Disaster at Sunnybrook

Introduction

In a matter of hours on April 13, 2003, nine health workers caring for a SARS patient, referred to as Mr. Z, contracted the disease at Sunnybrook,[392] one of Canada's best-known teaching hospitals.[393] Six health workers were in the room when the 54-year-old man, who had severe breathing difficulties, was intubated.[394] The three others were exposed a few hours earlier.

Sunnybrook was forced to close its critical care unit, its cardiovascular intensive care unit, its emergency department, its regional trauma service and its SARS assessment clinics.[395] As Dr. Mary Vearncombe, senior infection control specialist at Sunnybrook, said:

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392. During SARS, Sunnybrook was part of the Sunnybrook and Women's College Health Sciences Centre.

    In June 1998, the Ontario government passed a *Special Act of Legislation* (Bill 51) creating Sunnybrook and Women's College Health Sciences Centre (Sunnybrook & Women's). This new health organization amalgamated Sunnybrook Health Sciences Centre and Women's College Hospital. On August 18, 2005, the Ontario government announced that Women's College Hospital and Sunnybrook would again become separate health care facilities.

393. For the full story of Sunnybrook during SARS, the reader is invited to view what was presented publicly during the Commission's hearings by Mr. Leo Steven, president and CEO; Dr. Bob Lester, EVP Academic and Medical Affairs; and Dr. Mary Vearncombe, hospital epidemiologist and senior infection control specialist. Their PowerPoint presentation and the transcript of their oral presentation are, and have been, available on the Commission's website. For the hospital's SARS story, the reader is invited to consult these Commission documents.

394. The Commission has no mandate to investigate any legal issues arising from the intubation that are the subject of pending lawsuits.

395. Dr. Mary Vearncombe told the SARS Commission's public hearings: "We had to close our critical care unit and, because our critical care unit is contiguous with our cardiovascular ICU, that also had to be closed. Our SARS unit had to be closed and because our critical care unit was closed, then our emergency department was closed which closed our trauma unit which is, I am told, the first time that the regional trauma service has ever been closed and we had to close our SARS assessment clinics because there was, then, nowhere for us to house the patients that needed admission." See: SARS Commission Public Hearings, Sept. 29, 2003, p. 144.

> The infecting of these staff members did put us in quarantine.[396]

This was a big setback for Ontario, and a serious blow to Sunnybrook, a major contributor to the fight against SARS, and one of Toronto's largest hospitals.[397] Five weeks into the outbreak, it also demonstrated that SARS was still not under control in Toronto, reinforcing its international reputation as a SARS hot spot.[398]

The events of April 13 do not reflect on Sunnybrook, whose dedication to the fight against SARS is noteworthy.[399] Sunnybrook was committed to doing its best to protect its workers, patients and visitors. The hospital believed its protective measures complied with Provincial Operations Centre directives. The workers who caught SARS did everything the hospital said they needed to do to be safe.

With the benefit of hindsight, the events of April 13 illustrate how limited, neglected, and malnourished was the health system's capacity to protect its workers. This systemic problem undermined the ability of Sunnybrook and other Ontario institutions on the front lines of the battle against SARS to effectively respond to the outbreak.

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396. SARS Commission Public Hearings, September 29, 2003.
397. In its Sept. 29, 2003, presentation to the SARS Commission's public hearings, Sunnybrook described itself as follows:

    - One of Canada's largest academic health sciences centres with about 8,000 staff and physicians and 2,000 volunteers

    - Fully affiliated with the University of Toronto and each year we teach about 2,000 students and spend more than $70 million on research.

398. See "The SARS Epidemic: Precautions; Toronto, Hard Hit by Mystery Illness, Warily Celebrates Easter," *New York Times*, April 21, 2003; CNN, "China facing big SARS spread – WHO; More infected in Hong Kong, Singapore, Canada," April 22, 2003.
399. Among other things, it is worth noting that at time when Ontario's laboratory resources were woefully inadequate, Sunnybrook helped to fill that gap. As the Naylor Report noted:

    > With the provincial lab overwhelmed, some hospitals sent specimens directly to the National Microbiology Laboratory, bypassing the usual hierarchy of referral.
    >
    > The Hospital for Sick Children, Mount Sinai, and Sunnybrook and Women's had strong platforms in polymerase chain reaction technology—an elegant laboratory testing modality that identifies microorganisms by analyzing strands of their DNA or RNA. They became the de facto and unfunded referral centres for Toronto SARS testing.

