

## Chapter 5

# BUILDING CAPACITY AND COORDINATION: National Infectious Disease Surveillance, Outbreak Management, and Emergency Response

Public Health is charged with protecting the health of a particular population. Among other activities, this requires surveillance functions, the capacity to lead the fight against specific disease outbreaks, and the ability to participate effectively in a multi-modal response to major health emergencies. Out of surveillance flows the ability to issue alerts about health threats to public health practitioners, clinicians, health care facilities, governments, and the general public. Effective surveillance, coupled to first-line outbreak management, can prevent the spread of an infectious disease and its escalation into a full-blown health emergency.

Because first-line outbreak response occurs at the local or regional level, the general renewal of public health infrastructure will pay dividends in better preparedness for 'the next SARS'. Our brief overview of SARS in Canada also has raised issues about the capacity and interplay of P/T and federal level responses to disease outbreaks, and the interface between outbreak management and broader emergency responses. Accordingly, this chapter draws together several threads.

First, we briefly introduce some of the elements of surveillance and outbreak management. Our overview of the basics of outbreak management is cross-walked directly to the SARS experience, providing a framework to revisit the chronology from Chapter 2.

Second, we review the 1999 and 2002 reports of the Auditor General on issues of infectious disease surveillance and outbreak management. These reports are prescient in the light of the events surrounding SARS.

Third, we turn to the broader issue of health emergencies. Here, there appears to be some progress in F/P/T collaboration, triggered in part by the terrorist attacks in the USA on and after September 11, 2001 and recognition of the global challenge of bioterrorism. We highlight the

need to clarify, and where necessary improve, the interaction of health emergency activity, specifically public health emergencies such as disease outbreaks, and broader emergency preparedness and response.

Fourth and finally, we outline how new transfers by the Canadian Agency for Public Health could reinforce the nation's second line of defence against infectious outbreaks by strengthening provincial and territorial capacity for communicable disease surveillance, epidemic response, and related activities in nosocomial infection control. This program of transfers would also seek to link these P/T activities with relevant federal centres to create a seamless national network for detecting and managing emerging and existing infectious threats to public health. Some federal funding and concerted action to ensure national preparedness should begin as soon as possible given the forthcoming winter season of upper and lower respiratory diseases. In the medium-term, the network must be harmonized with the other elements of a national public health strategy, including the Public Health Partnerships Program and funding to realize the National Immunization Strategy outlined in the previous chapter.

## 5A. Surveillance and Outbreak Management: Essential Functions for Public Health

### 5A.1 Surveillance

Experts have written lengthy chapters on the nature of surveillance functions in an ideal public health system. This report is not the place to repeat those details, but a brief introduction to this oft-misunderstood field is needed.

Health Surveillance may be defined as the tracking and forecasting of any health event or health determinant through the continuous collection of high-quality data, the integration, analysis and interpretation of those data into surveillance products (for example reports, advisories, alerts, and warnings), and the dissemination of those surveillance products to those who need to know. Surveillance products are produced for a specific public health purpose or policy objective.

Surveillance should be purposeful, economical, and action-oriented. It should not only detect emerging health risks, but include systems that allow public health officials to monitor and evaluate progress in health protection and disease prevention. New health risks such as bioterrorism and zoonoses, re-emergence of some diseases (e.g., multi-resistant bacteria), and globalization have fundamentally altered the scope and response time expected of surveillance programs at every level.

Surveillance uses whatever data sources will provide the necessary information. Surveillance systems may share data with personal health services information systems, but the end-products are different. Most of the data currently available from health facilities are originally generated for administrative purposes. They can serve as raw material for health services management and research, as well as for disease and health surveillance if procedures for capturing and handling administrative data are appropriately adapted.

In general, surveillance data can originate from any of four classes of source:

- **Special purpose**, i.e., data collected specifically for a particular surveillance need. Special purpose data sources select the most relevant data and facilitate detection and response, but are costly to operate and may be difficult to maintain over the long term.
- **Surveys**. Usually collected for more general health surveillance purposes, survey data differ from other special purpose data sets in that they are usually cross-sectional or 'one-off' and may be useful for multiple surveillance functions, notwithstanding their lack of specificity.
- **Administrative**. As noted, data collected for administrative purposes often find a secondary purpose in disease surveillance, e.g., analysis of the diagnostic fields on hospital discharge abstracts looking for geographic clusters of a particular disease. Administrative data are generally lower quality, and may not always be available on a timely basis, but are convenient to acquire and inexpensive.

- **Clinical**. For many surveillance purposes, this is the ideal source. Indeed, new diseases and emerging clusters of known diseases are often first suspected by astute clinicians who observe unusual patterns of illness, and work with others to initiate more systematic surveillance. Optimum efficiency in clinical surveillance can only be achieved if the clinical data are accessible electronically. This is rarely the case at present. The Electronic Health Record has the potential to be a rich source of surveillance data in future. Moreover, as submissions to the Committee have pointed out, clinical data for surveillance need to be assembled from a range of providers and facilities, including family physicians and other primary care providers, emergency departments, pharmacists, and veterinarians.

We alluded in Chapter 2 to the Global Public Health Intelligence Network [GPHIN]. While the two functions overlap, it is worthwhile to clarify the difference between surveillance and intelligence. Surveillance involves collection and aggregation of data before they are interpreted. In the case of intelligence, the sources of information have already been analyzed and interpreted (usually informally). Thus, an emergency physician may notice an unusually large number of cases of bloody diarrhoea and inform the local medical officer of health [MOH], or an MOH may post a report of an outbreak of flu-like illness with rash on an electronic bulletin board, or the GPHIN may detect news reports on influenza in Asia. The importance of intelligence is that it can alert authorities to look for similar cases in their own jurisdiction.

Public health is still struggling to catch up to the potential for effective surveillance afforded by new technologies. The problems have been not only the cost of implementing these systems (see Appendix 5.1 for the costing of a surveillance system), but also the very slow progress in gaining consensus across jurisdictions (as will be outlined below) and across programs on the architecture and standards. Grappling with recent demands placed upon the design of systems by privacy legislation has also been a serious challenge—one which we address in Chapter 9. As the Council of Chief Medical Officers of Health noted in their submission to the Committee, progress has been too slow, and "stovepipe" systems persist everywhere.

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## 5A.2 *Outbreak Management and Investigation*

Outbreaks or epidemics are the occurrence of a disease in excess of its expected frequency. Outbreak investigations are a type of fast-paced epidemiologic research, undertaken to determine the cause of the outbreak and what remedial actions are required. These investigations are typically retrospective, occur in real time often under intense public and political pressure, begin without hypotheses, are iterative, and are closely tied to the implementation of public health measures to contain the outbreak. Outbreak investigations also involve considerable challenges in communication, including essential risk communication to the public.

Foodborne epidemics are commonly multi-jurisdictional because of the wide distribution of foodstuffs from a single source. They often require national or international action. However, the investigation and management of infectious disease outbreaks is typically local and provincial, at least in the first instance. Other levels of government may assist, and the epidemic may even be managed by national or international bodies, but as a general rule, the first line of defence is local. The SARS situation is thus in many ways a unique national and international experience, a sign-post for actual and virtual globalization. Never has a worldwide outbreak emerged so quickly, been so widely covered by the global media, or sparked such interaction among different governments and international agencies. And never has a hitherto-unknown agent been investigated so quickly.

Again, readers can find textbooks devoted to these issues. In brief, outbreak management involves numerous steps, starting with **epidemic detection and alert**. Recognition of a new threat has different permutations and challenges, depending upon whether the agent is known or unknown, whether the known agent is a notifiable or non-notifiable disease, and the extent of knowledge about how to contain the agent most effectively and efficiently. The special challenge in SARS was that the agent was new, its mode of transmission was initially unclear (e.g., droplet or airborne), and aspects of its infectivity (e.g., ability to survive on inanimate objects or 'fomites' for many hours) only emerged during the course of the outbreak.

Detection demands the timely upward reporting of data through the public health hierarchy—local, regional, provincial, national, global—and the collation and analysis of case data at the lowest level where a cluster of cases can be recognized. As a leading industrialized nation, Canada should be operating an exemplary surveillance system for new and known infectious diseases. Currently, it does not.

On occasion, cases may be scattered widely so that an outbreak is not detectable at the local or even provincial level. For example, Health Canada occasionally aggregates data showing a cluster of disease and notifies a province or provinces about an unrecognized epidemic of a foodborne illness. Obviously the success of these systems is critically dependent on timely and accurate information flows across jurisdictions, along with data management and analytic capacity at the appropriate levels. A smoothly-functioning laboratory network is also essential to ensure that case characterization occurs in a timely fashion.

Once an epidemic is recognized in one country, this intelligence can forewarn public health officials in other countries. Health Canada publishes the Canada Communicable Diseases Report every two weeks; its distribution is primarily in electronic format. At the global level, there are several alert mechanisms. The GPHIN, developed by Health Canada's Centre for Emergency Preparedness and Response and now used by the World Health Organization [WHO], scans media reports from around the world on the Internet. This information is fed into the Global Outbreak Alert and Response Network [GOARN], which notifies countries about the activity and catalyzes investigations. ProMed is an Internet alert system with a wide subscription base among infectious disease and public health practitioners. Individual clinicians and public health officials post unusual occurrences of infectious disease on ProMed. It constitutes an informal and often useful back-up system to more official channels.

