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18 August 2003

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Chairman  
HA Review Panel on SARS Outbreak  
Hospital Authority  
Room 410S, 4/F Hospital Authority Building  
147B Argyle Street  
Kowloon

Dear *Ron*,

### **HA Review Panel on SARS Outbreak**

Thank you for your letter of 2 August. The secretary to your Review Panel has asked for our response by not later than 18 August.

2. To facilitate your review, we have taken a while to put together a comprehensive response. We have also included some background information to enable the Review Panel to better understand the position.

### **Events outside Hong Kong**

#### Guangdong Province

3. On 10 February, there was local media coverage about an outbreak of pneumonia in Guangzhou. The Director of Health in HKSARG (Director) immediately tried but in vain to contact by phone the Municipal Health and Anti-epidemic Station of Guangzhou and the Director General of the Department of Health, Guangdong Province. The

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Department of Health in HKSARG (DH) followed up with a letter faxed to the two officials to enquire about the reported outbreak. As subsequent phone calls were also unanswered, the Director approached the Director General of the Department of International Cooperation, Ministry of Health (MoH) for assistance.

4. On the following day, the Guangzhou Bureau of Health held a press conference informing the public that the situation in Guangzhou was under control. Details were uploaded onto the Internet (Annex 1). Separately, DH made verbal enquiries with the Hospital Authority (HA), private hospitals and sentinel doctors and they reported that no unusual pattern of influenza-like illness or pneumonia in Hong Kong was detected. With the information from Guangzhou and enquiry results in Hong Kong, the Director conducted a stand-up briefing and issued a press release (Annex 2) in late afternoon on 11 February on the reported outbreak in Guangzhou and provided health advice that should be observed in the usual peak season of influenza in Hong Kong (January - March).

5. DH had since maintained regular contacts with Beijing officials on the outbreak. On 7 March, the Mainland MoH verbally advised that no definite cause had been identified to account for the Atypical Pneumonia (AP) outbreak in Guangdong Province. The usual causative agents like influenza A, influenza B, adenovirus or chlamydia were isolated.

6. I should mention that the World Health Organization (WHO) stationed a team of experts in Beijing for two weeks in the latter part of February and early March to check media reports of the outbreak. On 16 August 2003, the South China Morning Post reported the visit, which took place between 23 February and 9 March, as "hitting a brick wall".

7. I now turn to efforts made in Hong Kong at the wake of the outbreak in Guangdong Province. I would first say that DH had all along been monitoring the pattern of pneumonia cases in Hong Kong. HA had an existing Task Force in Infection Control and DH became a co-opted member since its 24<sup>th</sup> meeting on 18 November 2002.

8. With the outbreak in Guangdong Province, HA set up on 11 February 2003 a Working Group on severe community acquired pneumonia (SCAP) cases with membership built on that of the Task Force. The aim was to review the statistics, clinical presentation and laboratory findings related to SCAP cases admitted into HA hospitals.

Rather than setting up a separate mechanism, DH joined the HA's Working Group to strengthen the surveillance system from the 2<sup>nd</sup> meeting. Under this arrangement, both HA and private hospitals were required to notify DH of SCAP cases to enable DH to co-ordinate actions on prevention and control measures.

Hanoi, Vietnam

9. On 3 March, WHO informed DH that an American Chinese with recent travel history to Hong Kong was hospitalized with severe pneumonia in Hanoi. Serological tests revealed positive IgM for influenza B. In response to an enquiry from WHO, DH replied that influenza B was prevailing at that time in Hong Kong and there were severe cases due to influenza B in the previous three weeks.

10. "DD" On 5 March, WHO notified DH that the American Chinese ( ) was being transferred from the French Hospital in Hanoi to Hong Kong for treatment upon request of the family. Seven Health Care Workers (HCWs) who had assisted the patient in Hanoi reported high fever, malaise, headache, but not respiratory symptoms. DH immediately contacted Dr ST Lai, Consultant Physician, Princess Margaret Hospital (PMH) but he was not aware of the transfer. DH verbally informed Dr Lai as well as Dr Beatrice Cheng of HA Head Office of the above details.

11. "DD" arrived Hong Kong on 6 March and was directly transferred to the intensive care unit (ICU) in PMH. He was too ill to be interviewed. A DH Nursing Officer tried to interview his wife on 7 March but in vain. She was not cooperative. Attaching great importance to this case, DH sent a health team of a Senior Medical & Health Officer (SMO) and a MO to approach ( ) again on 8 March. Although she agreed to be interviewed, difficulties were encountered. She did not have full details of her husband's travel history and she was reluctant to give information.

12. "DD" Based on clinical history and information provided by the wife, it was learnt that ( ) travelled from the US to Shanghai in mid-January unaccompanied and visited Hong Kong by himself in mid to late February to apply for a visa. He stayed in Hong Kong for a few days and continued his journey to Hanoi. He was admitted to the Hanoi French Hospital in Vietnam on 26 February. Chest X-ray (CXR) taken upon

admission was clear but lymphocyte count was low. His condition deteriorated rapidly after admission and he required intubation and artificial ventilation support on 2 March. Investigation by the French Hospital suggested that the patient was suffering from influenza B complicated with Adult Respiratory Distress Syndrome. Later CXR showed bilateral interstitial infiltrations, the white cell count was raised but the lymphocyte count and platelet count were decreased.

13. During the interview with [REDACTED], two relatives from Shanghai were also present. They advised that [REDACTED] did not have any contact with relatives in Shanghai. The wife and the relatives exposed to [REDACTED] in PMH were put under medical surveillance. Health advice on the prevention of respiratory infections and personal hygiene was given to them and they remained asymptomatic at the end of the surveillance period.

14. On 8 March, the DH health team discussed with the attending physicians on the condition of [REDACTED] and understood that PMH was aware that more than 10 HCWs who had taken care of him in the French Hospital were hospitalized. We noted that PMH had implemented strict infection control measures during [REDACTED]'s stay and no HCW was infected.

15. Despite active treatment in Hong Kong, [REDACTED]'s condition further deteriorated with congested lung and renal failure requiring haemodialysis. He finally succumbed on 13 March.

16. Results of extensive laboratory investigations conducted by the University of Hong Kong (HKU) and the Government Virus Unit (GVU) were negative. Autopsy specimens were sent to the Centres for Disease Control and Prevention, US on 17 March and the case was subsequently diagnosed on 22 March, as reported during inter-laboratories teleconference, as a SARS case.

#### WHO Global Alert

17. On 11 March, there was media coverage that more than 10 HCWs in Prince of Wales Hospital (PWH) Ward 8A reported respiratory infection symptoms in the previous three to four days. DH immediately contacted PWH for case investigation and contact tracing. After assessing the situation, DH notified WHO of the outbreak on the following day (12 March). WHO immediately issued a global alert

— (Annex 3), raising awareness all over the world. As a result, we had received reports from Singapore and Canada which had led to the discovery of the Metropole Hotel (Hotel M) cluster and the source of infection in Hong Kong.

Singapore

— 18. On 13 March, the Singapore MoH issued a press statement (Annex 4) about three persons who had traveled to Hong Kong at the end of February and who were admitted to hospital for pneumonia after they had returned to Singapore. None of the hospital staff attending to these patients had reported ill. In sending the press statement to DH, the Singapore MoH also mentioned that its investigations had identified no causative organism and that laboratory tests were negative for flu, parafu, chlamydia, legionella or mycoplasma. The common factor was that the three cases stayed at Hotel M in Hong Kong around 20-25 February 2003.

*[Note: The Singapore MoH first discussed with DH on the three patients in the course of a telephone conversation on another subject on 8 March. It was noted that they had all stayed in Hotel M in Hong Kong and two were friends. Laboratory investigations were pending and the patients' illnesses improved with antibiotics treatment. As there was insufficient evidence that their illnesses were related to Hotel M, DH asked the Singapore MoH to keep it posted of positive laboratory findings if any.]*

3 — 19. On 15 March, DH was aware of a second press statement made by the Singapore MoH dated 14 March (Annex 5) and noted that some HCWs who had attended the patients got infected. In view of the PWH outbreak among HCWs, DH asked the Singapore MoH for more details of the incident, hoping to get more information on cause of the illnesses, mode of spread, clinical presentations, etc. Replies were received on 15 and 16 March. Nothing significant was observed.

20. On 19 March, with the suspicion of Hotel M (paragraphs 23-24 below) being the place where an outbreak might have occurred among residents, DH made further enquiries with the Singapore MoH to find if there were any linkages between the three Singapore cases and [REDACTED], the index case. A reply was received on 20 March but no definite route of transmission could be established. "AA"

21. I would like to point out here that [REDACTED] was initially suspected as the index case for PWH on 13 March and it was confirmed on 14 March (paragraphs 71-74 below). [REDACTED] was not a guest in Hotel M at the material time. It was only on repeated questioning that he admitted that he had visited a friend in Hotel M around that period (paragraph 23 below). The information provided by the Singapore MoH could not and would not help us in any way to identify him as the index case for PWH.

#### Toronto, Canada

22. On 18 March, Health Canada sent DH some information on three cases in Canada who had traveled to Hong Kong prior to their illnesses. Hotel M was mentioned for one of the patients.

#### **Metropole Hotel Cluster**

23. Having been aware that the Singapore tourists were residing in Hotel M before onset of their illnesses, the information from Canada triggered off an immediate investigation by DH on the same day (18 March). DH searched the patient records on the SCAP list and PWH cases, and interviewed all cases. By the following day, DH found a total of seven cases related to Hotel M. We inspected the hotel environment and 9/F immediately and found the general hygiene satisfactory. At the same time, DH verbally advised Dr WM Ko of HA of the cluster. In the evening (19 March), DH announced the findings in a press conference. [REDACTED] was identified as the index case as he had onset of symptoms on 15 February and he resided in the hotel on 21-22 February 2003.

24. On 20 March, WHO informed DH that the American Chinese from Hanoi had also stayed in Hotel M around that time. Announcement was made to the media again. More cases were subsequently found related to the Hotel M Cluster. For details, please refer to the investigation report at Annex 6.

#### **[REDACTED] and Kwong Wah Hospital Cluster**

25. On 24 February, DH received notification that a tourist from Guangzhou ([REDACTED]) admitted to the ICU of Kwong Wah Hospital

(KWH) at around noon time on 22 February was suspected to suffer from SCAP. He was fully sedated and intubated for supported ventilation on 23 February. The fever did not subside and his condition continued to deteriorate. He subsequently suffered from multi-organ failure and succumbed on 4 March.

26. DH initiated immediate and extensive epidemiological investigation in the afternoon upon receipt of notification. According to his wife and daughter, [REDACTED] worked in Guangzhou Sun Yat San Hospital as a doctor in the out-patient clinic of Medical Department. In the week preceding his onset of symptoms, he came into contact with two patients presenting with high-grade fever and chest symptoms. CXR of both patients showed haziness and [REDACTED] referred them to the Accident and Emergency Department (AED). [REDACTED] was not exposed to any poultry two weeks prior to the onset of symptoms.

27. [REDACTED] had good past health. In the evening of 15 February, he had a sudden onset of fever (39°C), chills and rigor. He took oral antibiotics that night. He later developed cough and sputum. CXR done on 17 February showed haziness in the left lower zone. He changed the antibiotic to intravenous Pencillin that day. Repeated CXR on 20 February showed increased haziness. As he had to attend the wedding banquet of his nephew (sister's son), he came to Hong Kong with his wife on 21 February by coach. They arrived Hong Kong at 12.30 hours and resided in Room 911 of Hotel M. In the night time, he had increased cough, shortness of breath, fever and peripheral cyanosis.

