



Singapore

Exercise SparrowHawk I (2006), Exercise SparrowHawk II (2006) and Exercise SparrowHawk I (2008)

1. Background

The Government of Singapore has developed a national influenza pandemic plan²⁰ which incorporates preparedness and response plans and standard operating procedures (SOPs). To put the plan into practice, the government has conducted individual-, functional-, institutional- and system-level training, and has undertaken infrastructure development and stockpiling of drugs, such as antivirals. As part of the overall national effort to gear up the response plans and ensure the readiness of the health-care system to combat a possible influenza pandemic, a two-stage exercise codenamed *Exercise SparrowHawk I* (2006) and *Exercise SparrowHawk II* (2006) was conducted from April to June 2006, and from 21 to 22 July 2006 respectively.

2. Objectives

The overall objectives of the exercise were:

- to test and validate the influenza pandemic readiness and response plans of critical government agencies and health-care institutions;
- to assist the various health-care institutions to develop their own readiness capabilities;
- to serve as a platform to launch a public campaign to raise public vigilance and confidence.

The specific objectives of the two exercises were:

- *Exercise SparrowHawk I* (2006): to validate the influenza pandemic response plans of the acute-care public and private hospitals, in particular their ability to manage an outbreak of influenza cases in their wards in a pre-pandemic setting;
- *Exercise SparrowHawk II* (2006): (a) to exercise system-level integration involving part or the whole of critical components, i.e. Ministry of Health headquarters, selected hospitals, polyclinics, general practitioners, nursing homes and key ministries and agencies, especially border health; (b) to practise the critical components of the influenza pandemic medical response plan, namely the management of imported cases and close contacts; health-care institutions' infection control measures and case management; and the operation of influenza clinics;

(c) to build up public awareness and confidence in the country's influenza response plans and measures.

3. Participating agencies and organizations

Over 1000 personnel from 21 home-front and related agencies were involved.

Table 15 Participants and locations

Principal participants
Ministry of Health
Ministry of Education
Civil Aviation Authority of Singapore (CAAS)
Immigration and Checkpoints Authority (ICA)
Maritime and Port Authority (MPA) of Singapore
People's Association
Locations
Changi Airport Terminal 2
Tuas Land Checkpoint
Tanah Merah Ferry Terminal
7 public hospitals and 5 private hospitals
Lions Home for the Elderly (Toa Payoh Rise)
Pasir Ris Polyclinic and Bukit Batok Polyclinic
4 Parkway Shenton general practitioner (GP) clinics
Greenview Secondary School and Yuhua Primary School

4. Type of exercise

Exercise SparrowHawk I (2006): TTX and full-scale exercise.
Exercise SparrowHawk II (2006): TTX and full-scale exercise.

5. Preparation for the exercise

5.1 Planning

This involved completing and publicizing the national pandemic influenza plan prior to the exercise. In addition to the medical response component, the plan emphasized the concurrent whole-of-government response with focus on continuity of essential services and

²⁰ *Influenza Pandemic Readiness Response Plan*. Ministry of Health, Singapore, updated May 2007 (<http://www.moh.gov.sg/mohcorp/currentissues.aspx?id=16134>, accessed 27 May 2008).

providing social and economic support. Response plans involving tertiary care institutions (e.g. hospitals), intermediate and long-term care institutions (e.g. step-down care nursing homes) and the primary care sector (including public polyclinics and private GPs) were formulated.

Preparation for the two exercises began six months before the exercises. At the initial exercise coordination meeting with the home-front and related agencies, the exercise objectives were established. By the end of the second meeting, the exercise timetable was finalized. Following that, regular meetings were held in the lead-up to the exercises.

5.2 Training

This involved conducting individual-level training (e.g. PPE use); institutional-level training (i.e. completion of *Exercise SparrowHawk I* (2006) in preparation for *Exercise SparrowHawk II* (2006)); functional-level training (e.g. contact tracing, serving home quarantine orders, border health exercises); and a system-level TTX to examine policy issues.

5.3 Public communication

As 2006 was the first time that the Ministry of Health was exercising its influenza pandemic response plan, the Ministry used the exercise to generate greater public awareness and to drill home the message that the nation was prepared to deal with a potential influenza pandemic holistically. The messaging also sought to enlist the cooperation of the public to keep the disease at bay or slow down its spread by being personally and socially responsible (for example by practising good personal hygiene habits and following health advisories from the authorities).²¹ A *Flu Pandemic Business Continuity Guide to Small and Medium Size Enterprises (SMEs)* was also produced.

6. Conduct of the exercise

The 'live' components of *Exercise SparrowHawk I* and *II* (2006) each lasted approximately 24 hours, and saw the hospitals' key management and staff managing the outbreak of the first influenza cases in their wards and emergency departments. The exercises were conducted within a week of the completion of the respective TTXs. The Ministry of Health's Exercise Management Staff (EMS) arrived at the designated hospital in the morning to initiate and observe the exercise. The following processes were exercised:

- **Case management and infection control:** To test the hospital's management of suspected influenza cases, especially at a low level of alert (i.e. WHO 1 to



Signs informing the public about ongoing exercise.

