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SPECIAL COMMUNICATION

Impact of a Viral Respiratory Epidemic on the Practice of Medicine and Rehabilitation: Severe Acute Respiratory Syndrome

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Severe acute respiratory syndrome (SARS) is a new respiratory viral epidemic that originated in China but has affected many parts of the world, with devastating impact on economies and the practice of medicine and rehabilitation. A novel coronavirus has been implicated, with transmission through respiratory droplets. Rehabilitation was significantly affected by SARS, because strict infection control measures run counter to principles such as multidisciplinary interactions, patients encouraging and learning from each other, and close physical contact during therapy. Immunocompromised patients who may silently carry SARS are common in rehabilitation and include those with renal failure, diabetes, and cancer. Routine procedures such as management of feces and respiratory secretions (eg, airway suctioning, tracheotomy care) have been classified as high risk. Personal protection equipment presented not only a physical but also a psychologic barrier to therapeutic human contact. Visitor restriction to decrease chances of disease transmission are particularly difficult for long-staying rehabilitation patients. At the height of the epidemic, curtailment of patient movement stopped all transfers for rehabilitation, and physiatrists had to function as general internists. Our experiences strongly suggest that rehabilitation institutions should have emergency preparedness plans because such epidemics may recur, whether as a result of nature or of bioterrorism.

Key Words: Infection control; Rehabilitation; SARS virus; Severe acute respiratory syndrome.

ON MARCH 1, 2003, a previously healthy patient in her early twenties was admitted to Tan Tock Seng Hospital (TTSH), a public teaching hospital in Singapore, with progressively severe pneumonia nonresponsive to routine antibiotic therapy. This was the start of a new viral respiratory epidemic for the island-nation of 4 million; the infection rapidly spread from this index case, who was in a multibed ward without barrier infection control measures. Those infected at TTSH included 9 of approximately 30 family members and friends who visited this patient, 1 of the 12 patients in adjacent beds, 1 of the 8 physicians, and 9 of the 30 nurses who attended to her.[1]

Based on nasopharyngeal and serum samples of patients, the infective agent implicated was a novel coronavirus.[2-4] The name *severe acute respiratory syndrome* (SARS), adopted for this infection, was an appropriate recognition of its nature and virulence. SARS started as an atypical pneumonia in the Guangdong Province of China in November 2002, affecting 792 people and causing 31 deaths.[2,3] It was carried into Hong Kong and transmitted to 3 vacationing Singaporeans (including the index case), apparently while they were waiting for a hotel elevator along with a SARS-infected person. The epidemic spread to many countries across the globe, with the hardest hit areas being the cities of Beijing, Hong Kong,[5] Taipei, Singapore, and Toronto. The last probable case of SARS in Singapore was hospital-isolated on May 11. As of June 20, 2003, the tally in Singapore was a total of 206 probable cases, with 170 recovered and discharged home, 32 dead, and 3 still hospitalized. On July 5, 2003, the World Health Organization issued a declaration that SARS had been contained worldwide.

Although the SARS outbreak had a relatively high mortality rate and SARS can lead to residual lung damage in serious cases, the epidemic arguably had a devastating impact well beyond the absolute numbers affected by the disease. Fear of the unknown with a new disease entity and the potential for uncontrollable spread resulted in much apprehension and the implementation of far-reaching measures. In Singapore, the economic toll has been significant and estimates suggest that SARS may have taken 2% from the gross domestic product growth in 2003. This resulted not only from direct costs to control the epidemic, but also from losses in productivity, decreased demand for sales and services, and a massive blow to the important airline and tourist industries. Tourism to Singapore decreased drastically and international conferences were postponed. Many multinational business corporations instituted policies against travel to affected countries like Singapore. Travel from Singapore to other SARS-affected countries was similarly curtailed. In simple terms, nobody wanted to put themselves at risk of contracting the SARS virus.