SARS Intubation: A Risky Procedure

Patients are intubated when their respiratory system cannot provide them with enough oxygen and other forms of assistance aren't enough. A tube is placed into their windpipe and the airway is opened so oxygen or medication can be administered.[400]

When the tube is successfully inserted into a patient, respiratory secretions may, as occurred at Sunnybrook on April 13, be expelled into the air with great force. One expert graphically describes intubations as "a mucous gun."

About one in four SARS patients was intubated.[401] Intubating a SARS patient was risky because their respiratory droplets might contain "a high viral burden."[402]

How extensively it can disperse secretions was dramatically demonstrated in a WHO teaching film in which a computerized medical dummy was intubated. A small amount of a special gel visible only under ultraviolet light was smeared around the dummy's lips and chin to simulate respiratory secretions.

After the procedure was completed, the regular room lights were turned off, and an ultra-violet light turned on. To the surprise of the participants, tiny specks of blue were illuminated all over the room, indicating how far the gel had been expelled by the dummy.[403]

One participant said:

> We looked and said "What the hell is that?"[404]

400. "An endotracheal intubation places a tube into the windpipe (trachea). This is done to open the airway to administer oxygen, medication, or anesthesia. It may also be done to remove blockages or to view the interior walls." Source: Medline Plus Encyclopedia, a service of the U.S. National Library of Medicine and the U.S. National Institutes of Health.
401. Caputo et al., "Intubation of SARS patients: infection and perspectives of healthcare workers," *Canadian Journal of Anesthesia*, 51:A43 (2004).
402. Andrew Cooper, Amit Joglekar, Neill Adhikari, "A practical approach to airway management in patients with SARS," *Canadian Medical Association Journal*, Oct. 14, 2003, p. 785.
403. American Public Health Association, *Behind the Mask: How the World Survived SARS*, (Washington, DC: APHA 2005), p. 92 (*Behind the Mask: How the World Survived SARS*).
404. *Behind the Mask: How the World Survived SARS*, p. 92.

He was referring to the following scene in the film:

> Eerie patches of light blue are glowing everywhere – on the protective clothing; on the surgical tools used and set aside on a tray; on a couple of syringes with the rims, plungers and barrels all glowing.[405]

One physician who participated in making the film said:

> It was unreal. It was only then that it clicked how many times the doctor and nurse had touched that dummy's head and chin.[406]

There were even blue splotches on the heart monitor:

> Even if the doctor disrobed and disinfected after finishing the procedure, someone else – even cleaning staff – was going to end up touching that heart monitor. And the SARS coronavirus can survive outside the body for up to two days.[407]

Mr. Z Is Taken to the ICU

On the morning of April 13, 2003, Mr. Z was on the SARS isolation unit. As his condition deteriorated, he was examined by two physicians and had his x-ray taken by a technician. All three would contract SARS.

A physician said:

> Earlier that morning he had been okay in his room, just on oxygen by nasal prongs and he became progressively more short of breath and … needing more and more oxygen. We moved him onto a facemask of oxygen and that wasn't enough, so they moved him into ICU.

At about 9:45 a.m, Mr. Z was transferred to the Intensive Care Unit. His oxygen levels were very low, and he was, in the words of one health worker, "in extreme distress, extreme distress."

405. *Behind the Mask: How the World Survived SARS*, p. 92.
406. *Behind the Mask: How the World Survived SARS*, p. 92.
407. *Behind the Mask: How the World Survived SARS*, p. 92.

He also had a terrible cough. A health worker said:

> I do recall that he had this persistent cough, he was almost like a kid with whooping cough that just goes on and on.

In the ICU, Mr. Z was initially looked after by two respiratory therapists and a nurse. Two other nurses helped out when they could, and when they were needed.