28. Contact tracing further revealed that [REDACTED]'s wife had fever (38.4°C) in the afternoon on 24 February. She returned to Guangzhou where she was hospitalised that evening. [REDACTED]'s daughter, who separately arrived in Hong Kong on 22 February, accompanied her mother on the return trip on 24 February. She was also admitted to a hospital in Guangzhou on 27 February for fever. In Hong Kong, [REDACTED] was hospitalised on 1 March and her husband (i.e. [REDACTED]) on 28 February, both for fever, cough and sputum. [REDACTED] subsequently died on 19 March. All other family members related to [REDACTED] eventually recovered.

29. [REDACTED] died on 4 March. Results of extensive laboratory investigations carried out in HKU and the GUV were all negative, except a 4-fold rise in adenovirus antibody titre.

30. With a number of persons fallen sick and although it appeared it was an intra familial spread due to close contact, the situation was a cause for concern. The Director had many discussions with one of the attending physicians and the Consultant of the GUV to explore further actions required for identifying the causative agent. [REDACTED]'s specimens<sup>AA</sup> were subsequently tested positive for coronavirus by polymerase chain reaction in mid-April. A full report on the detailed action taken by DH's Kowloon Regional Office in respect of [REDACTED]'s case is at Annex 7.  
<sup>AA</sup>

31. According to a HA paper prepared for the SARS Expert Committee, there were two infected HCWs whose infection might be related to the three patients in [REDACTED]'s family. The first case concerned a Registered Nurse who was hospitalised on 28 February. She did not have direct contact history with [REDACTED].<sup>AA</sup> On 22 February, she worked in a cubicle next to the one where [REDACTED] stayed. She wore surgical mask at the time because she was having flu symptoms herself. She recovered well and was discharged on 18 March. DH was not notified of this case.  
<sup>AA</sup>

32. In the second case, the infected Health Care Assistant had a history of contact with the [REDACTED] – she was working in the isolation room where he stayed. She attended KWH's AED on 6 March and was discharged with two days' sick leave. She re-attended KWH's AED on 7 March and was admitted into an isolation room. She was intubated and transferred to ICU on 12 March. DH was notified on 13 March when action on case investigation and contact tracing was immediately initiated. She was eventually discharged on 27 March.  
<sup>00</sup>

### Clusters by 24 March 2003

33. There were the following clusters by 24 March 2003 -
- (a) the M[REDACTED] Hotel Cluster including tourists / patients from Vietnam, Singapore and Canada;
  - (b) the Kwong Wah Hospital Cluster;
  - (c) the Prince of Wales Hospital Cluster;
  - (d) two clusters involving medical practitioners' clinics;
  - (e) the Pamela Youde Nethersole Eastern Hospital Cluster;



- (f) the St Paul's Hospital Cluster;
- (g) the Queen Elizabeth Hospital Cluster;
- (h) the Baptist Hospital Cluster; and
- (i) Flights CA112 / CA115.

34. I have set out in details in the above paragraphs DH's actions on the clusters in (a) and (b). Cluster (c) will be dealt with at below from paragraph 35 onwards while clusters (d) – (i) are covered by Annex 8.

### **The PWH Cluster**

35. Dr TK Au, Community Physician (New Territories East) [CP(NTE)], was the directorate officer in charge of case investigation, contact tracing and follow up action for the PWH cluster. He took four days sick leave during period 18-21 March and his temporary absence was covered by Dr Teresa Choi, another directorate officer at the same level.

36. In view of the magnitude of the cluster, I think it would assist the Review Panel by setting out in the following paragraphs a day-by-day account of work undertaken by DH colleagues at the initial stage (11-21 March). DH staff's attendance at meetings with PWH was confined to understanding the outbreak situation and discussions on the epidemiological study, contact tracing and related matters. We did not participate in discussions on operational matters of the hospital.

### **11 March 2003**

37. On reading media reports about an abnormal pattern of sick leave among PWH Ward 8A staff, CP(NTE) immediately rang PWH management colleagues and managed to speak to the Deputy Hospital Chief Executive on the phone at about 10:45 a.m. The latter confirmed the media reports and advised that there would be a special meeting at PWH at 11:00 a.m. CP(NTE) volunteered and attended the meeting.

38. Prof Sung chaired the meeting. Participants included, among others, Dr Donald Lyon, Consultant of Microbiology and Infection Control; Prof John Tam, Professor of Microbiology and Virology;

Dr Alan Wu, Ms Deborah Ho and Ms Regina Chan. This was the usual makeup of colleagues from PWH / CUHK although sometimes certain participants did not show up while other colleagues joined in. For simplicity, we would not repeat the participants on every occasion hereafter. Normally, Dr Fung Hong, the Hospital Chief Executive (HCE) chaired these daily meetings.

44. At the meeting, PWH advised that more than 20 staff had been admitted and isolated. The 8<sup>th</sup> floor of the main building of PWH had been made a restricted area. There was no abnormal sick leave pattern for staff in other wards. CP(NTE) requested PWH to provide a master list of cases for follow up and contact tracing.

45. CP(NTE) then presented the preliminary epidemiological findings and the epidemic curve was tabled. The probable mode of spread was discussed and droplets and fomites were incriminated. The incubation period was estimated from one to seven days. The survey findings on clinical features were shared and PWH and NTERO agreed on a working case definition for active case finding and surveillance. As positive CXR findings were observed in some cases, CP(NTE) advised PWH to include CXR as one of the screening tools. He also advised PWH to freeze movement of staff who had been exposed in Ward 8A.

46. After the meeting, CP(NTE) asked the Ward Manager of Ward 8A to provide a list of patients who had stayed in Ward 8A on or after 24 February but had since been discharged home. The objectives were two-fold: to help identify the source of infection and active case finding.

47. DH set up a special Control Team in NTERO to deal with the PWH outbreak, including case follow-up, contact tracing and surveillance, epidemiological analysis, and prevention of spread to community.

#### 13 March 2003

48. To facilitate communication, outbreak investigation and contact tracing, DH stationed a team of staff at PWH (in addition to the Control Team at NTERO). The DH Team comprised an experienced Medical & Health Officer (MO) and two Nursing Officers.

49. Dr TC Shiu (the DH MO) attended a meeting chaired by Dr Fung Hong in the morning. The meeting discussed the latest progress

of the outbreak, including figures on the number of affected staff, the number of specimens collected and laboratory results. The arrangements on control measures were also discussed. The meeting agreed on a proposal to step up infection control by separating staff into "clean team" and "dirty team".

50. The DH team started interviewing patients of Ward 8A to identify the source of the outbreak and assess the risk of spread to other patients. Communication with the special staff clinic was strengthened to facilitate return of questionnaires to speed up contact tracing and data compilation. Information on sick leave pattern of nursing and minor grades of all specialties of PWH was presented to the DH Team. No abnormal pattern of sick leave was observed in all other specialties except in medical wards.

51. A master list of cumulated cases was provided by PWH to the DH Team in the evening. Upon receipt of the master list from PWH, the Control Team at NTERO immediately sorted out new cases from the master list for follow up and contact tracing.

52. CP(NTE) attended a further meeting at PWH chaired by Dr Fung Hong in the evening. Participants included, among others, Dr Philip Li, Prof Joseph Sung, Dr S F Lui and Prof Paul Chan.

53. CP(NTE) presented the latest epidemiological findings. He observed that some staff outside Ward 8A, who did not have regular contacts with staff/medical students in that ward but who had attended to patients there, had contracted the disease. He therefore said that the source of infection from Ward 8A patients or from patients of other wards should be explored.

14 March 2003

54. Consultant (Community Medicine), Disease Prevention and Control Division of DH [Con(CM)] and CP(NTE) met the HCE of PWH and his deputy in the morning. Surveillance strategies were discussed, in particular the exploration of the inclusion of positive CXR findings in case definition.

55. In the evening, Con(CM) and CP(NTE) visited PWH again to share the updated epidemiological findings. They were joined by Dr TC Shiu of the DH Team. The usual makeup of PWH colleagues, led by HCE, was there. The findings of the index case was shared and discussed (details are set out in paragraphs 71-74) and he was immediately isolated. It was agreed that PWH would follow up staff, medical students and in-patients exposed to [REDACTED]<sup>"DD"</sup> (index case) while DH would follow up discharged patients (non-SARS) and hospital visitors exposed to [REDACTED]<sup>"DD"</sup> (index case). DH would also follow up community contacts of reported cases. CP(NTE) further advised that the first wave of cases was likely to have peaked but another wave from those of the affected close contacts incubating the disease might prop up in the following week and asked PWH to prepare for it.

15 March 2003

56. With the assistance of PWH, the DH Team found 36 patients who had been exposed to [REDACTED]<sup>"DD"</sup> by having been in the same cubicle with him. Among the 36 patients, five had been investigated into and followed up by DH as reported cases.

57. DH immediately traced the remaining 31 patients (some of whom had already been discharged) and found they had 133 close contacts / hospital visitors. All of them were contacted for investigation, medical advice and medical surveillance. Symptomatic persons were advised to seek early medical treatment. Others were put under medical surveillance. At the end of the surveillance period, we found a total of 15 patients and 19 close contacts / visitors had developed symptoms. They were subsequently diagnosed as SARS cases.

58. The exercise to trace contacts who had been exposed to [REDACTED]<sup>"DD"</sup> identified a total of 34 (15 + 19) cases. This had helped prevent the further spread of SARS into the community.

59. Dr TC Shiu attended the usual PWH meeting when the latest progress of the cluster and the arrangements of control measures were discussed. The meeting also discussed issues on the index case, contacts and secondary cases, including the possible mode of spread of infection from the index case.

16 March 2003

60. The list of persons requested by CP(NTE) on 12 March, which went further than those exposed to [REDACTED] by having been in his cubicle, and included persons who had been to any part of Ward 8A since 24 February, was still not available by 16 March. CP(NTE) enlisted the assistance of Mr Albert Ng, Department Operations Manager (DOM). While expressing difficulty, the DOM agreed to make an attempt to compile the list.

61. Separately, CP(NTE) confirmed with PWH that the hospital had already adopted positive CXR as a parameter for confirmation as a clinical case. Accordingly, the new case definition was adopted for epidemiological analysis with effective from the following day with consequential changes to the guidelines on contact tracing.

17 March 2003

62. Con (CM) and Dr TC Shiu of DH accompanied WHO experts on a visit to PWH. They discussed with HCE on the epidemiological findings of the outbreak and the clinical presentation of the disease.

18 March 2003

63. Dr Teresa Choi covered for Dr TK Au as CP(NTE) while the latter was on sick leave up to 21 March. She attended the PWH meeting in the evening at which Professor Sydney Chung asked if the spread of the disease could be air-borne, as suggested by the CDC. CP(NTE) replied that current data supported the earlier findings that the spread was primarily through droplets.

64. CP(NTE) asked if control actions in the hospital had been in place. PWH confirmed that Ward 8A had been closed and infection control measures strengthened. Attendance figures of infection control seminars were reported at the meeting.

65. To speed up the flow of information and enable prompt follow up of cases and contacts, CP(NTE) asked if PWH could assign an officer to provide the necessary support. In response, HCE designated Dr Louis Chan to be the contact point for DH.

19 March 2003

66. CP(NTE) met with HCE in the afternoon to update PWH of the epidemiological findings and discuss ways to further streamline data collection. She also expressed the need to follow up patients and visitors who had been to Ward 8A before ward closure other than those confined to the same cubicle as the index patient.

67. CP(NTE) attended another meeting with PHW and the WHO for the latter to better understand the outbreak position.

68. At about 18:30, Dr Louis Chan of PWH faxed to CP(NTE) a list of printout of patient records (samples at Annex 9). This we understood to be the outcome of CP(NTE)'s request for contact telephone numbers.

20 March 2003

69. Con(CM) and CP(NTE) presented the latest epidemiological findings at a meeting in PWH and discussed matters with HCE on management of contacts.