4), simulated cases of human infection with avian influenza were 'triggered' at the hospital's emergency department and within the wards, resulting in an influenza cluster. The hospital then implemented its case management procedure and infection control in accordance with its influenza response and readiness plan.

- **Epidemiological investigation and contact tracing:**

In parallel, the hospital contact tracing team was activated in response to the cases. The team needed approximately 24 hours to conduct epidemiological investigation and contact tracing and to prepare an activity map of the cases, including lists of close/remote contacts of the index cases.

For *Exercise SparrowHawk II* (2006), the Ministry of Health centrally coordinated the multi-agency exercise, while at the same time allowing individual participating institutions decentralized control over their own respective exercises. The Ministry of Health maintained command and control of the various exercises by deploying its EMS during the exercises. The exercise tested and fine-tuned the *Influenza Pandemic Readiness Response Plan* at various levels among key government agencies as well as public and private health-care institutions. Some of the key activities included the management of imported cases and close contacts at checkpoints; health-care institutions' infection control measures and case management as part of the continuum of care with patients managed at the right site; and the operation of polyclinics and GP clinics as influenza clinics. The exercise also tested procedures for triaging of patients; registration and temperature screening of visitors at hospitals and polyclinics; isolation of suspected cases; and treatment and transfer of patients. The entire two-day exercise was scripted so that there were no surprises to participating institutions and agencies.

To inject realism into the exercise, a surge of influenza patients was simulated at participating polyclinics and

²¹ Singapore Government influenza web site (<http://www.flu.gov.sg>, accessed 25 August 2008).

GP clinics that necessitated the set-up of influenza clinics to manage the increased patient load. About 500 community volunteers played the role of the influenza patients and close contacts at the polyclinics and air/land checkpoints. Additional volunteers from a local university also participated in the checkpoint exercises.

During the exercise, there was imposition of temperature screening and visitor movement restriction and registration at the participating hospitals. The public was involved so that they could experience at first hand the impact of a pandemic. The public was informed of the influenza pandemic exercise through a series of pre-exercise announcements and alerts by the different health-care institutions.

Foreign observers from the Asia-Pacific region, including from Hong Kong, Australia and Malaysia, were invited to the exercise so that they could share their experiences, benefit from the cross-learning and deepen ties.



Throat swabs are taken from suspected influenza patients.

7. Evaluation

The 2006 *SparrowHawk* series was successful in meeting its established objectives on case management, infection control, and contact tracing. Besides serving as a training opportunity, the exercises provided the Ministry of Health with the opportunity to assess the influenza pandemic readiness of the health-care sector and identify gaps in the procedures and plans. Following the exercises, the Ministry of Health received useful and constructive feedback on its policies and guidelines.

In 2008, a second series of disease outbreak management exercises was embarked on with each of the six acute-care public hospitals. The first exercise was conducted on 10 March 2008, and the last on 15 May 2008.

The objective of *Exercise SparrowHawk I* (2008) was to determine the readiness level of the acute-care public hospitals in their immediate response to suspected human infections with avian influenza in a

pre-pandemic setting, with special focus on the Ministry of Health's newly introduced Infection Control Response Team (ICRT) concept.

Exercise SparrowHawk I (2008) was a TTX and full-scale exercise. It was conducted in a manner similar to *Exercise SparrowHawk I* (2006), with the major difference being that the exercises were activated unannounced to inject greater realism. The Ministry of Health EMS turned up without prior notification at the general ward of the exercise hospital and 'triggered' the simulated case of human infection with avian influenza.

Prior to the 2008 series of exercises, the Ministry of Health felt that there was a need to develop a more structured and objective evaluation tool to determine the readiness level of the hospital in disease outbreak management. With a proper evaluation tool, the Ministry of Health could determine a Readiness Key Performance Indicator that the hospitals should meet.

Culling from existing literature and SOPs, and from the lessons learnt from the 2006 exercises, the Ministry of Health collaborated with the public hospitals to develop an evaluation system based on the *Disease Outbreak Response Management – Best Practice Guidelines* (BPG) (see Figure 7.), to facilitate and enhance the quality of observations made on the ground by the evaluators, and to enhance the quality of assessment. The BPG are a collection of statements that spell out the requirements for processes and activities that are deemed necessary ('must have') or good practice ('good to have') in order for the system to function effectively. Weightings are given to different practices depending on their relative importance. For the 2008 exercises, BPG were used for the Infection Control Response Team (ICRT) management, infection control practices in the infected ward and isolation ward, and system of investigation and contact tracing.

The pre-defined evaluation methodology made evaluation much easier, more focused and more transparent. There was a great deal of engagement with the public hospitals to jointly develop the tool. The transparency of the tool made after-exercise-review discussions with the hospitals easier because the hospitals knew beforehand which processes and activities would be assessed. The evaluators consisted of public health experts from the Ministry of Health and clinicians from the public hospitals themselves, thus increasing the credibility of the evaluation process.

