

### The Princess Margaret Hospital Experience

3.95 Princess Margaret Hospital, a 1,200-bed acute hospital serving a population of 1.5 million, is the only hospital in Hong Kong with dedicated infectious disease facilities. It features 4 isolation wards – 2 each for air-borne infection and enteric or blood-borne infection – with a total capacity of 86 beds. During the epidemic, Princess Margaret Hospital took in the highest number of SARS cases, having treated 34% or 593 out of the 1,755 SARS patients in Hong Kong. Despite its exemplary track record on infection control, the hospital also encountered significant problems with SARS infection among its healthcare workers at the height of the epidemic. In total, 62 healthcare workers were infected in the hospital, 25 (40.3%) of them in the intensive care unit.

3.96 SARS infection in staff in Princess Margaret Hospital occurred following an upsurge of caseload between 29.3.03 and 7.4.03, after the hospital was designated as a SARS hospital. The designation was made against the backdrop of a worsening epidemic in Hong Kong, with over 300 cases cumulatively.

#### 26.3.03 Wednesday

3.97 At the HWFB Task Force meeting on 26.3.03, the Director of Health recommended that all new cases referred by DH's designated medical centres should be received by one designated SARS hospital, preferably Princess

Margaret Hospital. After the meeting, internal discussions were held by senior executives including cluster chief executives, at the HA head office. Princess Margaret Hospital was observed to be managing around 100 SARS patients at that time, and none of its staff had been infected.

3.98 In view of its dedicated infectious disease facilities, track record in treating infectious diseases, strong culture on infection control and zero staff infection from managing SARS cases up to that point in time, a decision was taken to designate Princess Margaret Hospital to receive all SARS cases referred from the designated medical centres as well as from accident and emergency departments of other HA hospitals.

3.99 Since the existing capacity of the infectious disease ward was only 86 beds (inclusive of the 14 beds in the intensive care unit), preparations were immediately underway to enhance the hospital's capacity to take in new SARS cases, as follows –

- ◆ Decant all non-SARS services out of the hospital to create 912 acute SARS beds, including 74 intensive care beds
- ◆ Close the accident and emergency department of the hospital
- ◆ Decant the entire non-acute Wong Tai Sin Hospital to create an additional 400 SARS convalescent beds for Princess Margaret Hospital
- ◆ Arrange for HA-wide staff deployment and training

- ◆ Put in place logistics support, such as ventilation improvement, personal protection equipment, and temporary accommodation for staff who did not want to go home.

3.100 There was little at that time to indicate that cases from the community outbreak in Amoy Gardens would soon escalate exponentially, resulting in significantly larger than expected numbers of SARS referrals to the hospital. The plan at the time was to decant Princess Margaret Hospital over a week, department by department, starting from 29.3.03, the day it commenced admissions of all new SARS cases. As the designated medical centres were scheduled to start operating on 31.3.03, it was envisaged that referrals would build up gradually during the first week. It was also anticipated that the enhanced capacity arising from the decanting would be adequate to cope with all the referrals from both the designated medical centres and accident and emergency departments in other hospitals.

#### **27.3.03 Thursday – 28.3.03 Friday**

3.101 While preparing logistics, the hospital management also held a series of staff forums in Kowloon West Cluster on 27.3.03 and 28.3.03 to prepare staff for the major tasks ahead. Further forums were held between 29.3.03 and 9.4.03, some of which were separately attended by the HA Chairman, SHWF, and Chief Executive of HA.

3.102 DH's New Territories West Regional Office also liaised with Princess Margaret Hospital on 28.3.03 concerning the setting up of a control centre to facilitate the flow of case information between them.