21 March 2003

70. -Deputy Director of Health (1) [DDH(1)], CP(NTE) and Principal Medical & Health Officer (1) [PMO(1)] had a meeting with PWH. At the suggestion of DDH(1), PMO(1) was redeployed to oversee the operation of a joint contact surveillance centre at PWH control room. Surveillance on visitors to all acute wards in PWH commenced.

Investigation into the source of outbreak

71. At the initial stage of the outbreak, PWH advised (on 11 March) that only staff of Ward 8A were affected while no abnormal pattern was observed in in-patients of the ward. An epidemiological survey conducted in the same evening found that medical students and some staff not of Ward 8A but having visited Ward 8A had been affected. Further interview of these non-ward 8A staff and medical students on 12 March supported that they had no close contact with Ward 8A staff. They went to Ward 8A to attend selective patients. NTERO and PWH visualized the need to explore if one or some patients in Ward 8A were

involved or served as the source. NTERO and PWH conducted joint investigation on 13 March by reviewing the contact and clinical history of Medical Ward 8A in-patients and patients who were discharged from Ward 8A since mid-February with respiratory or unexplained febrile illness.

72. Review of the clinical history of a Ward 8A in-patient <sup>"DD"</sup> [REDACTED] suggested his symptoms were compatible as a case, and he had the earliest onset date of 24 February. He had fever and respiratory symptoms before admission. Most of the initial cases including a number of the medical students had history of having visited the cubicle where <sup>"DD"</sup> [REDACTED] stayed.

73. On 14 March, NTERO identified four cases with fever admitted to PWH on late 13 and early 14 March were relatives of <sup>"DD"</sup> [REDACTED]. Another relative of [REDACTED] was noted to be admitted to Baptist Hospital (BH) on 13 March with fever. While two were household contacts, other relatives only met [REDACTED] during his stay in PWH Ward 8A.

74. NTERO also informed PWH of the linkage, and the latter immediately reviewed exposure history of sick staff and identified a number of them had contact with <sup>"DD"</sup> [REDACTED] during the incubation period. The above <sup>"DD"</sup> discoveries and other <sup>"DD"</sup> epidemiological findings supported <sup>"DD"</sup> [REDACTED] as the index case. [REDACTED] was isolated on 14 March. PWH later postulated that the use of nebuliser in [REDACTED] had played an important role in the spread of the disease. <sup>"DD"</sup>

#### Special Control Team at NTERO

75. I would now like to sum up the deployment of resources to deal with the PWH outbreak. DH staff normally operate from Regional Offices in carrying out case investigation, contact tracing, surveillance, epidemiological analysis and prevention of spread of diseases to the community. In recognition of the scale of the outbreak at PWH, we set up a Special Control Team at NTERO within 24 hours of learning the outbreak (i.e. on 12 March). The team was strengthened on the following and subsequent days through redeployment from the Disease Prevention and Control Division (DPCD) and other service units to cope with increasing workload. By 25 March, there were 40 staff compared to the original figure of 14. A detailed day-by-day breakdown is at Annex 10.

### DH Team at PWH

76. In view of the magnitude of the outbreak, the non-specific nature of the symptoms, the lack of a quick diagnostic test for the syndrome and the speed with which workload and cases were increasing, there was much confusion in the flow of information of cases from PWH to DH at the working level in the initial days. To facilitate communication, outbreak investigation and contact tracing, DH started to station a team of staff at PWH (in addition to the Special Control Team at NTERO) on 13 March. The DH Team spent a lot of time in wards interviewing cases and reviewing medical notes. In the light of developing situations, we had since 21 March put all visitors to acute wards (i.e., extending beyond those who had visited cases) under medical surveillance by the DH Team.

77. An experienced Medical & Health Officer headed the DH Team from 13 to 20 March and a Principal Medical & Health Officer from 21 March. The daily manpower provision is at Annex 11.

78. Both the Special Control Team at NTERO and the DH Team at PWH worked extended hours voluntarily throughout the period under review, very often late into the evenings and over weekends. Having regard to the reported caseload, there were less staff on Sundays but there was a standby arrangement to ensure that sufficient staff were available to cope with developing situations.

### Workload Statistics

79. As an indication of workload generated in the PWH cluster, we have included at Annex 12 the number of referred cases interviewed and contacts (including hospital visitors) followed up. As at 25 March 2003, we had successfully interviewed 386 cases, of which 134 were confirmed to be SARS eventually. A total of 1 884 contacts were successfully followed up and subsequently 59 developed SARS.

80. Given that case interview and contact tracing form only part of the case investigation and medical surveillance, it was not possible to quantify separately the workload of the Special Control Team at NTERO and the DH Team at PWH. Suffice it to say that the workload generated for the Special Control Team at NTERO was much greater than that for the DH Team at PWH and hence the greater number of staff in the former



office. For example, for each referred case processed by the DH Team at PWH, the Special Control Team at NTERO had to deal with a number of contacts and put them under medical surveillance for two weeks following the last day of exposure to cases during which they were followed up several times by the Special Control Team. NTERO had also to deal with various enquiries, prevention and control measures in institutions, deliver health talks and process SARS cases reported from hospitals other than PWH.

### Index Patient of Amoy Gardens Outbreak

81. With regard to the index patient of the Amoy Gardens outbreak, We would refer you to the chronology of events at Annex 13 and paragraph 2.10 of the Investigation Report dated April 2003. The paragraph reads -

*The index case was a 33-year old man (██████████) who traveled between Hong Kong and Shenzhen. He required haemodialysis for chronic renal failure due to systemic lupus erythematosus, and he was followed up at PWH. On 14 March 2003, he had onset of fever, malaise, chills, rigor and diarrhea. He visited his brother's family in Unit 1607, Block E of Amoy Gardens, stayed overnight and used the toilet there. On 15 March, when he was followed up at PWH, he had a fever of 38 degrees Celsius, white cell count of 6.1, lymphocyte count of 0.5, and right lower zone haziness on chest X-ray. Nasopharyngeal aspirate was positive for influenza A. Upon hospital discharge on 19 March, he stayed at his brother's flat and passed stools in the toilet. On 22 March, he was re-admitted due to shortness of breath.*

*[Note: ██████████ returned to Shenzhen on 20 March and attended PWH direct from Shenzhen for scheduled haemodialysis. The earliest onset dates of Amoy Gardens Block E residents were 21 March (3), 22 March (4), 23 March (9), 24 March (41) and 25 March (26).]*

82. DH was aware that ██████████ appeared in the patient list referred by PWH to NTERO in the evening on 16 March. After sorting out newly reported cases from old cases, DH staff embarked on case investigation

on 17 March. It was likely that by the time we were to interview <sup>"yy"</sup> [REDACTED], he had already been tested positive for influenza A. Hence no follow up action was required. His name was subsequently dropped by PWH from the list.

83. <sup>"yy"</sup> [REDACTED] stayed for the night in Amoy Gardens on two occasions: 14 and 19 March. On either days, DH would not have been able to prevent him from spreading SARS to Amoy Gardens residents. DH was notified of [REDACTED] case on 23 March and we commenced tracing of his close contacts on the same day. His brother and sister-in-law in Amoy Gardens were admitted as suspected SARS on 24 and 28 March respectively and later with the diagnosis confirmed on 26 March and 9 April respectively. All three finally recovered.

### Contact Tracing and Medical Surveillance

84. The chief purposes of contact tracing are to confirm the diagnosis, determine the extent of secondary transmission, and identify control measures (Oxford Textbook of Public Health, 4<sup>th</sup> Edition). Together with medical surveillance, contact tracing has been an important public health tool employed by DH in the control of communicable diseases. It helps in facilitating early diagnosis, isolation, treatment of a disease among contacts and prevention of its spread in the community.

85. - I have explained in the above paragraphs for the PWH cluster the involvement of HA in contact tracing in connection with an unknown disease. In particular, I would draw your attention to the following -

- (a) the success of contact tracing depends to a large extent on the timely flow of information from HA and there were difficulties in the initial days;
- (b) CP(NTE) had drawn to the attention of PWH on the likely workload arising from the second wave of cases (para 55). This should have assisted in HA contingency planning;
- (c) the PWH index case is discussed in para 71-74;
- (d) the deployment of resources is explained in para 75-80;
- (e) the Amoy Gardens index case is described in para 81-83.

86. As you would appreciate, our contact tracing and surveillance arrangements were enhanced as we gained more knowledge of the disease. The evolution is described in the following paragraphs.

87. The scope of DH's contact tracing for SARS covered both close contacts and social contacts. Under the WHO definition close contacts include those who have lived with, cared for, or handled respiratory secretions of SARS patients. Persons who have had contact with a person with SARS but do not satisfy this definition are defined as social contacts by DH.

88. Once a SARS notification was received, the DH Regional Offices promptly initiated case investigation and contact tracing. Information required for contact tracing was obtained from the cases or their family members through face-to-face or telephone interviews. Medical staff of the Regional Offices called up contact households regularly and asked about their health status, especially if they had any fever, chills, myalgia, cough and respiratory symptoms. Contacts who reported compatible symptoms of SARS were referred to hospital. Asymptomatic contacts were advised of the symptoms to watch out and the appropriate precautionary actions to take in case symptoms appeared, such as wearing mask and observing general hygiene. They were also asked to contact Regional Offices if they developed symptoms. Household contacts were advised not to go to work or school during the surveillance period. Since March 31, close contacts of SARS cases were required to report daily to one of the four Designated Medical Centers (DMCs). They were required to undergo a temperature check. Depending on the presence of significant symptoms (fever, cough, shortness of breath), a CXR examination might be performed on the spot. Suspected cases were referred to hospital for further investigation and management. Close contacts were otherwise advised to stay at home and medical leave was granted for them. Social contacts were subject to telephone surveillance.

89. With effect from 10 April, household contacts of probable SARS patients were required to undergo home confinement. Home confinees were required to stay at home for a minimum of ten days after last contact with SARS case. They were not allowed to leave home without the permission of a Health Officer. Visiting health teams comprising nurses visited the confinees regularly for medical monitoring. The Police conducted spot checks to ensure compliance. Non-compliant confinees would be removed to camp upon repeated warnings. Confinees

who developed symptoms were either referred to DMCs for screening or directly to hospitals for further management. The measure was further extended to household contacts of suspected SARS patients from 25 April onwards.

90. In contact tracing related to hospital SARS outbreak, Regional Offices of DH followed up on cases referred by hospitals and covered hospital visitors exposed to SARS patients. As a further measure to improve the integrity of our contact tracing system, beginning in April, non-SARS patients discharged from SARS wards were referred to DMCs for daily medical surveillance for 10 days.

91. DH gave particular emphasis to contact tracing in elderly homes, which was vulnerable to SARS outbreaks. When a SARS case involving a patient of an elderly home arose, the concerned Regional Office would immediately alert the home and initiate case investigation. The Elderly Health Services (EHS) would also be informed. Medical surveillance and health advice on infection control would be provided by EHS with on-site visits, detailed advice and on-going support and monitor during the medical surveillance period.

92. Over 26 000 persons, including close contacts and social contacts, have been traced by DH during the SARS outbreak and about 280 of them were subsequently found to be SARS cases, representing 16% of all SARS cases in Hong Kong.

93. According to a study which evaluated the impact of public health measures in the control of SARS, it was concluded that contact tracing and the other public health measures had been successful in greatly reducing the reproduction number of the SARS outbreak in Hong Kong. (Transmission dynamics of the etiological agent of SARS in Hong Kong: impact of public health interventions. Science. 2003 Jun 20; 300(5627):1961-6).

94. Finally, I now turn to your enquiry regarding legal powers. My responses are -

- (a) According to r.24 the Prevention of the Spread of Infectious Diseases Regulations (Cap. 141B), the Director is empowered to order areas or premises to be isolated for the prevention of the spread of any infectious disease. Movement in any isolation area or premises is restricted further under r.25 of

Cap. 141B. In other words, the Director may order any public or private hospital as an isolation area or designate a particular block of a hospital as isolation premises and restrict movement thereof to achieve the practical effect of shutting down a hospital from service.

