

A Report on
Data Collection and Clinical Management
on SARS

HA SARS 16/03

25 June 2003

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Evolving Organization

As knowledge on SARS and clinical experience in its management is built up throughout the phases of the crisis, continuous and concerted effort has been made to collect, evaluate and disseminate information and knowledge regarding the diagnosis and treatment of SARS. Appendix I shows the evolution of the organization to cope with the need in different phases of the crisis.

2. In the early phase of the disease when it was still known as Community Acquired Pneumonia (CAP), management of the disease was largely steered by the Infection Control Task Force and the Working Group on Severe Community Acquired Pneumonia (SCAP) was formed. As the situation developed, an Expert Panel was set up to advise on infection control, work on case definition and empirical treatment of the disease.

3. When the disease developed into its peak phase, the virus causing the disease was identified and the Expert Panel concentrated on diagnosis and possible treatment based on available scientific information. In April, the number of cases for the disease plateaued off. During this period, advisory subgroups were formed for specific areas namely infection control, facility and equipment, virology, immunopathology, treatment, Paediatrics, Obstetrics, use of convalescent patient plasma and Chinese Medicine. With the number of cases coming down from end April onwards, the advisory subgroups focused their attention on reviewing treatment outcomes.

4. In early May, the HA SARS Collaborative Committee (HASCOC) was formed to focus on clinical management and information on SARS, made up of representatives from the various advisory subgroups. It is multi-disciplinary comprising Respiratory Physicians, Accident & Emergency Specialists, Geriatricians, Intensivists, Radiologists, Microbiologists, Rehabilitation Specialists, Paediatricians, Pathologists and Psychiatrists. The mode of operation is at Appendix II.

Measures in Improving Clinical Management for SARS

5. With the background of a new disease causing rapidly progressing epidemic, a number of measures are taken to support clinicians in designing a more rational management approach through regular sharing of experience, data collation and interim analysis of results. Local consensus and latest publications on SARS are widely promulgated through the HA intranet and internet. A summary of key measures are provided below:

Information Dissemination

6. Substantial efforts have been made to collate and make available the latest information on SARS to HA staff, the public and worldwide through the HA website via Internet and Intranet, and the e-Knowledge Gateway (eKG). Important knowledge is distributed via chain emails to concerned parties, or through eKG's email alerts to clinicians and the SARS Forum. Appendix III shows the chronology of changes in the HA guidelines.

7. Throughout the epidemic, clinicians in HA and academic staff of the two universities worked closely in enhancing the hospital infection control measures and clinical management protocols. HA has participated in a number of Scientific Symposia since March 2003. (Appendix IV)

Data Collection and Analysis

8. The diagnosis and reporting of SARS in HA hospitals follows a set of criteria closely modelled on the World Health Organisation (WHO) guidelines. A central database for SARS patients (confirmed, suspected and under observation) linking to the existing hospital systems was developed in late March to April 2003. This facilitates information sharing with the Department of Health for contact tracing and allows timely evaluation of local experience, especially in evaluating the role of diagnostic tests, identifying possible prognostic factors and comparing the relative risks and benefits of treatment alternatives. A huge exercise was conducted to review the medical records of all confirmed SARS patients in order to extract detailed clinical and treatment information, to supplement information available in the electronic database. Important clinical management issues could then be addressed scientifically, and such information availability also paved the way for future academic research agenda.

Investigation of Exploratory Treatment

9. Given the observation that some patients did not achieve the desired outcome from the standard treatment, clinicians began exploring other possibilities based on known knowledge and experience in other diseases. Centrally, HA Head Office facilitated in literature searches, summary of evidence, and putting proposals to vetting by the relevant advisory groups. Research protocols were developed for use in promising areas.

10. Suggestions and experience sharing of treatment options from other sources outside HA were received and gathered almost on a daily basis. These correspondences were followed up, vetted for the level of evidence supplied and complemented with appropriate literature search when indicated. At regular intervals, various advisory groups and sub-groups comprising scientists and clinicians with experience and expertise in the relevant fields were coordinated to review and discuss diagnostic and treatment approaches.

Publication

11. Local workers had been active in publishing information on the latest understanding and management of SARS on international journals. Over 40 such articles have been published so far. The list of publications from Hong Kong is at Appendix V.

Phased Action in Clinical and Data Management

12. Appendix VI shows the actions and plans for data management and clinical management throughout the 6 phases of the disease. Through the HAHO new command structure for SARS, a team of dedicated staff from Informatics, Statistics and Research Unit, Clinical Effectiveness Unit and Knowledge Management Unit worked together to drive the development of data and clinical management. Appendix VII is a summary chronology of events.

Preparatory Phase (11 Feb. - 9 March)

13. HA was first alerted in February to heighten surveillance following reports of increase in pneumonia cases in Mainland. A Working Group on Severe Community Acquired Pneumonia (SCAP) was formed to review the cases and share experience.

Data Collection

14. To enhance surveillance, case report form was developed and sent to hospitals for case reporting. The Department of Health was also invited to join the Working Group.

15. The Working Group met seven times between 11 February and 18 March 2003 to review the recent reported cases of SCAP and to compare the reported incidence with those of past seasons. There was no evidence of a surge of SCAP cases in February 2003 compared to February 2002.

Clinical Management

16. The Working Group initiated the first case definition of SCAP and discussed the infection control measures for high-risk procedures. At that stage, empirical treatment was given with reference to atypical pneumonia caused by various micro-organisms.