Mr. Z's Condition Worsens

Despite the assisted ventilation known as a BiPap, or bilevel positive airway pressure device,[408] Mr. Z remained disoriented and was "coughing incessantly," recalled one nurse:

> He was also resisting efforts to treat him.

One health worker recalled:

> His condition continued to worsen and we were in the room for a long time, and he was becoming more and more, like, he was becoming violent. He pulled my mask off at one time. He pretty much punched the nurse and I. We were trying to restrain him.

Another health worker recalled:

> He was quite agitated…

A third health worker said:

> He kicked us and pulled and kicked and pulled and kicked.

This health worker recalled vividly how hard the respiratory therapist (RT) worked caring for this extremely agitated patient:

408. "Bilevel positive airway pressure (BiPAP) delivers a higher pressure on inspiration, helping the patient obtain a full breath, and a low pressure on expiration, allowing the patient to exhale easily. BiPAP is a common choice for neuromuscular disease." Source: *Gale Encyclopedia of Surgery*. http://www.answers.com/topic/mechanical-ventilation

> I remember the RT that was working with us, how hard she worked to maintain him. Her face was so red. She worked so hard … He was just very sick and she worked like a dog to maintain that man before intubation.

In his distress, Mr. Z would pull off the BiPap mask, cough and expel secretions into the room.

One health worker recalled:

> When the BiPap [mask] comes off which he was pulling off, you know, he was coughing also, and it does spray. And the other thing too, we were in the room for such a long time trying to set this up that I was sweating and I could feel my mask literally disintegrating, like I don't even think I had a mask on at that time when you think about the condition it was in.

As time passed, health workers were becoming increasingly concerned about Mr. Z's condition.

One health worker said:

> We were all very frightened of what was going on.

Mr. Z Is Intubated

Efforts to use the BiPap therapy continued over a few hours, but they were not effective.

One physician said:

> We tried him on BiPap, which is a kind of ventilation mask that has a tight fitting mask over their face which blows air in and out. But we weren't able to give him enough oxygen that way.

The decision was made to intubate Mr. Z:

> After an approximately two-hour attempt to provide oxygen through BiPAP, the patient was intubated.[409]

The three physicians on duty that morning in the ICU came into the room and one of them intubated Mr. Z.

Once the tube had been inserted into Mr. Z's airway, there was, said one nurse,

> Just a huge spray … I am sure everybody was covered with it because I remember myself looking at my yellow gown and seeing the droplets, the little red droplets all over, all over my gown. I remember seeing droplets at the foot of his bed, on his sheets. So I remember thinking anybody that was at, or around, the bed, was probably sprayed.

A health worker said:

> It was quite messy actually… when the endotrachial tube went in, there was lots of secretions that actually shot out of the tube, under force. It was very messy.

A report by the CDC said:

> During intubation, he had copious frothy secretions that later obstructed the ventilator tubing, requiring disconnection and drainage.[410]

After the intubation, the tubing quickly filled with liquid and had to be changed.

One health worker said:

> And it was so bad that when I actually put him on the ventilator, the tubing was filling up with fluid … we actually changed the tubing on the ventilator … normally the thing you would do is just change the circuit and we did that. And that exposes you as well. So we did a four-man

409. "Cluster of Severe Acute Respiratory Syndrome Cases Among Protected Health-Care Workers – Toronto, Canada, April 2003," *Morbidity and Mortality Weekly Report*, May 16, 2003 / 52(19), 433-436 (Cluster of Severe Acute Respiratory Syndrome Cases).

410. Cluster of Severe Acute Respiratory Syndrome Cases, pp. 433-436.

> circuit change. Normally you do it by yourself, but we did it with four people so that we could quickly take everything off and put everything back on so he wouldn't even miss a breath.

Later that evening, Mr. Z's condition stabilized.[411] But he eventually died.

Aftermath of the Intubation

The health workers who cared for Mr. Z in the ICU on April 13 ended their shifts exhausted and concerned they might have contracted the disease.

One health worker said:

> We had been very unnerved by the whole situation.