(b) Technically speaking, the Director did not have the legal authority to designate a hospital as an isolation place under r.24 of Cap. 141B prior to March 2003 because –

- Section 2 of the Quarantine and Prevention of Disease Ordinance (Cap. 141) stipulates that “infectious disease” means any disease specified in the First Schedule to the principal Ordinance.
- First named by WHO as a disease entity on 15 March 2003, SARS was included as an infectious disease in the First Schedule to the principal Ordinance of Cap. 141 on 27 March 2003.
- In other words, the provisions of Cap. 141 and its subsidiary legislation were applied to SARS only after 27 March 2003.

(c) Yet, being the authority under s.72 of Cap. 141 which may amend the First and Second Schedules of the principal Ordinance by order in Gazette, the Director indeed has the power to include SARS as an infectious disease so that provisions of Cap. 141 would apply with immediate effect so long as she sees a need to do so in the interest of public health. Such need is established only if the risk of spread from a hospital and the threat to public health is greater than the downsides of this drastic option e.g. disruption to services to patients.

(d) Apart from resorting to legal authority under Cap. 141 to order a public hospital as an isolation area, the Director may also escalate to the Chief Executive, HKSAR, through SHWF, who may then instruct CE/HA, the public hospital management authority, to close a public hospital administratively. Alternatively, the Director may persuade CE/HA direct for closure of a public hospital as long as the need is established. Indeed, the escalation and persuasion route allows CE/HA to

assess the need for hospital closure and other issues related to the control of SARS from the hospital management perspective. Even if the need for drastic measure to close a public hospital is not established, CE/HA may take administrative measures to improve infection control measures or patient management in the hospital.

- (e) Hypothetically, if PWH were a private hospital licensed under the Hospitals, Nursing Homes and Maternity Homes Registration Ordinance (Cap. 165), the Director could also take advantage of the licensing conditions of private hospitals i.e. accommodation, staffing or equipment as provided by s.3 of Cap. 165, to exert control over PWH even in mid-March 2003 when SARS was not yet included as one of the infectious diseases of which the provisions of Cap. 141 apply.

95. I hope you find the above information useful.

Yours sincerely,



(Dr Margaret Chan)  
Director of Health

Annex 1

(Translation)  
(uploaded onto Internet)

Guangzhou City Government News Conference  
Two people died in Guangzhou till now  
(11 February 2003)

Director of Health Bureau in Guangzhou, Huang Jionglie, explaining the situation of atypical pneumonia in Guangzhou.

News Conference in progress

Deputy Secretary General of Guangzhou Government, Zhang Huoying,  
Speaking at the conference.

Deputy Mayor of Guangzhou, Chen Chuanyu, Speaking at the conference.

Guangzhou City Government held a news conference at 10:30 this morning. Huang Jionglie, Director of Health Bureau in Guangzhou, reported on the situation of atypical pneumonia in Guangzhou.

At the end of last year, atypical pneumonia cases were reported in certain parts of Guangdong Province. Since 12 January 2003, some of the seriously ill patients have been transferred to some major hospitals in Guangzhou for treatment. During the period around Lunar New Year, local cases were detected in Guangzhou region. To date, more than a hundred of cases have been reported in Guangzhou.

Pneumonia is an infectious disease commonly detected in winter and spring seasons. But unlike those in the past years, most pneumonia cases reported this year are atypical with a quick onset and fever as the first symptom. Patients may also develop apparent respiratory symptoms of dry and

unproductive coughs. Despite its quick onset, there is a low risk of fatality. The conditions of most patients are not serious with fever as the major symptom. All existing cases have been properly treated and the conditions of the great majority of patients are under control. Some patients have already been discharged after recovery. As at February 9, two people died among all cases detected in Guangzhou City.

Current situation shows that the disease is infectious and is mainly transmitted through close contact with the respiratory droplets or secretions of the patients. The risk of contracting the disease is generally low unless there is close contact with infected patients suffering from fever.

There are over a hundred cases in Guangzhou City, many of whom are healthcare workers who worked in a few local hospitals where there was neither enough awareness of the disease nor adequate supply of protective gear. They were infected while in close contact with seriously ill patients who came for treatment from places outside Guangzhou. So far, no healthcare workers have been infected in hospitals with adequate and active precautionary measures in place and full awareness of the disease. There is clinical proof that healthcare workers can avoid being infected by strictly complying with the relevant procedures.

The City of Guangzhou has been affected by the disease for more than a month now. The patients are all under effective treatment and their condition under control. There is no need to panic. People generally would not be infected if they follow the guidelines issued by relevant departments of the Guangzhou Province and Guangzhou City by avoiding close contact with patients suffering from fever, maintaining good ventilation of household and working environment, and avoiding excessive fatigue. People are advised to seek early medical treatment at nearby hospitals if they develop such symptoms.

Recently, all sorts of rumors about the disease have been spreading around in the community. It has been described as a biological attack, an inexplicable virus attack, and the spread of plague. All these have been found to be nothing but rumors. The public are urged not to believe in such rumors so as to avoid unnecessary worry and inconvenience.



Press Release on 11 February 2003

DH monitors situation closely

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The Department of Health is closely monitoring the situation in Hong Kong in relation to the high incidence of pneumonia cases in Guangzhou, the Director of Health, Dr Margaret Chan said today (February 11).

The Department has already contacted Mainland health officials to get more information. As it is the high season for respiratory diseases in the Mainland, consultation and hospital admission rates have risen significantly recently.

Initial reports showed that the cases were not anthrax or plague. When further laboratory results are available, DH would be informed, Dr Chan said.

In Hong Kong, the Department of Health operates an effective surveillance system. No unusual patterns of influenza-like illness and respiratory tract infection including pneumonia have been identified through the surveillance network of hospitals, clinics and laboratories in the public and private sectors.

She reminded members of the public to take steps to prevent influenza as we have entered the usual peak season for influenza in Hong Kong between January and March.

To prevent influenza, it is important to:

- \* maintain good ventilation;
- \* avoid crowded places;
- \* observe good personal hygiene and wash hands after sneezing, coughing or cleaning the nose;
- \* build up good body immunity by having a balanced diet, adequate exercise and rest; and
- \* avoid smoking.

Travellers are also advised to observe these preventive measures.

Persons who fall sick are advised to seek medical advice early.

End/Tuesday, February 11, 2003

## **WHO issues a global alert about cases of atypical pneumonia Cases Of Severe Respiratory Illness May Spread To Hospital Staff**

12 March 2003 | GENEVA -- Since mid February, WHO has been actively working to confirm reports of outbreaks of a severe form of pneumonia in Viet Nam, Hong Kong Special Administrative Region (SAR), China, and Guangdong province in China.

In Viet Nam the outbreak began with a single initial case who was hospitalized for treatment of severe, acute respiratory syndrome of unknown origin. He felt unwell during his journey and fell ill shortly after arrival in Hanoi from Shanghai and Hong Kong SAR, China. Following his admission to the hospital, approximately 20 hospital staff became sick with similar symptoms.

The signs and symptoms of the disease in Hanoi include initial flu-like illness (rapid onset of high fever followed by muscle aches, headache and sore throat). These are the most common symptoms. Early laboratory findings may include thrombocytopenia (low platelet count) and leucopenia (low white blood cell count). In some, but not all cases, this is followed by bilateral pneumonia, in some cases progressing to acute respiratory distress requiring assisted breathing on a respirator. Some patients are recovering but some patients remain critically ill.

Today, the Department of Health Hong Kong SAR has reported on an outbreak of respiratory illness in one of its public hospitals. As of midnight 11 March, 50 health care workers had been screened and 23 of them were found to have febrile illness. They were admitted to the hospital for observation as a precautionary measure. In this group, eight have developed early chest x-ray signs of pneumonia. Their conditions are stable. Three other health care workers self-presented to hospitals with febrile illness and two of them have chest x-ray signs of pneumonia.

Investigation by Hong Kong SAR public health authorities is on-going. The Hospital Authority has increased infection control measures to prevent the spread of the disease in the hospital. So far, no link has been found between these cases and the outbreak in Hanoi.

In mid February, the Government of China reported that 305 cases of atypical pneumonia, with five deaths, had occurred in Guangdong province. In two cases that died, chlamydia infection was found. Further investigations of the cause of the outbreak is ongoing. Overall the outbreaks in Hanoi and Hong Kong SAR appear to be confined to the hospital environment. Those at highest risk appear to be staff caring for the patients.

No link has so far been made between these outbreaks of acute respiratory illness in Hanoi and Hong Kong and the outbreak of 'bird flu,' A(H5N1) in Hong Kong SAR reported on 19 February. Further investigations continue and laboratory tests on specimens from Viet Nam and Hong Kong SAR are being studied by WHO collaborating centres in Japan and the United States.

Until more is known about the cause of these outbreaks, WHO recommends patients with atypical pneumonia who may be related to these outbreaks be isolated with barrier nursing techniques. At the same time, WHO recommends that any suspect cases be reported to national health authorities.

WHO is in close contact with relevant national authorities and has also offered epidemiological, laboratory and clinical support. WHO is working with national authorities to ensure appropriate investigation, reporting and containment of these outbreaks.

### THREE CASES REPORTED BUT NO LINK TO OUTBREAK OF ATYPICAL PNEUMONIA IN HONGKONG, VIETNAM AND GUANGDONG PROVINCE IN CHINA

The World Health Organisation (WHO) has on 12 March 03 issued a global alert about outbreaks of cases of a severe form of pneumonia in Hong Kong, Vietnam and Guangdong province in China.

2 In Vietnam, the outbreak began when a traveller was hospitalised on 26 February 03 for the treatment of severe and acute breathing difficulties of unknown origin. He had become sick shortly after arrival in Hanoi from Shanghai and Hong Kong. Following his admission to the hospital, about 20 hospital staff became sick with similar symptoms. Some of these staff are recovering but some remain critically ill.

3 In Hong Kong, an outbreak of respiratory illness has been reported on 11 March 03 in the Prince of Wales Hospital. More than 20 hospital staff were admitted for observation after they developed fever. Some of these staff, also developed pneumonia. Their conditions are stable.

4 In February 03, it was reported that about 300 cases of atypical pneumonia, with 5 deaths, had occurred in Guangdong province in China.

5 The signs and symptoms of the disease include initial flu-like illness (rapid onset of high fever followed by muscle aches, headache and sore throat). In some cases, they developed pneumonia progressing to difficulty in breathing.

6 The outbreaks in Hong Kong and Hanoi appear to be confined to the hospital environment. No link has so far been made between the outbreaks of pneumonia in Hong Kong and Hanoi and the earlier outbreak of 'bird-flu' A(H5N1) in Hong Kong in February this year. Investigations into the cause of the outbreaks are currently being carried out by the WHO.

7 The Ministry of Health is closely monitoring the situation. We had been notified of three persons who had travelled to Hong Kong at the end of February and who were admitted to hospital for pneumonia after they returned to Singapore. Two of them have recovered and been discharged from hospital. The remaining case is recovering in hospital. Investigations suggest a viral origin, however no causative organism has been identified. We have conducted contact tracing and given advice to the contacts of these cases to seek medical attention early should they become ill. The hospital staff attending to these cases were advised to take the necessary infection control precautions. None of the hospital staff attending to these patients have reported ill. So far, we have not established that these cases are related to the outbreak in Hong Kong and Hanoi.

8 Our surveillance has shown that there has not been any increase in the number of cases of acute respiratory infections. As a precautionary measure, we are advising all medical practitioners to be vigilant and to be on the look out for similar cases.