In health care, the costs to combat SARS have been in the hundreds of millions—US$110 million was spent on direct operating expenditures, such as medical supplies, protective gear for health care workers and patients, free SARS screening and ambulance services, administering and enforcing home quarantine orders, setting up fever clinics, contact tracing, and a SARS hotline center. US$60 million was spent on infrastructure expenditures, including construction of isolation rooms and renovation of wards and medical facilities.[6] The fears and concerns generated by the disease also had a considerable impact on hospitals.[7] A striking feature of SARS was the significantly increased risk to health care workers, with a large proportion of those infected in Singapore (90/206 [44%]) from among these ranks. The fear of the "super-spreader" (a person

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who directly infected ≥10 other persons[8] with minimal contact), lying undiscovered in the wards, asymptomatic or minimally symptomatic, was of considerable concern and caused much stress.

The Singapore General Hospital (SGH), from which this account of events arose, is a 1400-bed public tertiary teaching hospital. With the National Dental, Eye, Heart and Cancer Centres on the same campus, it offers services in most areas of medical expertise. The department of rehabilitation medicine in SGH provides comprehensive inpatient and outpatient services, and had between 20 and 28 inpatients at the time of the epidemic. This article recounts chronologically the effect of SARS on medical and rehabilitation services. It reviews the preventive and control measures taken, and it describes the solutions and adaptations taken to overcome some of the problems faced by rehabilitation medicine.

PERIOD 1: SARS STRIKES

Once the highly infectious and virulent nature of SARS became apparent, a process was rapidly implemented for identifying suspected patients. This process centered on the clinical findings of fever, cough, respiratory difficulties, and radiographic changes, including consolidation or findings of adult respiratory distress syndrome. It was also important to determine any history of close contact with someone infected by SARS or travel to SARS-affected regions (appendix 1). At the time, the nature of the virus was still unconfirmed, and no diagnostic tests were yet available.

Increased Rehabilitation Workload

The Ministry of Health (MOH) Singapore, which had authority over 8748 of the 11,820 hospital beds in the country,[9] placed TTSH and its Communicable Disease Centre under quarantine. TTSH was designated for assessment and isolation of suspected SARS cases, either by direct admission or by transfer from any other health care facility.[8] Non-SARS–suspected cases were diverted to the other public sector hospitals, resulting in a shift of acute health care workloads to the other hospitals. For rehabilitation medicine, this meant having to cope with a noticeable increase of patients needing rehabilitation from events such as strokes and traumatic injuries.

Staff Losses

Hospital staff who became sick or had a fever, defined as a tympanic temperature higher than 37.5°C confirmed by oral retesting, had to report to the employee clinic or to the emergency department for screening. This in turn necessitated redeployment of staff from other departments to these 2 areas, to help cope with the dramatically increased workload, because they had become busy frontline areas for staff and patients, respectively. Ironically, a significant number of healthy staff with higher body temperatures were ordered to take sick leave until it was determined that these people had higher baseline temperatures and waivers were issued. All nonemergency leave and vacation time were suspended. An appeal was put out by the MOH for private practitioners to help out by filling locum clinic roles and nonspecialized areas, such as employee clinics and clinical audits.

Personal Protection Equipment

All staff received retraining in infection control practices, as appropriate. This included proper hand-washing techniques and donning and doffing of personal protection equipment (PPE), which included head cover, goggles, N-95 masks, gowns or plastic aprons, gloves, and shoe covers. N-95 masks, certified by the National Institute for Occupational Safety and Health, with a 95% or greater filter efficiency against oil-free particulate aerosols of 0.3μ in size, became mandatory for health care workers with direct patient contact. Although potentially preventing SARS transmission, these masks required increased breathing effort, and the staff found itself fatigued more quickly or even dizzy after using these masks. This was particularly difficult for our therapy and nursing staff because of their physical work duties, although doctors and others were also affected.

Work efficiency dropped considerably with the need for donning and doffing fresh PPE with each patient. The discomfort and stress of PPE was particularly difficult for pregnant or claustrophobic staff, and it was made worse by having to wear gowns in a tropical climate. Knowing that one could still get infected while using protective measures was not helpful.[10]

Allergies and Eczema

Equipment such as stethoscopes, sphygmomanometers, therapy plinths or platforms, examination tables, and trolleys had to be wiped down after each use with an antiseptic solution (eg, alcohol, sodium hypochlorite, phenolic acid). Fastidious and frequent hand washing affected staff with eczema and allergies to the antiseptic soaps or hand rubs that were compulsory after each and every patient contact no matter how trivial.