Early Phase (10 March - 23 March)

17. This phase was marked by the extraordinary March 11 outbreak of the disease among patients, healthcare workers (HCW) and visitors in A8 ward of the Prince of Wales Hospital (PWH). The disease was officially termed Severe Acute Respiratory Syndrome (SARS) by WHO on 15 March, 2003. As the aetiological agent was still unknown, the main effort was to

share experience with the disease among clinicians through meetings, chain emails and eKG.

Data Collection

18. The major work during this period was early identification and reporting of cases and the setting up of the SARS registry. Daily reporting of confirmed SARS cases started on 19 March, 2003. To this end, the SARS Control Centre was set up at HAHO on 21 March, 2003 and similarly in all hospitals admitting SARS patients to enable direct reporting.

Clinical Management

19. Apart from the initial use of antibiotics for community-acquired pneumonia, use of oxygen and supportive treatment, there was no universally accepted specific treatment for SARS. Local workers advocated the use of Ribavirin based on its broad-spectrum antiviral activities and effect on the immune system of mice. Taking into account experience from Guangzhou as shared at the Annual Meeting of the Hong Kong Thoracic Society around mid-March, local workers largely concurred on the use of Ribavirin and Steroid in treating the disease.

20. During this stage, the main tasks were to promulgate the WHO case definition and to identify the route of transmission. On 18th March, it was announced that there was evidence to show the association of transmission to HCW with the use of nebulizer in the PWH index case. This led to a virtual ban on the use of nebulizer in hospitals. High vigilance was applied to other potential aerosol generating procedures and the use of non-invasive positive pressure ventilation was also restricted. On 19 March, the SARS guidelines were posted on the HA Internet. Guidelines for General Practitioners were also published.

Peak Phase (24 March – 6 April)

21. This period was marked by the Amoy Garden outbreak with large number of patients flooding into the United Christian Hospital (UCH) and Princess Margaret Hospital (PMH). During this period, Coronavirus was identified as the leading cause of the disease.

Data Collection

22. To facilitate contact tracing which is instrumental in the containment of the outbreak, regional coordinators were appointed to work with the regional offices of the Department of Health. Data collection was enhanced with the development of the corporate system of SARS patient database. At the same time, data on hospital activities was analysed to assist the projection of work load and bed utilization in coping with the disease.

Clinical Management

23. Diagnostic tests (PCR & IF-IgG) were developed by local virologists with some promising results. With the virus causing the disease having been identified, clinicians and researchers began to discuss possible treatment regimens more scientifically. At the Expert Panel meeting on 1 April, 2003, the treatment experience in PYNEH, PWH and PMH especially in the use of high-dose Steroid was reviewed and the treatment guidelines were revised and posted onto HA Internet and HA Intranet. With the suspicion that nasopharyngeal aspirate could generate aerosol, its use was limited / discouraged.

The Plateau Phase (7 April – 20 April)

24. With a rapidly increasing number of SARS cases, there was widespread fear in the community. Hospitals were also overstretched particularly for their intensive care facilities. This phase was also characterized by the overwhelming workload of the laboratories.

Data Collection

25. By making use of the existing Clinical Management System in HA, a comprehensive electronic online web-based contact tracing and tracking system 'e-SARS' was established. This provides real time information exchange with the Department of Health about newly admitted SARS patients and facilitates the Department of Health in tracing contacts. Collaboration was also built up with the Police in the identification of areas with possible cluster outbreaks, thus enhancing epidemiological information which is pivotal in containing the spread of the disease.

Clinical Management

26. Due to the apparently low detection rate in the diagnostic tests, criteria for requesting such tests were reviewed. Advisory subgroups were formed to review and examine the treatment regimen in specific areas. Investigations into other exploratory treatment options were also conducted. Alternative treatment modalities were considered when standard treatment regimen failed to yield the responses expected. Research protocols were developed for experimental therapies to be conducted on SARS patients. Meetings with the Chinese Medicine (CM) Expert Panel were also held and clinical protocols on the use of CM as prophylaxes for high risk frontline staff were developed. On 17 April, the Hospital Authority organized a visit to Guangdong Ministry of Health and Guangzhou hospitals to discuss and share their experience in fighting the disease. A detailed report on the development of CM in the treatment of SARS is at Appendix VIII

The Resolution Phase (21 April – 4 May)

27. The situation has largely been stabilized with the number of confirmed cases coming down. The target was to achieve zero infection for staff and to prevent further outbreak. Nevertheless, the increasing number of deaths has caused great concern in the community.

Data Collection

28. Reviews were conducted on staff infection with a view to identify possible lapses for improvement. In addition to 'e-SARS', a clinical data base, capturing clinical information and laboratory data of all SARS patients was planned.

Clinical Management

29. To consolidate and maximize the corporate effort in clinical management, expert panels and advisory sub-groups were pooled to form the Advisory Group for Treatment of SARS. Data on preliminary treatment outcomes among various hospitals were presented and reviewed by the Advisory Group at its first meeting held on 25 April 2003. The results were encouraging and were shared at the meeting with the Secretary for Health, Welfare & Food. New Treatment options were tested. Rehabilitation programmes were piloted in individual clusters.

The Normalising Phase (5 May to present)

30. A number of hospitals suffered from small outbreaks caused by unsuspected cases with atypical or vague presentations. With effective control of the epidemic in the community, the prevention of nosocomial infection became important in eradicating SARS in Hong Kong.

Data Collection

31. The central clinical data base was expanded by data mining information existing in the HAHO data warehouse to facilitate accurate electronic data capture and validate manual data entry. More data sets were added to explore the utility in the fields of Accident & Emergency, Radiology, Intensive Care, Geriatrics etc.

Clinical Management

32. The HASCOC was set up to discuss and review treatment regimen as well as planned studies. Based on the data captured at the Central Clinical Database, retrospective analyses were conducted on disease pattern, prognostic indicators, use of different treatment modalities and virological test results. The Group would also review, vet and approve proposed research protocols involving access to the Central Clinical Database.