We saw in Chapter 2 that an early opportunity to detect SARS in China was missed by Health Canada and WHO when a GPHIN report in November was not fully translated. However, by February, with an apparent outbreak of avian flu in Hong Kong and an unusual respiratory outbreak in Guangdong, WHO put member countries on the alert. WHO and Health Canada alerts were picked up by the British Columbia Centre for Disease Control [BC CDC]; the BC CDC's dissemination of that information was probably responsible for the prompt isolation of the first SARS case in Vancouver. Alerts were also issued by local and provincial public health officials in Ontario, but uptake was apparently inconsistent. In any event, the

spread of the outbreak at The Scarborough Hospital, Grace Division was difficult to prevent given that the index patient's son arrived in the emergency department with SARS and without a travel history.

As recognition of a new disease emerged in Vietnam and Hong Kong, WHO sent out further alerts specific to SARS on March 12, 2003. In Canada, WHO alerts triggered an immediate cascade of domestic alerts. While all this was done promptly, SARS had already been in Canada for almost three weeks and the outbreak was taking flight in Toronto. A more effective Canadian alert system—involving both the ability to reach all levels of the health care system and an uptake/response capacity in the system—is absolutely necessary for the future.

**Rapid epidemiologic assessment** is essential at the beginning of an outbreak or epidemic to define the scope of the problem and start mobilization of containment strategies. In Canada at the national level, the Pandemic Influenza Committee was already in place, and it was transmogrified into the basis for the daily F/P/T SARS conference call. These calls served a useful purpose according to many informants, but most participants on the calls were not directly involved in fighting the outbreak. Moreover, those on the front-lines were overwhelmed by constant demands to give and get information by teleconference. Again, we see that Canada lacked back-up capacity—the 'B-team' functions that the CDC mobilizes in an outbreak. If nothing else, one might have expected rapid assessment to yield a focus on the epidemic curve for SARS with its positive messages, rather than the cumulative case counts that contributed to a sense of crisis.

The next step is **epidemic investigation** to identify the etiology and the modes of transmission of an infectious agent, thereby guiding appropriate measures to prevent further transmission. An ongoing outbreak is generally a health emergency. Approaches to its investigation require different modes of operation, different command-and-control structures and unified leadership. Investigators should be insulated from the constant demands of data flow. This did not happen with SARS in Canada. As one participant put it, "The continuous requests for information on a minute-by-minute basis, day and night—locally, provincially, and federally—hampered the efforts of a limited number of overworked staff to get on with the job of collecting, analyzing, interpreting and disseminating the epidemiologic information required to control this disease." Bureaucratically-structured organizations are not well suited to responding to an epidemic and their structures need to be modified for them to respond effectively to the exigencies of rapid 'command-and-

control' responses. This was one of the major lessons learned from the CDC experience with anthrax. It underscores why a federal agency is necessary but not sufficient for improved responsiveness in Canada.

The collective activity in epidemic investigation during the SARS outbreak in Toronto was embarrassingly meagre. As we have seen, no shared database was established; jurisdictions squabbled over data flow; clinicians and public health physicians were unable to collaborate effectively on investigation and research; Health Canada's responses were well-intentioned but the federal government's role was unclear and its capacity limited as compared to the US CDC; the provincial public health laboratory was overwhelmed; and the provincial public health branch was not able to coordinate a response to an outbreak that involved four distinct local health units or take a leadership role in epidemic investigation. For data management Health Canada's web-enabled Public Health Information System [i-PHIS] was eventually put into service by the provincial public health branch, but not by local public health units as it does not yet contain contact tracing and quarantine management modules. Local agencies instead used systems built during the outbreak by each unit.

**Establishing a case definition** is central to disease surveillance and outbreak containment. The Committee has been advised that WHO developed its case definition to emphasize epidemiologic links because SARS, clinically, resembled so many other forms of atypical community-acquired pneumonia. As clinical and epidemiologic characterization of SARS continued and laboratory serology became available, case definitions did evolve both at WHO and elsewhere. In Canada, there were several changes throughout the epidemic in the case definition achieved by consensus on F/P/T conference calls, but again, this was not a straightforward exercise (see Appendix 5.2).

The first case definition from Health Canada demanded close contact with a suspect or probable SARS case for an epidemiologic link to be established. On March 31, 2003, the definition was revised to include "recent travel to a defined setting that is associated with a cluster of SARS cases." This was added to capture exposure to sites within Canada, particularly in Toronto where transmission of SARS had occurred in health care settings. The term 'travel', however, may have added to uncertainty about whether the definition was meant to apply to residents of SARS-affected areas. Ontario, moreover, had its own case definition (included in Appendix 5.2) that specified the need for an epidemiologic link consisting of "close contact" with a probable or suspect case. Other revisions to the Ontario definition were made on April 29, but the requirement for "close contact" was not changed.

On May 26, 2003, Ontario amended its definition after the emergence of the second wave of SARS to include “recent travel or visit within 10 days of onset of symptoms to a defined setting that is associated with a cluster of SARS AND no other known cause of current illness.” As part of a general revision on May 29, 2003, Health Canada also amended its definition to make it clear that even a visit to a hospital with a SARS unit or other “identified setting in Canada where exposure to SARS may have occurred” should be considered sufficient link (again see Appendix 5.2 for details).

This inter-jurisdictional confusion, including Health Canada’s belated recognition of the differences in definitions, and Ontario’s decision to post its own more specific definition, may have contributed to non-recognition of clusters of potential SARS in Ontario, as public health assessors focused on demonstrating epidemiologic links. That said, clinicians would use their own best judgement regardless of any case definition, and the Ontario definition has also been defended as a necessity to contain the number of persons who would have to be investigated.

On March 17, 2003, Health Canada, mirroring WHO, added an exclusion criterion. SARS was excluded if another etiology was defined for a case that otherwise met the case definition. This tended to preclude the possibility that an individual might be infected with more than one agent, or that other non-infectious conditions (e.g., congestive heart failure or post-operative atelectasis) might co-exist with SARS (as was likely true on 4 West in North York General Hospital). On May 29, after the North York cluster, the definition was revised to specify that the alternative cause must “fully explain” the clinical presentation.

The other key change on May 29, 2003 was that the probable case definition now included a “suspect case with radiographic evidence of infiltrates consistent with pneumonia or respiratory distress syndrome on chest x-ray.” This clarification was welcomed by Toronto clinicians, who had been frustrated with the insufficient weight given to radiological evidence.

The continued variation in case definition had international implications. Differences in case definitions around the world led to occasional misclassification of individuals who had visited Toronto, and later developed what was clearly not SARS, as exported probable or suspect cases of SARS. And in something of a *reductio ad absurdum*, US authorities took transit through the Toronto Airport (in Peel Region) as constituting a visit to Toronto for purposes of assessing exposure to a SARS-affected area.

**Establishing an etiology** is usually straightforward for known agents, provided the requisite logistical arrangements and laboratory capacity are in place. Scientists in Vancouver and Winnipeg were among the leaders internationally in sequencing the SARS coronavirus, which in turn facilitated the development of serological tests for SARS. Remarkable work was also done by laboratory workers in various institutions in Toronto to establish diagnostic capacity for the coronavirus, supporting clinicians on the front-lines and facilitating public health containment efforts. Unfortunately, as hospital laboratories stepped forward to take on responsibility for testing for the SARS coronavirus, the ability to monitor data at the national and even provincial level was undercut because of poor information systems and the lack of data-sharing protocols. Epidemiologic and laboratory data became even more disintegrated, compromising epidemic investigation efforts.

**Confirmation of cases** presupposes the existence of a definitive test to ascertain true cases. When the agent is unknown, as was true for SARS, this takes some time. More definitive testing was possible only towards the end of SARS I, with acquisition of the capability to detect the genetic fingerprint of the coronavirus from nasopharyngeal swabs, sputa, or stool, and during SARS II when serological tests for SARS became available.

Along with confirming apparent cases, the outbreak management and investigation team must **find cases and define the scope of the problem**. SARS was a huge challenge in this regard, because of the lack of any screening test, the similarity of the symptoms to other infections, and the lack of rapid confirmatory tests. Enhanced surveillance for the illness is particularly critical at precisely that point when it appears that progress towards containing the outbreak has been made. We have seen already that Canada’s local responses were deficient in these respects. Part of the detection imperative also involved measures to find potential imported and exported cases of SARS. Health Canada was pushed internationally and nationally to implement expensive and cumbersome airline passenger screening procedures. We return to this issue in Chapter 11.

As data accumulate during the outbreak, the investigative team should be immediately **generating descriptive epidemiologic information**, as well as **generating and testing hypotheses**. For example, this step could have helped to pin down more rapidly the incubation period of SARS and attack rates in different subgroups. An investigative team normally uses case-control, cohort, and experimental studies to test hypotheses about the causative agent, its modes of transmission and possible

interventions to contain it. Because of poor coordination, lack of standardized data collection, and substandard data management and analysis capacity, we are only reaching this stage now that the Canadian outbreak has receded. Many valuable opportunities were lost, and Canada's research productivity suffered as suggested in Chapter 2.

**Reporting of findings of epidemiologic investigations to national and international bodies** is a critical part of an outbreak investigation for several reasons. Understanding a disease allows other jurisdictions to put in place appropriate measures for its control and to learn from the experience of others. SARS has driven home the need for timely and accurate reporting of information on epidemics and their investigation to the national level, with subsequent reporting to other countries and international bodies. At times during the SARS outbreak, it seemed that reports through the public health system lagged significantly behind media reports, a situation that did not engender international confidence.