Heightened Vigilance and Screening

In rehabilitation medicine, a heightened vigilance and a tighter screening process was adopted before transfer of patients to the rehabilitation ward, especially those with fever or a history of pneumonia. Specifically explored during rehabilitation consultations were the issues of patient fever, travel or contact history, and respiratory symptoms or issues.

Team Approach

Rehabilitation medicine was increasingly affected by ever-stricter infection control measures regarding close contacts and interactions between health care workers. Multidisciplinary team meetings were canceled; instead, telephone updates or intranet e-mails were strongly encouraged. Nevertheless, one-on-one meetings between masked team rehabilitation members still occurred, to pass on progress reports and to discuss important issues.

Specialist Consultations

The use of telephone or e-mail was encouraged for specialist consultations unless a personal examination or bedside consultation was felt to be necessary, in which case PPE was expected before entering the patient's room. The hospital was already partially converted to electronic medical records; hence, it was possible to pull out laboratory tests, radiologic reports, and medical summaries from any hospital computer terminal using individualized physician passwords. Rehabilitation consultations often ended with a recommendation for transfer to a smaller community hospital with therapy services, because SARS had left these institutions relatively unaffected. Alternatively, those well enough to go home were sent for outpatient therapies at one of the various facilities for day rehabilitation across the city, and home-based therapy was also available although limited because of personnel constraints.

PERIOD 2: HEIGHT OF THE EPIDEMIC

The first death from SARS in Singapore was reported on March 25, 2003. MOH's official strategy focused on 3 areas of control: (1) eliminate nosocomial transmission through sub-

stantially enhanced infection-control practices; (2) prevent additional importation of infection through health screening and travel advisories at the airport and seaports; and (3) stop community transmission through education, contact tracing, and quarantine measures.[8]

Modular System

SGH implemented a modular system, with physical barriers (eg, gypsum boards, closed fire doors) quickly installed between sectors, in an attempt to contain and limit any subsequent outbreaks. Rehabilitation medicine was organized into such a module. Doctors were not permitted to move out of modules or between outpatients and inpatients. No patient transfers were permitted between modules, except to the isolation or intensive care units. Departments were encouraged to separate into teams to enable a backup in case 1 team became exposed and prophylactic quarantine necessary. Where possible, only 1 doctor was to examine the patient to avoid excessive contact. Visitors to the hospital were restricted and eventually banned altogether, except for immediate family of dangerously ill patients. Temperatures and contact history were taken at checkpoints set up at entry points to the patient wards and the visitor restrictions enforced here.

Rehabilitation Equipment

Group therapy and patients using therapy gyms in relatively close quarters were prohibited to avoid spread of the virus. Therapies thus became exclusively one-on-one and were provided at the bedside. Rehabilitation equipment, such as parallel bars, step platforms, therapy balls, and assistive walking devices, were distributed to modules depending on estimated therapy load because the therapy gyms were closed.

Risks of Rehabilitation Transfers

Rehabilitation medicine was directly affected when the entire neurology ward, including patients and health care staff, were transferred out to TTSH for isolation and observation because of suspicious clusters of fevers that involved both patients and staff. Several patients from this neurology ward, who had previously been transferred to us for rehabilitation, were also transferred out. As secondary contacts, the rehabilitation team, including doctors, nurses, and therapists, were placed on a prophylactic 10-day home quarantine. Fortunately, our policy of grouping transferred patients into 1 physical area according to previous wards meant the chance of their contaminating other rehabilitation patients was minimal.

Management of the remaining rehabilitation patients was taken over by physicians from the adjacent ward for the quarantine period, with continued input from the 1 physiatrist unaffected by the quarantine order—he was running the outpatient clinic at the time of the outbreak and hence had not been exposed to the virus. Ultimately, it was determined that none of the staff nor patients had the SARS virus. Nevertheless, it demonstrated how entire units, including rehabilitation medicine, could abruptly be closed down by any possibility of SARS.