Way Ahead

33. To understand the impact of the disease and to prepare treatment protocols for possible future outbreak, the HASCOC planned the following studies:

- a. Trial of hyperimmune globulin for post-exposure prophylaxis
- b. Diagnostic index
- c. Atypical presentations
- d. Geriatric presentations for "cryptic" Cases
- e. Trials of antiviral agents
- f. Scoring System for radiological findings
- g. ICU common database
- h. Prevention and treatment of pulmonary fibrosis
- i. Study on SARS patients with residual lung damage
- j. Pulmonary & psychological rehabilitation programme
- k. Common data collection for autopsy
- l. Trials of immuno-modulating agents

34. Our experience was shared with clinicians from other countries at the WHO Workshop on Clinical Management of SARS held on 13 –14 June 2003. The content of the workshop (Appendix IX) reveals the contribution of the clinicians of Hong Kong at the conference. The knowledge so generated led to constructive plans for international co-operation in future research.

Appendix I

Evolution of HA SARS Collaborative Group (HASCOG)

- Early phase – Case definition, infection control, empirical treatment of CAP (Expert Panel)
- Peak phase – Virus identified (Expert Panel)
- Plateau phase – (Advisory subgroups) on specific areas
- Resolution phase – Treatment Advisory subgroups to report on interim treatment outcomes
- Normalizing phase – HA SARS Collaborative Group

Appendix II

HA SARS Collaborative Group

Mode of Operation

Objective: To steer, coordinate, enhance, report and disseminate the latest information on SARS management

Membership: Physicians (Respiratory, A&E, Infection Control, Geriatric, Intensivists, Radiologists, Microbiologists, Rehabilitation), Paediatricians, pathologists, Psychiatrists with contributions and expertise in SARS management.

Operation: 1) Joint ownership, monitor utilization, maintenance of a central clinical database

2) Approve legitimate projects necessitating access to the full database initiated by interested parties

3) Contributing units entitled to publish respective data and to acknowledge Collaborative Group collectively

Appendix III

Summary of Important Information Posted on HA Web-site on SARS

<u>Date</u>	<u>Contents</u>
21-Feb-03	FAQ on SCAP with case definition, droplets precaution, laboratory testing & use of antivirals released
7-Mar-03	Measures for HCW in contact with SCAP patients released
12-Mar-03	Advice to staff with flu-like illness released
19-Mar-03	Information on SARS case definition, infection control measures, avoidance of nebulizer use released
24-Mar-03	Risk-stratified use of PPE & Infection control measures for staff/ contacts while at home & for visitors released
26-Mar-03	First SARS forum in Intranet for experience sharing among clinicians HASLink Express issued
27-Mar-03	Keeping patients for 3 weeks from onset or 7 days from WHO-defined convalescence released
1-Apr-03	A webpage for Private Practitioners launched & designated email address for their enquiries related to status of patients referred
3-Apr-03	enhanced information on infectrol control measures including 1) disallowing any visiting 2) mandatory mask wearing for all staff/ patients 3) caution on serious-risk and high-risk procedures 4) waste management 5) post-mortem examination & measures at mortuary released Information on admission criteria, paediatric patients, pregnant patient, primary care released
10-Apr-03	Sub-section on suspected case refined & separately inserted into case definition
17-Apr-03	Revision of duration of cohorting convalescence cases to 5 days released
25-Apr-03	Pattern of breakthrough infections highlighted
29-Apr-03	Information on measures for community health care workers released
30-Apr-03	Extension of precautionary measures at home for convalescent patients extended from 10 days to 14 days released
6-May-03	Measures for "ward contacts" and "handling laboratory specimens" released
7-May-03	Appraisal of exploratory treatment released
15-May-03	Principle of treatment revisited based on latest evidence
21-May-03	Information on in-hospital resuscitation of patients released
22-May-03	Information on measures in out-patient settings and non-emergency patient transfer released

* information posted on websites may rarely lag behind other means of dissemination including hospital forums, emails etc .

Appendix IV

SARS Symposium & Exchange Meetings

Date	Subject
30.3 .03	Seminars on SARS for GP organized by HA
31.3 .03	Seminars on SARS organized by Hong Kong Medical Association
13 .4.03	Symposium on SARS organized by the Hong Kong College of Physicians
16.4.03	Seminar on SARS treatment with Chinese Medicine organized by Hong Kong Baptist University
17.4.03 – 18 4 2003	Visit to Guangdong Ministry of Health & Guangzhou Hospitals
20.4.03	Seminar on "Paediatric SARS" - Experience Sharing
25.4.03	Symposium on SARS update — A Global Perspective organized by the Chinese University of Hong Kong
26.4.03	Panel Meeting on Joint Symposium on Atypical Pneumonia organized University of Hong Kong
27.4.03	Joint Symposium on Atypical Pneumonia by University of Hong Kong
4.5.03	An Exploration on Treatment of SARS: Chinese Medicine, Modern Medicine & Integrative approaches
15.5.03	Visit by Chinese Academy of Science
19.5.03	Visit from Canadian team headed by Commissioner of Public Security
29.5.03 - 30.5.03	First meeting of Guangdong-HK-Macau SARS Expert Group
7.6.03	Symposium on SARS Imaging – Pneumonia, Atypical Pneumonia & Pneumonia-like conditions organized by Hong Kong College of Radiologists
8.6.03	Symposium on One School One Doctor: A Review and Preview on the Treatment of Paediatric SARS cases organized by the Hong Kong College of Paediatricians.
13 – 14.6.03	WHO Workshop on Clinical Management SARS

Appendix V

List of publications in peer-reviewed journals by Hong Kong clinicians (up to 23 June 2003)

Etiology and Prevention

Fouchier RAM, Kuiken T, Schutten M, van Amerongen-G, van Doornum GJJ, van den Hoogen BG, et al. Aetiology: Koch's postulates fulfilled for SARS virus. *Nature* 2003 May 15; 423: 240.

