67	0.25	<0.01
Relying on religious faith	0.66	<0.01	0.27
Avoid thinking about the risks	0.51	-0.16	0.33
Taking vitamins, herbs	0.37	-0.14	0.32
Staying informed about SARS	<0.01	0.87	<0.01
Adhering to infection control procedures	<0.01	0.83	0.15
Just accepting the risks	0.16	0.27	<0.01
Avoiding travel	0.18	<0.01	0.85
Avoiding crowds, people with colds	<0.01	0.16	0.83
Eigenvalue	3.09	1.64	1.23
Variance explained (%)	28.13	14.92	11.18

sults identified that physicians' main concerns were the decreased ability to care for non-SARS patients during the outbreaks and personal loss of income, both of which are novel concerns not raised in the literature regarding other infectious diseases. Consistent with the HIV literature however,¹¹ almost a third of physicians were concerned about spreading the infection to their family. In addition, almost one-fifth reported experiencing new distressing psychological symptoms as a result of their potential occupational exposure (almost 50% among those providing direct care). Remarkably, few physicians reevaluated their career choice, and most felt it was their duty to treat these infectious patients regardless of the personal risks.

This study highlights the racial stigmatization associated with the outbreaks. Asian physicians reported that their ethnocultural background affected how they were perceived to a greater extent than Caucasian physicians, which may reflect the origination of SARS in Asia. Clearly, media coverage of politicians dining in Toronto's Chinatown did little to quell public fear. Regardless of ethnocultural background, however, many physicians reported that they had been treated differently because they worked in a hospital that treated SARS patients.

It was disconcerting that almost 11% of physicians attended work regardless of reporting new SARS-like symptoms, and that additionally some of the "non-SARS symptoms" reported were in fact SARS symptoms listed on screening protocols that every hospital staff member completed daily on hospital entry. The screening protocol does specify "unexplained" myalgia or malaise, "severe" headache, and shortness of breath that is "worse than what is normal for you," and included temperature assessment. Because the self-report nature of our survey precluded deeper probing regarding physicians' perceptions regarding the severity of their symptoms or whether there was a direct alternative explanation for their symptoms, we cannot definitively conclude that physicians failed to comply with the screening precautions (although Occupational Health and the Department of Infectious Diseases reported that only a few physicians consulted them concerning their symptoms). However, our findings may reflect low perceived susceptibility,¹⁸ a sense of invulnerability to contracting SARS, or an optimistic bias,¹⁹ despite the fact that health care workers in affected hospitals are at greatly increased risk^{20,21} and almost half of our respondents knew an infected colleague. Considering that this behavior could lead to further transmission of this highly virulent infection, additional investigation and preventive action are imperative.

A highly prominent and recurring physician concern was loss of income due to decreased clinical work. It may be that some physicians worked for financial reasons despite SARS-like symptoms, since most Canadian physicians work in a fee-for-service system (with a government payor). As some governments are now reimbursing a variety of workers for lost income due to the SARS outbreaks, consideration should be given to policy regarding timely guarantees of income for physicians during future virulent infectious outbreaks.

Over and above financial repercussions, physicians perceived the worst aspect of the outbreak to be the disruptions to clinical care that adversely affected the health of their non-SARS patients. When asked about the best aspect of the outbreak, 40% of physicians conveyed the increased collegiality and teamwork that ensued. This extended to appreciation of allied health, nursing, and administrative leaders. Comments centered around camaraderie, courage, professionalism, dedication to patient care, altruism, cooperation, mutual support, unity in a common cause, the spirit of pulling together through a crisis, and rising to the challenge. Other beneficial aspects included having more time for research, reading, paperwork, writing, and relaxation. A few physicians amusingly noted the decrease in rounds and meetings and shorter waiting times for elevators.

Physicians providing direct care to SARS patients reported greater psychological distress, greater stigmatization, and greater concern regarding contagion to family than physicians not providing such care. Because all physicians are at increased risk of contracting SARS, providing support and disseminating scientific findings in a timely fashion may potentially mitigate these negative effects. Future research is required to determine what policies or interventions could be instituted to support physicians working under such uncertain conditions, particularly those physicians providing direct care to suspected or probable SARS patients.

