



**Review of the New Zealand health sector's response to
the outbreak of severe acute respiratory syndrome
(SARS)**

Prepared for the Public Health Directorate, Ministry of Health by
BRC Marketing & Social Research with Allen & Clarke Ltd

Contents

1. Executive Summary	4
2. Introduction	5
2.1 Methodology	5
2.2 Limitations and assumptions	5
2.3 Context	6
3. Background.....	7
3.1 Severe Acute Respiratory Syndrome	7
3.2 Chronology of the outbreak	8
3.3 SARS in New Zealand.....	9
4. Organisation of pandemic response in New Zealand.....	10
4.1 The New Zealand Ministry of Health's <i>Influenza Pandemic Action Plan</i>	10
4.2 Officials Committee for Domestic and External Security and Co-ordination (ODESC).....	11
4.3 Testing Pandemic Response: Operation Virex 2002	11
4.4 Comment.....	13
5. The New Zealand health sector response to SARS.....	14
5.1 The Ministry of Health's response to SARS.....	14
5.2 District Health Board responses to SARS: five case studies	17
5.3 Issues identified by District Health Boards	22
5.3 Other agencies	27
5.5 Sector-wide issues	29
5.6 Summary	29
6. Perception of the health sector's response to SARS	31
6.1 Perceived strengths of the response	32
6.2 Perceived weaknesses of the response	35
7. Pandemic response plan objectives.....	44
8. Conclusions	47
9. Recommendations	49

Appendix One: Sampling methodology: targeted web-based and general public surveys

Appendix Two: Contingency plan: Influenza Pandemic Action Plan for New Zealand

Appendix Three: Coordinated Incident Management System (CIMS)

Appendix Four: Chronology of Ministry of Health actions during the SARS response period

Appendix Five: Pandemic response roles for key health sector agencies: recommendations from Operation Virex

1. Executive Summary

Severe Acute Respiratory Syndrome (SARS) first appeared in Southern China in November 2002. By February 2003, health authorities in Hong Kong, Singapore and Vietnam began reporting cases. SARS eventually spread to 29 countries, affecting nearly 9000 people and causing 774 deaths. The New Zealand Ministry of Health reported one case to the WHO as a possible case.

This report provides a review of the New Zealand health sector's response to the threat of SARS, covering the responses of the Ministry of Health, District Health Boards, public health units and the wider health sector. It is one of a number of actions taken to identify areas for review and refinement of the health sector's pandemic response plans.

The Ministry of Health was the lead agency during the SARS event. SARS also provoked a whole of government response, co-ordinated by the Officials' Committee for Domestic and External Security and Co-ordination (ODESC) framework, which facilitated a co-ordinated response between the Ministry of Health and the range of other government agencies whose areas of interest were affected by SARS.

Planning and preparation had taken place at national and regional levels to address the threat of an influenza pandemic. New Zealand's *Influenza Pandemic Action Plan*, supported by the National Pandemic Planning Committee lies at the centre of preparedness for pandemic response. The Influenza Pandemic Action Plan had been tested in a desktop exercise (Operation Virex) in 2002.

In the absence of confirmed cases in New Zealand, SARS was effectively a live exercise to test the pandemic response of the health sector. The perceptions of those surveyed indicate that the response was generally seen as effective and appropriate. The response to SARS has highlighted both strengths and weaknesses in the health sector's pandemic response plans and processes.

An analysis of the response to SARS indicates that the objectives of the Influenza Pandemic Action Plan were met, at least in part, suggesting that the desired outcomes were generally achieved; however, the means by which they were achieved were not always optimal. A number of recommendations from the Operation Virex report remain relevant.

In conclusion, the New Zealand health sector's response to SARS appeared to be largely effective and appropriate. There is a need to employ the lessons learned from SARS into future planning to improve emergency response throughout the sector and in a range of scenarios.

2. Introduction

In November 2002, there were reports of an outbreak of an influenza-like illness in the Guangdong Province of southern China. By February 2003, cases had begun to emerge in Hong Kong and Vietnam, and it soon became apparent that this was a novel infection. Named Severe Acute Respiratory Syndrome (SARS), from a description of its symptoms, a total of 8098 probable cases of SARS were reported in 29 countries. 774 people died of SARS during this period; 21 percent of those affected were health care workers¹.

The objectives of this report are to identify areas of strength on which to build, weaknesses that can be addressed, and perhaps most importantly, lessons learned that will see New Zealand's health sector better prepared for the next global infectious disease outbreak.

2.1 Methodology

This review includes information from a variety of sources, collected using three specific methods of data gathering:

- face-to-face or telephone interviews;
- a web-based survey; and
- a survey of 500 randomly selected members of the general public.

Information from a survey of general practitioners concerning SARS-related issues has also been incorporated into this review².

A detailed overview of sampling methodology is included in *appendix one*.

2.2 Limitations and assumptions

This document reviews the health sector's response to SARS during the period between 24 February and 30 June 2003. While some events outside this time frame are included as points of context, this report does not cover events, issues arising and processes developed or already in place outside the specified period.

¹ Summary of probable SARS cases with onset of illness from 1 November 2002 to 31 July 2003 (revised 26 September 2003). World Health Organization: http://www.who.int/csr/sars/country/table2003_09_23/en/

² Dr Sally Talbot conducted this survey as part of the National Emerging Novel Infectious Diseases Clinical Action Plan project. Dr Talbot is a general practitioner contracted by the Ministry of Health.

Information about SARS is being updated regularly as knowledge improves. The information contained in this report is current at the time of writing.

This review is based on the opinions of those interviewed and surveyed. Due to the large number of people involved in the response to SARS both inside and outside the health sector, it was not possible to identify and survey everyone. While best efforts have been made to ensure the information collected has been sourced from a representative sample, it is inevitable that the experiences and points of view of some involved in the response are not represented in this report.

Documentation regarding the health sector and specifically the Ministry of Health's response to SARS was provided to the review team by the Ministry. No other file information from the Ministry was considered in this review.

2.3 Context

This report is one of a series of Ministry of Health initiatives focused on strengthening the health sector's emergency response under the umbrella of the National Emergency Management Plan for the health sector, and should be considered in the context of a suite of SARS-related evaluation activities, not as an isolated single review.

The Ministry of Health had expectations concerning the findings of this review as a result of previous internally-produced reports. Part of the purpose of this review was to confirm those initial findings and/or identify additional issues using a different methodology and external reviewers. As a result, some conclusions and recommendations in this report are common with those reported in other review documents, indicating a high level of agreement and consistency of reporting among those agencies and individuals involved.

3. Background

This section provides general information on what is known about SARS, including a description of the syndrome, and the chronology and epidemiology of the outbreak³.

3.1 Severe Acute Respiratory Syndrome

SARS is characterised by influenza-like symptoms, such as a high fever and chills, progressing to a cough and difficulty breathing. SARS can only be spread by droplet transmission from symptomatic people. Most secondary cases of SARS occurred in people who were in very close, sustained contact with affected people, including family members and health care workers.

There were a small number of 'super spreading events,' in which a single SARS-affected person infected a much higher than expected number of people without close personal contact⁴.

The mortality rate for SARS varied by age of the case, from less than 1 percent for those under 24 years of age; 15 percent for people aged 45 to 64 years, and up to 50 percent for those aged over 65 years. SARS appeared to be more severe in people with pre-existing chronic health conditions.

Control of SARS centres on what the World Health Organization describes as "classic epidemiological measures⁵": patient isolation, infection control, contact tracing and management of contacts, and restrictions on travel.

At present, there is no vaccine or cure for SARS. Supportive treatment and infection control measures are recommended to treat patients and control any further spread. There is no internationally agreed, recommended or standardised treatment protocol to guide those persons who are treating patients with SARS.

³ For more detailed information on SARS, refer to the World Health Organization and Communicable Diseases Center websites: www.who.int/csr/sars/ and www.cdc.gov/ncidod/sars/ respectively. Information specific to New Zealand is available on the Ministry of Health website: www.moh.govt.nz/sars

⁴ Department of Communicable Disease Surveillance and Response (17 October 2003). *Consensus Document on the Epidemiology of Severe Acute Respiratory Syndrome (SARS)*. World Health Organization: Geneva.

⁵ Summary report: WHO Global Conference on Severe Acute Respiratory Syndrome (SARS) *Where do we go from here?*. Kuala Lumpur, Malaysia, 17-18 June 2003.

http://www.who.int/csr/sars/conference/june_2003/materials/report/en/print.html

3.2 Chronology of the outbreak

SARS was first reported as an outbreak of atypical pneumonia in Guangdong Province, China in November 2002. By February 2003, cases of atypical pneumonia were being reported in Hong Kong. Initially these cases were not linked to the Guangdong outbreak, and were suspected of being caused by the H5N1 virus widely known as avian influenza.

By early March it was clear that cases of atypical pneumonia with similar symptoms and disease processes to those reported in China were appearing in Hong Kong, Vietnam and Singapore, linked to people from the affected regions in China. Of significant concern was the fact that many of those affected were health care workers who had been caring for people with SARS.

International media reports of an outbreak of illness in Hong Kong, Singapore and Vietnam began to gather momentum in the first two weeks of March. The first official international notification of the outbreak came on March 12, when the WHO issued a global alert regarding atypical pneumonia in those areas.

The syndrome was officially named Severe Acute Respiratory Syndrome on March 15 2003.

During April and May 2003, the outbreak of SARS was brought under control in some countries while at the same time others experienced their first cases. Control was achieved first in Vietnam, then throughout other South East Asian countries as effective infection control measures were identified and implemented.

The worst affected area outside South East Asia was Toronto in Ontario, Canada. The index case was infected with SARS after staying at the Hotel Metropole in Hong Kong at the same time as one of the 'super spreading' cases. This person then travelled home to Toronto, and subsequently infected family members. Health care workers involved in the initial care and treatment of infected individuals also became sick with SARS.

After initially thinking that SARS in Toronto was under control in April, the disease re-emerged in late May. The Canadian experience highlighted the necessity of maintaining vigilance and strict infection control practices for a conservatively long period of time after the outbreak is thought to be contained.

By July 1, the threat of SARS had declined. Travel advisories were lifted and all affected countries were declared free of local transmission of the SARS virus.

At present, the WHO is advising continued heightened awareness of SARS and SARS-like illnesses. There is concern that SARS may reappear during the northern hemisphere winter. Given the similarity of symptoms between SARS and influenza-like illnesses, initial post-outbreak cases could evade immediate detection. Confounding the issue is the fact that understanding of SARS is somewhat limited. For this reason, the WHO has developed and disseminated a SARS alert operational definition to ensure that all necessary containment measures are taken until SARS can be discounted as the cause

of cases of atypical pneumonia⁶. SARS has not been eradicated – three confirmed and one probable case have been reported in China since late December 2003.

3.3 SARS in New Zealand

No confirmed cases of SARS occurred in New Zealand. As of the end of June 2003, 12 suspected and one probable case had been notified to medical officers of health. All 12 suspected cases were found not to be SARS. New Zealand's only probable SARS case was in a Hawke's Bay woman who became ill with SARS-like symptoms after returning from a tour of southern China. She was treated at Hawke's Bay Regional Hospital before returning home.

Key points

- SARS was first reported in China in late 2002 as atypical pneumonia. Reports of an outbreak in some South East Asia countries in March 2003 were shortly followed by the syndrome being officially named on 15 March 2003.
- SARS can be contained using measures such as patient isolation, infection control, contact tracing and management.
- Between 1 November 2002 and 31 July 2003, 8098 probable cases were reported in 29 countries. 774 people died. No confirmed cases were reported in New Zealand, although there was one probable and 12 suspected cases.
- While the threat of SARS had largely ceased by July 2003, the World Health Organization still advises heightened awareness of SARS and SARS-like illnesses.

⁶ WHO 14 August 2003 "Alert, verification and public health management of SARS in the post-outbreak period." <http://www.who.int/csr/sars/postoutbreak/en/>

4. Organisation of pandemic response in New Zealand

This section discusses some of the key components of New Zealand's planning for pandemic response including the Ministry of Health's Influenza Pandemic Action Plan, the Officials Committee for Domestic and External Security and Co-ordination, and Operation Virex 2002, a hypothetical exercise designed to test the pandemic planning and response capabilities of the Ministry of Health District Health Boards and Public Health Services across New Zealand.

4.1 The New Zealand Ministry of Health's *Influenza Pandemic Action Plan*

While influenza is relatively common in the general community, occasionally strains arise that are particularly severe. These can cause global pandemics involving significant morbidity and mortality.

Ready access to international air travel has increased the threat of outbreaks of highly contagious diseases arriving and becoming established in New Zealand. As a result, the Ministry of Health has developed plans to provide a framework for responding to an incidence of a rapidly spreading contagious illness. These plans are centered on response to influenza, considered the most likely source of a significant and serious outbreak.

The Influenza Pandemic Action Plan was most recently updated in October 2002⁷. The aim of the Influenza Pandemic Action Plan is to:

...facilitate a co-ordinated and effective national response in the event of an influenza pandemic.

The objectives are to:

- Provide a plan to ensure rapid, timely and co-ordinated action, including current and authoritative information for health professionals, the public and media at all stages.
- Specify the roles and responsibilities of the Ministry of Health, District Health Boards, public health units and other key organisations.
- Reduce the morbidity and mortality from influenza illness.
- Ensure that essential services are maintained.
- Minimise the social disruption and economic losses that may be associated with an influenza pandemic.

⁷ Ministry of Health (2002) *Influenza Pandemic Action Plan*. Ministry of Health; Wellington New Zealand. The Plan is available on the Ministry of Health website: www.moh.govt.nz

- Provide guidance to District Health Boards with the establishment of regional influenza pandemic plans and annual influenza winter planning.

The critical areas of action are summarised under the following headings.