Outbreaks are often highly visible and are conducted under intense public, political and media scrutiny. **Communications with the media, clinical personnel, governments, and the public** are all extremely important. We return to intra- and inter-organizational communication in Chapter 8. Media demands on local and provincial public health officials were intense and time-consuming during the SARS outbreak. Management of communications was widely seen to be substandard, as indicated already in Chapter 2. Federal communications were generally reactive as Health Canada waited for the latest press conference in Ontario, and provincial communications in turn were frequently disorganized. Our perception is that as the outbreak continued, various media outlets themselves took on the role of public educators and modulators of risk communication in a commendable effort to stabilize community perceptions of the crisis.

**The control of an epidemic through public health measures** is the immediate purpose for epidemic investigations. With disease spreading, decisions on public health interventions need to be taken quickly and often with incomplete information. The actions that are taken in controlling any epidemic have very significant costs and may be controversial or highly unpopular. In the SARS epidemic, case detection, isolation of cases, follow up and quarantine of contacts, strict infection control measures in hospitals, closure of hospitals, airline passenger screening and travel advisories were the main tools used to control the epidemic nationally and globally. Along with massive impacts on tourism and travel, the outbreak

had staggering costs. SARS led to direct costs through public health and health care measures necessary to contain the outbreak and treat those affected. Indirect costs were incurred as a result of: lost productivity from illness, quarantine, self-isolation, and related workflow disruption; payments to health care facilities and physicians in lieu of ordinary throughput-related revenues that were interrupted by SARS; salary and other compensation for those who were quarantined or otherwise unable to carry on their normal duties of employment as a result of SARS; and service backlogs in health care and public health that must now be cleared. The TD Bank has estimated the net cost of the outbreak to the national economy at between \$1.5 billion and \$2.1 billion.

The foregoing analysis may add to the impression from Chapter 2 that SARS in Canada was not an exemplar of outbreak management. However, so far as the Committee can tell, all those directly involved made their very best efforts. Countless health care and local public health personnel conducted themselves in exemplary fashion. To them goes the credit for containing an unprecedented and sudden outbreak of a hitherto-unknown and moderately communicable disease, with a meaningful fatality rate. Various other positive actions and developments are worth noting.

In British Columbia, alerts issued by the BC CDC set the stage for the early recognition and isolation of the province's first SARS case at Vancouver General Hospital. Public health surveillance measures were instituted, and an Emergency Operations Centre was opened. There were regular teleconferences among BC CDC experts, local medical health officers and the Provincial Health Officer, and active liaison with the infectious disease community. All physicians received direct communication about case definitions and protective measures, and a website was established. Additional cases of SARS in British Columbia were managed effectively, as were suspect cases of SARS in other provinces.

In Ontario, despite tensions between provincial and federal public health officials, data did flow and international reporting proceeded on a regular basis. Experts from local public health units and Health Canada collaborated in cluster investigation. The federal government assisted directly with the recruitment of various public health professionals such as epidemiologists, community medicine physicians, case investigators (i.e., public health nurses/inspectors) and public health managers. Ultimately, an effort by all three levels of government with support from stakeholders such as the Canadian Public Health Association allowed Toronto's personnel needs to be met. Health Canada staff also

worked with P/T representatives to create working groups on surveillance, infection control, clinical management, laboratory issues and public health management.

The control efforts in Toronto involved multiple jurisdictions, and were carried out in a blaze of publicity. All leaders of the outbreak containment efforts worked day and night. Local public health agencies overcame systems deficiencies and effectively managed an overwhelming workload. Volunteerism was the order of the day, as exemplified by the contribution of the Scientific Advisory Committee and various clinical experts who worked at the Provincial Operations Centre and SARS Operations Centre in Toronto. Ontario was forced to activate its new emergency plans for the first time in the face of a mysterious and dangerous virus. Anxieties at times ran high, but citizens in affected areas were calm and generally tolerant of the disruption to their lives. Compliance with quarantine and other public health measures was extremely high. The Ministry of Health and hospitals alike learned from the first wave of the outbreak, and used a more selective approach to clinical care of SARS patients in the second wave. Stakeholder organizations such as the Ontario Hospital Association and the Ontario Medical Association made strenuous efforts to communicate with their members about SARS and to support the outbreak response. The outbreak affected students and trainees in many disciplines who receive training within hospitals; it also occurred at the time of final examinations for post-secondary institutions and Royal College examinations for resident physicians completing their specialty training. Nevertheless, all the involved educational institutions were able to manage in ways that enabled—or will allow—students to complete their programs or examinations on schedule. Hospitals showed unprecedented adaptability, and the bravery of a range of health care workers, including front-line nurses, physicians, rehabilitation professionals, respiratory and laboratory technicians, and ambulance personnel/paramedics, was little short of heroic.

These, moreover, are just a few of the success stories of SARS in Canada. They reflect people and institutions rising to the occasion in the face of suboptimal systems and inadequate preparation. To paraphrase T.S. Eliot, we can never build systems so perfect that people no longer need to be good. But the greatest lesson of SARS in Canada is arguably that there is no excuse for tolerating systems so imperfect that bad things happen unnecessarily to good people.

## 5B. The Auditor General's Perspective

Well before SARS appeared in Canada, the Auditor General highlighted the challenges faced by the nation in operationalizing an infectious disease surveillance system through existing F/P/T processes. The Auditor General's reports in September 1999 and September 2002 were highly critical of the failure of the F/P/T process to establish the needed infrastructure and concluded that these failings were impairing Canada's ability to detect and respond to such outbreaks. Drawing on the report prepared for the Committee by our legal consultant, Prof. Sujit Choudhry, the Auditor General's findings are summarized below.

Health Canada depends on the voluntary cooperation of provincial and territorial authorities, both regarding health surveillance (including case reporting) and responses to outbreaks. The large body of federal, provincial and territorial legislation that governs public health does not spell out the terms of inter-jurisdictional cooperation. Non-legal documents such as policy statements, intergovernmental agreements and memoranda of understanding are used inconsistently to formalize the terms of intergovernmental collaboration. Although there are disease specific arrangements (e.g., AIDS), there is no comprehensive F/P/T document that assigns specific roles and responsibilities to federal, provincial and territorial government actors. The lack of formal terms of cooperation impedes rapid responses to emergency situations. Formal documents are clearly necessary to deal with issues such as data sharing, data ownership, privacy, permitted distribution of data, and the consequences of governmental non-compliance with these terms.

Although the situation for AIDS, influenza and enteric diseases improved between 1999 and 2002, the Auditor General found that the general picture as of September 2002 remained worrisome with respect to the timeliness, accuracy and completeness of data. Provinces continued to vary in their reporting to Health Canada. For example, only 8 provinces (representing 55% of the population) reported cases of chicken pox. By 2002, an informal national agreement existed on the list of reportable diseases and most recent provincial lists of reportable diseases do show substantial and reassuring congruence. However, the flow of data to Ottawa remains inconsistent. Some provinces report diseases electronically; others do not. Provinces themselves are coping with under-reporting or non-reporting of new cases by providers. For example, a study of FluWatch in 1997-98 revealed that even with a rota of interested physicians, only 60% submitted a

report each week. In addition, data on hospitalizations and deaths from flu were neither timely nor accurate—a situation that has not changed and has adverse implications for SARS surveillance.

An F/P/T process has been at work for several years to develop an integrated national public health surveillance network, through the Network for Health Surveillance in Canada. These committees include the Health Surveillance Working Group, the Communicable Disease Surveillance Sub-Group, the Canadian Public Health Laboratory Network, the National Health Surveillance Infostructure Project, and the Canadian Integrated Public Health Surveillance Project [CIPHS]. Health Canada's Centre for Surveillance Coordination was set up in 2000 to provide leadership on intergovernmental coordination. The Auditor General reported in September 2002 that some progress had been made. The Health Surveillance Working Group had agreed that a health surveillance infostructure should be developed. However, no specific timelines had been set, and the Auditor-General's office was told that a national system would "take several to many years" to develop, particularly in the absence of targeted funding.

More recently, welcome agreement has been secured on data elements for the core data set of communicable diseases, and progress is being made on disease-specific data sets. The federal government has developed both the Laboratory Data Management System and, as noted above, i-PHIS, both components of the Canadian Integrated Public Health Surveillance program. These platforms have been adopted by many provinces, most recently Ontario post-SARS. On the positive side, the federal government will continue to cover the cost of software development and provinces are able to add specific modules as they see fit. However, we have seen that i-PHIS lacked the capacity to manage an outbreak, and has not been adopted by the local public health units where the front-line work of SARS containment was done. The Laboratory Data Management System has not won consistently favourable reviews even inside the Health Canada laboratory system. Although CIPHS will allow for real-time reporting at the national level, these data will not be comprehensive in scope, because some provinces are still not participating. Health Canada's aim is to pass the infostructure development project to a federal/provincial/territorial consortium (the CIPHS Collaborative). However, some informants suggested to the Committee that a large-scale and customized architecture was undesirable, and that the way forward should be more incremental, relying on flexible and widely-available commercial software as the primary platform. Thus, both technical and jurisdictional issues are still in play, and exacerbated by resource constraints.

The Canadian Enteric Outbreak Surveillance Centre (CEOSC) now provides an electronic vehicle for public health practitioners and users, thereby allowing a growing number of officials to exchange and discuss information about enteric outbreaks in a secure environment. Health Canada's Health Products and Food Branch has revised its Food Illness Outbreak Response Protocol. The Branch intends to consult with provincial and territorial government authorities in the Fall and will seek endorsement of the Protocol by F/P/T Deputy Ministers of Health in December 2003. In sum, progress continues, but it is slow and fragmentary.

## 5C. Managing Public Health Emergencies

### 5C.1 *Public Health qua Firefighting*

SARS can be considered as a relevant and revealing test of the resilience and the flexibility of the public health infrastructure to manage health emergencies of any kind. Emergency management experts advise that the successful resolution of an emergency, whether in health or otherwise, always requires preparedness, planning, efficient and well-coordinated responses, and quick and accurate decision making by the responders.