Staff-Patient Interactions

The need to avoid unnecessary contact and interactions, as well as to generally isolate our patients from one another, struck the rehabilitation unit with full force. Rehabilitation patients were not allowed to move around or interact with each other. Surgical masks, which some patients found uncomfortable or intolerable, had to be worn by those with a fever or cough. The rehabilitation staff had to don full PPE, including N-95 mask, head cover, face shield, gown, and gloves, before contact with each patient, introducing not only a physical but also a psychologic barrier. Conceivably, close patient contact (eg, during transfers) could transmit infection by way of fomites.

The amount of physical, occupational, or speech therapy that each patient received was significantly reduced, because of staff fatigue from the masks and heat from the gowns. Staff had to refrain from the usual acts of comforting patients, such as holding hands and appropriate touching, unless it was through the PPE. Scrubs and T-shirts were provided to all staff working in patient areas or having patient contact. Shower facilities were opened for baths and staff changed into street clothes before heading home at the end of the shift.

Positive Air Purifying Respirator

Because the virus is typically found in the respiratory secretions (and, to a lesser extent, in feces), certain tasks were now deemed to need a higher level of precaution and protection. To prevent spread of the SARS virus among staff, a positive air purifying respirator (PAPR) was worn on top of the PPE during procedures such as suctioning of respiratory secretions. The PAPR is a battery-operated device that continuously blew filtered air out through the hood worn, thus preventing the virus from being inhaled. However, the additional protection had a price in terms of heat retention and weight, both of which resulted in profuse sweating, especially in non–air conditioned patient care areas. It also restricted movements and required adequate operator hydration and rest periods. Sufficient numbers were necessary because of the many procedures for which it would be needed, and effort and time was required for cleaning after each use.[11]

Other Staff-Staff Interactions

Staff lounges and cafeterias were closed, to avoid interactions between health care workers, and free packed meals were provided for all on duty. Foreign guest workers, especially nursing staff and aides who shared apartments but worked in different hospitals in Singapore, were provided with optional housing, such as hostels and rented apartments. Teaching programs and meetings were suspended, again to avoid unnecessary interactions. Bedside teaching with patients was stopped. Face-to-face and group meetings were avoided where possible, and a system (Lotus Sametime) for virtual meetings and conferencing via the hospital intranet was instituted for heads of clinical departments, to ease communication.

General Medicine

After the incident involving the transfer of neurology patients (see Risks of Rehabilitation Transfers), no other patients were transferred into the rehabilitation unit. Instead, rehabilitation medicine, along with other specialty departments such as neurology, renal medicine, and gastroenterology, provided general internal medicine care for any patient admitted to their respective wards. Our department took care of patients with diagnoses ranging from congestive heart failure to renal failure, and from fresh strokes to psychiatric disorders including drug overdose.

It became a matter of chance whether a patient would be transferred from the emergency department to the rehabilitation ward. It was understood, however, that during triage in the emergency department, staff would try to direct patients to an appropriate departmental ward—for example, strokes to the neurology or rehabilitation medicine module. Patients admitted with fevers were sent to the isolation wards and were managed

by respiratory medicine and infectious-diseases physicians, with the help of medical personnel seconded from other departments, including ours. All elective procedures and surgeries were canceled, and only urgent or emergency surgeries were performed.

Training for rehabilitation medicine physicians in Singapore is a 3-year program after a residency-equivalent training and certification examination in internal medicine. In addition, rehabilitation medicine trainees are part of the internal medicine call schedule for the hospital. This turned out to be an important reason for the relatively easy time our doctors had coping with their new roles as internists.

Therapy Practice

Similarly, therapists with special interests or those who worked predominantly with certain patients (eg, stroke, amputees, sports medicine) now found themselves practicing outside their usual area of expertise. Despite experience or training with populations such as those with spinal cord injury, therapists might find themselves working with amputee patients or performing chest physiotherapy (PT).