- National co-ordination and planning
- Prevention
- Treatment
- Surveillance
- Information and communications
- Containment and reduction of spread
- Resource management and allocation
- Liaison with non-health care agencies.

Overall responsibility for implementing the Influenza Pandemic Action Plan lies with the Ministry of Health, supported by the National Pandemic Planning Committee (NPPC), and involves all health care and emergency services. The Influenza Pandemic Action Plan sets out roles and required action for the core group of agencies likely to be involved in response to a pandemic.

A copy of the contingency plan that sets out the operational detail of the Influenza Pandemic Action Plan is included in *appendix two*.

4.2 Officials Committee for Domestic and External Security and Co-ordination (ODESC)

During a pandemic there are potential issues for not only the health sector, but also for trade, tourism, national security, international relations and national emergency management. ODESC provides a forum at which whole-of-government responses can be co-ordinated at a central point, charging agencies with specific responsibilities and roles. In addition, ODESC provides an opportunity to balance the actions proposed by some agencies and the impacts those actions may have on other sectors.

ODESC's usual membership comprises the Chief Executives of the Ministry of Foreign Affairs and Trade, the New Zealand Defence Force and the Ministry of Defence, the New Zealand Security Intelligence Service and Government Communications Security Bureau, the Police, Civil Defence and Emergency Management and the Treasury. Other relevant agency representatives participate in the ODESC process as required by the situation.

4.3 Testing Pandemic Response: Operation Virex 2002

The Influenza Pandemic Action Plan was tested in a hypothetical desktop exercise in January 2002. Operation Virex was designed to evaluate the performance of both the national Plan, and the emergency incident and response plans developed and maintained by each District Health Board.

The overall objectives of Operation Virex were to:

- Mitigate, respond and recover from a national influenza pandemic.
- Test the communication links with the District Health Boards and public health units.
- Identify the triggers for escalation within the plan.
- Gather and analyse information from the District Health Boards to provide an Influenza Pandemic Action Plan.
- Identify the gaps and overlaps within the planning process.

The participants were the Emergency Response Centre and the Communicable Diseases Team from the Ministry of Health, District Health Boards and public health units, and the National Pandemic Planning Committee.

The exercise tested four stages of the scenario.

1. Notification of outbreak of influenza in Hong Kong and “Wellsun” (alert and preparation).
2. Outbreak in Australia and initial cases in New Zealand (public health emergency response activated).
3. Increasing number of cases in New Zealand.
4. Severe pressure on health systems as epidemic peaks.

Lines and methods of communication were tested during Virex to identify the preferred methods and processes for communication between the Ministry of Health and District Health Boards.

4.3.1 Results of Operation Virex

As a result of Operation Virex, participants reported that testing plans had been a valuable experience, particularly with regard to identifying areas of pandemic planning requiring further development. These findings are summarised in a series of recommended key actions from the final report to the Ministry of Health, concentrating on the need to:

- Review plans to ensure relevance and practicality;
- Ensure command centres resources are appropriate;
- Strengthen linkages within regions;
- Improve links between District Health Boards and general practitioners;
- Adopt and train staff in the Co-ordinated Incident Management System (see section 4.3.2, below);
- Review response team membership extended as appropriate; and
- Acknowledge the need for further and ongoing exercises to ensure all involved know their roles, responsibilities and are confident in carrying out the required actions.

4.3.2 Co-ordinated Incident Management System (CIMS)

CIMS is a system designed to facilitate a co-ordinated approach between major agencies involved in emergency response. CIMS provides a structure and set of rules that define a system for managing incidents. It focuses on defining relationships, responsibilities and management rules that should be consistently applied across

agencies involved in incident response. The aim of CIMS is to allow a smooth response within and between response agencies, based on a commonly understood, simple and transparent structure.

CIMS is becoming more commonly used in government and non-government agencies in New Zealand. Further detailed information on CIMS is included in *appendix three*.

4.4 Comment

The Operation Virex report concluded that:

“Lessons have been learned and people have taken responsibility to improve our preparedness for an influenza pandemic.

Should an influenza pandemic occur, the New Zealand [h]ealth [s]ector would be aware of the impact on services and the issues that will arise and the challenges it will bring to our communities. It is our responsibility to ensure our plans save patient lives and reduce the probable level of mortality⁸.”

A framework for pandemic response was largely in place prior to the emergence of SARS. Despite the fact that SARS did not become established in New Zealand, the experience of responding to the potential threat highlighted some significant issues that tested the health sector’s readiness and ability to respond. Examination of the response reinforces the need to implement the lessons of Operation Virex into planning for future pandemic events.

Key points

- Key components of New Zealand’s planning for pandemic response include:
 - The Ministry of Health’s Influenza Pandemic Action Plan, which identifies critical areas of action and responsibilities for response;
 - The National Influenza Pandemic Planning Committee, which provides expert advice and support for refining the Plan and during epidemic events;
 - The Officials Committee for Domestic and External Security Co-ordination (and its Secretariat), which provides a forum for whole-of-government responses; and
 - Regional pandemic action plans developed by District Health Boards.

Operation Virex, an exercise conducted in 2002 to test pandemic planning and response capabilities identified areas requiring further attention to ensure an appropriate level of preparedness.

⁸ Ministry of Health (March 2002). *Exercise Virex: National Report*. Page 8. Ministry of Health: Wellington.

5. The New Zealand health sector's response to SARS

This section briefly describes the Ministry of Health's and District Health Board's response to SARS, and identifies and discusses issues they faced during the response period.

5.1 The Ministry of Health's response to SARS

The Ministry of Health's response to SARS began with the first National Pandemic Planning Committee (NPPC) meeting in late February, and continued until the outbreak was effectively contained in early July. The Ministry was a critical participant in the ODESC process, including establishing five sub-groups to support the work of the Officials Committee.

5.1.1 Structure

The Public Health Directorate led the SARS-related work, with support from the Clinical Services Directorate once the likely health service delivery effects of SARS were apparent, around early April.

No formal emergency management model was used to structure the SARS response. A core SARS response team was situated in a single incident control room from the beginning of April 2003 until the outbreak was effectively under control. Staff in the SARS response team were assigned specific roles, for example border control liaison, communication and development of advice for specific audiences, while others undertook more general analytical and support functions. Ministry of Health records indicate that 37 staff and contractors were directly involved in the SARS response; however anecdotal reports from Ministry staff indicate that a much higher number were involved for at least a short amount of time.

Throughout the response, the focus and composition of the team altered to respond to the changing environment around SARS. The team comprised a mixture of permanent staff, contractors and people seconded from DHBs and other agencies.

5.1.2 Core activities

Under the Influenza Pandemic Action Plan, the Ministry of Health is charged with the following key tasks:

- National planning;
- initiation, direction and central co-ordination of response;
- co-ordination of surveillance activities;
- fulfilling reporting requirements to WHO and other jurisdictions as required;

- estimating the need for availability of vaccines and anti-virals;
- securing government funding as required;
- authorising use of additional powers for medical officers of health to prevent or control the spread of disease;
- co-ordinating media interaction and issuing advice to health professionals and the public; and
- providing assistance to other Pacific nations as required.

National planning had been undertaken via the development of the Influenza Pandemic Action Plan and Virex testing. In line with its assigned responsibilities, the Ministry undertook a wide range of actions to respond to the threat of SARS.

- Establishment of an internal SARS response team;
- communication of information to the sector, external agencies, government and the general public;
- media liaison;
- technical advice, including development and dissemination of protocols and guidelines with support of the NPPC, IDAC and later the SARS technical advisory group⁹;
- legal support such as the development of instrument for additional powers for medical officers of health; clarification on surveillance, isolation and quarantine issues;
- liaising with the Institute of Environmental Science and Research (ESR) on surveillance and reference testing issues;
- policy support for service providers;
- external agency liaison via ODESC and through direct contact;
- international liaison; and
- provision of specific services (ie nurses in airports, thermo-imaging equipment).

A full chronology of the Ministry of Health actions undertaken during the SARS response period is attached at *appendix four*. It details the timing of particular events and demonstrates the level of activity required to support the response effort.

The Ministry of Health developed innovative and rapid solutions to issues, including revision of the passenger arrival card in association with border control agencies and airlines and implementation of a staffed 0800 number for general enquiries which worked well despite initial difficulties with providers.

Establishing and maintaining close working relationships with private companies, including airports, sea ports, airlines, and travel providers were another focus of effort. These relationships were critical in the context of SARS, given that prevention of imported cases was central to limiting the potential impact of SARS in this country.

⁹ The NPPC and IDAC were merged to form the SARS Technical Advisory Group in mid-April.

5.1.3 Issues identified within the Ministry of Health response

Ministry of Health commentators noted three issues being of particular concern during the response period, primarily:

- Response structure;
- inter-directorate co-ordination, and
- capacity.

It should be noted that all these issues have been previously recorded as concerns during, or immediately after, the response period, and are therefore only briefly covered here.

- *Response structure*

Perceived weaknesses resulting from not using a formal structure included the absence of clear shift from business as usual to emergency response footing; lack of rapid and clear assignment of specific roles and responsibilities within the response team; duplication of work (for example two people in the response team contacting a single DHB for information already collected); a lack of clarity as to who the incident controller was, and a related lack of a person with clear oversight for the whole operation.

The CIMS structure was frequently cited as being the preferred model for emergency response within an organisation. Respondents noted and supported the Ministry's current efforts to provide CIMS training for all staff likely to be involved in managing emergency response, including members of the Executive Team.

Two related issues that were frequently cited were the need for robust support systems for staff involved in emergency response work, and the need for support services such as human resources and information technology to be involved from the outset. The CIMS model addresses both of these areas, hence continued training and formal adoption of the model was widely supported.

- *Inter-directorate co-ordination*

A number of interview participants noted a lack of rapid co-ordination of effort between the Public Health and Clinical Services Directorates of the Ministry of Health, leading to some duplication of effort and instances of confusion regarding roles and responsibilities. For example Clinical Services communicated with District Health Board CEOs while Public Health liaised with SARS response team coordinators. Again, the CIMS structure was cited as one way to address internal co-ordination and communication issues.

A common observation associated with inter-directorate co-ordination was the fact that the SARS response required the Ministry to move from operating as a policy agency, to undertaking an operational role, cutting across normal organisational structures. Again, a formal emergency response structure was seen as a potentially effective way of smoothly and rapidly shifting operational focus in the future.

- *Capacity*

A number of commentators from within the Ministry noted that the agency struggled to cope with the workload at times, and although this is not surprising, it did prove difficult for response team members who had to continue carrying their usual workload, particularly over the relatively long response period.

The use of contractors was necessary to support the Ministry of Health's response; however some commentators noted that some temporary staff were not familiar with the Ministry's processes and were therefore unable to provide full and immediate support to the response team. People who made comment on this point felt that internal administrative staff should be seconded to support the response team, with temporary staff employed to provide support services to groups not involved in emergency response.

Key points

- The Ministry of Health led the SARS response both within the health sector and across government.
- The Ministry of Health carried out a large amount of work over a range of areas. In summary, such activity included:
 - Helping to co-ordinate responses with health sector and non-health sector partners;
 - Providing information and advice to stakeholders;
 - Implementing a range of operational activities; and
 - Providing analytical and administrative support for example, making SARS notifiable, authorising special powers under the Health Act.

Some areas of concern identified during the SARS response period included internal communication and co-ordination, and the lack of a formal response structure. Remedies for some of these issues have been suggested and/or initiated post-SARS.

5.2 District Health Board responses to SARS: five case studies

This section describes the experiences of five District Health Boards and three public health units during the SARS outbreak¹⁰, and provides some indication of the response

¹⁰ The sites were chosen to cover responses from large urban centres with larger emergency capacity and higher population levels; a smaller rural Board, the Board that dealt with New Zealand's only reported probable case, and a South Island Board with multiple sites. The three public health unit sites are all areas with international air and sea ports. All three public health units provide services to multiple District Health Boards.

mounted at the operational level, including co-ordination between hospital-based services (emergency, secondary and tertiary care), public health units, the primary health care sector, allied health professionals, other emergency response services and private organisations that had a role in the SARS response.

Public health units are part of District Health Boards; however they are responsible for a number of services that extend beyond treatment services to health promotion and disease prevention and are therefore considered alongside hospital-based services in this section

The District Health Boards visited were:	The PHUs visited were:
<ul style="list-style-type: none"> • Auckland • Counties Manukau • Hawke's Bay • Taranaki • Canterbury 	<ul style="list-style-type: none"> • Auckland • Regional Public Health (Wellington and Wairarapa) • Community and Public Health (Canterbury)

The information is intended to provide examples of the responses mounted, rather than a complete overview of actions taken by all District Health Boards and public health units. It is highly likely that other District Health Boards and public health units would have had varying experiences of the SARS response, and may have been more or less prepared than those interviewed.

5.2.1 General findings

There were a number of similarities in the response processes used and issues encountered by the services visited. General findings from case study visits are therefore grouped, with specific comment included on variations between areas.

- *Timing of response initiation*

All District Health Boards initiated responses to SARS on the 17th of March. Canterbury DHB's emergency department began preparations about a week prior after direct contact (e-mail messages and telephone conversations) from a colleague working in an affected area.

- *Response structure and planning frameworks*

All District Health Boards used a core group for response, based loosely or more formally on the CIMS structure. All working groups included a response manager position, and specific positions for emergency management, communications, clinical, infection control expertise, public health, and primary health care liaison.

The response teams were the means by which District Health Boards co-ordinated the response between hospital-based services (emergency, secondary and tertiary care), and public health units.

Primary health care services were linked into these response groups to varying degrees, normally through the General Practice liaison manager (or equivalent) at the District Health Board. Primary health care representation was delayed in some areas. Auckland District Health Board's SARS response group involved the GP liaison manager from the end of the second week onwards. Taranaki used a local primary health organisation representative as primary health care liaison point.