Another health worker said:

> I went home and luckily avoided a lot of my friends. I just felt, I felt really dirty this whole time. When I went home I just felt like my skin was crawling. I basically went home and had a shower and laid low the next couple of days. I didn't go out really or do anything. I just kind of kept to myself. I had a roommate as well so I was trying to avoid her. I was just so afraid. I thought: "I don't want to spread this to anyone." … I don't know if I was confident I was going to become infected. I was terrified of it. I think we all were.

A third health worker said:

> I remember that I had this mask on and how it was wet and had come down off my nose, how it didn't fit properly. And I was feeling scared that I was going to get SARS.

These fears were realized in the coming days.

411. Cluster of Severe Acute Respiratory Syndrome Cases, pp. 433-436.

Over the next week, two respiratory therapists, three nurses and a physician who cared for Mr. Z around the time he was intubated began developing SARS symptoms. As noted earlier, two other physicians who examined Mr. Z on the SARS isolation unit and an X-ray technician were also infected.

A CDC investigation said:

> During April 15-21, nine HCWs who had cared for this patient around the time he was intubated had illnesses consistent with the World Health Organization case definition for suspect or probable SARS; another two HCWs had symptoms that were not consistent with the case definition. Six of these 11 HCWs had been present during the intubation procedure.[412]

The CDC Is Asked to Investigate

By the evening of Friday April 18th it was clear to officials leading the fight against SARS that something had gone terribly wrong at Sunnybrook Hospital.

As one hospital official said:

> That was Friday night and we had the conference call … We knew people at Sunnybrook were now sick.

An investigation by an outside agency was needed. As one hospital official who recommended that an outside agency be brought in to help recalled saying to collagues during a conference call:

> We need fresh bodies to come in and look at this because we do not have the time to do it, and our health care workers, we have to do it for them, we need somebody fresh to come in and their only job is to come in and work out this problem with transmission to health care workers through precautions.

Everyone agreed. The CDC was contacted that weekend, and it assigned a team to investigate the events of April 13th.

412. Cluster of Severe Acute Respiratory Syndrome Cases, pp. 433-436.

The composition of the CDC team is worth noting. As would be expected, it included field epidemiologists and infection control practitioners. But unusually for Ontario it also had an occupational hygienist from the National Institute for Occupational Safety and Health (NIOSH), part of the CDC.[413] That an occupational hygienist was an integral component of the team was not an anomaly at the CDC. Worker safety has a high profile at the CDC, and the expertise of occupational hygienists is highly valued. As one senior CDC official told the SARS Commission:

> Over that weekend we started talking about the makeup of a team and right away we had the idea that we would want a NIOSH person.

Ministry of Labour officials told the Commission they were not aware that a CDC-NIOSH investigative team was in Toronto to look into the events of April 13.

It is unfortunate that the Ministry of Labour was not asked by the Provincial Operations Centre to participate in the investigation. Not only is the ministry the workplace regulator in Ontario, it has first-class worker safety experts, including some who before SARS helped set the Canadian Safety Association's respirator standards.[414] It was another regrettable example of how the Ministry was sidelined during SARS and how little awareness there was in the health system of the labour ministry's expertise and responsibilities.

It is also symptomatic of the general lack of awareness in the Ontario health system during SARS of the importance of workplace safety expertise. As one hospital, which

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413. NIOSH's duties include:

- Investigating potentially hazardous working conditions as requested by employers or employees.
- Evaluating hazards in the workplace, ranging from chemicals to machinery.
- Creating and disseminating methods for preventing disease, injury, and disability.
- Conducting research and providing scientifically valid recommendations for protecting workers.
- Providing education and training to individuals preparing for or actively working in the field of occupational safety and health.

See: http://www.er.doe.gov/ober/humsubj/appendix_b.pdf

414. See Canadian Standards Association, Z94.4-02 Selection, Use, and Care of Respirator, (Toronto: CSA, April 1, 2003).

was unusual in Ontario in having worker safety experts on staff before SARS, said in its submission to the Commission:

> It was interesting to note that an occupational hygienist was part of the CDC team called in to help review how SARS was being spread; earlier recognition and utilization of local professional resources (e.g. through the Canadian Registration Board of Occupational Hygienists, the University of Toronto graduate program in occupational hygiene, etc.), may have helped contain the problem much sooner.