9 The Ministry advises you to build up your body's resistance to illnesses by having a proper diet with adequate exercise and rest. If you have returned from recent travel overseas, in particular to Hong Kong, Hanoi and Guangdong province in China, you are advised to seek medical attention early if you experience flu-like symptoms.

MINISTRY OF HEALTH  
13 MARCH 2003

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Singapore Government Press Release

120394

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### UPDATE ON ATYPICAL PNEUMONIA CASES IN SINGAPORE

In Singapore, in addition to the 3 cases reported yesterday, the Ministry of Health has been notified of 6 other persons who have been admitted to hospital for pneumonia. These persons had been in close contact with the patients who had developed pneumonia after returning from Hong Kong. Of these, two are hospital staff who had attended to the patients. Their conditions are stable. As a precautionary measure, all close contacts of the cases and hospital staff who have attended to the cases, are being monitored closely.

On-going investigations suggest a viral origin. However no causative organism has been identified. The transmission of the infection among the cases in Singapore appears to be due to close contact with the patients who had travelled to Hong Kong.

The Ministry is in touch with the WHO and the Hong Kong health authorities to closely monitor the situation in Hong Kong and Hanoi. Investigations into the cause of the outbreaks are still on going and no causative organisms have been identified.

On 13 March 03, the World Health Organisation (WHO) had started a worldwide surveillance of cases of atypical pneumonia.

The Ministry advises you to seek immediate medical attention if you develop fever, muscle ache and flu-like symptoms (cough, sore throat, shortness of breath or breathing difficulty) and have travelled to Hong Kong, Hanoi or Guangdong province in China, within 2 weeks of onset of the symptoms. If you are a close contact of such persons and you develop similar symptoms, you should seek immediate medical attention as well.

As a precautionary measure, the Ministry advises you to avoid travel to Hong Kong, Hanoi and Guangdong province in China for the time being, unless absolutely necessary.

MINISTRY OF HEALTH

14 MARCH 2003

HONG KONG TOURISM BOARD 香港旅遊協會		FAX NOTE
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## Report on Metropole Hotel Cluster

### Background

██████████ (Hotel M) at ██████████ was associated with a cluster of SARS cases in Hong Kong. At this point, ongoing communication with the World Health Organization (WHO) and other health authorities revealed a total of 16 probable and suspected SARS cases associated with the hotel.

2. Initial investigation undertaken by the Department of Health (DH) in March 2003 found seven persons associated with Hotel M, including three visitors from Singapore, two from Canada, one Mainland visitor and a local resident. Epidemiological investigations revealed that these cases originated from the Mainland visitor who stayed at Hotel M during 21-22 February. All seven cases resided or visited the 9/F of the hotel between 12 February and 2 March.

### **Guangzhou visitor (Patient A)**

3. According to information provided by the patient's wife: the visitor from Guangzhou came to Hong Kong on 21 Feb and stayed at Hotel M during 21-22 Feb. He stayed in room 911. He had been sick since 15 Feb before he came to Hong Kong. He was admitted to Kwong Wah Hospital on 22 Feb and he died on 4 March. His serum showed 4-fold rise in antibody against adenovirus. More detail about this case is at SARS EC 23/03.

### **Prince of Wales Hospital cluster index patient (Patient B)**

4. According to information provided by the index patient himself, cross-checked with hotel records and Hong Kong Immigration records: he went to Hotel M to visit a friend from San Francisco who stayed in room 906 during 18-23 Feb. He developed illness on 24 Feb. He was the index case for the Prince of Wales Hospital cluster of SARS.

**Singapore visitors (Patients C,D,E)**

5. According to information provided by Singapore Ministry of Health, cross checked with hotel records and Hong Kong Immigration records: 2 pairs of female Singapore tourists (who did not know each other) visited Hong Kong, one pair during 21-25 Feb and the other 20-25 Feb. They stayed at Hotel M. Each pair shared a room in the hotel: the first pair in room 938 and the second pair in room 915. Two developed illness on 24 Feb, one from each of the rooms. The other roommate of room 938 also developed illness on 25 Feb (the other roommate of room 915 was asymptomatic). They returned to Singapore on 25 Feb and were admitted to hospital on 1 to 3 March respectively. They were discharged eventually.

**Toronto tourist (Patient F)**

6. According to information provided by the Health Canada, cross checked with hotel records and Hong Kong Immigration records: a Canadian resident traveled to Hong Kong to visit her family during 18-22 Feb. She stayed at Hotel M during this time (room 904). She departed Hong Kong on 22 Feb and arrived at Canada on 23 Feb. The date of onset was not precisely known and she died subsequently.

**St. Paul's Hospital cluster index patient (Patient G)**

7. According to information provided by the index patient himself, he was a Canadian resident who came to Hong Kong to visit relatives on 12 Feb. He stayed at Hotel M during 12 Feb – 2 March (room 902). He developed illness on 27 Feb and was admitted to St. Paul's Hospital on 2 March. He was the index case for the St. Paul's Hospital cluster of SARS. He was transferred to Queen Mary Hospital on 8 March and discharged on 14 April.

**Immediate measures taken**

8. Following the discovery of common linkage between the above cases and hotel M, an investigation team of the DH visited the hotel on 19 March. The hotel environment and 9/F were inspected. The general hygiene on 9/F was satisfactory. There were four elevators in the lift

lobby. Each had a capacity of 13 persons. Except for the lift lobby, there were no other common areas or toilets. The rooms were tidy and clean. Each room had its own ventilation control. According to hotel management, air ventilation in different rooms did not mix, and air ventilation on different floors did not mix. Laundry was collected by staff twice daily. They were sent to a laundry shop in Tuen Mun. Basically, four laundry staff worked on 9/F, and a few rooms on some other floors. There was no breakdown in electricity, ventilation systems and lift services during the past two months.

9. The hotel had 285 staff of which about 170 came into contact with visitors regularly. Sickness records were kept for individual staff. They did not reveal upsurges around the date of inspection. At any one time, not more than three staff who had direct contact with customers were sick according to the records. One staff was admitted to Yan Chai Hospital during 2-11 March with a diagnosis of bacteria pneumonia, with good response to antibiotic treatment. There was no increased sickness around 21-22 Feb.

10. During the inspection on 19 March, DH advised the hotel to inform all in-house guests that several SARS cases were found to be associated with 9/F of the hotel. The hotel manager was asked to evacuate guests on 9/F and thoroughly disinfect all rooms and areas on this floor and other floors. Disinfection guideline was given to the hotel to follow. The 9/F was not allowed to re-open until it was cleansed to DH's satisfaction. Advice was given that no sick staff should be allowed to work. The hotel floor plan and guest list were obtained from the hotel for follow up actions. Health talks and advice were given to hotel staff and a questionnaire survey on staff sickness was administered. No staff had symptoms of SARS.

11. On 19 March, DH announced the hotel findings in a press conference. A hotline was set up at DH headquarters for public enquiries. At the request of DH, the hotel management closed down 9/F temporarily for thorough cleansing and disinfection. The other floors of the hotel were also disinfected subsequently.

12. DH obtained a guest list from the hotel. We sought assistance from Immigration Department to match the hotel records and yielded data on nationality of the visitors. A list was prepared for guests who stayed



on 9/F at the hotel during 21-22 Feb. This was sent to the respective Consulates on 22 March for necessary follow up action. On 24 and 26 March, DH sent letters to Consulates of 43 countries providing them with a list of their citizens/residents who had stayed at the hotel any time during 18 Feb to 3 March. The whole list contained 1 730 people.

13. On 20 March, DH staff returned to the hotel to ensure that the hotel management had already conducted proper cleansing and disinfection. DH held a health talk and meeting with District Council members and residents of Kowloon City concerning the hotel.

14. On 22 March, DH staff again visited the hotel to inspect its hygiene and environment and the progress of disinfection, which was found to be satisfactory. DH advised the hotel that 9/F could be re-opened to the public.

#### **Further case finding**

15. Following DH's public announcement of the hotel cluster and distribution of letters to Consulates and health authorities in other countries, we received feedback from different sources that led to the identification of more suspect / probable cases associated with the hotel.

#### **American Chinese in Hanoi (Patient H)**

16. According to information provided by WHO/Vietnam, this American visitor arrived in Hong Kong from Shanghai on 19 Feb and left for Hanoi on 23 Feb. He stayed at Hotel M during 21-23 Feb (room 910). He developed illness while he was in Hanoi and returned to Hong Kong for treatment on 6 March. He passed away at Princess Margaret Hospital subsequently. Some healthcare workers who looked after him in Hanoi developed pneumonia.

#### **Patients I, J and K reported by the CDC, US**

17. Patient I traveled from US to Hong Kong with her husband and 3-year-old daughter to visit her family residing in Hong Kong. She stayed on the 9/F of Hotel M during 19-22 Feb and another room of 9/F during 24 Feb – 2 March. She began feeling ill on 24 Feb and sought medical treatment from private practitioner in Hong Kong. On return to United

States on 2 March, she was sent to hospital immediately. She was admitted and was discharged on 17 March.

18. Patient J came from US, stayed on 9/F of Hotel M on 1 March and stayed on 14/F during 2-6 March. His reported onset date was 13 March.

19. Patient K came from Canada. He stayed on 14/F in Hotel M for two periods, 20-24 Feb and 3-6 March. He had onset of illness on 28 Feb.

#### **Patients L and M reported by Guangdong Health Authority**

20. Patients L and M were a couple from Canada. They stayed on 9/F during 19-22 Feb, then they went to Guangdong through Macau to visit their relatives. The husband had onset of symptoms on 25 Feb and the wife's onset date was 24 Feb. They traveled to Guangzhou on 1 March. Both were admitted to the hospital for treatment on 6 March and recovered afterwards.

#### **Patient N identified during active case finding**

21. Patient N was Patient A's nephew in China. He did not live with Patient A in China. They traveled to Hong Kong separately to attend a relative's wedding. The two families met when they arrived at Hong Kong and stayed at 9/F of Hotel M. Patient N had onset of illness on 25 Feb.

#### **Patient O and P notified by the WHO**

22. WHO informed DH of two SARS cases that were related to Hotel M. A couple from the UK stayed on 9/F of Hotel M during 18-23 February and left Hong Kong for the Philippines on 23 February. The wife had onset of symptoms on 27 February and was admitted to the hospital with pneumonia on 6 March. She was discharged on 12 March and returned to the UK on 14 March. Because the woman was still unwell, a doctor in England was consulted. Blood sample taken on 18 March was positive for antibodies against SARS coronavirus.

23. The husband had onset of symptoms on 25 February and was

admitted to the hospital in Philippines on 5 March. He was discharged from the hospital on 12 March and returned to the UK on 14 March. Blood sample taken on 19 May was positive for antibodies against SARS coronavirus.

#### Investigating the mode of transmission

24. The staff who cleaned up Room 911 was interviewed. He started cleaning from the 901 side. Details of the room visit record was shown. After cleaning 911, he cleaned 910, 915 and 938 in succession. However, records did not show that he cleaned 902, 904 and 906 before 911.

25. Their routine was to throw away rubbish, made the bed, wiped the room with a wet cloth, washed the bathroom (wearing latex gloves) and then vacuum cleaned the floor. There has not been any repair of piping during February.

26. DH made a joint visit to Hotel M together with Environment Protection Department to inspect its sewerage and air ventilation systems. Air ventilation was delivered to each and every room separately through a system that draws air from the outside and extracts air out of the toilet. Air in one room would not be mixed with another room. Air flow in the corridor was delivered by an air vent system. The design was up to the standard required by the Buildings Department.

27. The sewerage system also had a U-shape device to prevent sewage inflow. It was constantly maintained so that it was functional. There was no complaint of foul smell from the drains. There was no possibility of sewage flow from one room to another. The wastewater pipe and toilet pipe were not linked.

