SARS: A Local Public Health Perspective

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The outbreak of Severe Acute Respiratory Syndrome (SARS) was an international incident that was unprecedented in scale and scope. It led to the first declaration of a health emergency by the Province of Ontario and required the mobilization of public health staff, infectious disease specialists and infection control practitioners from across Toronto, Ontario and the U.S. The overall response was a team effort that in many ways brought out the best in organizations and individuals.

It has been said that SARS will do for febrile respiratory illnesses what HIV/AIDS did for bloodborne illnesses. SARS has been a tremendous wake-up call for stronger attention to hospital infection control, infectious disease surveillance, outbreak investigation and management, and surge capacity across the health sector.

The SARS outbreak differed from outbreaks of previously known infectious diseases. There was no diagnostic test, no treatment, no vaccine, and rapidly changing information on its transmission and virulence. This was combined with rapid spread across the health care sector and across international boundaries. These factors required a concerted and coordinated response from local, provincial and federal health authorities, the health care sector, the community, and other agencies.

A snapshot of the local Public Health response

The first case of SARS was initially reported to Toronto Public Health (TPH) on Sunday, March 9, 2003 as a case of possible tuberculosis (TB). Within days, the TB tests on family members had proved negative, additional family members were seriously ill, and an international health alert had been received from the World Health Organization (WHO) about atypical pneumonia in Hong Kong and Hanoi. In consultation with provincial and federal health officials, TPH held a press conference on March 14, 2003, activated its emergency response plan, established a public information hotline and assigned staff full-time to the outbreak investigation.

The main roles of TPH were case investigation and management, identification and quarantine of contacts, disease surveillance and reporting, health risk assessment and infection control advice to health institutions and other community settings. Public communications and managing community relations were also extremely important. These functions were overseen by the Associate MOH/Director of Communicable Disease Control under the leadership of the Medical Officer of Health and provincial officials, under the authority of a provincial health emergency declaration. Local public health activities were carried out in concert with and informed the development of provincial directives for infection control and disease surveillance in health care settings.

Daily media conferences were held by the Province that included local medical officers of health and infectious disease specialists. TPH also used community/ethnic media outlets and the City of Toronto website to disseminate health information and advice to the public. Print/web materials were translated into 14 languages and staff with special language skills were assigned to hotline functions, along with use of AT&T translators for non-English-speaking clients. Community meetings were held to address specific concerns in schools, workplaces and among community groups.

About 700 TPH staff were involved in the SARS response between mid-March and the end of June, with up to 400 staff working on SARS on any given day. Public health staff and physicians from the City of Hamilton, County of Lambton, Middlesex-London, City of Ottawa and Leeds, Grenville and Lanark Health Units as well as the federal government also provided on-site assistance, which proved invaluable in sustaining the TPH response.

The majority of staff were assigned to the SARS Hotline, Case Management, Contact Follow-up, and Epidemiology teams. These teams operated seven days a week from 8:00 a.m. until 11:00 p.m. on two shifts daily. A description of these functions is provided below.

SARS Hotline

Over 200 staff worked on the SARS Hotline, which provided health information and counselling, case and contact identification, and response to emerging issues in affected institutions and communities. The Hotline received over 300,000 calls with a peak of 47,567 calls in a single day. Call volumes fluctuated dramatically in concert with new outbreak developments and emerging community concerns.

The majority of calls related to illness or exposure to a case, need for emergency supplies (food, masks, thermometers), non-compliance with quarantine requirements, fears about travel or disease exposure, concerns about business failure, loss of personal income and potential loss of housing, racial profiling and fear of being shunned.