Variations to the response structure were reported by Auckland and Counties-Manukau, both of whom participated in a regional SARS response committee including all three Auckland area District Health Boards, aiming to facilitate a consistent approach to preparation for and management of SARS cases.

Canterbury District Health Board convened a response group on the 17th of March. Approximately three weeks later, an additional group was formed to address issues specific to Christchurch hospital.

All District Health Boards reported that co-ordination and co-operation between services within boards was good, although some noted that relationships between services were established rather than strengthened during SARS, particularly the relationships between public health units and hospital-based services and between clinical departments that do not normally work closely together. The general comment was that District Health Board management was very supportive of the actions of SARS response teams. All five District Health Boards referred to the Influenza Pandemic Action Plan as a starting point for initiating a response. Four of the five District Health Boards used their existing regional pandemic Influenza Pandemic Action Plans and major incident plans to support the SARS response. Two of the three public health units used existing pandemic plans and supporting arrangements such as emergency response plans developed with the airports to respond to incoming international flights with sick passengers.

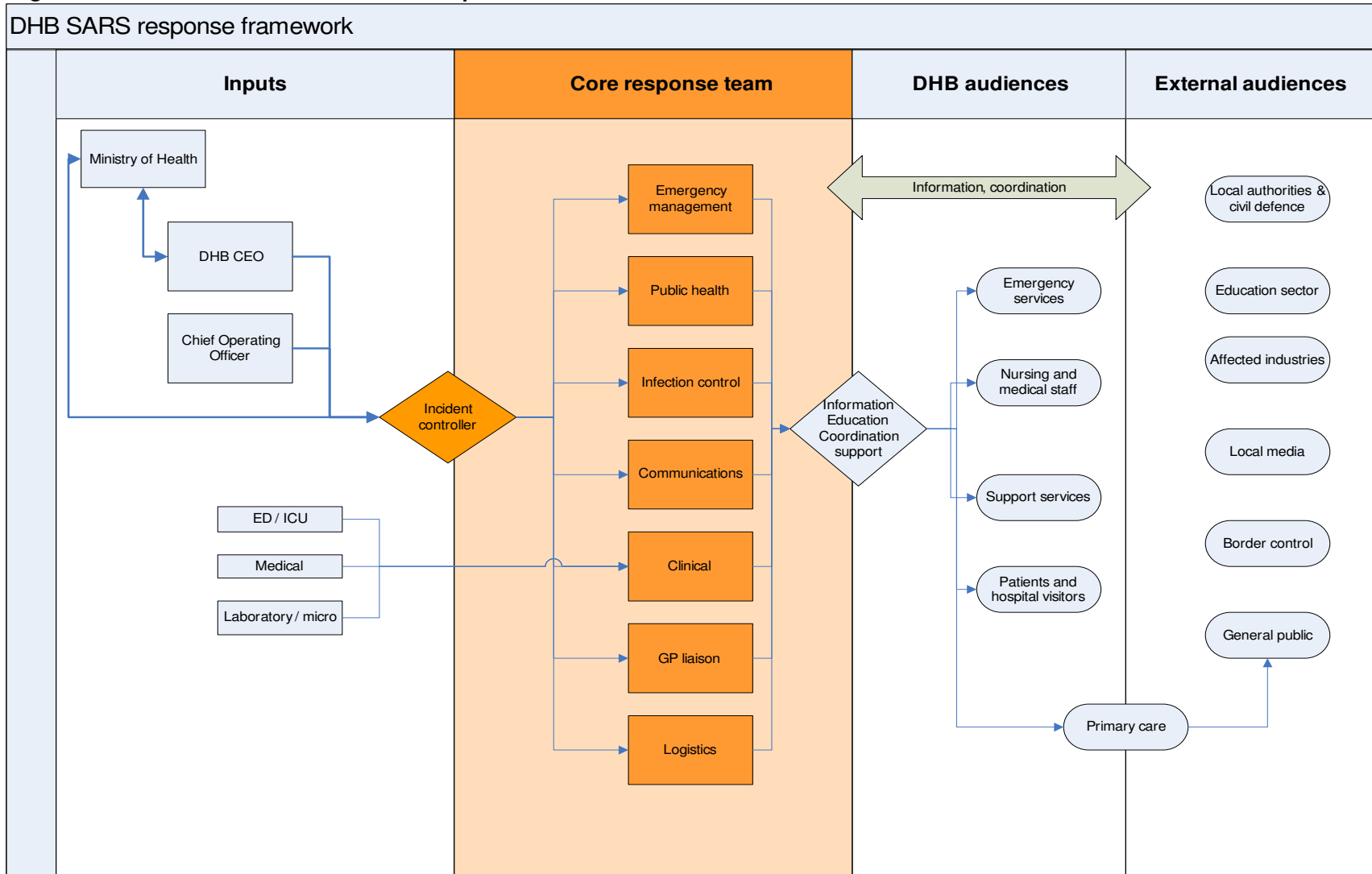
Figure one describes the common elements of response structure found at the case study District Health Boards, including interaction with hospital staff and key external audiences.

- *Core activities*

The Influenza Pandemic Action Plan requires District Health Boards to undertake the following actions for their own regions:

- Develop and maintain regional Influenza Pandemic Action Plans and regional action committees.
- Assess and plan for staffing issues including a register of GPs, nurses, social services staff available in the region.
- Identify medical and health care provisions and facilities.
- Participate in surveillance activities.
- Secure access to adequate antibiotics, ancillary drugs and equipment.

Figure one: District Health Boards SARS response framework



The following core activities were reported by all case study sites:

<ul style="list-style-type: none"> • Emergency response activation 	<ul style="list-style-type: none"> • Rapid activation of SARS response groups • Involvement of additional personnel as required • Identification of key local contacts outside DHB
<ul style="list-style-type: none"> • Information and communication 	<ul style="list-style-type: none"> • Media liaison • Information dissemination throughout DHB (websites, intranet, hard copies, information sessions, question boxes and boards) • Education sessions for DHB staff, primary health care and other health service providers • Ministry of Health teleconferences
<ul style="list-style-type: none"> • Clinical information and support 	<ul style="list-style-type: none"> • Infection control education sessions • Development and/or sharing and implementing clinical pathways and protocols and patient management guidelines
<ul style="list-style-type: none"> • Resource management 	<ul style="list-style-type: none"> • Assessing available personal protective equipment (PPE) • Assessing staffing issues • Isolation and negative pressure capacity • Planning for alternative treatment centres
<ul style="list-style-type: none"> • Interagency liaison 	<ul style="list-style-type: none"> • Communication and co-ordinated planning with and information provision for external agencies: border control, ports, airports, education sector, private health providers.

5.2.2 Innovative responses to SARS

Each area reported developing new processes for dealing with some of the challenges posed by SARS. These are summarised below:

Auckland District Health Board	<ul style="list-style-type: none"> • Establishment of a general practice forum to advise on primary health care issues and implications in future response situations • Development and implementation of an infection control awareness campaign¹¹. • Formalised links between public health and District Health Board emergency management. •
Counties Manukau	<ul style="list-style-type: none"> • Clarification of legal issues, i.e. duty of care. • Participation in regional pandemic group. • Improved links with other emergency response agencies and

¹¹ The campaign is based on the highly visible “Yeah, right” advertising campaign used by a national brewery. Key messages are conveyed in a direct and humorous way, for example “Doctors always wash their hands after examining each patient. Yeah, right.” Feedback has been very positive.

	Auckland International Airport.
Hawke's Bay	<ul style="list-style-type: none"> • An 0800 number goes directly into emergency department for emergency services, so patient information is not transmitted by radio. • Emergency department is informed of any after-hours emergency calls to the Public Health Service.
Taranaki	<ul style="list-style-type: none"> • Pre-admission processes altered to include SARS screening. • Building debrief into planning processes.
Canterbury	<ul style="list-style-type: none"> • Masks for all patients presenting to ED with flu-like symptoms. • Placement of full PPE equipment in ED. • Established link between triage nurses and on call infectious diseases registrar/physician to fast-track assessment of anyone suspected of having an infectious disease resulting in a lower risk of infection passing to other patients and staff. • Establishment of primary health care access to the DHB intranet site, initially used for SARS but now carries range of general information. • Isolation training for all medical registrars.
Community and Public Health	<ul style="list-style-type: none"> • Initiated SARS information briefings for all airport staff, developing relationships that smoothed introduction of nurses to airports. • Introduced a dedicated room to manage SARS response, now an established emergency response room.

These are examples of innovative responses – it is likely that most District Health Boards and public health units made refinements, improvements and/or developed new processes to respond to the challenges the SARS threat posed in their regions.

5.3 Issues identified by District Health Boards

District Health Board respondents noted several issues that arose during the SARS response period, relating to areas of concern and/or requiring additional attention in future planning. District Health Boards are addressing many of the concerns identified here as a result of the SARS response experience.

- Resource and facility management;
 - Capacity;
 - access to expert advice;
 - planning;
 - engagement with the primary health care sector; and
 - working with external agencies.
- *Resource and facility management*

Sourcing specific resources and making the best use of existing ones were issues for all case study organisations.

Scarce resources most frequently mentioned were the N95 and N100 masks recommended as basic protection for clinical staff treating suspect or confirmed SARS cases: District Health Boards without adequate supplies of masks on hand reported very high levels of concern among staff regarding protection from possible infection.

Facility management concerns related to access to isolation facilities, particularly in emergency departments. The lack of alternative entrances and easily isolated triage areas that could be dedicated to SARS patients was also noted: designs focusing on maintaining security hampered appropriate management of patients with suspected infectious diseases.

Staffing resources were frequently cited as an area of considerable concern, particularly access to additional staff with the required levels of skill and experience.

Key lessons: resource and facility management:

- ❖ Plan for the need to carefully limit equipment supplies
- ❖ Include infection control as a critical component of planning construction or renovation of health care facilities.

- *Capacity*

District Health Boards and public health units reported that while they were able to respond to the SARS threat, their capacity to deliver non-acute, non-SARS care would have been severely compromised at an early stage in a local outbreak. Had a significant SARS outbreak occurred in New Zealand, they agreed with the Ministry of Health that, as in an influenza pandemic situation, most SARS patients would have to be cared for at home¹².

Respondents cited the need for advanced escalation planning and clear guidelines for identifying the point at which the District Health Board would provide care for only seriously ill patients.

Infection control capacity was stretched during the SARS response, primarily by the need for additional education sessions to reassure staff and provide training for those not already familiar with personal protective techniques.

In public health units, respondents noted that the SARS response meant most other work was put on hold, and that units would have had limited ability to respond to any other emergent issues.

¹² Ministry of Health (2002) *Influenza Pandemic Action Plan*, page 4.

Respondents also discussed capacity within response teams, referring to the need for well trained, well resourced and very well supported teams and incident controllers. District Health Boards and public health units all noted that rapid initiation of an effective response, particularly in smaller centres, could easily hinge on the capability of a single person.

Key lessons: capacity

- ❖ Assess emergency response capacity levels using a variety of scenarios, from short-term mass casualty events to SARS-like illnesses requiring a high level of care over a long period of time.
- ❖ Consider fluctuating staff levels in emergency response planning.
- ❖ Emergency response teams must be sufficiently experienced, supported and resourced.

- *Access to expert advice*

Taranaki District Health Board reported that it does not have on-site expertise in infectious disease or medical microbiology, a situation common to other smaller District Health Boards. All sites felt that access to expert resources would be a significant issue in an outbreak as specialists would not have the capacity to provide advice and support to other District Health Boards or public health units.

Key lesson: access to expert advice

- ❖ Identify and develop links with multiple sources of technical support for District Health Boards lacking on-site expertise in relevant fields, considering best use of limited time in a pandemic situation while limiting demands on the individual experts concerned.

- *Planning*

The level of planning varied somewhat between District Health Boards. Canterbury noted that their existing response plan was based on a relatively small number of patients – between 20 and 40 people - as dictated by available hospital resources. CDHB interview participants recognised this approach as being unsuitable for response to an infectious diseases emergency.

Auckland District Health Board did not, at the time of the SARS outbreak, have a formal pandemic plan or major incident plan.

In terms of the scope of planning, the need to include staff support and management issues was widely discussed. High levels of staff anxiety meant that additional measures needed to be considered to provide support for those working with suspect cases, including advice for protection of family members, and ways of minimising the

effects of spending time in ante-rooms isolated from colleagues and normal working environments. All District Health Boards noted that this was a key area for additional planning in the future.

Other examples included the need for detailed transport planning, such as moving patients from outlying health centres to base hospitals, including protection for drivers or pilots, and the inability to use those vehicles to respond to other emergencies until disinfected. The impact of SARS on support services such as laundry, catering, cleaning and security were mentioned as needing additional attention in future planning.

Key lessons: planning

- ❖ Effective emergency planning must be up to date, relevant and well disseminated throughout the District Health Board.
 - ❖ Contingency planning for support services needs to be developed to support other emergency response processes.
 - ❖ Staff support issues should be addressed in pandemic response planning.
- *Engagement with primary health care sector*

Engagement with the primary health care sector was an area of concern for all case study participants. In some areas, primary health care was not represented on existing pandemic groups, meaning that effective communication had to be rapidly established, both from the District Health Board to the primary health care sector, and from the sector back to the Boards. All Boards noted that the lack of up-to-date contact lists (partially stemming from the continual movement of individual practitioners within primary health care) and variable levels of primary health care representation on pandemic planning groups were factors that contributed to communication difficulties.

District Health Boards reported a lack of clarity concerning expectations of the primary health care sector's role in responding to SARS, and that the role of primary health care is an area requiring significant levels of additional planning that must include strong primary health care sector representation.

