# Chapter 9 Outbreak at the United Christian Hospital

## Finding of facts

9.1 *YY*, who appeared to be the source of the outbreak at the Amoy Gardens, stayed overnight at his brother's flat in the Amoy Gardens on 14 March 2003. At that time, he had already developed a fever and was having diarrhoea. He spent another night at his brother's flat on 19 March 2003 after he had been discharged from the Prince of Wales Hospital (PWH), having been treated for a respiratory tract disease.

9.2 *YY*'s brother, a resident of the Amoy Gardens, suffered from fever and cough, and attended the Accident and Emergency Department (AED) in the United Christian Hospital (UCH) on 24 March 2003. This marked the beginning of the influx of Amoy Gardens residents to AED in UCH. By the end of March 2003, UCH had admitted more than 100 suspected and confirmed SARS patients. During the SARS outbreak at UCH, 28 healthcare workers (HCWs), one contract worker, nine non-SARS patients and two visitors were infected. Twenty-five out of the 40 cases were related to the outbreak in Ward 12A in UCH, comprising 14 HCWs, nine non-SARS patients and two visitors.

Preparation to receive SARS patients

9.3 According to the Hospital Chief Executive (HCE) of UCH, Dr TSE Chun-yan, UCH had been following the guidelines set out in the memorandum on surveillance on Severe Community-Acquired Pneumonia issued by the Head Office of the Hospital Authority (HAHO) on 12 February 2003. Having heard of the atypical pneumonia (AP) epidemic in Guangdong and the outbreak at PWH, UCH considered the need to treat AP/SARS patients in UCH a real possibility. UCH started taking measures to prepare HCWs for a sudden surge of admissions and to provide them with additional training on infection control. Starting from 13 March 2003, UCH closely monitored the admission of less severe Community-Acquired Pneumonia cases. On 15 March 2003, Ward 6A was designated as the cohort ward to admit AP and suspected SARS

patients. HCWs in the cohort ward were required to wear N95 masks, goggles and disposable gowns. Starting from 17 March 2003, all patients in the cohort ward were required to wear surgical masks. Starting from the same day, less urgent elective admissions were deferred.

9.4 In AED in UCH, infection control measures were also stepped up soon after the outbreak at PWH. On 13 March 2003, HCWs started to wear surgical masks in the clinical areas, and on 20 March 2003, those working in the triage and resuscitation areas were required to wear N95 masks. Droplet precautions were adopted and HCWs were instructed to wash their hands frequently. At that time, the standard triage guidelines issued by HAHO were used. Starting from 15 March 2003, patients with a complaint of fever, chest infection and SARS contact history would be admitted directly from AED to the cohort ward.

9.5 Using the guidelines issued by HAHO as the model, UCH developed its own guidelines in Chinese for implementation. According to the Ward Manager of Ward 12A in UCH, Ms CHIU Wing-mui, the customized guidelines were more comprehensive.

Admission of Amoy Gardens residents

9.6 Those residents from the Amoy Gardens who felt unwell started to seek treatment in AED in UCH on 24 March 2003. The first patient admitted was *YY*'s brother who suffered from fever and cough. In the afternoon of 25 March 2003, a couple was admitted, also with a complaint of fever and cough. As none of the three patients had definite chest X-ray changes upon admission, they did not fulfil the criteria for notification to the SARS Registry of HA. These cases were therefore neither reported to HAHO nor to the Department of Health (DH).

9.7 More Amoy Gardens residents sought treatment in AED in the days following. In the evening of 25 March 2003, two families showing features of suspected SARS attended AED. The Chief of Service (COS) of AED in UCH, Dr LAU Fei-lung, informed Dr TSE Chun-yan of the unusual situation. Dr TSE Chun-yan in turn reported it to the Deputizing Chief Executive of HA,

Dr KO Wing-man, and they agreed that the situation would be reported to the Daily SARS Round Up Meeting and to DH the following morning. Dr TSE Chun-yan then asked his staff in the cohort ward to check whether there had been earlier admissions of patients from the Amoy Gardens. It was then found out that *YY*'s brother and the couple who had been admitted on 24 March and 25 March 2003 respectively were both from the Amoy Gardens.