Shortridge KF. SARS exposed, pandemic influenza lurks. *The Lancet* 2003 May 10; 361(9369): 1649.

Seto WH, Tsang D, Yung RWH, Ching TY, Ng TK, Ho M, Ho LM, Peiris JSM and Advisors of Expert SARS group of Hospital Authority. Effectiveness of precautions against droplets and contact in prevention of nosocomial transmission of severe acute respiratory syndrome (SARS). *The Lancet* 2003 May 3; 361(9368): 1519-20.

Li TST, Buckley TA, Yap FHY, Sung JJY, Joynt GM. Severe acute respiratory syndrome (SARS): infection control. *The Lancet* 2003 April 19; 361(9366): 1386.

Peiris JSM, Lai ST, Poon LLM, Guan Y, Yam LYC, Lim W, et al and members of the SARS study group. Coronavirus as a possible cause of severe acute respiratory syndrome. *The Lancet* 2003 April 19; 361(9366): 1319-25. (published online 2003 April 8)

Ksiazek TG, Erdman D, Goldsmith C, Zaki SR, Peret T, Emery S, et al for the SARS Working Group. A novel coronavirus associated with severe acute respiratory syndrome. *New Engl J Med* 2003 May 15; 348(2): 1953-66. (published online 2003 April 10)

Case presentations and diagnosis

Antonio GE, Wong KT, Hui DSC, Lee N, Yuen EHY, Wu A, Chung SSC, Sung JJY, Ahuja AT. Imaging of severe acute respiratory syndrome in Hong Kong. *Am J Roentgenol* 2003 July; 181(1): 11-8.

Müller NL, Ooi GC, Khong PL and Nicolaou S. Severe acute respiratory syndrome: radiographic and CT findings. *Am J Roentgenol* 2003 July; 181(1): 3-8.

Rainer TH, Cameron PA, Smit D, Ong KL, Ng AWH, Chan DPN, Ahuja AT, Chan LYS, Sung JJY. Evaluation of WHO criteria for identifying patients with severe acute respiratory syndrome out of hospital: prospective observational study. *BMJ* 2003 June 21; 326: 1354-8.

Wong RSM, Wu A, To KF, Lee N, Lam CWK, Wong CK, Chan PKS, Ng MHL, Yu LM, Hui DS, Tam JS, Cheng G, Sung JJY. Haematological manifestations in patients with severe acute respiratory syndrome: retrospective analysis. *BMJ* 2003 June 21; 326: 1358-62.

Chiu WK, Cheung PCH, Ng KL, Ip PLS, Sugunan VK, Luk DCK, Ma LCK, Chan BHB, Lo KL, Lai WM. Severe acute respiratory syndrome in children: experience in a regional hospital in Hong Kong. *Pediatr Crit Care Med* 2003; 4(3): 279-83.

Hon KLE, Li AM, Cheng FWT, Leung TF and Ng PC. Personal view of SARS: confusing definition, confusing diagnoses. *The Lancet* 2003 June 7; 361(9373): 1984-5. [Letter]

Panesar NS. Lymphopenia in SARS. *The Lancet* 2003 June 7; 361(9373): 1985. [Letter]

Nicholls JM, Poon LLM, Lee KC, Ng WF, Lai ST, Leung CY, Chu CM, Hui PK, Mak KL, Lim W, Yan KW, Chan KH, Tsang NC, Guan Y, Yuen KY, Peiris JSM. Lung pathology of fatal severe acute respiratory syndrome. *The Lancet* 2003 May 24; 361(9371): 1773-8. (published online 2003 May 16)

Wong KT, Antonio GE, Hui DSC, Lee N, Yuen EHY, Wu A, Leung CB, Rainer TH, Cameron P, Chung SSC, Sung JJY, and Ahuja AT. Severe acute respiratory syndrome: radiographic appearances and pattern of progression in 138 patients. *Radiology*. (published online 2003 May 20)

Cameron PA. The plague within: an Australian doctor's experience of SARS in Hong Kong. *Med J Aust* 2003 May 19; 178 (10): 512-3. (published online 2003 April 21)

Cameron PA, Rainer TH and De Villiers Smit P. The SARS epidemic: lessons for Australia. *Med J Aust* 2003 May 19; 178 (10): 478-9. (published online 2003 April 21)

Sung JJY. Severe acute respiratory syndrome: what do we know about this disease? *Hong Kong Medical Diary* 2003 May; 8(3).

Fok TF. Management of severe acute respiratory syndrome (SARS) in children. *Hong Kong Medical Diary* 2003 May; 8(3).

Yan KW, Chan JK. Images in pathology: pulmonary pathology of severe acute respiratory syndrome (SARS). *Int J Surg Pathol* 2003 Apr; 11(2): 118.

Chan-Yeung M, Yu WC. Outbreak of severe acute respiratory syndrome in Hong Kong Special Administrative Region: case report. *BMJ* 2003 April 19; 326(7394): 850-2. (published online 2003 April 12)

Wong RSM. Severe acute respiratory syndrome in a doctor working at the Prince of Wales Hospital. *Hong Kong Medical Journal*; published online 2003 April.