28. A WHO team from Health Canada and DH conducted joint investigation on 2, 5 and 10 May 2003. Inspection was made on the general environmental condition, sewerage system and air conditioning system. The roof, 9/F and 14/F of the hotel were also inspected. Air flow tests were conducted on the hotel lifts as well as ventilation systems on 9/F, 14/F. A total of 154 environmental samples were taken. The samples were taken from hotel rooms, floor drains, air vents, carpet of the hallway on 9/F and 14/F. Preliminary results found positive RT-PCR for

coronavirus was on 9/F - 4 out of 31 samples collected from the carpet in the hallway and 4 out of 7 samples collected from the lift lobby area, suggesting contamination event had occurred in the hallway outside room 911 and the lift lobby area. The hotel staff had no record of any gathering of residents (e.g., fire alarm), or being called to clean up a vomitus on Feb 21-22.

29. The WHO environmental investigation report on Hotel M is still pending at the time of writing this summary.

Department of Health  
3 July 2003

"AA"

[REDACTED] - a visitor from Guangzhou

## Introduction

On 24 February 2003, the Hospital Authority (HA) notified the Department of Health (DH) that a visitor from Guangzhou - [REDACTED] "AA" was suspected to suffer from severe atypical pneumonia and was admitted to Intensive Care Unit (ICU) of Kwong Wah Hospital (KWH). His personal particulars were as follows:-

Name :	[REDACTED] "AA"
Sex / Age:	Male / [REDACTED]
Ethnicity :	Chinese
Residential address :	An apartment in Guangzhou
Occupation :	Doctor in Sun Yat San Hospital located in Guangzhou
Past medical history :	Good past health
Date of Onset :	15 February 2003
Admission date & time:	11:47 hours on 22 February 2003 through Accident and Emergency Department (AED) of KWH
Date of death:	Certified at 22:48 hours on 4 March 2003

2. [REDACTED] "AA" was the index patient of a cluster of SARS cases involving three families in total (see summary at Appendix I). Actions taken by DH on cases investigation, contact tracing and medical surveillance in chronological sequence are summarized in this paper.

[REDACTED] "AA" 's history before admission to KWH (obtained from his wife and daughter)

3. [REDACTED] "AA" worked in Guangzhou Sun Yat San Hospital as a doctor in the out-patient clinic of Medical Department. In the week preceding his onset of symptoms, he contacted two patients presenting with high-grade fever and chest symptoms. Chest X-ray (CXR) of both patients showed haziness and [REDACTED] then referred both patients to attend AED of the hospital.

4. <sup>AA</sup> [REDACTED] had good past health. In the evening of 15 February, he had a sudden onset of fever (39°C), chills and rigor. He took oral antibiotic (exact name unknown) that night. He later developed cough and sputum. CXR done on 17 February showed haziness in the left lower zone. He changed the antibiotic to intravenous Penicillin that day. Repeated CXR on 20 February showed increasing haziness. As he had to attend the wedding banquet of his nephew (sister's son), he came to Hong Kong (HK) with his wife on 21 February from Guangzhou by coach. They arrived HK at 12:30 hours and resided in Rm 911 of Metropole Hotel in Mongkok. In the night time, he had increased cough, shortness of breath, fever and peripheral cyanosis.

### Progress after Admission

5. On 22 February 11:00 hours, <sup>AA</sup> [REDACTED] (the patient) attended KWH AED. CXR showed bilateral infiltration. He was diagnosed to have severe fulminating pneumonia and was admitted to ICU directly. He was treated with Augmentin, Azithromycin, Ranitidine, Amantadine, Cisatracurium infusion and Dopamine infusion. His condition deteriorated and he developed adult respiratory distress syndrome. He was fully sedated and intubated for supported ventilation on 23 February. The fever did not subside and his condition continued to deteriorate. He subsequently suffered from multi-organ failure and finally succumbed at 22:48 hours on 4 March.

### Contact Tracing and Case Investigation

#### 24 February 2003

6. At 15:20 hours, Miss But, a Registered Nurse of Kowloon Regional Office (KRO) of DH departed for KWH. Before her departure, Miss But had informed the nursing staff of KWH Ward E5 that she was on her way for investigation and asked the nursing staff to keep the relatives of the patient in the ward for interview. However, when Miss But arrived at the ICU, the relatives of the patient had already left.

7. Miss But studied the case notes and made copies. No direct interview of the patient was done as he had already been intubated. She returned to KRO at 16:30 hours.

8. Miss But then rang the patient's sister in HK, <sup>CC</sup> [REDACTED]. History of the patient was then obtained from [REDACTED] and the patient's wife and daughter during the same phone call. The symptoms and

clinical course of the patient were noted and the travel history obtained. It was noted that the patient was not exposed to any poultry in the two weeks prior to the onset of his symptoms. He did not keep any chickens, ducks or birds, nor go to any market where live poultry was kept.

9. During this phone interview, five family contacts of the patient were identified. They were the patient's wife, daughter and son, all residents of Guangzhou, as well as his sister in Hong Kong and her husband. The following details were obtained during the phone interview -

- (a) [REDACTED] the patient's wife, was a housewife. She complained that she had fever (38.4°C) on that day (24 February/date of the interview). Miss But advised her to attend AED for further management. However, [REDACTED] wanted to return to Guangzhou for treatment because of the high cost in Hong Kong. (Later on that day i.e., 24 February, [REDACTED] returned to Guangzhou with her daughter later at 18:00 hours.)
- (b) [REDACTED], the patient's daughter, arrived HK on 22 February (left HK on 24 February). She was asymptomatic.
- (c) [REDACTED], the patient's son, also arrived HK on 22 February. He had gone back to Guangzhou on 23 February. He was asymptomatic.
- (d) The patient and his wife stayed at M [REDACTED] Hotel, Room 911 on 21 February.
- (e) Since 22 February, the patient's wife, daughter and son were staying at the home of the patient's sister in HK, [REDACTED]. [REDACTED] and [REDACTED] were asymptomatic on the day of the interview (24 February). "cc" "cc"
- (f) The patient spent the afternoon of 21 February with [REDACTED] shopping in Central, HK. "cc"

All the family contacts were advised to watch out for symptoms of respiratory tract infection and take care of personal hygiene.

**Follow-up Action for Family Contacts**  
**25 – 27 February 2003**

**120405**

10. Miss But and Dr Ma of KRO contacted KWH daily for the clinical progress including investigation results. [REDACTED] was called daily for active medical surveillance. It was noted that the patient's wife was admitted to Sun Yat San Hospital in Guangzhou on 24 February for fever. All other four close contacts mentioned in para. 9 above (i.e. the patient's daughter and son, his sister in HK and the latter's husband) were asymptomatic. (It later turned out that the patient's daughter was symptomatic and admitted to hospital on 27 February – para. 14 refers.)

**28 February 2003 – 2 March 2003**

11. Since 25 February, there were media reports about the patient's clinical details with personal particulars disclosed. [REDACTED] felt dissatisfied and eventually was not cooperative in giving further information from 28 February onwards. In fact, Miss But did call [REDACTED] twice on 28 February but to no avail.

**3 March 2003**

12. On 3 March p.m., KRO was notified that two family contacts of the patient, [REDACTED] and [REDACTED] (the patient's sister in HK and her husband) were admitted to KWH on 1 March and 28 February respectively. Another workup for contact tracing was performed by nursing staff Miss But and Miss Chiu on the same day through face to face interview with the two cases in the ward. In view of the suspected high infectivity of the disease, detailed exposure history to possible sources of infection was obtained.

13. [REDACTED] reported that there were two common meals with the patient on 21 February:

- (a) Lunch was held at 12:30 hours in a Chinese restaurant. The following eight persons attended the lunch -
- (i) the patient and his wife;
  - (ii) [REDACTED] and her husband [REDACTED]; and
  - (iii) another sister of the patient and her son, daughter in law and grandson. This family lives in Guangzhou. They arrived HK at 11:00 hours on 21 February and returned to Guangzhou on 22 February. Only the son [REDACTED] was noted to have symptoms suggestive of pneumonia.



- "CC"
- (b) Dinner was held at 19:30 hours in [REDACTED]'s home. In addition to the eight persons who attended the lunch ((a) above), two others also joined the party, namely [REDACTED] (son of [REDACTED]) and a friend.
- "CC"

#### 4 March 2003

- "CC"
14. On 4 March a.m., Miss But phoned [REDACTED] (son of the [REDACTED]) for contact tracing. It was noted that [REDACTED] and his wife were asymptomatic and that [REDACTED] (the patient's son) had come to Hong Kong on 27 February and been staying at [REDACTED]'s home. [REDACTED] was also asymptomatic. In addition, it was noted that [REDACTED] (the patient's daughter) had fever on 27 February and was admitted to a hospital in Guangzhou on the same day.

#### 5 to 18 March 2003

15. From 5 to 18 March, Miss But contacted [REDACTED] (son of the patient's sister in HK) and [REDACTED] (the patient's son) several times for contact tracing. It was noted that [REDACTED] and [REDACTED] and the latter's wife were asymptomatic. The patient's wife and daughter were still in hospital in Guangzhou and their conditions were stable. (Note: Both the patient's wife and daughter have eventually recovered.)

#### Laboratory Investigations

- "AA"
16. Extensive laboratory investigations on [REDACTED] were carried in the University of Hong Kong (HKU) and the Government Virus Unit. Initially, results were negative for all known atypical pneumonia agents, except a four-fold rise in adenovirus antibody titre. His specimens were subsequently tested positive for coronavirus by polymerase chain reaction (PCR) in mid April. The results are tabulated in Appendix II.

Department of Health  
August 2003

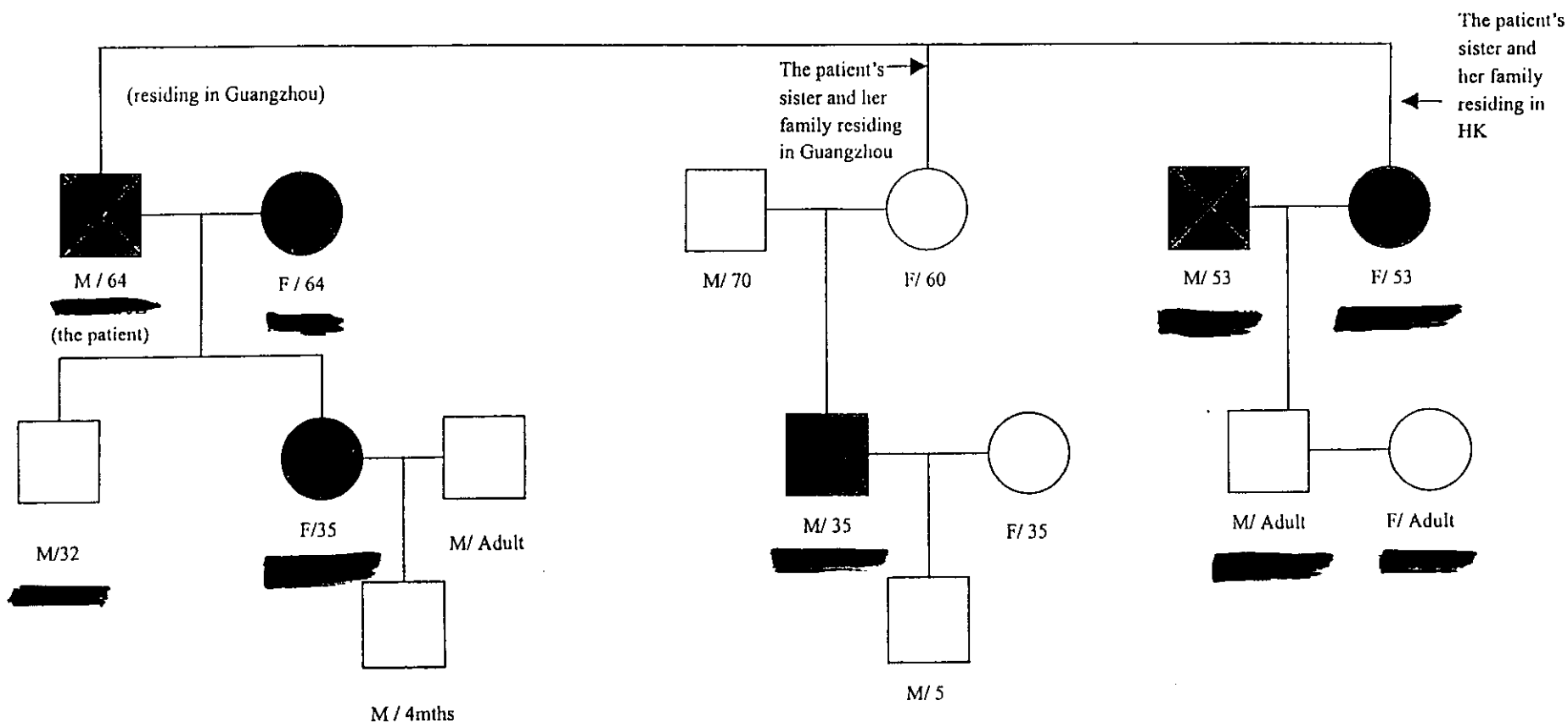
PP's

**family and his two sisters' families**

□ - male

○ - female

\*Those shaded are symptomatic and those eventually succumbed are marked with a cross.