9.8 The situation was reported to the Daily SARS Round Up Meeting held at 8:30 am on 26 March 2003. Dr KO immediately notified DH of the outbreak at the Amoy Gardens by telephone. Dr TSE Chun-yan, on his way back to UCH, also telephoned the Consultant Community Medicine in-charge of the Disease Prevention and Control Division of DH, Dr TSE Lai-yin, to inform her of the outbreak. Subsequently, details including the patients' addresses, demographic data, contact history, travel history, occupations and clinical conditions were forwarded to DH. When more Amoy Gardens residents were admitted later in the morning of 26 March 2003, Dr TSE Chun-yan telephoned the Community Physician (Kowloon) of DH, Dr LEE Siu-yuen, to update her on the situation. At the same time, computerized axial tomographic scan was conducted on *YY*'s brother and the couple, and pneumonic changes were confirmed.

9.9 With the unusual number of Amoy Gardens residents attending AED, UCH opened Ward 6B as the second SARS ward on 26 March 2003. Having learnt from the experience of PWH shared at informal meetings, Dr LAU set up a fever clinic in AED on the same day. The clinic was segregated from the main clinical area of AED with separate ventilation and waiting area. With this arrangement, Amoy Gardens residents and other patients displaying SARS symptoms were attended without delay. Dr LAU told the Select Committee that before the outbreak at the Amoy Gardens, patients suffering from fever could not be handled separately owing to resource constraints. As less urgent elective cases had been deferred since 17 March 2003, UCH was able to deploy wards and manpower more flexibly to handle the sudden increase in SARS cases. After the outbreak at the Amoy Gardens, the whole AED was upgraded to a high risk area with appropriate infection control measures put in place. All HCWs in AED were required to wear N95 masks, gloves, gowns, caps and goggles.

9.10 Patients in the fever clinic were seen by Medical Officers (MOs) with at least three years' experience. Patients suffering from fever with respiratory tract infection and pneumonic changes in chest X-ray, whether with or without contact history of SARS, were regarded as suspected cases, and were reviewed by a Senior Medical Officer (SMO) to ensure that the patients were admitted to the appropriate wards. According to Dr LAU, patients with a low likelihood of being infected with SARS would be treated, followed up daily, and given health advice on home isolation and droplet precautions. Dr LAU told the Select Committee that the accuracy rates of diagnosing SARS and non-SARS patients in AED in UCH were 91% and 96% respectively.

9.11 With the admission of more SARS patients, UCH was under mounting pressure. Dr TSE Chun-yan appealed for assistance at the Daily SARS Round Up Meeting on 27 March 2003. UCH, however, was asked to open one more SARS ward to admit SARS patients from the Amoy Gardens at the meeting. It was also agreed that patients would be diverted to the Princess Margaret Hospital (PMH) if the influx of new cases continued. Ward 8A in UCH was opened as the third SARS ward on 27 March 2003. After UCH had admitted an additional 54 SARS patients, Dr TSE Chun-yan again appealed to HAHO for assistance on 28 March 2003. Recognizing the magnitude and severity of the outbreak at the Amoy Gardens, HAHO agreed to reduce the number of SARS patients in UCH. On the same day, 22 SARS patients were transferred out of UCH: 16 to PMH and six to the Queen Elizabeth Hospital.

Outbreak in Ward 12A

9.12 Ward 12A is a general medical ward designated for female patients. It admitted respiratory cases, in addition to general medical cases. In accordance with the guidelines issued by HAHO on 24 March 2003 which provided that patients with respiratory illnesses were required to wear surgical masks, Ms CHIU instructed her staff to distribute masks to all the patients in Ward 12A for use on 25 March 2003.

9.13 On 24 March 2003, a terminal "Ca lung" patient with a fever was admitted to Ward 12A. This patient presented no SARS symptoms but was later identified as one of the three index patients of Ward 12A.

9.14 On 26 March 2003, a 72-year-old lady with mental confusion was admitted to Ward 12A. The patient, the second index case, developed a fever on the following day after admission, but her chest X-ray showed no change. As the old lady had visited her daughter at the Amoy Gardens before admission, she was moved to the cohorting cubicle in Ward 12A.

9.15 The last index patient was admitted in the night of 28 March 2003 with a fever and loin pain. After it was found out that she was a resident of the Amoy Gardens, she was put in a bed near the wash basin in Ward 12A, and subsequently transferred to a SARS ward the following morning.