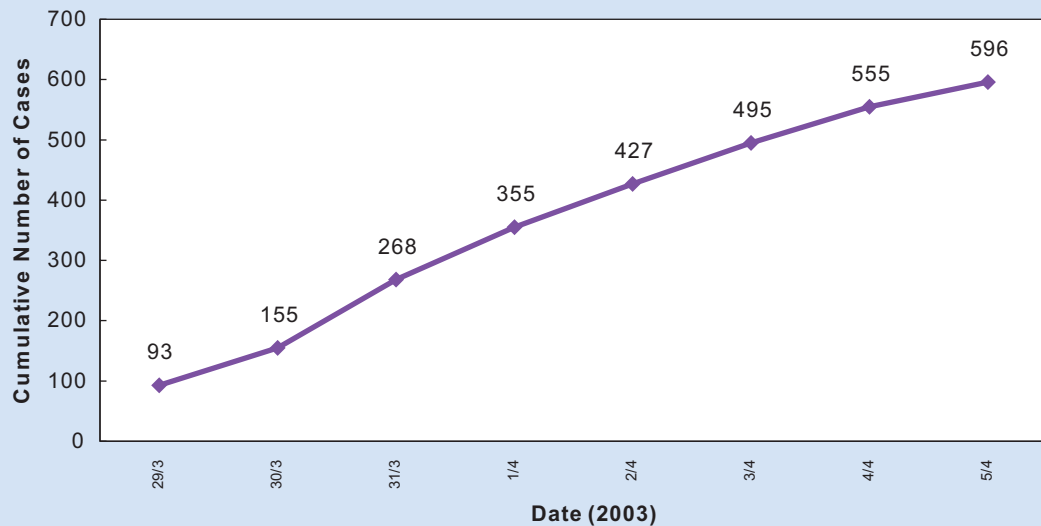
#### **29.3.03 Saturday – 5.4.03 Saturday**

3.103 On 29.3.03, Princess Margaret Hospital closed its accident and emergency department at 00:00 hours and started receiving SARS referrals from other hospitals, both private and public, at 09:00. A total of 93 patients were admitted on the first day. The rest of the week continued to see a high number of daily admissions, with a cumulative total of 268 SARS patients being admitted within the first 3 days, and 555 patients by the end of the first week, as shown in Figure 3.12.

3.104 The large influx of SARS patients into Princess Margaret Hospital within the first few days made it necessary for HA to adjust the original timetable of decanting the entire hospital within a week. The process of transferring out the non-SARS patients was therefore speeded up. This was completed on 31.3.03, the day the four designated medical centres commenced operation. On the same day, DH's New Territories West Regional Office also stationed a team of public health workers in the hospital to man their control centre.

3.105 The unexpected upsurge in the number of admissions, largely related to the Amoy Gardens outbreak at the time, had

Figure 3.12 Admission of New SARS Cases  
Princess Margaret Hospital



stretched the hospital's capacity to the limit. Many of the patients referred from other hospitals were also noted to be more critically ill, requiring a higher level of care. The deterioration of their clinical condition

necessitated intensive care support, and the intensive care facilities were soon overwhelmed. This was unforeseen, and happened when the SARS team was still being formed in Princess Margaret Hospital.

### The no-visiting policy

Following the community outbreak in Amoy Gardens, HA announced on 27.3.03 a no-visiting policy for all cohort wards and SARS wards in its hospitals. The purpose was to further strengthen infection control. In preparation for its role as the designated SARS hospital, the management of Princess Margaret Hospital implemented a no-visiting policy for all its acute wards on 28.3.03.

As the epidemic intensified, HA implemented a no-visiting policy for all its acute wards commencing from 3.4.03. Visits to acute wards would only be approved under very exceptional circumstances. For non-acute wards, the visiting hours were restricted to only two hours per day, and only one visitor was allowed for each patient during the designated visiting hours. Detailed records had to be made for every visitor.

While applauded by hospital staff and sections of the community, the Committee had heard from patients about their sense of despair and loneliness with no family and friends being allowed at their bedside. To be able to see their loved ones would have meant a lot to them when they were grappling with a devastating illness requiring hospitalisation. This issue highlighted a delicate balance between public health and individual rights. The Committee, however, was pleased to note innovative use of video link installed in hospitals which facilitated 'virtual visiting' and communication.

3.106 To cope with the rapid increase of patients requiring intensive care, HA had to urgently deploy reinforcements of appropriately skilled staff from other hospitals to Princess Margaret Hospital. Altogether, 62 such staff had been re-deployed. All had to be given orientation sessions before commencing work in the new environment. The hospital also made internal re-deployment, moving staff from the operation theatre, high dependency unit, coronary care unit and respiratory ward to boost intensive care unit manpower. In the process, some staff had to be given training to refresh their skills within a short time.