Random Errors Ruled Out

The CDC team's key finding was that the nine health workers probably got SARS because of systemic problems.

Individual error might make sense, said the CDC, if one or two people out of 11 who treated Mr. Z on the morning of April 13th got SARS. But this was unlikely when it involved nine of 11. This suggested a systemic cause that affected all nine workers equally.

One CDC official told the SARS Commission:

> A lot of human error is systemic, as you know, where we have a procedure that's wrong or something like that. But there's also human error which is not totally random but it's individual specific: It's an individual who feels like he doesn't need to comply with appropriate protection; or one health care worker had a beard and therefore the thing didn't fit well. But if you're going to say that for 11 health care workers then that becomes problematic because you're saying this is happening in succession in 11, in a close sphere, so it's probably a systemic problem.

Another CDC official said:

> If this were a breach in some of the protection that was being offered, it had to be a systematic breach, we can't argue there was a random breach and there is the possibility that just the level of contagion, if you want to call it, the level of virus load in the environment exceeded the level of protection that these health care providers were using.

Systemic Problems Identified

The CDC report identified a number of systemic flaws.

Instead of N95 respirators,[415] as required in the U.S., the CDC found the affected health workers at Sunnybrook wore PCM 2000 masks.[416] They have the same specifications as an N95, but their performance has not been independently tested and certified.

A member of the CDC's investigative team told the Commission:

> The masks that we were told that they used during those events was what we consider more of a surgical mask so it didn't have, it wouldn't have had the filtration efficiency of an N95.

During SARS, directives required health workers to use N95 or equivalent respirators. The term "equivalent," however, was defined very differently by Health and Labour. This issue is discussed in greater detail in a later chapter entitled "The Mask."

The Ministry of Health, reflecting Health Canada guidelines,[417] said PCM 2000 masks, even though they had not been independently tested, were the same as N95

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415. Using highly efficient filtering materials, N95 respirators are one of the nine types of disposable particulate respirators that are independently tested and certified by the National Institute for Occupational Safety and Health in the United States, which is part of the Centers for Disease Control. "The N indicates that the respirator provides no protection against oils and the 95 indicates that it removes at least 95% of airborne particles during "worst case" testing using a "most-penetrating"-sized particle." Source: Yassi et al., "Research Gaps in Protecting Healthcare Workers From SARS," *Journal of Occupational and Environmental Medicine*. DOI: 10.1097/01.jom.0000150207.18085.41.

416. "Interviews with affected HCWs indicated that they all had worn the recommended personal protective equipment each time they entered the patient's room, including gown, gloves, PCM2000™ duckbill masks (Kimberly Clark Health Care, Roswell, Georgia), and goggles with or without an overlying face shield." "Cluster of Severe Acute Respiratory Syndrome Cases Among Protected Health-Care Workers – Toronto, Canada, April 2003", Morbidity and Mortality Weekly Report, May 16, 2003 / 52(19);433-436.

417. See: Health Canada, "Infection Control Guidance for Respirators (Masks) worn by Health Care Workers – Frequently Asked Questions – SEVERE ACUTE RESPIRATORY SYNDROME (SARS)," Revised 2003-06-05:

> 4. Health Canada recommends wearing an N95 mask or equivalent. What does "equivalent" mean?

respirators. A ministry document issued just days before the events of April 13 said:

> Question: Are the PCM 2000, P95 and R95 masks equivalent to the N95 mask?
>
> Answer: Yes.[418]

Labour took a very different position: A respiratory protective device was the equivalent of an N95 only if it was independently tested by NIOSH or to NIOSH standards by an equivalent body. "Equivalent" also applied to higher-rated approved respirators like the N99 or N100, which could be used if N95 respirators were in short supply.[419] One Ministry official told the Commission:

> Now, if somebody uses an N99 or an N100, they are equivalent and would provide even higher protection.

This approach was reflected in a document Labour prepared for its staff:

> Problem: Refusal to work with or serve a patient, client or inmate with

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It should be noted that NIOSH is an American agency, and there is no equivalent agency in Canada which certifies masks for industrial use. N95 masks have been tested and certified by NIOSH. For more information on NIOSH, testing and certification, visit http://www.cdc.gov/niosh/homepage.html

Health Canada recognizes that many institutions and other health settings may not use N95 masks that are NIOSH approved, and considers masks fulfilling the following requirements as the "equivalent" to NIOSH certified N95 masks:

- Filter particles one micron in size or smaller
- Have a 95% filter efficiency
- Provide a tight facial seal (less than 10% leak).