Key lessons: engagement with primary health care sector

- ❖ Include primary health care representation in pandemic and emergency planning, ensuring that all provider groups are represented.
 - ❖ Up-to-date contact lists and registers of practitioners are critical to rapid and effective engagement with the primary health care sector.
 - ❖ Identify and employ preferred methods of communication for primary health care providers.
- *Working with external agencies*

Liaison with external agencies, including primary health care as noted above, was not a key focus of pandemic planning at all District Health Boards pre-SARS. A number of case study participants noted that planning was centred almost entirely on hospital-based services rather than community issues or collaboration with external agencies.

An extension of planning to include external agency liaison was widely mentioned, including the need to develop linkages with key government and non-government agencies with a role in SARS response. Engagement with airports, ports and airlines varied. In Wellington and Christchurch, existing emergency plans appear to have smoothed the way for working collaboratively on SARS. In Auckland, health sector representatives noted that the airport was slow to respond; the airport authority made the same comment about health service providers. A case for maintaining a closer working relationship was identified as a result of the SARS experience.

One of the key issues was management of the impact that external agencies can have on health sector response. A frequently cited example was an apparent lack of information and use of misinformation in the education sector. Examples include schools and tertiary institutions excluding students from classes, and providing information to parents that contradicted Ministry of Health and District Health Board advice, creating significant amounts of additional work for District Health Board staff.

Relationships between the health sector and civil defence were perceived to be weak, and an area requiring additional attention for future planning.

Key lessons

- ❖ Identify all agencies with potential involvement in or that may be affected by a pandemic situation – suggestions included a check list to prompt recollection of all possible players.
- ❖ Ensure that key external agencies are familiar with roles in the health sector, and expectations of them during an outbreak.

Key points

- The general perception at case study sites was that the response was well managed.
- SARS response groups were the primary means by which the SARS response was delivered at regional and local levels.
- The groups facilitated co-ordination within hospital-based services, between those services and public health, and between the District Health Boards, the Ministry of Health and external agencies.
- A wide range of activities, including innovative measures, was delivered as part of the local and regional responses to SARS.

- Not all District Health Boards or public health units had existing plans to support a response to SARS.
- Key lessons learned during SARS were identified as important supporting information for future planning.

5.3 Other agencies

A number of other agencies played critical roles in the SARS response process. Many were directly related to supporting health by implementing actions in areas of specific responsibility. The roles of external agencies are summarised below:

Agency	Role
<ul style="list-style-type: none"> • Department of Prime Minister and Cabinet 	<ul style="list-style-type: none"> • Management of whole of government (ODESC) process • Facilitation of inter-agency communication.
<ul style="list-style-type: none"> • Ministry of Civil Defence and Emergency Management 	<ul style="list-style-type: none"> • Provision of advice on emergency management; implications of declaration of a state of emergency, powers and resources available therein; communication with local Civil Defence Management groups.
<ul style="list-style-type: none"> • Ministry of Foreign Affairs and Trade 	<ul style="list-style-type: none"> • Intelligence on international occurrences • Liaison with diplomatic community • Provision of advice to expatriates and staff on postings in affected areas.
<ul style="list-style-type: none"> • Customs, MAF, New Zealand Immigration Service and Aviation Security 	<ul style="list-style-type: none"> • Co-ordination with Health to implement border control activities to limit risk of imported cases at local, regional and national levels • Development/revision of standard or local operating procedures.
<ul style="list-style-type: none"> • Occupational Safety and Health 	<ul style="list-style-type: none"> • Dissemination of key health and safety messages for people working in areas with some risk of exposure to SARS.
<ul style="list-style-type: none"> • Ministry of Education 	<ul style="list-style-type: none"> • Provision of SARS-related advice to education institutions, particularly those with a high proportion of international students.
<ul style="list-style-type: none"> • Police, Defence 	<ul style="list-style-type: none"> • Support for Health on escalation plans involving limiting freedom of movement, crowd control, enforcement of quarantine.
<ul style="list-style-type: none"> • Ministry of Tourism, Trade New Zealand, Treasury 	<ul style="list-style-type: none"> • Information on the economic impact of SARS on New Zealand, including likely economic implications of particular actions (ie border closure).

The following agencies were also involved for part or all of the SARS response, and were responsible for implementing SARS-related procedures in their own operations:

- Department of Corrections;
- the Civil Aviation Authority;
- the Maritime Safety Authority; and
- the Department of Internal Affairs.

Effective working relationships were critical to ensuring that the SARS response was well informed, and appropriately balanced between the protection of the public health, and the protection of New Zealand's economic and political ties.

The Ministry of Health and other health agencies liaised with a number of private organisations to facilitate SARS-related response. These included airlines, airport companies, port companies, travel operation representatives and educational institutions. The Ministry also responded a large number of enquiries from the general public.

Representatives from the above stakeholders were interviewed for this report. In general terms, they found the health sector's response to be appropriate. Information and communication, particularly media management, were highlighted as very positive aspects of the response. Most agency representatives noted that they had good contact with the Ministry of Health, normally with a small group of designated people within the SARS response teams. Smaller agencies with a lesser role in the SARS response did, however, report that they had more difficulty maintaining a consistent point of contact with the Ministry of Health. None of the external agencies had direct contact with other parts of the health sector.

Interaction between external agencies and the health sector at local and regional levels was reported as being generally good, although an initial lack of clarity of roles and responsibilities was noted by border control agencies and airlines and airports in some regions, possibly related to a perception that the health sector took time to identify them as key audiences for SARS-related information.

Similar reports indicate that, while interagency liaison was generally strong at a national level, there was some confusion and lack of engagement between Civil Defence and the health sector at a local level, as noted above. The Education sector reported good links with the Ministry of Health at a national level; however this experience was not repeated at regional and local level.

The external agencies' perceptions of the health sector's performance are covered in more detail in section 6, below.

Key points

- The role of other agencies implementing actions in their specific areas of responsibility was also vital, for example border control.
- Private organisations also undertook important roles (e.g. airlines, port companies, travel operation representatives and educational organisations).

5.5 Sector-wide issues

Ministry of Health and District Health Board commentators identified the following issues as being of concern to the sector as whole:

- Communication between the Ministry and the sector;
- Lack of clarity concerning expectations of agencies;
- Insufficient direction and central co-ordination of the response by the Ministry of Health; and
- Concerns regarding laboratory capacity and effective national surveillance functions.

These issues are discussed in section 6.2, below. Observations in that section include comments made by District Health Boards and public health services during case study interviews.

5.6 Summary

Overall, the Ministry of Health and District Health Boards visited were positive about the outcomes of the SARS response, namely: that there were no confirmed cases in New Zealand; staff responded appropriately to the threat; and that there is now the opportunity to test and refine plans for future use. While the ultimate outcome (no confirmed cases in New Zealand) was positive, the methods used to reach that outcome were viewed as less than optimal in some cases.

A brief examination of the actions of the Ministry and District Health Boards indicates that they generally fulfilled their obligations for pandemic response under the Influenza Pandemic Action Plan. There were, however, a few notable exceptions.

The case study identified a lack of regional pandemic planning at Auckland District Health Board. This was quickly addressed at the outset of the SARS response by the staff involved in the response. It should be noted other District Health Boards may have been in a similar situation.

The District Health Board SARS response groups appeared to be generally effective in coordinating action between hospital based services and public health services,

although relationships with primary health care services and external agencies were identified as an area for improvement in future planning and response situations.

During the SARS response, unexpected issues were encountered at all case study sites. Examples included: the impact the response on staff in response and treatment teams; inconsistent levels of planning and preparedness; and resource issues, particularly masks and other personal protective equipment.

These experiences highlight the need to build on the SARS experience to ensure that plans are as relevant and complete as possible, and use the valuable examples of innovative responses employed by various District Health Boards.

Like the District Health Boards, the Ministry of Health identified particular areas of concern during the SARS response, many of which are being addressed in post-SARS reviews of plans and implementation of the CIMS response system.

On a wider scale, links between the health sector and external agencies were tested by SARS, prompting some to note that existing plans at national and regional levels are too closely centred on the health sector, excluding critical links with other government and non-government agencies, either with key roles in a response framework, or significantly impacted by a threat such as SARS. There remains a level of concern in this area; however there is also strong motivation to address the gaps in planning and relationship building.

Looking to the future, the challenge is to ensure that the lessons learned during the SARS response are shared widely between agencies, and translated into integrated and improved plans, policies and procedures. Ideally, revision of plans should take place while the SARS response experience is fresh in the minds of those involved, and while the momentum exists to address these issues in constructive and collaborative ways within and between agencies.

6. Perception of the health sector's response to SARS

In order to ascertain whether the health sector's response to SARS was effective, a number of interviews were conducted, along with a web-based survey of key stakeholders. Points raised by case study participants are also included. The interviews and survey focused on three points:

- What were the strengths of the health sector's response to SARS?
- What were the apparent weaknesses of the response?
- What key lessons were learned during SARS that could be used to inform future responses?

This section also includes information from a survey of general practitioners, carried out as part of the National Emergency Plan project currently being undertaken by the Ministry of Health.

The information methods used were, briefly:

Web-based survey

The project group invited a range of people to participate in the web-based survey and the key informant interviews. The surveyed groups were:

- Ministry of Health employees;
- District Health Board employees;
- Other health sector (public health units, medical officers of health, primary health care providers); and
- Industry (travel industry and airlines, airport companies, private educational providers).

The web-based survey was designed to include a much larger number of people than could be interviewed face-to-face.

Interviews

Face-to-face or telephone interviews were conducted with individuals who played a key role in the response to SARS. Interview subjects represented government agencies, industry, District Health Boards, public health service and primary health care services. Interviews were conducted using an interview guide (attached at *appendix four*) available to interviewees prior to the meeting.

Interviews were conducted to collect more detailed information to augment the web-based survey.

All interview subjects were offered the opportunity to complete the web-based survey if they wished to make further comment, or anonymous comment.

Omnibus survey of the general public

Questions related to SARS were included in a regularly held survey of 500 randomly selected members of the general public. The survey questions were designed to assess the awareness, information sources and knowledge levels of the general public.

The methodology for both approaches is discussed in *appendix one*, attached.

6.1 Perceived strengths of the response

The overall perception of the response among interview subjects and web survey respondents was positive. Commentators from the Ministry of Health, health sector and external agencies stated that the response was as well conceived as was possible given the uncertainties present at the time and the pressure on the health sector to respond very rapidly, including the need to engage with a large number of external agencies.

A number of interview and survey respondents mentioned a shaky start, notably during the first three to four weeks. Some respondents felt this was understandable in the circumstances; others felt it indicated an initial lack of co-ordination in a "...rusty system..." that would not necessarily be repeated in future emergency management situations.

The perceptions of many interview and survey respondents were summed up by one who said that the most positive thing about the SARS response was that it was a "...learning exercise without having to deal with actual cases."

The web survey results mirror this finding. Of the total sample, 72 percent rated the response as either somewhat or very effective. A higher proportion of Ministry of Health respondents rated the response as being very effective (37 percent) as opposed to 21 percent of the total sample.

The most common themes relating to positive aspects of the SARS response were:

- health sector response;
- response timing and pitch;
- information to the public and sector;
- the Ministry of Health website, media management and choice of spokesperson;
- establishment of critical networks and relationships within the health sector and with external agencies;
- an improved profile for services, particularly infection control and public health; and
- identification of gaps and overlaps which can inform future planning.

6.1.1 Sector response

Commentators noted that the vast majority of those involved in the response made enormous efforts to ensure that all that could be done, was done, sometimes in very trying circumstances. One commentator noted that:

“I feel more confident now, having seen what people are willing to do to help out.”

6.1.2 Response timing and pitch

New Zealand’s rapid response to SARS was widely noted by interview subjects and web-based respondents. A range of interview and survey respondents praised the Ministry’s early activation of the Influenza Pandemic Action Plan, rapid dissemination of information and quick sharing of protocols and procedures (particularly on infection control). While some of the delivery mechanisms and structures behind the actions were not perceived as entirely smooth, respondents were confident that the New Zealand health sector was, in the main, acknowledging and responding to the SARS threat in a timely manner, and that most critical decisions and actions were made in good time.

Interview subjects were asked if they thought the response to SARS was pitched appropriately. The common perception was that the response mounted was suitable given the lack of knowledge that characterised the beginning of the outbreak, and the need to balance the needs and concerns of the public and industry with public health measures. Some perceived the response as overly conservative; however, as one noted, it is generally better to doubt an over- reaction than an under-reaction.

6.1.3 Information

Dissemination of information was an area perceived as having been generally well managed. Sixty six percent of the total web survey sample felt that very well informed about SARS, although the response varied across agency groups, from 74 percent at the Ministry of Health to 38 percent of industry respondents. Verbatim comments from industry respondents suggest that the low rating for information stems from a perceived delay in health services engaging with them directly.

Among the 250 general practices surveyed, all received information about SARS. 98 percent reported that they had ‘plenty’ of information. The most common source was the local public health unit, cited by 70 percent.

Among the public surveyed, 97 percent recalled hearing about SARS. The media was by far the most important source of information, mentioned by 91 percent of respondents. While it is not possible to judge what proportion of the media reports seen by respondents contained information sourced from the Ministry of Health, 94 percent of the public surveyed said they felt somewhat or very well informed about SARS.

When asked to describe SARS, respondents in the public sample mentioned issues such as aetiology, symptoms, transmission paths, infectivity, mortality rates (although those given varied between 2 and 100 percent) and affected countries.

Respondents to the web-based survey and interviewees mentioned the role of Dr Colin Tukuitonga in a positive light: there were no negative comments specifically regarding

his performance. Dr Tukuitonga was described as a credible, trustworthy and honest spokesperson that could convey key messages clearly and without inciting undue alarm:

“There seemed to be a well considered response without inciting panic. I felt quite positive that if and when it reached NZ we would mostly deal with it. Colin Tukuitonga I thought really did everything he could to convince people generally that until someone had symptoms it was rather foolish to panic. This should have been broadcast at regular intervals on TV I thought. “
Web survey respondent

The Ministry of Health and World Health Organization websites were the most common sources of information for web survey respondents, indicating that the Ministry's information provision services were well used. Interview subjects frequently mentioned the website and 0800 number as being very useful for information, and as a point of referral. One District Health Board respondent described these services as a “...Godsend – we could refer most calls to either service and it saved a lot of time.”