3.107 As the number of patients increased rapidly, healthcare workers in Princess Margaret Hospital started to fall ill with SARS on 30.3.03. By the end of the first week on 5.4.03, a core team of intensive care unit doctors and nurses had also been infected. By then, the total number of patients admitted had risen to 596, with 423 of them confirmed SARS. Patients in the intensive care unit had also

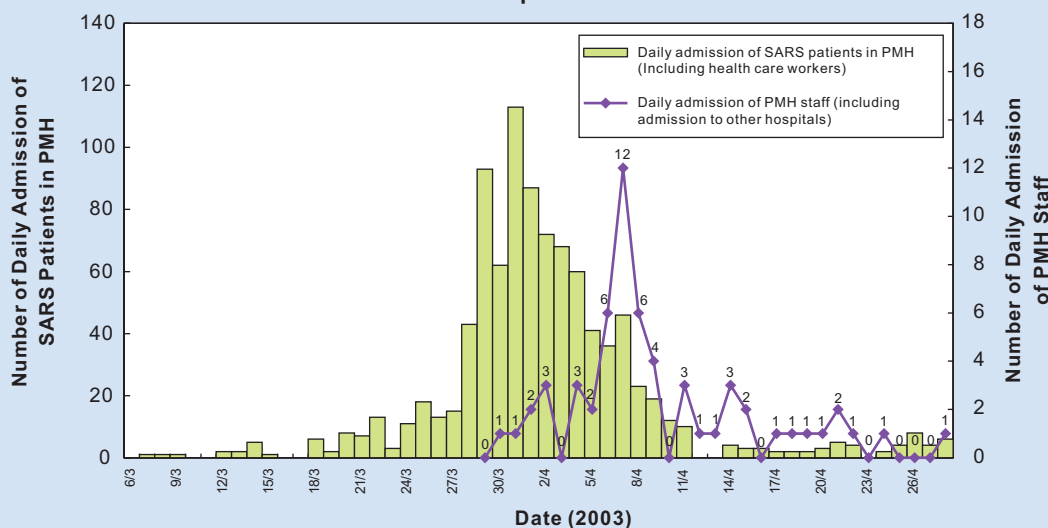
increased from 13 to 43. Figure 3.13 depicts the number of admitted patients and infected staff over the relevant time period.

### Appraising hospital staff infections

Of the 1,755 SARS infections in Hong Kong, 22% (n=386) were healthcare workers, of whom 320 were HA staff infected while on duty. The HA statistics comprised 180 nurses, 62 healthcare assistants, 49 doctors and 9 allied health professionals. The remaining 20 belonged to the 'others' category.

To identify contributing factors of staff infections, HA had carried out a number of studies such as questionnaire survey, site inspections, and case-control studies. Factors leading to staff infections were attributed to overwhelming caseload and high viral load due to the high concentration of SARS patients, environmental constraints such as overcrowding and insufficient isolation facilities, cases with cryptic or atypical presentation of SARS symptoms, and lack of experience or vigilance with regard to infection control precautions.

Figure 3.13 Admission of PMH staff (confirmed SARS) in relation to the number of patient admission



### 7.4.03 Monday – 11.4.03 Friday

3.108 On 7.4.03, a peak of 12 infected staff was registered in a single day. To alleviate the workload pressure of managing 600 suspected and confirmed patients, Princess Margaret Hospital started to transfer convalescent SARS patients to Wong Tai Sin Hospital. On the same day, HA decided to stop admitting referrals from other hospitals to Princess Margaret Hospital and confine its admission to referrals from DH's designated medical centres.

3.109 On 11.4.03, HA suspended the admission of new SARS cases to Princess Margaret Hospital. Referrals from designated medical centres were diverted to Tuen Mun Hospital of the New Territories West Cluster

on 12.4.03. In parallel, potential cases requiring intensive care were transferred to other hospitals to ease the mounting pressure on the intensive care unit at Princess Margaret Hospital. After the transfers and suspension of admissions, the number of patients in Princess Margaret Hospital came down to just over 400. The number of infected staff also came down after the relief measures were put in place. Significantly, no more staff from the intensive care unit were infected after 14.4.03.

3.110 Princess Margaret Hospital soon resumed admission of its own infected staff on 14.4.03, and subsequently also resumed receiving referrals from the designated medical centres on 24.4.03.

### Re-distributing SARS patients – a simulation scenario

The Committee had considered in depth the Princess Margaret Hospital experience as a designated SARS hospital. This included a review of a simulation scenario examining the pattern of re-distribution of SARS patients in the Hong Kong healthcare system if Princess Margaret Hospital were not a designated SARS hospital.