Outpatients

The number of patients presenting for outpatient evaluations and follow-ups dropped dramatically, because the public avoided hospitals whenever possible. Recognizing this, medical record reviews of scheduled outpatients who did not show up for appointments were performed to determine the urgency of follow-up. Telephone contact was made as necessary, especially where follow-up was important to assess for any problem. Where indicated, medication refills were dispensed and sent by courier to patients' homes. New appointments were rescheduled before the end of the medication prescription period, by which time the SARS epidemic we hoped would have abated. The PT department set up a service known as e-Physio via the hospital's Internet Web site (*http://www.sgh.com.sg*), whereby patients with access to the Internet could book appointments for assessment and therapy sessions through webcams from their own homes.

Quarantine and Lock-Down

Lock-downs of modules occurred sporadically, whenever a fever cluster or SARS-suspicious patient was discovered. Patients and staff affected were monitored for at least a 10-day period, longer than the SARS incubation period of 6 days previously described, to allow for an increased margin of safety.[5] This meant, however, that patients in the same physical vicinity, who might have otherwise been discharged home, ended up with an enforced prolongation of hospital stay while being monitored for development of fever and other signs and symptoms. Active contact-tracing efforts by the MOH and at each hospital was in full force, with every suspected or infected patient mapped for movements and recent human contacts, and home quarantined for the disease incubation period imposed.

High-Risk Patients

Patients with immune system disorders and pathologies were deemed to be immunocompromised, and this included people with diabetes mellitus, malignancies, and chronic renal failure. The possibility of these patients contracting SARS and not presenting with the typical fever and respiratory symptoms was a very real concern. This was borne out by a cluster of SARS infections at SGH that originated from a single patient with renal failure.[8] Patients eligible for discharge who were immunocompromised in some manner were instructed to stay at home for 10 days and to monitor their temperatures. Needless to say, this included many of our patients with diabetes, which is such a common risk factor for stroke and amputation. Discharging these patients to a step-down facility, such as a community hospital or an extended-care facility, became a problem, because these facilities stopped accepting such cases as a precaution against inadvertently importing SARS.

High-Risk Procedures

As discussed earlier, certain ward procedures relatively common for rehabilitation patients were among those classified as high risk. These included nasopharyngeal aspiration, bronchoscopy, endotracheal intubation, airway suctioning, and even noninvasive ventilation procedures.[12] Caution was also needed with chest PT and postural drainage, because there was potential for coughing and producing respiratory secretions, as well as with the occasional cardiopulmonary resuscitation. During such procedures, full PPE and PAPR were mandatory, which meant that several sets of this equipment had to be ready and available at all times.

Because of the risk of aerosolized virus particles or droplet spread of the virus, nebulizers for respiratory medications, such as albuterol (Salbutamol), were used only when absolutely necessary, and only under controlled situations, generally in a closed single room and with the health care worker in PAPR. Wherever possible, spacer devices, to which the medications' pocket inhalers could be connected, were substituted. Care was also taken when using nasal intermittent positive pressure ventilation devices for respiratory rehabilitation patients.

Fecal transmission was theoretically possible; hence, even patient hygiene and laundering bedding after fecal incontinence were classified as a high-risk procedure.[12] Handling of diapers, disposal of excreta, and manual digital evacuation were done with full PPE worn and due care and diligence.

Psychosocial Issues

Patients. With regulations that initially limited visitors and subsequently prohibited visitors except to patients on the dangerously ill list, boredom and lack of emotional support became a major factor for our longer-staying patients. Only private-rate paying patients had individual bedside telephones; hence, hospital-wide loaner cellular phones (with airtime donated by local telecommunication companies) were made available on request to any other patient who wished to talk with family.

Connections were made for video conferencing whereby the family, either at the SGH visitors' center or at 1 of several designated community centers, booked slots to use real-time video cameras to talk to their loved ones on the ward. Personal laptop computers were permitted and encouraged for those with their own e-mail accounts. Rather than aiming for optimal functioning, the rehabilitation goal became one of quickly getting patients as adequately functional as possible, to where their families could manage caregiving at home despite an earlier discharge than pre-SARS days.