A common metaphor for this successful emergency continuum is firefighting. Detection of the blaze is akin to the action of an astute nurse, pharmacist, or physician who detects an unusual illness or disease cluster and immediately alerts the relevant administrators or local public health department. The response of firefighters is analogous to the response by front-line public health workers at the local level. The analogy extends to decision making about the need for support. With any large blaze, an incident commander arrives on the scene and must assess whether the fire is beyond the capacity of his or her crew. If so, back-up equipment and personnel are called. Effective public health emergency response similarly requires the presence of an authority on the scene who is charged with direct command-and-control responsibility. We expect that firefighters and fire engines from different jurisdictions will come together seamlessly to contain an emergency. In the public health field, this seamlessness can only come about from effective preparedness and coordination by public health authorities at the local, provincial, federal and territorial levels. As with firefighting, there must be knowledge of common operating procedures, compatible training and equipment and, most importantly, prior agreements for mutual assistance in emergencies requiring a sudden surge capacity.



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The public health analogy can also be extended back to prevention of fires. For example, municipal governments implement building codes to require flame retardant construction materials. Firefighters spend considerable time in fire safety education aimed at preventing fires and preparing citizens to do first-line firefighting at home, in institutions, or in workplaces. Analogous activities are food safety and public health inspection, immunizations, and various health promotion activities. When prevention breaks down or is inadequate, firefighters move to emergency response mode, as do public health workers.

In the preceding sections, we saw that F/P/T collaboration has been inadequate in the realm of disease surveillance and outbreak management. Had the SARS outbreak mushroomed into a truly national epidemic, our lack of preparedness could have been disastrous. The SARS outbreak and subsequent events in Toronto therefore illustrate the need to address public health emergency response gaps and to develop a more comprehensive approach to managing public health emergencies through a truly pan-Canadian system.

This integrated pan-Canadian system should encompass all the tools, plans and agreements necessary to respond to SARS or to any other large scale public health emergency. If, as we have seen, governments cannot agree on surveillance strategies during 'business as usual', then one can hardly expect them to work cohesively in the heat of an outbreak.

## **5C.2 The National Emergency Framework**

The federal government's generic emergency framework assesses incidents on a spectrum progressing from small to large and from the slightly consequential to the catastrophic. Emergencies, including disease outbreaks, progress along a jurisdictional spectrum from the local response, up to provincial, national, continental and ultimately international levels.

The federal policy for emergencies accordingly assumes a hierarchy of response moving through successive levels of government in a mutually supportive chain. All federal government departments are required under the *Emergencies Act* and the *Emergency Preparedness Act* to have their own departmental emergency plans. The latter legislation, proclaimed in 1988, puts a particularly clear onus on federal ministers to be prepared for civil emergencies, and "to monitor any potential, imminent or actual civil emergency and to report, as required, to other ministers on the emergency and any measures

necessary for dealing with it." Similar requirements exist at the provincial level, where multiple P/T jurisdictions have been reviewing and upgrading their emergency planning and preparedness frameworks. Plans and preparations undertaken by the federal government departments focus on actions to assist provinces when their capacity to respond is exceeded, to save lives and to preserve peace, order and good government. Federal departments are also expected to prepare for transborder or international emergencies with appropriate policy, risk analysis and communication strategies.

All federal departments involved in an emergency follow four key response principles: an all-hazards approach; decentralization to departments that assume command and control; interdepartmental coordination; and federal/provincial coordination. The first three are straightforward. The all-hazards approach recognizes that while the causes of emergencies and disasters are diverse, the response capabilities to deal with them are frequently similar. In the federal government structure, emergency planning and response is decentralized to take advantage of relevant knowledge and expertise as well as command-and-control capacity, resources, and regulatory tools residing within different departments. While some emergencies may be dealt with by a single federal department or agency, most incidents warranting a federal response require the involvement of a number of departments. In all cases, one department takes the lead role that assumes command and control while others play supporting roles.

It is at the level of F/P/T collaboration and coordination that the gaps emerge. All provincial and territorial governments have constitutional responsibility for the safety, security and well-being of their citizens. The provinces and territories have all created frameworks to meet their constitutional responsibilities, and as noted, modernized these apace in many instances. However, to the best of the Committee's knowledge, the federal, provincial and territorial frameworks have not been analyzed for comparability and interoperability. Federal and provincial emergency planning must be as integrated as possible to avoid confusion and duplication of effort and to ensure a timely flow of essential information and advice between levels of government. In other words, what happened with SARS could happen with a natural disaster.

### **5C.3 Focal Points for Health Emergencies**

The federal government created the Centre for Emergency Preparedness and Response [CEPR] in July 2000 to act as a national coordinating point for public health security within Health Canada and across various levels of government in the country. This addressed the need for a more consistent, sustainable and integrated approach to preparing for and responding to all types of public health emergencies in Canada. The Centre brought together most of Health Canada's emergency preparedness and response programs and created a 'critical mass' of resources to allow for a more cohesive and synergistic response to emergency situations from both a departmental and interdepartmental perspective.

The CEPR mandate focuses on public health issues arising from various threats to the safety and health security of Canadians, including:

- natural events and disasters such as floods, earthquakes, fires and highly dangerous infectious diseases; and
- human-caused disasters such as accidents or criminal and terrorist acts involving explosives, chemicals, radioactive substances or biological threats.

CEPR, in collaboration with provincial and territorial governments, operates the National Emergency Stockpile System [NESS]. This system, little known to Canadians, maintains \$300 million in medical services, supplies and equipment in a state of readiness for immediate distribution to provinces and territories in the event of a human-caused or natural disaster. NESS contains supplies found in medical treatment centres ranging in size from small field medical units right up to a large hospital, including beds and blankets, and pharmaceuticals. The stockpile includes 165 emergency 200-bed hospitals that are transportable on short notice either by truck or airplane. They are stockpiled throughout the country and can be set up in existing buildings such as schools and community centres. The Committee recognizes the utility of NESS and recommends that the stocks and the operating principles be updated to allow for interoperability with current health care facilities. As the situation with N95 masks showed during the SARS outbreak, a sourcing and clearinghouse function on the part of NESS may be more important than the creation of static stockpiles. We also see the need for F/P/T training and exercises to ensure that personnel are familiar with the equipment in this largely unrecognized national resource.

CEPR has integrated functions that would be carried out in most provincial settings by the Chief Medical Officer of Health, Emergency Health Director, and Emergency Social Services Director. Not all provinces have created parallel structures that provide a single focal point for health emergencies. In Ontario, the Commissioner of Public Security and Commissioner of Public Health shared the lead role in the SARS outbreak, contributing to a lack of clarity about authority. In Quebec, an all-hazards approach to emergency preparedness and response is led from a planning hub within the Ministère de la Sécurité Publique. This hub assigns an emergency response coordinator to other departments who become part of a network for integrated information sharing and response. The Quebec model is attractive, but could also lead to some of the same challenges as emerged in Ontario.

The Committee recognizes that health emergencies such as major infectious disease outbreaks rapidly become general emergencies, with a panoply of concerns that spill across multiple government departments. The choice of a lead official from the health department or from public security will depend on the specific nature of the threat to population health. What is needed, in any event, is a clear protocol for determining a lead official, appropriate expertise around that individual, and the delegation of appropriate command-and-control authority to the leader of the response to a public health emergency. The federal CEPR has the advantage of creating a major focus for health emergencies that can either take the lead itself, or connect smoothly to broader emergency response machinery. It was not fully tested by SARS and the strengths and weaknesses of the model may only become apparent in a larger-scale crisis. The Ontario SARS experience, in contrast, constituted a particularly difficult first test for that province's new emergency machinery. Comparing notes across F/P/T jurisdictions seems prudent to determine whether current legislative, regulatory, and administrative elements are optimally organized either to exert the required command-and-control functions in a public health emergency, or to allow smooth interactions between health departments and a command-and-control function vested in another branch of government, such as an office or department of public security.

### **5C.4 The Post-September 11 Environment**

In the immediate aftermath of September 11, 2001 terrorist attacks on the World Trade Center and the anthrax bioterrorist attacks in the United States, the federal, provincial and territorial Ministers of Health met to plan a common response and to map out a strategy for strengthening the public health sector's emergency prevention, detection

and response capacities. The public health system was recognized as the key mechanism whereby such threats can be prevented or contained. Our American neighbour's tragedy sparked an important degree of solidarity at the F/P/T tables that we hope will carry over, post-SARS, to the broader goal of enhancing public health in Canada.

In October 2001, the F/P/T Deputy Ministers of Health created the Special Task Force on Emergency Preparedness and Response with broad representation. In March 2002, the Special Task Force tabled 31 recommendations grouped under broad clusters such as: leadership and coordination; surge capacity; training and education; surveillance and detection infrastructure (including laboratories); supplies; and communications. The F/P/T Deputy Ministers and Ministers of Health endorsed the recommendations of the Special Task Force, and created the F/P/T Network for Emergency Preparedness and Response to develop strategies and a plan to implement the recommendations. The Special Task Force went to great lengths to promote the benefits of enhanced F/P/T coordination across virtually every area of concern.

Notably, the Task Force emphasized the importance of building on existing public health infrastructures to achieve effective emergency response coordination across Canada. This idea of "filling in the gaps" rather than starting from scratch recognizes that our public health infrastructure remains the best basis from which to prevent, detect, respond to and manage disease outbreaks—including terrorist actions based on chemical, biological and radionuclear weapons of mass destruction.

