Chapter 10 Outbreak at the Princess Margaret Hospital

Finding of facts

10.1 The Princess Margaret Hospital (PMH) was designated as a SARS hospital on 26 March 2003 and started to receive all new SARS patients from 29 March 2003. At the time of the designation, PMH was the only infectious disease hospital in Hong Kong with four isolation wards (two wards for airborne infection cases and two for enteric or blood-borne infection cases) with a total capacity of 86 beds, three teams of infectious disease specialists, and one respiratory team.

Decision to designate a SARS hospital

10.2 At about noon on 26 March 2003, the Cluster Chief Executive (CCE) (Kowloon West)/Hospital Chief Executive (HCE) of PMH, Dr Lily CHIU Lee-lee, received a telephone call from the Deputy Director of Health, Dr LEUNG Pak-yin, asking her about the bed capacity of PMH to receive all new SARS patients. Dr CHIU responded that there were about 1 200 beds in PMH. If PMH was to serve as a SARS hospital, she estimated that PMH could provide a maximum of about 1 000 beds for SARS patients.

10.3 Dr CHIU told the Select Committee that she had asked Dr LEUNG whether consideration could be given to designating another hospital as a SARS hospital. She, however, was given to understand that PMH was considered appropriate as a designated SARS hospital because it was already an infectious disease hospital and no healthcare workers (HCWs), patients or visitors were infected in PMH at that time. Dr CHIU immediately called the Deputizing Chief Executive (CE) of the Hospital Authority (HA), Dr KO Wing-man, with a view to finding out more about Dr LEUNG's proposition. From what Dr CHIU gathered from both Dr LEUNG and Dr KO, the Department of Health (DH) and HA had already agreed that one hospital, preferably PMH, should be designated to receive all new SARS patients, and PMH was being asked to assess how many patients it could receive.

10.4 The Secretary for Health, Welfare and Food, Dr YEOH Eng-kiong, explained to the Select Committee that at the Health, Welfare and Food Bureau (HWFB) Task Force meeting on 26 March 2003, the Director of Health, Dr Margaret CHAN FUNG Fu-chun, recommended a basket of public health measures. Dr CHAN recommended, among other things, the establishment of designated medical centres (DMCs) to screen contacts of SARS patients. It was considered desirable for all these new DMC cases to be referred to one hospital, so that case information could be collected more efficiently and effectively by stationing a health team there. In this context, PMH, being the only infectious disease hospital in Hong Kong, was preferred to be the hospital to receive these new cases.

10.5 At the HWFB Task Force meeting, Dr YEOH enquired of HA the feasibility of the DH's proposal and the capability of PMH in terms of its facilities and manpower to serve as a SARS hospital. There were also discussions as to whether there should be more than one SARS hospital. HA was represented by Dr KO at the meeting who indicated that the recommendation was feasible and acceptable. The Task Force then endorsed the proposal to "designate PMH to receive all new cases of SRS (existing cases to stay put)". The Task Force also agreed that PMH would sort out the isolation and Intensive Care Unit (ICU) facilities. The meeting did not give a specific date for HA to implement the proposal. Dr YEOH expected at that time that the date of implementation would be a decision between HA and DH as DMCs were not to come into operation until 31 March 2003. The proposal was further discussed by HA and agreed to at the Daily SARS Round Up Meeting on the same day. According to Dr YEOH, as the designation of a SARS hospital was an operational matter of HA, it was not discussed by the Chief Executive's Steering Committee.

10.6 The Select Committee noted from the written statement of the Chief of Service (COS) of the Department of Medicine and Geriatrics in PMH, Dr Matthew TONG Kwok-lung, that Dr CHIU had a meeting with him and the Consultant in-charge of the Infectious Disease Team at about noon on 26 March 2003. At the meeting, he was told that DH had made a request to explore the feasibility of admitting all new SARS patients to PMH. Immediately after the meeting, Dr TONG held an urgent Department

Committee Meeting with his consultant physicians, team heads and the Department Operations Manager. According to Dr TONG, all HCWs at the meeting had no objection to the proposal. They were, however, concerned that the number of new SARS patients could be quite large, and that PMH alone might not be able to handle the crisis on its own. The views were reflected to Dr CHIU.

10.7 According to Dr CHIU, COS of ICU in PMH, Dr YAN Wing-wa, was not asked to attend the meeting on 26 March 2003 because the purpose of the meeting was to discuss on a preliminary basis the possibility of admitting all new SARS patients to PMH. The immediate key issue was whether PMH could do it. Moreover, the ICU ward had the capacity to be expanded within a short time to two ICU wards of a total of 32 beds.

10.8 CCEs were notified of the HWFB Task Force's decision by Dr KO at the Daily SARS Round Up Meeting held in the afternoon of 26 March 2003, at which the HA Chairman, Dr LEONG Che-hung, was present. The Daily SARS Round Up Meeting agreed that in the light of the worsening Amoy Gardens outbreak, PMH would handle the first 1 000 new SARS cases. If the number of patients went beyond 1 000, the Prince of Wales Hospital (PWH) would be the second designated hospital. The logistics of preparing PMH's designation as a SARS hospital, such as the decanting of patients, the closure of the Accident and Emergency Department (AED), etc. was discussed at the meeting. The Daily SARS Round Up Meeting also decided that PMH would commence to serve as the SARS hospital on 29 March 2003 and its AED would be closed from midnight on 29 March 2003.