The scenario was constructed using real data shown in the table below.

**Figure 3.14 Number of daily SARS admission to Princess Margaret Hospital by location of referral sources**

	29/3	30/3	31/3	1/4	2/4	3/4	4/4	5/4	6/4	7/4	8/4	9/4	10/4	11/4	Total
KW	28	9	42	23	26	22	26	18	11	27	22	20	14	10	298
KE	42	31	39	33	34	36	14	14	12	9					264
NTE	15	9	20	15	6	6	8	5	9	10	1				104
KC	7	9	10	4	2	2	7								41
HK		3	2	9	2		3	2	1	1					23
NTW	1	1		3	2	2	2	2	1						14
<b>Total</b>	<b>93</b>	<b>62</b>	<b>113</b>	<b>87</b>	<b>72</b>	<b>68</b>	<b>60</b>	<b>41</b>	<b>34</b>	<b>47</b>	<b>23</b>	<b>20</b>	<b>14</b>	<b>10</b>	<b>744</b>

KW denotes Kowloon West region where Princess Margaret Hospital is situated

KE denotes Kowloon East region where United Christian Hospital is situated. Also the location of Amoy Gardens

NTE denotes New Territories East region where Prince of Wales Hospital is situated

KC denotes Kowloon Central region

HK denotes Hong Kong Island

NTW denotes New Territories West region

### Re-distributing SARS patients – a simulation scenario (continued)

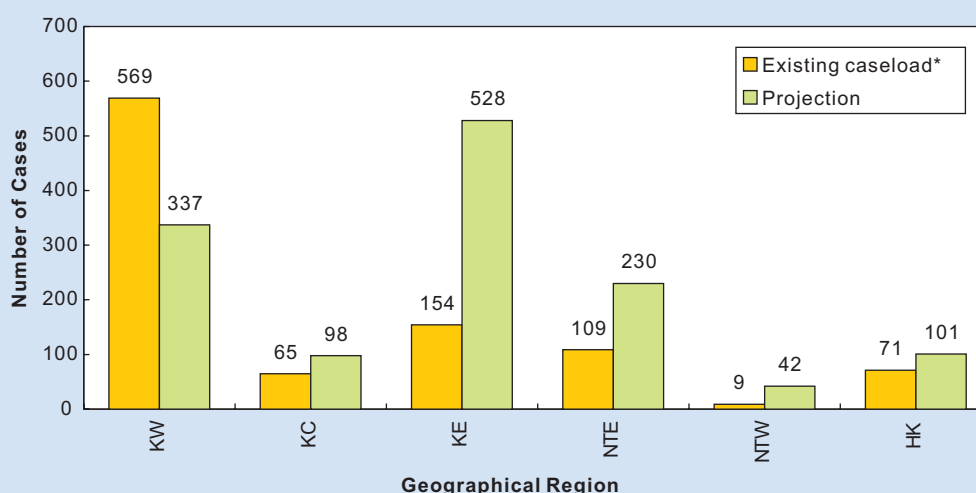
The data showed that there was a cumulative total of 744 confirmed or suspected SARS patients admitted to Princess Margaret Hospital between 29.3.03 and 11.4.03. Of these,

- ◆ 35.5% (264/744) were referred by hospitals in the Kowloon East region
- ◆ 14% (104/744) were referred by hospitals in the New Territories East region.

Geographical analysis by residential address further revealed that 50.3% (374/744) of these patients were residing in the Kowloon East region at the time of referral.

Under the simulation scenario, if Princess Margaret Hospital were not a designated SARS hospital, these 744 patients would be re-distributed within the referring regions. The pattern of re-distribution of SARS patients is summarised in the graph below –

**Figure 3.15 Pattern of SARS patients re-distribution  
Results of a simulation scenario**



\*Census date 11.4.03

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The findings showed that re-distributing the SARS patients from Princess Margaret Hospital under the simulation scenario would have resulted in dire consequences to hospitals in the Kowloon East region (with more than three times its SARS workload, in addition to meeting service needs of non-SARS patients), and aggravated the already difficult situation in the New Territories East region (with a doubling of its SARS workload and a continuing need to manage the after-effects of the Prince of Wales Hospital outbreak).