Since March 2002, the various partners in the F/P/T Network for Emergency Preparedness and Response have been working to integrate public health practices into a truly national emergency management system. The national emergency management system aims to support strategic investments in public health security; enhance cross-sectoral and cross-jurisdictional collaboration; increase information sharing; establish clear emergency management protocols, roles and responsibilities; and establish greater coordination between emergency health and social services and public health practitioners.

The Network has already supported the federal CEPR's efforts to develop a National Emergency Transportation Strategy that will ensure the transportation of samples, personnel, materials, supplies and medical countermeasures in emergencies whatever they may be. The Emergency Preparedness and Response Framework is also being applied to public health emergencies. The Network has been involved in the development of a series of integrated national emergency response plans including the

*National Smallpox Contingency Plan* and the *Pandemic Influenza Plan*. For example, work on the National Smallpox Contingency Plan involved provincial and territorial consultations that brought together over 200 individuals from a variety of professional streams including public health officials, laboratory scientists, epidemiologists, emergency health services, emergency social services, and ambulatory services. And as we have seen, work on Pandemic Influenza Planning formed the platform for some successful F/P/T interactions during the SARS outbreak.

More generally, CEPR has been working with provinces, territories, and other federal departments to update and expand Emergency Preparedness Training with a view to incorporating public health needs, but these activities are still under-resourced and underdeveloped. Effective emergency response also requires timely communication and passage of information among all response partners. The SARS outbreak clearly illustrated that many of the necessary data-sharing arrangements and business process agreements have yet to be developed. The emergency paradigm presumes that there will be sustained efforts to develop, test and maintain interoperability amongst federal, provincial and territorial emergency operations centres. This includes conjoint training exercises. As a corollary, the Committee sees an urgent requirement for multi-jurisdictional planning to create integrative protocols for outbreak management, followed by training exercises to test the protocols and assure a high degree of preparedness to manage outbreaks.

In sum, at the time of the World Trade Center and anthrax attacks, emergency leaders in health services, social services, public security, and public health worked independently from one another in most Canadian jurisdictions. Progress has since been made in collaboration across and within jurisdictions. Canadian governments at all levels need to capitalize on this momentum, and invest urgently in formal mechanisms to exchange information, share best practices, undertake conjoint training, integrate and test contingency plans, and examine the interoperability of processes, protocols and equipment to respond to health emergencies.

The Committee also wishes to emphasize the need for involvement of non-governmental organizations [NGOs] and employers in the process of emergency preparedness. In this respect, long before the 9/11 attacks, six Canadian NGOs had agreed to share resources in an emergency and settle up the financial implications later—an example that governments could emulate. Major employers have their own role to play. For example, during the SARS outbreak, a major information technology company in

Toronto took prompt action, activating an eight-point contingency plan to shut down operations after an employee left quarantine and arrived at work with SARS-like symptoms. However, little is known about the state of corporate emergency plans more generally and the degree of interaction between major employers and public health units or emergency measures/public security offices. Communication with major employers, and especially with enterprises involved with high volumes of human traffic such as hotels, airports, and transportation providers (e.g., VIA Rail) was suboptimal during the SARS outbreak. These links must be strengthened as part of emergency preparedness.

### **5C.5 Building Surge Capacity**

The outbreak of SARS has reinforced the need for surge capacity to provide greater flexibility in health and public health emergency response. Developing robust surge capacity across jurisdictions is predicated on adequate professional resources, a depth of skill sets and overcoming jurisdictional legislative and regulatory barriers to allow, for instance, medical practitioners and health professionals to act outside their licensing jurisdiction in emergencies. A number of stakeholder briefs addressed this topic, including a joint communication from nine national health-related associations.

At the outset, the Committee endorses the Canadian Public Health Association's caveat: the concept of surge capacity must be based on a sufficiency of capacity for 'business as usual', thereby allowing effective redirection of resources in time of need. The Canadian Federation of Nurses Unions and other stakeholders similarly emphasized that surge capacity is difficult to create when there are shortfalls in resources for usual public health and personal health service needs.

To create surge capacity for emergencies, the above-noted F/P/T Task Force on Emergency Preparedness and Response endorsed the concept of establishing a national framework to mobilize teams of professionally-qualified first responders to crisis sites as requested by a provincial/territorial or international authority. The Canadian concept is modelled after the United States' National Disaster Medical System. The US system has included the organization of over 7,000 volunteer clinical personnel into trained response teams for quick disaster response. For example, the US federal government was able to place four to five teams at the periphery of the World Trade Towers collapse within hours of the event. The Canadian concept builds on and expands the US approach.

CEPR established the National Office of Health Emergency Response Teams in December 2001. Subsequently, F/P/T Deputy Ministers and Ministers of Health have unanimously endorsed the principles for the development of Health Emergency Response Teams [HERT]. The National Office has a broad mandate to oversee funding, recruitment, planning, equipment, training and education, field exercises, operational deployment, transportation and coordination of the teams.

A HERT would be composed of professional health personnel specially trained and certified for rapid deployment to disaster sites across the country. Each HERT would follow a generic "all hazards" approach encompassing emergency medical response to natural events such as earthquakes, tornadoes and to man-made disasters including chemical hazardous material spills and chemical, biological, radiological or nuclear terrorist attacks and, in the aftermath of SARS, infectious disease outbreaks. These teams would be positioned in strategic locations across the country, and available to assist and support local/provincial/territorial health authorities in the management of emergencies.

While the HERT model has been developed as a multi-disciplinary group of clinical and support personnel for "all hazards", the SARS experience has highlighted the need to be able to mobilize select groups of skilled personnel such as quarantine officers and public health nurses. The related concept of 'epidemic response teams' has been endorsed by various stakeholder submissions. Nonetheless, the HERT program has the potential to be a platform for the mobilization of personnel to address the specific requirements of a health emergency, such as an epidemic or major outbreak of infectious disease. The concept is already complemented by specialized surge capacity-building that is underway through the F/P/T Network for Emergency Preparedness and Response, viz. development and deployment of a Smallpox Emergency Response Force and Pandemic Influenza Response Teams.

The federal government would activate HERTs at the request of the province or territory, or alternatively, in response to an event falling within the jurisdiction of federal responsibilities. A HERT deployed at Kananaskis in the support of the G8 Summit is an example of the latter function.

Sponsorship of a HERT can range from local organizations such as a hospital or local health department to provinces and territories. Coverage for professional and legal liabilities must still be determined as part of the HERT development process, but this problem is surmountable with appropriate funding. The Committee is aware of a

similar provincial proposal developed by some clinical leaders in Toronto and Hamilton after SARS, and we expect that parallel structures may emerge in multiple jurisdictions. Again, however, the goal must be to coordinate activities seamlessly, rather than set up overlapping and competing teams. For example, in the current national framework, if a HERT is deployed for emergencies that do not cross provincial boundaries and do not require federal intervention, then upon request by the province or territory to the federal government, the team would be designated to assist the provincial response. The responsibility for all costs, equipment replacement, licensing, liability and all other factors directly and indirectly related to the use of the teams then becomes a provincial or territorial responsibility.

Based on the SARS precedent, expedited cross-jurisdictional licensure of healthcare personnel should be feasible to facilitate HERT activity. One option is that the licensing authority in the affected province should accept all qualified individuals for the purpose and duration of the emergency as long as those persons are appropriately licensed in at least one province/territory in Canada. The functioning of HERTs will require enthusiastic and committed partnerships at all levels of stakeholders from federal departments, provinces and territories, NGOs, regional and municipal agencies and health care organizations, healthcare facilities, and individual professionals.<sup>1</sup>

### **5C.6 Crisis Communications to the Public: A Missing Link**

Communications to the public during an emergency are crucial, as we have seen. During the SARS outbreak, Health Canada determined at the outset to identify one consistent spokesperson in English and one in French. Liaison was established with the Ontario Government Communications Office and with CDC Communications in Atlanta. Among the other strategies were: creating and continually updating a SARS website, establishing a 24/7 1-800 public information line; briefing media; and issuing travel advisories, an activity to which we return in Chapter 11. Federal spokespeople understandably had a lower profile than provincial and local health leaders and clinical experts, and communications strategies, as with other elements of outbreak management, were not well-coordinated across jurisdictions.

Health Canada's in-house specialists have done their own assessment post-SARS and noted the need for a clearer framework for F/P/T collaboration. Prior to SARS, an F/P/T group had in fact worked together to develop a National Crisis Communications Strategy aimed at helping Canadian governments plan for, and respond to, the communications challenges inherent in a wide range of emergencies from natural disasters and disease outbreaks to terrorist actions. This work must move ahead promptly.

The Committee appreciates that communicating accurate data to the public during a fast-moving outbreak can be enormously difficult, and SARS was no exception. A particular challenge was the lag in characterizing cases. Epidemic curves posted on the Health Canada website were constructed by date of onset. This is a more consistent and valid approach than tallying new cases by the date that they came to attention. However, there is a Catch-22. If new cases are assigned back to an earlier date of onset, it can appear as if the outbreak is over prematurely. If new cases are instead reported to the media as part of a cumulative case count, the impression is created that the outbreak is still snowballing when the number of new cases might actually be falling. One way around this problem is the use of statistical projections to control for anticipated reporting delays. The other is to report the data from different analytical perspectives, an approach that could cause confusion but is more comprehensive and accurate.

These communications nuances were apparently addressed 'on the fly' during the outbreak. The Committee has ascertained that Health Canada does not have a sophisticated analytical framework for risk communication. Health Canada must build expert capacity in this area.