10.9 Dr CHIU told the Select Committee that during her telephone conversation with Dr LEUNG on 26 March 2003, she was uncertain whether PMH was asked to receive SARS cases referred by DMCs or all new SARS cases, as she knew nothing about the functions and operation of DMCs at that time. Even if Dr LEUNG had mentioned DMCs in their conversation, she would not know the specific difference between receiving SARS cases referred by DMCs and receiving new SARS cases referred by all other hospitals. According to Dr CHIU, there were 26 referrals by DMCs to PMH from

29 March to 11 April 2003. During the same period, 718 non-DMC referrals were admitted to PMH for suspected SARS.

10.10 The Select Committee noted that according to the recollection of CCE (Hong Kong West)/HCE of Queen Mary Hospital (QMH), Dr York CHOW Yat-ngok, the issue of whether one or more hospitals be designated to look after SARS patients so that other hospitals could continue to provide regular services was discussed at the Daily SARS Round Up Meeting held probably on 19 March 2003 in the presence of Dr LEONG. According to Dr CHOW, he informed the meeting that QMH was already designated as the only hospital to receive suspected and confirmed SARS patients within the cluster. Dr CHOW also proposed that regional centres for SARS patients should be considered, i.e. PWH for the New Territories, PMH for Kowloon and the Ruttonjee Hospital for Hong Kong Island. The other CCEs either disagreed with him, or did not comment. The majority of CCEs were not in favour of the policy to designate any one hospital as a SARS hospital.

10.11 Dr CHIU and Dr LEONG, however, told the Select Committee that they could not recall any discussion on the designation policy at the Daily SARS Round Up Meeting prior to 25 March 2003. Dr LEONG pointed out to the Select Committee that he had not joined any Daily SARS Round Up Meeting before that day. Dr LEONG explained to the Select Committee that it was necessary to designate an infectious disease hospital as a SARS hospital to centralize the caring of SARS patients, and free up other hospitals for non-SARS patients as the demand for hospital beds for such patients was also very large. There were also calls from the community for a designated hospital to treat SARS patients.

10.12 The Select Committee noted that Dr YEOH told the HA Review Panel on the SARS Outbreak that it was not his intention to designate PMH as the only hospital to take in SARS patients, as the patient load would be beyond the capability of the hospital concerned. HA should consider the anticipated workload, and the logistical and practical problems in dealing with the request.

Preparation for serving as a designated SARS hospital

Preparation of the Wong Tai Sin Hospital to provide convalescent beds

10.13 A meeting of HCEs in the Kowloon West Cluster (KWC) was held in the evening of 26 March 2003 to discuss the preparation work to convert PMH into a SARS hospital. In order to better utilize the beds in PMH, the Wong Tai Sin Hospital (WTSH) was to be vacated to provide 400 SARS convalescent beds. The Select Committee noted that the Daily SARS Round Up Meeting agreed on 27 March 2003 that the idea of using PWH as the second SARS hospital be dropped, and that WTSH would support PMH with a maximum of up to 800 beds (subsequently reduced to 400 beds).

10.14 In the morning of 27 March 2003, Dr CHIU convened an urgent meeting of all the PMH department heads, including Dr YAN, to notify them of the decision to designate PMH as a SARS hospital.

Preparation for the SARS wards

10.15 According to Dr CHIU, the initial plan was to implement the conversion of PMH into a SARS hospital in two phases: the first phase was to provide 400 SARS beds in the Medical Block, and the second phase was to convert the rest of the hospital. Service diversion was to be completed within one week. Planning for the SARS patients intake was based on PMH's own SARS data collected prior to 27 March 2003. Up to 26 March 2003, the average daily number of suspected or confirmed SARS patients admitted to PMH varied from one to 13 patients, while there were around 30 daily admissions to all HA hospitals. On this basis, PMH had a very rough estimate that there would be 50 to 60 new admissions per day. Dr CHIU pointed out to the Select Committee that during the initial phase, manpower for the SARS wards would come from all the Medical and Geriatrics wards, Paediatrics wards, ICU and AED in PMH. A gradual approach was to be adopted for the provision of 1 000 beds. On 27 March 2003, a special Task Force involving 12 work groups was formed in PMH to make the necessary preparation for decanting existing non-SARS patients and opening new SARS wards. The

whole senior management of KWC was involved and Dr CHIU was in overall charge.

10.16 Dr TONG told the Select Committee that non-SARS medical patients were transferred to the Lai King Convalescence Block and other hospitals in the cluster. Apart from patients discharged home, a total of 340 patients were transferred to other hospitals between 26 March and 4 April 2003.

Preparation for the intensive care wards

10.17 Dr YAN told the Select Committee that there were 14 beds including two isolation rooms in ICU in PMH. Another ward which could hold 18 ICU beds was also ready to treat SARS patients at that time. There were 11 SARS patients being treated in ICU on 26 March 2003. PMH was expected to provide up to 1 000 SARS beds. Based on PMH's own experience in treating SARS patients before 27 March 2003, namely, that an estimate of about 10% of the SARS patients would require ICU treatment seven to 10 days after admission, it was projected that ICU would on average admit five SARS patients each day if the daily SARS patients intake was about 50 to 60. The plan was to prepare a total of 64 ICU adult beds in four wards, and to open them gradually.

10.18 Regarding the provision of 64 ICU adult beds, the Department Operations Manager of ICU in PMH, Ms Winnie CHAN Kwan-ying, told the Select Committee that apart from the 32 ICU beds ready for use for treating SARS patients on 27 March 2003, it was estimated that 32 additional ICU beds could be provided in two nearby wards on the same floor after the patients were decanted. PMH was thus ready to provide 64 ICU adults beds in four wards.

10.19 The Select Committee, however, noted that prior to 26 March 2003, PMH handled 84 Severe Community-Acquired Pneumonia (SCAP)/suspected SARS patients[9] and 22 or 26% of them were transferred to ICU on or before 26 March 2003. The Select Committee also noted that these 22 patients were

[9] Of the 84 SCAP/suspected SARS patients handled by PMH prior to 26 March 2003, nine were eventually confirmed as non-SARS cases. Twenty-two of these 84 patients were transferred to ICU on or before 26 March 2003, and 21 of them were confirmed SARS cases.

transferred to ICU on an average of three days after admission. Four of these patients required ICU care on the day they were admitted and seven needed ICU treatment one day after admission.