The main limitation of this study pertains to the response rate, although our rate equates closely to other physician surveys in the literature.²² Moreover, in a review of physician response to surveys, demographic characteristics of late respondents (considered to be a proxy for nonrespondents) were similar to the characteristics of respondents to the first mailing.²³ Moreover, physicians as a group are more homogeneous with regard to knowledge, training, attitudes, and behavior than the general population, suggesting that nonresponse bias may not be as crucial in physician surveys as in surveys of the general population.²³ The gen-

Impact of SARS on Physicians

eralizability of our findings to nonresponders, nonacademic physicians, or those in other reimbursements systems is unknown.

This study holds important implications for dealing with future infectious disease outbreaks. Physicians with children in the home appeared to feel more vulnerable and need more psychosocial support. Targeted interventions should be explored to help physicians cope with their fear of infectivity and the risks to their families. While physicians should not be pathologized, offering a support or discussion group through the use of web-based technology could be evaluated as a potential means of offering support without the risk of transmission. Also, posting a question-and-answer page on the hospital intranet outlining how to talk with children about these risks might be useful. Future research should evaluate the most effective ways of offering support to reduce the psychosocial impact on physicians and their families.

In conclusion, despite the increased risk of contracting SARS in health care workers, scientific uncertainty, and the lack of effective SARS treatment, physician coping methods, collegiality, and psychosocial well-being appear to be fairly resilient. Although the current absence of new cases is promising, this may simply reflect the seasonal variation in the transmission of the virus.²⁴ Before SARS or another virulent disease erupts, consideration of how best to support physicians through timely information sharing, appropriate infection control procedures, security of income during outbreaks, attention to risk management for family members, reducing disruptions to other clinical care, and degree of psychosocial distress need to be addressed.

The authors acknowledge the University of Toronto Institute of Medical Sciences for funding a summer scholarship to K. Hershenfeld, and the CIHR Institute of Gender and Health for a postdoctoral fellowship to S. Grace.