6.1.4 Establishment of networks and linkages

Survey respondents and interview subjects noted the networking that occurred during SARS as a very positive aspect of the response, particularly establishment of relationships between hospital-based services not normally working together; between public health and personal health services, and between the health sector and external agencies. Despite some reported difficulties in communication between the Ministry and the wider health sector, it is apparent that arrangements for the preferred types and methods of communication were established during SARS.

External agency representatives commented along similar lines, noting that the SARS response has increased agencies' knowledge of respective roles, pressures and limitations, and has highlighted the need to consider impacts of actions by one agency on other agencies. The ODESC process was seen as particularly useful in this respect.

6.1.5 Improved profile for services

The improved profile of infection control and public health units was widely commented on among interview subjects, case study participants and web survey respondents. The perception is that there is now a greater awareness of the role of these agencies in emergency response, but also in everyday practice. This particularly applies to infection control. Commentators note that post-SARS, health care workers are more receptive to infection control messages. The importance of infection control as an education and support tool during SARS was very widely discussed during the case study interviews, as noted above.

The experience of SARS response appears to have worked as practical demonstration of public health in practice. This perception was validated by the results of the web survey. Sixty percent of respondents agreed or strongly agreed that the roles and

responsibilities of the public health units were clearly defined, the most positive result of all agencies.

6.1.6 Informing future planning and response

The opportunity to identify gaps and overlaps in emergency response was frequently cited as a positive aspect of the response to SARS. All interview subjects felt that the New Zealand is now better placed to respond effectively to a future outbreak. Sixty nine percent of the web based survey sample rated the health sector's ability to respond to future events as likely to be either somewhat or very effective.

The opportunity to test a response system must, however, include identification and examination of weaknesses that were apparent during the SARS outbreak. One web survey respondent noted that the most positive thing about the SARS response was "...finding the deficiencies in the current system," an acknowledgement that there are areas of the response that were not as effective or efficient as possible.

Key points

- Most respondents felt the health sector's response was effective.
- Interview subjects, survey respondents and the general public felt well informed.
- Many of the Ministry's critical actions, such as communication, information, media management and use of expert advisory groups were well regarded.
- The learning opportunities and linkages forged during SARS are considered very valuable.

6.2 Perceived weaknesses of the response

While the overall perception was generally positive, the case studies, interviews and survey highlighted a number of areas that were perceived as lacking in the health sector response.

The most commonly perceived areas of weakness were:

- response structure;
- delineation of roles and responsibilities;
- co-ordination within the sector;
- information and communication;
- planning and readiness;
- capacity, resources, equipment and facilities; and
- laboratory capacity and co-ordination.

6.2.1 Response structure

Commentators from the wider health sector and external agencies noted that the absence of a formal, pre-practised response structure, CIMS or otherwise, appeared to cause difficulties within the Ministry of Health, and between the Ministry and other agencies. A strong theme was an impression that the implementation of a formal emergency management structure could have facilitated the move from policy to operational stance within the Ministry, and signalled the gravity of the situation to the rest of the Ministry and the wider sector. Use of a common response system (CIMS, for example) was seen as a relatively simple way of improving integration between the Ministry and the wider sector.

Command and control was an issue cited by a number of Ministry of Health and sector commentators in interviews and survey responses. In the absence of a clear incident command role within the Ministry itself, respondents perceived a lack of oversight at times.

Other issues related to a lack of formal response structure mirrored those reported by Ministry of Health commentators, including internal communication, staff support, identification of key audiences for SARS messages, and improving linkages with other organisations (see section 5.1, above).

Key issue

- The absence of a formal response structure at the Ministry of Health was perceived to have contributed to other issues within the Ministry and the wider health sector

6.2.2 Delineation of roles and responsibilities

A perceived lack of national leadership from the Ministry of Health was noted by several interview and web study participants and was identified, as noted previously, as an issue by District Health Board and public health unit case study participants. Examples given relate to the perception that the Ministry could have provided stronger direction to people requiring definitive advice, such as conference organisers and travel agencies, and clinical management issues like determining who should provide post-discharge care for any SARS patients.

The parameters of the Ministry of Health's role were not clear to a number of interview participants, some of whom noted that while the Influenza Pandemic Action Plan sets out general areas of responsibility, these did not appear to be cleanly translated into the SARS response. The web-based survey illustrates this point: 38 percent of the total sample felt the Ministry's role was not well defined: 21 percent of Ministry of Health respondents and 51 percent of District Health Board respondents gave this answer. In comparison, 21 percent of respondents felt that the role of the District Health Boards was not well defined.

The primary health care sector was identified by respondents as the having the least clarity of roles and responsibilities, as noted in case study interviews. Thirty-two percent of the total web sample felt that the role of this sector was well defined.

The perception of a lack of leadership within the health sector appears to be closely associated with the need for clear allocation of roles and responsibilities, and clear expectations of every agency involved in the SARS response.

A number of interview participants noted that some government agencies appeared to shy away from taking full responsibility for implementing SARS-related procedures. It is interesting to note that the agencies named in these comments are among those who most strongly perceived a lack of leadership from the Ministry of Health.

The business-as-usual consultative approach was frequently cited by Ministry and other health sector commentators as having been too slow, acting as a barrier to decisive action, and to achieving consistency of approach between District Health Boards.

Some interview participants from within the health sector and external agencies described the Ministry of Health's role as a difficult balancing act, but also felt that it would be greatly helped by clarification of expectations, roles and responsibilities throughout the health sector and, where required, between the sector and other agencies.

Key issues

- There was a lack of clear delineation of roles and responsibilities throughout the health sector, with related issues concerning leadership and command and control within the Ministry of Health and the wider sector.
- The role of the Ministry of Health was less clear to respondents than the roles of the more visible District Health Boards.
- The role of primary health care, not specified in the Influenza Pandemic Action Plan, was the least clear during the response to SARS.
- Some external agencies appeared unsure of or unable to fulfil their roles, resulting in additional work for the health sector.

6.2.3 Co-ordination

Survey and interview respondents identified co-ordination of action across the health sector as central to an effective response; however comments indicated that there were weaknesses in this area during the SARS response.

Interview subjects from within and external to the health sector, as well as survey respondents, noted that the Public Health and Clinical Services Directorates within the Ministry were not always well co-ordinated, as previously noted.

A lack of national co-ordination of scarce resources, be they skilled staff, masks or other protective equipment, was noted by interview and survey respondents as an area requiring more attention. The development of clinical protocols and procedures, apparently undertaken separately by most District Health Boards and public health units, was an area that commentators felt could have been nationally co-ordinated to promote consistency and save duplication of effort.

Within the wider health sector, there was concern regarding co-ordination of primary health care service. Without clarity over the role of primary health care providers, the co-ordination of a large, widely distributed group of providers proved difficult in some circumstances.

Key points

- Lack of co-ordination between the Public Health and Clinical Services Directorates caused some confusion in the wider sector and was apparent to external agencies.
- A co-ordinated approach to some issues, namely management of scarce resources and development of protocols and procedures was identified as an area for improvement.
- Respondents noted a lack of co-ordination between primary health care services, and between primary health care and other parts of the health sector.

6.2.4 Information and communication

Information was one of the greatest strengths noted during the response, and it is perhaps an indication of the effectiveness of the action that respondents' concerns related almost solely to the volume of information received from the Ministry of Health. Interview respondents, web survey and case study participants frequently noted that a lot of time was spent organising and filtering information to ease dissemination to wider audiences.

Twenty two percent of the total web sample felt that information was not distributed in a timely manner, citing the use of inappropriate communication channels and delays updating the website. A number of respondents noted that they used the World Health Organization website for what they perceived to be more up to date information.

Web survey respondents were asked to identify areas in which they felt less than fully informed. The most common responses were information on prevention (15 percent), containment measures (26 percent) and treatment (14 percent). A number of respondents noted these as areas of uncertainty throughout the world, particularly at the beginning of the outbreak.

Requests for additional technical information were a problem for some survey respondents and interview subjects. Instances were cited where providers sought advice from the Ministry of Health on specific issues but did not receive timely replies. One respondent reported that this made them feel "...lonely – we were looking for support and advice and couldn't get it when we were really worried."

Interview subjects and survey respondents noted that, while the teleconferences were generally useful, they were often time-consuming. Several commentators noted that stronger moderation would have helped make better use of the time.

Use of email was generally well regarded. The survey of general practitioners indicated that, while most (82 percent) have access to email, 89 percent preferred to receive urgent information from the Ministry of Health by fax. Other survey and interview participants noted that the health sector lacked a 'master list' of contacts, and that this was particularly apparent when contacting primary health care organisations, resulting in gaps, overlaps and delays in information dissemination. While a high percentage of GPs surveyed reported receiving enough information, it should be noted that some interview subjects said that this was the case "...in the end." At the outset of the outbreak, those interviewed felt that information took too long to get to the primary health care sector.

Key points

- The volume of information was difficult for District Health Boards and public health services to manage.
- Information and advice on specific technical issues was difficult to access.
- Respondents noted concerns relating to the completeness of information on containment, treatment and prevention of SARS.
- Communication methods and channels were not always appropriate.
- Contact details were not always accurate.
- Communication with the primary health care sector was an area of particular concern.

6.2.5 Planning and readiness

The general perception of interview subjects and web survey respondents was that the health sector was, in overall terms, relatively well prepared for an infectious diseases outbreak. The presence of the Influenza Pandemic Action Plan was mentioned as being a significant factor. A number of respondents noted that New Zealand is among relatively few countries with an active influenza pandemic planning process, and noted that even fewer have tested their plans.

Nevertheless, there was variation in the perceptions of the health sector's readiness to take on the roles prescribed in the Influenza Pandemic Action Plan.

Forty two percent of web survey respondents agreed or strongly agreed that the health sector was geared up to prevent a major outbreak of SARS, citing forward planning and the presence of advisory groups such as the National Pandemic Planning Committee and the Infectious Diseases Advisory Committee. Despite this, there were some serious concerns voiced regarding the detail and quality of planning.

Interview subjects and web survey commentators noted that while the Influenza Pandemic Action Plan provides an overview, it does not cover the operational details critical to a co-ordinated and efficient response to local cases, including the transport, post-discharge care and role of primary health care.

Some respondents felt that the implementation of entry control processes too late, and would not have been effective in preventing entry of imported cases early on the in SARS outbreak. These respondents felt that the absence of formal, local and national interagency response processes between border control and health agencies, airlines and airport companies hindered rapid implementation of effective border control measures.

There was a perception among interview participants that New Zealand was very vulnerable to imported cases of SARS. Respondents generally felt that New Zealand needs to make the most of its isolation and rigorously protect the border.

The limitations of planning processes were succinctly put by one respondent:

You can't be totally prepared for this sort of event; the experience overseas shows how unpredictable and uncontrollable some of the factors were. Doesn't mean you shouldn't plan but don't rely on plans to always work.

Key points

- The Influenza Pandemic Action Plan provided a framework for response but was perceived as lacking sufficient detail or structures for rapidly developing and implementing specific processes.
- Readiness varied among health sector providers.
- The lack of a formal response structure at the Ministry of Health was a key gap in planning and readiness.
- Border control issues were perceived as an area of vulnerability and gap in previous planning.

6.2.6 Capacity, resources, equipment and facilities

Capacity issues were the most commonly cited reasons that web survey respondents felt that the sector was not geared to prevent or contain an outbreak of SARS, effectively treat cases or maintain essential medical services. Capacity and resource issues cited closely matched those mentioned by case study participants:

- Lack of surge capacity within District Health Boards treatment services and public health units.
- Insufficient numbers of negative pressure and isolation beds; ventilators; and stocks of personal protective equipment, namely N95 and N100 masks.
- Inadequate numbers of expert clinical staff in the areas of infection control, infectious disease and respiratory medicine, critical care, medical microbiology and emergency medicine; and public health physicians with communicable disease expertise.
- Access to and knowledge of the proper use of personal protective equipment.

Some characteristics of SARS were noted as being particularly troubling with regard to capacity. The fact that up to 25 percent of SARS patients needed intensive care, and were in intensive care units for an average of nine days was sited as a key concern. The lack of adequate isolation facilities in almost all District Health Boards was widely noted by survey and interview respondents and was perceived as potentially significant for other services:

“We do not have available a second hospital available in many areas in which to isolate infected persons, while continuing to run necessary medical services.”

Respondents felt that New Zealand would have experienced significant difficulty providing appropriate levels of care for all but a small number of SARS cases.

With regard to resources, the most common issue cited was scarcity of N95 and N100 masks, along with confusion on availability and distribution lines, and how hoarding could be prevented. Ways of making the most of limited capacity and resources were discussed at length during interviews, focusing primarily on allocating scarce resources to areas of greatest need, an activity seen as requiring strong national leadership.

Key points

- Limited capacity, resources and suitable facilities were factors that were perceived as potentially limiting the sector’s ability to respond to SARS.
- Skills, equipment and access to personal protective equipment were the most commonly cited areas of concern.
- The limited surge capacity within treatment services was of significant concern.

6.2.7 Laboratory and surveillance capacity and co-ordination

A number of interview subjects commented on the apparent lack of surge capacity within laboratory services, and the lack of co-ordination to make best use of the facilities and expertise available in this country. The use of three reference laboratories during the response reportedly lead to duplication of effort at each of the sites, and was perceived as an overreaction in a country this size. Commentators felt that one nominated laboratory would have been sufficient.