10.20 The Consultant Intensivist and Specialist in Intensive Care of the Department of Anaesthesia and Intensive Care in PWH, Dr Thomas Anthony BUCKLEY, pointed out to the Select Committee that based on PWH's experience in handling SARS patients, it could be predicted that 20% of the patients would require admission to ICU.

10.21 Dr YAN told the Select Committee that he was not consulted prior to the designation of PMH as a SARS hospital. He was only informed of the decision at the special meeting on 27 March 2003. While he understood that it would be a very difficult task, Dr YAN did not raise opposition because there was already an outbreak in the community. Dr YAN was prepared to try his best to accomplish the task. Immediately after the special meeting, Dr YAN arranged for the HCWs in ICU to be deployed and for extra equipment to be ordered. He also arranged for some improvement works to be carried out which included the installation of additional exhaust fans to create negative pressure in the wards, relocation of staff changing areas, and installation of cubicle doors. The wards were also zoned into "dirty" and "clean" areas.

10.22 Dr YAN estimated that a total of 28 doctors, 200 nurses, 28 supporting staff and four clerical staff would be required when all the 64 ICU beds were occupied. The manpower of ICU at that time consisted of six doctors, 56 nurses and eight supporting staff.

10.23 Dr CHIU told the Select Committee that the 64 adult ICU beds were expected to be put into full operation gradually in April 2003. Thirty-two ICU beds were to be made available in early April 2003. New ICU beds would be opened gradually with support from the anaesthetists, HCWs from other ICUs and basic trainees. Nurses from the operating theatres or those with ICU experience would be deployed to ICU. The nursing section of the Head Office of HA (HAHO) would coordinate deployment of nurses with ICU experience from other clusters.

Readiness of the Princess Margaret Hospital to serve as a SARS hospital

10.24 Ms CHAN told the Select Committee that she was not surprised to learn of the designation plan and that, as far as she was aware, there were no strong views expressed by her colleagues. She considered that on the basis of the situation on 26 March 2003, ICU would be able to cope with the additional SARS patient load. The General Manager (Nursing), Ms Adela LAI Shuet-fun, gave similar evidence to the Select Committee. As there were 11 patients in ICU on 26 March 2003, Ms CHAN expected that the third ICU ward would not be needed before the end of the first week in April 2003.

10.25 The Select Committee, however, learnt from Dr TONG, as well as the Consultant Physician of the Respiratory Team in PMH, Dr YU Wai-cho, and the Senior Medical Officer of the Department of Paediatrics in PMH, Dr HUI Yim-wo, that they did not consider PMH to be truly ready to serve as a SARS hospital on 29 March 2003. Dr TONG considered that the time allowed for decanting was too short and that not every HCW had the experience in handling SARS patients. He, however, did not raise his concern because it was the Government's decision to designate PMH as a SARS hospital. Dr YU and Dr HUI, however, believed that the circumstances did not allow PMH to be completely equipped before taking up the challenge. The Infection Control Officer (ICO) of PMH, Dr NG Tak-keung, pointed out to the Select Committee that he was concerned about PMH receiving up to 1 000 SARS patients especially when it was uncertain as to the span of time during which they would be admitted.

10.26 Dr CHIU informed the Select Committee that she was aware of concerns about the limited time available to prepare PMH as the designated SARS hospital, but that the circumstances did not allow PMH to be engaged in further discussions. In the light of the outbreak at the Alice Ho Miu Ling Nethersole Hospital and the United Christian Hospital (UCH) in late March 2003, there was an urgent need to cohort SARS patients in one designated hospital. As PMH had started to decant non-SARS patients to other hospitals, it was appropriate for PMH to assume the task as a designated SARS hospital at that time.

Infection control measures

10.27 Dr NG told the Select Committee that the infection control measures taken in PMH were in line with HAHO guidelines. PMH promulgated instructions to HCWs in the Hospital to take droplet precautions when handling patients with atypical pneumonia as early as in mid-February 2003. To ensure compliance, Infection Control Link Nurses and the Infection Control Enforcement Team worked together to carry out training and policing. Infection control measures taken in PMH during the SARS outbreak were as follows -

(a) wearing of full personal protective equipment (PPE) in all SARS wards, i.e. N95 masks, goggles/face shields, gowns, caps, gloves;

(b) installation of exhaust fans in all SARS wards to create negative pressure;

(c) demarcation of "clean" zones, "dirty" zones, gowning and de-gowning areas in all SARS wards;

(d) increasing hand washing/hand hygiene facilities in all areas;

(e) training, demonstrations and on-site briefings on the use of PPE and hand hygiene;

(f) orientation training for new staff on infection control and SARS;

(g) production of a VCD to demonstrate gowning, de-gowning and hand washing techniques;

(h) strengthening environmental hygiene and pest control in all areas;

(i) enforcing guidelines on droplet precautions, contact isolation, waste handling and dress codes; and

(j) no visiting in all SARS wards.

10.28 Dr NG further explained to the Select Committee that all new HCWs were briefed on the infection control measures that should be practised on the first day of their deployment to PMH. Crash courses were arranged for newly deployed staff. Infection Control Nurses (ICNs) conducted infection control briefings and demonstrations in wards as well as in CCE staff forums on the proper way of putting on PPE. VCDs on SARS precaution guidelines, dress codes and posters were prepared and circulated widely to departments and workplaces. Videos on PPE were run continuously in staff canteens, lobbies and the Community Health Resources Centre. All the relevant guidelines and updated information were posted on the PMH intranet and circulated through email.