References

1. Drosten C, Gunther S, Preiser W, van der Werf S, Brodt HR, Becker S, Rabenau H, Panning M, Kolesnikova L, Fouchier RA, Berger A, Burguiere AM, Cinatl J, Eickmann M, Escrioni N, Grywna K, Kramme S, Manuguerra JC, Muller S, Rickerts V, Sturmer M, Vieth S, Klenk HD, Osterhaus AD, Schmitz H, Doerr HW: Identification of a novel coronavirus in patients with severe acute respiratory syndrome. *N Engl J Med* 2003; 348:1967–1976
2. Ksiazek TG, Erdman D, Goldsmith CS, Zaki SR, Peret T, Emery S, Tong S, Urbani C, Comer JA, Lim W, Rollin PE, Dowell SF, Ling AE, Humphrey CD, Shieh WJ, Guarner J, Paddock CD, Rota P, Fields B, DeRisi J, Yang JY, Cox N, Hughes JM, LeDuc JW, Bellini WJ, Anderson LJ; SARS Working Group: A novel coronavirus associated with severe acute respiratory syndrome. *N Engl J Med* 2003; 348:1953–1966
3. Poutanen SM, Low DE, Henry B, Finkelstein S, Rose D, Green K, Tellier R, Draker R, Adachi D, Ayers M, Chan AK, Skowronski DM, Salit I, Simor AE, Slutsky AS, Doyle PW, Krajden M, Petric M, Brunham RC, McGeer AJ; National Microbiology Laboratory, Canada; Canadian Severe Acute Respiratory Syndrome Study Team: Identification of severe acute respiratory syndrome in Canada. *N Engl J Med* 2003; 348:1995–2005
4. Zhao Z, Zhang F, Xu M, Huang K, Zhong W, Cai W, Yin Z, Huang S, Deng Z, Wei M, Xiong J, Hawkey PM: Description and clinical treatment of an early outbreak of severe acute respiratory syndrome (SARS) in Guangzhou, PR China. *J Med Microbiol* 2003; 52:715–720
5. Maunder R, Hunter J, Vincent L, Bennett J, Peladeau N, Leszcz M, Sadavoy J, Verhaeghe LM, Steinberg R, Mazzulli T: The immediate psychological and occupational impact of the 2003 SARS outbreak in a teaching hospital. *CMAJ* 2003; 168:1245–1251
6. Ontario Ministry of Health and Long-Term Care: Fact Sheet: Severe Acute Respiratory Syndrome (SARS) Update. http://www.health.gov.on.ca/english/public/updates/archives/hu_03/sars_stats/stat_081403.pdf
7. Fowler RA, Lapinsky SE, Hallett D, Detsky AS, Sibbald WJ, Slutsky AS, Stewart TE; Toronto SARS Critical Care Group: Critically ill patients with severe acute respiratory syndrome. *JAMA* 2003; 290:367–373
8. Masur H, Emanuel E, Lane HC: Severe acute respiratory syndrome: providing care in the face of uncertainty. *JAMA* 2003; 289:2861–2863
9. Kondro W: SARS back in Canada. *Lancet* 2003; 361:1876
10. SPSS for Windows. Statistical Package for the Social Sciences, 11.0.1. Chicago, SPSS, 2001
11. Berkowitz N, Nuttall R: Attitudes of pediatric nurses facing HIV risk. *Soc Science & Med* 2003; 42:463–469
12. Reutter L, Northcott H: Managing occupational HIV exposures: a Canadian study. *Int J Nursing Studies* 1995; 32:493–505
13. Klimes I: The impact of HIV infection on health care staff and other carers. *Int Rev Psychiatry* 1991; 3:429–438
14. Cockcroft A, Oakley K, Gooch C, Mastin S: Anxiety and perception of risk of HIV and hepatitis B infection among health-care workers reporting accidental exposures to blood and other body fluids. *AIDS Care* 1994; 6:205–214
15. Ferguson E, Cox T, Farnsworth W, Irving K, Leiter M: Nurses' anxieties about biohazards as a function of context and knowledge. *J Applied Soc Psychol* 1994; 24:926–940
16. Parry J: World Health Organization warns death rate from SARS could reach 10%. *BMJ* 2003; 326:999
17. Seto W, Tsang D, Yung R, Ching T, Ng T, Ho M, Ho LM, Peiris JS; Advisors of Expert SARS group of Hospital Authority: Effectiveness of precautions against droplets and contact in prevention of nosocomial transmission of severe acute respiratory syndrome (SARS). *Lancet* 2003; 361:1519–1520
18. Leventhal H, Nerenz DR, Steele DS: Illness representations and coping with health threats, in *Handbook of Psychology & Health*, 4th ed. Edited by Baum A, Taylor SE, Singer JE. Hillsdale, NJ, Lawrence Erlbaum, 1989, pp 219–251
19. Hopwood P: Breast cancer risk perception: what do we know and understand. *Breast Cancer Res* 2000; 2:387–391
20. Booth C, Matukas L, Tomlinson GA, Rachlis AR, Rose DB, Dwosh HA, Walmsley SL, Mazzulli T, Avendano M, Derkach P, Eptimios

- IE, Kitai I, Mederski BD, Shadowitz SB, Gold WL, Hawryluck LA, Rea E, Chenkin JS, Cescon DW, Poutanen SM, Detsky AS: Clinical features and short-term outcomes of 144 patients with SARS in the greater Toronto area. *JAMA* 2003; 289:2801–2809
21. Dwosh H, Hong H, Austgarden D, Herman S, Schabas R: Identification and containment of an outbreak of SARS in a community hospital. *CMAJ* 2003; 168:1415–1420
22. Field TS, Cadoret CA, Brown ML, Ford M, Greene SM, Hill D, Hornbrook MC, Meenan RT, White MJ, Zapka JM: Surveying physicians: do components of the “total design approach” to optimizing survey response rates apply to physicians? *Med Care* 2002; 40:596–605
23. Kellerman SE, Herold J: Physician response to surveys: a review of the literature. *Am J Prev Med* 2001; 20:61–67
24. Drazen J: SARS: looking back over the first 100 days. *N Engl J Med* 2003; 349:319–320