Co-ordination of laboratory services was reported as having been an issue for some time, with specific reference to the role of ESR as a national reference laboratory when other laboratories are perceived to be better resourced. Some commentators noted concern regarding ESR's capacity to deliver national surveillance in an emergency situation. A number of interview participants noted that this appears to the sector to stem from long-standing difficulties in the relationship between ESR and the Ministry of Health, and a perceived lack of laboratory expertise at Ministry level.

New Zealand's highest level of laboratory containment facility is PC 2. The WHO recommended that SARS be stored at PC 3 level facilities for safe containment. ESR reached agreement with MAF for the use of PC 3+ facilities at the Wallaceville site in Wellington, normally used for animal diseases. Interviewees noted that at the very least, a formal arrangement with Wallaceville should be made to allow access to the PC 3+ facilities in emergency situations. A number of interview subjects noted that it would be preferable to have a PC 3 or higher facility dedicated for human disease work.

Key issues

- A perceived lack of co-ordination between laboratory services, leading to a lack of clarity of roles and duplication of effort.
- Reported concerns over the clarity of role and response capacity of ESR.
- The need for more formal arrangements for access to PC 3 facilities.

Summary

Asked how they would rate the New Zealand health sector's capability for rapid, co-ordinated action in prevention, containment and treatment of major infectious disease outbreaks in the future, 69 percent of respondents indicated that they felt the health sector could mount a somewhat or very effective response.

There remain, however, significant concerns relating to particular issues highlighted by SARS. Eighteen percent of web survey respondents felt that the health sector would be not at all or not very able to mount an effective response in the future. Lack of consistent levels of planning across the health sector (for example variations in the levels of

planning between District Health Boards and public health units), limited access to resources (both skills and equipment), inability to respond to sudden surges in demand, and a health sector operating in a relatively new structure were all identified as issues that require urgent attention or consideration in planning for the future.

While the issues discussed above are undoubtedly significant, they represent opportunities to refine the process of responding to future pandemics. As one interview participant noted, the very fact that people within and external to the health sector are able to identify problems and contributing factors in such detail is a positive indicator, and shows a willingness to build on the SARS experience and address the issues identified in a positive and constructive way.

7. Pandemic response plan objectives

As noted previously, the Ministry of Health initiated the SARS response using the Influenza Pandemic Action Plan. This section compares the response mounted against the objectives of the Plan to determine whether the response effort fulfilled the Plan's objectives.

Objective 1: Provide a plan to ensure rapid, timely and co-ordinated action, including current and authoritative information for health professionals, the public and media at all stages.

There is little doubt that the Influenza Pandemic Action Plan provided a useful framework for initial response, including rapid activation following the WHO's alert on March 12. Most of the critical actions taken were timely, with the possible exception of border control measures. Co-ordination was, as previously noted, an issue within the Ministry, the wider health sector and, on occasion, between the health sector and external agencies.

Comments made during the case studies, interviews and the web survey indicate that the information aspects of the SARS response were generally perceived in a positive light.

Review participants noted that, at times, the information available was not as authoritative as it could have been, particularly concerning use personal protective equipment, and on specific issues such as patient transfer and use of negative pressure beds. These gaps in information did, however, reflect the global uncertainties concerning the management of SARS, particularly in the early stages of the outbreak.

The dissemination of information to health professionals was largely positively received, with the exception of information to primary health care and allied health professional groups. The results of Operation Virex identified these lines of communication as requiring further review, and it appears that this is still the case.

Objective 2: Specify the roles and responsibilities of the Ministry of Health, District Health Boards, public health units and other key organisations.

Comment from the health sector indicates that the roles and responsibilities set out by the Influenza Pandemic Action Plan were not well understood by all agencies with a role to play, for example some District Health Boards lacked regional pandemic plans.

The report following Operation Virex noted, "all participants have identified the areas they will work on and have asked for...clarification on roles and responsibilities of who does what, when." The response to SARS illustrated that this recommendation remains highly relevant.

The Operation Virex report identified the need to clarify roles for key health sector agencies (see *appendix five*). The review findings suggest that these areas require ongoing attention, and may suggest that the Influenza Pandemic Action Plan should contain a greater level of detail.

One issue not covered in either the Plan or the results of Operation Virex was the impact of the response effort on staff. During the SARS response it became apparent that objectives cannot be met if the right people are not involved and well supported during their involvement. This is a key responsibility of all agencies involved.

Objective 3: Reduce morbidity and mortality from influenza illness

New Zealand did not experience any confirmed cases of SARS. It is impossible to determine whether this was due to the response mounted, or whether this country was fortunate to escape a Toronto-like scenario – the likely answer falls somewhere between the two.

The perception in the health sector and among other agencies is that the response could have fulfilled this objective short of a very rapid increase in cases, or widespread, overwhelming rates of infection. Capacity and resource issues identified during SARS, including lack of isolation facilities, infection control expertise, laboratory services and co-ordinated distribution of scarce resources appear likely to have limited the sector's ability to fulfil this objective if significant levels of local transmission had occurred.

Objective 4: Ensure that essential services are maintained; minimise the social disruption and economic losses that may be associated with an influenza pandemic.

The key to achieving this objective is effective interagency liaison. During SARS, the focus was on the ODESC process as a means of effecting a whole-of-government response.

ODESC appeared to enhance liaison between Health and other government agencies, and, despite a few initial difficulties establishing links, was perceived to have worked well. Some respondents were concerned that, in the medium to long term, agencies are likely to revert to pre-SARS levels of communication if efforts are not made to maintain inter-agency linkages. A revised plan including a more detailed outline of external agencies' likely roles in a pandemic response, and including external agencies in health sector planning and response exercises are ways to address this issue.

Objective 5: Provide guidance to District Health Boards with the establishment of regional influenza pandemic plans and annual influenza winter planning.

This objective relates more to inter-epidemic action than emergency response. The lack of regional planning by some District Health Boards indicates that this objective may not have been adequately addressed prior to SARS. While the Influenza Pandemic Action Plan does provide a framework; however as noted previously, for SARS showed that the

devil can be in the operational detail. A national Plan plays a role in defining the parameters of action, but is no substitute for active and ongoing collaborative planning efforts.

Key points

- The Influenza Pandemic Action Plan objectives were largely relevant to the SARS response.
- All objectives were met in part.
- The recommendations and lessons learned from Operation Virex remain relevant and should be considered in future planning.
- A greater level of specificity in the Influenza Pandemic Action Plan or supporting documents may help to address issues in areas where objectives were not met.
- Staff management and support at all response agencies was an emerging issue that may warrant specific attention under a specific objective of an emergency response plan.

8. Conclusions

Overall, case study interviews, survey responses and interview results indicated that the New Zealand health sector's response to SARS was considered to have been generally effective. The issues that arose generally related to processes used to put response actions in place, rather than the effectiveness or the quality of the actions themselves.

A pandemic plan was in place and had been tested. During the SARS outbreak, the Influenza Pandemic Action Plan helped to facilitate action at a national level, allowing for the involvement of the National Pandemic Planning Committee and the establishment of the SARS response team and later, the technical advisory group to support response functions.

At a local and regional level, SARS response groups brought together hospital-based services and public health services to facilitate co-ordinated planning and response to any suspect SARS cases. These groups required the collaboration efforts of services and staff that may not normally work together.

The SARS response process did, however, highlight issues related to co-ordination within the Ministry of Health and between the Ministry and the wider health sector. Lack of effective engagement with primary health care is an important example. The lack of a formal response structure at the Ministry of Health, the need to clearly delineate roles and responsibilities (including those specified in legislation), the importance of effective and relevant planning, improved communication systems and the maintenance of effective relationships with other agencies and private industries were all highlighted as areas where additional attention could significantly improve response to future infectious disease outbreaks.

Comparison of the response with the objectives of the Influenza Pandemic Action Plan supports the findings of the case studies and surveys, namely that the response appeared to meet, at least in part, all relevant objectives, but there is room for refinement.

Given the number and potential gravity of the issues highlighted by the health sector's response to the SARS outbreak, it is easy to lose sight of the fact that there were many positive outcomes, and the most involved in the response thought that, overall, it was done well.

Response participants benefited from the experience in terms of going through a live exercise, despite the demands of working in highly stressful situations over an extended period of time. Some commentators noted specifically that the issues highlighted fall generally into the realm of areas for improvement rather than a requirement for transformational change, and that SARS provided New Zealand with a valuable opportunity to test pandemic response plans.

There is no doubt that some of the issues highlighted were highly significant; however the mechanisms and the motivation exist to address them and move to a stronger footing for the future.

9. Recommendations

These recommendations relate to forward planning for emergency response, based on the SARS experience.

Structure

1. Support the timely implementation of CIMS across the Ministry of Health and throughout the health sector to provide a common framework for emergency response. Ensure all staff with a potential key role in a response receive training
2. Introduce relatively low thresholds for CIMS activation to ensure systems are regularly used and clearly understood by all involved.
3. Identify and formally communicate lines of command, control and accountability within the Ministry of Health, between the Ministry and the wider health sector, and between personal and public health care services.
4. Examine the potential for an agreed emergency response protocol between the Ministry of Health and District Health Boards
5. Include clear expectations of staff support and management in emergency planning in all areas of the health sector.

Planning

6. A generic infectious disease response plan should be considered as part of the wider suite of emergency response plans and scenarios at national, regional and local levels.
7. The Influenza Pandemic Action Plan should be reviewed in the post-SARS environment, taking into account to the following key issues:
 - Identifying tasks that can be managed nationally or allocated to identified agencies within the health sector to avoid duplication
 - An increased focus on logistical and operational issues (accommodation for staff under quarantine, patient transfer, etc)
 - An increased emphasis on linkages with other key government and non government agencies, namely border control, travel, airline and airport companies
 - Systematic approach to identification of and communication with all potential key audiences

These points would be relevant to a generic infectious diseases response plan and could be included in the Plan or supporting documentation.

8. Establish a forum of emergency response managers from District Health Boards and public health units to share SARS-related experiences and lessons, and to act as an advisory group to Ministry of Health emergency response planning.
9. Include primary health care representation at all phases of emergency response planning
10. Appoint external expert peer reviewers to assess the suitability of national emergency plans developed by the Ministry of Health
11. The Ministry of Health should ensure that all District Health Boards and public health units have adequate plans in place, and that there is clear emphasis on, and accountability for, appropriate levels of emergency planning.

Communication

12. Development of a systematic method of identifying and communicating details of key audiences who may not normally be the target of detailed health-related messages. Examples identified during the SARS response include private educational institutions, frontline border control staff, airline and airport staff.
13. Develop and maintain contact lists within the health sector, including allied health professionals, and with external agencies, in particular border control agencies, and include private companies where required. Develop protocols with professional medical colleges for the use of their contacts lists and processes in emergency situations.
14. Continue to establish and maintain close links with key international organisations, and support the development and implementation of the revised International Health Regulations.

Capacity

15. Assess laboratory and surveillance capacity to meet the requirements of the Influenza Pandemic Action Plan
16. Analyse the capacity and resource levels at service delivery agencies, with a specific focus on infection control, medical microbiological and infectious disease skills, including access to expert support for District Health Boards without on-site staff in these areas
17. Establish and maintain up-to-date information on capacity and resource availability, particularly at District Health Board level. This information should be immediately available to the Ministry of Health when required.

Funding

18. Clarify funding streams for emergency response for District Health Boards, public health units, laboratory services and primary health care organisations, including both service and support costs

Sampling methodology: targeted web-based and general public surveys

Overview

This methodology section addresses the following processes and areas:

1. Questionnaire design
2. Sample
 - a. Sampling unit
 - b. Sampling process
3. Interviewing processes
4. Sampling and non-sampling error
5. Confidentiality of respondents.

Questionnaire Design

The questionnaires for both the general public survey and the Internet survey were designed in consultation with the Ministry of Health. Once the preliminary versions had been agreed to, they were subjected to an internal peer review. Following the peer reviews, minor changes to the wording of some questions were recommended and approved by the Ministry before being implemented.

Sampling

The sampling for the two surveys was conducted via two different methods.

General public sampling units

The general public survey was conducted through the BRC Omnibus. Each month the omnibus randomly surveys by telephone, a nationally representative sample of New Zealanders. The primary sampling unit of the omnibus sample survey was all households in the New Zealand telephone directories. The secondary sampling unit was individuals 15 years of age and over living in those households.

Sampling process – general public

The objective was to select a sample of households in such a way that every such household had a known, non-zero probability of being selected, including those not necessarily listed in the New Zealand White Pages. This was ensured through using a random number generator to create and select potential telephone numbers. The achieved sample size of the general public survey was n=500

Internet survey sampling units

The primary sampling unit of the internet survey was individuals from:

- Ministry of Health (SARS Technical Advisory Group, National Pandemic Planning Committee members)
- The Health Sector (DHBs not involved in the health studies Public Health Services, GPs, IPAs and PHOs, Airport Nurses)
- “Other” informants (i.e. Airline Industry (BARNZ), Tourism/Travel Industry (TIANZ, TAANZ), Education Industry).

The secondary sampling unit was individuals nominated by the Ministry of Health as being stakeholders in New Zealand’s SARS response, or having been involved in the coordinated response effort.

The tertiary sampling unit was individuals not participating in the case studies (face-to-face interviews or telephone interviews) who had access to e-mail.

Sampling process – internet survey

As it was the aim to invite participation from all key nominated representatives of each key organisation/industry/sector of interest who were not involved in the case studies, the approach used for the internet survey was a census survey (as opposed to a sample survey).

154 nominated individuals were invited to participate and 95 of these individuals completed the survey.

Interviewing

General public interviewing

Interviewing for the Omnibus was conducted evenings and weekends between the dates of 8 September and 24 September 2003. Five attempts to contact each household selected were made before the attempt to obtain an interview was abandoned and a different household from the samples was substituted in its place.