5. Are N95 masks considered an "equivalent" to the TB masks?

Yes, NIOSH approved N95 respirators/masks or equivalent meet and exceed the TB mask criteria.

418. http://www.health.gov.on.ca/english/providers/program/pubhealth/sars/docs/qa_041103.pdf

419. The minimum efficiency of each tested filter is to be greater than or equal to 99.97% for N100 filters and 99% for N99 filters.

> possible SARS and symptoms e.g. fever, cough, history of travel or contact with confirmed SARS case, in healthcare setting or in corrections facilities.
>
> Solution: Health care facilities and corrections facilities must implement the infection control measures required by MOHLTC and public health units. These include gloves, gowns, **N95 or better respirators**, eye protection, handwashing facilities, plus the appropriate training and respirator fit testing.[420] [emphasis added]

The Ministry of Labour's position is the one that should have counted. Labour regulates workplace safety, sets workplace safety standards, and enforces worker safety laws and regulations. None of these statutory responsibilities falls under the Ministry of Health's ambit. And yet, in a dramatic example of how the Ministry of Labour was sidelined during SARS as a result of systemic flaws, its position on respirator equivalency was never spelled out in Provincial Operations Centre directives, or otherwise conveyed to health care institutions.

Amid this systemic confusion and lack of clear direction from the workplace regulator, it is not surprising that a number of leading Toronto hospitals,[421] including Sunnybrook, believed PCM 2000 masks were the same as an N95, and sufficient to protect their workers.

On a related worker safety issue, the CDC report into the events of April 13 also noted that:

> . . . individual workers had not been fit tested.

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420. Document entitled "SARS Scenarios" which was attached to a copy of the Ministry of Labour's SARS protocol, which it provided to the SARS Commission in the course of its submission at the public hearings.

421. For example, see: Toronto Medical Laboratories/Mount Sinai Hospital Microbiology Department, Procedure Manual, Revised as at December 2003, p. 136. http://microbiology.mtsinai.on.ca/manual/ls/mi_ls.pdf; An article by experts at the University Health Network and Toronto West Hospital said: "The PCM 2000 Tuberculosis masks meet the N95 filtration criteria and fit the majority of wearers adequately." Kamming et al., Anaesthesia and SARS, "*British Journal of Anaesthesia*", 2003, Vol. 90, No. 6, 715-718. An article by Toronto experts in the *Canadian Journal of Anesthesia* contained the following description in a footnote for a PCM 2000 mask: "N95-equivalent mask". Source: "Intubation of SARS patients: infection and perspectives of healthcare workers", *Canadian Journal of Anesthesia*, ANESTH 2006 / 53: 2.

That the health workers who cared for Mr. Z were not fit tested does not reflect on Sunnybrook but reveals a system-wide problem.

Fit testing had been required by Ontario law since 1993.[422] Yet, for the first two months of the outbreak, this legal requirement was not explicitly spelled out for hospitals[423]. Many hospitals officials told the Commission they only became aware of this when the May 13, 2003, directives[424] were issued. This was a full month after nine health workers contracted SARS at Sunnybrook while caring for Mr. Z.

Hospitals should have been told from the start that if health workers were required to wear N95 respirators they had to be meet statutory safety equipment requirements, including fit testing.[425]

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422. Section 10 of the Ontario Regulation 67/93 requires:

> 10. (1) A worker who is required by his or her employer or by this Regulation to wear or use any protective clothing, equipment or device shall be instructed and trained in its care, use and limitations before wearing or using it for the first time and at regular intervals thereafter and the worker shall participate in such instruction and training.
>
> (2) Personal protective equipment that is to be provided, worn or used shall,
>
> (a) be properly used and maintained;
>
> (b) be a proper fit;
>
> (c) be inspected for damage or deterioration; and
>
> (d) be stored in a convenient, clean and sanitary location when not in use. O. Reg. 67/93, s. 10.