Psychosocial Issues

Staff. Beyond the underlying fear of infection and the physical stress of working with protective equipment and regulations, security staff in particular came under risk of verbal abuse and physical threats from aggravated members of the public. This mainly originated from frustration with the regulations restricting visitors, but it was occasionally triggered by someone who refused to be screened for contact or travel history or to undergo a temperature check. Incidents occurred where armed police were needed to enforce security.

Incidents also arose in which health care workers were shunned and even discriminated against, probably because of the fear of catching SARS. Nursing staff in particular, who still routinely wore uniforms in Singapore, were easily identified. Nurses reported that taxicabs did not stop when hailed. They also noticed having ample seating on public transportation, because no one wanted to sit next to them. On a more subtle level, children of health care workers noted that their friends' parents canceled play dates and social events for vague reasons. This issue was quickly picked up by the media, and a successful campaign ensued that helped health care workers be treated as brave professionals, rather than as potentially infectious persons.

PERIOD 3: SERVICE RECOVERY

As the number of new SARS cases dropped and affected patients were discharged home, cautious attempts at service recovery and a return to normality began. This was dampened in part by news of a resurgence of SARS in Toronto, Canada, when an infected elderly patient with hip fracture transferred to a rehabilitation facility, thus creating another cluster of infections. The principle of the day for Singapore hospitals thus became one of vigilance and caution, to avoid a similar occurrence.

Fever monitoring in both patients and staff several times daily continued as a routine, and infection control audit teams roamed the hospitals to detect and discourage breaches of control measures. A computerized system was set up for cluster monitoring in the wards, whereby any cluster of 3 or more patients in the vicinity with fever greater than 38°C triggered an alert.

The coronavirus genome was sequenced and a polymerase chain reaction (PCR) test became available. It was a valuable tool for testing stools and respiratory secretions, although the test's accuracy was still believed to be relatively low. Other tests available included blood tests for SARS antibody seroconversion (appendix 1). A vaccine for SARS was still not available and not expected for several years.

Interhospital Transfers/Step-Down Facilities

Regulations for readmission and transfer of patients between hospitals, generally still to be avoided, were instituted and included absence of clinical findings, negative chest radiographs, stool PCR test, or serum SARS antibody. Step-down facilities, such as community hospitals and nursing homes, cautiously began accepting patients again, after placing similar preconditions (eg, absence of fever, negative SARS PCR or antibody tests). This shifted some of the burden of unnecessary prolonged stays, because disabled patients who were still unable to return home but were otherwise suitable for a step-down facility could now be moved appropriately.

Lessons for Rehabilitation Medicine

The impact that SARS had on health care, and rehabilitation medicine in particular, would have been the same as that for any uncontrolled infectious disease, whether arising from nature (eg, a zoonotic infection), or from bioterrorism, a growing concern in these times. Infection control measures effectively compromised the fundamental principles of rehabilitation, including interdisciplinary interactions, patients mingling and learning from each other, use of touch to encourage and comfort patients, and close physical contact during therapy.

There were significant financial considerations that stemmed from limited group therapies and reversion to a strictly one-on-one therapy approach. Similarly, routine use of infection control measures, including the costs of PPE, time taken to don and doff, and greatly reduced work efficiency among health care workers need to be factored in. The question of expertise arose when physiatrists had to manage medical complications themselves instead of being able to call in consultants or transfer patients to an appropriate specialist. The accuracy of a telephone consultation that relies on the reported history and examination findings of the doctor calling the consult may be questioned. There is a high probability of fatigue and stress after a prolonged period under semimilitary rules and regulations, and attentiveness and vigilance to precautions may slip. Health care workers may need to prepare for extended periods in full PPE.