Internet survey interviewing

Nominated individuals were initially sent an e-mail from the Ministry of Health pre-notifying them of the survey. On 23 October 2003, an e-mail originating from BRC invited all nominated individuals to complete the survey. The e-mail contained unique Logins and Passwords, a link to the survey web page, and directions on how to complete the survey. A reminder to complete the survey was sent on 4 November 2003 (for those stakeholders who had not yet completed the survey).

To boost responses, a successive e-mail was sent on 13 November 2003 by the Ministry thanking those that had completed the survey and encouraging those that had not, to do so. A final, follow up e-mail from BRC was sent on the 18 November 2003 re-providing Logins and Passwords to those who had not yet completed the survey. The final day of surveying was 26 November 2003.

Individual interviews

68 interviews were conducted on an individual, face to face or telephone basis. These interviews were used to collect information from key contact people within the Ministry of Health, other government agencies involved in the response to SARS, and a number of clinical staff not otherwise involved in the web-based survey or case study visits.

Interview participants were nominated by the Ministry of Health, or by the District Health Boards identified as case study sites.

Case studies

Five District Health Boards (DHBs) were invited to participate as case study sites:

- Auckland
- Counties Manukau
- Hawkes Bay
- Taranaki
- Canterbury

The mix of DHBs was designed to cover large urban populations with a major international airport, smaller rural DHBs, South Island urban and remote rural DHBs, and Hawkes Bay as the DHB involved in the management of New Zealand's only probable case of SARS. Interviews with management and clinical staff involved in the SARS response were conducted at each site.

Three Public Health Services (PHSs) were also involved as case study sites:

- Auckland;
- Regional Public Health (greater Wellington); and
- Community and Public Health (Canterbury, South Canterbury and the West Coast).

Information from the web-based survey, interviews and case studies has been incorporated into the body of this report. Where necessary, information source is specified for clarity.

Sampling and non-sampling error

Sampling errors – general public survey

As the general public survey was of a random sampling of New Zealand households, the reader should be aware that margins of error and confidence levels apply any statistics reported from that survey. (e.g. where a reported result from the general public survey equals 50%, the maximum margin of error at the 95% confidence level for a random sample of $n=500$ is $\pm 4.4\%$. This means that were the survey repeated under similar circumstances, it can be expected that 19 times out of 20 the reported result for the same question would be between 45.6% and 54.4%).

The table below can be used as a guide for determining the maximum margin of error at the 95% confidence level for the proportional responses of the general public survey results within this report,

Table 1: Margin of Error Interpretation – general public survey results

Percentage of Sample	Total Sample n=500 %
50%	4.4%
40% of 60%	4.3%
30% to 70%	4.0%
20% to 80%	3.5%
10% to 90%	2.6%
5 % to 95%	1.9%

Sampling errors – internet survey

As the internet survey was conducted as a census of nominated stakeholders, the normal constraints of sampling error and confidence intervals do not apply to the internet survey results. Thus the results and any comments that identified serious issues or concerns can be viewed as significant – in that if even one person stated that they had concerns about or evidence of serious economic loss (for example) in their organisation/sector/industry this should be viewed as important data for the review.

Non-sampling errors

Non-sampling errors arise from a variety of sources and may occur at several stages in a survey process. For example, at the design stage the way the questions are phrased may create bias, at the interviewing stage interviewers may create various biases by the way they ask the questions and record the answers, at the data processing stage errors may occur in data cleaning and in tabulation. Finally, in reporting the results researchers may unwittingly misinterpret the results.

Throughout the project, all feasible steps to minimise the extent of non-sampling error have been taken, including: ensuring that all aspects of the work were carried out in a professional manner, i.e. that the design was peer-reviewed and pilot tested, that telephone interviewers conducting the general public survey were well trained to avoid biases, and that robust quality control measures were maintained for trapping errors at the data processing, analysis and reporting stages.

Non-response bias

The objective of any sampling scheme (whether census or random sample survey) is to obtain a body of data that can be interpreted as representative of the population of interest. Unfortunately, some sample members become non-respondents because they:

- Refuse to respond
- Lack the ability to respond
- Are not at home or work during the period of the survey, or are otherwise inaccessible.

The seriousness of non-response bias depends upon the extent of the non-response as well as how the non-respondents differ from the respondents, particularly on the key questions of interest.

The effects of non-response upon the results have not been estimated for the purposes of analysis and reporting, however all feasible steps have been taken to minimise the extent of non-response bias through:

- The use of pre-notification e-mails to the internet sample to raise potential interest in the survey topic
- Testing the design and placement of survey questions of both surveys through peer reviews and survey piloting
- Call backs (general public survey) - five attempts to contact each household selected were made at different times and on different days before the attempt to obtain an interview was abandoned and a different household from the samples was substituted in its place
- Three reminders (including one from the Ministry of Health) to those internet survey respondents who had not yet responded
- Providing the general public survey respondents with the option of scheduled appointment times to be interviewed
- The use of skilled interviewers to better generate rapport with the general public respondents.

Respondent Confidentiality

All researchers at BRC and Allen & Clarke fully understand their obligations and responsibilities under the Privacy of Information Act (1993). These, in turn, are reflected in those that relate to the Market Research Society of New Zealand Inc.'s Code of Practice – especially those that concern the anonymity of clients and respondents, and the confidentiality of information supplied by both.

The important Principles in this regard relating to information collected from or about an individual during the research process are as follows:

- Participation in the research process was purely voluntary and was undertaken on an informed consent basis
- Respondents had the right to withdraw their participation in a research process at any stage (pre- and post-interview)
- Evaluators/researchers were obliged to indicate what personal information if any they held about a respondent to the said respondent should they enquire.
- Evaluators/researchers were obliged provide respondents with access to the personal information they held about them.

- Evaluators/researchers were obliged ensure the anonymity of the respondents, unless otherwise authorised by the respondent.

Contingency plan: Influenza Pandemic Action Plan for New Zealand

Contingency plan

The following plan uses the broad WHO definitions for pandemic preparedness, adapted to ensure relevance to New Zealand. The WHO will announce the onset of phase 1 and progression to subsequent phases based on evidence collected by its Pandemic Taskforce and international consultation.

There are key actions that need to be taken during each level of global alert of an influenza pandemic. This should not be viewed as a complete list, as certain actions will be mitigated by events arising during the course of the pandemic.

The time intervals between phases 1–4 will not be predictable. If the pandemic has a particularly rapid onset, some of the phases may progress very rapidly or be missed altogether.

WHO pandemic phases and levels of preparedness	Actions required in New Zealand	Lead New Zealand agency
<p>Phase 0 Inter-pandemic period – No indications of new virus type reported</p> <p>Preparedness level 1 – appearance of a new influenza strain in a human case</p> <p>Preparedness level 2 – two or more human infection confirmed</p> <p>Preparedness level 3 – human transmission confirmed</p>	<p>Establish NPPC and work plan</p> <p>Ensure every region has an Action Plan and Action Committee in place, and that both are complementary to each other and to the national plan</p> <p>Ensure legislative basis for implementing Action Plan</p> <p>Factsheets and briefing material prepared and web sites running</p>	<p>DHB/PHS</p> <p>Ministry of Health</p> <p>Ministry of Health</p>
	<p>Develop Regional Action Plans</p> <p>Establish regional pandemic action committees, with stakeholder representation (eg, Medical Officers of Health and GPs)</p> <p>Set up register of general practitioners, nurses, and social service staff available in region</p> <p>Identify and document all medical and health care provisions and facilities (eg, hospital beds, ventilators)</p>	<p>DHB/PHS</p> <p>DHB/PHS</p> <p>DHB</p>
	<p>Attention to having access to adequate supplies of antibiotics, ancillary drugs and equipment</p>	<p>DHB</p>

WHO pandemic phases and levels of preparedness	Actions required in New Zealand	Lead New Zealand agency
	Determine mortuary capacity and locations of appropriate cold storage facilities	DHB
	<p>Vaccines</p> <p>National policies on vaccine supply and distribution in place, and priority groups for immunisation identified</p> <p>Adopt a single system for reporting and monitoring adverse reactions to vaccine</p> <p>Attain high coverage of influenza immunisation in identified cohorts and high-risk groups</p>	<p>Ministry of Health, NPPC, NSIIG</p> <p>Ministry of Health</p> <p>Service providers</p>
	<p>Antimicrobials</p> <p>Determine the supply and distribution of antibiotics</p>	Ministry of Health, Pharmac
	<p>Implement national surveillance system</p> <p><i>Preparedness levels 1 and 2:</i></p> <p>Nationally agreed definition of influenza-like illness, and consistent surveillance methods</p> <p>Set up national co-ordination centre for data collection, intelligence and dissemination</p> <p>Monitor international developments in influenza pandemic planning</p>	<p>Ministry of Health</p> <p>Ministry of Health, ESR</p> <p>Ministry of Health, ESR</p>
	<p>Enhance laboratory capacity to provide more comprehensive and consistent support for national influenza surveillance</p> <p>Liaise with overseas laboratories and national influenza centres, and characterise strains</p> <p><i>Preparedness level 3: Enhance surveillance</i></p> <p>Reporting enhanced with daily updates to central collation point</p> <p>Patient influenza-positive samples to be sent urgently to WHO Collaborating Centre</p>	<p>Ministry of Health, ESR</p> <p>ESR</p> <p>ESR</p>
	Ministry of Health initiate immediate national response	

WHO pandemic phases and levels of preparedness	Actions required in New Zealand	Lead New Zealand agency
<p>Phase 1 confirmation of onset of pandemic – Several outbreaks involving the novel influenza virus strain in at least one country with spread to other countries</p>	<p>Establish national 0800 number</p> <p>Daily assessment of pandemic status</p> <p>Convene news conference with media as required. Media Unit and necessary staff to be available at other times for interviews.</p> <p>Disseminate latest pandemic information and distribute fact sheets</p> <p>Ensure public access to Ministry of Health website and other media sources for information</p> <p>Advise public against travel to known affected areas, and prevention measures</p>	<p>Ministry of Health</p> <p>Ministry of Health, NPPC</p> <p>Ministry of Health</p> <p>Ministry of Health, DHB/PHS</p> <p>Ministry of Health</p> <p>Ministry of Health, NPPC</p>
	<p>Assess vaccine availability</p> <p>Acquire supplies of vaccine</p> <p>Analyse available clinical data on age-specific attack rates and complications and if necessary reprioritise population groups for vaccination</p> <p>Immediate mobilisation to immunise priority groups against pandemic strain (as soon as vaccine is available)</p>	<p>Ministry of Health/ NSIIG</p> <p>Ministry of Health, NPPC</p> <p>DHB, PHS</p>
	<p>Implement enhanced surveillance strategies</p> <p>Additional laboratory facilities operational and resourced</p> <p>Regular and timely reporting to jurisdictions on the spread of the pandemic</p> <p>Enhance State surveillance through general practitioners. Increase hospital-based surveillance</p> <p>Monitor adverse reactions to vaccines and antivirals</p> <p>Ongoing monitoring of viral isolates</p>	<p>Ministry of Health</p> <p>Ministry of Health</p> <p>DHBs</p> <p>Ministry of Health, CARM</p> <p>ESR</p>

WHO pandemic phases and levels of preparedness	Actions required in New Zealand	Lead New Zealand agency
	<p>In addition to the above, if New Zealand has cases:</p> <p>Enhance activity of NPPC Implement communications strategy</p> <p>Advise people of travel and other risks</p> <p>Make recommendations on public health measures (eg school closures, event cancellation etc) as appropriate</p> <p>Vaccine and antimicrobial supply Co-ordinate supply of vaccines and antivirals. Follow the Ministry of Health's Infectious Diseases Advisory Committee recommendations for antiviral treatment and prophylaxis</p> <p>Determine availability of appropriate antibiotics</p> <p>Surveillance Use absentee data from local industry Hospitals to prioritise admissions and services. Commence reallocation of staff and duties if required Notify relevant areas of mortuary capacity within each jurisdiction</p>	<p>Ministry of Health</p> <p>Ministry of Health</p> <p>Medical Officers of Health</p> <p>Ministry of Health, IDAC, DHBs</p> <p>DHBs</p> <p>DHBs</p> <p>DHBs</p> <p>DHBs</p>
<p>Phase 2 regional and multi-regional epidemics – Outbreaks and epidemics occurring in multiple countries and spreading in regions across the world</p>	<p>Communication Regular updates to be distributed and posted on the Ministry of Health website</p>	<p>Ministry of Health</p>
	<p>Ongoing enhanced surveillance including adverse reactions Continue monitoring course of pandemic and adverse reactions to vaccines and antivirals. Continue reporting on spread of virus.</p>	<p>ESR, CARM</p>
	<p>Monitor morbidity and mortality rates</p>	<p>Ministry of Health</p>

WHO pandemic phases and levels of preparedness	Actions required in New Zealand	Lead New Zealand agency
	<p>Public health measures</p> <p>Medical Officer of Health will consider whether further public health measures are required (eg, school closures, etc)</p> <p>Consider alternative arrangements for hospital beds in event of shortage (community halls etc)</p> <p>Vaccines</p> <p>Co-ordinate distribution of vaccines (if vaccine is available)</p> <p>Continue review of age-specific attack rates and complications, and any subsequent re-prioritisation of immunisation groups</p> <p>Surveillance</p> <p>Continue with enhanced surveillance through general practitioners and continue surveillance of hospital infections</p>	<p>Medical Officer of Health</p> <p>DHBs</p> <p>Ministry of Health</p> <p>Ministry of Health, NPPC</p> <p>DHBs, ESR</p>
<p>Phase 3 end of first pandemic wave – No increase in countries affected initially but outbreaks occurring elsewhere in the world</p>	<p>NPPC</p> <p>Regroup and evaluate phases 1 and 2</p> <p>Analysis of surveillance information and development of strategies for next pandemic wave</p> <p>Vaccines and antimicrobials</p> <p>Collate data on cases and effectiveness of vaccines and antivirals</p> <p>Monitor match of vaccine to circulating strains</p>	<p>NPPC</p> <p>Ministry of Health, NPPC</p> <p>Ministry of Health</p> <p>ESR</p>
<p>Phase 4 second or later waves of pandemic – Second wave of outbreaks occurring in many countries</p>	<p>The same measures should be implemented in phase 4 as were implemented in phase 2</p>	
<p>Phase 5 end of pandemic/ post pandemic phase –</p>	<p>Evaluation and reporting</p> <p>Phase out national information hotline</p>	<p>Ministry of Health</p>

WHO pandemic phases and levels of preparedness	Actions required in New Zealand	Lead New Zealand agency
Influenza activity returned to normal inter-pandemic levels and immunity to new virus is widespread	<p>Phase out public health measures</p> <p>Summarise impact of pandemic, collate data, and update national and State and Territory Action Plans. Prepare report to WHO, states and territories, etc reviewing the effectiveness of the plans</p> <p>Restock resources used during the pandemic</p>	<p>Medical Officer of Health</p> <p>Ministry of Health, NPPC, DHBs</p> <p>DHBs</p>

Coordinated Incident Management System (CIMS)

CIMS was designed to address and number of difficulties identified during emergency response, namely:

- Lack of coordination between services
- Non-standard terminology
- Lack of capability to alter structures to respond to unusual situations
- Lack of integrated communications
- Absence of consolidated action plans
- Lack of designated facilities

The system is based on the following elements:

- Common terminology
- Modular organisation (an established command and control structure)
- Integrated communications
- Consolidated incident action plans
- A manageable span of control
- Designated incident facilities
- Comprehensive resource management.