423. Although early directives referred in passing to fitted masks, they did not reference the legal requirements for fit testing and they did not emphasize the importance of fit testing.

424. All six directives issued that day contained the following language:

> Personal protective equipment must be properly used and maintained
>
> consistent with the *Occupational Health and Safety Act* Reg. 67/93 s.10. N95
>
> or equivalent masks must be qualitatively fit tested to ensure maximum effectiveness. (See NIOSH website at www.cdc.gov/niosh -Publication No.99-143).

425. Section 10 of the Ontario Regulation 67/93 requires:

> 10. (1) A worker who is required by his or her employer or by this Regulation to wear or use any protective clothing, equipment or device shall be instructed and trained in its care, use and

However, the system that led the response to SARS did not give the Ministry of Labour a level of oversight over workplace safety issues, including references in the directives, commensurate to its statutory duties and responsibilities.

What compounded the systemic problems related to N95 equivalency and fit testing was the decision by the Ministry of Labour not to conduct any proactive inspections until June 2003. Proactive inspections would have permitted it to ensure that hospitals were aware of what was required under Ontario laws and regulations. In B.C., as noted earlier, the WCB started conducting workplace inspections in early April 2003 to ensure workplace standards were being upheld.

New Directives Issued

With the benefit of hindsight, we can see that even though SARS intubations were inherently risky, the dangers of intubations were not quickly recognized in Ontario.

As noted earlier, the intubation of Mr. M on March 17, 2003, at Scarborough Grace infected four health workers. One infected his daughter; another, a household member:

> In the ICU, intubation for mechanical ventilation of [Mr. M] was performed by a physician wearing a surgical mask, gown and gloves. He subsequently acquired SARS and transmitted the infection to a member of his family. Three ICU nurses who were present at the intubation and who used droplet and contact precautions had onset of early symptoms

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limitations before wearing or using it for the first time and at regular intervals thereafter and the worker shall participate in such instruction and training.

(2) Personal protective equipment that is to be provided, worn or used shall,

(a) be properly used and maintained;

(b) be a proper fit;

(c) be inspected for damage or deterioration; and

(d) be stored in a convenient, clean and sanitary location when not in use. O. Reg. 67/93, s. 10.

> between Mar. 18 and 20. One transmitted the infection to a household member.[426]

Three days later, on March 20, 2003, a warning about the dangers of intubations was issued by the Centers for Disease Control.[427]

Four more days later, on March 24, three health workers at Mount Sinai were infected during the intubation of Mr. N:

> SARS developed in three of the five persons present during the endotracheal intubation of the patient. During this procedure, the patient's respiratory secretions were splashed onto the uncovered cheek of one of the health workers. No other healthcare worker reported direct skin exposure to the patient's bodily secretions at any time during his admission. Two of the three persons in whom SARS developed after the endotracheal intubation wore a gown, surgical mask, and gloves; one healthcare worker wore a gown, gloves, and N95 mask.
>
> Of the two health workers present during endotracheal intubation in whom SARS did not develop, one was a postgraduate medical trainee who assisted with manual ventilation (bag-valve-mask ventilation using a Laerdal bag) and was positioned to the side of the patient rather than directly over the patient's head. This health care worker wore gown, gloves, and surgical mask during the procedure. The second worker was a respiratory therapist who helped prepare the necessary equipment while wearing gown, gloves, and an N95 mask.[428]

In their presentation to the SARS Commission's public hearings, Ontario Nurses' Association and Ontario Public Services Employees Union noted that, in the U.S., the first directives for intubations had been issued on March 20, just days after the Scarborough Grace incident, and four days before the intubation of Mr. N:

426. Varia et al., "Investigation of a nosocomial outbreak of SARS.", p. 290.
427. Centers for Disease Control, "Infection Control Precautions for Aerosol-Generating Procedures on Patients who have Suspected Severe Acute Respiratory Syndrome (SARS)," March 20, 2003.
428. Scales et al., "Illness in Intensive Care Staff after Brief Exposure to Severe Acute Respiratory Syndrome," *Emerging Infectious Diseases*, Vol. 9, No. 10, October 2003.