Tsang KW, Ho PL, Ooi GC, Yee WK, Wang T, Chan-Yeung M, et al. A cluster of cases of Severe Acute Respiratory Syndrome in Hong Kong. *New Engl J Med* 2003 May 15; 348(2): 1977-85. (published online 2003 March 31)

Hon KLE, Leung CW, Cheng WTF, Chan PKS, Chu WCW, Kwan YW, et al. Clinical presentations and outcome of severe acute respiratory syndrome in children. *The Lancet* 2003 May 17; 361(9370): 1701-3. (published online 2003 April 29)

Lee N, Hui D, Wu A, Chan P, Cameron P, Joynt GM, et al. A major outbreak of severe acute respiratory syndrome in Hong Kong. *New Engl J Med* 2003 May 15; 348(2): 1986-94. (published online 2003 April 7)

Poon LLM, Wong OK, Luk W, Yuen KY, Peiris JSM and Guan Y. Rapid diagnosis of a coronavirus associated with Severe Acute Respiratory Syndrome (SARS). *Clinical Chemistry* 2003 April; 49(7). (Published online 2003 April 18)

Peiris JSM, Chu CM, Cheng VCC, Chan KS, Hung IFN, Poon LLM, Law KI, Tang BSF, Hon TYW, Chan CS, Chan KH, Ng JSC, Zheng BJ, Ng WL, Lai RWM, Guan Y, Yuen KY, and members of the HKU/UCH SARS Study Group. Clinical progression and viral load in a community outbreak of coronavirus-associated SARS pneumonia: a prospective study. *The Lancet* 2003 May 10; 361(9369).

Tomlinson B and Cockram C. SARS: experience at Prince of Wales Hospital, Hong Kong. *The Lancet* 2003 May 3; 361(9368): 1486-7.

Wong KT, Antonio GE, Hui DS, Lee N, Yuen EH, Wu A, Leung CB, Rainer TH, Cameron P, Chung SS, Sung JJ, Ahuja AT. Thin-Section CT of Severe Acute Respiratory Syndrome: Evaluation of 74 patients exposed to or with the disease. *Radiology*; published online 2003 May 8.

Wu EB and Sung JJY. Haemorrhagic-fever-like changes and normal chest radiograph in a doctor with SARS. *The Lancet* 2003 May 3; 361(9368): 1520-1.

Treatment and management

Antonio GE, Wong KT, Hui DSC, Wu A, Lee N, Yuen EHY, Leung CB, Rainer TH, Cameron P, Chung SSC, Sung JJY, and Ahuja AT. Thin-section CT in patients with severe acute respiratory syndrome following hospital discharge: preliminary experience. *Radiology*; published online 2003 June 12.

Oba Y. The use of corticosteroids in SARS. *New Engl J Med* 2003 May 15; 348(20): 2034-5. [Letter] (reply written by HK doctors)

Wong VWS, Dai D, Wu AKL, Sung JJY. Treatment of severe acute respiratory syndrome with convalescent plasma. *Hong Kong Medical Journal*; published online 2003 April.

So LKY, Lau ACW, Yam LYC, Cheung TMT, Poon E, Yung RWH, Yuen KY. Development of a standard treatment protocol for severe acute respiratory syndrome. *The Lancet* 2003 May 10; 361(9369): 1615-7.

Ho W. Guideline on management of severe acute respiratory syndrome (SARS). *The Lancet*; 2003 April 19; 361(9366): 1313-5. (published online 2003 April 8)

Epidemiology

Chan-Yeung M, Seto WH, Sung JJY. Severe acute respiratory syndrome: patients were epidemiologically linked. *BMJ* 2003 June 21; 326: 1393. (letter)

Riley S, Fraser C, Donnelly CA, Ghani AC, Abu-Raddad LJ, Hedley AJ, et al. Transmission dynamics of the aetiological agent of severe acute respiratory syndrome (SARS) in Hong Kong: the impact of public health interventions. *Science*. (published online 2003 May 23)

Donnelly CA, Ghani AC, Leung GM, Hedley AJ, Fraser C, et al. Epidemiological determinants of spread of causal agent of severe acute respiratory syndrome in Hong Kong. *The Lancet* 2003 May 24; 361(9371): 1761-6. (published online 2003 May 7)

Other

Ho W. The Hospital Authority and public health in Hong Kong: from theory to practice. *The Quarterly: The Royal Australasian College of Medical Administrators* 2003 April; 36(1): 5-7.

Ho SSY, Chan PL, Wong PK, Antonio GE, Wong KT, Lyon DJ, Fung KSC, Li CK, Cheng AFB, Ahuja AT. Eye of the storm: the roles of a radiology department in the outbreak of severe acute respiratory syndrome. *Am J Roentgenol* 2003 July; 181(1): 19-24.

King AD, Ching ASC, Chan PL, Cheng AYH, Wong PK, Ho SSY, Griffith JF, Lyon DJ, Fung KSC, Choi P, Li CK, Cheng AFB, Ahuja AT. Severe acute respiratory syndrome: avoiding the spread of infection in a radiology department. *Am J Roentgenol* 2003 July; 181(1): 25-8.

Fang D. SARS: facts and considerations for the orthopaedic community. *J Orthop Surg (Hong Kong)* 2003 Jun; 11(1): 3-5. [Editorial]

Chan-Yeung M. Severe acute respiratory syndrome: a lesson in infectious disease. *Int J Tuberc Lung Dis* 2003 May; 7(5): 407-8. [Editorial]

Ho W. SARS: reflections on the public hospital system. *Hong Kong Medical Diary* 2003 May; 8(3).