Rehabilitation departments may need to split into self-contained teams, each with physiatrist, nurses, and therapists, to avoid cross-infection. Preparations need to be made to ensure continuity of care for outpatients unable to come for clinic reviews by systematic chart review. Potential offsite facilities should be identified as satellites for caregiver teaching and possibly as outpatient clinics for follow-up and therapies in the event of an outbreak. An adequate supply of PPE, including masks, gown, and gloves, needs to be stockpiled and available while awaiting sources to ramp up emergency supplies. Rethinking may be necessary about having large common and open therapy areas for patients from several wards. Alternatively, smaller areas located near patient wards could be identified for rapid conversion, if necessary, into "mini"-therapy areas by moving in basic therapy equipment. Technologic and telecommunication aids, such as the computer, video, and television, can be used to teach rehabilitation. The emotional well-being of patients, especially the ability to communicate easily with loved ones, can also be aided by technology.

A system of segregating rehabilitation patients transferred to the hospital should be developed to avoid cross-infection in the early stages or in the event of a controlled outbreak. Admission criteria, such as patient temperature, contact and travel history, chest radiographs, and laboratory or serologic evidence of being noninfected, can be predetermined. Many of these recommendations will not be so critical if a vaccine is developed soon. Physiatrists may also need to keep current with internal medicine skills. This will allow them to continue to care for patients in a crisis where at least for the interim the practice of rehabilitation medicine is limited. Therapists may want to engage in crosstraining or intermittently work with patients outside their usual realm, in order to remain comfortable with nonfamiliar therapy activities.

CONCLUSIONS

SARS is a new respiratory epidemic with a devastating impact on the practice of medicine, and, in particular, rehabilitation medicine. Besides changes to patient care, the measures taken to control SARS have implications for personal freedom and privacy; they may also involve medicolegal issues.

The psychobehavioral and medicolegal questions raised will need to be explored and dissected, and it is suggested that committees be set up to examine potential issues and to formalize protocols. New legislation possibly akin to Good Samaritan laws may have to be proposed, to allow all physicians to function as best as possible under emergency circumstances.

We have been able to proceed with service recovery and to return to normal levels of service as the SARS epidemic has abated. Nevertheless, our experience leads us to conclude that leaders in rehabilitation medicine should anticipate such an infectious epidemic occurring in their institutions. An emergency preparedness plan should be put in place at the facility level, and possibly at the state and national levels, ready for implementation if the need arises so that it does not have to be created as events unfold.

APPENDIX 1: DEFINITIONS FOR SURVEILLANCE OF SARS AND LABORATORY METHODS FOR SARS DIAGNOSIS

Case Definitions for Surveillance of SARS[13]	
Suspect case	1. Presenting after 1 November 2002 with history of: High fever (>38°C) and Cough or difficulty breathing and Close contact with suspect or probable case of SARS, and/or Travel history to area with recent local SARS transmission, and/or Residing in area with recent local SARS transmission 2. Unexplained acute respiratory illness resulting in death after 1 November 2002, without autopsy and Close contact with suspect or probable case of SARS, and/or Travel history to area with recent local SARS transmission, and/or Residing in area with recent local SARS transmission
Probable case	1. Suspect case with infiltrates consistent with pneumonia or respiratory distress syndrome (RDS) on chest x-ray 2. Suspect case positive for SARS coronavirus by 1 or more assays 3. Suspect case with autopsy findings consistent with RDS without identifiable cause

Use of Laboratory Methods for SARS Diagnosis[14]	
Positive SARS diagnostic test	a) Confirmed positive PCR for SARS virus At least 2 different clinical specimens (eg, nasopharyngeal and stool), or Same clinical specimen collected on 2 or more days during illness (eg, 2 or more nasopharyngeal aspirates), or Two different assays or repeat PCR using original clinical sample on each occasion b) Seroconversion by ELISA or IFA Negative antibody test on acute serum followed by positive antibody test on convalescent serum, or Four-fold or greater rise in antibody titer between acute and convalescent phase sera tested in parallel c) Virus isolation Isolation in cell culture of SARS CoV from any specimen, plus PCR confirmation using validated method

NOTE. Adapted by permission of the World Health Organization.[13,14]
Abbreviations: CoV, coronavirus; ELISA, enzyme-linked immunosorbent assay; IFA, immunofluorescent assay.

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