10.29 According to Dr NG, a series of CCE forums was held on 19 March, 27 March, 28 March, 29 March, 2 April and 9 April 2003 respectively to update HCWs on the latest development and to enable the top management to obtain feedback from frontline HCWs. Outside experts were also invited to share their experience and knowledge with all staff in the Hospital.

10.30 Dr CHIU, Dr TONG and Ms CHAN all told the Select Committee that there was no problem with the supply of PPE in PMH during the SARS outbreak at the Hospital.

Admission of new SARS patients

10.31 PMH started to receive new SARS patients at 9:00 am on 29 March 2003. Prior to that date, over 110 SARS patients had been treated in PMH since 3 March 2003.

10.32 With the worsening of the outbreak at the Amoy Gardens, there was a rapid influx of SARS patients into PMH. The numbers of admissions in the first week after PMH's designation as the SARS hospital were as follows -

	March 2003			April 2003					Total
	29th	30th	31st	1st	2nd	3rd	4th	5th	
New SARS admissions	93	62 (155)	113 (268)	87 (355)	72 (427)	68 (495)	60 (555)	41 (596)	596
New SARS patients admitted to ICU	5	2 (7)	3 (10)	10 (20)	7 (27)	6 (33)	8 (41)	4 (45)	45

(cumulative figures in brackets)

Outbreak in the Intensive Care Unit

Infection of HCWs

10.33 The Select Committee noted that by the end of the first week of the designation, there were already over 40 SARS patients being treated in ICU.

10.34 The first case of SARS infection of HCW in PMH was reported on 30 March 2003. The first case of SARS infection of HCW in ICU was reported on 1 April 2003, with a peak of 12 cases of infected HCWs reported on 7 April 2003.

Manpower resources for the Intensive Care Unit

10.35 With the high concentration of SARS patients and a significant number of HCWs in ICU being infected with SARS, the manpower resources in ICU became overstretched. Dr YAN appealed to the Consultant of ICU in the Caritas Medical Centre (CMC), Dr CHEUNG King-on, for deployment of ICU nurses to PMH on 2 April 2003. In response, Dr CHEUNG agreed to send four ICU nurses to PMH, and to set an example himself, he also offered to help out in PMH and made a visit to PMH on 5 April 2003.

10.36 Dr CHEUNG told the Select Committee that from what he had observed, he was very concerned about the environment and the infection control measures in ICU in PMH. After receiving feedback from the CMC nurses deployed to ICU in PMH, Dr CHEUNG formed the impression that HCWs there were completely overwhelmed by the large volume of very sick SARS patients. Dr CHEUNG had a two-hour telephone conversation with Dr YAN in the evening of 6 April 2003 to better understand the situation in ICU and discuss plans for improvement. On 7 April 2003, instead of providing assistance on a part-time basis as originally planned, Dr CHEUNG temporarily took over the management of ICU in PMH because a core team of ICU HCWs including Dr YAN had fallen ill on that day.

10.37 According to Dr CHEUNG, there were some 40 SARS patients in ICU when he took over from Dr YAN on 7 April 2003. There was a drastic shortage of doctors. Some doctors who had promised to work in ICU never arrived, and some doctors stayed in ICU for just one or two days. He recalled that there were only nine doctors (four specialists and five medical officers), including himself, working in ICU on 7 April 2003. Although four doctors were from PMH, only one of them belonged to the original PMH ICU core team. Apart from repeatedly urging the PMH management to resolve the problem of shortage of doctors, Dr CHEUNG also approached other doctors for assistance through various formal channels as well as his personal network. By 14 April 2003, the staffing situation had been much improved. There were 27 doctors in ICU, 12 from PMH, though none of them was from the original ICU core team.

10.38 Dr CHEUNG told the Select Committee that the severe shortage of medical staff in ICU was due to the fact that there were insufficient experienced or trained ICU doctors in Hong Kong. Notwithstanding the difficulties encountered by ICU, there was strong pressure for PMH to open the fourth ICU ward on 15 April 2003. Dr CHEUNG made it very clear to the hospital management that under no circumstances should a fourth ICU ward be opened. Instead, PMH should consider diverting patients to other hospitals.

10.39 Dr BUCKLEY was requested to be transferred to ICU in PMH on 9 April 2003. Upon his arrival at PMH the following day, Dr BUCKLEY agreed with Dr CHEUNG that he would concentrate on infection control and clinical management while Dr CHEUNG would be responsible for the liaising work with the hospital management. Having worked in PMH for just one week, Dr CHEUNG left PMH on 14 April 2003 as CMC would start admitting SARS patients on the following day. HCE of the Kwong Wah Hospital, Dr LUK Che-chung, was deployed to PMH and assume responsibility for the overall management of ICU on 14 April 2003.

10.40 Dr BUCKLEY told the Select Committee that from his experience in PWH, teamwork was crucial in ICU. ICU in PWH had been built over many years such that HCWs in ICU in PWH had remained relatively constant over the previous five years. He explained that each ICU would develop its own policies, protocols and guidelines so as to standardize care. Dr BUCKLEY informed the Select Committee that the non-ICU HCWs (both medical and nursing) deployed to work in ICU in PMH were unfamiliar with the policies, protocols, guidelines, equipment and routines of ICU in PMH. Some of them were not even acquainted with one another, not knowing other HCWs' names or level of experience. This was compounded by HCWs being unrecognizable in full PPE. Furthermore, they were not familiar with the environment in ICU.

10.41 On 10 April 2003, there were altogether six specialists and 13 medical officers in ICU. However, only one of the six specialists was from ICU in PMH and familiar with the environment there. As for the 13 medical officers, only two were from ICU in PMH. Three more medical officers without ICU experience arrived on 11 April 2003. To further enhance the teamwork in ICU, Dr BUCKLEY split the junior medical staff into three teams, i.e. one designated team for each ward. He raised with Dr CHIU the need to deploy additional experienced HCWs to ICU in order to provide a minimal standard of care in ICU. He also decided that it would be inappropriate to open the fourth ICU ward as scheduled on 15 April 2003.