120407

"AA"

## Appendix II

## Laboratory investigations results of [REDACTED]

Investigations done by Department of Microbiology, HKU:

Date of specimen collection	Specimen	Test	Result	Date of reporting	Remarks
24.2.2003	Urine	Pneumococcal antigen	Negative	25.2.03	
		Legionella antigen	Negative	25.2.03	
	Serum [Day 9]	Mycoplasma pneumoniae antibody	< 1:40	25.2.03	
		Chlamydia pneumoniae antibody (micro-IF)	1:128	25.2.03	Comments by (Dr P L HO): The titre is <b>not</b> diagnostic although it implies there has been an infection in the past. The Ab titre was expected to rise after 3-4 weeks if it were a recent infection.
		Chlamydia psittaci antibody	<1:32	25.2.03	
	Nasopharyngeal aspirate and tracheal aspirate	Direct IF for influenza A, B, adenovirus, Respiratory Syncytial Virus (RSV) and parainfluenza 1,2,3	Negative	25.2.03	
		PCR for influenza and Chlamydia nucleic acid	Negative	25.2.03	Quality of the specimens were poor & inadequate

## Investigations done by GVV:

Date of specimen received	Specimen	Test	Result	Date of reporting
24.2.2003	Urine	Legionella antigen	Negative	N.A.
	Serum	Influenza A	<10	26.2.2003
		Influenza B	<10	-ditto-
		Adenovirus	10	-ditto-
		Chlamydia	10	-ditto-
		Mycoplasma	<10	-ditto-
		Parainfluenza 1	<10	-ditto-
		Parainfluenza 2	<10	-ditto-
		Parainfluenza 3	10	-ditto-
		RSV	<10	-ditto-
		Legionella	<32	-ditto-
		Rickettsia mooseri	<40	-ditto-
		Rickettsia coronii	40	-ditto-
		Hantaan virus	<10	-ditto-
		Coronavirus	QI	10.6.2003
26.2.2003	Nasopharyngeal aspirate	Viral culture	Negative	12.3.2003
		PCR for coronavirus	<b>Positive</b>	19.4.2003
		PCR for other agents*	Negative	-ditto-
26.2.2003	Serum	Influenza A	<10	27.2.2003
		Influenza B	<10	-ditto-
		Adenovirus	10	-ditto-
		Chlamydia	10	-ditto-
		Mycoplasma	<10	-ditto-
		Parainfluenza 1	<10	-ditto-
		Parainfluenza 2	<10	-ditto-
		Parainfluenza 3	10	-ditto-
		RSV	<10	-ditto-
		Legionella	<32	-ditto-
		Rickettsia mooseri	<40	-ditto-
		Rickettsia coronii	40	-ditto-
	Tracheal aspirate	Viral culture	Negative	17.4.2003
		PCR for coronavirus	<b>Positive</b>	19.4.2003

Date of specimen received	Specimen	Test	Result	Date of reporting
3.3.2003	Serum	Influenza A	10	5.3.2003
		Influenza B	10	-ditto-
		Adenovirus	<u>40</u>	-ditto-
		Chlamydia	10	-ditto-
		Mycoplasma	<10	-ditto-
		Parainfluenza 1	10	-ditto-
		Parainfluenza 2	10	-ditto-
		Parainfluenza 3	20	-ditto-
		RSV	10	-ditto-
		Legionella	<32	-ditto-
		Rickettsia mooseri	<40	-ditto-
		Rickettsia coronii	40	-ditto-
		Hantaan	<10	-ditto-
12.3.2003	Left lung tissue	PCR for coronavirus	<i>Positive</i>	19.4.2003
	Right lung tissue	PCR for coronavirus	<i>Positive</i>	17.4.2003
	Liver tissue	PCR for coronavirus	<i>Positive</i>	19.4.2003

\* Other PCR tested included Influenza A(H1, H3, H5, H7), Influenza B, Adenovirus, Chlamydia pneumoniae, Chlamydia psittaci, Mycoplasma pneumoniae, Parainfluenza 1,2,3, human metapneumovirus, Hantavirus and enterovirus.

"KK"

██████████ clinic cluster reported on 13 March 2003

Department of Health (DH) received notification of a GP and his nurses suspected to be suffering from atypical pneumonia. DH immediately initiated follow up action on the same day. Case investigation by DH revealed that the cluster involved five persons, namely ██████████<sup>"KK"</sup>, his wife and three nurses in his clinic. A nurse first developed symptoms on 3 March, followed by the second nurse on 5 March. ██████████<sup>"KK"</sup> was ill on 10 March, followed by his wife on 12 March and then the third nurse on 16 March.

2. The source of infection was not immediately obvious at the time of epidemiological investigation. It later transpired that the first nurse who fell sick could have acquired the infection from ██████████<sup>"GL"</sup>, who attended the clinic on 23 February and succumbed from severe community acquired pneumonia (SCAP) on 15 March. ██████████<sup>"GL"</sup> had history of traveling to the Mainland before becoming sick.

3. Close contacts of ██████████<sup>"KK"</sup>, his wife, nurses of the clinic (four nurses in total) and their hospital visitors were given health advice and placed under medical surveillance. Apart from the doctor's wife who contracted the infection from her husband, no other contacts were identified. All patients recovered.

Pamela Youde Nethersole Eastern Hospital (PYNEH) cluster reported on 13 March 2003

4. DH received notification from PYNEH that six health care workers (HCWs) of A5 ward were suffering from atypical pneumonia. Their onset dates were between 4 and 10 March. DH staff immediately carried out face-to-face interviews with the patients, traced their close contacts for health advice and started daily medical surveillance.

5. Source of the infection was traced to a 44-year old salesman, ██████████, who stayed in A5 ward of PYNEH from 2 March to 7 March,

"LL"

before transfer to high dependency unit. Ward staff did not take isolation or droplet precautions at that time. The case was reported to DH as SCAP on 11 March but direct patient interview was not possible as he was in a poor state. The patient's sister however volunteered a history of traveling to Zhongshan with his daughter and two friends on 22-23 February. The patient was said to have developed upper respiratory infection symptoms the day before, and fever during the trip. DH staff conducted medical surveillance and found no household or close contacts developing symptoms. The patient died on 16 March.

6. While DH was tracing contacts of the six HCWs, PYNEH stepped up hospital infection control and carried out surveillance of other HCWs and patients who shared the same cubicle with the index case. One patient, a visitor and another HCW were later found to be suffering from SARS. Contact tracing and medical surveillance were carried out.

7. At the conclusion of this outbreak, 14 persons including the index patient were affected. Secondary spread was limited to four close contacts of three HCWs.

#### St Paul's Hospital (SPH) outbreak reported on 17 March 2003

8. DH received notification from SPH of an outbreak of atypical pneumonia among three HCWs of Old-1 ward. Their onset dates were between 9 and 14 March. DH staff immediately carried out face-to-face interviews with the patients, traced their contacts for health advice and started daily medical surveillance. SPH was asked to step up hospital infection control and monitor the health of other HCWs.

9. Meanwhile, the source was traced to a 72-year-old male patient, [REDACTED] <sup>"FF"</sup> whose onset of illness was on 27 February. He was a Canadian visitor who stayed in M [REDACTED] Hotel since 12 February. He was admitted into Old-1 ward from 2 to 8 March before transfer to QMH for further management. Hospital staff did not take special isolation or droplet precautions at that time. DH was notified of the case as SCAP on 13 March and contact tracing and medical surveillance were carried out in the usual manner.

10. Once the index case had been identified, SPH immediately took follow-up action for all patients who stayed in the same room. Active case finding revealed that one patient and five visitors of Old-1 ward were infected.

11. At the conclusion of this outbreak, a total of 12 cases including the index patient were affected. Secondary spread was limited to one family contact of an affected HCW and one family contact of an affected visitor. All patients recovered.

Queen Elizabeth Hospital (QEH) Ward G6 cluster reported on 18 March 2003

12. A hospital cluster in Ward G6 came to light in a newspaper report. A doctor and two nurses with onset dates from 12 to 16 March were involved. DH conducted immediate epidemiological investigation and traced the source to a patient known by the name of [REDACTED] who had travel history to Guangzhou every weekend. [REDACTED] was admitted on 9 March and died on 30 March from SARS. "HH"

13. DH provided health advice to home contacts of the affected HCWs and conducted medical surveillance. At the same time, QEH carried out health surveillance of work contacts. None developed symptoms. All cases recovered.

Baptist Hospital (BH) 8/F outbreak reported on 21 March 2003

14. DH received notification from BH of a total of four healthcare workers suspected to be suffering from SARS. Two wards, namely N8 and O8, were involved. After active case finding and surveillance, 34 persons were found to have contracted the disease. They included 10 healthcare workers, one visiting doctor, 12 patients, eight contacts and three visitors. The onset dates ranged from 3 March to 31 March.

15. The source of infection could be traced to a patient who was the sister-in-law of the index case for the PWH outbreak. With disease onset



on 10 March, the patient admitted herself on 13 March and was sent to both N8 and O8 wards during her brief stay in the hospital. She was later transferred to a public hospital for further management.

16. DH asked BH to step up infection control measures in 8/F. Admission to these wards was temporarily suspended since 22 March and ward movement in N8 and O8 was frozen. Both wards were eventually closed for thorough cleansing and disinfection. Visitors to hospital were urged to observe strict personal hygiene during hospital visits. Health education was strengthened and ward staff was reminded to observe strict personal and environmental hygiene as well as infection control practices.

17. BH actively followed up patients discharged from O8 & N8 wards. None of them developed SARS. On the other hand, active surveillance of wards O8 and N8 staff identified six more healthcare workers who subsequently were confirmed SARS. One visiting doctor, his wife and his two patients were confirmed with SARS. Household/social contacts of all other patients were placed under medical surveillance and given health advice by DH. Among them, five household contacts developed SARS.

18. Four patients, including the visiting doctor, died. The others were discharged between March and May.

"PP"

██████████ clinic cluster brought to light on 21 March 2003

19. In the process of investigating the PWH ward 8A outbreak, active tracing was conducted of discharged patients who stayed in the same ward with the index patient, ██████████. On 15 March, DH noted a discharged patient, ██████████, readmitting PWH for fever that started on 9 March. ██████████ did not, however, report seeing a general practitioner before admission. All his close contacts were traced and monitored, with three developing symptoms and requiring admission on 20 March. When these three patients were re-interviewed, they admitted all, including ██████████, had visited ██████████'s clinic prior to admission.