Case Management

A dedicated case reporting telephone line was established for medical practitioners and hospitals. The Case Management Team investigated all reports, obtaining detailed histories of symptoms, laboratory results and epidemiological linkages with other SARS cases. From this infor-

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mation, a preliminary determination was made as to whether the individual met the definition of a probable or suspect case, did not meet the case definition, or remained a person under investigation. Since the symptoms of SARS could be non-specific or atypical, the disease was difficult to diagnose, especially in its early stages, and required ongoing investigation and consultation until a decision could be made as to whether this met the case definition for SARS. It was often more labour intensive to rule out a case of SARS than it was to manage more easily identified cases of probable SARS, and the final decision carried major implications for the affected person, their contacts and health facilities. Therefore the Case Management Team held daily case conferences within TPH, consulted infectious disease experts and conducted joint investigations with other health units in order to identify the best public health strategy to manage complex situations.

For each case, a detailed list was obtained of activities in the ten days prior to onset of symptoms and while they were symptomatic. At-risk contacts were identified, and decisions were made regarding isolation of the case and quarantine of contacts. All potential cases were contacted daily to update their clinical status until either a final diagnosis had been made which ruled SARS out or, in suspect or probable cases, until they had been without fever and showed symptom improvement for 10 days.

Toronto Public Health placed staff in hospitals with SARS cases to facilitate the public health management of the case. In hospitals with evidence of disease transmission, a Toronto Public Health team consisting of a public health physician, a manager, and several case investigators, was placed on-site.

During the outbreak, approximately 2,000 case investigations were conducted, each taking an average of nine hours to complete. Eventually, 224 SARS cases were documented among Toronto residents over two phases (Figure 1).

Contact Follow-up

Asymptomatic contacts were placed under quarantine to reduce the risk of transmission to others during the 10-day incubation period when they might fall ill. Masks and thermometers were delivered to people in quarantine, and referrals were made as required to the Canadian Red Cross and Salvation Army for emergency food orders. After the initial assessment to determine their degree of contact and risk of infection, each close contact was called regularly to ensure that they remained in quarantine and to assess them for symptoms. As the outbreak progressed, those in quarantine were called once or twice daily to ensure that quarantine was maintained.

Over 23,300 people were identified as contacts, of whom 13,374 were placed in quarantine. All were notified by TPH, but not all were reached within the 10-day incubation period. The overall degree of cooperation and compliance was extremely high, with only 27 isolation orders being issued to those who did not comply with quarantine directives.

Epidemiology

Case and contact information was collected by each team and forwarded daily to the Epidemiology Team, which updated local databases and transmitted data to the provincial government. Despite substantial technical difficulties, information systems were created to support public health activities while the event was unfolding. Researchers from the Centers for Disease Control and Prevention in Atlanta, Health Canada, hospitals and universities were and continue to be involved in SARS investigation and research.

The volume of information generated in the SARS outbreak far exceeded previous experience. Since people have not been put into quarantine for at least 50 years in the City of Toronto, there were no information systems in place at the start of the first SARS outbreak to support the widescale management and follow-up of people in quarantine. The 14-year-old provincially-mandated information system used to support the surveillance of reportable diseases (i.e., RDIS) was not equipped to handle quarantine management and could not be modified to support SARS case management.

Disease surveillance information was regularly shared with infectious disease specialists, emergency room physicians and infection control practitioners as well as other Ontario Public Health Units.

Impact of SARS in Toronto

The re-allocation of many managers and staff to SARS severely reduced other TPH programs and services in the community. At the peak of the SARS response, many of the services delivered by Public Health Nurses and Public Health Inspectors in the areas of Family Health, Healthy Lifestyle, Healthy Environments and Communicable Disease Control were reduced to essential services only.

The outbreak was limited primarily to hospital staff, patients and visitors as well as the household members of known cases. Disease transmission rarely occurred in non-health care settings, which greatly limited spread into the general community. However, SARS caused major upheaval in health care settings due to the risks of occupational exposure and the operational constraints imposed by stringent infection control requirements. The social and economic impacts arising from this outbreak made a profound impact on the lives of untold numbers of people across Toronto, Ontario and Canada.