Implementation of upgraded infection control measures

10.42 The Select Committee noted that additional infection control measures were put in place in ICU to prepare PMH to serve as a SARS hospital. Upon the designation, additional exhaust fans and doors were installed in ICU. "Clean" and "dirty" zones were identified with areas for gowning and de-gowning. Designated staff were assigned for infection control and training.

10.43 Dr YAN provided further information to the Select Committee about his plans for various ICU improvements before he fell ill on 7 April 2003. Such plans included the relocation of gowning/de-gowning area, the relocation of staff resting/eating area, re-zoning of ICU, and the enforcement of infection control by assigning staff to police compliance. Some of these actions were already in progress before he fell ill. According to Dr YAN, patients in ICU were located in cubicles that were separated from the staffing area. Furthermore, sleeping and eating were always strictly prohibited in the patient area.

10.44 The Select Committee noted that Ms LAI, in her capacity as the General Manager (Nursing), issued an open letter to all ICU nurses in PMH on 5 April 2003 informing them of the process of putting in place the following measures to address the concerns about the situation in ICU -

(a) opening up changing and resting areas for ICU nurses;

(b) setting up zone area;

(c) supervision and policing of infection control; and

(d) medical and nursing staff deployment plan.

10.45 Apart from asking for additional medical staff, Dr CHEUNG further upgraded the infection control measures in ICU for immediate and strict enforcement. For instance, gowning and de-gowning stations were set up and all ICU HCWs were strictly prohibited from sleeping and eating in the entire

ICU area. By the end of the week during which he had worked in ICU in PMH, most of the improvement measures had been implemented.

10.46 Dr BUCKLEY told the Select Committee that upon his transfer to PMH, he made an assessment of the situation in ICU. On 10 April 2003, three ICU wards were in use, with the preparation for the fourth ICU ward in progress. However, the ICU wards were already crowded and there were six patients in one patient area. From his observation, the level of compliance with infection control guidelines by the HCWs in ICU was unacceptably low. He then decided that his first priority was to review the infection control practices in ICU, and that his second priority was "to restore the order and shape to ICU". A number of changes to infection control procedures were introduced which included making the whole ICU an "ultra-high risk zone", reducing the number of patients contained in a patient area from six to four, enforcing compliance with infection control guidelines, and connecting the scavenging system to all Siemens ventilators.

"Expandability" of the Intensive Care Unit

10.47 Dr BUCKLEY pointed out that as stated in HAHO guidelines, the nursing establishment (bedside and senior nurses) was 4.2 nurses per ICU bed under normal situation. The Select Committee noted that before March 2003, there were 56 nurses in ICU in PMH, and the ratio was 4. Dr BUCKLEY considered that the level of ICU nursing manpower in PMH was unacceptable even before its designation; hence the manpower was not capable of absorbing extra work.

10.48 Dr BUCKLEY also gave an account to the Select Committee of the difficulties in recruiting medical staff to work in ICU. ICU medical staff required six years of training to become a specialist. Rotating junior medical staff required three to six months' experience in ICU to become semi-independent. A Registered Nurse required two to three years of experience before he/she would be regarded as proficient in the care of critically ill patients.

10.49 Both Dr BUCKLEY and Dr CHEUNG considered that the capacity of ICU could not be expanded within a short period of time. Dr BUCKLEY pointed out to the Select Committee that based on PWH's experience in handling SARS patients, 20% of the patients could be predicted to require admission to ICU. If PMH was to provide 1 000 SARS beds, it would be unacceptable to plan for only 100 ICU beds. He did not believe that HA could find sufficient experienced HCWs to work in ICU. According to Dr YAN, he did not know the percentage of SARS patients in PWH who would require ICU care at the time of PMH's designation as a SARS hospital.

Equipment in the Intensive Care Unit

10.50 As regards the equipment in ICU, Dr BUCKLEY told the Select Committee that when he arrived in PMH on 10 April 2003, he observed that some of the ventilators used in ICU were not equipped with closed suction systems or filters. He then requested that high efficiency viral filters be connected to the expiratory end of each ventilator and closed suction system be used for all patients on ventilators. Dr BUCKLEY further told the Select Committee that there was an enormous debate as to how the gases from ventilators used in ICU could be removed from within ICU in order to reduce the viral load within ICU. He also had a lot of discussion with Dr CHEUNG regarding the pros and cons of using filters in the ventilators and also connecting scavenging systems to the ventilators, in order to reduce the contamination of the ICU environment for HCWs' safety.

10.51 Dr CHEUNG, however, informed the Select Committee that in his opinion, it was not important for ventilators to be connected to scavenging systems. He believed that the lack of scavenging systems was not a factor contributing to the infection of HCWs in ICU. Dr NG also told the Select Committee that a scavenging system was only an additional safety device for a ventilator, as all the ventilators were already fitted with filters.

<u>Manpower resources in the SARS wards</u>

10.52 Dr TONG told the Select Committee that the manpower in the Department of Medicine and Geriatrics should be able to handle the first 400

patients admitted under phase one of the implementation plan. He made requests to HAHO through Dr CHIU for the deployment of 30 extra doctors for phase two of the plan. The first batch of doctors from KWC hospitals arrived on 1 April 2003 and a total of 26 doctors from KWC hospitals, the Ruttonjee Hospital and PWH and seven additional interns from KWC were deployed to the Department.

10.53 Dr CHIU informed the Select Committee that requests for staff deployment were discussed at the Daily SARS Round Up Meeting. There was difficulty in deploying HCWs to PMH swiftly because first, deployment was based on experience and on a voluntary basis; second, actual manpower was tight in all hospitals; and third, transfer of HCWs required lead time owing to the need to re-arrange their duties. In the end, 49 doctors and 42 nurses were deployed from other hospitals to PMH.