Owens D. SARS: The view from the community. *The Hong Kong Practitioner* 2003 May; 25(5): 201-2. [Editorial]

Owens D. SARS: Impressions from the early days of an epidemic. *The Hong Kong Practitioner* 2003 Apr; 25(4): 153-4. [Editorial]

Appendix VI

Phased Action in Clinical & Data Management for SARS

<u>Phases</u>	Preparatory 11/2 – 9/3	Early 10/3 – 23/3	Peak 24/3 – 6/4	Plateau 7/4 – 21/4	Resolution 21/4 – 4/5	Normalizing 5/5 -	
Event	Guangdong News on Severe Pneumonia	PWH outbreak SARS defined	Amoy outbreak Virus identified	ICU overload Community panic	Increasing Deaths Target "0" infection	Nosocomial Infection in the Elderly	
Data	<u>Action</u>	SCAP WG	Identification, Reporting, Control Centre	Cluster Coordinators	eSARS implemented	Staff Infection Review	HASCOC launched
	<u>Planning</u>	Surveillance	Corporate Registry	Workload & Bed utilization projection	Epidemiological Models	Clinical Database	Expansion of Database
Clinical	<u>Action</u>	Empirical Treatment	Case Definition	Virological Tests	Exploratory Treatment	Review of Treatment	Review of Elderly cases
	<u>Planning</u>	Infection Control Measures	Route of Infection	Treatment Guideline	Introduce TCM	Review of Virological tests	Rehabilitation Programs

Clinical Diagnosis and Treatment of SARS

Clinical Management of SARS through 6 phases

Preparatory phase (11 Feb – 9 Mar)

- 11 Feb 1st Working Group(WG) meeting on severe Community Acquired Pneumonia (CAP) convened – experience sharing on recent cases of severe atypical pneumonia
- 12 Feb Case report form to collect data on severe CAP finalized and sent to hospitals
- 17 Feb 2nd WG meeting on severe CAP – review of severe CAP in past season planned
- 18 Feb First email discussions on the use of Ribavirin
- 19 Feb 3rd WG meeting on severe CAP – cases of severe CAP of 2001-02 and 2002-3 winter compared with no evidence of recent surge of cases
- 21 Feb First FAQ on severe CAP with case definition released
- 8 Mar WG discussions on infection control measures for high-risk procedures

Early phase (10 Mar – 23 Mar)

- 10 Mar Outbreak of SARS among HCWs at PWH
- 19 Mar Guidelines on SARS posted on HA intranet. Guidelines for general practitioners published.

Peak phase (24 Mar – 6 Apr)

- 27 Mar A new coronavirus was identified as the leading cause of SARS. Revised guidelines on SARS posted on HA intranet
- 1 Apr Expert Panel meeting – review of treatment experience in PYNEH, PWH and PMH to revise treatment guidelines. Meeting of surgeons on staff deployment in Surgery for SARS – surgeons were ready to help in management of SARS.
- 2 Apr Experience sharing session among respiratory physicians to agree on revised treatment guidelines
- 3 Apr Revised guidelines on SARS posted on HA intranet and internet. Meeting on Obstetrics and Neonatal guidelines on SARS

Plateau phase (7 Apr – 20 Apr)

- 7 Apr Expert Panel meeting – review of facility, equipment, protection of staff, infectivity, treatment and operational issues. Convalescence Patient Plasma (CPP) group meeting decided on indications, logistics, safety, efficacy and evaluation of the use of CPP.
- 10 Apr Chinese medicine advisory group meeting – possibility of preventing and treating SARS with CM explored
- 13 Apr Meeting with Secretary for Health, Welfare and Food on definition and treatment with refinement of data entry to eSARS registry and discharge criteria
- 14 Apr 1st meeting of Advisory Group on Facilities, Equipment and PPE
- 15 Apr 1st meeting of the Laboratory Diagnostic Group - sharing session to discuss funding, distribution of work and the need to collect data on coronavirus infectivity during incubation period and convalescence. Based on preliminary results, guideline for sample collection was revised.
- 15 Apr CM Expert Panel meeting – 2 clinical protocols on the use of CM as prophylaxis for high risk frontline staff developed
- 17 Apr Immunology group meeting discussed alternative treatment using immuno-modulating agents, resulting in several study protocols
- 18 Apr Advisory Group for Treatment of SARS meeting – [REDACTED] shared with members the hypothesis of 3-phase disease of SARS and recommendations on treatment strategies. ICU group meeting discussed intensive treatment strategies and reviewed manpower.
- 22 Apr Research protocols for new treatment options finalized

Resolution phase (21 Apr – 4 May)

- 24 Apr 2nd meeting of the Laboratory Diagnostic Group - shared results and their interpretations, revised sample collection protocol and discussed laboratory safety measures. [REDACTED] demonstrated the ozone machine, followed by further test by QMH lab on virus killing (on-going).
- 25 Apr Advisory Group for Treatment of SARS meeting – presentations of preliminary treatment outcomes among various hospitals
- 28 Apr Meeting with geriatricians – strategies for prevention of hospital cross infection in elders of OAHs and possible outbreaks were discussed and detailed implementation plans were formulated
- 29 Apr 2nd meeting of Advisory Group on Facilities, Equipment and PPE. 1st meeting of the psychiatrists on risk management measures for prevention of SARS in psy. wards/hospitals.