9.16 These three patients were not originally regarded as SARS patients as they did not present any SARS symptoms on admission. They were only identified as the index patients of the outbreak in Ward 12A in subsequent investigations.

9.17 On 31 March 2003, an MO working in Ward 12A was suspected to have contracted the disease. He attended six patients in Ward 8A which was a SARS ward when he was on call duty on 27 March 2003. After being informed of the MO's infection, the Infection Control Officer (ICO) of UCH, Dr LAI Wai-man, reviewed the contact history of the MO. The Infection Control Team of UCH also started investigations on the same day. Initially, it was thought that the MO got infected when he was on call duty in the SARS ward on 27 March 2003. Dr TSE Chun-yan was informed of the infection of the MO but the case was not reported to DH because the MO had fever only and there was no change shown on his chest X-ray.

9.18 As Ward 12A was not then suspected to be the source of the infection, there was no enhancement of infection control measures in the Ward. On 1 April 2003, four HCWs from Ward 12A were suspected to have been infected with SARS. As they were nurses who did not work in other wards, it was obvious that the source of the outbreak was inside Ward 12A. Dr LAI, together with an Infection Control Nurse (ICN), went to the Ward to conduct contact tracing in an attempt to identify the index case. Dr TSE Chun-yan immediately held a meeting with his colleagues, including Dr LAI, to discuss the outbreak. He also informed Dr KO of the outbreak. Dr TSE Chun-yan

and Dr KO jointly made the decision to stop all admissions to Ward 12A after midnight on 2 April 2003.

9.19 The outbreak was reported to DH on 2 April 2003. On the same day, four more HCWs from Ward 12A were infected, making a total of nine cases from one single ward. On 3 April 2003, two more HCWs in Ward 12A became unwell. UCH decided to stop all discharges from Ward 12A. All remaining patients in the Ward were transferred to Ward 12B for surveillance for 10 days. All HCWs in Ward 12A were assigned non-patient duties and temporary accommodation was provided. Ward 12A was thoroughly cleansed and disinfected after it had been vacated. Two more HCWs in Ward 12A came down with the disease on 6 April 2003 and 8 April 2003 respectively. The last HCW in Ward 12A infected with the disease was reported on 10 April 2003.

9.20 Owing to the huge pressure generated by having to treat some 150 SARS patients in UCH, Dr TSE Chun-yan appealed for assistance at the Daily SARS Round Up meeting. It was decided on 5 April 2003 that male medical admissions be stopped with effect from the following day. From 13 April 2003, seven seriously ill cases were transferred to other hospitals to reduce the workload of the Intensive Care Unit in UCH. As from 20 April 2003, no more HCWs were infected. On the same day, UCH started to re-admit SARS patients. Non-urgent elective services were also resumed steadily.

Contact tracing

9.21 While the Amoy Gardens residents who had been infected with SARS started attending AED in UCH on 24 March 2003, the New Territories East Regional Office (NTERO) of DH, in the course of conducting contact tracing on *YY*, who was re-admitted to PWH on 22 March 2003, managed to contact *YY*'s father on 24 March 2003 and was told that all family contacts were asymptomatic. On 25 March 2003, NTERO further learnt from *YY*'s father that *YY*'s brother had developed a fever and cough and had been admitted to UCH. On the same day, the Kowloon Regional Office (KRO) took over the case of *YY*'s brother and conducted contact tracing in relation to him.

9.22 Dr LEE Siu-yuen of KRO of DH was informed of the admission of the 15 Amoy Gardens residents on 26 March 2003. Although hospitals were not required to notify DH of the admission of suspected SARS cases, DH specifically requested UCH to do so if Amoy Gardens residents were involved. Starting from 2 April 2003, cases involving HCWs in Ward 12A were also reported to DH.

Infection control

9.23 UCH adopted the infection control measures laid down in the guidelines issued by HAHO. UCH further developed its own supplementary guidelines to suit its own conditions and environment. According to Dr LAI, actions were taken to enhance the understanding and implementation of the measures. In addition to the briefings on infection control precautions and updates on SARS provided for all HCWs, Dr LAI and ICNs conducted on-site training and ward inspections, the results of which were relayed to the HCWs concerned and to their supervisors for follow-up actions.