Review of the designation arrangement

10.54 In the light of the unexpectedly large number of SARS patients being treated in PMH and the increasing number of HCWs having been infected, Dr CHIU raised with HAHO on 6 April 2003 that admission of new SARS patients to PMH should be halted. The Daily SARS Round Up Meeting decided on 7 April 2003 that PMH stop admitting SARS patients from all hospitals, except those referred by DMCs.

10.55 At the first meeting of the KWC SARS Management Committee on 7 April 2003, it was decided that PMH should continue to receive SARS patients from the Yan Chai Hospital and CMC so as to keep these two hospitals within KWC clean.

10.56 On 11 April 2003, the Daily SARS Round Up Meeting decided that PMH stop all new SARS admissions, and that potential ICU patients be transferred to other hospitals. Dr BUCKLEY informed the Select Committee that in the morning of 14 April 2003, the PMH SARS Management Committee agreed not to open the fourth ICU ward.

Role of an Infection Control Officer

10.57 When asked by the Select Committee as to what actions should be taken when an HCW became infected with SARS, Dr NG Tak-keung said that every case of HCW infection was followed up by a senior nurse. Information was exchanged between these senior nurses and ICNs on a daily basis. Dr NG pointed out that the manning scale in the establishment was one ICN to 250 beds. However, there were only three ICNs in the entire PMH. Dr NG further pointed out that in addition to his infection control related duties, he also worked in the laboratory for the development of rapid Polymerase Chain Reaction tests for SARS. He was therefore not able to visit ICU after PMH had an outbreak of SARS. Instead, Dr NG sent an ICN to visit ICU and was informed of the situation there.

10.58 According to the evidence given to the Select Committee by the Convenor of the Central Committee on Infection Control (named Task Force on Infection Control before 4 March 2003) and the Working Group on SCAP, Dr LIU Shao-haei, the role and functions of an ICO included investigating an outbreak of infectious disease in a hospital and taking all necessary follow-up actions. To carry out the investigation, an ICO would be expected to lead an investigation team comprising a microbiologist to inspect the infected ward in order to find out the cause of the outbreak.

10.59 The Chief Executive of HA, Dr William HO Shiu-wei, also told the Select Committee that prior to the SARS outbreak, there were requests from some ICOs and other HCWs in hospitals that apart from carrying out researches in laboratories, ICOs should also be encouraged to provide specific on-site advice on infection control measures. The above issues were raised at the HA Service Management Meeting. Dr HO considered it undesirable for an ICO not to visit an infected ward following an outbreak at a hospital.

Possible reasons for infection of healthcare workers

10.60 During the period from 29 March to 11 April 2003 when PMH served as the designated SARS hospital, a total of 744 SARS patients were admitted to the Hospital, and the highest number of SARS patients treated in

ICU was 44. With the gradual stabilization of the ICU's management structure and effective implementation of infection control measures, the infection rate of HCWs began to drop. A total of 25 HCWs in ICU, including Dr YAN, were infected. A total of 63 HCWs were infected during the SARS outbreak at PMH. No more HCW in ICU was infected after 14 April 2003. Among all HCWs infected, 18% were doctors, 55% were nurses, and 27% were supporting staff; 40% of these HCWs were infected in ICU and the remainder, in the wards.

10.61 Some of the witnesses explained the possible causes for the infection of the large number of HCWs in PMH to the Select Committee. The various possible causes given by Ms LAI, Dr YU, Dr YAN, Dr TONG and Dr CHIU are summarized as follows -

(a) the large number of nearly 600 SARS patients were admitted to PMH within one week;

(b) having to perform high risk procedures such as intubation and bagging;

(c) handling of infected wastes and excreta;

(d) high viral load in the SARS wards in the Hospital; and

(e) prolonged work stress.

10.62 Dr CHEUNG King-on pointed out to the Select Committee that one of the main reasons why so many HCWs in PMH were infected during the outbreak at PMH was that it did not have enough time to properly set up an effective infection control policy. The guidelines at that time were not well established and were only evolving in accordance with the accumulated knowledge and information about the disease.

Should the Princess Margaret Hospital have asked for more preparation time

10.63 When asked by the Select Committee whether PMH should have asked for more time for preparation, Dr CHIU told the Select Committee that on 28 March 2003, there were already 44 new suspected SARS admissions, of which 19 were from UCH. In view of the worsening outbreak at the Amoy Gardens, which was calamitous, it was not a question of asking for more time, but a question of how to cope with an existing crisis. PMH accepted the task because of the urgency at that point in time, and she had the reassurance of support from HAHO and the top management team in her cluster. The PMH team had pulled together all the resources to fight the battle. However, when she asked for additional ICU HCWs from other cluster hospitals, it was not as easy as she thought when she accepted the designation plan. Deployment of HCWs from hospitals in other clusters would have been easier and smoother if HAHO had issued a "military order" to demand compliance from all other hospitals.

10.64 Dr YAN told the Select Committee that ICU in PMH was able to cope with a gradual increase of SARS patients. However, the influx of SARS patients requiring ICU services in PMH turned out to be both huge and sudden, resulting in the infection of HCWs in ICU.

10.65 Ms LAI informed the Select Committee that HCWs in PMH were concerned when 93 new SARS cases were admitted on 29 March 2003. However, as PMH was designated as a SARS hospital to combat the Amoy Gardens outbreak, all HCWs in PMH had to try their very best to accomplish the entrusted mission. Ms LAI further informed the Select Committee that as far as the SARS wards were concerned, the issue of whether too many SARS patients had been admitted to PMH was not discussed. In fact, PMH never reached its target capacity of handling 1 000 SARS patients.