Similar shortcomings were evident elsewhere during the SARS outbreak. Focus groups with front-line staff (see Chapter 8) suggested that even within well-established and close-knit organizations that had crisis plans in place, risk communication was suboptimal during the SARS outbreak.

Peter M. Sandman was consulted by the CDC about its crisis communications strategies, an area of increased emphasis and investment for that organization in the wake of the anthrax attacks on the US. Sandman and Jody Lanard have published various documents<sup>2</sup> that offer a useful perspective on risk communication during SARS and more generally, including a set of counterintuitive but

1 As regards partnerships, the Canadian Pharmacists Association has highlighted the need to consider role re-definition in the face of public health emergencies. They recommend that legislation be amended to allow pharmacists to administer vaccines in the case of pandemics or biological warfare/terrorism. This could bring thousands of additional front-line health professionals into play to support epidemic response.

2 See <http://www.psandman.com> [Enter searchword SARS to locate several items].

compelling axioms for crisis communication. For example, they suggest that downplaying the risk of an outbreak such as SARS is ultimately damaging; over-reassurance should be avoided. Spokespeople should not conceal their fears or downplay risks; “a fearless leader is a useless role model.” Intriguingly, they urge communicators to be “at least as worried in public as you are in private.” The paternalistic assumption that the public should be blandly reassured is wrong. Instead, lay risk assessments should be respected. (In the Committee’s view, a corollary is that the risk assessments of front-line health care workers should also be respected.) The goal of communication should be to teach the public what useful steps they can take to help fight the outbreak, rather than offering reassurances that will ring false.

Sandman and Lanard have been scathing in their assessment of Canadian communications strategies around SARS, particularly in comparison to the deft handling of communications in Singapore:

*“The same day WHO lifted Canada’s travel warning, the international health agency said that the worst of Singapore’s SARS outbreak seemed to be over. Singapore health ministry spokeswoman Eunice Teo responded masterfully by moving to the fulcrum of the risk communication seesaw. ‘The WHO said the peak is over in Singapore,’ she noted, ‘but our minister has said it is too early to tell.’”*

This type of balance, in their view, ultimately generates more sustainable public confidence “than Canada’s angry protests and premature celebrations. Canada’s foreign stakeholders (and in private, even its own citizens) are likely to sit on the worried, distrustful seat of the risk communication seesaw, since Canada is occupying the over-reassuring, over-confident seat.”

Public opinion research commissioned by Health Canada suggests that Canadians were actually riding the “seesaw” alongside various spokespersons, not reacting to them. A poll was taken after the WHO travel advisory when political and health leaders united to highlight the progress being made in containing the outbreak. Among respondents nationally, 62% said the SARS situation was improving on April 29-30, 2003, up from just 33% during April 25-26, 2003. In Toronto, 68% said the situation had gotten better. Nonetheless, given the second wave of SARS in Toronto, Sandman and Lanard’s comments about sitting on “the over-reassuring, over-confident seat” seem all too prophetic. The CDC now has a comprehensive

crisis communications training program<sup>3</sup> that, in our view, bears close study and early emulation. Nothing we have seen from any F/P/T jurisdiction to date is comparable.

## 5D. National Capacity and Network for Disease Surveillance & Outbreak Management

Focusing on smallpox, SARS or pandemic influenza raises the risk of over-investing limited resources in managing a restricted range of public health emergencies rather than engineering a system that can be flexible and responsive as well as sustainable. This section focuses on how to build provincial and territorial capacity for responding to communicable diseases, and how to connect that capacity into a strong network of federal, regional, and provincial hubs for disease surveillance and outbreak management. The network, in turn, must be linked to the existing F/P/T Network for Emergency Preparedness and Response, thereby creating the multi-level protection that Canadians need and deserve.

By way of precedent, the European Commission formed a Network on Communicable Diseases in 1999. It builds on the capacity of member states and focuses on surveillance and early warning for outbreaks with greater than national dimensions. The Commission has specified that communicable diseases should be placed progressively under EU-wide surveillance. To monitor and track developments, disease-specific networks have been created. At present, these consist mainly of key laboratories in participating countries. Following on from discussion over a number of years about the creation of an infectious disease agency for Europe, the European Commission has also just adopted a proposal to create a European Centre for Disease Prevention and Control by 2005. The Centre will have a small core staff and coordinate an extended network in member states. Fifteen European countries sponsor the European Program for Intervention Epidemiology Training. It is similar to Canada’s Field Epidemiology Training Program, but also represents a potential F/P/T collaborative model. In short, if the sovereign nations of Europe have come together around infectious disease surveillance and management, how can Canada allow F/P/T tensions to undermine its response to public health threats?

<sup>3</sup> See <http://www.cdc.gov/cdcenergy/emergency/>

Chapter 4 outlined a \$300 million per annum investment for core public health functions that would help to shore up Canada's first line of local responses to disease outbreaks and health threats, particularly when coupled with a \$100 million per annum injection of support for new vaccines. The handling of the SARS outbreak in Ontario illustrates that a different level of functionality is also needed—a second line of defence at the provincial or regional level with surveillance, analytical, investigative and coordinating capacity. Quebec's National Institute of Public Health and British Columbia's Centre for Disease Control both offer models in this respect. We focus on the BC CDC because of its primary mandate in infectious diseases.

The BC CDC was established to be the province's focal point for "the prevention, detection and control of communicable disease," and a provider of specialty health support and resource services. The Centre integrates five divisions: Hepatitis Services; Epidemiology Services; Laboratory Services; STD/AIDS Control; and Tuberculosis Control. Support services include Information Management and Pharmacy. In April 2002, the BC CDC assimilated several new programs, including a Drug and Poison Information Centre; Food Protection Services; and Radiation Protection Services. The BC CDC works closely with the provincial health ministry, Medical Health Officers, and the Provincial Health Officer. Its annual budget of approximately \$70 million includes \$30 million for vaccinations and \$40 million directed primarily to control of communicable diseases. The BC CDC has catalyzed the creation of the University of British Columbia (UBC) Centre for Disease Control in research and teaching activities. The UBC CDC focuses on "collaborative research into the surveillance, control and prevention of communicable disease" and "links academia, governments and public health organizations in the understanding, management and prevention of infectious diseases of public health significance." The BC CDC has proven sufficiently successful that its mandate is now broadening to include other specialized areas beyond its communicable disease mandate.

This type of investment and structure will not be attractive or appropriate for all provinces and territories individually. Some provinces could structure their participation in a national network as a within-province network, drawing on strengths in both public health and academe; smaller provinces in a region may decide to pool resources and create a regional CDC. Transfers from the new federal agency to catalyze this second-line capacity for surveillance and outbreak management must accordingly allow for reasonable P/T pluralism.

Estimating the required level of contributions through the new federal agency is not straightforward. As one simple benchmark, approximately \$40 million per annum is invested by the BC CDC, outside of vaccines, to maintain an outstanding core infectious disease facility for that province. British Columbia has 13% of Canada's population, thus roughly \$280 million per annum would be required to sustain similar activity across Canada. However, other P/T jurisdictions have already developed some capacity analogous to the BC CDC, not least Quebec through its multidisciplinary National Institute of Public Health.

As well, this second line of defence could be construed as exclusively a P/T responsibility. We reject that argument as an abdication of federal responsibility on four counts.

First, the Auditor General's comments underscore an acute need to build surveillance capacity across Canada as a matter of broad national interest. Multiple stakeholders urged the Committee to foster a national approach to infectious disease surveillance. The US precedent suggests that national data and surveillance systems are only achievable with dedicated federal funding. To that end, the investments in the new federal agency outlined in Chapter 4 already presumed that \$25 million per annum towards surveillance would be drawn from a separate allocation for infectious diseases.

Second, as the SARS experience demonstrated, even substantially enhanced firepower in a new federal agency will do little in the absence of a well-coordinated response to an outbreak at the provincial level. SARS has also highlighted the importance of enhanced nosocomial infection control. Better linkages between public health and the clinical sphere, and the roll-up of institutional infection control activities to the P/T and ultimately national level, will not be achieved without meaningful funding.

Third, if any province fails to contain an outbreak efficiently, the results for all of Canada are devastating on multiple levels. We refer not just to the spread and toll of disease, but other impacts. The Greater Toronto Area, for example, accounts for approximately one-fifth of Canada's GDP, and SARS therefore had national economic implications.

Fourth, Ottawa's revenue-collecting and spending powers are disproportionate to its constitutional administrative mandate in the Canadian federation. This tension in the national fabric places a constant onus on the federal government to fund provincially-administered activities, particularly those that are in the broad national interest.

On the other hand, the provinces also have revenue-generation mechanisms and access to new funds from the Canada Health and Social Transfer. The Committee assumes that P/T jurisdictions would not claim their rightful authority in a strengthened public health system without taking responsibility for helping to fund it. Hence, just as the Public Health Partnerships Program would leverage P/T investments in local public health infrastructure, so also do we assume that federal transfers for prevention and control of communicable diseases at the P/T and regional level would be matched in some measure by the involved P/T jurisdictions.

Weighing these factors and estimates, the Committee envisages that the Canadian Agency for Public Health should ultimately receive and earmark \$100 million per annum for support of P/T capacity in infectious disease surveillance and outbreak containment in the form of a Communicable Disease Control Fund. This is distinct from and above the transfers recommended for general public health infrastructure and immunizations, and completes the \$500 million per annum suite of P/T contribution programs that the Committee views as necessary for the renewal of a national public health system. We anticipate that these transfers would start at a lower level and rise over a number of years in response to enhanced capacity arising from increases in the numbers of skilled personnel and interlocking P/T investments.