8. Lessons learnt

The lessons learnt from the 2006 exercises were:

- A high level of readiness is not sustainable amongst all health-care staff. Rather, institutions need to have a designated response team to manage the 'first

case(s)' while the institution ramps up to meet the increased demands. This has since been addressed under the ICRT concept.

- Proper build-up to an exercise is necessary to secure its full benefits.
- Early engagement of the participating agencies creates greater commitment on their part to the exercise.

- Proper media and publicity planning from pre- to post-exercise is necessary to ensure the maximum effect intended for publicity objectives.
- Involvement of senior political leaders is important in emphasizing the message of public preparedness, and highlighting that an influenza pandemic is not just a health problem.

Figure 7 Singapore Disease Outbreak Response Management – Best Practice Guidelines (BPG)

BEST PRACTICE GUIDELINES FOR HOSPITAL DISEASE OUTBREAK RESPONSE (Arden Influenza at DORSCON Green)

(A) INFECTED WARD

SN	Process/Area	Best Practice Guidelines (BPG) Statement	Evaluation Mode			Score									
			BGP	FTX	FTY	1	2	3	4	5					
1	Response														
1.1	Group Management (GM)														
1.1.1		Clear command and control line													
1.1.2		Systems to document clinical team													
1.1.3		Systems to take vital temperature													
1.1.4		Systems to identify staff/patient													
1.1.5		Systems to isolate individuals and suspect ward from other cohorts													
1.1.6		Systems to isolate other infection ward ward to the ward of the ward													
1.1.7		Systems to isolate other infection ward ward to the ward of the ward													
1.1.8		Systems to monitor and record case													
1.2	Infection Control Response Team (ICRT) (ICRT)														
1.2.1		Systems to coordinate response													
1.2.2		Facilities with contact precautions													
1.2.3		Staff define tasks and responsibility													
1.2.4		ICRT staff are adequately protected													
1.2.5		Systems to ICRT to ensure effective control by the ward staff/patient													
1.2.6		Systems to take care clinic & ward													
1.2.7		Systems to obtain clinical reports													
1.2.8		Systems to ensure clinic of staff/patient													
1.2.9		Systems to transmit clinical report													
1.2.10		Systems to monitor clinical report													
1.2.11		Systems to monitor clinical report													
1.2.12		Systems to communicate to the ward													
1.2.13		Systems to ensure clinical report													
1.2.14		Systems to manage the clinical report													
1.2.15		Systems to ensure clinical report													

BEST PRACTICE GUIDELINES FOR HOSPITAL DISEASE OUTBREAK RESPONSE (Arden Influenza at DORSCON Green)

(B) ISOLATION WARD

SN	Process/Area	Best Practice Guidelines (BPG) Statement	Evaluation Mode			Score									
			BGP	FTX	FTY	1	2	3	4	5					
1	Response														
1.1	Group Management (GM)														
1.1.1		Clear command and control line for the clinical management of the subject case													
1.1.2		Systems to document clinical management													
1.1.3		Systems to carry out temperature screening of suspect case													
1.1.4		Systems to isolate ward of confirmed patients													
1.1.5		Facilities to ensure clinical security, including studies, and other procedures are handled off-ward in the ward													
1.2	Infection Control Response Team (ICRT) (ICRT)														
1.2.1		Facilities to ensure clinical security													
1.2.2		Systems to ensure clinical security													
1.2.3		Systems to ensure clinical security													
1.2.4		Systems to ensure clinical security													
1.2.5		Systems to ensure clinical security													
1.2.6		Systems to ensure clinical security													
1.2.7		Systems to ensure clinical security													
1.2.8		Systems to ensure clinical security													
1.2.9		Systems to ensure clinical security													
1.2.10		Systems to ensure clinical security													
1.2.11		Systems to ensure clinical security													
1.2.12		Systems to ensure clinical security													
1.2.13		Systems to ensure clinical security													
1.2.14		Systems to ensure clinical security													
1.2.15		Systems to ensure clinical security													
1.3	Infection Control Response Team (ICRT) (ICRT)														
1.3.1		Systems to notify TTH/ICDC of transfer prior to actual departure from the hospital													
1.3.2		Systems to transfer suspect/confirmed case to TTH/ICDC													
1.3.3		Staff & equipment to the required medical staff during the transfer													
1.3.4		Staff carrying out the transfer are adequately protected													
1.3.5		Systems to ensure the transfer and handover of clinical management documentation together with the case													
1.3.6		Systems to document transfer													
1.3.7		Systems to document transfer													
1.3.8		Systems to document transfer													
1.3.9		Systems to document transfer													
1.3.10		Systems to document transfer													
1.4	Physical & Environmental (PE)														
1.4.1		Systems to carry out disinfection/sterilisation of the environment													
1.4.2		Systems to dispose of waste/contaminated waste													
1.4.3		Systems to ensure clinical security													