Analysis

Designation of the Princess Margaret Hospital as a SARS hospital

10.66 The Select Committee does not find the decision to designate PMH as a SARS hospital unreasonable. The Select Committee, however, considers that the decision to designate PMH as a SARS hospital to take up the 1 000 new SARS patients from the end of March 2003 was made without having sufficiently considered the important issues set out below.

10.67 When Dr LEUNG Pak-yin enquired about the bed capacity of PMH to receive all new SARS patients, Dr Lily CHIU gave the figure of 1 000 beds on the basis that there were about 1 200 beds in PMH. Dr CHIU did not invite Dr YAN Wing-wa or any doctors of ICU to the meeting on 26 March 2003 at which she discussed with her senior staff DH's request for PMH to handle all new SARS cases. On the same day, the Daily SARS Round Up Meeting decided that PMH was to take up the first 1 000 SARS patients from the end of March 2003.

10.68 Dr CHIU explained to the Select Committee that she considered that ICU in PMH had the capacity to be expanded within a short time from one ward of 14 beds to two wards of 32 beds. However, the Select Committee has observed that what happened in ICU during the first few days of PMH becoming the SARS hospital showed that Dr CHIU had overestimated the expandability of ICU and underestimated the demand for ICU care arising from the new SARS cases.

10.69 Both Dr CHIU and Dr YAN explained to the Select Committee that based on PMH's own experience in treating SARS patients before 27 March 2003, it was estimated that only about 10% of the SARS patients would require ICU treatment seven to 10 days after admission. The plan was to prepare 64 adult ICU beds by the end of April 2003. Dr YAN also told the Select Committee that he was not aware of PWH's experience that 20% of SARS patients there required ICU care.

10.70 The Select Committee notes that prior to 26 March 2003, PMH had admitted 84 SCAP/suspected SARS patients and, on or before that date, 22 of them had required ICU treatment on an average of three days after admission. Of these 22 patients, four were admitted to ICU on the day they were admitted to PMH and seven needed ICU treatment one day after admission. The percentage of patients requiring ICU care was 26%, which was close to PWH's 20%, and not the 10% that Dr CHIU and Dr YAN told the Select Committee. If only the above figures were taken into consideration, the number of patients requiring ICU care could be around 260, if PMH was to handle 1 000 SARS patients, and some of the patients could be expected to require ICU care almost immediately after admission. It is apparent to the Select Committee that Dr CHIU and Dr YAN's estimate was not based on the PMH figures referred to above which were available to them if they had asked for the figures.

10.71 According to the further information provided by Dr CHIU, a retrospective analysis of PMH's statistics showed that from 29 March to 5 April 2003, there were 45 ICU admissions out of the 596 SARS patients, i.e. an ICU admission rate of 7.55%. A retrospective analysis of PMH's overall ICU admissions during that period was 11.8%.

10.72 It was PMH's plan to expand ICU from 14 beds to 64 beds within April 2003. According to Dr CHEUNG King-on and Dr Thomas BUCKLEY, the capacity of an ICU cannot be expanded within a short period of time as it is necessary to, among other things, deploy enough experienced ICU HCWs to staff the "expanded" ICU and experienced ICU HCWs are not easy to find. The Select Committee notes that PMH immediately faced the problem of shortage of experienced ICU HCWs when it commenced operation as the SARS hospital on 29 March 2003. The shortage of ICU HCWs became more acute when PMH's own ICU core team, including Dr YAN, contracted SARS.

10.73 The Select Committee understands that the Government and HAHO considered that there were good reasons to designate PMH as the SARS hospital, and that PMH felt duty-bound to accept the arrangement. The Select Committee notes that PMH is the only infectious disease hospital in Hong Kong, and that it had a track record of "zero infection" among HCWs in treating SARS patients prior to 26 March 2003. This might explain why the

PMH management was confident in accepting the decision that PMH be designated as the SARS hospital.

10.74 The Select Committee notes that 84 SCAP/suspected SARS patients had already been admitted to PMH prior to 26 March 2003. The Select Committee also notes that the first case of an HCW in PMH being infected with SARS was reported on 30 March 2003. Taking into account the incubation period of SARS, this HCW would probably have been infected before PMH served as a SARS hospital on 29 March 2003. The Select Committee considers that even if PMH was not to serve as the SARS hospital, it was questionable whether PMH was still able to keep its record of "zero infection" among HCWs.

10.75 The Select Committee is of the view that the Daily SARS Round Up Meeting and PMH should have considered whether it was practicable for PMH to handle a total of 1 000 new SARS patients under the prevailing circumstances, and that little time was available for PMH to prepare for the new role. A more realistic figure should have been worked out after taking into consideration of all the relevant data and information, the additional available manpower, facilities and equipment required as well as the preparation time needed. The Government and HAHO should also have pursued the option of designating more than one SARS hospital.

Preparation time for the Princess Margaret Hospital to be converted into the designated SARS hospital

10.76 The Select Committee has examined whether PMH had been given adequate time to make preparations to serve as the designated SARS hospital. The Select Committee notes that when the decision was made at the HWFB Task Force meeting on 26 March 2003, it did not give a specific date for HA to implement the proposal. However, PMH had to commence admitting all new SARS patients on 29 March 2003 because of the SARS outbreak at the Amoy Gardens; hence PMH did not have enough time to complete all the necessary preparatory work.

10.77 The Select Committee is of the view that PMH was not allowed sufficient preparation time to implement phase one of the plan to designate PMH as the SARS hospital, under which 400 SARS beds were to be provided upon completing service diversion work. A total of 268 SARS patients were admitted to PMH in the first three days after designation. As a result, PMH had to speed up the original decanting plan. The Select Committee considers that the preparation time available was far too short for PMH to put in place all the necessary arrangements for admission of 400 SARS patients under the phase one plan.