9.24 According to COS of the Department of Medicine and Geriatrics in UCH, Dr LEUNG Man-fuk, UCH had thought of dividing MOs into "clean" and "dirty" teams following PWH's experience in managing the SARS outbreak there. However, owing to the tight manpower situation in UCH, this measure was not implemented until 29 March 2003.

9.25 Following the outbreak in Ward 12A, HAHO's audit team visited UCH. Upon the advice of the audit team, all HCWs in AED in UCH wore N95 masks and took precautionary measures of the highest level. UCH was stratified into ultra-high risk areas, high risk areas and moderate risk areas according to the risk of contracting SARS and the chances of encountering SARS patients in these areas. Patients suspected to have contracted SARS were cohorted to avoid mixing with other patients. The Select Committee noted that the ward environment improved gradually after the upgraded infection control measures had been introduced, including the installation of exhaust fans and modification of one operating room to provide negative pressure in the room. Patients suffering from fever and respiratory illness were closely monitored on their chest X-ray changes.

9.26 On 7 April 2003, Ward 5D was used as the first step-down ward. It was then moved to Ward 9B on 17 April 2003. The infection control measures in all the medical wards had been upgraded to a standard close to that of SARS wards by 14 April 2003. On 17 April 2003, a survey was conducted by UCH's Infection Control Enforcement Team to ascertain HCWs' knowledge of SARS and the necessary precautions. The General Manager (Nursing) of UCH, Ms CHAN Yuet-kwai, told the Select Committee that audits were conducted to ensure compliance with infection control measures.

Supply of personal protective equipment

9.27 In accordance with HAHO guidelines, HCWs working in the SARS wards by the end of March 2003 wore N95 masks, goggles, gloves and protective gowns, and washed their hands whenever necessary, while HCWs attending to non-SARS patients could wear either N95 or surgical masks. The infection control guidelines for a general medical ward were to follow universal precautions plus droplet precautions if necessary. Although Ward 12A was a general ward, patients suffering from fever/respiratory illnesses were required to wear masks.

9.28 Although UCH endeavoured to follow infection control guidelines, it suffered from an inadequate supply of PPE. Some HCWs in Ward 12A requested for higher-level PPE including goggles and disposable protective gowns. As the provision of higher-level PPE was not mandatory for a general medical ward, their requests were not acceded to. The Select Committee noted that disposable gowns and goggles were not generally available in all the general wards at the end of March 2003. In Ward 12A, HCWs could use surgical masks with shields when conducting high risk procedures. Ms CHIU also advised her colleagues not to use any PPE which was not provided by UCH, or else HA might not accept liability if there were accidents or if HCWs got infected. According to Ms CHIU, such advice was endorsed by the Department Operations Manager. At a later stage, however, masks purchased by HCWs themselves were allowed to be used after their quality had been checked and approved by an ICN. Ms CHIU recalled that when the supply of gowns and goggles in Ward 12A was inadequate, ordinary surgical gowns, which might not meet the required standard, were used instead. On 3 April

2003 when caps were not available, Ms CHIU became anxious and bought some shower caps for her colleagues. Both Dr TSE Chun-yan and Ms CHAN indicated that when the supply of N95 masks became stable around 24 March 2003, the masks could be changed once every two days. The "occurrence book" of Ward 12A obtained by the Select Committee, however, showed that HCWs in the Ward were asked on 29 March 2003 to change their N95 masks after they had been used for seven days, unless the masks had been damaged or soiled before then.

9.29 Dr TSE Chun-yan admitted that the stock of some PPE items in UCH had been low at certain times. In addition to notifying HAHO of the shortages, UCH also requested other hospitals to transfer some items to the Hospital. The situation improved when HAHO centralized the procurement of PPE. The Select Committee noted that despite the shortages, HCWs' requests for N95 masks had not been rejected. However, some requests for using goggles and disposable gowns for routine patient care in non-SARS wards were not approved before the end of March 2003 because of the limited supply of such items.

## Analysis

<u>The preparedness of the United Christian Hospital to cope with the SARS outbreak</u>

9.30 The Select Committee has considered whether UCH was adequately prepared to cope with the SARS outbreak from three perspectives: the infection control measures, the management of patient load, and the supply of PPE.