"TT"

"PP"

"TT"

"PP"

20. DH made repeated attempts right away to contact ██████████ only to learn that he had already been admitted on 20 March for SARS symptoms

"PP"

appearing on 17 March. From [REDACTED] active contact tracing for health advice and medical surveillance was initiated. A total of 544 patients, clinic staff and close contacts of the two symptomatic clients were traced. Among these contacts, a child and a 39-year old woman were found to have SARS. Further tracing and medical surveillance of their contacts were done, extending to cover the child's kindergarten. No new case was detected among them.

21. At the conclusion of this outbreak, a total of seven persons, including the index, had been affected.

Flights CA112/CA115 outbreak reported on 23 March 2003

22. DH received notification from Tuen Mun Hospital concerning a couple admitted the day before for fever since 18 March during their tour to Beijing from 15 to 19 March. The couple was on board CA112 for the outbound journey and CA115 on return. DH started case investigations the same day and quickly learned that a third case was admitted, again for fever since 18 March. Through the tour group leader, DH obtained information to contact the remaining 33 members, of whom seven subsequently had SARS. Their onset dates were from 17 to 23 March. Epidemiological investigation did not reveal a source of infection within the group.

23. Since the sick travelers were symptomatic and could be infectious on their return flight to Hong Kong, attempt was made to trace all other passengers on board CA115 on 19 March. Separately, while actively tracing contacts in connection with the PWH ward 8A outbreak, DH learned on 25 March that a Beijing resident had visited a terminally ill family member in PWH ward 8A in early March, subsequently to come down with illness when departing on board CA 112 on 15 March. DH rapidly extended contact tracing through public announcements to appeal to passengers of the flights CA112/CA115 to call a designated DH telephone hotline. Assistance from consulates of overseas passengers was sought. Tour agencies were invited to provide information regarding other tour groups who had taken the same flights.

24. 54 of 112 passengers on board CA112 and 124 of 164 passengers on

3.  
**120416**

board CA115 have been contacted. Including the index patient, 23 passengers and two crew members were subsequently confirmed SARS. Among them, 13 were confirmed in Hong Kong, seven in the Mainland, four in Taiwan and one in Singapore. All had acquired the infection while traveling on board CA112 from Hong Kong to Beijing on 15 March.

Department of Health  
August 2003

Fax

To: Dr Teresa Choy  
Department of Health

Fax: 2604 5391

From: Dr Louis Chan  
PWH

Tel: 2632 3555

Total no of pages (including this page):

62 + 2 → 64

NAME: [REDACTED] "47" [REDACTED] 120418  
 CCC Code: [REDACTED]  
 Address: [REDACTED]  
 Reports: [REDACTED] Floor: [REDACTED] Block: [REDACTED] District: WTK  
 HKID: [REDACTED] Sex: M Medical Status: U Other Doc: [REDACTED]  
 Date of Birth: [REDACTED] Age: 27 Nationality: CH Religion: [REDACTED]  
 Telephone: Home: [REDACTED] Office: [REDACTED] Other: [REDACTED]

Household Number: [REDACTED] Admission Date/Time: [REDACTED] Source Code: [REDACTED] Exit Code: [REDACTED] Location of Discharge: [REDACTED] Discharge Date/Time: [REDACTED]

[REDACTED]	12/03/2003	07:12	4	PWH	EP1	12/03/2003	14:51	H+FU
[REDACTED]	08/03/2003	13:21	4	PWH	EP1	08/03/2003	20:35	H+FU
[REDACTED]	05/03/2003	07:02	4	PWH	EP1	05/03/2003	14:33	H+FU
[REDACTED]	01/03/2003	11:46	4	PWH	EP1	01/03/2003	18:26	H+FU
[REDACTED]	28/02/2003	07:11	4	PWH	EP1	28/02/2003	13:27	H+FU
[REDACTED]	22/02/2003	13:30	4	PWH	EP1	22/02/2003	20:22	H+FU

Household Number	Discharge Date/Time	Ward	Source Code	Exit Code	Room	Bed No.	Count
[REDACTED]	15/03/2003 15:18	BC	REN	3	A		1
[REDACTED]	15/03/2003 20:27	BA	MED	3	T		2
[REDACTED]	15/03/2003 20:52	BA	MED	3	B	25	3

☐ Print with Movement Log

NOK

Print

Return

Exit

**Special Control Team at NTERO  
Staff Composition**

Date	Principal Medical & Health Officer	Senior Medical & Health Officer	Medical & Health Officer	Senior Nursing Officer	Nursing Officer	Registered Nurse	Clerical staff	Total
11 Mar (Tue)	1	1	4	1	3	2	2	14
12 Mar (Wed)	1	1	4	1	3	2	2	14
13 Mar (Thu)	1	2	3	1	3	5	3	19
14 Mar (Fri)	1	2	4	1	6	4	3	21
15 Mar (Sat)	1	3	7	1	5	4	3	24
16 Mar (Sun)	1		1		3			5
17 Mar (Mon)	1	2	5	1	7	4	3	23
18 Mar (Tue)	1	3	7	1	7	6	3	28
19 Mar (Wed)	1	3	8	1	7	6	4	30
20 Mar (Thu)	1	3	8	1	7	6	4	30
21 Mar (Fri)	1	4	8	1	8	7	5	34
22 Mar (Sat)	1	4	8	1	9	8	5	36
23 Mar (Sun)	1		2		4			7
24 Mar (Mon)	1	4	8	1	9	10	5	38
25 Mar (Tue)	1	4	8	1	9	12	5	40

Annex 11**DH Team at PWH  
Staff Composition**

<b>Date</b>	<b>Principal Medical &amp; Health Officer</b>	<b>Medical &amp; Health Officer</b>	<b>Nursing Officer</b>	<b>Registered Nurses</b>	<b>Total no. of Staff</b>
13 Mar (Thu)		1	1	1	3
14 Mar (Fri)		1	1	1	3
15 Mar (Sat)		2	3	1	6
16 Mar (Sun)		1	1	0	2
17 Mar (Mon)		2	2	2	6
18 Mar (Tue)		2	2	0	4
19 Mar (Wed)		1	2	0	3
20 Mar (Thu)		1	2	0	3
21 Mar (Fri)	1	2	2	1	6
22 Mar (Sat)	1	2	1	1	5
23 Mar (Sun)		1	2	1	4
24 Mar (Mon)	1	2	1	1	5
25 Mar (Tue)	1	2	1	1	5

Prince of Wales Hospital Cluster

Work done by DH Team at PWH  
and Special Control Team at NTERO

Date	Total No. of Referred Cases & Contacts Interviewed	Referred Cases Interviewed		Contacts Follow-up	
		Total No.	No. turned SARS	Total No.	No. turned SARS
11 Mar (Tue)	87	26	24	61	0
12 Mar (Wed)	66	17	13	49	1
13 Mar (Thu)	227	77	12	150	3
14 Mar (Fri)	133	26	9	107	10
15 Mar (Sat)	161	29	18	132	19
16 Mar (Sun)	95	4	2	91	3
17 Mar (Mon)	101	26	5	75	5
18 Mar (Tue)	63	20	8	43	2
19 Mar (Wed)	129	41	12	88	6
20 Mar (Thu)	179	56	7	123	4
21 Mar (Fri)	34	9	3	25	1
22 Mar (Sat)	805	37	7	768*	1
23 Mar (Sun)	53	6	2	47	0
24 Mar (Mon)	60	2	2	58	1
25 Mar (Tue)	77	10	10	67	3
Total	2270	386	134	1884	59

\*Note: The figure includes 599 contacts of a private practitioner, 82 hospital visitors, 34 contacts of an ambulance man and contacts of other cases.



YY"  
[REDACTED]  
**Chronology of Events**

DATES	ACTIVITIES & EVENTS
Before 14 March 2003	<ul style="list-style-type: none"> <li>● Lived and worked part-time in Shenzhen.</li> <li>● Stayed overnight in younger brother's ([REDACTED] a SARS case) flat at Block E, Amoy Gardens two to three times a week.</li> <li>● Received regular haemodialysis (twice a week on every Wed &amp; Sat) at Prince of Wales Hospital (PWH) for chronic renal failure due to systemic lupus erythematosus (SLE).</li> </ul>
14 March 2003	<ul style="list-style-type: none"> <li>● Stayed overnight at Amoy Gardens.</li> <li>● Started to have fever, malaise, chills, rigors, and diarrhea.</li> </ul>
15 March 2003	<ul style="list-style-type: none"> <li>● Attended ward 8C of PWH for scheduled haemodialysis.</li> <li>● After the 2 hours' haemodialysis, he was noted to be sick with fever of 38°C by the attending nurses.</li> <li>● Further investigation revealed white cell count of 6.1 with lymphocyte count of 0.5, and right lower zone haziness on chest X-ray (CXR).</li> <li>● Transferred to ward 8A at around 20:50 for further management of the fever and chest infection.</li> <li>● Not reported to NTERO as suspected atypical pneumonia (or SARS) until 23 March.</li> </ul>
16 March 2003	<ul style="list-style-type: none"> <li>● Received treatment at ward 8A of PWH.</li> </ul>
17 March 2003	<ul style="list-style-type: none"> <li>● Received treatment at ward 8A of PWH.</li> <li>● Nasopharyngeal aspirate positive for influenza A.</li> </ul>
18 March 2003	<ul style="list-style-type: none"> <li>● Received treatment at ward 8A of PWH</li> </ul>
19 March 2003	<ul style="list-style-type: none"> <li>● Improved after treatment. Diagnosed as Influenza A infection.</li> <li>● Discharged home from PWH at around 3 pm.</li> <li>● NTERO not informed of [REDACTED] discharge from PWH ward 8A.</li> </ul> <p>Stayed overnight at Amoy Gardens with brother and brother's wife.</p>

DATES	ACTIVITIES & EVENTS
20 March 2003	<ul style="list-style-type: none"> <li>● Back to Shenzhen.</li> </ul>
21 March 2003	<ul style="list-style-type: none"> <li>● Stayed in Shenzhen.</li> </ul>
22 March 2003	<ul style="list-style-type: none"> <li>● Attended PWH directly from Shenzhen for scheduled haemodialysis.</li> <li>● Noted sick and having respiratory symptoms including shortness of breath by the attending nurses.</li> <li>● Admitted into 8D ward and later transferred to 9D ward for further management.</li> </ul>
23 March 2003	<ul style="list-style-type: none"> <li>● CXR revealed bilateral haziness. Suspected to be SARS.</li> <li>● Serum for SARS coronavirus testing IgG: IgG titre &lt;40.</li> <li>● Treatment with Ribavirin started.</li> <li>● PWH notified the DH health team stationed at the PWH control room about the case by means of a new case list. [REDACTED] <sup>yy</sup> was among the nine new cases on the list of 23 March.</li> <li>● DH health team staff conducted face-to-face interview with [REDACTED] <sup>yy</sup> and completed the standard questionnaire.</li> <li>● DH commenced contact tracing of [REDACTED] <sup>yy</sup>'s close contacts (his brother and sister-in-law in Amoy Gardens, onset of symptoms on 23 and 28 March respectively, admitted to hospitals on 24 and 28 March respectively, and confirmed SARS on 26 March and 9 April respectively).</li> </ul>
24 March 2003	<ul style="list-style-type: none"> <li>● Condition deteriorated. Transferred to Intensive Care Unit (ICU) for management.</li> </ul>
9 April 2003	<ul style="list-style-type: none"> <li>● Serum for SARS coronavirus IgG 1: 640.</li> </ul>
6 May 2003	<ul style="list-style-type: none"> <li>● Stool for coronavirus by PCR test: positive.</li> </ul>
2 June 2003	<ul style="list-style-type: none"> <li>● Discharged home.</li> </ul>