Initial allocations from this Communicable Disease Control Fund should start flowing in advance of the creation of any new agency as part of preparedness for the winter influenza season. Similarly, the creation of an F/P/T Network for Communicable Disease Control can begin sooner rather than later to ensure that F/P/T jurisdictional collaboration is enhanced, and that the nation is appropriately positioned to respond to existing and emerging infectious diseases. We explain further in Chapter 9 how these transfers should be tied to intergovernmental agreements and initiatives to secure standardized business processes and a harmonized legislative framework for disease surveillance and outbreak management. For now, we refer readers to Appendix 5.3 below for a summary of the agreements required to promote a more seamless approach to outbreak management and prevent a recurrence of the inter-jurisdictional tensions evident during the SARS crisis.

As suggested in Chapter 4, the Communicable Disease Control Fund directed at infectious disease surveillance and outbreak management could be bundled with the Public Health Partnerships Program and National Immunization Strategy into a single transfer managed according to the Social Union Framework Agreement.

This ensures maximum flexibility for the Chief Public Health Officer of Canada and her/his provincial/territorial counterparts in aligning transfers with both provincial/territorial priorities and a national strategic plan.

Although accountability for the transfers from the Communicable Disease Control Fund would be determined between each P/T jurisdiction and the new federal agency, some proportion of the \$100 million should be reserved for networking functions. The concept of a second line of defence presupposes strong connections not only among provincial and regional centres of excellence in infectious disease control, but also between these P/T nodes or hubs and the relevant centres in the new federal agency. The latter could include the National Microbiology Laboratory, the Centre for Infectious Disease Prevention and Control, the Centre for Surveillance Coordination, and the Centre for Emergency Preparedness and Response.

This F/P/T Network for Communicable Disease Control could be formed quickly by connecting structures that already exist in some provinces (e.g., the BC CDC, relevant centres in Quebec's National Institute of Public Health) to leaders from other provincial public health branches pending their decision on the creation of provincial centres of specialized expertise. Agreements among participating provinces and the relevant nodes and centres within the Canadian Agency for Public Health would be negotiated with the intent of maximizing co-location of facilities and personnel, and creating both integrated disease surveillance machinery and graduated responses to infectious disease outbreaks. The network would presumably include task forces or working groups to address issues such as surveillance, outbreak management and emergency response, nosocomial infection control and hospital epidemiology, strategic communication, and related matters.

This new F/P/T network should seek to embody the same collaborative culture that has apparently emerged with the F/P/T Network for Emergency Preparedness and Response or the Canadian Public Health Laboratory Network (see Chapter 6). To that end, the communicable diseases network should be mandated and supported by the F/P/T Conference of Deputy Ministers of Health. Its steering committee would include designates from the relevant provincial or regional centres and leaders of the relevant federal centres.



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## 5E. Recommendations

The Committee recommends that:

- 5.1 Under the aegis of the new Canadian Agency for Public Health, the Government of Canada should budget for a Communicable Disease Control Fund, allocating a sum rising over 2-3 years to \$100 million per annum in support of provincial, territorial, and regional capacity for infectious disease surveillance, outbreak management, and related infection control activities, including the sponsorship of a new F/P/T network. Initial allocations from this Fund should be made to facilitate immediate preparedness for a possible return of SARS to Canada during the winter season of respiratory illnesses and influenza.**
  - 5.2 The F/P/T Conference of Deputy Ministers of Health should initiate a new Network for Communicable Disease Control that would link F/P/T activities in infectious disease surveillance, prevention, and management. This initiative should be started as soon as possible, and integrated with the existing F/P/T Network for Emergency Preparedness and Response.**
  - 5.3 The Canadian Agency for Public Health, in partnership with the new F/P/T Network for Communicable Disease Control, should give priority to infectious disease surveillance, including provision of technical advice and funding to provincial/territorial jurisdictions and programs to support training of personnel required to implement surveillance programs. The Agency should facilitate the longer-term development of a comprehensive and national public health surveillance system that will collect, analyze, and disseminate laboratory and health care facility data on infectious diseases and non-infectious diseases to relevant stakeholders.**
  - 5.4 Assuming some lag time to inception of a new Agency or F/P/T Network, Health Canada and the provinces and territories should urgently commence a process to arrive at business process agreements for collaborative surveillance of infectious diseases and response to outbreaks. The business processes for infectious disease surveillance would be extended over time with support from the Agency's Centre for Surveillance Coordination and the Public Health Partnerships Program, to a national system for non-communicable diseases and population health factors.**
- To elaborate: the Committee envisages that the system would begin by collecting data on communicable diseases, and extend its ambit to non-communicable diseases as well as relevant population health factors. The surveillance system must be relevant at the local level, with timely reporting and analysis, and flexible enough to adapt to changing needs and different local and institutional circumstances. Such a system must be built so that databases can communicate with one another, and be sufficiently 'low tech' to maximize uptake in hospitals (not least hospital emergency rooms where renewal and upgrading of information systems is urgently needed), clinics and public health units. The system should be modular in both its conception and implementation, but with data collection mechanisms and software structured so as to permit the integration of information into a larger surveillance and public health information system.
- The business process agreements for surveillance would cover multiple fronts, including:
- a. Developing procedures for uniform and timely reporting of identified infectious diseases, including new pathogens, by local authorities, provinces and territories to Canadian Agency for Public Health. In turn, the Agency should establish a system for rapid determination of diseases that must be reported on a national basis.
  - b. Identifying relevant surveillance tools and methods as appropriate for health professionals in other settings to input data to the surveillance system (e.g., pharmacy identification of increased use of antidiarrheals, early identification of nursing home or other collective living outbreaks, role of other facilities such as schools in the event of large community outbreaks, linkage of information systems in hospital emergency departments, etc.).
  - c. Developing standards for data gathering, and protocols for data ownership, data sharing and dissemination.
- 5.5 Through its own core budget and the Communicable Disease Control Fund, the Canadian Agency for Public Health should support nosocomial infection control, including hospital surveillance, as a priority program. Specific nosocomial infections should be deemed nationally notifiable, and surveillance for them supported by mechanisms for active and passive laboratory surveillance.**

As is true for health care more generally, public health has under-invested in information technology for years. Other sectors such as banking and insurance make a several-fold higher investment in information technology as compared to health, notwithstanding the acceleration of investment in recent years. Through Canada Health Infoway Inc., the recent federal Budget provided \$600 million in one-time only support to move ahead with the creation of an Electronic Health Record. Comparatively speaking, the needs of surveillance have not received much attention or funding. The presence of a national “blueprint” for health IT, with a concentration on the Electronic Health Record, highlights the need for an approach to health surveillance that is integrated with the clinical systems of the future. The Committee accordingly recommends that:

**5.6 The Government of Canada should seek the establishment of a working group under the auspices of the Canada Health Infoway Incorporated and Health Canada and/or the new Canadian Agency for Public Health, to focus specifically on the needs of public health infostructure and potential investments to enhance disease surveillance and link public health and clinical information systems.**

We have also highlighted the need to create collaboration between public health emergency capacity, particularly outbreak management, and the broader emergency response capability of F/P/T jurisdictions. The Committee therefore recommends that:

**5.7 The F/P/T Network for Emergency Preparedness and Response, in collaboration with the new F/P/T Network for Communicable Disease Control, should urgently move ahead with the development of a comprehensive approach to managing public health emergencies through a pan-Canadian system that includes:**

- **harmonizing emergency preparedness and response frameworks at the federal, provincial and territorial levels;**
- **developing seamless planning and response capacities as envisaged by the 31 recommendations of the Special Task Force on Emergency Preparedness and Response;**

- **building an integrated F/P/T planning, training and exercising platform for responding to all-hazard disasters, including public health emergencies created by large-scale disease outbreaks;**
- **developing and applying a common set of principles, concepts and capabilities for large-scale disease outbreaks, and**
- **creating the requisite linkages to major employers, the travel and hotel industry, and relevant NGOs.**

We return to legal issues in Chapter 9. In this context, the Committee recommends that:

**5.8 Health Canada in collaboration with provincial/territorial jurisdictions should lead the development of a national legislative and policy framework for a measured, harmonized, and unified response to public health emergencies.**

The Committee further recommends that:

**5.9 F/P/T governments should develop and provide training programs and tools to support local public health units and institutions in systematically developing, implementing, and evaluating crisis and emergency risk communication strategies.**

**5.10 The F/P/T Conference of Deputy Ministers of Health should support the continued activity of the F/P/T Network for Emergency Preparedness and Response with a view to enhanced surge capacities in all jurisdictions, including:**

- **developing an integrated risk assessment capability for public health emergency response;**
- **assessing the National Emergency Stockpile System [NESS] to optimize its role in supporting the response to large-scale disease outbreaks; and**
- **developing and funding the Health Emergency Response Team concept, including a psychosocial response component, as a practical, flexible mechanism for addressing the need for human resource surge capacity.**

## Appendix 5.1 Costing of a Surveillance System

The costs below reflect, first, a reasonably comprehensive system for the surveillance of reportable infectious diseases, with the capability to link to front-line public health case management systems, laboratory systems, and infection control systems. These systems only partly exist and will need to be developed further. To satisfy the needs of public health users and to meet the goals of the renewed National Immunization Strategy, immunization and vaccine adverse event reporting modules will need to be included. It is assumed that modules for disease syndromes and for mass quarantine will be included. Syndromic surveillance for bioterrorism is listed separately.

The costs are incremental, based upon the current state of development of surveillance infrastructure and infrastructure in the Population and Public Health Branch.