*Infection control measures*

9.31 The Select Committee notes that UCH had taken actions to step up infection control measures. Starting from 13 March 2003, UCH implemented more stringent measures than those advised by HAHO by monitoring the admission of less severe Community-Acquired Pneumonia cases. On 15 March 2003, when more information about the epidemic was known, a

cohort ward was set up and HCWs were required to wear N95 masks, goggles and disposable gowns. The infection control measures in all the medical wards were later also upgraded to a standard close to that of SARS wards. To ensure a better understanding of the infection control measures by the frontline HCWs, UCH developed its own guidelines in Chinese based on the guidelines issued by HAHO. In addition to the briefings on infection control precautions and updates on SARS, on-site training, ward inspections and audits were conducted.

*Management of patient load*

9.32 The Select Committee notes that UCH was at all material times highly alert to a possible upsurge of patients in the Hospital. After the AP epidemic in Guangdong and the outbreak in Ward 8A in PWH, UCH anticipated the admission of AP/SARS patients. Measures were taken immediately to prepare for an increase in admissions, including deferring less urgent elective admissions. With this arrangement, UCH was able to deploy manpower resources and re-organize the wards more flexibility so as to be able to handle the subsequent sudden increase in workload. UCH was also aware of the need to maintain quality healthcare during those difficult times. When the influx of new SARS patients continued to rise very rapidly, UCH appealed for assistance at the Daily SARS Round Up Meeting on 27 March 2003.

*Supply of personal protective equipment*

9.33 The Select Committee notes that UCH did not have sufficient PPE to cope with the SARS outbreak. Some PPE items including goggles and disposable gowns could not be provided to HCWs in the general medical wards, such as Ward 12A. At certain times, self-provided shower caps were used instead of the standard provision. The Select Committee is of the view that the unsteady supply of PPE in UCH was not, however, the result of poor management on the part of the Hospital, as the sudden surge in demand for PPE following the SARS outbreak could not have been reasonably anticipated.

Management of the SARS outbreak

9.34 The Select Committee finds that UCH managed the SARS outbreak competently. Dr LAU Fei-lung demonstrated alertness when he informed Dr TSE Chun-yan that two families of the Amoy Gardens had sought treatment in AED in the evening of 25 March 2003. Dr TSE Chun-yan in turn reported the unusual situation to Dr KO Wing-man. When it became clear that Ward 12A was a source of infection on 1 April 2003, Dr LAI Wai-man immediately went to the Ward to conduct contact tracing in an attempt to trace the index patient. Dr TSE Chun-yan, having been informed of the infection, immediately informed Dr KO of the outbreak. It was then decided to close Ward 12A to all admissions after midnight on 2 April 2003. The prompt action taken by UCH facilitated the early deployment of resources and forward planning by HAHO to handle the crisis.

9.35 When the number of SARS cases in UCH continued to increase as the situation in the Amoy Gardens deteriorated, UCH acted promptly in seeking assistance from HAHO on 27 March 2003 and again on 28 March 2003. The Select Committee notes that agreement was only secured after the second appeal was lodged for 22 SARS patients to be transferred out of UCH. If this arrangement had not been made, the continued increase in SARS cases in UCH might have overwhelmed the Hospital.

Arrangement of patients in the Accident and Emergency Department

9.36 As regards the triage arrangement of patients in AED in UCH, the Select Committee notes that Dr LAU set up a fever clinic in AED so that Amoy Gardens residents and other patients displaying SARS symptoms could be attended without delay.

Contact tracing

9.37 The Select Committee has examined whether the linkage between *YY* and his brother could have been established earlier. Given that data relating to contact tracing was processed manually at that time and that contact tracing in respect of *YY* and his brother involved two separate regional offices,

i.e. NTERO and KRO, the Select Committee finds it acceptable that the linkage was established on 25 March 2003, one day after *YY*'s brother was admitted to UCH. The Select Committee is of the view that if there had been a computerized system for contact tracing, the linkage between *YY* and his brother would have been established upon admission of his brother to UCH.

**Performance and Accountability**

9.38 Having regard to the measures promptly taken by UCH to prepare itself for the increase of SARS patients and to manage the outbreak, the Select Committee compliments HCWs in UCH for their teamwork in dealing with the crisis effectively under the able leadership of the Hospital management, in particular, its HCE, Dr TSE Chun-yan.