10.78 The Select Committee notes that the original plan to admit 1 000 new SARS patients had never been carried out when PMH found it necessary to stop admission of new SARS patients on 11 April 2003. It should have been obvious on 1 April 2003 when over 300 patients had been admitted and HCWs in PMH began to fall ill that PMH, in particular its ICU, was not able to cope with the workload.

Review of the decision for the Princess Margaret Hospital to handle the first 1 000 cases

10.79 According to PMH's own estimate, an average of 50 to 60 new patients would be admitted per day after it commenced operation as the SARS hospital. The actual figure was that 268 new SARS patients were admitted to PMH within the first three days. The Select Committee notes that Dr CHIU raised with HAHO on 6 April 2003 that admission of new SARS patients to PMH should be halted, and that the Daily SARS Round Up Meeting decided that PMH was to stop the admission of SARS patients from all hospitals, except those referred by DMCs, on 7 April 2003. On 11 April 2003, the Daily SARS Round Up Meeting finally decided that PMH was to stop all new SARS admissions from that date.

10.80 Given that SARS was an emerging infectious disease at that time, and that no hospital had the experience in handling 1 000 SARS cases, the Select Committee considers that it would have been prudent for HAHO to set a threshold for review, i.e. the decision for PMH to accept the 1 000 new cases should be reviewed when the number of SARS patients admitted to PMH

reached a certain level. Even without a pre-set threshold, the Select Committee is of the view that HAHO should have closely monitored the situation in PMH and should have reviewed the decision on 1 April 2003 when more than 300 patients had been admitted to PMH.

10.81 The Select Committee considers that even if HAHO did not take the initiative to review the decision, Dr CHIU should have raised with HAHO on 1 April 2003, and not until 6 April 2003, that PMH could no longer handle all the new SARS patients given the severity of the outbreak at the Amoy Gardens. The Select Committee believes that the heavy workload in PMH, in particular in ICU, would have been alleviated if new SARS cases had been diverted to other hospitals earlier.

Support from the Head Office of the Hospital Authority to the Princess Margaret Hospital

10.82 The Select Committee has considered whether HAHO had provided adequate support to PMH, particularly in transferring HCWs from other hospitals to PMH. The Select Committee has taken note of the difficulties in the deployment of HCWs, in particular experienced ICU HCWs, from one hospital to another because of the practical arrangements involved, the tight manpower situation of all HA hospitals at that time and the level of readiness of individual HCWs to be transferred to ICU in PMH.

10.83 Dr CHIU told the Select Committee that she had the assurance of support from HAHO when she accepted the task. However, when she asked for additional ICU HCWs from other cluster hospitals, it was not as easy as she had thought. The Select Committee notes that although it was discussed at the Daily SARS Round Up Meeting on several occasions that other CCEs would deploy HCWs to PMH, a concrete decision that each cluster would deploy 10% of its ICU nurses was not made until 5 April 2003 when PMH was already in a crisis situation.

Performance and accountability

Head Office of the Hospital Authority

10.84 The Select Committee understands that HAHO was overwhelmed by the SARS outbreak at that time. However, the Select Committee is of the view that insufficient consideration was given to possible implementation difficulties before the designation plan was confirmed on 26 March 2003 at the Daily SARS Round Up Meeting chaired by Dr KO Wing-man. The Daily SARS Round Up Meeting neither set a threshold for review nor closely monitored the situation at PMH. The Daily SARS Round Up Meeting should have reviewed the designation plan in the light of the rapid influx of over 300 patients into PMH by 1 April 2003. As the decision that PMH was to admit 1 000 new SARS patients from the end of March 2003 was made under Dr KO's chairmanship, the Select Committee considers that Dr KO should be held responsible for the decision.

10.85 The Select Committee notes that Dr LEONG Che-hung participated in the Daily SARS Round Up Meeting on 26 March 2003 in his capacity as the Chairman of the HA Board, and accepted the decision to designate PMH to handle 1 000 new SARS cases from the end of March 2003. The Select Committee considers that Dr LEONG should also be held responsible for that decision.

The Princess Margaret Hospital

10.86 The Select Committee appreciates the courage, strong sense of duty and dedication of HCWs in PMH in carrying out the unenviable task of handling all new SARS cases after the designation of PMH as the SARS hospital.

10.87 The Select Committee is of the view that Dr Lily CHIU demonstrated commitment in agreeing to PMH being designated as the SARS hospital. However, Dr CHIU should have taken into consideration all the relevant and available data and information at that time as well as sought appropriate professional advice before deciding on the number of SARS

patients that PMH could handle as a designated SARS hospital. In failing to do so, Dr CHIU overestimated the capability and capacity of PMH, in particular its ICU, in handling SARS cases. Dr CHIU should be held responsible in this regard.

10.88 The Select Committee considers that Dr CHIU should have raised more firmly with HAHO her concerns about the implementation difficulties in carrying out the decision to designate PMH as the SARS hospital. The Daily SARS Round Up Meeting should have monitored and reviewed the situation in PMH more closely when over 300 SARS patients had been admitted by 1 April 2003. Dr CHIU, as HCE of PMH, had the responsibility to raise the matter with HAHO on 1 April 2003, and not until 6 April 2003.

10.89 The Select Committee notes that Dr YAN Wing-wa was industrious in and dedicated to his work. Unfortunately, he contracted SARS during the outbreak at PMH. The Select Committee concludes that in the course of his preparing ICU in PMH for PMH to function as the SARS hospital according to the designation plan, he did not give full consideration to some of the relevant data and information that were available.

10.90 The Select Committee commends Dr CHEUNG King-on, Dr Thomas BUCKLEY, Dr LUK Che-chung and all other HCWs concerned for their courage and readiness to work in ICU in PMH under very difficult circumstances, and for their invaluable service rendered.