Worksites affected by a symptomatic case required immediate quarantine of exposed workers and on-site presence of TPH staff to explain risks, assess individuals for exposure and symptoms, and to identify contacts for follow-up. TPH followed up four possible cases of SARS who had some contact with a school while ill. One school was closed by TPH for public health reasons and four by the local school board due to operational considerations when certain students and teachers were quarantined. In each case, TPH staff met with students, teachers and parents to address questions and concerns when the school was closed and again when it re-opened after their quarantine ended. Nonetheless, substantial health concerns, child care difficulties and academic challenges were faced by families and students in affected schools and post-secondary institutions.

Toronto lost hundreds of millions of dollars in revenue when conventions, conferences and meetings were cancelled and tourists changed vacation plans to visit the city. Many people who worked in the hospitality industry lost income or were laid off. Because SARS originated in China, many Chinese businesses and restaurants were affected by public fears of SARS

transmission at these establishments. The impact on the Canadian economy from SARS has since been estimated at $2.5 billion (Naylor, 2003).

Many families were affected on a personal level when member(s) became ill or were identified as contacts and had to be quarantined. Individuals and families affected by SARS faced multiple complex issues, including physical illness, psychological stress, financial hardship and social stigma.

While thousands of individuals and their families were directly affected, certain groups were particularly burdened by the pressures of intense public attention. The Chinese and East Asian communities were associated with the geographical origin of the outbreak and other "hotspot" locations where SARS was present. In addition, one religious group within the Filipino community experienced tremendous stress from both the effects of the illness on several of its members and the disclosure that the entire group of about 500 persons was under quarantine. A high rise residential complex was placed on alert as a precaution and its residents and businesses were also thrust into the public spotlight. A funeral home and several workplaces were publicly identified as places where precautionary measures were being taken. In managing the "risk communications", there was a recurring trade-off between the need to protect individual privacy and the need to broadcast timely and relevant health risk messages to the wider community.

The federal and provincial governments established expert committees to review the response to SARS. The Province has also appointed Mr. Justice Archie Campbell to investigate the specific incidents that occurred during the outbreak.

Active disease surveillance and strong infection control will be essential during the upcoming winter season to ensure early detection and control of SARS if it re-emerges. The provincial Mandatory Health Programs and Service Guidelines for the Control of Infectious Diseases and Infection Control outline the basic requirements for Boards of Health with respect to infection control and outbreak response in hospitals and long-term care facilities. The SARS experience has shown the need for the Province to revise these guidelines in order to strengthen the role of local public health units in the surveillance, prevention and control of infectious diseases in these facilities.

The information demands of managing an outbreak of this magnitude and complexity also highlighted the limited capacity of existing information management systems at TPH. Overall outbreak investigation and response was severely hampered by the multiple and loosely linked data collection systems within TPH and the lack of compatibility among data management systems across local health units and the province. Complete, accurate and timely information about cases and contacts is crucial for public health and health care staff to understand the epidemiology of the outbreak, to plan containment strategies based on evidence of risk, and to monitor the effectiveness of disease control efforts.

The SARS outbreak illustrated the vulnerability of Toronto to a new emerging disease and showed how vital a strong public health infrastructure is to the well-being of the city. Public health staff and managers need cross-training on outbreak investigation and emergency preparedness. Structures and processes that provide surge capacity and facilitate emergency response without decimating other public health programs and services are also needed.

Lessons learned

SARS has demonstrated the need for the hospital sector and public health to work more closely, particularly with respect to infection control practice. It is most critical that additional resources be added to local public health units and the health care sector to ensure stronger surveillance, prevention and control of infectious diseases, along with stronger coordination, communication and support mechanisms across sectors and jurisdictions.

SARS has also helped us recognize the importance of an effective public health emergency planning and response capacity. During SARS, key officials often had to make decisions in the absence of the full picture. In some instances, it was impossible to fully take into account the human impact of the emergency – i.e., the impact on families, on communities and on health care and public health staff. In addition, attention to the so-called "Recovery" phase usually does not make it onto anyone's radar screen, particularly once the pressure is on to revert to "normal". It takes time to recover from the stress of responding to any emergency situation, particularly one of the duration and magnitude of SARS. This must not be forgotten.