A second major component is an intelligence dissemination or health alert network system, not unlike that recommended by the Canadian Medical Association in their submission. It would be developed gradually and will ultimately resemble the CDC's Public Health Intelligence Network System. Portal-type capabilities allowing controlled access to a wide range of information will eventually be included. It would provide a fully-featured secure system for high-priority users and a simple e-mail/fax capability for general users.

Total costs are shown: this would be shared in some fashion (according to the type of expenditure, not by formula) between federal and P/T governments. Basic hardware and connectivity costs are not included.

Costs are shown as average yearly costs over a five-year period.

### *Costing of a Surveillance System for Infectious Disease & Emergencies*

	<b>\$ millions p.a. (average, over 5 years)</b>
<hr/>	
CIPHS/i-PHIS	
<hr/>	
Collaborative	2.0
<hr/>	
Updates, pilots, rollout	1.8
<hr/>	
Modules &/or links:	
inspection/water	0.4
non-infectious (basic)	0.5
lab (link)	0.3
blood-borne infections (link)	0.4
influenza	0.1
quarantine	0.1
immunization/vaccine-preventable diseases/vaccine-associated adverse events	0.6
<hr/>	
Lab systems development	2.0
<hr/>	
Infection control system development	2.5
<hr/>	
Architecture	0.4
<hr/>	
Standards	0.7
<hr/>	
Policy Issues (privacy, data management)	0.4
<hr/>	
Local implementation	7.0
<hr/>	
<b>Subtotal</b>	<b>19.2</b>
<hr/>	
Bioterrorism	
architecture/standards	0.8
public health system development	1.7
feeder systems development	3.0
implementation	5.0
<hr/>	
<b>Subtotal</b>	<b>10.5</b>
<hr/>	
Portal/Health Alert Network	
Consultation/design	0.2
IM/IT development, project management	2.3
Component development	0.8
Implementation & operations	10.0
<hr/>	
<b>Subtotal</b>	<b>13.3</b>
<hr/>	
<b>TOTAL</b>	<b>43.3</b>
<hr/>	
Five-year total: \$215 million	

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## Appendix 5.2 Case Definitions for SARS from Health Canada and Ontario

### *1. Evolution of Health Canada's SARS Case Definition*

**March 16:** first case definition with a probable case being one who meets the suspect case definition “together with severe progressive respiratory illness suggestive of atypical pneumonia”.

Comment section indicates signs/symptoms that may characterize severe progressive respiratory illness and that “chest x-ray changes may or may not be present”.

- First Case definition included “Close contact\* with a probable case
- Recent history of travel (within 10 days) to Asia, especially in areas reporting cases of SARS (see below)

#### **Areas in Asia Reporting Cases of SARS**

**China:** Guangdong province, Hong Kong SAR

**Vietnam:** City of Hanoi

#### **Singapore**

**March 17:** “AND No other known cause of current illness” was added to case definition.

**March 20:** “Persons under observation” is defined and added to case definitions. Recent history of travel (within 10 days) to WHO-reported “affected areas” in Asia is added to suspect case definition (rather than Recent history of travel (within 10 days) to Asia).

**March 21:** Definition of Persons “under observation” is removed and added to website under “Public Health Measures”.

#### **March 31:**

- “Close contact\* *within 10 days of onset of symptoms* with a probable case” is added to suspect case definition.
- “recent travel to a setting that is associated with a cluster of SARS cases” is added to suspect case definition. This was added to capture exposure sites within Canada (i.e., Toronto).

#### **Areas in Asia with Local Transmission**

(March 29, 2003 21:00 EST)

**China,** including Hong Kong Special Administrative Region

**Vietnam:** City of Hanoi

#### **Singapore**

#### **Taiwan [added]**

**April 2:** “Close contact\* within 10 days of onset of symptoms with a *suspect* or probable case” is added to suspect cases definition.

**May 14:** Wording of Affected area changed slightly “Recent travel within 10 days of onset of symptoms to a WHO-reported “affected area” *outside of Canada* [previously in Asia]

- Table of Areas, OUTSIDE OF Canada listed as “Affected Areas” (with Local Transmission of SARS) included. Case Definitions stayed the same.

**May 29:** Clinical criteria for a living suspect case stays the same.

- addition of: “A person with unexplained acute respiratory illness resulting in death after 1 November 2002, but on whom no autopsy has been performed” added to suspect case definition
- Recent travel or visit within 10 days of onset of symptoms to a defined setting that is associated with a cluster of SARS cases changed to “Recent travel or visit to an identified setting in Canada where exposure to SARS may have occurred (e.g., hospital [including any hospital with an occupied SARS unit], household, workplace, school, etc.).\*\* This includes inpatients, employees or visitors to an institution if the exposure setting is an institution.”
- link to Ontario site provided: “\*\*The list of potential SARS exposure sites in the Province of Ontario can be obtained at the following address:  
<[http://www.health.gov.on.ca/english/public/updates/archives/hu\\_03/sars/exposure\\_sites\\_052703.pdf](http://www.health.gov.on.ca/english/public/updates/archives/hu_03/sars/exposure_sites_052703.pdf)>”
- Probable case definition changed: “A suspect case with radiographic evidence of infiltrates consistent with pneumonia or respiratory distress syndrome (RDS) on chest x-ray (CXR).”

- "Exclusion Criteria strengthened"

A suspect or probable case should be excluded if an alternate diagnosis can *fully explain* their illness.

- Areas, OUTSIDE OF Canada listed as "Areas with recent local transmission" of SARS revised

***Chronology of Ontario SARS Case Definitions as per their website***

<b>Date</b>	<b>Website</b>	<b>Probable Case Definition</b>	<b>Suspect Case Definition</b>
April 11, 2003	<a href="http://ogov.newswire.ca/ontario/GPOE/2003/04/11/c0428.html?lmatch=&amp;lang=_e.html">http://ogov.newswire.ca/ontario/GPOE/2003/04/11/c0428.html?lmatch=&amp;lang=_e.html</a>	A probable case is someone who either has chest x-ray findings of pneumonia or Acute Respiratory Distress Syndrome OR is a suspect case with an unexplained respiratory illness resulting in death, with findings of Acute Respiratory Distress Syndrome of unidentifiable cause AND has had close contact with a probable or suspect case of SARS or traveled to Hong Kong, Vietnam, China, Taiwan or Singapore.	A person with a history of high fever (over 38 degrees C) AND respiratory symptoms including cough, shortness of breath, difficulty breathing AND no other known cause of current illness AND has had close contact with a probable or suspect case of SARS or traveled to Hong Kong, Vietnam, China, Taiwan, or Singapore in the last 10 days.
April 29, 2003	<a href="http://ogov.newswire.ca/ontario/GPOE/2003/04/29/c5627.html?lmatch=&amp;lang=_e.html">http://ogov.newswire.ca/ontario/GPOE/2003/04/29/c5627.html?lmatch=&amp;lang=_e.html</a>	A probable case is someone who either has chest x-ray findings of pneumonia or Acute Respiratory Distress Syndrome OR is a suspect case with an unexplained respiratory illness resulting in death, with findings of Acute Respiratory Distress syndrome of unidentifiable cause AND has had close contact with a probable or suspect case of SARS or traveled to Hong Kong, Vietnam, China, Taiwan or Singapore <i>in the last 10 days</i> .	No change
May 26, 2003	<a href="http://www.health.gov.on.ca/english/public/updates/archives/hu_03/sars_stats/stat_052603.pdf">http://www.health.gov.on.ca/english/public/updates/archives/hu_03/sars_stats/stat_052603.pdf</a>	A person meeting the suspect case definition together with progressive respiratory illness suggestive of atypical pneumonia or acute respiratory distress syndrome with no known cause OR a person meeting the suspect case definition with an unexplained respiratory illness resulting in death, with an autopsy examination demonstrating the pathology of acute respiratory distress syndrome with no known cause.	A person presenting with a fever (over 38 degrees Celsius) AND one or more respiratory symptoms including cough, shortness of breath, difficulty breathing, AND one or more of the following: 1) close contact* within 10 days of onset with a suspect or probable case; 2) recent travel within 10 days of onset of symptoms to a WHO reported "affected area" outside of Canada (see WHO website for latest information: <a href="http://www.who.int/csr/sars/en/">http://www.who.int/csr/sars/en/</a> ); 3) recent travel or visit within 10 days of onset of symptoms to a defined setting that is associated with a cluster of SARS AND no other known cause of current illness.

\* Close contact means having cared for, lived with or had face-to-face (within 1 metre) contact with, or having had direct contact with respiratory secretions and/or other body fluids of a person with SARS.

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## Appendix 5.3

# Some Steps toward Achieving Seamless Outbreak Management in Canada

Either memoranda of agreement or legislative arrangements should be developed among Health Canada and all P/T jurisdictions laying out protocols covering all aspects of the conduct of the management of significant outbreaks, as below:

- agreement on roles and responsibilities;
- agreement on data ownership, custody, sharing; the aim should be to facilitate greater sharing of data;
- prior agreement on the use of data for publication and authorship must be included;
- clear identification of persons responsible for (a) management of the outbreak, (b) data management, and (c) communications;
- prior agreement on the general outline of information management elements (standards, definitions, etc.), based on accepted standards, with one person responsible for authorizing elaborations of these elements, and enforcing their use;
- development of a shared 'B-team' function, with separate teams responsible for front-line outbreak containment, epidemiology and data analysis, and 'sober second thoughts/hypothesis generation';
- agreed strategy and workplan to ensure interoperability of all information systems concerned with infectious diseases in hospital and public health;
- sharing of information to be by access to a common database rather than through transmission of data; and
- uniform adoption of highly flexible and interoperable data platforms, that allow sharing of public health information, capture of clinical information from hospitals, and integration into an outbreak management database platform.