- 30 Apr Meeting on management of Paediatric SARS – need of clinical database agreed and service organization for the management of paediatric SARS patients discussed. Meeting on management of Obstetrics SARS – need of clinical database agreed and guidelines planned.
- 3 May Meeting with Secretary for Health, Welfare and Food – shared PWH experience in the use of convalescence patient plasma, UCH experience on phases of treatment and review on treatment among elderly patients. A central clinical database managed by HAHO was endorsed.
- 5 May [REDACTED] of the Chinese Medicine Hospital of Guangdong Province arrived HK to help treat SARS patients. COC(Psy) demonstration session on infra-red imaging/screening systems for patients/staff/visitors to psy. wards.
- 6 May Meeting of geriatricians with CE – SARS in the elderly people

Normalizing phase (5 May – present)

- 9 May 1st HA SARS Collaborative Committee meeting – collective experience on alternative treatment modalities were discussed. The modus operandi was presented.
- 10 May Prototype by City University of Hong Kong – [REDACTED] used bleach water and heat to disinfect contaminated air
- 14 May CGAT/VMO collaboration in Old Aged Homes – detailed logistics and arrangement discussed
- 15 May 1st meeting on Pulmonary & Psychological Rehabilitation Programs for SARS patients. 2nd meeting of the psychiatrists on risk management measures for prevention of SARS in psy. wards/hospitals.
- 16 May 2nd HA SARS Collaborative Committee meeting – interim analysis of data from HA SARS Clinical Database was discussed. Results from high dose methylprednisolone treatment from QMH and QEH, convalescence plasma treatment from PWH, radiological scoring, ICU coding were presented. Study on admission decision by Accident & Emergency Department was endorsed. Pulmonary and psychological rehabilitation program was endorsed.
- 20 May 3rd meeting of the Laboratory Diagnostic Group – evaluation of IgG antibody test kit from China via Innovation & Technology Commission. Sensitivity too low for acceptance.
- 21 May 1st meeting of Immunopathology Advisory Group – clinical correlation of post-mortem findings
- 23 May 3rd meeting of HA SARS Collaborative Committee – laboratory results analysis from central clinical database discussed, results of retrospective analysis on use of Kaletra presented, ICU Collaborative

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- Database and study protocol to prevent pulmonary fibrosis endorsed and update on alternative treatment modalities shown
- 27 May 2nd meeting of Pulmonary & Psychological Rehabilitation Program for SARS patients
- 28 May 2nd meeting of Immunopathology Advisory Group – proposed strategies for treatment of pulmonary fibrosis
- 29 May COC(Psy) meeting – study on SARS related psychosis
- 30 May Hong Kong College of Physicians / HA - SARS Clinical Assessment Group – Proposal on collaborative retrospective analysis regarding study on clinical features, diagnosis, prognostic factors and treatment outcome of atypical SARS cases in HK endorsed
- 2 June Meeting with [REDACTED], [REDACTED], [REDACTED] on Infection Control Research
- 6 June 4th meeting of HA SARS Collaborative Committee - analysis of data from HA SARS Clinical Database and laboratory results presented, proposals of study on Atypical presentation, study on MBL as an antiviral agent and SARS patients with residual lung damage discussed, study on Pregnancy and Perinatal Outcomes of Women with SARS in Hong Kong and post mortem findings on the impact of the diseases on the lungs presented, Case-control study on the "Incremental" effect of Pentaglobin / IVIG presented.
- 13 June } WHO SARS Workshop on Clinical Management
14 June }

Appendix VIII

Progress Report on the Chinese medicine/Western medicine collaboration in the treatment of Severe Acute Respiratory Syndrome (SARS)

Early Phase (10 - 23 March 2003)

1. The finalization of the Hospital Authority Guidelines on Western Medicine/Chinese Medicine Interface Issues was expedited in the early phase of the SARS epidemic with the possibility that the use of CM for SARS might be necessary.

Peak Phase (24 March – 6 April 2003)

2. The Knowledge Management Unit of HAHO commenced a data search by electronic means to ascertain evidence-based literature available worldwide on the treatment of SARS by Chinese/alternative medicines.

Plateau Phase (7 – 20 April 2003)

3. In the plateau phase of the development of the SARS epidemic, new treatment options including Chinese medicine was being considered. A Chinese medicine advisory meeting, with participants from the CM experts from the 3 local tertiary institutions with CM faculties (CU, HKU and BU) was held on 10 April to explore the possibility of treating SARS with Chinese medicine. The meeting concluded that the use of Chinese medicine as prophylaxis was feasible. The issue was further followed up by a newly-established Chinese Medicine Expert Panel, which included CM experts, WM practitioners with good understanding of CM principles and clinical research methodology and other health care professionals, in its meeting on 15 April 2003. Two clinical protocols on the use of Chinese Medicine as prophylaxis for high risk frontline staff were developed, one by the Chinese University of Hong Kong and the other by the Kwong Wah Hospital. As at 12 June 2003, prophylactic CM have been distributed to a total of 5,950 frontline health care workers (3,160 by CUHK and 2,790 by KWH) from 16 HA hospitals including AHNH, CMC, FYKH, KH, KWH, NDH, PMH, PWH, QEH, SH, TMH, TPH, TWEH, UCH, WTSH & YCH.

4. In the meantime, the HA joined the delegation of the Hong Kong Government in a study visit to the Guangdong Province from 17 – 18 April 2003, where the onset of the SARS epidemic occurred a few months earlier, and where the treatment methods made use of a combination of western treatment regime and Chinese medicine. The WM/CM integrated treatment method appeared to have yielded effective outcome which even the World Health Organization complimented.

Resolution Phase (21 April – 4 May 2003)

5. The findings of the visits to Guangdong Province were reported to the Chinese Medicine Expert Panel at its meeting on 24 April 2003. With the assistance of the Ministry of Health, the Government of Guangdong Province, the Department of Health of Guangdong Province, the Chinese Medicine Hospital of Guangdong Province, the Government of the Hong Kong Special Administrative Region, the Hospital Authority (HA) successfully invited two Chinese medicine experts with experience in the treatment of SARS to Hong Kong for treating SARS patients.