CIMS includes an organisational structure built around four major components:

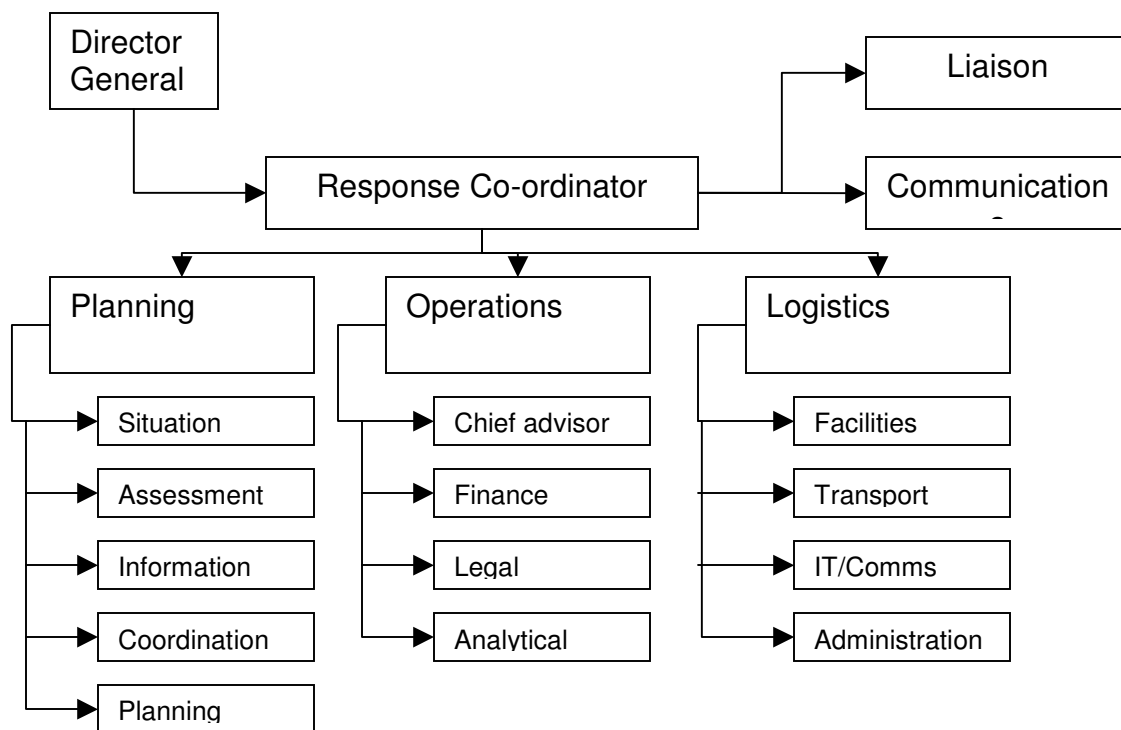
1. Control: the management of the incident
2. Planning/intelligence: the collection and analysis of incident information and planning of response activities
3. Operation: the direction of an agency's resources in responding to the incident
4. Logistics: the provision of facilities, services and materials required to respond to the incident.

These are the foundation of the CIMS structure in action. They apply in preparing for unusual events, or when managing a response to an incident or disaster.

CIMS also provides a framework for shift-based management of incident response, to ensure that staff involved are well rested and have time away from the pressure of response, while ensuring that handovers are smooth and the response continues to run appropriately regardless of changes in personnel. Handover briefings are a critical part of the process.

CIMS at the Ministry of Health

The report on Operation Virex included a proposed Emergency Response Centre Structure for the Ministry of Health, incorporating the key aspects of a CIMS structure:



Appendix Four

Chronology of Ministry of Health actions during the SARS response period¹³

Date (2003)	Action
February 21	<ul style="list-style-type: none"> NPPC meets re: atypical pneumonia outbreak. Recommendation to DHBs that they review regional pandemic action plans. Advice conveyed to Medical Officers of Health
March 16	<ul style="list-style-type: none"> Ministry sends WHO global alert and travel advisory to MOsH and DHB emergency coordinators. Specific advice given to MOsH with airports in their jurisdictions
March 17	<ul style="list-style-type: none"> IPAP activated at Level 1 Minister of Health briefed NPPC meets again Media conference Initial contact made with Ministry of Foreign Affairs and Trade
March 18	<ul style="list-style-type: none"> First interagency meeting: SARS enquiry line established SARS section added to MoH website
March 21	<ul style="list-style-type: none"> NPPC meets: IPAP level 1 confirmed Infection control information, SARS Q and A placed on website Posters and 80,000 pamphlets printed for distribution to airports Consideration of legal issues re: isolation and treatment of SARS Daily reports to the Minister of Health begin
March 24	<ul style="list-style-type: none"> DHBs asked to provide information on levels of preparedness Any queries re: SARS to be directed to MoH via DHBs
March 26	<ul style="list-style-type: none"> Ministry of Health coordinates contact tracing of NZ guests who stayed at the Hotel Metropole in Hong Kong (site of super spread) Ministry peer reviews Police operation advice to officers re: SARS
March 31	<ul style="list-style-type: none"> Travel advice updated Draft "Notes for the Process of SARS" developed
April 1	<ul style="list-style-type: none"> Advice issued to educational institutions including private and tertiary, Principals Associations and Trustees Association
April 2	<ul style="list-style-type: none"> Order in Council comes into effect making SARS notifiable and subject to powers under section 79 of the Health Act SARS scenario planning commences Press conference aiming to lower SARS anxiety 0800 number staffed by operators and goes 24 hours Quickplace established as restricted website for NPPC and Medical Officers of Health <i>Mask shortage identified</i>

¹³ Chronology provided by the Ministry of Health Communications team.

April 3	<ul style="list-style-type: none"> • ODESC meets and establishes five sub-groups
April 4	<ul style="list-style-type: none"> • IDAC asked to develop clinical and lab guidelines • Dentists, pharmacists, private hospitals and resthomes contacted to ensure they are informed • Meetings with DHB DONs and RNZCGP • Proposal for conditional authorisation of Health Act special powers is submitted to the Minister
April 7	<ul style="list-style-type: none"> • Paper for Minister developed on public health resourcing issues • Consideration of stationing nurses at international airports
April 8	<ul style="list-style-type: none"> • “Advice to Health Professionals” sent to council of Medical Colleges • Laboratory protocol posted on Quickplace
April 11	<ul style="list-style-type: none"> • Dedicated SARS hotline established
April 17	<ul style="list-style-type: none"> • Revised travel advice (3 levels of risk) placed on website and released to media • IDAC and NPPC replaced by SARS technical advisory group (STAG) for advice on SARS; communication continues with all groups involved in the Influenza Pandemic Planning Committee • Interim SARS management guidelines (including contact tracing) developed and issued to Medical Officers of Health • Masks delivered to key PHSs for distribution • Communiqué to GPs advising them that PHSs to make local decisions on mask distribution • Working with Ministry of Education on advice for institutions with students from affected areas
April 22	<ul style="list-style-type: none"> • PCR test for SARS available at A+ and ESR • Delivery of P2 masks to PHSs in Auckland, Hamilton, Palmerston North, Hutt Valley, Christchurch, Dunedin and Queenstown completed
April 23	<ul style="list-style-type: none"> • Nurses stationed at Auckland, Wellington, Christchurch and Queenstown airports • <i>Suspect case notified at Hawkes Bay</i>
April 28	<ul style="list-style-type: none"> • Travel advice updated
April 29	<ul style="list-style-type: none"> • Updated advice on infection control from WHO on masks is received and disseminated •
May 1	<ul style="list-style-type: none"> • SARS declaration ready to be piloted for incoming international travellers • Disposable thermometers sourced by Ministry for distribution via PHSs
May 2	<ul style="list-style-type: none"> • Weekly teleconferences with DHB CEOs commence • Travel advice updated • Infection control advice updated: mask use for those with prolonged contact with patients • Ongoing investigation of issues concerning use of N95 or N100 masks
May 5	<ul style="list-style-type: none"> • New Zealand reporting daily to WHO on SARS status in this country • Travel advice revised
May 7	<ul style="list-style-type: none"> • Thermo-imaging camera trial begins at Auckland airport • DHB CEO teleconference: preparedness, contingency planning and

	<p>escalation pathway development</p> <ul style="list-style-type: none"> • Ministry meets with NZMA, RNZCGP, College of Practice Nurses, Plunket re: primary care response to SARS • Protocol for nurses stationed at Auckland is trialled
May 8	<ul style="list-style-type: none"> • STAG recommendations: excluding patients from affected areas from non-essential dental work and elective surgery for 10 days following return (was previously 14) Formation of a National Virus Laboratory Group Develop a scoring framework to inform SARS case definition Finalise SARS management slow chart and risk assessment continuum for website
May 14	<ul style="list-style-type: none"> • Thermo-imaging trial begins at Auckland airport
May 16	<ul style="list-style-type: none"> • Travel advice revised
May 19	<ul style="list-style-type: none"> • Arrival cards including SARS declaration put into circulation
May 21	<ul style="list-style-type: none"> • <i>National Protocol: Management of Contacts of Cases of SARS in New Zealand</i> released on Ministry website • Nurses in place at all international airports, including Palmerston North, Hamilton and Dunedin
May 22	<ul style="list-style-type: none"> • Ministry holds briefing for editorial writers and other media commentators
May 27	<ul style="list-style-type: none"> • Travel advice revised
May 30	<ul style="list-style-type: none"> • All inbound international flights now using arrival card with SARS declaration
June 17	<ul style="list-style-type: none"> • Ministry and New Zealand representatives attend WHO SARS conference in Kuala Lumpur
June 18	<ul style="list-style-type: none"> • Travel advice revised
June 23	<ul style="list-style-type: none"> • Travel advice revised
June 30	<ul style="list-style-type: none"> • National SARS conference held to present latest national and global information on SARS; provide forum for sharing experiences and identify ways of improving response to future events. Includes MOsH, DHB representatives, clinical specialist, GPs, nurses and emergency services • Daily SARS reports to the Minister cease
July 31	<ul style="list-style-type: none"> • Nurses withdrawn from all international airports

**Pandemic response roles for key health sector agencies: recommendations from
Operation Virex**

The Operation Virex report noted that:

“All participants have identified areas that they will work on and have asked for... clarification on roles and responsibilities of who does what, when.”

The following roles and responsibilities were suggested in the Virex report:

Ministry of Health / Government

National leadership, guidance and advice on:

- Vaccination strategy (prioritisation and delivery)
 - advice to frontline staff re: infection
 - strategy for non-eligible people (when vaccine is limited and prioritised)
- Funding
 - vaccination subsidy
 - GP service costs
 - Public Health programme
 - primary healthcare, hospital and surgical costs
- Border control
- Identified threshold of infection to provide guidance on:
 - closure of schools, businesses and mass gatherings
- National increase in surveillance
- National communication strategy
- Best use of anti-viral drugs / alternative models of care
- Working with other key Government agencies
- Review current legislation to assess whether it meets our needs in relation to burial, Medical Officer of Health powers and volunteers
- International assistance.

District health boards

- Improving surveillance data by capturing hospitalisation rates

- Strategy for dealing with supply and demand of beds – regional database?
- Strategy to deal with staff shortage – regional approach?
- Guidelines on volunteers
- Working closely with Public Health Services and healthcare providers.

Public health services

- Improving surveillance
- Medical officer of health
- Work with community general practitioners

National Pandemic Planning Committee

- General practitioner representation on NPPC
- A non-health representative has been suggested as a possible NPPC member
- Clearer triggers in plan linked to action plan and tasks assigned to 'responsible agency'
- Access to international data to predict rates of illness, hospitalisation and deaths
- WHO case index definition

Police / coroners / mortuaries / undertakers / general practitioners

- Capacity and capability to deal with large numbers of dead
- Sensitivity of cultural and religious issues with burial of the deceased.

MAF

- Linked surveillance between human and animal networks

New Zealand blood service

- Impact on blood bank baseline supplies

Institute of Environmental Science and Research

- Increasing surveillance
- Supply and distribution of testing kits
- Laboratory analysis

Ambulance service

- Increased demand for services

Other agencies (public and private)

- Logistics support for district health boards: patient transport, security, communications, administration, laundry, catering and treatment centres.

Mental health

- Counselling services.