> Directives to All Ontario Acute Care Hospitals for High-risk procedures in Critical Care Areas During SARS Outbreak, April 29 (Interim), May 1: Between April 15 and 21, nine HCWs at Sunnybrook and Women's Hospital were diagnosed with SARS following exposure to a SARS patient during a complex and prolonged medical intervention. Approximately a week later, the POC released these Directives to address the exposures that may take place during treatment and diagnostic procedures that can produce airborne respiratory secretions carrying SARS. The U.S. Centers for Disease Control published its first SARS-related document concerning aerosol-generating procedures on patients March 20.[429]

The first Provincial Operations Centre directive on how health workers who participated in intubations could protect themselves was not issued until April 29, 2003. These interim directives were superseded on May 1, 2003, and May 13, 2003.

ONA and OPSEU told the SARS Commission:

> One of the critical aspects of SARS is that it is primarily a respiratory infection, often requiring a variety of diagnostic and treatment procedures that generate airborne respiratory secretions. We question why these Directives were issued more than a month after the SARS emergency was declared and after nine HCWs were infected during a procedure where the risks of exposure were known to be greater.[430]

One study said:

> The first provincial guidelines for intubation were published one month after the onset of SARS 1. These guidelines focused on both the intubation procedures ("intubate while the patient is sedated and paralyzed if medical condition permits") and personnel requirements ("the most experienced staff member should perform the intubation with a maximum of two to three persons present"). The time course suggests a lag in gathering local knowledge and providing feedback to practitioners. Responses from the HCWs suggest that the process underlying the development of guidelines was suboptimal as it did not incorporate the

429. SARS Commission Public Hearings, November 17, 2003.
430. SARS Commission Public Hearings, November 17, 2003.

> experiences of front-line staff, and guidelines were inconsistently implemented.[431]

The Commission finds with the benefit of hindsight, that, there was a lack of systemic awareness in Ontario on April 13, 2003, of the dangers of SARS intubations, and a concomitant lack of special procedures for intubating SARS patients.

Conclusion

The problems revealed by the events of April 13 were the result of inadequate systems.

With some exceptions such as the Hospital for Sick Children, the health care system's capacity to protect its workers was generally inadequate. The health system had too little worker safety expertise, too few worker safety resources, and too little knowledge of Ontario worker safety laws and regulations.

By April 13, 2003, more than a month into the outbreak, the system that responded to SARS, through the fault of no individual or institution, had failed to make it clear in Provincial Operations Centre directives that non-certified devices like PCM 2000 masks were not the equivalent of an N95 respirator, and that N95 respirators had to be fit tested.

Five weeks into the outbreak, hospitals lacked clear regulatory direction on what personal protective equipment to give their workers and what needed to be done so this equipment was safely used and provided the required protection

The events of April 13 also reveal that the health system was unable to react to earlier danger signals about intubations, and to develop procedures quickly enough to ensure these life-saving procedures could be done safely.

This highlights another difference in the experience of Vancouver and Toronto.

As noted in an earlier chapter, B.C. had made a much stronger commitment to work safety in health care before SARS. This made it better prepared to combat this new disease.

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431. Caputo et al, "Intubation of SARS patients: infection and perspectives of healthcare workers," in *Canadian Journal of Anesthesia*, (2004) 51:A43.

It is worth recalling that on March 8, 2003, more than a month before the events of April 13 at Sunnybrook and even before SARS was itself identified, the B.C. index patient was intubated at Vancouver General Hospital. There was no transmission to staff.

Many of the circumstances in the intubations in Vancouver on March 8 and Sunnybrook on April 13 were different, and it is not possible to directly compare them.

Nevertheless, what can be said is that an intubation was safely conducted in B.C. in a health system oriented to worker safety at the start of the SARS outbreak before the dangers of SARS or of intubating SARS patients were known.

Conversely, in a health system that was woefully unprepared to protect workers, nine Sunnybrook staff got SARS more than a month into the outbreak despite all that was known by then about safeguarding workers, and despite the facts that two cases had occurred in the interim in Toronto, highlighting the dangers of intubating SARS patients, and that the CDC had issued its warning.