6. [REDACTED] and [REDACTED] of the Guangdong Provincial Hospital of Traditional Chinese Medicine arrived on 3 May 2003 to assist in treating SARS

patients. The two experts have experience in using an integrated Western medicine/Chinese medicine (WM/CM) approach to treating SARS patients in Guangzhou, and they have also been involved in developing relevant clinical and research protocols using the model of WM/CM collaboration for SARS treatment.

7. The work of the two Chinese medicine (CM) experts is supported by the aforesaid Chinese Medicine Advisory/Expert Panel (EP). Arising from discussions in the EP, the following 2 clinical research protocols have been developed to facilitate the work organization of the two CM experts:

- (a) Use of CM for convalescing SARS patients
- (b) Use of CM in treating acute phase SARS patients

8. A mechanism of referral was also set up by HAHO which facilitated CM consultation upon requests of the patient and consent by the attending physician.

9. As at 12 June 2003, a total of 49 SARS patients have received consultations with the two CM experts, with the agreement of their attending doctor, and the patient/family of the patients concerned. In addition, as at the same date, a total of 45 convalescing patients at Wong Tai Sin Hospital have also sought CM consultations.

10. The HA has also invited the medical superintendent of the Chinese Medicine Hospital of Guangdong Province, [REDACTED] and two other experts from the same hospital to Hong Kong to review progress and to further exchange views on the clinical assessment and clinical protocols. The delegation visited Hong Kong on 14-15 May 2003.

11. The HA had initially planned to invite the two CM expert to stay for a period 4 weeks wef 3 May 2003. However, in view of the workload and the progress of the implementation of the clinical protocols, it is now estimated that assistance from the two CM experts will need to be extended for another two months.

SARS Clinical Management Workshop
13th to 14th June 2003
Rm 201, New Wing, Hong Kong Convention and Exhibition Centre
Programme

13th June 2003 (Friday) - Morning Session

Time	Programme	
8:00 – 9:00	Registration	

Opening Ceremony

Time	Programme	Speaker
9:00	Welcome and opening	[REDACTED] [REDACTED]

Session Title : Clinical Presentation and Progress of Disease

Chairman: [REDACTED]

Rapporteur: [REDACTED]

Time	Programme	Speaker
9:20 – 10:20	Presentations (Maximum of 10 minutes per presentation) Experience from Hong Kong <ul style="list-style-type: none"> • Typical presentations & diagnostic index • Atypical presentation & extra-pulmonary presentation • Prognostic indicators • Pregnancy cases • Neonatal & paediatric cases • Geriatric cases 	[REDACTED] [REDACTED] [REDACTED] [REDACTED] [REDACTED] [REDACTED]
10:20 – 11:00	Discussion	All delegates
11:00 – 11:15	Coffee break	
11:15 – 12:15	Presentations (Maximum of 10 minutes per presentation) Clinical presentation and progress of disease – experience from other SARS affected areas	Country delegates
12:15 – 13:00	Comments from other countries with SARS experience Discussion	Country delegates All delegates
13:00 – 14:00	Lunch	

13th June 2003 (Friday) - Afternoon Session**Session Title: Treatment modalities**

Chairman: [REDACTED]

Rapporteur: [REDACTED]

Time	Programme	Speaker
14:00 – 14:50	Presentations (Maximum of 10 minutes per presentation) <u>Experience from Hong Kong</u> <ul style="list-style-type: none"> • Treatment - antiviral therapy • Treatment - Kaletra • Treatment - immunosuppressive & immunomodulating agents • Treatment – Intensive Care • Treatment perspective – retrospective analysis 	[REDACTED] [REDACTED] [REDACTED] [REDACTED] [REDACTED]
14:50 – 15:15	Discussion	All delegates
15:15 – 15:35	Presentations (Maximum of 10 minutes per presentation) <u>Experience from Hong Kong</u> <ul style="list-style-type: none"> • Pulmonary Complications • Radiological indicators 	[REDACTED] [REDACTED]
13:35 – 15:45	Discussion	All delegates
15:45 – 16:00	Coffee break	
16:00 – 17:00	Presentations (Maximum of 10 minutes per presentation) Treatment modalities – experience from other SARS affected areas	
17:00 – 17:50	<u>Comments from other countries with SARS experience</u> Discussion	Country delegates All delegates

14th June 2003 (Saturday) - Morning Session**Session Title: Nosocomial Infection and Infection Control**

Chairman: [REDACTED]

Rapporteur: [REDACTED]

Time	Programme	Speaker
9:00 – 9:50	Presentation (Maximum of 10 minutes per presentation) <u>Experience from Hong Kong</u> <ul style="list-style-type: none"> • Routes of transmission • Infection of healthcare worker • Nosocomial infection • High risk procedures • Viral factors in infection control 	[REDACTED] [REDACTED] [REDACTED] [REDACTED] [REDACTED]
9:50 – 10:30	Discussion	All delegates
10:30 – 10:45	Coffee break	

Time	Programme	Speaker
10:45 – 11:45	Presentations (<i>Maximum of 10 minutes per presentation</i>) Nosocomial infection and infection control – experience from other SARS affected areas	Country delegates
11:45 – 12:45	Comments from other countries with SARS experience Discussion	Country delegates All delegates
12:45 – 14:00	Lunch	

14th June 2003 (Saturday) – Afternoon Session

Session Title: Formulation of Consensus

Chairman: [REDACTED]

Rapporteur: [REDACTED]

Time	Programme
14:00 – 14:40	Clinical Presentation and Progress of Disease
14:40 – 15:20	Treatment Modalities
15:20 - 16:00	Nosocomial Infection and Infection Control
16:00 – 16:20	Coffee break
16:20 – 17:00	Endorsement of Consensus Document